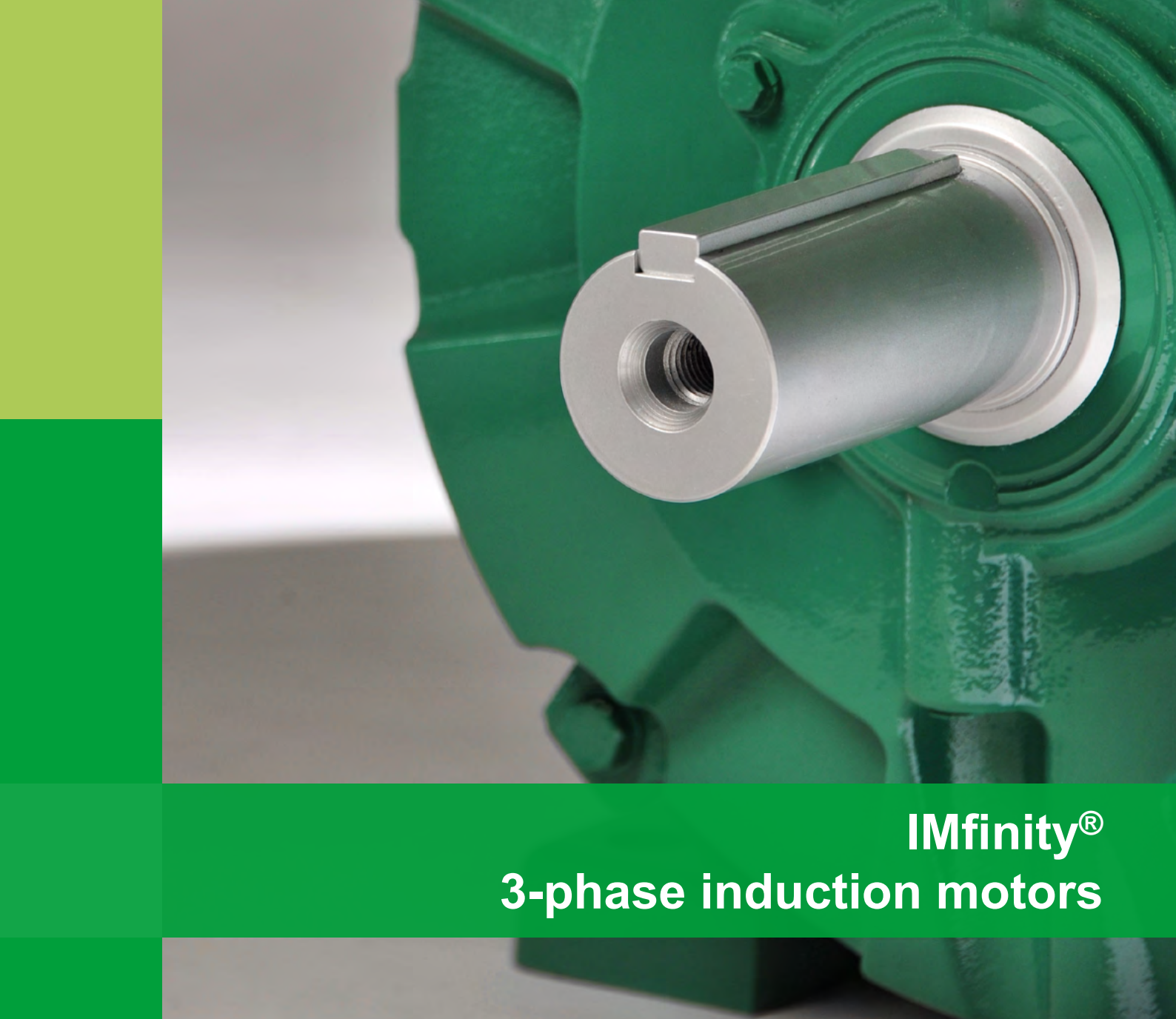




# IMfinity® 3-phase induction motors

**IE2 High efficiency & IE3 Premium efficiency and  
IE4 Super Premium efficiency motors**

Non IE for current or special use

**Variable speed and fixed speed**

Frame size 56 to 450

Power rating 0.09 to 1250 kW

**LEROY-SOMER™**

***Nidec***  
— All for dreams

This catalogue presents the induction motors of the IMfinity® generation, in all their efficiency classes and construction shapes.

IMfinity® motors are designed to reach a very high efficiency, whether supplied directly through mains or controlled by a speed drive.

Premium efficiency IMfinity® aluminium frame motors are designed to comply with European and US energy regulations.

Many other countries in the world impose minimum efficiency levels for electric motors.

Refer to the information presented at the end of the catalogue.



**All 2-, 4- et 6-pole motors, from 0.75 to 375 kW, covered by the European directive ErP and marketed in the European Union must be IE2 class from 2011/06/16, then IE3 or IE2 and used with a speed drive:**

- from 2015/01/01 for power ratings from 7.5 to 375 kW**
- from 2017/01/01 for power ratings from 0.75 to 375 kW**

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## General information Introduction

In this catalogue, Leroy-Somer describes the IMfinity® new generation induction motors.

These motors have been designed to incorporate the latest European

standards, and can satisfy most of industry's demands.

They are par excellence the leading products in the Leroy-Somer range.

Other motors, ranging in power

from **0.045 to 2200 kW** and special construction types, are included in the Leroy-Somer motor programme.

### IP55 ALUMINIUM MOTORS



#### NON IE EFFICIENCY

IP 55 ALUMINIUM ON MAINS\*

#### HIGH EFFICIENCY

**IE2** IP55 ALUMINIUM ON MAINS\*

**IE2** IP55 ALUMINIUM ON DRIVE

#### PREMIUM EFFICIENCY

**IE3** IP55 ALUMINIUM ON MAINS

**IE3** IP55 ALUMINIUM ON DRIVE

### IP55 CAST IRON MOTORS



#### HIGH EFFICIENCY

**IE2** IP 55 CAST IRON ON MAINS\*

**IE2** CAST IRON ON DRIVE

#### PREMIUM EFFICIENCY

**IE3** IP55 CAST IRON ON MAINS

**IE3** CAST IRON ON DRIVE

#### SUPER PREMIUM EFFICIENCY

**IE4** IP55 CAST IRON ON MAINS

**IE4** CAST IRON ON DRIVE

### IP23 DRIP-PROOF MOTORS



#### HIGH EFFICIENCY

**IE2** IP23 PROTECTED ON MAINS\*

**IE2** IP23 PROTECTED ON DRIVE

#### PREMIUM EFFICIENCY

**IE3** IP23 PROTECTED ON MAINS

**IE3** IP23 PROTECTED ON DRIVE

For more information, see the "Directives and standards relating to motor efficiency" section.

\* Use outside the European Union

## General

## General information

## Quality commitment

Leroy-Somer's quality management system is based on:

- Control of procedures right from the initial sales offering until delivery to the customer, including design, manufacturing start-up and production
- A total quality policy based on making continuous progress in improving operational procedures, involving all departments in the company in order to give customer satisfaction as regards delivery times, conformity and cost
- Indicators used to monitor procedure performance
- Corrective actions and advancements with tools such as FMECA, QFD, MAVP, MSP/MSQ and Hoshin type improvement workshops on flows,

process re-engineering, plus Lean Manufacturing and Lean Office

- Annual surveys, opinion polls and regular visits to customers in order to ascertain and detect their expectations.

Personnel are trained and take part in analyses and actions for continuous improvement of our procedures.

- The motors in this catalogue have been specially designed to measure the impact of their life cycle on the environment. This eco-design approach has resulted in the creation of a "Product Environmental Profile" (references 4592/4950/4951).



Leroy-Somer has entrusted the certification of its expertise to various international organisations.

Certification is granted by independent professional auditors, and recognises the high standards of the **company's quality assurance procedures**. All activities resulting in the final version of the machine have therefore received official certification **ISO 9001: 2008 from the DNV**. Similarly, our environmental approach has enabled us to obtain certification ISO 14001: 2004.

Products for particular applications or those designed to operate in specific environments are also approved or certified by the following organisations: LCIE, DNV, INERIS, EFECTIS, UL, BSRIA, TUV, GOST, which check their technical performance against the various standards or recommendations.



# ISO 9001 : 2008



There have been a number of changes to the standards and new standards created in recent years. They mainly concern motor efficiency and their scope includes measurement methods and motor classification.

Regulations are gradually being implemented, both nationally and internationally, in many countries in order to promote the use of high-efficiency motors (Europe, USA, Canada, Brazil, Australia, New Zealand, Korea, China, Israel, etc).

The new generation of Premium efficiency three-phase induction motors responds to changes in the standards as well as the latest demands of system integrators and users.

### STANDARD IEC 60034-30-1 (January 2014)

It defines the principle to be adopted and brings global harmonisation to energy efficiency classes for electric motors throughout the world.

#### Motors concerned

Single-speed, single-phase and three-phase cage induction or permanent magnet motors, on a sinusoidal mains supply.

Sphere of application:

- $U_N$  from 50 to 1000 V
- $P_N$  from 0.12 to 1000 kW
- 2, 4, 6 and 8 poles
- Continuous duty at rated power without exceeding the specified insulation class. Generally known as S1 duty.
- 50 and 60 Hz frequency
- On the mains
- Marked for an ambient temperature between -20°C and +60°C
- Marked for an altitude up to 4000 m

#### Motors not concerned

- Motors with frequency inverter when the motor cannot be tested without one.
- Brake motors when the brake forms an integral part of the motor and can neither be removed nor supplied by a separate source when being tested.
- Motors which are fully integrated in a machine and cannot be tested separately (such as rotor/stator).

### STANDARD FOR MEASURING THE EFFICIENCY OF ELECTRIC MOTORS: IEC 60034-2-1 (September 2007)

It concerns asynchronous induction motors:

- Single-phase and three-phase with power ratings of 1 kW or less. The preferred method is the D.O.L. method.
- Three-phase motors with power ratings above 1 kW. The preferred method is the summation of losses method with the total of additional losses measured.

#### Notes:

- The standard for efficiency measurement is very similar to the IEEE 112-B method used in North America.
- Since the measurement method is different, this means that for the same motor, the rated value will be different (usually lower) with IEC 60034-2-1 than with IEC 60034-2.

*Example of a 22 kW 4P LSES motor:*

- according to IEC 60034-2, the efficiency is 92.6%
- according to IEC 60034-2-1, the efficiency is 92.3%

### DIRECTIVE 2009/125/CE (21 October 2009)

It establishes a framework for setting the eco-design requirements to be applied to "energy-using products". These products are grouped in lots. Motors come under lot 11 of the eco-design programme, as do pumps, fans and circulating pumps.

### DECREE IMPLEMENTING EUROPEAN DIRECTIVE ErP (Energy Related Product) EC/640/2009 - LOT 11 (July 2009) + UE/4/2014 (January 2014)

This is based on standard IEC 60034-30-1 and will define the efficiency classes whose use will be mandatory in the future. It specifies the efficiency levels to be attained for machines sold in the European market and outlines the timetable for their implementation.

| Efficiency classes | Efficiency level |
|--------------------|------------------|
| IE1                | Standard         |
| IE2                | High             |
| IE3                | Premium          |
| IE4                | Super Premium    |

This standard only defines efficiency classes and their conditions. It is then up to each country to define the efficiency classes and the exact scope of application.

### EUROPEAN DIRECTIVE ErP

**Motors concerned:** 3-phase motors from 0.75 to 375 kW with 2, 4 and 6 poles.

Obligation to place High efficiency or Premium efficiency motors on the market:

- IE2 class from 16 June 2011
- Class IE3\* from 1st January 2015 for power ratings from 7.5 to 375 kW
- Class IE3\* from 1st January 2017 for power ratings from 0.75 to 375 kW

The European Commission is currently working to define minimum efficiency values for drives.

\* or IE2 motor + drive

#### Motors not concerned:

- Motors designed to operate when fully submerged in liquid
- Motors which are fully integrated in another product (rotor/stator)
- Motors with duty other than continuous duty
- Motors designed to operate in the following conditions:
  - altitude > 4000 m
  - ambient air temperature > 60°C
  - maximum operating temperature > 400°C
  - ambient air temperature < -30°C or < 0°C for water-cooled motors
  - safety motors conforming to directive ATEX 94/9/EC
  - brake motors
  - onboard motors

Motors comply with the standards  
quoted in this catalogue

## LIST OF STANDARDS QUOTED IN THIS DOCUMENT

| Reference                 |             | International standards                                                                                                                                                                     |
|---------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IEC 60034-1               | EN 60034-1  | Electrical rotating machines: ratings and operating characteristics                                                                                                                         |
| IEC 60034-2               |             | Electrical rotating machines: methods for determining losses and efficiency from tests (additional losses added as a fixed percentage)                                                      |
| IEC 60034-2-1             |             | Electrical rotating machines: methods for determining losses and efficiency from tests (measured additional losses)                                                                         |
| IEC 60034-5               | EN 60034-5  | Electrical rotating machines: classification of degrees of protection provided by casings of rotating machines                                                                              |
| IEC 60034-6               | EN 60034-6  | Electrical rotating machines (except traction): cooling methods                                                                                                                             |
| IEC 60034-7               | EN 60034-7  | Electrical rotating machines (except traction): symbols for mounting positions and assembly layouts                                                                                         |
| IEC 60034-8               |             | Electrical rotating machines: terminal markings and direction of rotation                                                                                                                   |
| IEC 60034-9               | EN 60034-9  | Electrical rotating machines: noise limits                                                                                                                                                  |
| IEC 60034-12              | EN 60034-12 | Starting performance of single-speed three-phase cage induction motors for supply voltages up to and including 660 V.                                                                       |
| IEC 60034-14              | EN 60034-14 | Electrical rotating machines: mechanical vibration of certain machines with shaft heights 56 mm and higher. Measurement, evaluation and limits of vibrational intensity                     |
| IEC 60034-17              |             | Cage induction motors when fed from converters - Application guide                                                                                                                          |
| IEC 60034-30-1            |             | Electrical rotating machines: efficiency classes for single-speed three-phase cage induction motors (IE code)                                                                               |
| IEC 60038                 |             | IEC standard voltages                                                                                                                                                                       |
| IEC 60072-1               |             | Dimensions and power series for electrical rotating machines: designation of casings between 56 and 400 and flanges between 55 and 1080                                                     |
| IEC 60085                 |             | Evaluation and thermal classification of electrical insulation                                                                                                                              |
| IEC 60721-2-1             |             | Classification of natural environment conditions. Temperature and humidity                                                                                                                  |
| IEC 60892                 |             | Effects of an imbalance in the voltage system on the characteristics of three-phase squirrel-cage induction motors                                                                          |
| IEC 61000-2-10/11 and 2-2 |             | Electromagnetic compatibility (EMC): environment                                                                                                                                            |
| IEC guide 106             |             | Guidelines on the specification of environmental conditions for the determination of operating characteristics of equipment                                                                 |
| ISO 281                   |             | Bearings - Basic dynamic loadings and nominal bearing life                                                                                                                                  |
| ISO 1680                  | EN 21680    | Acoustics - Test code for measuring airborne noise emitted by electrical rotating machines: a method for establishing an expert opinion for free field conditions over a reflective surface |
| ISO 8821                  |             | Mechanical vibration - Balancing. Conventions on shaft keys and related parts                                                                                                               |
|                           | EN 50102    | Degree of protection provided by electrical housings against extreme mechanical impacts                                                                                                     |
| ISO 12944-2               |             | Corrosion protection.                                                                                                                                                                       |



### MAIN PRODUCT MARKINGS WORLDWIDE

There are lots of special markings throughout the world. They mainly concern product conformance with current user safety standards in different countries. Some markings or labels only concern energy regulations. The same country can therefore have two markings: one for safety and one for energy.



This marking is mandatory throughout the European Economic Community. It means that the product conforms to all the relevant directives. If the product does not conform to a relevant directive, it cannot be CE rated and cannot therefore bear the **CE** mark.



In **Canada and the United States**: The **CSA** mark accompanied by the letters C and US means that the product is approved for the US and Canadian markets, in accordance with the relevant American and Canadian standards. If a product has characteristics applicable to more than one type of product (eg: electrical equipment incorporating fuel combustion), the mark indicates conformance with all the relevant standards.



This marking only applies to finished products such as complete machines. A motor is just a component and is not therefore affected by this marking.

**Note:** c CSA us and c UL us mean the same thing but one is delivered by the CSA and the other by the UL.



The **c UL us** mark, which is optional, indicates conformance with Canadian requirements and those of the United States. UL encourages manufacturers distributing products bearing the UL Recognized Component Mark for both countries to use this combined mark.

For Canada at least c UR us or c CSA us is required. Both are also possible.

Components covered by the UL "Recognized Component Mark" programme are designed to be installed in another device, system or final product. They should be installed in the factory, not in the field and it is possible that their performance capability will be restricted and will limit their use. When a complete product or system containing UL Recognized components is assessed, the final product assessment process can be rationalised.



**Canada:** energy efficiency conformance logo (optional).



**USA:** energy efficiency conformance logo (optional).



**USA and Canada:** EISA conformance logo (optional).



This marking is mandatory for the Chinese market. It indicates that the product conforms to the regulations currently in force (safety of users). Concerned electric motors are rated  $\leq 1.1$  kW.



The EAC mark replaces the GOST mark. It is the equivalent of the CE mark for the European Union market. This new mark covers regulations for Russia, Kazakhstan and Belarus. All products marketed in these three countries must bear this marking.

Other markings concern specific applications, such as ATEX for example.



**APPROVALS FOR LEROY-SOMER MOTORS (versions derived from standard CONSTRUCTION)**

| Country | Initials       | Certification No.              | Application                                                                                        |
|---------|----------------|--------------------------------|----------------------------------------------------------------------------------------------------|
| CANADA  | CSA            | LR 57 008<br>166,631           | Standard adapted range (see section "Supply voltage")<br>Complete motors                           |
| USA     | UL or EUL      | E 68554<br>SA 6704<br>E 206450 | Impregnation systems<br>Stator/rotor assemblies for sealed units<br>Complete motors up to 132 size |
| FRANCE  | LCIE<br>INERIS | Various nos.                   | Sealing, shocks, safety                                                                            |

For approved special products, see the relevant documents.

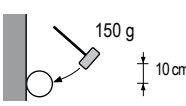
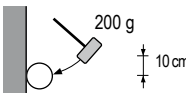
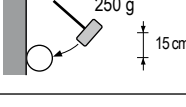
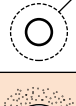
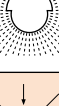
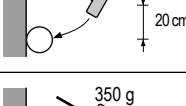
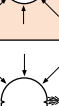
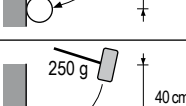
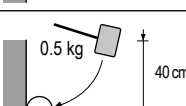
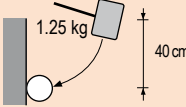
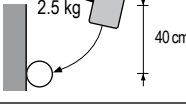
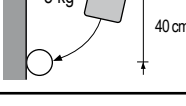
**INTERNATIONAL AND NATIONAL STANDARD EQUIVALENTS**

| International reference standards |                                                                                                                | National standards                       |                                                                              |                |             |                 |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------|------------------------------------------|------------------------------------------------------------------------------|----------------|-------------|-----------------|
| IEC                               | Title (summary)                                                                                                | FRANCE                                   | GERMANY                                                                      | U.K.           | ITALY       | SWITZERLAND     |
| 60034-1                           | Ratings and operating characteristics                                                                          | NFEN 60034-1<br>NFC 51-120<br>NFC 51-200 | DIN/VDE 0530                                                                 | BS 4999        | CEI 2.3.VI. | SEV ASE 3009    |
| 60034-5                           | Classification of degrees of protection                                                                        | NFEN 60034-5                             | DIN/EN 60034-5                                                               | BS EN 60034-5  | UNEL B 1781 |                 |
| 60034-6                           | Cooling methods                                                                                                | NFEN 60034-6                             | DIN/EN 60034-6                                                               | BS EN 60034-6  |             |                 |
| 60034-7                           | Mounting arrangements and assembly layouts                                                                     | NFEN 60034-7                             | DIN/EN 60034-7                                                               | BS EN 60034-7  |             |                 |
| 60034-8                           | Terminal markings and direction of rotation                                                                    | NFC 51 118                               | DIN/VDE 0530<br>Teil 8                                                       | BS 4999-108    |             |                 |
| 60034-9                           | Noise limits                                                                                                   | NFEN 60034-9                             | DIN/EN 60034-9                                                               | BS EN 60034-9  |             |                 |
| 60034-12                          | Starting characteristics for single-speed motors for supply voltages ≤ 660 V                                   | NFEN 60034-12                            | DIN/EN 60034-12                                                              | BS EN 60034-12 |             | SEV ASE 3009-12 |
| 60034-14                          | Mechanical vibrations of machines with frame size ≥ 56 mm                                                      | NFEN 60034-14                            | DIN/EN 60034-14                                                              | BS EN 60034-14 |             |                 |
| 60072-1                           | Dimensions and output powers for machines of between 56 and 400 frame size and flanges of between 55 and 1080. | NFC 51 104<br>NFC 51 105                 | DIN 748 (~)<br>DIN 42672<br>DIN 42673<br>DIN 42631<br>DIN 42676<br>DIN 42677 | BS 4999        |             |                 |
| 60085                             | Evaluation and thermal classification of electrical insulation                                                 | NFC 26206                                | DIN/EN 60085                                                                 | BS 2757        |             | SEV ASE 3584    |

Note: DIN 748 tolerances do not conform to IEC 60072-1.

## INDEXES OF PROTECTION OF ELECTRICAL EQUIPMENT ENCLOSURES

In accordance with IEC 60034-5 - EN 60034-5 (IP) - IEC 62262 (IK)

| 1 <sup>st</sup> digit:<br>protection against solid materials                                                                |                                                                                     |                                                                                           | 2 <sup>nd</sup> digit<br>protection against liquids |                                                                                     |                                                                      | 3 <sup>rd</sup> digit<br>mechanical protection |                                                                                       |                       |
|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------|------------------------------------------------|---------------------------------------------------------------------------------------|-----------------------|
| IP                                                                                                                          | Tests                                                                               | Definition                                                                                | IP                                                  | Tests                                                                               | Definition                                                           | IK                                             | Tests                                                                                 | Definition            |
| 0                                                                                                                           |                                                                                     | No protection                                                                             | 0                                                   |                                                                                     | No protection                                                        | 00                                             |                                                                                       | No protection         |
| 1                                                                                                                           |    | Protected against solid objects larger than 50 mm (e.g. accidental contact with the hand) | 1                                                   |    | Protected against water drops falling vertically (condensation)      | 01                                             |    | Impact energy: 0.15 J |
| 2                                                                                                                           |    | Protected against solid objects larger than 12 mm (e.g. a finger)                         | 2                                                   |    | Protected against water drops falling at up to 15° from the vertical | 02                                             |    | Impact energy: 0.20 J |
| 3                                                                                                                           |    | Protected against solid objects larger than 2.5 mm (e.g. tools, wires)                    | 3                                                   |    | Protected against rain falling at up to 60° from the vertical        | 03                                             |    | Impact energy: 0.37 J |
| 4                                                                                                                           |   | Protected against solid objects larger than 1 mm (e.g. thin tools, small wires)           | 4                                                   |   | Protected against projected water from all directions                | 04                                             |   | Impact energy: 0.50 J |
| 5                                                                                                                           |  | Protected against dust (no deposits of harmful material)                                  | 5                                                   |  | Protected against jets of water from all directions from a hose      | 05                                             |  | Impact energy: 0.70 J |
| 6                                                                                                                           |  | Protected against any dust penetration                                                    | 6                                                   |  | Protected against projected water comparable to big waves            | 06                                             |  | Impact energy: 1 J    |
| Example:<br> Example of an IP 55 machine |                                                                                     |                                                                                           | 7                                                   |  | Protected against the effects of immersion between 0.15 and 1 m      | 07                                             |  | Impact energy: 2 J    |
|                                                                                                                             |                                                                                     |                                                                                           | 8                                                   |  | Protected against prolonged effects of immersion under pressure      | 08                                             |  | Impact energy: 5 J    |
|                                                                                                                             |                                                                                     |                                                                                           |                                                     |                                                                                     |                                                                      | 09                                             |  | Impact energy: 10 J   |
|                                                                                                                             |                                                                                     |                                                                                           |                                                     |                                                                                     |                                                                      | 10                                             |  | Impact energy: 20 J   |

IP : Index of Protection

5. : Machine protected against dust and accidental contact.

Test result: no dust enters in harmful quantities, no risk of direct contact with rotating parts. The test will last for 2 hours.

.5 : Machine protected against jets of water from all directions from hoses at 3 m distance with a flow rate of 12.5 l/min at 0.3 bar.

The test will last for 3 minutes.

Test result: no damage from water projected onto the machine.

### NORMAL OPERATING CONDITIONS

ACCORDING TO IEC 60034-1, MOTORS CAN OPERATE IN THE FOLLOWING NORMAL CONDITIONS:

- ambient temperature within the range -16°C to +40°C
- altitude less than 1000 m
- atmospheric pressure: 1050 hPa (mbar) = (750 mm Hg)

### POWER CORRECTION FACTOR

For operating conditions outside these limits, apply the power correction coefficient shown in the chart on the right while maintaining the thermal reserve, as a function of the altitude and ambient temperature.

### NORMAL STORAGE CONDITIONS

Machines should be stored at an ambient temperature between -16°C and +80°C for aluminium motors, between -40°C and +80°C for cast iron motors, and at a relative humidity of less than 90%.

For restarting, see the commissioning manual.

### RELATIVE AND ABSOLUTE HUMIDITY

#### MEASURING THE HUMIDITY:

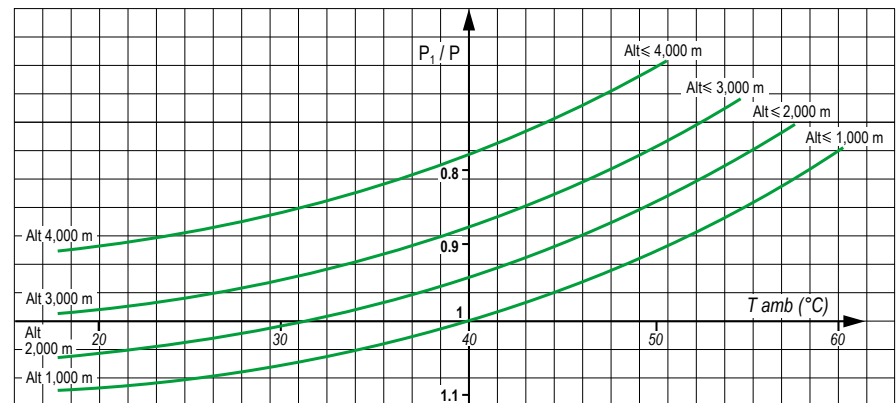
Humidity is usually measured by the “wet and dry bulb thermometer” method. Absolute humidity, calculated from the readings taken on the two thermometers, can be determined using the chart on the right. The chart also provides relative humidity figures.

To determine the humidity correctly, a good air flow is required for stable readings, and accurate readings must be taken on the thermometers.

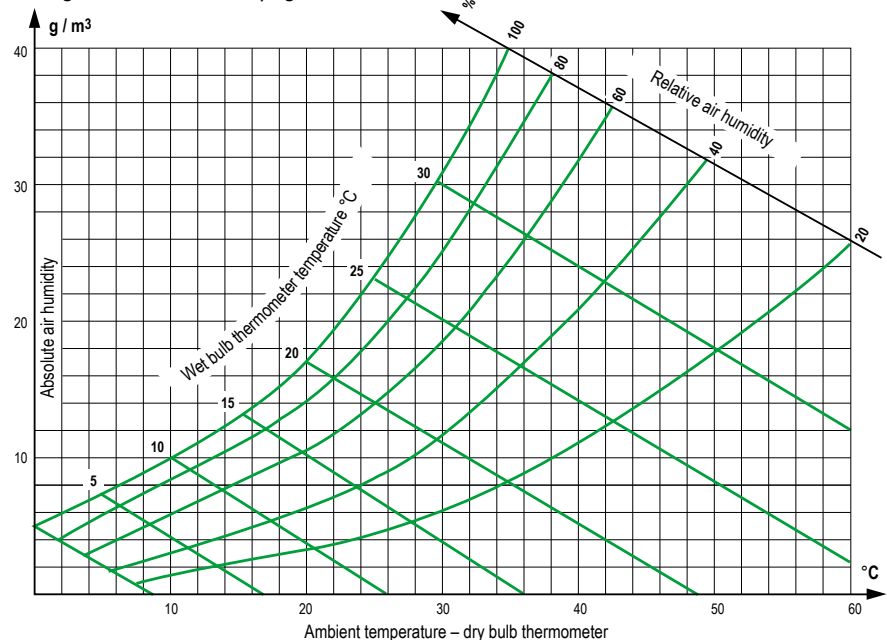
During the construction of aluminium motors, the materials of the various components which are in contact with one another are selected so as to minimise deterioration by galvanic effect. The voltages in the metal combinations used (cast iron-steel; cast iron-aluminium; steel-aluminium; steeltin) are too low to cause deterioration.

Correction coefficient table

NB: The output power can only be corrected upwards once the ability of the motor to start the load has been checked.



In temperate climates, relative humidity is generally between 50 and 70%. For the relationship between relative humidity and motor impregnation, especially where humidity and temperature are high, see table on next page.



### DRAIN HOLES

Holes are provided at the lowest points of the enclosure, depending on the operating position (IM etc) to drain off any moisture that may have accumulated inside during cooling of the machine.

The holes may be sealed in various ways:

- standard: with plastic plugs
- on request: with screws, siphon or plastic ventilator

Under certain special conditions, it is advisable to leave the drain holes permanently open (operation in environments with high levels of condensation). Opening the holes periodically should be part of the regular maintenance procedure.

### DRIP COVERS

For machines operating outdoors, with the drive shaft downwards, drip covers are recommended.

This is an option and should be specified on the order if required.

## NORMAL ATMOSPHERIC PRESSURE (750 MM HG)

The selection table below can be used to find the method of manufacture best suited to particular environments in which temperature and relative humidity show large degrees of variation (see relative and absolute humidity calculation method, on preceding page).

The symbols used refer to permutations of components, materials, impregnation methods and finishes (varnish or paint).

**The protection of the winding is generally described by the term “tropicalization”.**

*T*: Tropicalization

*TC*: Complete Tropicalization

For high humidity environments, we recommend that the windings are pre-heated (see next page).

## INFLUENCE OF ATMOSPHERIC PRESSURE

As atmospheric pressure decreases, air particles rarefy and the environment becomes increasingly conductive.

-  $P > 550$  mm Hg:

standard impregnation according to previous table - Possible derating or forced ventilation.

-  $P > 200$  mm Hg :

Coating of bearings - Flying leads up to a zone at  $P \sim 750$  mm Hg - Derating to take account of insufficient ventilation - Forced ventilation.

-  $P < 200$  mm Hg: Special manufacture based on specification.

In all cases, these problems should be resolved by a special contract worked out on the basis of a specification.

| Ambient temperature                           | Relative humidity | Influence on construction        |                              |
|-----------------------------------------------|-------------------|----------------------------------|------------------------------|
|                                               |                   | RH $\leq 95\%$                   | RH $> 95\%$ <sup>1</sup>     |
| $\theta < -40\text{ °C}$                      |                   | ask for estimate (quotation)     | ask for estimate (quotation) |
| $-16\text{ °C to }+50\text{ °C}$              |                   | T Standard                       | TC Standard                  |
| $-40\text{ °C to }+50\text{ °C}$ <sup>2</sup> |                   | T1                               | TC1                          |
| $-16\text{ °C to }+65\text{ °C}$ <sup>2</sup> |                   | T2                               | TC2                          |
| $+65\text{ °C to }+90\text{ °C}$ <sup>2</sup> |                   | T3                               | TC3                          |
| $\theta > +90\text{ °C}$                      |                   | ask for estimate (quotation)     | ask for estimate (quotation) |
| Plate mark                                    |                   | T                                | TC                           |
| Influence on construction                     |                   | Increased protection of windings |                              |

Increasing derating

1. Atmosphere without high levels of condensation

2. For motors with a frame size  $\geq 280$  mm and IP23 motors with frame size  $\geq 315$  mm: upon offer

Standard impregnation

## General Environment Heaters

### SPACE HEATERS

Severe climatic conditions, e.g.  $T_{amb} < -40^{\circ}\text{C}$ ,  $RH > 95\%$  etc, may require the use of space heaters (fitted to one or two winding end coils) which serve to maintain the average temperature of the motor, provide trouble-free starting, and/or eliminate problems caused by condensation (loss of insulation).

The heater supply wires are brought out to a terminal block in the motor terminal box.

The heaters must be switched off while the motor is running.

### D.C. SUPPLY INJECTION HEATING

An alternative to the use of space heaters is to inject direct current into two of the phases wired in series from a D.C. voltage source.

This is easily calculated: if  $R$  is the resistance of the windings in series, the D.C. voltage will be given by the equation (Ohm's law):

$$U_{(V)} = \sqrt{P_{(W)} \cdot R_{(\Omega)}}$$

Resistance should be measured with a micro-ohmmeter.

### A.C. INJECTION HEATING

A single-phase A.C. voltage (from 10 to 15% of rated voltage), can be used between 2 phases placed in series.

This method can be used on the whole motor range.

See the mechanical and electrical options pages for each motor family to find the space heater values.





Surface protection is defined in the ISO 12944 standard. This standard defines the planned lifetime of a paint system until the first major application of maintenance paint. Durability is not a guarantee.

The EN ISO 12944 standard comprises 8 sections. Part 2 covers the classification of the environments.

Leroy-Somer motors are protected with a range of surface finishes.

The surfaces receive appropriate special treatments, as shown below.

### PREPARATION OF SURFACES

| SURFACE         | PARTS                                             | TREATMENT                                                                                             |
|-----------------|---------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| Cast iron       | End shields                                       | Shot blasting + Primer                                                                                |
| Steel           | Accessories                                       | Phosphatization + Primer                                                                              |
|                 | Terminal boxes - Fan covers                       | Electrostatic painting or Epoxy powder                                                                |
| Aluminium alloy | Housings - Terminal boxes                         | Shot blasting                                                                                         |
| Polymer         | Fan covers- Terminal boxes<br>Ventilation grilles | None, but must be free from grease, casting-mould coatings and dust which would affect paint adhesion |

### CLASSIFICATION OF THE ENVIRONMENTS

Leroy-Somer paint systems according to the categories.

| ATMOSPHERIC CORROSIVE CATEGORIES | CORROSIVITY CATEGORY* AS PER ISO 12944-2 | Durability class | ISO 6270                    | ISO 9227           | Leroy-Somer system equivalent |
|----------------------------------|------------------------------------------|------------------|-----------------------------|--------------------|-------------------------------|
|                                  |                                          |                  | Water condensation nb hours | Salt mist nb hours |                               |
| AVERAGE                          | C3                                       | Limited          | 48                          | 120                | Ia                            |
|                                  |                                          | Medium           | 120                         | 240                | IIa                           |
|                                  |                                          | High             | 240                         | 480                | IIb                           |
| HIGH                             | C4                                       | Limited          | 120                         | 240                | -                             |
|                                  |                                          | Medium           | 240                         | 480                | IIIa                          |
|                                  |                                          | High             | 480                         | 720                | IIIb**                        |
| VERY HIGH (Industry)             | C5-I                                     | Limited          | 240                         | 480                | -                             |
|                                  |                                          | Medium           | 480                         | 720                | Ve**                          |
|                                  |                                          | High             | 720                         | 1440               | -                             |
| VERY HIGH (Marine)               | C5-M                                     | Limited          | 240                         | 480                | -                             |
|                                  |                                          | Medium           | 480                         | 720                | -                             |
|                                  |                                          | High             | 720                         | 1440               | 161b**                        |

Standard for LSES aluminium and PLSES steel motors

Standard for FLSES cast iron motors and PLSES > 315 MGU steel motors

\* Values given for information only since the substrates vary in nature whereas the standard only takes account of steel substrates.

\*\* Evaluation of the degree of rusting in accordance with ISO 4628 (rusted area between 1 and 0.5%).

Leroy-Somer standard paint colour reference:

**RAL 6000**

Paint brightness standard:  
satin

### **AIRBORNE INTERFERENCE EMISSION**

For standard motors, the housing acts as an electromagnetic screening, reducing electromagnetic emissions measured at 0.25 metres from the motor to approximately 5 gauss ( $5 \times 10^{-4}$  T).

However, electromagnetic emissions may be noticeably reduced by a special construction of aluminium alloy end shields and a stainless steel shaft.

### **IMMUNITY**

The construction of motor housings (especially finned aluminium alloy frames) isolates external electromagnetic sources to the extent that any field penetrating the casing and magnetic circuit will be too weak to interfere with the operation of the motor.

### **POWER SUPPLY INTERFERENCE**

The use of electronic systems for starting, variable speed control or power supply can create harmonics on the supply lines which may interfere with the operation of machines. These phenomena are taken into account in determining the machine dimensions, which act as quenching chokes in this respect.

The IEC 61000 standard, currently in preparation, will define permissible rejection and immunity rates: only then will machines for general distribution (especially single-phase motors and

commutator motors) have to be fitted with suppression systems.

Three-phase squirrel cage machines do not in themselves produce interference of this type. Mains connection equipment (contactors) may, however, need interference protection.

### **APPLICATION OF DIRECTIVE 2004/108/EC CONCERNING ELECTROMAGNETIC COMPATIBILITY (EMC)**

#### **a - for motors only**

According to amendment 1 of IEC 60034-1, induction motors are not transmitters and do not produce interference (via carried or airborne signals) and therefore conform inherently to the essential requirements of the EMC directives.

#### **b - for motors supplied by inverters (at fixed or variable frequency)**

In this case, the motor is only a sub-assembly of a device which the system builder must ensure conforms to the essential requirements of the EMC directives.

### **APPLICATION OF LOW VOLTAGE DIRECTIVE 2006/95/CE**

All motors are subject to this directive. The main requirements concern the protection of people, animals and property against risks caused by operation of the motors (see the commissioning and maintenance manual for precautions to be taken).

### **APPLICATION OF MACHINERY DIRECTIVE 2006/42/EC**

All motors are designed to be integrated in a device subject to the machinery directive.

### **CE PRODUCT MARKING**

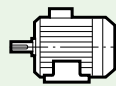
The fact that motors comply with the essential requirements of the Directives is shown by the **CE** mark on their nameplates and/or packaging and documentation.

## MOUNTINGS AND POSITIONS (IEC STANDARD 60034-7)

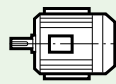
## Foot mounted motors

- all frame sizes

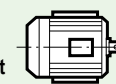
IM 1001 (IM B3)  
- Horizontal shaft  
- Feet on floor



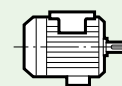
IM 1051 (IM B6)  
- Horizontal shaft  
- Wall mounted with feet on left  
when viewed from drive end



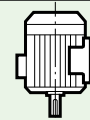
IM 1061 (IM B7)  
- Horizontal shaft  
- Wall mounted with feet on right  
when viewed from drive end



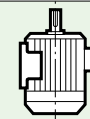
IM 1071 (IM B8)  
- Horizontal shaft  
- Feet on top



IM 1011 (IM V5)  
- Vertical shaft facing down  
- Feet on wall



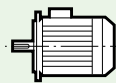
IM 1031 (IM V6)  
- Vertical shaft facing up  
- Feet on wall



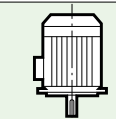
## (FF) flange mounted motors

- all frame sizes  
(except IM 3001, which is limited  
to frame size 225 mm)

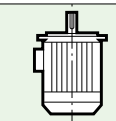
IM 3001 (IM B5)  
- Horizontal shaft



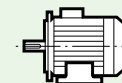
IM 3011 (IM V1)  
- Vertical shaft facing down



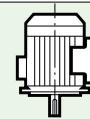
IM 3031 (IM V3)  
- Vertical shaft facing up



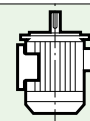
IM 2001 (IM B35)  
- Horizontal shaft  
- Feet on floor



IM 2011 (IM V15)  
- Vertical shaft facing down  
- Feet on wall



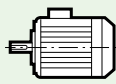
IM 2031 (IM V36)  
- Vertical shaft facing up  
- Feet on wall



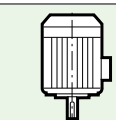
## (FT) face mounted motors

- all frame sizes ≤ 160 mm

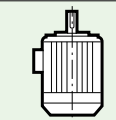
IM 3601 (IM B14)  
- Horizontal shaft



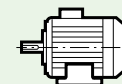
IM 3611 (IM V18)  
- Vertical shaft facing down



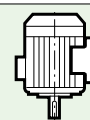
IM 3631 (IM V19)  
- Vertical shaft facing up



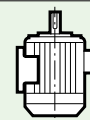
IM 2101 (IM B34)  
- Horizontal shaft  
- Feet on floor



IM 2111 (IM V58)  
- Vertical shaft facing down  
- Feet on wall



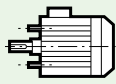
IM 2131 (IM V69)  
- Vertical shaft facing up  
- Feet on wall



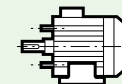
## Motors without drive end shield

Warning: The protection (IP) specified on  
the IM B9 and IM B15 motor nameplates  
is provided by the customer when the  
motor is assembled.

IM 9101 (IM B9)  
- Threaded tie rods  
- Horizontal shaft



IM 1201 (IM B15)  
- Foot mounted with  
threaded tie rods  
- Horizontal shaft



| Frame<br>size (mm) | Mounting positions |         |         |         |         |         |         |         |         |         |         |         |
|--------------------|--------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|                    | IM 1001            | IM 1051 | IM 1061 | IM 1071 | IM 1011 | IM 1031 | IM 3001 | IM 3011 | IM 3031 | IM 2001 | IM 2011 | IM 2031 |
| ≤ 200              | •                  | •       | •       | •       | •       | •       | •       | •       | •       | •       | •       | •       |
| 225 and 250        | •                  | •       | •       | •       | •       | •       | •       | •       | •       | •       | •       | •       |
| ≥ 280              | •                  | •       | •       | •       | •       | •       | •       | •       | •       | •       | •       | •       |

• : possible positions.

• : please consult Leroy-Somer specifying the coupling method and the axial and radial loads if applicable

## General Construction Mains connection

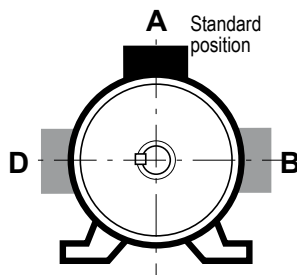
### TERMINAL BOX

Placed as standard on the top of the motor near the drive end, it is IP 55 protection and fitted with threaded plugs or a removable undrilled support plate.

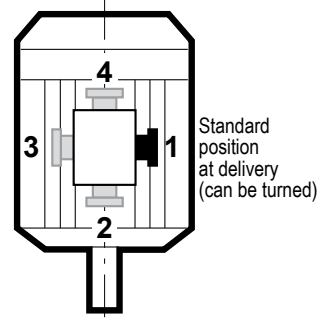
The standard position of the plug is on the right, seen from the drive end but, owing to the symmetrical construction of the box, it can usually be placed in any of the 4 directions, as shown in the table below:

If required, the terminal box may be fitted in a different position (on the left or right as seen from the drive end, and at the DE or NDE of the motor housing).

Positions of the terminal box in relation to the drive end (motor in IM 1001 position)



Positions of the plug in relation to the drive end



### FLYING LEADS

According to specification, motors can be supplied with flying leads using single-core cables (as an option, the cables can be protected by a sheath) or multicore cables.

Please state cable characteristics (cross-section, length, number of conductors), connection method (flying leads or on a terminal block) and the drill hole position.

| Terminal box position | A | B | D |
|-----------------------|---|---|---|
| LSES                  | ● | ■ | ■ |
| FLSES 80 to 225 SR/MR | ● | - | - |
| FLSES 225M to 450     | ● | ■ | ■ |
| PLSES                 | ● | ■ | ■ |

- : standard
- : please consult Leroy-Somer
- : not available

| Cable gland position                       | 1 | 2* | 3 | 4 |
|--------------------------------------------|---|----|---|---|
| LSES - FLSES - PLSES 80 to 315             | ◆ | ★  | ★ | ★ |
| PLSES 315 LG/MGU/VLG/VLGR<br>PLSES 355/400 | ◆ | -  | ★ | - |

\* not recommended (impossible on (FF) flange mounted motors and on the FLSES 355LK/400/450)

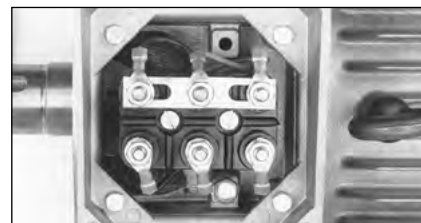
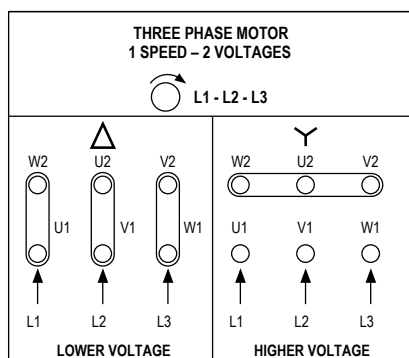
- ◆ : standard
- ★ : possible by simply turning round the terminal box
- : not available

### WIRING DIAGRAMS

All standard motors are supplied with a wiring diagram in the terminal box.

The diagrams normally used are shown opposite.

On the following pages are outline diagrams with internal and external connections.



### EARTH TERMINAL

This is situated inside the terminal box. Consisting of a threaded stud with a hexagonal nut, it is used to connect cables with cross-sections at least as large as the cross-section of the phase conductors.

It is indicated by the sign:  $\perp$  in the terminal box moulding.

On request, a second earth terminal can be fitted on one of the feet or on one of the cooling fins.

## General Construction Radial loads

### PERMISSIBLE RADIAL LOAD ON THE MAIN SHAFT EXTENSION

In pulley and belt couplings, the drive shaft carrying the pulley is subjected to a radial force  $F_{pr}$  applied at a distance  $X$  (mm) from the shoulder of the shaft extension (length  $E$ ).

#### Radial force acting on the drive shaft: $F_{pr}$

The radial force  $F_{pr}$  expressed in daN applied to the drive shaft is found by the formula.

$$F_{pr} = 1.91 \cdot 10^6 \frac{P_N \cdot k}{D \cdot N_N} \pm P_P$$

where:

$P_N$  = rated motor power (kW)

$D$  = external diameter of the drive pulley (mm)

$N_N$  = rated motor speed ( $\text{min}^{-1}$ )

$k$  = factor depending on the type of transmission

$P_P$  = weight of the pulley (daN)

The weight of the pulley is positive when it acts in the same direction as the tension force in the belt (and negative when it acts in the opposite direction).

Range of values for factor  $k$ (\*)

- toothed belts:  $k = 1$  to  $1.5$

- V-belts:  $k = 2$  to  $2.5$

- flat belts

• with tensioner:  $k = 2.5$  to  $3$

• without tensioner:  $k = 3$  to  $4$

(\*) A more accurate figure for factor  $k$  can be obtained from the transmission suppliers.

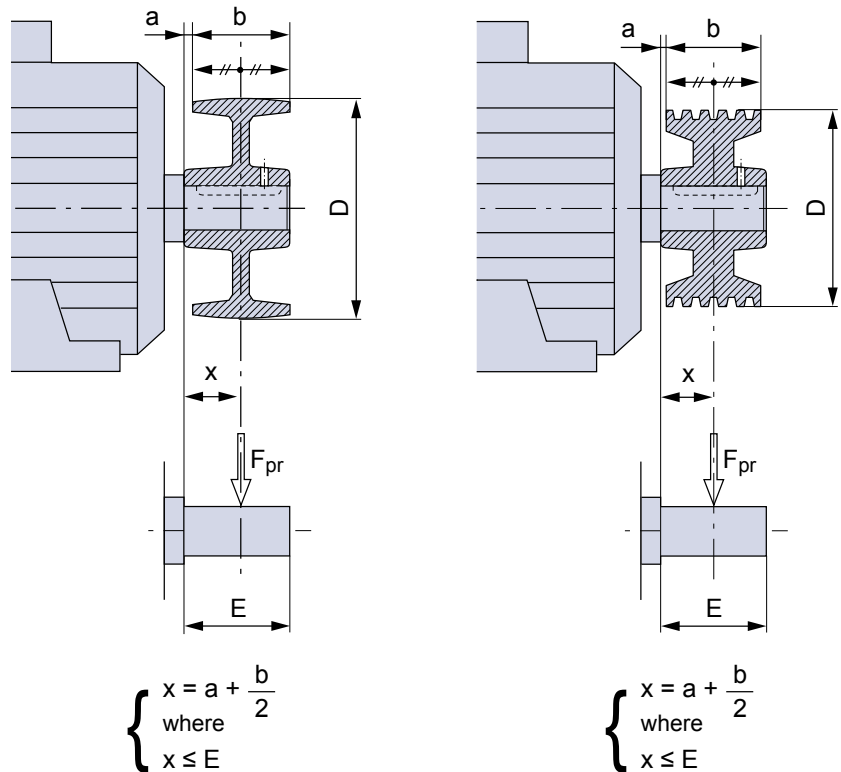
#### Permissible radial force on the drive shaft:

The charts on the following pages indicate, for each type of motor, the radial force  $F_R$  at a distance  $X$  permissible on the drive end shaft extension, for a bearing life  $L_{10h}$  of 25,000 hours.

Note: For frame sizes  $\geq 315$  M, the selection charts are applicable for a motor installed with the shaft horizontal.

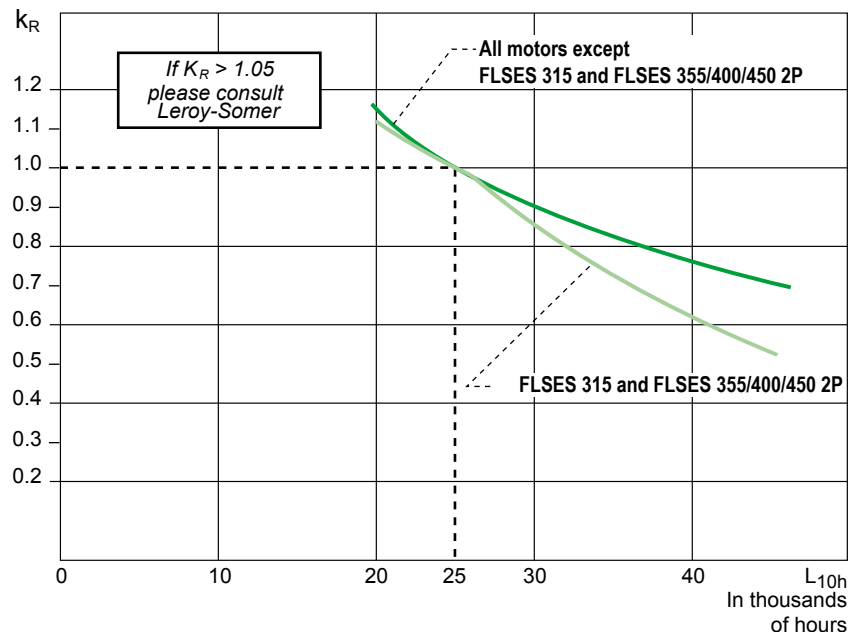
#### Change in bearing life depending on the radial load factor.

For a radial load  $F_{pr}$  ( $F_{pr} \neq F_R$ ), applied at distance  $X$ , the bearing life  $L_{10h}$  changes, as a rough estimate, in the ratio  $k_R$  ( $k_R = F_{pr}/F_R$ ) as shown in the chart below, for standard fitting arrangements.



If the load factor  $k_R$  is greater than 1.05, you should consult our technical department, stating mounting position and direction of force before opting for a special fitting arrangement.

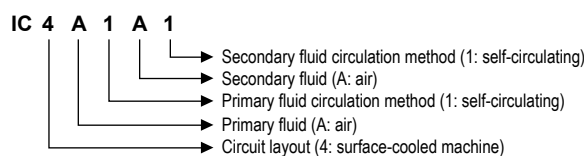
#### Change in bearing life $L_{10h}$ depending on the radial load factor $k_R$ for standard fitting arrangements.



## General Construction Cooling

Designation for the IC (International Cooling) coded cooling method in the IEC 60034-6 standard.

The standard allows for two designations (general formula and simplified formula) as shown in the example opposite.



**NB:** The letter A may be omitted if this will not lead to confusion. This contracted formula becomes the simplified formula.

**Simplified form: IC 411.**

### Circuit layout

| Characteristic number | Abbreviated designation                                                | Description                                                                                                                                                                                                                                |
|-----------------------|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0(1)                  | Free circulation                                                       | The coolant enters and leaves the machine freely. It is taken from and returned to the fluid round the machine.                                                                                                                            |
| 1(1)                  | Machine with one intake pipe                                           | The coolant is taken up elsewhere than from the fluid round the machine, brought into the machine through an intake pipe and emptied into the fluid round the machine.                                                                     |
| 2(1)                  | Machine with one outlet pipe                                           | The coolant is taken up from the fluid round the machine, brought away from the machine by an outlet pipe and does not go back into the fluid round the machine.                                                                           |
| 3(1)                  | Machine with two pipes (intake and outlet)                             | The coolant is taken up elsewhere than from the fluid round the machine, brought to the machine through an intake pipe, then taken away from the machine through an outlet pipe and does not go back into the fluid round the machine.     |
| 4                     | Surface cooled machine using the fluid round the machine               | The primary coolant circulates in a closed circuit, transferring its heat to a secondary coolant (the one surrounding the machine) through the machine casing. The casing surface is either smooth or finned to improve heat transmission. |
| 5(2)                  | Built-in heat exchanger (using the surrounding environment)            | The primary coolant circulates in a closed circuit, transferring its heat to a secondary coolant (the one surrounding the machine) in an integral heat exchanger inside the machine.                                                       |
| 6(2)                  | Machine-mounted heat exchanger (using the surrounding environment)     | The primary coolant circulates in a closed circuit, transferring its heat to a secondary coolant (the one surrounding the machine) in a heat exchanger that forms an independent unit, mounted on the machine.                             |
| 7(2)                  | Built-in heat exchanger (not using the surrounding environment)        | The primary coolant circulates in a closed circuit, transferring its heat to a secondary coolant (which is not the one round the machine) in an integral heat exchanger inside the machine.                                                |
| 8(2)                  | Machine-mounted heat exchanger (not using the surrounding environment) | The primary coolant circulates in a closed circuit, transferring its heat to a secondary coolant (which is not the one round the machine) in a heat exchanger that forms an independent unit, mounted on the machine.                      |
| 9(2)(3)               | Separate heat exchanger (using the surrounding environment or not)     | The primary coolant circulates in a closed circuit, transferring its heat to the secondary fluid in a heat exchanger that forms an independent unit, away from the machine.                                                                |

### Coolant

| Characteristic letter | Type of fluid                                          |
|-----------------------|--------------------------------------------------------|
| A                     | Air                                                    |
| F                     | Freon                                                  |
| H                     | Hydrogen                                               |
| N                     | Nitrogen                                               |
| C                     | Carbon dioxide                                         |
| W                     | Water                                                  |
| U                     | Oil                                                    |
| S                     | Any other fluid (must be identified separately)        |
| Y                     | The fluid has not yet been selected (used temporarily) |

### Method of circulation

| Characteristic number | Designation abbreviated                                                                      | Description                                                                                                                                                                                                           |
|-----------------------|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0                     | Free circulation                                                                             | The circulation of the coolant is due only to differences in temperature. Ventilation caused by the rotor is negligible.                                                                                              |
| 1                     | Self-circulating                                                                             | The circulation of the coolant depends on the rotational speed of the main machine, and is caused by the action of the rotor alone, or a device mounted directly on it.                                               |
| 2, 3, 4               |                                                                                              | Not yet defined.                                                                                                                                                                                                      |
| 5(4)                  | Built-in and independent device                                                              | The coolant is circulated by a built-in device which is powered independently of the rotational speed of the main machine.                                                                                            |
| 6(4)                  | Independent device mounted on the machine                                                    | The coolant is circulated by a device mounted on the machine which is powered independently of the rotational speed of the main machine.                                                                              |
| 7(4)                  | Entirely separate independent device or using the pressure of the coolant circulation system | The coolant is circulated by a separate electrical or mechanical device, independent and not mounted on the machine, or by the pressure in the coolant circulation system.                                            |
| 8(4)                  | Relative displacement                                                                        | The circulation of the coolant is produced by the relative movement between the machine and the coolant, either by displacement of the machine in relation to the coolant, or by the flow of the surrounding coolant. |
| 9                     | All other devices                                                                            | The coolant is circulated using a method other than those defined above: it must be described in full.                                                                                                                |

(1) Filters or labyrinth seals for dust removal or noise protection can be fitted inside the casing or in the ducting. The first characteristic numbers 0 to 3 also apply to machines in which the coolant is taken up at the outlet of a water-cooler designed to lower the temperature of the ambient air or recirculated through a water-cooler so as not to increase the ambient temperature.

(2) The nature of the heat exchanger elements is not specified (smooth or finned tubes, corrugated surfaces, etc).

(3) A separate heat exchanger can be installed near to or at a distance from the machine. A secondary gas coolant may be the surrounding environment or not.

(4) Use of such a device does not exclude the ventilating action of the rotor or the existence of an additional fan mounted directly on the rotor.



## General Construction Cooling

### MOTOR VENTILATION

In compliance with IEC 60034-6, the motors in this catalogue are cooled using method IC 411, ie. "surface-cooled machine using the ambient air circulating round the machine".

Cooling is achieved by a fan mounted at the non-drive end of the motor, inside a fan cover which acts as a safety guard (check according to IEC 600 34-5). The fan draws the air through the grille in the cover and blows it along the housing fins, giving an identical heat balance in either direction of rotation (except for LSES 2-pole motors of frame size 315 mm).

**NB: Obstruction, even accidental, of the fan cover grille (grille clogged or placed against a wall) seriously impairs motor cooling.**

We recommend a minimum distance of 1/3 of the frame size between the end of the cover and any possible obstacle (wall, machine, etc).

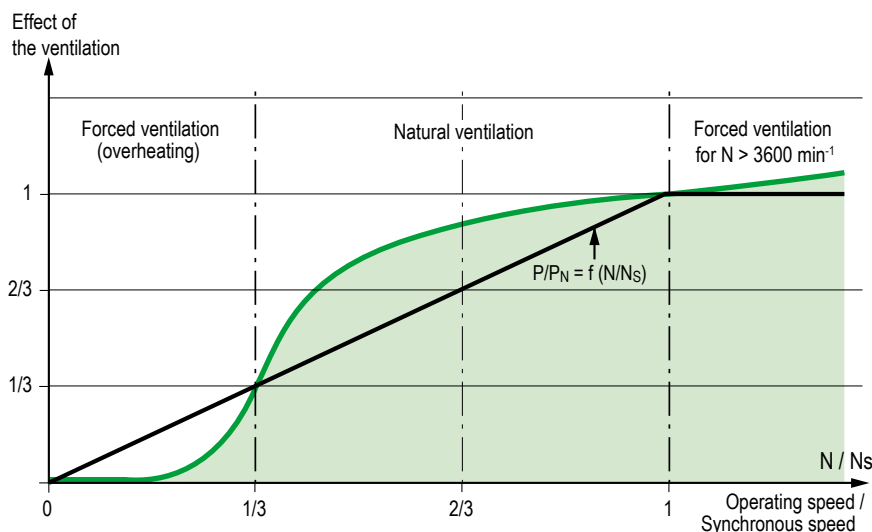
### Variable speed motor cooling (ventilation)

Special precautions need to be taken when standard induction motors are being used with variable speed, powered by an inverter or voltage controller.

During prolonged operation at low speed, cooling efficiency is greatly diminished. It is therefore advisable to

install a forced ventilation unit that will produce a constant flow of air independently of the motor speed.

In prolonged operation at high speed, the fan may make excessive noise. It is again advisable to install a forced ventilation unit.



### NON-VENTILATED APPLICATIONS IN CONTINUOUS OPERATION

Motors can be supplied without fans. Dimensions will depend on the application.

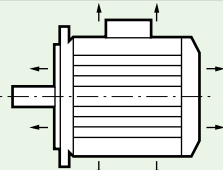
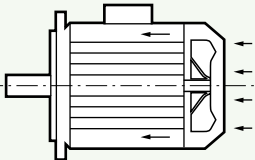
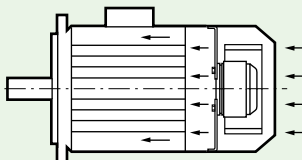
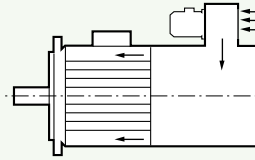
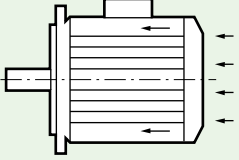
### IC 418 COOLING SYSTEM

If they are placed in the air flow from a fan, these motors are capable of supplying their rated power if the speed of the air between the housing fins and the overall flow rate of the air between the fins comply with the data in the table below.

| Type LSES/FLSES | 2 poles        |           | 4 poles        |           | 6 poles        |           |
|-----------------|----------------|-----------|----------------|-----------|----------------|-----------|
|                 | flow rate m³/h | speed m/s | flow rate m³/h | speed m/s | flow rate m³/h | speed m/s |
| 80              | 120            | 7.5       | 60             | 4         | 40             | 2.5       |
| 90              | 200            | 11.5      | 75             | 5.5       | 60             | 3.5       |
| 100             | 300            | 15        | 130            | 7.5       | 95             | 5         |
| 112             | 460            | 18        | 200            | 9         | 140            | 6         |
| 132             | 570            | 21        | 300            | 10.5      | 220            | 7         |
| 160             | 1000           | 21        | 600            | 12.5      | 420            | 9         |
| 180             | 1200           | 21        | 900            | 16        | 600            | 10        |
| 200             | 1800           | 23        | 1200           | 16        | 750            | 10        |
| 225             | 2000           | 24        | 1500           | 18        | 1700           | 13        |
| 250             | 3000           | 25        | 2600           | 20        | 1700           | 13        |
| 280             | 3000           | 25        | 2600           | 20        | 2000           | 15        |
| 315             | 5000           | 25        | 2600           | 20        | 2000           | 15        |
| 355             | 5200           | 25        | 2800           | 20        | 2200           | 15        |
| 400             | 5500           | 25        | 3000           | 20        | 2600           | 15        |
| 450             | 6000           | 25        | 3200           | 20        | 2600           | 15        |

These air flows are valid for normal operating conditions as described in the "Environmental limitations" section.

## STANDARD CODES

|                  |                                                                                                                                   |                                                                                       |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| <b>IC 410</b>    | Enclosed machine ,surface-cooled<br>by natural convection and radiation.<br>No external fan.                                      |    |
| <b>IC 411</b>    | Enclosed machine. Smooth or finned ventilated casing.<br>External shaft-mounted fan.                                              |    |
| <b>IC 416 A*</b> | Enclosed machine. Smooth or finned enclosed casing.<br>External motorized axial (A) fan supplied with the machine.                |    |
| <b>IC 416 R*</b> | Enclosed machine. Smooth or finned enclosed casing.<br>External motorized radial (R) fan supplied with the machine.               |    |
| <b>IC 418</b>    | Enclosed machine. Smooth or finned casing.<br>No external fan.<br>Ventilation provided by air flow coming from the driven system. |  |

\* Features not within manufacturer's standard range.

## APPLICATION OF COOLING SYSTEMS TO THE LEROY-SOMER RANGE

| Type<br>LSES/FLSES | IC 410<br>IC 418 | IC 411 | IC 416 A | IC 416 R |
|--------------------|------------------|--------|----------|----------|
| 80                 | ●                | ■      | ●        | ◆        |
| ≥ 90               | ●                | ■      | ●        | ●        |

■ : standard construction

● : possible (ask for estimate)

◆ : not available

Other cooling systems may be fitted,  
such as liquid cooling.

# SINGLE SPEED MOTORS

| Voltages and connections                                                                        | Internal wiring diagrams | Winding outline diagrams | External connection diagrams |                |
|-------------------------------------------------------------------------------------------------|--------------------------|--------------------------|------------------------------|----------------|
|                                                                                                 |                          |                          | D.O.L. starting              | Y / Δ starting |
| Single voltage type motors (3 TERMINALS)                                                        |                          |                          |                              |                |
| <p>- Voltage: U</p> <p>- Connection: Y internal</p> <p>Eg: 400 V/Y</p>                          |                          |                          |                              |                |
| <p>- Voltage: U</p> <p>- Connection: internal Δ</p> <p>e.g. 400 V / Δ</p>                       |                          |                          |                              |                |
| Dual-voltage motors with Y, Δ connections (6 TERMINALS)                                         |                          |                          |                              |                |
| <p>- Voltage: U</p> <p>- Connection: Δ (at lower voltage)</p> <p>e.g. 230 V / Δ</p>             |                          |                          |                              |                |
| <p>- Voltage: U / √3</p> <p>- Connection: Y (at higher voltage)</p> <p>Eg: 400 V/Y</p>          |                          |                          |                              |                |
| Dual-voltage motors with series-parallel connections (9 TERMINALS)                              |                          |                          |                              |                |
| <p>- Voltage: U</p> <p>- Connection: Y Y (at lower voltage)</p> <p>Eg: 230 V/Y Y</p>            |                          |                          |                              |                |
| <p>- Voltage: 2 U</p> <p>- Connection: Y (series-star at higher voltage)</p> <p>Eg: 460 V/Y</p> |                          |                          |                              |                |

### DEFINITIONS

#### LOAD RATINGS

##### Static load rating Co:

This is the load for which permanent deformation at point of contact between a bearing race and the ball (or roller) with the heaviest load reaches 0.01% of the diameter of the ball (or roller).

##### Dynamic load rating C:

This is the load (constant in intensity and direction) for which the nominal lifetime of the bearing will reach 1 million revolutions.

The static load rating Co and dynamic load rating C are obtained for each bearing by following the method in ISO 281.

#### LIFETIME

The lifetime of a bearing is the number of revolutions (or number of operating hours at a constant speed) that the bearing can accomplish before the first signs of fatigue (spalling) begin to appear on a ring, ball or roller.

##### Nominal lifetime L10h

According to the ISO recommendations, the nominal lifetime is the length of time achieved or exceeded by 90% of apparently identical bearings operating under the conditions specified by the manufacturer.

**Note:** The majority of bearings last much longer than the nominal lifetime; the average lifetime achieved or exceeded by 50% of bearings is around 5 times longer than the nominal lifetime.

#### DETERMINATION OF NOMINAL LIFETIME

##### Constant load and speed of rotation

The nominal lifetime of a bearing expressed in operating hours L10h, the dynamic load rating C expressed in daN and the applied loads (radial load Fr and axial load Fa) are related by the following equation:

$$L_{10h} = \frac{1000000}{60 \cdot N} \cdot \left(\frac{C}{P}\right)^p$$

where N = speed of rotation (rpm)

P ( $P = X F_r + Y F_a$ ): equivalent dynamic load ( $F_r$ ,  $F_a$ , P in daN)

p: exponent which is a function of the contact between the races and balls (or rollers)

p = 3 for ball bearings

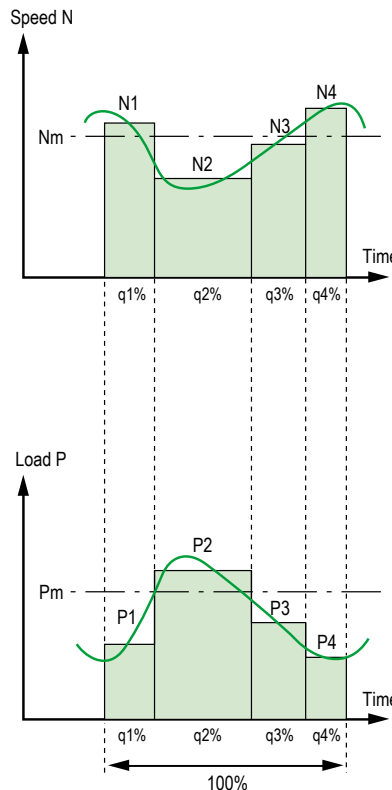
p = 10/3 for roller bearings

The formulae that give Equivalent Dynamic Load (values of factors X and Y) for different types of bearing may be obtained from the various manufacturers.

##### Variable load and speed of rotation

For bearings with periodically variable load and speed, the nominal lifetime is established using the equation:

$$L_{10h} = \frac{1000000}{60 \cdot N_m} \cdot \left(\frac{C}{P_m}\right)^p$$



$N_m$ : average speed of rotation

$$N_m = N_1 \cdot \frac{q_1}{100} + N_2 \cdot \frac{q_2}{100} + \dots (\text{min}^{-1})$$

$P_m$ : average equivalent dynamic load

$$P_m = \sqrt[p]{P_1^p \cdot \left(\frac{N_1}{N_m}\right) \cdot \frac{q_1}{100} + P_2^p \cdot \left(\frac{N_2}{N_m}\right) \cdot \frac{q_2}{100} + \dots (\text{daN})}$$

with q1, q2, etc as a %

Nominal lifetime L10h is applicable to bearings made of bearing steel and normal operating conditions (lubricating film present, no contamination, correctly fitted, etc).

Situations and data differing from these conditions will lead to either a reduction or an increase in lifetime compared to the nominal lifetime.

##### Corrected nominal lifetime

If the ISO recommendations (DIN ISO 281) are used, improvements to bearing steel, manufacturing processes and the effects of operating conditions may be integrated in the nominal lifetime calculation.

The theoretical pre-fatigue lifetime Lnah is thus calculated using the formula:

$$L_{nah} = a_1 a_2 a_3 L_{10h}$$

where:

$a_1$ : failure probability factor.

$a_2$ : factor for the characteristics and tempering of the steel.

$a_3$ : factor for the operating conditions (lubricant quality, temperature, speed of rotation, etc).

### ROLE OF THE LUBRICANT

The principal role of the lubricant is to avoid direct contact between the metal parts in motion: balls or rollers, slip-rings, cages, etc. It also protects the bearing against wear and corrosion.

The quantity of lubricant needed by a bearing is normally quite small. There should be enough to provide good lubrication without undesirable overheating. As well as lubrication itself and the operating temperature, the amount of lubricant should be judged by considerations such as sealing and heat dissipation.

The lubricating power of a grease or an oil lessens with time owing to mechanical constraints and straight forward ageing. Used or contaminated lubricants should therefore be replaced or topped up with new lubricant at regular intervals.

Bearings can be lubricated with grease, oil or, in certain cases, with a solid lubricant.

### GREASING

A lubricating grease can be defined as a product of semi-fluid consistency obtained by the dispersion of a thickening agent in a lubricating fluid and which may contain several additives to give it particular properties.

| Composition of a grease |
|-------------------------|
| Base oil: 85 to 97%     |
| Thickener: 3 to 15 %    |
| Additives: 0 to 12 %    |

### THE BASE OIL LUBRICATES

The oil making up the grease is of **prime importance**. It is the oil that lubricates the moving parts by coating them with a protective film which prevents direct contact. The thickness of the lubricating film is directly linked to the viscosity of the oil, and the viscosity itself depends on temperature. The two main types used to make grease are mineral oils and synthetic oils. Mineral oils are suitable for normal applications in a range of temperatures from -30°C to +150°C.

Synthetic oils have the advantage of being effective in severe conditions (extreme variations of temperature, harsh chemical environments, etc).

### THE THICKENER GIVES THE GREASE CONSISTENCY

The more thickener a grease contains, the "harder" it will be. Grease consistency varies with the temperature. In falling temperatures, the grease hardens progressively, and the opposite happens when temperatures rise.

The consistency of a grease can be quantified using the NLGI (National Lubricating Grease Institute) classification. There are 9 NLGI grades, from 000 for the softest greases up to 6 for the hardest. Consistency is expressed by the depth to which a cone may be driven into a grease maintained at 25°C.

If we only consider the chemical nature of the thickener, lubricating greases fall into three major categories:

- **Conventional greases with a metallic soap base** (calcium, sodium, aluminium, lithium). Lithium soaps have several advantages over other metallic soaps: a high melting point (180° to 200°), good mechanical stability and good water resistant properties.

- **Greases with a complex soap base.** The main advantage of this type of soap is a very high melting point (over 250°C).

- **Soapless greases.** The thickener is an inorganic compound, such as clay. Their main property is the absence of a melting point, which makes them practically non-liquefying.

### ADDITIVES IMPROVE SOME GREASE PROPERTIES

Additives fall into two types, depending on whether or not they are soluble in the base oil.

The most common insoluble additives - graphite, molybdenum disulphide, talc, mica, etc, improve the friction characteristics between metal surfaces. They are therefore used in applications where heavy pressure occurs.

The soluble additives are the same as those used in lubricating oils: antioxidants, anti-rust agents, etc.

### LUBRICATION TYPE

The bearings are lubricated with a polyurea soap-based grease.

## DUTY CYCLES

(IEC 60034-1)

The typical duty cycles are described below:

### 1 - Continuous duty - Type S1

Operation at constant load of sufficient duration for thermal equilibrium to be reached (see figure 1).

### 2 - Short-time duty - Type S2

Operation at constant load during a given time, less than that required for thermal equilibrium to be reached, followed by a rest and de-energized period of sufficient duration to re-establish machine temperatures within 2 K of the coolant (see figure 2).

### 3 - Intermittent periodic duty - Type S3

A sequence of identical duty cycles, each consisting of a period of operation at constant load and a rest and deenergized period (see figure 3). Here, the cycle is such that the starting current does not significantly affect the temperature rise.

### 4 - Intermittent periodic duty with starting - Type S4

A sequence of identical duty cycles, each consisting of a significant starting period, a period of operation at constant load and a rest and de-energized period (see figure 4).

### 5 - Intermittent periodic duty with electrical braking, Type S5.

A sequence of periodic duty cycles, each consisting of a starting period, a period of operation at constant load, a period of rapid electrical braking and a rest and de-energized period (see figure 5).

### 6 - Periodic continuous duty with intermittent load, Type S6.

A sequence of identical duty cycles, each consisting of a period of operation at constant load and a period of operation at no load. There is no rest and deenergized period (see figure 6).

### 7 - Periodic continuous duty with electrical braking, Type S7.

A sequence of identical duty cycles, each consisting of a starting period, a period of operation at constant load and a period of electrical braking. There is no rest and de-energized period (see figure 7).

### 8 - Periodic continuous duty with related changes of load and speed - Type S8

A sequence of identical duty cycles, each consisting of a period of operation at constant load corresponding to a predetermined rotation speed, followed by one or more periods of operation at other constant loads corresponding to different rotation speeds (in induction motors, this can be done by changing the

number of poles). There is no rest and de-energized period (see figure 8).

### 9 - Duty with non-periodic variations in load and speed - Type S9

This is a duty in which the load and speed generally vary non-periodically within the permissible operating range. This duty frequently includes applied overloads which may be much higher than the full load or loads (see figure 9).

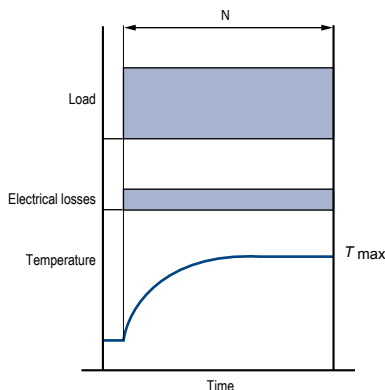
*Note - For this type of duty, the appropriate full load values must be used as the basis for calculating overload.*

### 10 - Operation at discrete constant loads - Type S10

This duty consists of a maximum of 4 discrete load values (or equivalent loads), each value being applied for sufficient time for the machine to reach thermal equilibrium. The minimum load during a load cycle may be zero (no-load operation or rest and de-energized period) (see figure 10).

**NB: only S1 duty type is affected by IEC 60034-30-1**

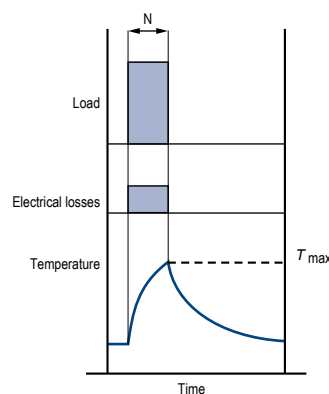
**Fig. 1. - Continuous duty, Type S1.**



N = operation at constant load

T<sub>max</sub> = maximum temperature attained

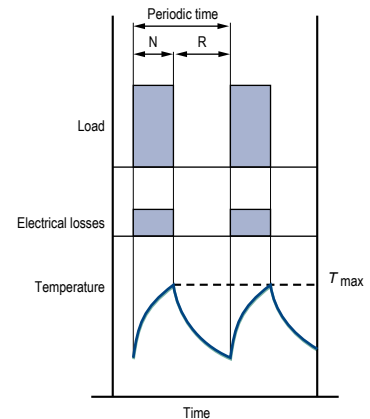
**Fig. 2. - Short-time duty, Type S2.**



N = operation at constant load

T<sub>max</sub> = maximum temperature attained

**Fig. 3. - Intermittent periodic duty, Type S3.**



N = operation at constant load

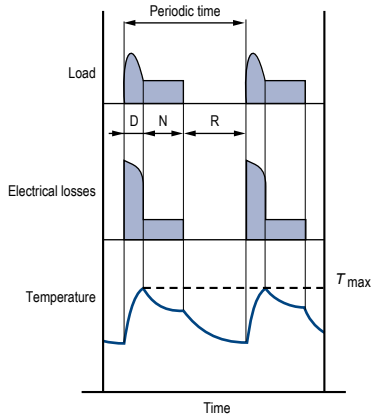
R = rest

T<sub>max</sub> = maximum temperature attained

$$\text{Running factor (\%)} = \frac{N}{N + R} \cdot 100$$



**Fig. 4. - Intermittent periodic duty with starting, Type S4.**



D = starting

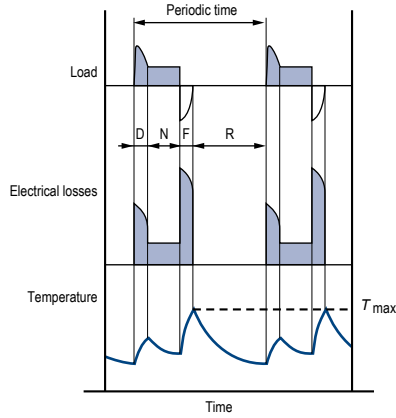
N = operation at constant load

R = rest

$T_{max}$  = maximum temperature attained during cycle

$$\text{Operating factor (\%)} = \frac{D + N}{N + R + D} \cdot 100$$

**Fig. 5. - Intermittent periodic duty with electrical braking, Type S5.**



D = starting

N = operation at constant load

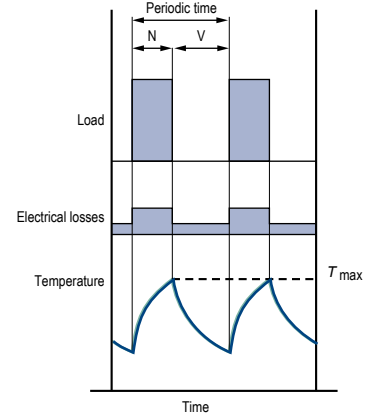
F = electrical braking

R = rest

$T_{max}$  = maximum temperature attained during cycle

$$\text{Operating factor (\%)} = \frac{D + N + F}{D + N + F + R} \cdot 100$$

**Fig. 6. - Periodic continuous duty with intermittent load, Type S6.**



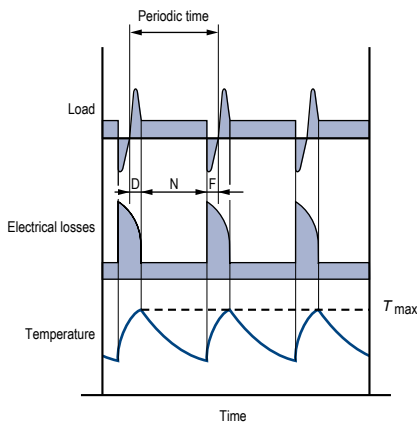
N = operation at constant load

V = no-load operation

$T_{max}$  = maximum temperature attained during cycle

$$\text{Operating factor (\%)} = \frac{N}{N + V} \cdot 100$$

**Fig. 7. - Periodic continuous duty with electrical braking, Type S7.**



D = starting

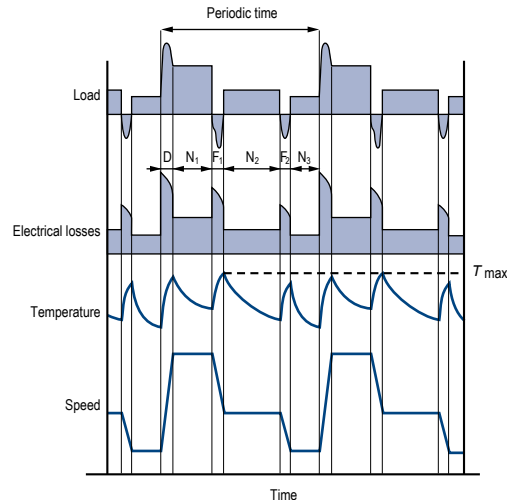
N = operation at constant load

F = electrical braking

$T_{max}$  = maximum temperature attained during cycle

Operating factor = 1

**Fig. 8. - Periodic continuous duty with related changes of load and speed, Type S8.**



$F_1 F_2$  = electric braking

D = starting

$N_1 N_2 N_3$  = operation at constant loads

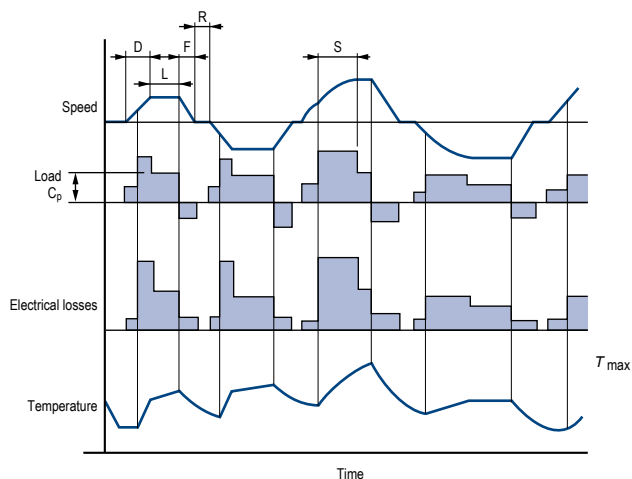
$T_{max}$  = maximum temperature attained during cycle

$$\text{Operating factor} = \frac{D + N_1}{D + N_1 + F_1 + N_2 + F_2 + N_3} 100 \%$$

$$\frac{F_1 + N_2}{D + N_1 + F_1 + N_2 + F_2 + N_3} 100 \%$$

$$\frac{F_2 + N_3}{D + N_1 + F_1 + N_2 + F_2 + N_3} 100 \%$$

**Fig. 9. - Duty with non-periodic variations in load and speed, Type S9.**



D = starting

L = operation at variable loads

F = electrical braking

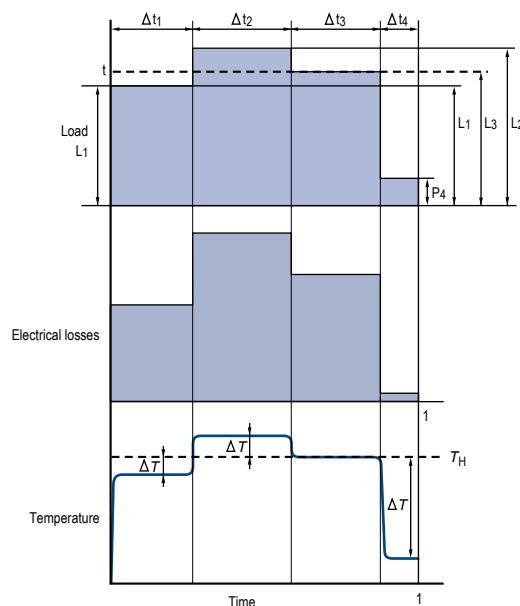
R = rest

S = operation at overload

$C_p$  = full load

$T_{max}$  = maximum temperature attained

**Fig. 10 - Duty at discrete constant loads, Type S10.**



L = load

N = rated power for type S1 duty

$p = \frac{L}{N}$  = reduced load

t = time

$T_p$  = total cycle time

$t_i$  = discrete period within a cycle

$\Delta t_i = t_i / T_p$  = relative duration of period within a cycle

$P_u$  = electrical losses

$H_N$  = temperature at rated power for type S1 duty

$\Delta H_i$  = increase or decrease in temperature rise during the  $i$ th period of the cycle

**Power is determined according to duty cycle. See "Operation" section, § "Power - Torque - Efficiency - Power Factor (Cos  $\phi$ )".**

**For duty ratings between S3 and S8 inclusive, the default cycle is 10 minutes unless otherwise indicated.**

## REGULATIONS AND STANDARDS

The IEC 60038 standard gives the European reference voltage as 230/400V three-phase and 230 V single-phase, with a tolerance of  $\pm 10\%$ .

The tolerances usually permitted for power supply sources are indicated below:

- Maximum line drop between customer delivery point and customer usage point: 4%.

- Variation in frequency around the rated frequency:

- continuous operation:  $\pm 1\%$

- transient state:  $\pm 2\%$

- Three-phase mains phase voltage imbalance:

- Zero-sequence component and/or negative phase sequence component compared to positive phase sequence component:  $< 2\%$

**The motors in this catalogue are designed for use on the European power supply of 230/400 V  $\pm 10\%$  - 50 Hz.**

**All other voltages and frequencies are available on request.**

- For motors of frame size  $\leq 160$  mm, maximum operating voltage: 700V

- For motors of frame size  $\geq 180$  mm, maximum operating voltage: 1000 V

## EFFECTS ON MOTOR PERFORMANCE

### VOLTAGE RANGE

The characteristics of motors will of course vary with a corresponding variation in voltage of  $\pm 10\%$  around the rated value.

An approximation of these variations is given in the table opposite.

|                                  | Voltage variation as a % |       |    |       |        |
|----------------------------------|--------------------------|-------|----|-------|--------|
|                                  | UN-10%                   | UN-5% | UN | UN+5% | UN+10% |
| Torque curve                     | 0.81                     | 0.90  | 1  | 1.10  | 1.21   |
| Slip                             | 1.23                     | 1.11  | 1  | 0.91  | 0.83   |
| Rated current                    | 1.10                     | 1.05  | 1  | 0.98  | 0.98   |
| Rated efficiency                 | 0.97                     | 0.98  | 1  | 1.00  | 0.98   |
| Rated power factor (cos $\phi$ ) | 1.03                     | 1.02  | 1  | 0.97  | 0.94   |
| Starting current                 | 0.90                     | 0.95  | 1  | 1.05  | 1.10   |
| Nominal temperature rise         | 1.18                     | 1.05* | 1  | 1*    | 1.10   |
| P (Watt) no-load                 | 0.85                     | 0.92  | 1  | 1.12  | 1.25   |
| Q (reactive VA) no-load          | 0.81                     | 0.9   | 1  | 1.1   | 1.21   |

\* According to standard IEC 60034-1, the additional temperature rise must not exceed 10 K within  $\pm 5\%$  of UN.

## SIMULTANEOUS VARIATION OF VOLTAGE AND FREQUENCY

Within the tolerances defined in guide 106 of the IEC (see § D2.1), machine input and performance are unaffected if the variations are of the same polarity and the voltage/frequency ratio  $U/f$  remains constant.

If this is not the case, variations in performance are significant and require the machine specification to be changed.

Variation in main motor parameters (approx.) within the limits defined in IEC Guide 106.

| $U/f$    | $P_u$                                        | $M$                                        | $N$              | $\cos \varphi$                            | Efficiency           |
|----------|----------------------------------------------|--------------------------------------------|------------------|-------------------------------------------|----------------------|
| Constant | $P_u \frac{f'}{f}$                           | $M$                                        | $N \frac{f'}{f}$ | $\cos \varphi$ unchanged                  | Efficiency unchanged |
| Variable | $P_u \left( \frac{u' / u}{f / f'} \right)^2$ | $M \left( \frac{u' / u}{f / f'} \right)^2$ | $N \frac{f'}{f}$ | Dependent on the machine saturation state |                      |

$M$  = minimum and maximum values of starting torque.

## USE OF 400V - 50 HZ MOTORS ON 460V - 60 HZ SUPPLIES

For a rated power at 60 Hz equal to the rated power at 50 Hz, the main characteristics are modified according to the following variations:

- Efficiency increases by 0.5 - 1.5%
- Power factor decreases by 0.5 to 1.5%
- Rated current decreases by 0 to 5%
- IS/IN increases by around 10%
- Slip and rated torque MN, MD/MN, MM/MN remain more or less constant.

**Comment:**

**For the North American markets, a different type of construction is needed to comply with the regulatory requirements.**

## USE ON SUPPLIES WITH U' VOLTAGES different from the voltages in the characteristics tables

In this case, the machine windings should be adjusted.

As a result, only the current values will be changed and become:

$$I' = I_{400V} \times \frac{400}{U'}$$

## PHASE VOLTAGE IMBALANCE

The phase imbalance for voltage is calculated as follows:

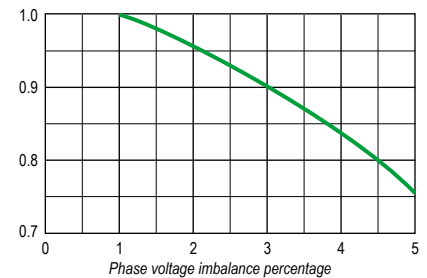
$$\text{Phase voltage imbalance as a \%} = 100 \times \frac{\text{maximum difference in voltage compared to the average voltage value}}{\text{average voltage value}}$$

The effect on motor performance is summarized in the table opposite.

When this imbalance is known before the motor is purchased, it is advisable, in

order to establish the type of motor required, to apply the derating specified in standard IEC 60892, illustrated on the graph opposite.

| Percentage imbalance      | 0   | 2    | 3.5  | 5     |
|---------------------------|-----|------|------|-------|
| Stator current            | 100 | 101  | 104  | 107.5 |
| Increase in losses as a % | 0   | 4    | 12.5 | 25    |
| Temperature rise          | 1   | 1.05 | 1.14 | 1.28  |

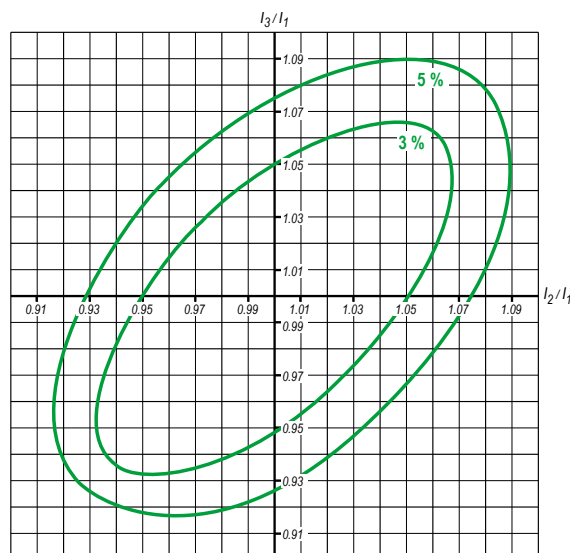


## PHASE CURRENT IMBALANCE

Voltage imbalances induce current imbalances. Natural lack of symmetry due to manufacture also induces current imbalances.

The chart opposite shows the ratios in which the negative phase component is equal to 5% (and 3%) of the positive phase components in three-phase current supplies without zero components (neutral absent or not connected).

Inside the curve, the negative phase component is lower than 5% (and 3%).



### INSULATION CLASS

The machines in this catalogue have been designed with a class F insulation system for the windings.

Class F allows for temperature rises of 105 K (measured by the resistance variation method) and maximum temperatures at the hot spots in the machine of 155°C (Ref. IEC 60085 and IEC 60034-1).

Complete impregnation with tropicalized varnish of thermal class 180°C gives protection against attacks from the environment, such as: 90% relative humidity, interference, etc.

For special constructions, the winding is class H and impregnated with special varnishes which enable it to operate in conditions of high temperatures with relative air humidity of up to 100%.

The insulation of the windings is monitored in two ways:

a - Dielectric inspection which involves checking the leakage current, at an applied voltage of (2U + 1000) V, in conditions complying with standard IEC 60034-1 (systematic test).

b - Monitoring the insulation resistance between the windings and between the windings and the earth (sampling test) at a D.C. voltage of 500 V or 1000 V.

### TEMPERATURE RISE AND THERMAL RESERVE

Leroy-Somer motors are built to have a maximum winding temperature rise of 80 K under normal operating conditions (ambient temperature 40°C, altitude below 1000 m, rated voltage and frequency, rated load).

**The result is a thermal reserve linked to the following factors:**

- A difference of 25 K between the nominal temperature rise (Un, Fn, Pn) and the permissible temperature rise (105 K) for class F insulation.

- A difference of 10°C minimum at the voltage limits.

In IEC 60034-1 and 60034-2, temperature rise ( $\Delta\theta$ ), is calculated using the winding resistance variation method, with the formula:

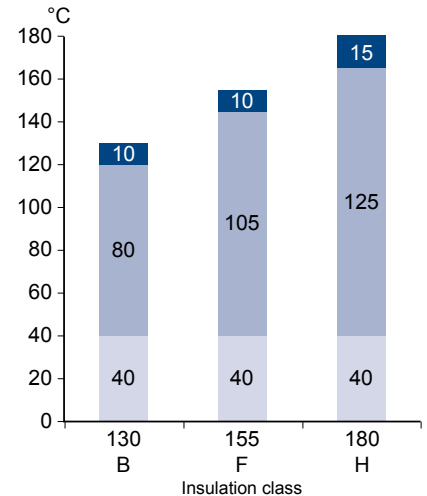
$$\Delta T = \frac{R_2 - R_1}{R_1} (235 + T_1) + (T_1 - T_2)$$

$R_1$ : cold resistance measured at ambient temperature  $T_1$

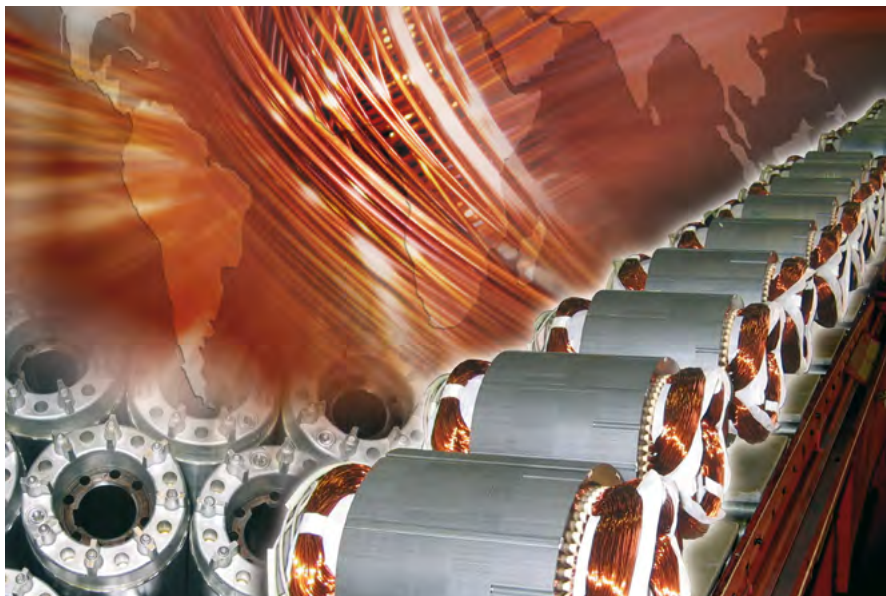
$R_2$ : stabilized hot resistance measured at ambient temperature  $T_2$

235: coefficient for a copper winding (for an aluminium winding, the coefficient is 225)

Temperature rise ( $\Delta T^*$ ) and maximum temperatures at hot spots ( $T_{max}$ ) for insulation classes (IEC 60034-1).



■ Temperature rise at hot spots  $T_{max}$   
 ■ Temperature rise  
 ■ Ambient temperature

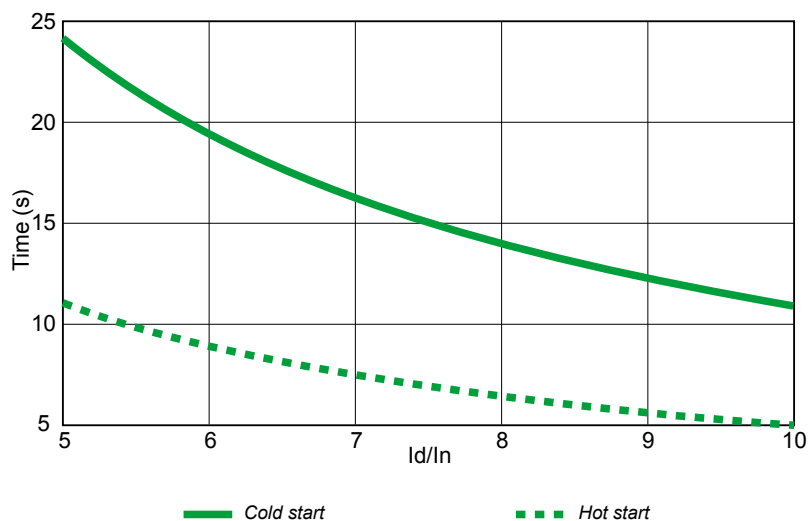


### PERMISSIBLE STARTING TIMES AND LOCKED ROTOR TIMES

The calculated starting times must remain within the limits of the graph opposite which defines maximum starting times in relation to the current surge.

Three successive cold starts and two consecutive hot starts are allowed with return to stop between each start.

Permissible motor starting time as a function of the ratio  $I_d/I_n$ .



**Note:** For IP55 motors with frame size  $\geq 355$  LD, 2 successive cold starts and 1 hot start are allowed (after thermal stabilisation at rated power). A stop of at least 15 minutes must be observed between each successive start.





### DEFINITIONS

The output power ( $P_u$ ) at the motor shaft is linked to the torque ( $M$ ) by the equation:

$$P_u = M \cdot \omega$$

where  $P_u$  in W,  $M$  in N.m,  $\omega$  in rad/s and where  $\omega$  is expressed as a function of the speed of rotation in rpm by the equation:

$$\omega = 2\pi \cdot N / 60$$

The active power ( $P$ ) drawn from the mains is expressed as a function of the

apparent power ( $S$ ) and the reactive power ( $Q$ ) by the equation:

$$S = \sqrt{P^2 + Q^2}$$

( $S$  in VA,  $P$  in W and  $Q$  in VAR)

The power  $P$  is linked to the output power  $P_u$  by the equation:

$$P = \frac{P_u}{\eta}$$

where  $\eta$  is the efficiency of the machine. The output power  $P_u$  at the motor shaft is

expressed as a function of the phase-to-phase mains voltage ( $U$  in Volts), of the line current absorbed ( $I$  in Amps) by the equation:

$$P_u = U \cdot I \cdot \sqrt{3} \cdot \cos \varphi \cdot \eta$$

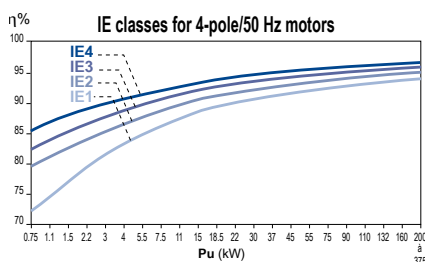
where  $\cos \varphi$  is the power factor found from the ratio:

$$\cos \varphi = \frac{P}{S}$$

### EFFICIENCY

In accordance with the agreements signed at the Rio and Buenos Aires international conferences, **the new generation of motors with aluminium or cast iron frame** has been designed to improve efficiency in order to reduce atmospheric pollution (carbon dioxide).

The improved efficiency of low voltage industrial motors (representing around 50% of installed power in industry) has had a large impact on energy consumption.



### Advantages of improvement in efficiency:

| Motor characteristics                      | Effects on the motor                                                                       | Customer benefits                                                                     |
|--------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Increase in efficiency and in power factor | -                                                                                          | Lower operating costs<br>Longer service life (x2 or 3)<br>Better return on investment |
| Noise reduction                            | -                                                                                          | Improved working conditions                                                           |
| Vibration reduction                        | -                                                                                          | Quiet operation and longer service life of equipment being driven                     |
| Temperature reduction                      | Longer service life of fragile components (insulation system components, greased bearings) | Reduced number of operating incidents and reduced maintenance costs                   |
|                                            | Increased capability of instantaneous or extended overloads                                | Wider field of applications (voltages, altitude, ambient temperature, etc)            |

### INFLUENCE OF LOAD ON EFFICIENCY AND COS φ

See the selection data.

Overrating motors in a number of applications causes them to operate at about 3/4 load, resulting in optimum motor efficiency.

## RATED POWER $P_N$ IN RELATION TO DUTY CYCLE GENERAL RULE FOR STANDARD MOTORS

$$P_n = \sqrt{\frac{n \times t_d \times [I_D/I_n \times P]^2 + (3600 - n \times t_d) P^2 u \times f_{dm}}{3600}}$$

Iterative calculation where:

$t_d(s)$  starting time achieved with motor rated  $P_{(w)}$

$n$  number of (equivalent) starts per hour

$f_{dm}$  (OF) Operating factor (decimal)

$I_D/I_n$  current demand for motor rated  $P$

$P_{u(w)}$  motor output power during the duty cycle using OF (in decimal), operating factor

$P_{(w)}$  motor rated power selected for the calculation

**Note:**  $n$  and OF are defined in section

D4.6.2

$Sp$  = specification

|     |                                                                                                                                                      |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------|
| S1  | OF = 1 ; $n \leq 6$                                                                                                                                  |
| S2  | $n = 1$ operating<br>life determined by specification ( $Sp$ )                                                                                       |
| S3  | OF according to $Sp$ ; $n \sim 0$<br>(no effect of starting on temperature rise)                                                                     |
| S4  | OF according to $Sp$ ; $n$ according to $Sp$ ; $t_d$ , $P_u$ ,<br>$P$ according to $Sp$<br>(replace $n$ with $4n$ in the above formula)              |
| S5  | OF according to $Sp$ ; $n = n$ starts<br>+ 3 $n$ brakings = $4n$ ;<br>$t_d$ , $P_u$ , $P$ as per CdC<br>(replace $n$ with $4n$ in the above formula) |
| S6  | $P = \sqrt{\frac{\sum n_i (P_i^2 \cdot t_i)}{\sum n_i t_i}}$                                                                                         |
| S7  | same formula as S5 but OF = 1                                                                                                                        |
| S8  | at high speed, same formula as in S1<br>at low speed, same formula as in S5                                                                          |
| S9  | S8 duty formula after complete description<br>of cycle with OF on each speed                                                                         |
| S10 | same formula as S6                                                                                                                                   |

In addition, see the warning regarding precautions to be taken. Variations in voltage and/or frequency greater than standard should also be taken into account. The application should also be taken into account (general at constant torque, centrifugal at quadratic torque, etc).

## DETERMINATION OF THE POWER IN INTERMITTENT DUTY CYCLES FOR ADAPTED MOTORS

### RMS POWER IN INTERMITTENT DUTY

This is the rated power absorbed by the driven machine, usually defined by the manufacturer.

If the power absorbed by the machine varies during a cycle, the rms power  $P$  is calculated using the equation:

$$P = \sqrt{\frac{\sum n_i (P_i^2 \cdot t_i)}{\sum n_i t_i}} = \sqrt{\frac{P_1^2 \cdot t_1 + P_2^2 \cdot t_2 + \dots + P_n^2 \cdot t_n}{t_1 + t_2 + \dots + t_n}}$$

if, during the working time the absorbed power is:

$P_1$  for period  $t_1$

$P_2$  for period  $t_2$

$P_n$  for period  $t_n$

Power values lower than 0.5  $P_N$  are replaced by 0.5  $P_N$  in the calculation of rms power  $P$  (no-load operation is a special case).

Additionally, it is also necessary to check that for a particular motor of power  $P_N$ :

- the actual starting time is at most equal to 5 seconds
- the maximum output of the cycle does not exceed twice the rated output power  $P$
- there is still sufficient accelerating torque during the starting period

### Load factor (LF)

Expressed as a percentage, this is the ratio of the period of operating time with a load during the cycle to the total powered-up time during the cycle.

### Operating factor (OF)

Expressed as a percentage, this is the ratio of the motor powered-up time during the cycle to the total cycle time, provided that the total cycle time is less than 10 minutes.

### Starting class

Class:  $n = nD + k \cdot nF + k' \cdot ni$

$nD$ : number of complete starts per hour

$nF$ : number of electrical braking operations per hour

“Electrical braking” means any braking directly involving the stator winding or the rotor winding:

- Regenerative braking (with frequency drive, multipole motor, etc).
- Reverse-current braking (the most commonly used)
- D.C. injection braking

$ni$ : number of pulses (incomplete starts up to a third of maximum speed) per hour

$k$  and  $k'$  are constants determined as follows:

|                       | $k$ | $k'$ |
|-----------------------|-----|------|
| Cage induction motors | 3   | 0.5  |

- Reversing the direction of rotation involves braking (usually electrical) and starting.

- Braking with Leroy-Somer electro-mechanical brakes, as with any other brakes that are independent of the motor, does not constitute electrical braking in the sense described above.

### CALCULATING DERATING

- Input criteria (load)
  - rms power during the cycle = P
  - Moment of inertia related to the speed of the motor:  $J_e$
  - Operating factor = OF
  - Class of starts per hour = n
  - Resistive torque during starting =  $M_r$

- Selection in catalogue
  - Motor rated power = PN
  - Starting current  $I_d$ ,  $\cos\phi_D$
  - Moment of rotor inertia  $J_r$
  - Average starting torque  $M_{mot}$
  - Efficiency at PN( $\eta_{PN}$ ) and at P( $\eta_P$ )

### Calculations

- Starting time:

$$t_d = \frac{\pi}{30} \cdot N \cdot \frac{(J_e + J_r)}{M_{mot} - M_r}$$

- Cumulative starting time per hour:  $n \times t_d$

- Energy to be dissipated per hour during starts = sum of the energy dissipated in the rotor (= inertia acceleration energy) and the energy dissipated in the stator during the cumulative starting time per hour:

$$E_d = \frac{1}{2} (J_e + J_r) \left( \frac{\pi \cdot N}{30} \right)^2 \times n + n \times t_d \sqrt{3} U_d \cos\phi_d$$

- Energy to be dissipated during operation

$$E_f = P \cdot (1 - \eta_P) \cdot [(OF) \times 3600 - n \times t_d]$$

- Energy that the motor can dissipate at rated power with the Operating Factor for Intermittent Duty.

$$E_m = (OF) 3600 \cdot P_N (1 - \eta_{PN})$$

(The heat dissipated when the motor is at rest can be ignored).

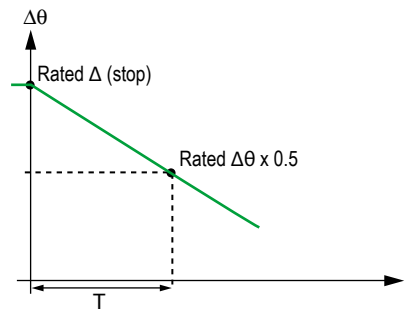
Dimensioning is correct if the following relationship is verified =

$$E_m \geq E_d + E_f$$

If the sum of  $E_d + E_f$  is lower than 0.75  $E_m$ , check whether a motor with the next lowest power rating would be more suitable.

### EQUIVALENT THERMAL CONSTANT

The equivalent thermal constant enables the machine cooling time to be predetermined.



$$\text{Thermal constant} = \frac{T}{\ln 2} = 1.44 T$$

Cooling curve  $\Delta\theta = f(t)$

where:

$\Delta\theta$  = temperature rise in S1 duty

$T$  = time taken to go from the nominal temperature rise to half its value

$t$  = time

$\ln$  = natural logarithm

### TRANSIENT OVERLOAD AFTER OPERATING IN TYPE S1 DUTY CYCLE

At rated voltage and frequency, the motors can withstand an overload of:

1.20 for an OF = 50 %

1.40 for an OF = 10 %

However, it is necessary to ensure that the maximum torque is much greater than 1.5 times the rated torque corresponding to the overload.

As of 1st January 2015, European regulations require IE3 motors or IE2 motors + drive to be released onto the market.

The motors in this catalogue comply with regulation 640/2009, and its modifications, in the ErP directive. For better selection, use and adjustment of the drive parameters, IE2 motors, as defined in the following pages, benefit from a dual nameplate\* which means equally good performance can be obtained on a mains supply (non- EU market) as on a drive (EU market).

It should also be noted that the regulation requires information to be included on the nameplate stating that a variable speed drive must be used with a class IE2 motor\*.

\* See example of nameplate in the Identification section.



CEMEP (the European Committee of Manufacturers of Electrical Machines and Power Electronics) decided to create a label to highlight the conformance of motors manufactured by its members with European regulations, thus ensuring the conformance of products released onto the market with the implementing regulation in the ErP directive.

The Emerson range of drives is extremely well adapted to all the most demanding constraints of the market.



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For applications which require an encoder and/or forced ventilation unit, refer to the LSMV range (catalogue ref. 4981) which is specially designed for variable speed.



### APPLICATIONS AND CHOICE OF SOLUTIONS

In principle, there are three typical types of load. It is essential to determine the speed range and the application torque (or power) in order to select the drive system:

#### CENTRIFUGAL MACHINES

The torque varies as the square of the speed (or cube of the power). The torque required for acceleration is low (about 20% of rated torque). The starting torque is low.

- Sizing: depends on the power or torque at maximum speed
- Drive selected for normal duty

Typical applications: ventilation, pumping, ...

#### APPLICATIONS WITH CONSTANT TORQUE

The torque remains constant throughout the speed range. The torque required for acceleration may be high, depending on the machine (higher than the rated torque).

- Sizing: depends on the torque required over the entire speed range
- Drive selected for heavy duty

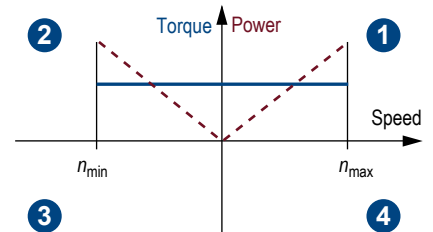
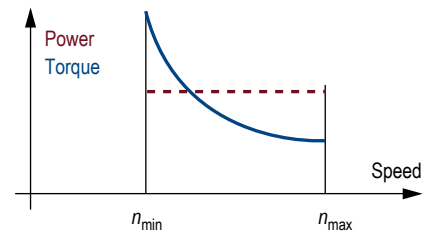
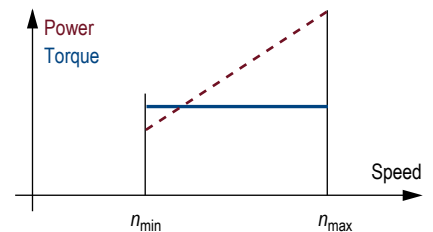
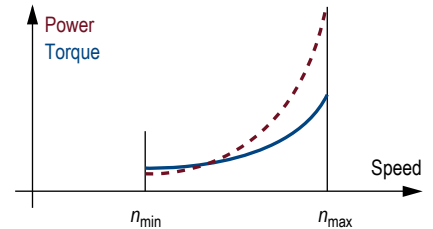
Typical machines: extruders, crushers, gantries, presses, ...

#### APPLICATIONS WITH CONSTANT POWER

The torque decreases as the speed increases. The torque required for acceleration is no more than the rated torque. The starting torque is at its maximum.

- Sizing: depends on the torque required at minimum speed and the range of operating speeds.
- Drive selected for heavy duty
- An encoder feedback is advisable for improved regulation

Typical machines: winders, machine tool spindles, ...



### 4 QUADRANTS MACHINES

These applications have a torque/speed operating type as described opposite, but the load becomes a driving load in certain stages of the cycle.

- Sizing: see above depending on the load.
- In the case of repetitive braking, install a reinforced insulation system (RIS).
- Drive selection: to dissipate the power from a driving load, it is possible to use a braking resistor, or to send power back to the grid. In the latter case, a regenerative or 4-quadrant drive should be used.

Typical machines: centrifuges, travelling cranes, presses, machine tool spindles, etc

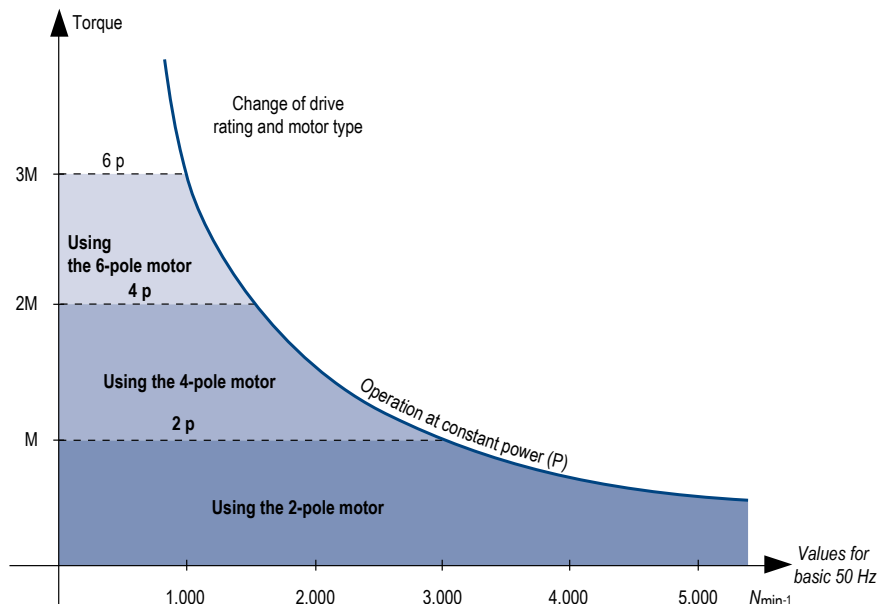
### CHOICE OF INVERTER/ MOTOR COMBINATION

The curve below expresses the output torque of a 50 Hz motor (2, 4 or 6 poles) supplied by a drive.

For a frequency inverter with power  $P_N$  operating at constant power  $P$  within a determined range of speeds, it is possible to optimise the choice of motor and its number of poles to give a maximum amount of torque.

*Example: the Unidrive M400-034-00056A-3.5 T drive can supply the following motors:*  
 LSES 90 - 2 p - 2.2 kW - 7.1 N.m  
 LSES 100 - 4 p - 2.2 kW - 14.6 N.m  
 LSES 112 - 6 p - 2.2 kW - 21.9 N.m

The choice of the motor and inverter combination will therefore depend on the application.



## USING THE MOTOR AT CONSTANT TORQUE FROM 0 to 87 HZ

Using motors with a  $\Delta$  connection in conjunction with a frequency inverter increases the constant torque range from 50 to 87 Hz, which can increase the power by the same ratio.

The size of the frequency inverter is determined by the current value in 230 V and programmed with a voltage/frequency ratio of 400 V 87 Hz.

### Example of selection with 4 poles:

- For constant torque of 195 Nm from 750 to 2600 min<sup>-1</sup>:

-> selection: 30 kW 4P LSES motor + 100 A drive

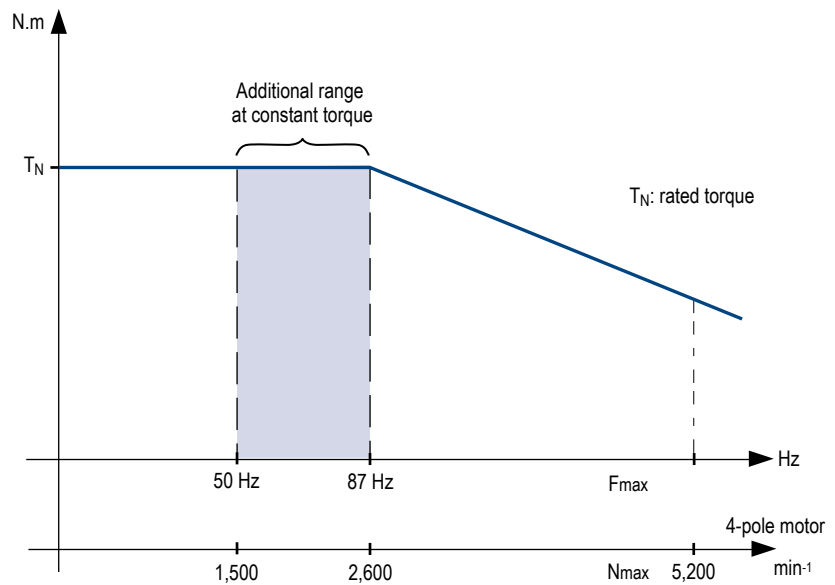
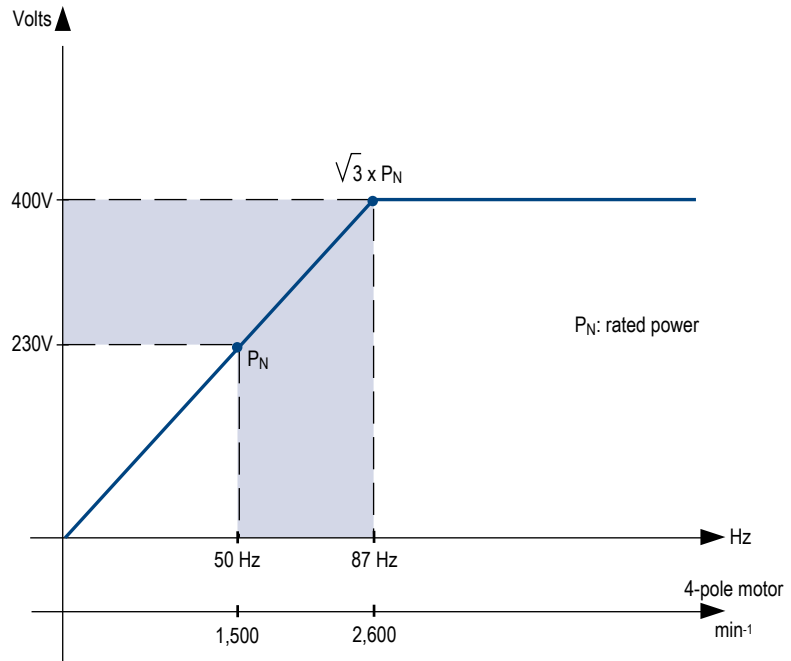
### Example of selection with 2 poles:

- For constant power of 4 kW from 3000 to 5200 min<sup>-1</sup>:

-> selection: 3 kW 2P LSES motor + 11 A drive

**CAUTION: Max. mechanical speed by frame size to be complied with.**

## Characteristics of motors on drives 230 V $\Delta$ connection 400 V 50 Hz supply





The motors in this catalog are equipped with PTC sensors for frame size  $\geq 160$  mm

### MOTORS USED WITH VARIABLE SPEED DRIVE

#### GENERAL

Drive control by a frequency inverter can in fact result in an increase in the machine temperature rise, due to a significantly lower supply voltage than on the mains, additional losses related to the wave form produced by the drive (PWM) and the reduction in speed of the cooling fan.

Standard IEC 60034-17 describes numerous good practices for all types of electric motor, however since this is LEROY-SOMER's area of specialist expertise, we describe the best ways to deal with variable speed in the section below.

#### DERATING THE POWER WHEN THE LSES, FLSES AND PLSES RANGES ARE USED AT VARIABLE SPEED

**Reminder:** Leroy-Somer recommends the use of PTC sensors, monitored by the drive, to protect the motor.

**The choice of temperature class B for the mains power supply means that LSES, FLSES or PLSES motors can be used on a drive without derating the power in centrifugal applications. In this case, the temperature class will change from B to F, ie. between 80 and 105 K.**

In constant torque applications which can operate below the rated frequency and to avoid derating the power, it may prove necessary to use a forced ventilation unit, depending on the operating cycle.

**Note 1:** The thermal reserve, a Leroy-Somer special feature, should be used to keep the motor in its temperature class. However in certain cases, the temperature class will change from B to F, ie. between 80 K and 105 K.

**Note 2:** To avoid changes in frame size due to derating within the standard ranges, Leroy-Somer has developed a range of LSMV adapted motors with standardized dimensions.

### ADAPTATION OF MOTORS

A motor is always characterised by the following parameters, which depend on the design:

- temperature class
- voltage range
- frequency range
- thermal reserve

### CHANGES IN MOTOR PERFORMANCE

When power is supplied by a drive, changes are observed in the above parameters due to certain phenomena:

- Voltage drops in the drive components
- Current increase in proportion with the decrease in voltage
- Difference in motor power supply according to the type of control (flux vector or U/F)

The main consequence is an increase in the motor current resulting in increased copper losses and therefore a higher temperature rise in the winding (even at 50 Hz).

Reducing the speed leads to a reduction in air flow and hence a reduction in cooling efficiency, and as a result the motor temperature rise will increase again. Conversely, in prolonged operation at high speed, the fan may make excessive noise, and it is advisable to install a forced ventilation system.

Above the synchronous speed, the iron losses increase and hence cause further temperature rise in the motor.

The type of control mode influences temperature rise in the motor:

- A U/F ratio gives the fundamental voltage maximum at 50 Hz but requires more current at low speed to obtain a high starting torque and therefore generates a temperature rise at low speed when the motor is poorly ventilated.
- Flux vector control requires less current at low speed while providing significant torque but regulates the voltage at 50 Hz and causes a voltage drop at the motor terminals, therefore requiring more current at the same power.

### Consequences for the motor

**Reminder: Leroy-Somer recommends the connection of PTC sensors, monitored by the drive, to protect the motor as much as possible.**

### CONSEQUENCES OF POWER SUPPLIED BY DRIVES

When power is supplied to the motor by a variable speed drive with diode rectifier, this causes a voltage drop (~5%).

Some PWM techniques can be used to limit this voltage drop (~2%), to the detriment of the machine temperature rise (injection of harmonics of orders 5 and 7).

The non-sinusoidal signal (PWM) provided by the drive generates voltage peaks at the winding terminals due to the significant voltage variations relating to switching of the IGBTs (also called  $dV/dt$ ). Repeated overvoltages can eventually damage the windings depending on their value and/or the motor design.

The value of the voltage peaks is proportional to the supply voltage. This value can exceed the minimum voltage for the windings which is related to the wire grade, the impregnation type and the insulation that may or may not be present in the slot bottoms or between phases.

Another reason for attaining high voltage values is when regeneration phenomena occur in the case of a driving load, hence the need to prioritise freewheel stops or stops that follow the longest permissible ramp.

## INSULATION SYSTEM FOR VARIABLE SPEED APPLICATIONS

The insulation system for the LSES, FLSES or PLSES motor series means it can be used on a drive without modification, regardless of the size of the machine or the application, at a supply voltage  $\leq 480$  V 50/60 Hz and can tolerate voltage peaks up to 1500 V and variations of 3500 V/ $\mu$ s at the motor terminals.

These values are guaranteed without using a filter at the motor terminals.

For any voltage  $> 480$  V, Leroy-Somer's reinforced insulation system (RIS) must be used unless otherwise agreed by Leroy-Somer or a sine filter is used (only compatible with a U/F control mode).

### RECOMMENDATIONS CONCERNING THE MECHANISM OF ROTATION FOR VARIABLE SPEED APPLICATIONS

The voltage wave form at the drive output (PWM) can generate high-frequency leakage currents which can, in certain situations, damage the motor bearings.

This phenomenon is amplified with:

- High mains supply voltages
- Increased motor size
- Incorrectly earthed motor-drive system
- Long cable length between the drive and the motor
- Motor incorrectly aligned with the driven machine

Leroy-Somer machines which have been earthed in accordance with good practice need no special options except in the situations listed below:

- For voltage  $\leq 480$  V 50/60 Hz, and frame size  $\geq 315$  mm, we recommend using an insulated NDE bearing.
- For voltage  $> 480$  V 50/60 Hz, and frame size  $\geq 315$  mm, we recommend using 2 insulated bearings. Another solution could be to only use one insulated NDE bearing, accompanied by a filter at the drive output (dV/dt type or common mode filter).

## SUMMARY OF RECOMMENDED PROTECTION

| Mains voltage                       | Cable length              | Frame size      | Winding protection  | Insulated bearings                           |
|-------------------------------------|---------------------------|-----------------|---------------------|----------------------------------------------|
| $\leq 480$ V                        | $< 20$ m                  | All frame sizes | Standard            | No                                           |
|                                     | $> 20$ m<br>and $< 100$ m | $\leq 315$      | Standard            | No                                           |
|                                     |                           | $\geq 315$      | RIS or drive filter | NDE                                          |
| $\leq 480$ V<br>and<br>$\leq 690$ V | $< 20$ m                  | $< 250$         | Standard            | No                                           |
|                                     |                           | $\geq 250$      | RIS or drive filter | NDE                                          |
|                                     | $> 20$ m<br>and $< 100$ m | $\leq 250$      | RIS or drive filter | NDE                                          |
|                                     |                           | $\geq 250$      | RIS or drive filter | NDE (or DE+NDE if no filter for $\geq 315$ ) |

**RIS:** Reinforced Insulation system.

**The filter is recommended above frame size 315.**

Standard insulation = 1500 V peak and 3500 V/ $\mu$ s.

For different cable length(s) and/or voltage(s), please consult Leroy-Somer.

### EXTREME OPERATING CONDITIONS AND OTHER POINTS

#### MOTOR CONNECTIONS

Leroy-Somer do not recommend any specific connections for applications operating with a single motor on a single drive.

#### TRANSIENT OVERLOADS

Drives are designed to withstand transient overload. When the overload values are too high, the system will automatically shut down. Leroy-Somer motors are designed to withstand these overloads, however in the event of very repetitive operation we still recommend use of a temperature sensor at the heart of the motor.

#### STARTING TORQUE AND CURRENT

Thanks to advances in control electronics, the torque available when the motor is switched on can be adjusted to a value between the rated torque and the variable speed drive breakdown torque. The starting current will be directly related to the torque (120 or 180%).

#### ADJUSTING THE SWITCHING FREQUENCY

The variable speed drive switching frequency has an impact on losses in the motor and the drive, on the acoustic noise and the torque ripple.

A low switching frequency has an adverse effect on temperature rise in motors.

Leroy-Somer recommends a drive switching frequency of 3 kHz minimum.

In addition, a high switching frequency optimises the acoustic noise and torque ripple level.

#### OPERATION AT SPEEDS HIGHER THAN THOSE ASSIGNED BY THE MAINS FREQUENCIES

(speed higher than 3600 min<sup>-1</sup>) can be risky:

- The cage may be damaged
- Bearing life may be impaired
- There may be increased vibration
- Etc.

When high-speed motors are used, they often need to be adapted, **and an in-depth mechanical and electrical design exercise is needed.**

#### CHOICE OF MOTOR

There are two possibilities:

##### **a - The frequency inverter is not supplied by Leroy-Somer**

All the motors in this catalogue can be used with a frequency inverter. Depending on the application, motors will need to be derated by around 10% compared to the motor operating curves in order to guarantee that motors will not be damaged.

##### **b - The frequency inverter is supplied by Leroy-Somer**

As these two ranges have been specifically designed for use in combination, excellent performance is guaranteed, in accordance with the curves on the previous page.

Use of motors in the LSMV range, especially in constant torque applications, can achieve unrivalled performance levels.



### GOOD WIRING PRACTICE

It is the responsibility of the user and/or the installer to connect the motor-drive system in accordance with the current legislation and regulations in the country of use. This is particularly important as concerns cable size and connection of earths and grounds.

The following information is given for guidance only, and should never be used as a substitute for the current standards, nor does it relieve the installer of his responsibility.

To ensure the safety of motors with frame size 315 mm or above, we recommend installing grounding braids between the terminal box and the housing and/or the motor and the driven machine.

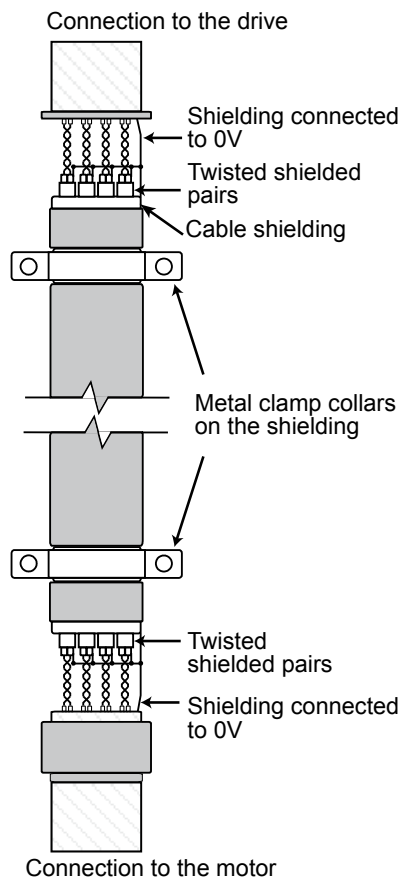
For high-powered motors, unshielded single-core cables can be used as long as they are installed together in a metal cable duct earthed on both sides with a grounding braid.

Cables must be kept as short as possible.

### Connection of control and encoder cables



**Strip back the shielding on the metal clamp collars in order to ensure 360° contact.**



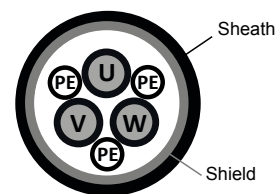
### Power cables

The following information is given for guidance only, and should never be used as a substitute for the current standards, nor does it relieve the installer of his responsibility. For more information, please refer to technical specification IEC 60034-25.

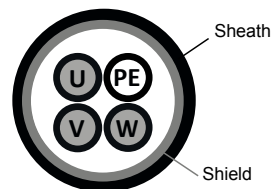
To ensure the safety of personnel, the size of the earthing cables should be determined individually in accordance with local regulations.

For compliance with standard EN 61800-3, the power conductors between drive and motor must be shielded. Use a special variable speed cable: shielded with low stray capacity and with 3 PE conductors 120° apart (diagram below).

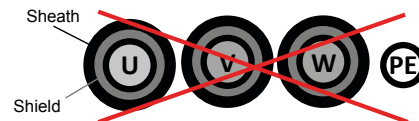
There is no need to shield the drive power supply cables.



**CAUTION: the following configuration is acceptable only if the motor cables include phase conductors with a cross-section below 10 mm<sup>2</sup> (motors < 30 kW / 40 HP).**



The use of shielded unipolar cables is forbidden.



The variable speed drive wiring must be symmetrical (U,V,W at the motor end must correspond to U,V,W at the drive end) with the cable shielding earthed at both the drive end and motor end over 360°.

When the installation complies with EMC 61800-3 standard on C2 category emissions (if the user has an HV/LV transformer), the shielded motor power supply cable can be replaced with a 3-core + earth cable placed in a fully-enclosed metal conduit (metal cable duct for example).

This metal conduit must be mechanically connected to the electrical cabinet and the structure supporting the motor.

**If the conduit consists of several pieces, these should be interconnected by braids to ensure earth continuity.**

The cables must be fixed securely at the bottom of the conduit.

**The motor earth terminal (PE) must be connected directly to the drive earth terminal.**

A separate PE protective conductor is mandatory if the conductivity of the cable shielding is less than 50% of the conductivity of the phase conductor.

### TYPICAL INSTALLATION OF A MOTOR-DRIVE

The following information is given for guidance only, and should never be used as a substitute for the current standards, nor does it relieve the installer of his responsibility.

Depending on the installation, more optional elements can be added to the installation:

**Fuse switch:** a padlockable breaking device to isolate the installation in case of intervention.

This element must ensure thermal and short-circuit protections. The fuse rating is indicated in the drive documentation. The fuse switch can be replaced by a circuit breaker (with a suitable breaking power).

**RFI filter:** its role is to reduce electromagnetic emissions of drives and hence meet EMC standards. In standard, our drives are fitted with an internal RFI filter. Certain environments require adding an external filter. Refer to the drive documentation for the levels of compliance of the drive, with and without external RFI filter.

**Drive supply cables:** these cables do not require systematic shielding. Their cross-section is recommended in the drive documentation, however, it can be adapted according to the type of cable, fitting mode, cable length (voltage drop), etc.

**Line reactor:** it reduces the risk of damage of the drives following an imbalance between phases or strong disturbance on the main supply. The line reactor also reduces low frequency harmonics.

**Motor choke:** different types of chokes or filters are available. According to the case at hand, the motor choke reduces high frequency leakage currents, differential currents between phases, voltage peaks  $dV/dt$ ... The choke is chosen according to the distance between motor and drive.

**Motor supply cables:** these cables must be shielded to ensure EMC compliance of the installation. The cable shield must be connected over 360° at both ends. The cross-section of the cables is recommended in the drive documentation, however, it can be adapted according to the type of cable, fitting mode, cable length (voltage drop), etc.

**Encoder cable:** the shielding of the sensor cables is important because of the interferences with the power cables. This cable must be laid at least 30 cm away from any power cables.

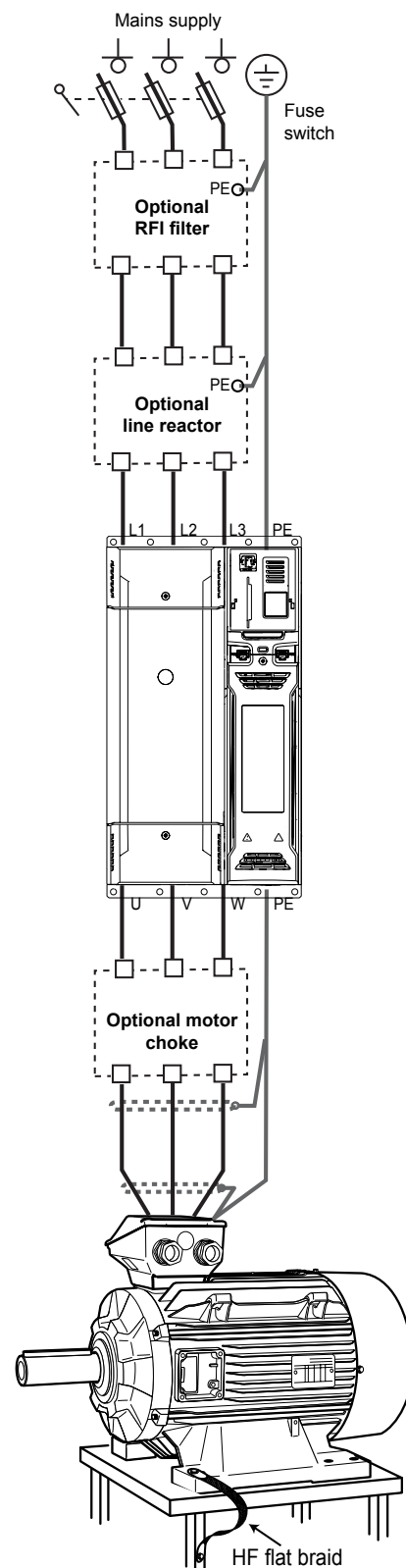
**Power cable sizing:** size the drive and motor supply cables according to the applicable standard and operating current, as indicated in the drive documentation.

Factors to be taken into account:

- installation method: inside a duct, a raceway, suspended,...
- Conductor material: copper or aluminium

Once the cable cross-section has been determined, check the voltage drop at the motor terminals. A high voltage drop causes increased current and additional loss in the motor (heating).

**Equipotential bonding between the frame, motor, drive and ground carried out in accordance with good practice will contribute significantly to reducing the voltage on the shaft and the motor casing, resulting in fewer high-frequency leakage currents. Premature breakage of bearings and auxiliary equipment, such as encoders, will thus be largely avoided.**





## General Operation Noise level

### NOISE EMITTED BY ROTATING MACHINES

In a compressible medium, the mechanical vibrations of an elastic body create pressure waves which are characterized by their amplitude and frequency. The pressure waves constitute an audible noise if they have a frequency of between 16 Hz and 16,000 Hz.

Noise is measured by a microphone linked to a frequency analyser. Measurements are taken in an anechoic chamber on machines at no-load, and a sound pressure level  $L_p$  or a sound power level  $L_w$  can then be established. Measurement can also be carried out in situ on machines which may be on-load, using an acoustic intensity meter which can differentiate between sound sources and identify the sound emissions from the machine.

The concept of noise is linked to hearing. The auditory sensation is determined by integrating weighted frequency components with isosonic curves (giving a sensation of constant sound level) according to their intensity.

The weighting is carried out on sound meters using filters whose bandwidth takes into account, to a certain extent, the physiology of the human ear:

**Filter A:** used for low and medium noise levels. High attenuation, narrow bandwidth.

**Filter B:** used for very high noise levels. Wide bandwidth.

**Filter C:** very low attenuation over the whole of the audible frequency range.

A few basic definitions:

The unit of reference is the bel, and the sub-multiple decibel dB is used here.

Sound pressure level in dB

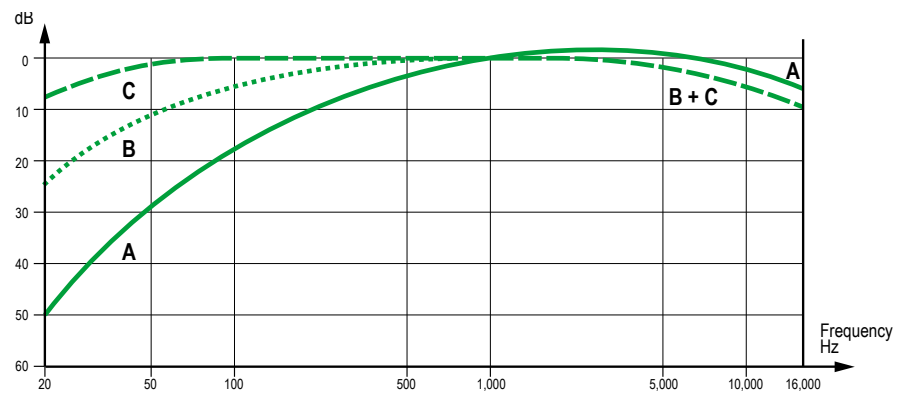
$$L_p = 20 \log_{10} \left( \frac{P}{P_0} \right) \quad p_0 = 2 \cdot 10^{-5} \text{ Pa}$$

Sound power level in dB

$$L_w = 10 \log_{10} \left( \frac{P}{P_0} \right) \quad p_0 = 10^{-12} \text{ W}$$

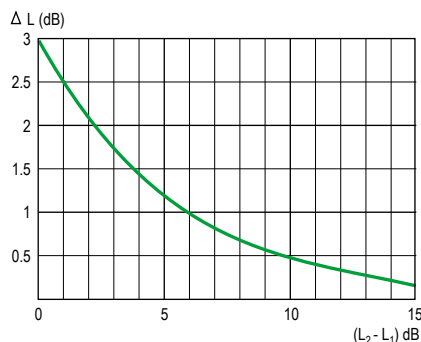
Sound intensity level in dB

$$L_w = 10 \log_{10} \left( \frac{I}{I_0} \right) \quad I_0 = 10^{-12} \text{ W/m}^2$$



### CORRECTION OF MEASUREMENTS

For differences of less than 10 dB between 2 sound sources or where there is background noise, corrections can be made by addition or subtraction using the rules below.

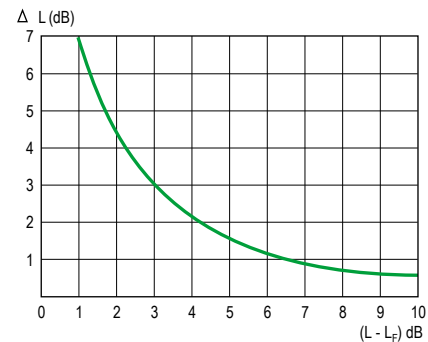


#### Addition of levels

If  $L_1$  and  $L_2$  are the separately measured levels ( $L_2 \geq L_1$ ), the resulting sound level  $L_R$  will be obtained by the formula:

$$L_R = L_2 + \Delta L$$

$\Delta L$  is found by using the curve above.



#### Subtraction of levels\*

This is most commonly used to eliminate background noise from measurements taken in a "noisy" environment.

If  $L$  is the measured level and  $L_f$  the background noise level, the actual sound level  $L_R$  will be obtained by the calculation:

$$L_R = L - \Delta L$$

$\Delta L$  is found by using the curve above.

*\*This method is the one normally used for measuring sound power and pressure levels. It is also an integral part of sound intensity measurement.*

Under IEC 60034-9, the guaranteed values are given for a machine operating at no-load under normal supply conditions (IEC 60034-1), in the actual operating position, or sometimes in the direction of rotation as specified in the design.

This being the case, standardized sound power level limits are shown for the values obtained for the machines described in this catalogue.

(Measurements were taken in conformity with standard ISO 1680).

Expressed as sound power level ( $L_w$ ) according to the standard, the level of sound is also shown as sound pressure level ( $L_p$ ) in the selection data.

The maximum standard tolerance for all these values is + 3 dB(A).



**The noise levels of the motors in this catalogue are indicated in the selection tables.**

### VIBRATION LEVELS - BALANCING

Inaccuracies due to construction (magnetic, mechanical and air-flow) lead to sinusoidal (or pseudo sinusoidal) vibrations over a wide range of frequencies. Other sources of vibrations disturb operation: bad fastening of the frame, incorrect coupling, bushing misalignment, etc.

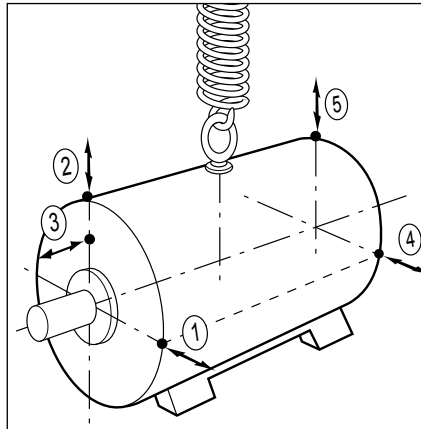
We shall first of all look at the vibrations emitted at the operating frequency, corresponding to an unbalanced load, whose amplitude swamps all other frequencies and on which the dynamic balancing of the mass in rotation has a decisive effect.

Under standard ISO 8821, rotating machines can be balanced with or without a key or with a half-key on the shaft extension.

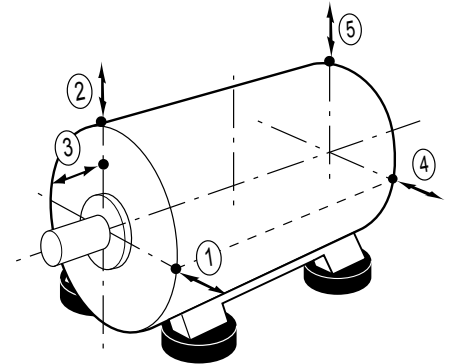
Standard ISO 8821 requires the balancing method to be marked on the shaft extension as follows:

- Half-key balancing: letter H
- Full key balancing: letter F
- No-key balancing: letter N

The machines in this catalogue are in vibration class level A - level B is available on request.



**Measuring system for suspended machines**



**Measuring system for machines on flexible mountings**

The measurement points quoted in the standards are indicated in the drawings above.

At each point, the results should be lower than those given in the tables below for each balancing class and only the highest value is to be taken as the "vibration level".

### MEASURED MAGNITUDE

The vibration speed can be chosen as the variable to be measured. This is the speed at which the machine moves either side of its static position. It is measured in mm/s.

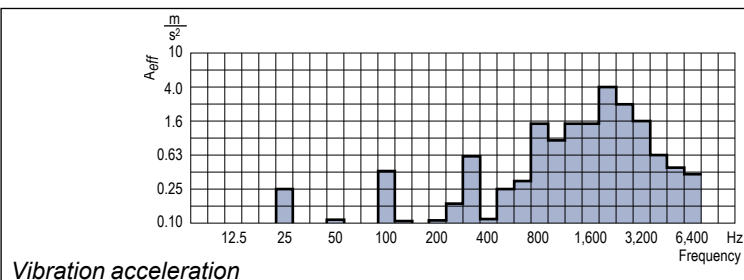
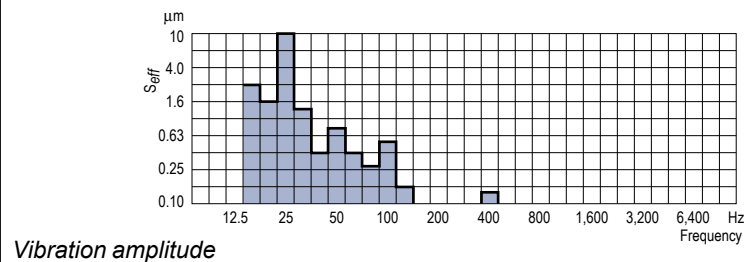
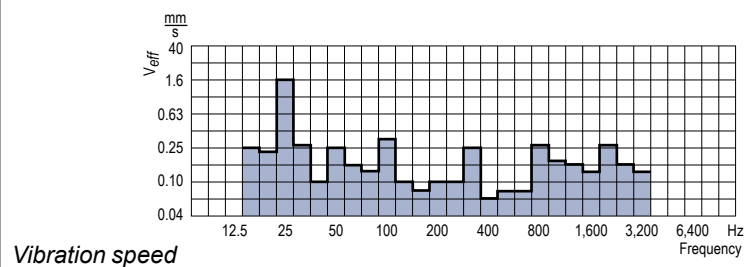
As the vibratory movements are complex and non-harmonic, it is the root mean square (rms) value of the speed of vibration which is used to express the vibration level.

Measured are the vibratory displacement amplitude (in  $\mu\text{m}$ ) or vibratory acceleration (in  $\text{m/s}^2$ ). If the vibratory displacement is measured against frequency, the measured value decreases with the frequency: high-frequency vibrations cannot be measured.

If the vibratory acceleration is measured, the measured value increases with the frequency: low-frequency vibrations (unbalanced loads) cannot be measured here.

The rms speed of vibration is the variable chosen by the standards.

However, if preferred, the table of vibration amplitudes may still be used (for measuring sinusoidal and similar vibrations).



**MAXIMUM VIBRATION MAGNITUDE LIMITS (RMS VALUES), IN TERMS OF DISPLACEMENT, SPEED AND ACCELERATION FOR A FRAME SIZE H (IEC 60034-14)**

| Vibration level | Frame size $H$ (mm)        |            |                             |                            |            |                             |                            |            |                             |
|-----------------|----------------------------|------------|-----------------------------|----------------------------|------------|-----------------------------|----------------------------|------------|-----------------------------|
|                 | $56 \leq H \leq 132$       |            |                             | $132 < H \leq 280$         |            |                             | $H > 280$                  |            |                             |
|                 | Displacement $\mu\text{m}$ | Speed mm/s | Acceleration $\text{m/s}^2$ | Displacement $\mu\text{m}$ | Speed mm/s | Acceleration $\text{m/s}^2$ | Displacement $\mu\text{m}$ | Speed mm/s | Acceleration $\text{m/s}^2$ |
| <b>A</b>        | 25                         | 1.6        | 2.5                         | 35                         | 2.2        | 3.5                         | 45                         | 2.8        | 4.4                         |
| <b>B</b>        | 11                         | 0.7        | 1.1                         | 18                         | 1.1        | 1.7                         | 29                         | 1.8        | 2.8                         |

For large machines and special requirements with regard to vibration, balancing can be carried out *in situ* (finished assembly). Prior consultation is essential, as the machine dimensions may be modified by the necessary addition of balancing disks mounted on the shaft extensions.

## THERMAL PROTECTION

Motors are protected by a manual or automatic overcurrent relay, placed between the isolating switch and the motor. This relay may in turn be protected by fuses.

These protection devices provide total protection of the motor against non-transient overloads. If a shorter reaction time is required, if you want to detect transient overloads, or if you wish to monitor temperature rises at "hot spots" in the motor or at strategic points in the installation for maintenance purposes, it would be advisable to install heat

sensors at sensitive points. The various types are shown in the table below, with a description of each. It must be emphasized that under no circumstances can these sensors be used to carry out direct regulation of the motor operating cycles.

## BUILT-IN INDIRECT THERMAL PROTECTIONS

| Type                                                                                                                                 | Operating principle                                                        | Operating curve | Breaking capacity (A)                  | Protection provided                                       | Mounting Number of devices*                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-----------------|----------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Normally closed thermal protection<br><b>PTO</b>                                                                                     | Bimetallic strip, indirectly heated, with normally closed (NC) contact<br> |                 | 2.5 A at 250 V<br>with $\cos \phi$ 0.4 | General monitoring for non-transient overloads            | Mounting in control circuit<br>2 in series                                                  |
| Normally open thermal protection<br><b>PTF</b>                                                                                       | Bimetallic strip, indirectly heated, with normally open (NO) contact<br>   |                 | 2.5 A at 250 V<br>with $\cos \phi$ 0.4 | General monitoring for non-transient overloads            | Mounting in control circuit<br>2 in parallel                                                |
| Positive temperature coefficient thermistor<br><b>PTC</b>                                                                            | Non-linear variable resistor, indirectly heated<br>                        |                 | 0                                      | General monitoring for transient overloads                | Mounted with associated relay in control circuit<br>3 in series                             |
| Temperature sensor<br><b>KT Y</b>                                                                                                    | Resistance depends on the winding temperature                              |                 | 0                                      | High accuracy continuous surveillance of key hot spots    | Mounted in control boards with associated reading equipment (or recorder)<br>1 per hot spot |
| Thermocouples<br><b>T</b> ( $T < 150^\circ\text{C}$ )<br>Copper Constantan<br><b>K</b> ( $T < 1000^\circ\text{C}$ )<br>Copper-nickel | Peltier effect                                                             |                 | 0                                      | Continuous surveillance of hot spots at regular intervals | Mounted in control boards with associated reading equipment (or recorder)<br>1 per hot spot |
| Platinum temperature sensor<br><b>PT 100</b>                                                                                         | Linear variable resistor, indirectly heated                                |                 | 0                                      | High accuracy continuous surveillance of key hot spots    | Mounted in control boards with associated reading equipment (or recorder)<br>1 per hot spot |

- NRT: nominal running temperature.

- The NRTs are chosen according to the position of the sensor in the motor and the temperature rise class.

- **KT Y** 84/130 as standard.

\* The number of devices relates to the winding protection.

## FITTING THERMAL PROTECTION

- PTO or PTF, in the control circuits
- PTC, with relay, in the control circuits
- PT 100 or thermocouples, with reading equipment or recorder, in the installation control panel for continuous surveillance

## ALARM AND EARLY WARNING

All protective equipment can be backed up by another type of protection (with different NRTs): the first device will then act as an early warning (light or sound signals given without shutting down the power circuits), and the second device will be the alarm (shutting down the power circuits).

## BUILT-IN DIRECT THERMAL PROTECTIONS

For low rated currents, bimetallic strip-type protection may be used. The line current passes through the strip, which shuts down or restores the supply circuit as necessary. The design of this type of protection allows for manual or automatic reset.

The two essential parameters for starting cage induction motors are:

- starting torque,
- starting current.

These two parameters and the resistive torque determine the starting time.

These three characteristics arise from the construction of cage induction motors. Depending on the driven load, it may be necessary to adjust these values to avoid torque surges on the load or current surges in the supply. There are essentially five different types of supply, which are:

- D.O.L. starting
- star/delta starting
- soft starting with auto-transformer
- soft starting with resistors
- electronic starting

The tables on the next few pages give the electrical outline diagrams, the effect on the characteristic curves, and a comparison of the respective advantages of each mode.

### MOTORS WITH ASSOCIATED ELECTRONICS

Electronic starting modes control the voltage at the motor terminals throughout the entire starting phase, giving very gradual smooth starting.

#### DIGISTART D2 ELECTRONIC STARTER

This simple, compact electronic starter enables three-phase induction motors to be started smoothly by controlling their acceleration. It incorporates motor protection.



- **18 to 200 A range**
- **Integrated by-pass:** ease of wiring
- Simplicity and speed of setup

All settings configured with just seven selector switches

#### • Flexibility

- Mains supply voltages  
200 - 440 VAC & 200 - 575 VAC

#### • Starting and stopping modes:

- Current limit
- Current ramp
- Deceleration control
- Communication
  - Modbus RTU, DeviceNet, Profibus, Ethernet/IP, Profinet, Modbus TCP, USB, display console
- Management of pumping functions

#### DIGISTART D3 ELECTRONIC STARTER

Using the latest electronic control technologies to manage transient phases, the DIGISTART D3 range combines simplicity and user-friendliness while offering the user a high-performance, communicating electronic starter, and can achieve substantial energy savings.



- Range from 23 to 1600A/ 400V or 690V
- Integrated bypass up to 1000 A:
- Compact design Up to 60% space saving.
- Energy saving.
- Reduced installation costs.

#### • Advanced control

- Starting and stopping adapt to the load automatically.
- Automatic parameter optimisation by gradually learning the types of start.
- Special deceleration curve for pumping applications which derives from more than 15 years of Leroy-Somer's experience and expertise.

#### • High availability

- Able to operate with only two power components operational.
- Protection devices can be disabled to implement forced run mode (smoke extraction, fire pump, etc.).

#### • Total protection

- Continuous thermal modelling for maximum motor protection (even in the event of a power cut).

- Trips on configurable power thresholds
- Control of phase current imbalance.
- Monitoring of motor temperatures and the environment with PTC or PT 100.

#### • Other features

- Installation trips in the event of an earth fault
- Connection to "Δ" motor (6-wire)
- Starter size at least one rating lower
- Automatic detection of motor connection
- Ideal for replacing Y/Δ starters

#### • Communication

Modbus RTU, DeviceNet, Profibus, Ethernet/IP, Profinet, Modbus TCP, USB.

#### • Simplicity of setup

- 3 parameter-setting levels
- Preset configurations for pumps, fans, compressors, etc
- Standard: access to the main parameters
- Advanced menu: access to all data.
- Storage
- Time-stamped log of trips
- Energy consumption and operating conditions
- Latest modifications
- Simulate operation by forcing control
- Display the state of the inputs/outputs
- Counters: running time, number of starts, etc.

### INTEGRATED VARIABLE SPEED MOTOR

These motors (Commander ID300 type) are designed and developed with built-in electronics.

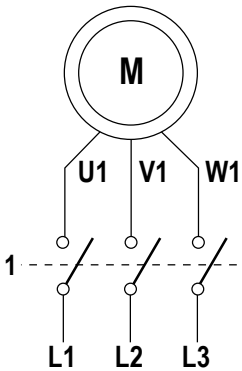
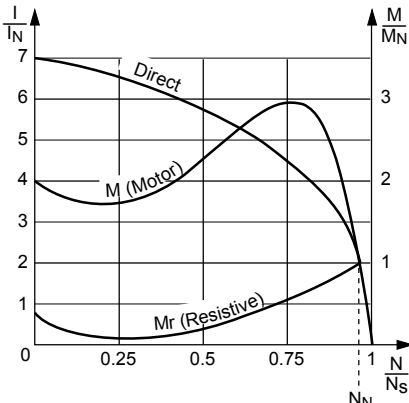
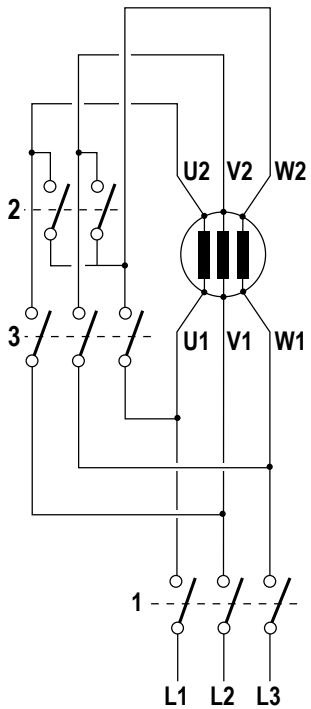
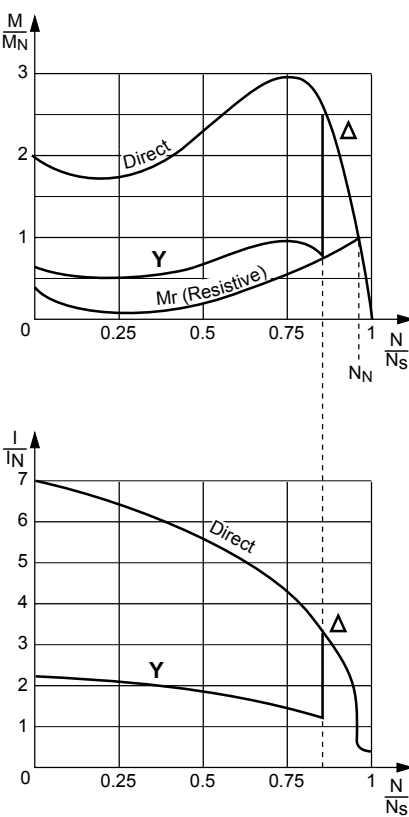
#### Characteristics:

- $0.25 \leq P \leq 7.5$  kW
- 50/60 Hz
- Frequency range: 10 to 150 Hz

#### • Starting on variable speed drive

One of the advantages of variable speed drives is that loads can be started without a current surge on the mains supply, since starting is always performed with no voltage or frequency at the motor terminals.



| Mode       | Outline diagram                                                                     | Characteristic curves                                                               | Number of steps | Starting torque | Starting current | Advantages                                                                                                                                           |
|------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------|-----------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| D.O.L.     |    |    | 1               | $M_D$           | $I_D$            | <ul style="list-style-type: none"> <li>Simplicity of the equipment</li> <li>High torque</li> <li>Minimum starting time</li> </ul>                    |
| Star-Delta |  |  | 2               | $M_D/3$         | $I_D/3$          | <ul style="list-style-type: none"> <li>Starting current divided by 3</li> <li>Simple equipment</li> <li>3 contactors including 1 two-pole</li> </ul> |

| Mode                               | Outline diagram | Characteristic curves | Number of steps | Starting torque | Starting current | Advantages                                                                                                                          |
|------------------------------------|-----------------|-----------------------|-----------------|-----------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Soft starting with autotransformer |                 |                       | $n \geq 3$      | $K^2 \cdot M_D$ | $K^2 \cdot I_D$  | <p>Can be used to select the torque</p> <p>Current reduction proportional to that for the torque</p> <p>No power cut-off</p>        |
| Soft starting with resistors       |                 |                       | $n$             | $K^2 \cdot M_D$ | $K \cdot I_D$    | <p>Can be used to select the torque or the current</p> <p>No power cut-off</p> <p>Modest additional cost (1 contactor per step)</p> |

| Mode                       | Outline diagram | Characteristic curves | Number of steps | Starting torque | Starting current | Advantages                                                                                                                                                                                                                |
|----------------------------|-----------------|-----------------------|-----------------|-----------------|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DIGISTART D2 & D3          |                 |                       |                 | $K^2 M_D$       | $K I_D$          | Adjustable on site<br>Choice of torque and current<br>No power cut-off<br>Smooth starting<br>Compact size<br>No maintenance<br>High number of starts<br>Digital<br>Integrated motor and machine protection<br>Serial link |
| DIGISTART D3 mode «6-wire» |                 |                       |                 | $K^2 M_D$       | $K I_D$          | Same advantages as the above DIGISTART<br>Current reduced by 35%<br>Suitable for retrofitting on installations Y-D<br>With or without bypass                                                                              |

## General Operation Braking

### GENERAL

The braking torque equals the torque developed by the motor increased by the resistant torque of the driven machine.

$$C_f = C_m + C_r$$

$C_f$  = braking torque

$C_m$  = motor torque

$C_r$  = resistive torque

Braking time, ie. the time required for an induction motor to change from speed  $N$  to stop, is calculated by the formula:

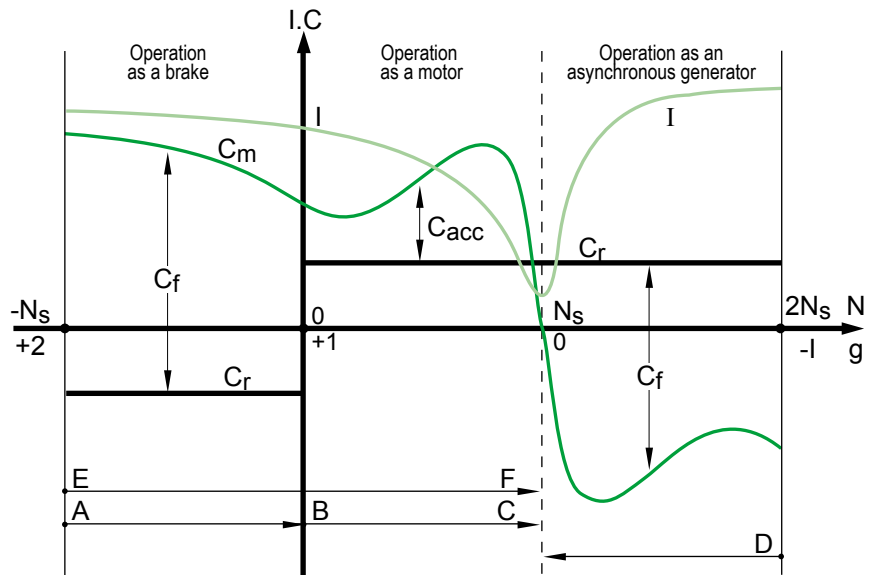
$$T_f = \frac{\Pi \cdot J \cdot N}{30 \cdot C_f(\text{moy})}$$

$T_f$  (in s) = braking time

$J$  (in  $\text{kgm}^2$ ) = moment of inertia

$N$  (in  $\text{min}^{-1}$ ) = speed of rotation

$C_f$  (av) (in  $\text{N.m}$ ) = average braking torque during the time period



Curves  $I = f(N)$ ,  $C_m = f(N)$ ,  $C_r = f(N)$ , in the motor's starting and braking zones.

$I$  = current absorbed

$C$  = torque value

$C_f$  = braking torque

$C_r$  = resistive torque

$C_m$  = motor torque

$N$  = speed of rotation

$g$  = slip

$N_s$  = synchronous speed

AB = reverse current braking

BC = starting, acceleration

DC = regenerative braking

EF = reversal

### REVERSE-CURRENT BRAKING

This method of braking is obtained by reversing two of the phases.

In general, an isolator disconnects the motor from the supply at the time the speed changes to  $N=0$ .

In cage induction motors, the average braking torque is generally greater than the starting torque.

Braking torque varies in different types of machine, as it depends on the rotor cage construction.

This method of braking involves a large amount of absorbed current, more or less constant and slightly higher than the starting current.

Thermal stresses during braking are three times higher than during acceleration.

Accurate calculations are required for repetitive braking.

Note: The direction of rotation of a motor is changed by reverse-current braking and restarting.

Thermally, one reversal is the equivalent of 4 starts. Care must therefore be taken when choosing a machine.

### D.C. INJECTION BRAKING

Operating stability can be a problem when reverse-current braking is used, due to the flattening out of the braking torque curve in the speed interval (0,  $-N_s$ ).

There is no such problem with D.C. injection braking: this can be used on both cage induction and slip-ring motors.

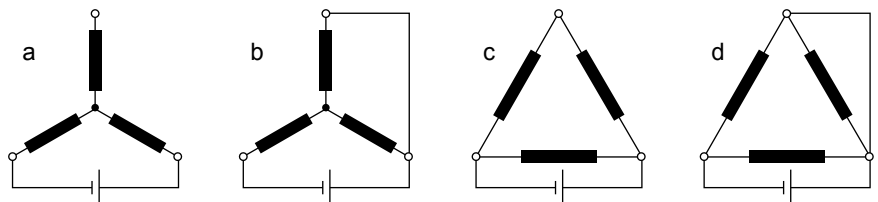
With this braking method, the induction motor is connected to the mains and braking occurs when the A.C. voltage is cut off and D.C. voltage is applied to the stator.

There are four different ways of connecting the windings to the D.C. voltage.

The D.C. voltage applied to the stator is usually supplied by a rectifier plugged into the mains.

Thermal stresses are approximately three times lower than for reverse-current braking.

The shape of the braking torque curve in the speed interval (0,  $-N_s$ ) is similar to that of the curve  $T_m = f(N)$  and is obtained by changing the abscissa variable to  $N_f = N_s - N$ .



Motor winding connections for D.C. voltage

## General Operation Braking

The braking current is calculated using the formula:

$$I_f = k1_i \times I_d \sqrt{\frac{C_f - C_{f0}}{k2 - C_d}}$$

The values of k1 according to the 4 couplings are:

$$\begin{aligned} k1_a &= 1.225 & k1_c &= 2.12 \\ k1_b &= 1.41 & k1_d &= 2.45 \end{aligned}$$

The braking torque can be found by:

$$C_f = \frac{\pi \cdot J \cdot N}{30 \cdot T_f}$$

In the formulae above:

- If (in A) = direct current for braking
- Id (in A) = starting current in the phase  
=  $\frac{1}{\sqrt{3}}$  Id as per catalogue (for Δ connection)
- Cf (in N.m) = average braking torque during the time period (Ns, N)
- Cf (in N.m) = external braking torque
- Cd (in N.m) = starting torque
- J (in kgm<sup>2</sup>) = total moment of inertia at motor shaft
- N (in min<sup>-1</sup>) = speed of rotation
- Tf (in s) = braking time
- k1i = numerical factors for connections a, b, c and d in the diagram
- k2 = numerical factors taking account of the average braking torque (k2 = 1.7)

The D.C. voltage to be applied to the windings is calculated by:

$$U_f = k3_i \cdot k4 \cdot I_f \cdot R1$$

k3 values for the four diagrams are as follows:

$$\begin{aligned} k3_a &= 2 & k3_b &= 1.5 \\ k3_c &= 0.66 & k3_d &= 0.5 \end{aligned}$$

- Uf (in V) = D.C. voltage for braking
- If (in A) = direct current for braking
- R1 (in Ω) = stator phase resistance at 20°C
- k3i = numerical factors for diagrams a, b, c and d
- k4 = numerical factor taking account of the temperature rise in the motor (k4 = 1.3)

### MECHANICAL BRAKING

Electromechanical brakes (D.C. or A.C. field excitation) can be fitted at the nondrive end of the motor.

For further details, see our "Brake motors" catalogue.

### REGENERATIVE BRAKING

This is the braking method applied to multi-speed motors when changing down to lower speeds. This procedure cannot be used to stop the motor.

Thermal stresses are approximately equal to those occurring when motors with Dahlander connections are started at the lower rated speed (speed ratio 1 : 2).

With the motor at the lower speed, working as an asynchronous generator, it develops very high braking torque in the speed interval (2Ns, Ns).

The maximum braking torque is slightly higher than the starting torque of the motor at the lower speed.

### DECELERATION BRAKES

For safety reasons, deceleration brakes are fitted at the rear of motors used on hazardous machines (for example, where cutting tools may come into contact with the operator).

The range of brakes is determined by its braking torques:

2.5 - 4 - 8 - 16 - 32 - 60 N.m

The appropriate brake is selected in the factory according to the number of motor poles, the driven inertia, the number of brakings per hour and the required braking time.



### GENERAL

The motor operates as an asynchronous generator each time the load becomes a driving load and the rotor speed exceeds the synchronous speed ( $N_s$ ).

This can be induced either voluntarily, as in the case of electric power stations (water or wind power, etc) or involuntarily, caused by factors linked to the application (downward movement of crane hooks or blocks, inclined conveyors, etc).

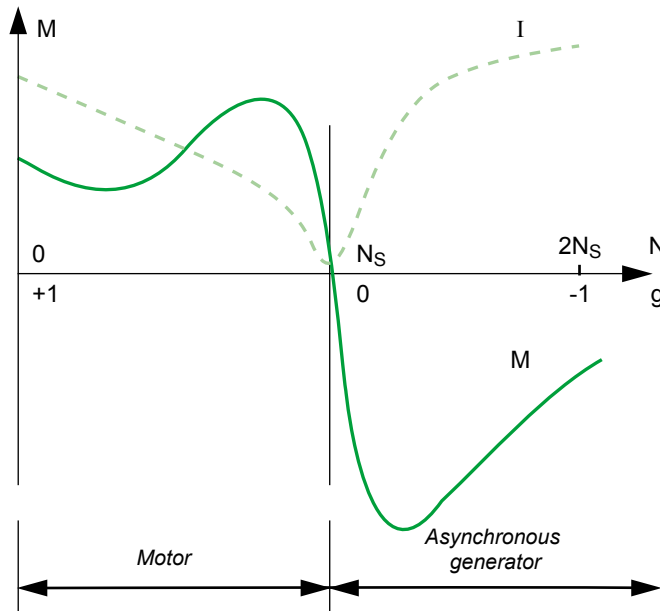
### OPERATING CHARACTERISTICS

The diagram opposite shows the various operations of an asynchronous machine in relation to its slip ( $g$ ) or its speed ( $N$ ).

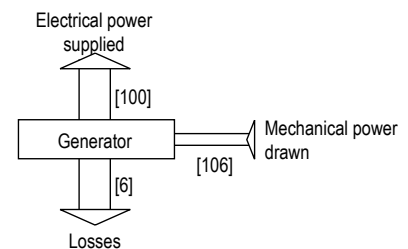
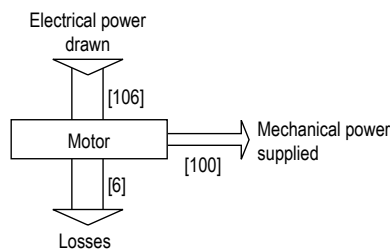
Example: Let us consider an induction motor of 45 kW, 4 poles, 50 Hz at 400 V. As a rough estimate, its characteristics as an asynchronous generator can be deduced from its rated characteristics as a motor, by applying the rules of symmetry.

If more precise values are required, the manufacturer should be consulted.

In practice, it is confirmed that the same machine, operating as a motor and as a generator with the same slip, has approximately the same losses in both cases, and therefore virtually the same efficiency. It can be deduced from this that the rated electrical power supplied by the asynchronous generator will be virtually the same as the motor output power.



| Characteristics                         | Motor              | AG                 |
|-----------------------------------------|--------------------|--------------------|
| Synchronism speed ( $\text{min}^{-1}$ ) | 1500               | 1500               |
| Rated speed ( $\text{min}^{-1}$ )       | 1465               | 1535               |
| Rated torque (m.N)                      | + 287              | - 287              |
| Rated current under 400 (A)             | 87 A<br>(absorbed) | 87 A<br>(supplied) |





### CONNECTION TO A POWERFUL MAINS SUPPLY

It is assumed that the machine stator is connected to a powerful electrical mains supply (usually the national grid), ie. a mains supply provided by a generator which regulates the power to at least twice that of the asynchronous generator.

Under these conditions, the mains supply imposes its own voltage and frequency on the asynchronous generator. Furthermore, it supplies it automatically with the reactive energy necessary for all its operating conditions.

### CONNECTION - DISCONNECTION

Before connecting the asynchronous generator to the mains supply, it is necessary to ensure that the direction of phase rotation of the asynchronous generator and the mains supply are in the same order.

- To connect an asynchronous generator to the mains supply, it should be accelerated gradually until it reaches its synchronous speed  $N_s$ . At this speed, the machine torque is zero and the current is minimal.

**This is an important advantage of asynchronous generators: as the rotor is not polarised until the stator is powered up, it is not necessary to synchronise the mains supply and the machine when they are connected.**

However, there is a phenomenon affecting the connection of asynchronous generators which, in some cases, can be a nuisance: the rotor of the asynchronous generator, although not energised, still has some residual magnetism.

On connection, when the magnetic flux created by the mains supply and that caused by the rotor residual magnetism are not in phase, the stator experiences a very brief current peak (one or two halfwaves), combined with an instantaneous overtorque of the same duration.

It is advisable to use connecting stator resistances to limit this phenomenon.

- Disconnecting the asynchronous generator from the mains supply does not pose any particular problem.

As soon as the machine is disconnected, it becomes electrically inert since it is no longer energised by the mains supply. It no longer brakes the driving machine, which should therefore be stopped to avoid reaching overspeed.

### Reactive power compensation

To limit the current in the lines and the transformer, the asynchronous generator can be compensated by restoring the power factor of the installation to the unit, using a bank of capacitors.

In this case, the capacitors are only inserted at the terminals of the asynchronous generator once it has been connected, to avoid self-energisation of the machine due to the residual magnetism during speed pick up. For a 3-phase low voltage asynchronous generator, 3-phase or single-phase capacitors in delta connection are used.

### Electrical protection and safety

There are two protection and safety categories:

- those which relate to the mains
- those which relate to the set and its generator

The major mains protection devices monitor:

- maximum-minimum voltage
- maximum-minimum frequency
- minimum power or energy feedback (operating as a motor)

- generator connection fault

The protection devices for the set are:

- stop on detection of racing start
- stop on detection of lubrication faults
- thermal magnetic protection of the generator, usually with probes in the winding.

### POWER SUPPLY FOR AN ISOLATED NETWORK

This concerns supplying a consuming network which does not have another generator of sufficient power to impose its voltage and frequency on the asynchronous generator.

### REACTIVE POWER COMPENSATION

In the most common case, reactive energy must be supplied:

- to the asynchronous generator,
- to the user loads which consume it.

To supply both of these consumption types with reactive energy, a reactive energy source of suitable power is connected in parallel on the circuit. This is usually a bank of capacitors with one or more stages which may be fixed, manually adjusted (using notches) or automatically adjusted. Synchronous capacitors are now rarely used.

**Example:** In an isolated network with power consumption of 50 kW where  $\cos \varphi = 0.9$  (and  $\tan \varphi = 0.49$ ), supplied by an asynchronous generator with  $\cos \varphi$  of 0.8 at 50 kW (and  $\tan \varphi = 0.75$ ), it is necessary to use a bank of capacitors which supplies:  $(50 \times 0.49) + (50 \times 0.75) = 62 \text{ kvar}$ .



## General

## Electrical and mechanical data

## Identification

### INFORMATION PLATES

The information plate identifies the motors, indicate the main performance and show compatibility of the motor concerned with the main standards and concerning them.

All motors in this catalogue with a power between 0.75 and 375 kW are fitted with two information plates: one indicating the motor's performance when supplied by the grid, and the other the motor's performance when supplied through an inverter.

The following table provides a clear vision of compliance of the motors with the different European and North-American regulations and standards.

|                                  |                 | Plate marking | CE       | cURus    | cCSAus   | IEC & CE (IE3 or IE2) | CSAE     | ee (CC055B)           | NEMA Premium          | EAC    |
|----------------------------------|-----------------|---------------|----------|----------|----------|-----------------------|----------|-----------------------|-----------------------|--------|
| Aluminium motors<br>LS / LSES    | Power < 7.5 kW  | 2 & 4 P       | Standard | Standard | Option   | Standard              | Option   | Standard <sup>2</sup> | Standard <sup>2</sup> | Option |
|                                  |                 | 6 P           | Standard | Standard | Option   | Standard              | Option   | Option                | Option                | Option |
|                                  | Power ≥ 7.5 kW  | 2 & 4 P       | Standard | Standard | Standard | Standard              | Standard | Standard              | Standard              | Option |
|                                  |                 | 6 P           | Standard | Standard | Standard | Standard              | Option   | Option                | Option                | Option |
| FLSES<br>cast iron motors        | Power > 0.75 kW | 2, 4 & 6 P    | Standard | Standard | -        | Standard              | -        | -                     | -                     | Option |
| PLSES IP 23<br>Drip-proof motors | Power > 55 kW   | 2 & 4 P       | Standard | Standard | -        | Standard              | -        | -                     | -                     | Option |

1. Non-IE motors are not CE plated

2. except 2 P: 1.8 kW, 3 kW, 3.7 kW and 4 P: 0.9 kW, 1.8 kW, 2.2 kW = option

Option: available upon request. In certain cases, may result in a modification or specific dimensioning of the motor.

### DEFINITION OF SYMBOLS USED ON NAMEPLATES



Legal mark of compliance of equipment with the requirements of European Directives

#### Main supply plate:

**MOT 3 ~** : Three-phase A.C. motor

**LSES** : Series

**200** : Frame size

**LU** : Housing symbol

**T** : Impregnation index

#### Motor no.

**789456** : Motor batch number

**F** : Month of production

**14** : Year of production

**001** : Serial number

**IE3** : Efficiency class

**93.6%** : Efficiency at 4/4 load

**IP55 IK08** : Degree of protection

**I cl. F** : Insulation class F

**40°C** : Ambient operating temperature

**S1** : Duty - Duty (operating) factor

**kg** : Weight

**V** : Supply voltage

**Hz** : Supply frequency

**min<sup>-1</sup>** : Revolutions per minute (rpm)

**kW** : Rated output power

**cos φ** : Power factor

**A** : Rated current

**Δ** : Delta connection

**Y** : Star connection

#### Bearings

**DE** : Drive end

Drive end bearing

**NDE** : Non drive end bearing

Bearing on end opposite the drive

**g** : Amount of grease at each regreasing (in g)

**h** : Regreasing interval (in hours)

**POLYREX EM103** : Type of grease

**A** : Vibration level

**H** : Balancing mode

**Please quote when ordering spare parts**

#### Inverter supply plate:

**Inverter settings** : Parameter setting the frequency inverter

**Motor performance** : Torque available on the motor shaft in % rated torque at the plate frequencies

**Min. Fsw (kHz)** : Minimum cut-off frequency acceptable for the motor

**Nmax (min<sup>-1</sup>)** : Maximum mechanical speed acceptable for the motor

### INFORMATION PLATES LSES ALUMINIUM MOTORS

IE3 power  $\geq 7.5$  kW\*

Main supply plate

**Nidec**

LEROY-SOMER

3~LSES200LU T  
N° 789457 F14 001

IP55 IK08

2014

**IE3**

NEMA

Nom Eff.

94.1%

DIN EN 60034-2

CLASS

B3

IEC 60034-2

CLASS

B3

CLASS

B3

CLASS

B3

CLASS

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CLASS

B3

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1000m 225kg

DE 6312 ZZ C3

NDE 6312 ZZ C3

F S1

1000m 225kg

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NDE 6312 ZZ C3

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1000m 225kg

1000m 225kg

1000m 225kg

NDE 6312 ZZ C3

F S1

1000m 225kg

1000m 225kg

1000m 225kg

1000m 225kg

1000m 225kg

NDE 6312 ZZ C3

F S1

1000m 225kg

1000m 225kg

1000m 225kg

1000m 225kg

1000m 225kg

NDE 6312 ZZ C3

F S1

1000m 225kg

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NDE 6312 ZZ C3

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1000m 225kg

1000m 225kg

1000m 225kg

1000m 225kg

NDE 6312 ZZ C3

F S1

1

Inverter supply plate

**Nidec**

**LEROY-SOMER**

3~LSES200LU T  
N° 789457 F14 001

2014  
IP55 IK08

Ta 40°C Ins.Cl. F S9

1000m 225kg

DE 6312 ZZ C3  
NDE 6312 ZZ C3

△ H

| Inverter settings |    |       |      |      |      |  |
|-------------------|----|-------|------|------|------|--|
| V                 | Hz | min-1 | kW   | cosφ | A    |  |
| Δ 400             | 50 | 1472  | 30.0 | 0.85 | 59.1 |  |
| Δ 400             | 87 | 2562  | 52.2 | 0.85 | 103  |  |
| min.FSw(kHz) 3    |    |       |      |      |      |  |
| Nmax(min-1) 2610  |    |       |      |      |      |  |

Motor performance

| Hz         | 10 | 17 | 25  | 50  | 87 |  |
|------------|----|----|-----|-----|----|--|
| T/Tn%      | 80 | 90 | 100 | 100 | 57 |  |
| Tn(Nm) 194 |    |    |     |     |    |  |

IE3

CLASS  
IE3 0.84-0.94

IE3 0.84-0.94

M50P\_600

IE3 power  $< 7.5$  kW\*

Main supply plate

**Nidec**

**LEROY-SOMER**

Ta 40°C Ins.Cl. F S1

3~LSES112MU T  
N° 123456 A15 001

2015 IP55 IK08

1000m 37kg

**IE3**

88.6%

NEMA  
Nom. Eff.

94.1%

DE: 6206 ZZ C3

NDE: 6206 ZZ C3

IEC60034-1

| V     | Hz | min-1 | kW   | cosφ | A     |  |
|-------|----|-------|------|------|-------|--|
| Δ 380 | 50 | 1450  | 4.00 | 0.83 | 8.30  |  |
| Δ 230 | 50 | 1458  | 4.00 | 0.80 | 14.10 |  |
| Δ 400 | 50 | 1458  | 4.00 | 0.80 | 8.10  |  |
| Δ 415 | 50 | 1462  | 4.00 | 0.78 | 8.05  |  |
| Δ 460 | 60 | 1764  | 4.00 | 0.79 | 7.10  |  |

H000L 50/50

Inverter supply plate

**Nidec**

3~LSES112MU T

N° 123456 A15 001

LEROY-SOMER

2015 IP55 IK08

Ta 40°C Ins.Cl. F S9 1000m 37kg

DE 6206 ZZ C3

NDE 6206 ZZ C3

Inverter settings

| V     | Hz | min-1 | kW   | cosφ | A     |
|-------|----|-------|------|------|-------|
| Δ 400 | 50 | 1452  | 4.00 | 0.85 | 8.45  |
| Δ 400 | 87 | 2562  | 6.96 | 0.85 | 14.70 |

Motor performance

min.FSw(kHz)

| Hz    | 10 | 17  | 25  | 50  | 87 | 3          |
|-------|----|-----|-----|-----|----|------------|
| T/Tn% | 90 | 100 | 100 | 100 | 57 | TnNm: 26.2 |

IEC60034-1

9504-100-30

\* Valid only for 2 & 4 pole motors except 2P 3 kW and 4P 2.2 kW.

Aluminium 6P motors all powers and 2P 3 kW and 4P 2.2 kW are available in CSAe, ee, cCSAus, NEMA Premium version as options upon specific request.

IE2 power  $\geq 7.5$  kW

Main supply plate

**Nidec**

LEROY-SOMER

3~LSES200LR T 2014

N° 789456 F14 001 IP55 IK08

**IE2**

92.3%

Ta 40°C Ins.Cl. F S1

1000m 166kg

DE 6312 ZZ C3

NDE 6312 ZZ C3

Must be used with  
inverter in EU

| V     | Hz | min-1 | kW   | cosφ | A    |
|-------|----|-------|------|------|------|
| Δ 380 | 50 | 1458  | 30.0 | 0.85 | 57.9 |
| Δ 230 | 50 | 1464  | 30.0 | 0.83 | 97.5 |
| Δ 400 | 50 | 1464  | 30.0 | 0.83 | 56.3 |
| Δ 415 | 50 | 1468  | 30.0 | 0.81 | 55.6 |
| Δ 460 | 60 | 1772  | 30.0 | 0.82 | 48.9 |

IEC  
60034-1  
IEC  
60034-29

H55P\_550

IEC60034-1

Inverter supply plate

**Nidec**

**LEROY-SOMER**

3~LSES200LR T

N° 789456 F14 001

2014

IP55 IK08

Ta 40°C Ins.Cl. F S9

1000m 166kg

DE 6312 ZZ C3

NDE 6312 ZZ C3

H

Inverter settings

| V     | Hz | min-1 | kW   | cosφ | A    |
|-------|----|-------|------|------|------|
| Δ 400 | 50 | 1458  | 30.0 | 0.86 | 59.9 |
| Δ 400 | 87 | 2568  | 52.2 | 0.86 | 104  |

min.FSw(kHz) 3

NMax(min-1) 2610

Motor performance

| Hz    | 10 | 17 | 25 | 50  | 87 |
|-------|----|----|----|-----|----|
| T/Tn% | 80 | 85 | 95 | 100 | 57 |

Tn(Nm) 196

IEC 60034-1

CFLP  
IE2  
2006-05-18

IEC60034-1

H50P\_400

IE2 power  $< 7.5$  kW

Main supply plate

|                                                                                     |    |                   |                |            |                                                                                     |  |
|-------------------------------------------------------------------------------------|----|-------------------|----------------|------------|-------------------------------------------------------------------------------------|--|
| <b>Nidec</b>                                                                        |    | 3~LSES112MU       |                | T          |  |  |
| LEROY-SOMER                                                                         |    | N° 123456 N14 001 |                |            |                                                                                     |  |
| Ta 40°C Ins.Cl. F                                                                   |    | S1                | 2014 IP55 IK08 | <b>IE2</b> |                                                                                     |  |
|                                                                                     |    |                   | 1000m 35kg     | 86.6%      |                                                                                     |  |
|  |    |                   |                |            |                                                                                     |  |
| E68554                                                                              |    |                   |                |            |                                                                                     |  |
| <hr/>                                                                               |    |                   |                |            |                                                                                     |  |
| DE: 6206 ZZ C3                                                                      |    |                   |                |            |  |  |
| NDE: 6206 ZZ C3                                                                     |    |                   |                |            |                                                                                     |  |
| V                                                                                   | Hz | min-1             | kW             | cosφ       | A                                                                                   |  |
| Δ 380                                                                               | 50 | 1435              | 4.00           | 0.85       | 8.25                                                                                |  |
| Δ 230                                                                               | 50 | 1445              | 4.00           | 0.84       | 13.60                                                                               |  |
| Δ 400                                                                               | 50 | 1445              | 4.00           | 0.84       | 7.85                                                                                |  |
| Δ 415                                                                               | 50 | 1450              | 4.00           | 0.82       | 7.70                                                                                |  |
| Δ 460                                                                               | 60 | 1756              | 4.00           | 0.82       | 6.85                                                                                |  |

L-174000331 I

03/10/2004

Inverter supply plate

**Nidec**

**LEROY-SOMER**

3~LSES112MU T

N° 123456 N14 001

2014 IP55 IK08

1000m 35kg

Ta 40°C Ins.Cl. F S9

  
E68554

DE 6206 ZZ C3

NDE 6206 ZZ C3

**inverter settings**

| V     | Hz | min-1 | kW   | cosφ | A     |
|-------|----|-------|------|------|-------|
| Δ 400 | 50 | 1435  | 4.00 | 0.86 | 8.50  |
| Δ 400 | 87 | 2545  | 6.96 | 0.86 | 14.80 |

**Motor performance**

min.Fsw(kHz)

| Hz    | 10 | 17  | 25  | 50  | 87 |
|-------|----|-----|-----|-----|----|
| T/Tn% | 85 | 100 | 100 | 100 | 57 |

3

TnNm: 26.4

IEC00434-1

NEMA 00-00

## INFORMATION PLATES FLSES CAST IRON MOTORS

### IE2

Main supply plate

| Nidec                                 |         |                   |     |     |       |       |    |     |        |
|---------------------------------------|---------|-------------------|-----|-----|-------|-------|----|-----|--------|
| MOT. 3~ FLSES 315 LB                  |         |                   |     |     |       |       |    |     |        |
| N° 62349200XM01                       |         |                   |     |     |       |       |    |     |        |
| 2014 1220 kg                          |         |                   |     |     |       |       |    |     |        |
| IE2                                   |         |                   |     |     |       |       |    |     |        |
| DE 6320 C3 50 g 12400h IP 55 1000 m   |         |                   |     |     |       |       |    |     |        |
| NDE 6316 C3 33 g 12400h IK 08 IM 1001 |         |                   |     |     |       |       |    |     |        |
| 40 °C                                 | Ins cl. | F                 | S   | 1   | 100%  | 6 d/h | SF | 1.0 | 95.1 % |
| V                                     | Hz      | min <sup>-1</sup> | kW  | A   | cos φ | %     |    |     |        |
| Δ 400                                 | 50      | 1486              | 200 | 357 | 0.85  | 95.1  |    |     |        |
| Δ 690                                 | 50      | 1486              | 200 | 204 | 0.85  |       |    |     |        |
| Δ 380                                 | 50      | 1483              | 200 | 367 | 0.87  |       |    |     |        |
| Δ 415                                 | 50      | 1487              | 200 | 348 | 0.84  |       |    |     |        |
| Δ 460                                 | 60      | 1785              | 200 | 308 | 0.85  | 95.8  |    |     |        |
| Must be used with inverter in EU      |         |                   |     |     |       |       |    |     |        |
| Polyrex EM 103                        |         |                   |     |     |       |       |    |     |        |
| CEC 60034-1 - MADE IN FRANCE          |         |                   |     |     |       |       |    |     |        |

### IE3

Main supply plate

| Nidec                                 |         |                   |     |     |       |       |    |     |        |
|---------------------------------------|---------|-------------------|-----|-----|-------|-------|----|-----|--------|
| MOT. 3~ FLSES 315 LB                  |         |                   |     |     |       |       |    |     |        |
| N° 62349200XM01                       |         |                   |     |     |       |       |    |     |        |
| 2014 1220 kg                          |         |                   |     |     |       |       |    |     |        |
| IE3                                   |         |                   |     |     |       |       |    |     |        |
| DE 6320 C3 50 g 12400h IP 55 1000 m   |         |                   |     |     |       |       |    |     |        |
| NDE 6316 C3 33 g 12400h IK 08 IM 1001 |         |                   |     |     |       |       |    |     |        |
| 40 °C                                 | Ins cl. | F                 | S   | 1   | 100%  | 6 d/h | SF | 1.0 | 96.0 % |
| V                                     | Hz      | min <sup>-1</sup> | kW  | A   | cos φ | %     |    |     |        |
| Δ 400                                 | 50      | 1486              | 200 | 354 | 0.85  | 96.0  |    |     |        |
| Δ 690                                 | 50      | 1486              | 200 | 204 | 0.85  |       |    |     |        |
| Δ 380                                 | 50      | 1483              | 200 | 364 | 0.87  |       |    |     |        |
| Δ 415                                 | 50      | 1487              | 200 | 345 | 0.84  |       |    |     |        |
| Δ 460                                 | 60      | 1785              | 200 | 307 | 0.85  | 96.2  |    |     |        |
| Polyrex EM 103                        |         |                   |     |     |       |       |    |     |        |
| CEC 60034-1 - MADE IN FRANCE          |         |                   |     |     |       |       |    |     |        |

### IE4

Main supply plate

| Nidec                                 |         |                   |     |     |       |       |    |     |        |
|---------------------------------------|---------|-------------------|-----|-----|-------|-------|----|-----|--------|
| MOT. 3~ FLSES 355 LB 4                |         |                   |     |     |       |       |    |     |        |
| N° 61138201DF01                       |         |                   |     |     |       |       |    |     |        |
| 2015 1650 kg                          |         |                   |     |     |       |       |    |     |        |
| IE4                                   |         |                   |     |     |       |       |    |     |        |
| DE 6322 C3 60 g 8316 h IP 55 1000 m   |         |                   |     |     |       |       |    |     |        |
| NDE 6316 C3 33 g 8316 h IK 08 IM 1001 |         |                   |     |     |       |       |    |     |        |
| 40 °C                                 | Ins cl. | F                 | S   | 1   | 100%  | 6 d/h | SF | 1.0 | 96.7 % |
| V                                     | Hz      | min <sup>-1</sup> | kW  | A   | cos φ | %     |    |     |        |
| Δ 400                                 | 50      | 1490              | 250 | 439 | 0.85  | 96.7  |    |     |        |
| Δ 690                                 | 50      | 1490              | 250 | 253 | 0.85  |       |    |     |        |
| Δ 380                                 | 50      | 1488              | 250 | 454 | 0.87  |       |    |     |        |
| Δ 415                                 | 50      | 1491              | 250 | 428 | 0.84  |       |    |     |        |
| Δ 460                                 | 60      | 1791              | 250 | 381 | 0.85  | 96.8  |    |     |        |
| Polyrex EM 103                        |         |                   |     |     |       |       |    |     |        |
| CEC 60034-1 - MADE IN FRANCE          |         |                   |     |     |       |       |    |     |        |

Inverter supply plate (for IE2-IE3-IE4)

| Nidec                                 |         |                   |     |     |       |                                 |    |  |  |
|---------------------------------------|---------|-------------------|-----|-----|-------|---------------------------------|----|--|--|
| MOT. 3~ FLSES 315 LB                  |         |                   |     |     |       |                                 |    |  |  |
| N° 62349200XM01                       |         |                   |     |     |       |                                 |    |  |  |
| 2014 1220 kg                          |         |                   |     |     |       |                                 |    |  |  |
| IE3                                   |         |                   |     |     |       |                                 |    |  |  |
| DE 6320 C3 50 g 12400h IP 55 1000 m   |         |                   |     |     |       |                                 |    |  |  |
| NDE 6316 C3 33 g 12400h IK 08 IM 1001 |         |                   |     |     |       |                                 |    |  |  |
| 40 °C                                 | Ins cl. | F                 | S   | 9   | %     | d/h                             | SF |  |  |
| Inverter settings                     |         |                   |     |     |       |                                 |    |  |  |
| V                                     | Hz      | min <sup>-1</sup> | kW  | A   | cos φ |                                 |    |  |  |
| Δ 400                                 | 50      | 1486              | 200 | 357 | 0.85  | min. Fsw (kHz): 3               |    |  |  |
|                                       |         |                   |     |     |       | Nmax (min <sup>-1</sup> ): 2610 |    |  |  |
| Motor performance                     |         |                   |     |     |       |                                 |    |  |  |
| Hz                                    | 10      | 17                | 25  | 50  | 60    | 87                              |    |  |  |
| T/Tn%                                 | 85      | 93                | 100 | 100 | 82.3  | 54.6                            |    |  |  |
| Polyrex EM 103                        |         |                   |     |     |       |                                 |    |  |  |
| CEC 60034-1 - MADE IN FRANCE          |         |                   |     |     |       |                                 |    |  |  |

## INFORMATION PLATES PLSES DRIP-PROOF MOTORS

### IE3

Main supply plate

| Nidec                            |    |       |     |      |      |  |  |  |  |
|----------------------------------|----|-------|-----|------|------|--|--|--|--|
| 3~ PLSES315LUS T 2014            |    |       |     |      |      |  |  |  |  |
| N° 789456 F14 001 IP23 IK08      |    |       |     |      |      |  |  |  |  |
| IE3                              |    |       |     |      |      |  |  |  |  |
| Ta 40°C Ins.Cl. F S1 1000m 960kg |    |       |     |      |      |  |  |  |  |
| DE: 6320 C3 POLYREX EM103        |    |       |     |      |      |  |  |  |  |
| NDE: 6316 C3 48g / 7800h         |    |       |     |      |      |  |  |  |  |
| V                                | Hz | min-1 | kW  | A    | cosφ |  |  |  |  |
| Δ380                             | 50 | 1484  | 250 | 0.85 | 466  |  |  |  |  |
| Δ400                             | 50 | 1486  | 250 | 0.83 | 450  |  |  |  |  |
| Δ690                             | 50 | 1486  | 250 | 0.83 | 260  |  |  |  |  |
| Δ415                             | 50 | 1488  | 250 | 0.81 | 446  |  |  |  |  |
| Δ460                             | 60 | 1790  | 250 | 0.82 | 398  |  |  |  |  |
| CEC 60034-1                      |    |       |     |      |      |  |  |  |  |
| H50P_500                         |    |       |     |      |      |  |  |  |  |

Inverter supply plate

| Nidec                            |    |       |     |      |      |                   |  |  |  |
|----------------------------------|----|-------|-----|------|------|-------------------|--|--|--|
| 3~ PLSES315LUS T 2014            |    |       |     |      |      |                   |  |  |  |
| N° 789456 F14 001 IP23 IK08      |    |       |     |      |      |                   |  |  |  |
| IE3                              |    |       |     |      |      |                   |  |  |  |
| Ta 40°C Ins.Cl. F S9 1000m 960kg |    |       |     |      |      |                   |  |  |  |
| DE: 6320 C3 POLYREX EM 103       |    |       |     |      |      |                   |  |  |  |
| NDE: 6316 C3 48g / 10200h        |    |       |     |      |      |                   |  |  |  |
| V                                | Hz | min-1 | kW  | A    | cosφ |                   |  |  |  |
| Δ400                             | 50 | 1484  | 250 | 0.85 | 478  | min.Fsw(kHz): 3   |  |  |  |
|                                  |    |       |     |      |      | Nmax(min-1): 2610 |  |  |  |
| Motor performance                |    |       |     |      |      |                   |  |  |  |
| Hz                               | 10 | 17    | 25  | 50   | 87   |                   |  |  |  |
| T/Tn%                            | 70 | 80    | 90  | 100  | 57   | Tn(1/min): 1610   |  |  |  |
| CEC 60034-1                      |    |       |     |      |      |                   |  |  |  |
| H50P_600                         |    |       |     |      |      |                   |  |  |  |

## INFORMATION PLATES LS ALUMINIUM MOTORS

| <b>Nidec</b><br><b>LEROY-SOMER</b><br>~3 LS71M/T_ <b>CE</b><br>N°502131/001/2015<br>IP 55 IK 00 Isol.CUF 40°C amb S1 |    |       |      |       |     |        |
|----------------------------------------------------------------------------------------------------------------------|----|-------|------|-------|-----|--------|
|                                                                                                                      |    |       |      |       |     | 7.5 kg |
| V                                                                                                                    | Hz | min-1 | kW   | cos φ | A   |        |
| Δ 230                                                                                                                | 50 | 1420  | 0,37 | 0,7   | 1,9 |        |
| Y 380/400                                                                                                            | 50 | 1410  | 0,37 | 0,7   | 1,1 |        |
| Y 415                                                                                                                | 50 | 1430  | 0,37 | 0,65  | 1,1 |        |
| Y 440/460                                                                                                            | 60 | 1710  | 0,44 | 0,7   | 1,1 |        |

Frame size 56 to 71

| <b>Nidec</b><br><b>LEROY-SOMER</b><br>3~LS112M T<br>N°123456 F15 001<br>2015 IP55 IK08<br>Ta 40°C Ins.Cl. F S1 1000m 23kg<br>CULUS<br>E68524 |    |       |      |       |      |  |
|----------------------------------------------------------------------------------------------------------------------------------------------|----|-------|------|-------|------|--|
|                                                                                                                                              |    |       |      |       |      |  |
| DE: 6206 Z2 C3<br>NOE: 6205 Z2 C3                                                                                                            |    |       |      |       |      |  |
| V                                                                                                                                            | Hz | min-1 | kW   | cos φ | A    |  |
| Δ 380                                                                                                                                        | 50 | 1420  | 4,00 | 0,84  | 8,90 |  |
| Δ 400                                                                                                                                        | 50 | 1430  | 4,00 | 0,79  | 8,95 |  |
| Δ 690                                                                                                                                        | 50 | 1430  | 4,00 | 0,79  | 5,15 |  |
| Δ 415                                                                                                                                        | 50 | 1440  | 4,00 | 0,75  | 9,10 |  |
| Δ 460                                                                                                                                        | 60 | 1730  | 4,00 | 0,81  | 8,60 |  |

Frame size 80 to 160 M

| <b>Nidec</b><br><b>LEROY-SOMER</b><br>3~LS200LR T 2015<br>N° 789456 F14 001 IP55 IK08<br>Ta 40°C Ins.Cl. F S1 1000m 144kg |    |       |      |       |      |  |
|---------------------------------------------------------------------------------------------------------------------------|----|-------|------|-------|------|--|
|                                                                                                                           |    |       |      |       |      |  |
| DE: 6312 Z2 C3<br>NOE: 6312 Z2 C3                                                                                         |    |       |      |       |      |  |
| V                                                                                                                         | Hz | min-1 | kW   | cos φ | A    |  |
| Δ 380                                                                                                                     | 50 | 1458  | 30,0 | 0,85  | 57,9 |  |
| Δ 230                                                                                                                     | 50 | 1464  | 30,0 | 0,83  | 97,5 |  |
| Δ 400                                                                                                                     | 50 | 1464  | 30,0 | 0,83  | 56,1 |  |
| Δ 415                                                                                                                     | 50 | 1468  | 30,0 | 0,81  | 55,6 |  |
| Δ 460                                                                                                                     | 60 | 1772  | 30,0 | 0,82  | 48,9 |  |

Frame size 160 L to 225

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|                                                      |                     |
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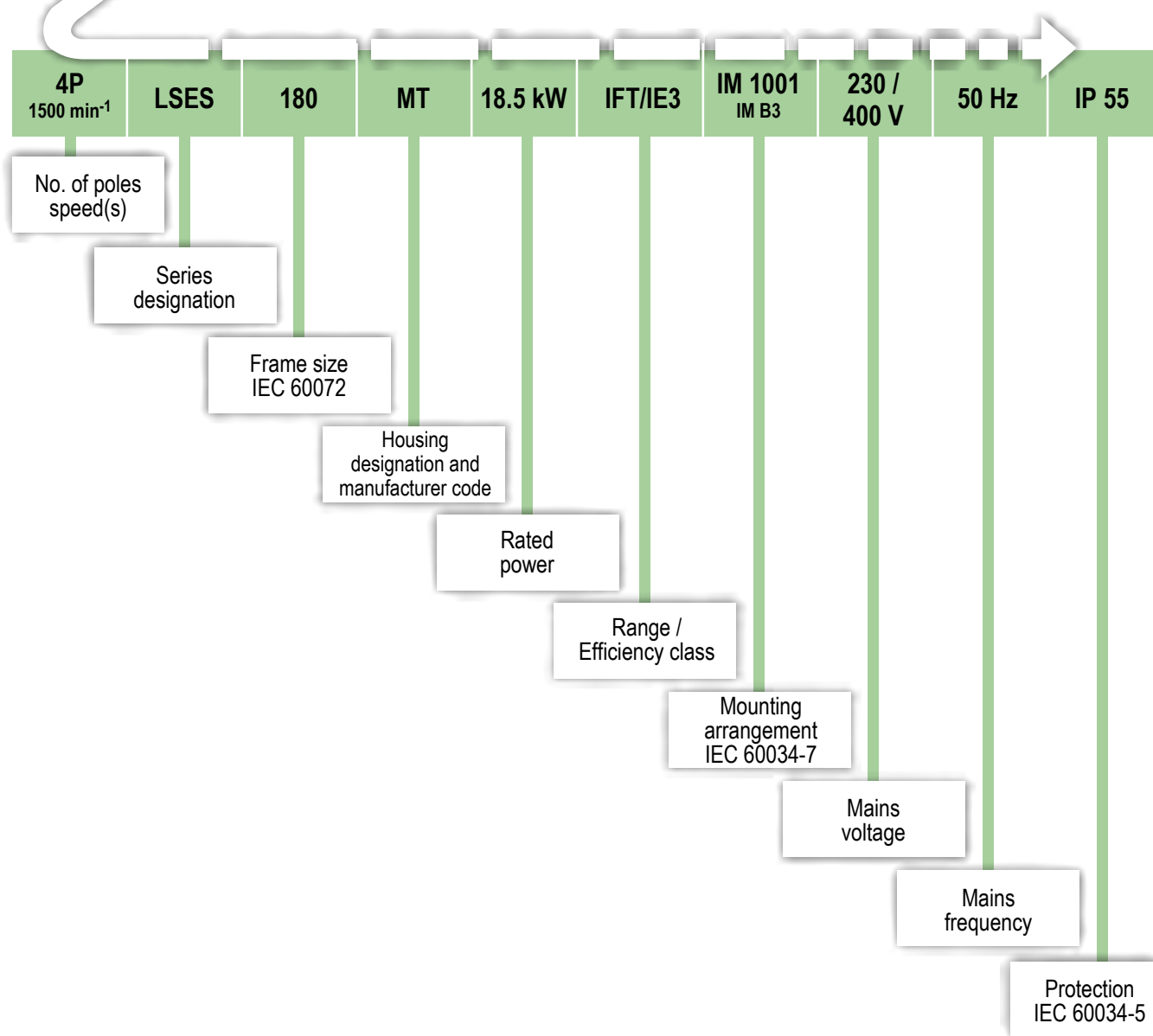




IP 55  
Cl. F -  $\Delta T$  80 K

The complete motor **reference** described below will enable you to order the desired **equipment**.

The selection method consists of following the terms in the designation.



| Component                  | Materials                                                               | Remarks                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------|-------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Housing with cooling fins  | Aluminium alloy                                                         | <ul style="list-style-type: none"> <li>- with integral or screw-on feet, or without feet</li> <li>- 4 or 6 fixing holes for housings with feet</li> <li>- lifting rings for frame size <math>\geq 100</math></li> <li>- earth terminal with an optional jumper screw</li> </ul>                                                                                                                                             |
| Stator                     | Insulated low-carbon magnetic steel laminations<br>Electroplated copper | <ul style="list-style-type: none"> <li>- low carbon content guarantees long-term lamination pack stability</li> <li>- semi-enclosed slots</li> <li>- class F insulation</li> </ul>                                                                                                                                                                                                                                          |
| Rotor                      | Insulated low-carbon magnetic steel laminations                         | <ul style="list-style-type: none"> <li>- inclined cage bars</li> <li>- rotor cage pressure die-cast in aluminium (or alloy for special applications)</li> <li>- shrink-fitted to shaft</li> <li>- rotor balanced dynamically, 1/2 key</li> </ul>                                                                                                                                                                            |
| Shaft                      | Steel                                                                   | <ul style="list-style-type: none"> <li>- for frame size <math>\leq 160</math> MP - LR: <ul style="list-style-type: none"> <li>• tapped hole</li> <li>• closed keyway</li> </ul> </li> <li>- for frame size <math>\geq 160</math> M - L: <ul style="list-style-type: none"> <li>• tapped hole</li> <li>• open keyway</li> </ul> </li> </ul>                                                                                  |
| End shields                | Aluminium alloy                                                         | <ul style="list-style-type: none"> <li>- 56 - 63 - 71 front and rear</li> <li>- 80 - 90 NDE shield</li> </ul>                                                                                                                                                                                                                                                                                                               |
|                            | Cast iron                                                               | <ul style="list-style-type: none"> <li>- 80 - 90 DE shield (except for 6-pole version and optional for 80 and 90 NDE shield)</li> <li>- 100 to 315 DE shield and NDE shield</li> </ul>                                                                                                                                                                                                                                      |
| Bearings and lubrication   |                                                                         | <ul style="list-style-type: none"> <li>- permanently greased bearings frame size 56 to 225</li> <li>- regreasable bearings frame size 250 to 315</li> <li>- bearings preloaded at non drive end</li> </ul>                                                                                                                                                                                                                  |
| Labyrinth seal<br>Lipseals | Plastic or steel<br>Synthetic rubber                                    | <ul style="list-style-type: none"> <li>- lipseal or deflector at drive end for all flange mounted motors</li> <li>- lipseal, deflector or labyrinth seal for foot mounted motors</li> </ul>                                                                                                                                                                                                                                 |
| Fan                        | Composite material or aluminium alloy                                   | <ul style="list-style-type: none"> <li>- 2 directions of rotation: straight blades</li> </ul>                                                                                                                                                                                                                                                                                                                               |
| Fan cover                  | Composite material or pressed steel                                     | <ul style="list-style-type: none"> <li>- fitted, on request, with a drip cover for operation in vertical position, shaft end facing down (steel cover)</li> </ul>                                                                                                                                                                                                                                                           |
| Terminal box               | Composite material or aluminium alloy                                   | <ul style="list-style-type: none"> <li>- IP 55</li> <li>- can be turned at 90°</li> <li>- fitted with a terminal block with 6 steel terminals as standard (brass as an option)</li> <li>- terminal box fitted with threaded plugs, supplied without cable glands (cable glands as an option)</li> <li>- 1 earth terminal in each terminal box</li> <li>- fixing system consisting of a cover with captive screws</li> </ul> |

In the standard version. the motors are wound 400 V 50 Hz:

- power ratings  $\leq 5.5$  kW: Y connection
- power ratings  $\geq 7.5$  kW: connection D

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Aluminium frame

## Electrical and mechanical characteristics

## Non IE efficiency - Powered by the mains

| Type      | Rated power<br><br>P <sub>n</sub><br>kW | Rated torque<br><br>M <sub>n</sub><br>N.m | Starting torque/<br>Rated torque<br>M <sub>σ</sub> /M <sub>n</sub> | Maximum torque/<br>Rated torque<br>M <sub>m</sub> /M <sub>n</sub> | Starting current/<br>Rated current<br>I <sub>σ</sub> /I <sub>n</sub> | Moment of inertia<br><br>J<br>kg.m <sup>2</sup> | Weight<br><br>IM B3<br>kg | Noise<br><br>LP<br>db(A) | 400V 50Hz                                              |                                          |                                              |      |      |              |      |      |
|-----------|-----------------------------------------|-------------------------------------------|--------------------------------------------------------------------|-------------------------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------------|---------------------------|--------------------------|--------------------------------------------------------|------------------------------------------|----------------------------------------------|------|------|--------------|------|------|
|           |                                         |                                           |                                                                    |                                                                   |                                                                      |                                                 |                           |                          | Rated speed<br><br>N <sub>n</sub><br>min <sup>-1</sup> | Rated current<br><br>I <sub>n</sub><br>A | Efficiency<br>IEC 60034-2-1<br>2007<br><br>η |      |      | Power factor |      |      |
|           |                                         |                                           |                                                                    |                                                                   |                                                                      |                                                 |                           |                          |                                                        |                                          | 4/4                                          | 3/4  | 2/4  | 4/4          | 3/4  | 2/4  |
| 2 poles   |                                         |                                           |                                                                    |                                                                   |                                                                      |                                                 |                           |                          |                                                        |                                          |                                              |      |      |              |      |      |
| LS 56 L * | 0.09                                    | 0.3                                       | 5.5                                                                | 5.6                                                               | 4.9                                                                  | 0.00015                                         | 3.8                       | 54                       | 2860                                                   | 0.44                                     | 54.0                                         | 45.0 | 37.0 | 0.55         | 0.45 | 0.40 |
| LS 56 L * | 0.12                                    | 0.4                                       | 4.1                                                                | 4.2                                                               | 4.6                                                                  | 0.00015                                         | 3.8                       | 54                       | 2820                                                   | 0.50                                     | 58.0                                         | 54.0 | 45.0 | 0.60         | 0.55 | 0.45 |
| LS 63 M * | 0.18                                    | 0.6                                       | 3.4                                                                | 3.0                                                               | 5.0                                                                  | 0.00019                                         | 4.8                       | 57                       | 2790                                                   | 0.52                                     | 67.0                                         | 66.0 | 59.0 | 0.75         | 0.65 | 0.55 |
| LS 63 M * | 0.25                                    | 0.8                                       | 3.4                                                                | 3.1                                                               | 5.4                                                                  | 0.00025                                         | 6.0                       | 57                       | 2800                                                   | 0.71                                     | 68.0                                         | 67.0 | 59.0 | 0.75         | 0.65 | 0.55 |
| LS 71 L * | 0.37                                    | 1.3                                       | 3.2                                                                | 3.8                                                               | 5.2                                                                  | 0.00035                                         | 6.4                       | 62                       | 2800                                                   | 0.98                                     | 68.0                                         | 67.0 | 63.0 | 0.80         | 0.70 | 0.60 |
| LS 71 L * | 0.55                                    | 1.9                                       | 3.2                                                                | 3.1                                                               | 6.0                                                                  | 0.00045                                         | 7.3                       | 62                       | 2800                                                   | 1.32                                     | 75.0                                         | 75.0 | 71.0 | 0.80         | 0.70 | 0.55 |
| LS 71 L * | 0.75                                    | 2.5                                       | 3.6                                                                | 3.4                                                               | 6.7                                                                  | 0.00060                                         | 9.0                       | 62                       | 2825                                                   | 1.67                                     | 77.6                                         | 77.7 | 74.8 | 0.83         | 0.76 | 0.64 |
| LS 80 L   | 0.75                                    | 2.6                                       | 2.2                                                                | 2.4                                                               | 5.1                                                                  | 0.00070                                         | 8.2                       | 56                       | 2820                                                   | 1.75                                     | 72.1                                         | 73.4 | 71.5 | 0.85         | 0.77 | 0.64 |
| LS 80 L   | 1.1                                     | 3.7                                       | 2.4                                                                | 2.6                                                               | 5.3                                                                  | 0.00090                                         | 9.7                       | 56                       | 2830                                                   | 2.50                                     | 75.0                                         | 76.3 | 74.9 | 0.84         | 0.77 | 0.63 |
| LS 90 SL  | 1.5                                     | 5.0                                       | 2.5                                                                | 3.0                                                               | 6.1                                                                  | 0.00140                                         | 13.5                      | 66                       | 2880                                                   | 3.35                                     | 77.2                                         | 77.8 | 76.3 | 0.84         | 0.77 | 0.66 |
| LS 90 L   | 2.2                                     | 7.3                                       | 2.8                                                                | 2.9                                                               | 6.1                                                                  | 0.00210                                         | 15.6                      | 67                       | 2870                                                   | 4.65                                     | 79.7                                         | 81.0 | 80.3 | 0.86         | 0.80 | 0.69 |
| LS 100 L  | 3                                       | 10.0                                      | 2.9                                                                | 2.9                                                               | 6.0                                                                  | 0.00220                                         | 19.5                      | 70                       | 2860                                                   | 6.45                                     | 81.5                                         | 82.7 | 81.5 | 0.82         | 0.75 | 0.62 |
| LS 100 L  | 3.7                                     | 12.2                                      | 3.7                                                                | 3.9                                                               | 8.1                                                                  | 0.00290                                         | 24.8                      | 66                       | 2905                                                   | 7.80                                     | 82.7                                         | 83.2 | 82.0 | 0.83         | 0.76 | 0.65 |
| LS 112 M  | 4                                       | 13.2                                      | 3.6                                                                | 3.6                                                               | 7.9                                                                  | 0.00290                                         | 24.8                      | 66                       | 2890                                                   | 8.20                                     | 83.1                                         | 84.0 | 83.3 | 0.85         | 0.79 | 0.68 |
| LS 132 S  | 5.5                                     | 18.0                                      | 2.3                                                                | 3.2                                                               | 7.4                                                                  | 0.00790                                         | 35.8                      | 63                       | 2925                                                   | 11.0                                     | 84.7                                         | 85.0 | 83.3 | 0.85         | 0.79 | 0.67 |
| LS 132 S  | 7.5                                     | 24.6                                      | 2.4                                                                | 3.1                                                               | 7.6                                                                  | 0.00960                                         | 39.4                      | 63                       | 2915                                                   | 14.6                                     | 86.0                                         | 86.6 | 85.5 | 0.86         | 0.79 | 0.67 |
| LS 132 M  | 9                                       | 29.3                                      | 2.2                                                                | 3.0                                                               | 6.6                                                                  | 0.01100                                         | 50.7                      | 71                       | 2935                                                   | 18.0                                     | 86.8                                         | 87.4 | 86.6 | 0.83         | 0.77 | 0.66 |
| LS 160 MP | 11                                      | 35.8                                      | 2.2                                                                | 3.1                                                               | 6.7                                                                  | 0.01260                                         | 61.7                      | 74                       | 2935                                                   | 22.4                                     | 87.6                                         | 87.8 | 86.6 | 0.81         | 0.74 | 0.63 |
| LS 160 MR | 15                                      | 48.8                                      | 2.7                                                                | 3.3                                                               | 7.7                                                                  | 0.01500                                         | 72.5                      | 75                       | 2935                                                   | 28.3                                     | 88.7                                         | 89.3 | 88.7 | 0.86         | 0.82 | 0.73 |
| LS 160 L  | 18.5                                    | 60.1                                      | 2.7                                                                | 3.4                                                               | 7.4                                                                  | 0.04400                                         | 100                       | 72                       | 2940                                                   | 35.2                                     | 89.3                                         | 89.3 | 88.3 | 0.85         | 0.80 | 0.69 |
| LS 180 MT | 22                                      | 71.5                                      | 2.7                                                                | 3.2                                                               | 7.3                                                                  | 0.05200                                         | 105                       | 73                       | 2940                                                   | 41.6                                     | 89.9                                         | 90.6 | 90.3 | 0.85         | 0.81 | 0.72 |
| LS 200 LR | 30                                      | 97.1                                      | 3.1                                                                | 3.6                                                               | 8.3                                                                  | 0.09010                                         | 158                       | 74                       | 2950                                                   | 55.8                                     | 90.7                                         | 91.1 | 90.8 | 0.86         | 0.82 | 0.74 |
| LS 200 L  | 37                                      | 120                                       | 2.0                                                                | 2.8                                                               | 6.5                                                                  | 0.11700                                         | 198                       | 74                       | 2940                                                   | 67.9                                     | 91.2                                         | 91.8 | 91.8 | 0.86         | 0.83 | 0.76 |
| LS 225 MT | 45                                      | 146                                       | 2.3                                                                | 3.3                                                               | 7.2                                                                  | 0.13890                                         | 200                       | 73                       | 2945                                                   | 83.3                                     | 91.7                                         | 92.3 | 92.3 | 0.85         | 0.81 | 0.73 |
| 4 poles   |                                         |                                           |                                                                    |                                                                   |                                                                      |                                                 |                           |                          |                                                        |                                          |                                              |      |      |              |      |      |
| LS 56 L * | 0.09                                    | 0.6                                       | 2.8                                                                | 2.8                                                               | 3.2                                                                  | 0.00025                                         | 4.0                       | 47                       | 1400                                                   | 0.39                                     | 55.0                                         | 49.6 | 42.8 | 0.60         | 0.52 | 0.42 |
| LS 63 M * | 0.12                                    | 0.8                                       | 2.5                                                                | 2.4                                                               | 3.2                                                                  | 0.00035                                         | 4.8                       | 49                       | 1380                                                   | 0.44                                     | 56.0                                         | 54.0 | 46.8 | 0.70         | 0.58 | 0.47 |
| LS 63 M * | 0.18                                    | 1.2                                       | 2.7                                                                | 2.7                                                               | 3.7                                                                  | 0.00048                                         | 5.0                       | 49                       | 1390                                                   | 0.64                                     | 62.0                                         | 58.0 | 51.0 | 0.65         | 0.55 | 0.44 |
| LS 71 M * | 0.25                                    | 1.7                                       | 2.7                                                                | 2.9                                                               | 4.6                                                                  | 0.00068                                         | 6.4                       | 49                       | 1425                                                   | 0.80                                     | 69.0                                         | 67.0 | 60.0 | 0.65         | 0.56 | 0.45 |
| LS 71 M*  | 0.37                                    | 2.5                                       | 2.4                                                                | 2.8                                                               | 4.9                                                                  | 0.00085                                         | 7.3                       | 49                       | 1420                                                   | 1.06                                     | 72.0                                         | 72.0 | 66.0 | 0.70         | 0.59 | 0.47 |
| LS 71 L * | 0.55                                    | 3.8                                       | 2.3                                                                | 2.5                                                               | 4.8                                                                  | 0.00110                                         | 8.3                       | 49                       | 1400                                                   | 1.62                                     | 70.0                                         | 70.0 | 65.0 | 0.70         | 0.62 | 0.49 |
| LS 80 L   | 0.55                                    | 3.8                                       | 2.2                                                                | 2.3                                                               | 3.9                                                                  | 0.00128                                         | 8.5                       | 61                       | 1405                                                   | 1.70                                     | 66.9                                         | 64.6 | 57.3 | 0.71         | 0.59 | 0.46 |
| LS 80 L   | 0.75                                    | 5.1                                       | 1.8                                                                | 2.2                                                               | 4.3                                                                  | 0.00164                                         | 10.5                      | 61                       | 1400                                                   | 2.05                                     | 69.3                                         | 68.8 | 64.0 | 0.77         | 0.67 | 0.53 |
| LS 80 L   | 0.9                                     | 6.1                                       | 3.1                                                                | 3.1                                                               | 5.6                                                                  | 0.00240                                         | 10.9                      | 61                       | 1425                                                   | 2.45                                     | 73.0                                         | 73.0 | 70.0 | 0.73         | 0.67 | 0.54 |
| LS 90 SL  | 1.1                                     | 7.4                                       | 1.5                                                                | 2.2                                                               | 4.5                                                                  | 0.00265                                         | 12.0                      | 49                       | 1425                                                   | 2.50                                     | 76.1                                         | 78.4 | 77.6 | 0.84         | 0.77 | 0.64 |
| LS 90 L   | 1.5                                     | 10.0                                      | 1.9                                                                | 2.4                                                               | 5.3                                                                  | 0.00337                                         | 13.8                      | 49                       | 1430                                                   | 3.30                                     | 79.2                                         | 80.8 | 79.6 | 0.83         | 0.75 | 0.61 |
| LS 90 L   | 1.8                                     | 12.0                                      | 2.0                                                                | 2.6                                                               | 5.6                                                                  | 0.00380                                         | 14.8                      | 54                       | 1435                                                   | 3.95                                     | 79.9                                         | 81.3 | 80.0 | 0.82         | 0.74 | 0.60 |
| LS 100 L  | 2.2                                     | 14.6                                      | 2.3                                                                | 2.7                                                               | 5.7                                                                  | 0.00430                                         | 18.8                      | 53                       | 1435                                                   | 4.80                                     | 80.2                                         | 81.6 | 80.4 | 0.82         | 0.74 | 0.61 |
| LS 100 L  | 3                                       | 20.0                                      | 2.6                                                                | 3.1                                                               | 6.7                                                                  | 0.00570                                         | 22.5                      | 51                       | 1435                                                   | 6.35                                     | 82.2                                         | 83.7 | 83.0 | 0.83         | 0.76 | 0.64 |
| LS 112 M  | 4                                       | 26.7                                      | 2.7                                                                | 3.1                                                               | 5.9                                                                  | 0.00620                                         | 23.0                      | 51                       | 1430                                                   | 8.95                                     | 81.4                                         | 82.4 | 80.6 | 0.79         | 0.70 | 0.55 |
| LS 132 S  | 5.5                                     | 36.1                                      | 2.6                                                                | 3.2                                                               | 7.0                                                                  | 0.01450                                         | 38.0                      | 58                       | 1456                                                   | 11.5                                     | 85.4                                         | 85.9 | 84.5 | 0.81         | 0.74 | 0.60 |
| LS 132 M  | 7.5                                     | 49.4                                      | 2.3                                                                | 3.0                                                               | 5.9                                                                  | 0.01920                                         | 48.0                      | 63                       | 1450                                                   | 15.6                                     | 86.8                                         | 87.7 | 86.9 | 0.80         | 0.71 | 0.56 |
| LS 132 M  | 9                                       | 59.3                                      | 2.4                                                                | 3.0                                                               | 6.6                                                                  | 0.02280                                         | 52.9                      | 63                       | 1450                                                   | 17.8                                     | 87.5                                         | 88.9 | 89.1 | 0.83         | 0.77 | 0.64 |
| LS 160 MP | 11                                      | 72.3                                      | 2.9                                                                | 3.3                                                               | 6.9                                                                  | 0.02780                                         | 65.6                      | 63                       | 1452                                                   | 22.1                                     | 88.8                                         | 89.7 | 89.3 | 0.81         | 0.72 | 0.58 |
| LS 160 LR | 15                                      | 98.5                                      | 2.9                                                                | 3.4                                                               | 7.5                                                                  | 0.03570                                         | 78.8                      | 64                       | 1454                                                   | 30.0                                     | 89.1                                         | 89.9 | 89.4 | 0.81         | 0.73 | 0.59 |
| LS 180 MT | 18.5                                    | 121                                       | 2.1                                                                | 3.2                                                               | 8.0                                                                  | 0.08440                                         | 100                       | 58                       | 1464                                                   | 36.0                                     | 89.3                                         | 90.1 | 90.1 | 0.83         | 0.77 | 0.66 |
| LS 180 LR | 22                                      | 143                                       | 2.6                                                                | 3.4                                                               | 8.4                                                                  | 0.09560                                         | 108                       | 60                       | 1466                                                   | 41.9                                     | 89.9                                         | 90.7 | 90.6 | 0.84         | 0.79 | 0.68 |
| LS 200 LR | 30                                      | 196                                       | 2.0                                                                | 2.6                                                               | 7.6                                                                  | 0.15630                                         | 166                       | 64                       | 1464                                                   | 57.4                                     | 90.7                                         | 91.6 | 91.7 | 0.83         | 0.78 | 0.69 |
| LS 225 ST | 37                                      | 240                                       | 2.7                                                                | 2.7                                                               | 6.1                                                                  | 0.22940                                         | 205                       | 64                       | 1472                                                   | 71.5                                     | 91.2                                         | 92.0 | 92.1 | 0.82         | 0.77 | 0.67 |
| LS 225 MR | 45                                      | 292                                       | 2.3                                                                | 2.4                                                               | 6.8                                                                  | 0.28850                                         | 230                       | 70                       | 1472                                                   | 85.3                                     | 91.7                                         | 92.3 | 92.3 | 0.83         | 0.78 | 0.68 |
| 6 poles   |                                         |                                           |                                                                    |                                                                   |                                                                      |                                                 |                           |                          |                                                        |                                          |                                              |      |      |              |      |      |
| LS 63 M * | 0.09                                    | 0.9                                       | 1.8                                                                | 1.8                                                               | 2.1                                                                  | 0.00060                                         | 5.5                       | 48                       | 860                                                    | 0.46                                     | 35.0                                         | 32.0 | 26.0 | 0.80         | 0.70 | 0.63 |
| LS 71 L * | 0.12                                    | 1.3                                       | 2.5                                                                | 2.6                                                               | 2.9                                                                  | 0.00070                                         | 6.5                       | 52                       | 920                                                    | 0.64                                     | 49.0                                         | 45.0 | 36.0 | 0.55         | 0.48 | 0.40 |
| LS 71 L * | 0.18                                    | 1.8                                       | 1.9                                                                | 2.0                                                               | 2.7                                                                  | 0.00110                                         | 7.6                       | 52                       | 895                                                    | 0.81                                     | 52.0                                         | 50.0 | 43.0 | 0.62         | 0.53 | 0.43 |
| LS 71 L * | 0.25                                    | 2.6                                       | 1.7                                                                | 1.7                                                               | 2.5                                                                  | 0.00130                                         | 7.9                       | 52                       | 840                                                    | 1.00                                     | 50.0                                         | 52.0 | 47.0 | 0.70         | 0.59 | 0.48 |
| LS 80 L   | 0.37                                    | 3.7                                       | 2.1                                                                | 2.5                                                               | 3.9                                                                  | 0.00320                                         | 9.7                       | 41                       | 954                                                    | 1.30                                     | 61.7                                         | 50.3 | 50.3 | 0.66         | 0.55 | 0.44 |
| LS 80 L   | 0.55                                    | 5.5                                       | 2.6                                                                | 3.0                                                               | 3.4                                                                  | 0.00420                                         | 11.0                      | 41                       | 956                                                    | 2.15                                     | 61.0                                         | 47.4 | 47.4 | 0.60         | 0.50 | 0.40 |
| LS 90 SL  | 0.75                                    | 7.5                                       | 1.9                                                                | 2.4                                                               | 3.7                                                                  | 0.00330                                         | 14.8                      | 43                       | 952                                                    | 2.25                                     | 70.0                                         | 66.8 | 66.8 | 0.68         | 0.58 | 0.44 |
| LS 90 L   | 1.1                                     | 11.2                                      | 1.9                                                                | 2.2                                                               | 3.9                                                                  | 0.00380                                         | 16.0                      | 56                       | 940                                                    | 3.05                                     | 72.9                                         | 72.2 | 72.2 | 0.71         | 0.61 | 0.47 |
| LS 100 L  | 1.5                                     | 15.4                                      | 2.0                                                                | 2.3                                                               | 3.8                                                                  | 0.00437                                         | 13.8                      | 70                       | 930                                                    | 4.00                                     | 75.2                                         | 76.0 | 76.0 | 0.72         | 0.62 | 0.48 |
| LS 112 MG | 2.2                                     | 21.9                                      | 2.1                                                                | 2.4                                                               | 4.8                                                                  | 0.01520                                         | 30.4                      | 50                       | 960                                                    | 5.60                                     | 77.7                                         | 78.0 | 78.0 | 0.73         | 0.65 | 0.52 |
| LS 132 S  | 3                                       | 29.8                                      | 2.4                                                                | 2.7                                                               | 5.0                                                                  | 0.01920                                         | 38.4                      | 49                       | 960                                                    | 7.65                                     | 79.7                                         | 79.8 | 79.8 | 0.71         | 0.63 | 0.50 |
| LS 132 M  | 4                                       | 39.6                                      | 2.2                                                                | 2.6                                                               | 5.4                                                                  | 0.02528                                         | 23.0                      | 53                       | 964                                                    | 9.25                                     | 81.4                                         | 82.6 | 82.6 | 0.77         | 0.71 | 0.59 |
| LS 132 M  | 5.5                                     | 54.4                                      | 2.6                                                                | 2.8                                                               | 5.6                                                                  | 0.03027                                         | 38.0                      | 58                       | 966                                                    | 13.1                                     | 83.1                                         | 83.7 | 83.7 | 0.73         | 0.66 | 0.53 |
| LS 160 M  | 7.5                                     | 73.5                                      | 1.7                                                                | 2.7                                                               | 5.2                                                                  | 0.08840                                         | 48.0                      | 59                       | 974                                                    | 17.2                                     | 84.7                                         | 83.3 | 83.3 | 0.74         | 0.66 | 0.53 |
| LS 160 L  | 11                                      | 109                                       | 1.9                                                                | 2.6                                                               | 5.3                                                                  | 0.11600                                         | 65.6                      | 59                       | 966                                                    | 23.6                                     | 86.4                                         | 86.6 | 86.6 | 0.78         | 0.70 | 0.57 |
| LS 180 LR | 15                                      | 149                                       | 1.8                                                                | 2.5                                                               | 4.8                                                                  | 0.13900                                         | 78.8                      | 59                       | 960                                                    | 31.9                                     | 87.0                                         | 88.2 | 88.2 | 0.78         | 0.73 | 0.61 |
| LS 200 LR | 18.5                                    | 181                                       | 2.6                                                                | 2.9                                                               | 6.7                                                                  | 0.25000                                         | 100                       | 58                       | 974                                                    | 37.7                                     | 88.6                                         | 89.7 | 89.7 | 0.80         | 0.75 | 0.66 |

\* non IMfinity® generation

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Aluminium frame

## Electrical and mechanical characteristics

## Non IE efficiency - Powered by the mains

| Type           | Rated power          | 380V 50Hz                           |                     |            |              | 415V 50Hz                           |                     |            |              | 460V 60Hz            |                                     |                     |            |              |
|----------------|----------------------|-------------------------------------|---------------------|------------|--------------|-------------------------------------|---------------------|------------|--------------|----------------------|-------------------------------------|---------------------|------------|--------------|
|                |                      | Rated speed                         | Rated current       | Efficiency | Power factor | Rated speed                         | Rated current       | Efficiency | Power factor | Rated power          | Rated speed                         | Rated current       | Efficiency | Power factor |
|                | P <sub>n</sub><br>kW | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4   | cos φ<br>4/4 | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4   | cos φ<br>4/4 | P <sub>n</sub><br>kW | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4   | cos φ<br>4/4 |
| <b>2 poles</b> |                      |                                     |                     |            |              |                                     |                     |            |              |                      |                                     |                     |            |              |
| LS 56 L *      | 0.09                 | 2850                                | 0.42                | 56.0       | 0.60         | 2870                                | 0.49                | 51.0       | 0.50         | 0.11                 | 3450                                | 0.47                | 59.0       | 0.50         |
| LS 56 L *      | 0.12                 | 2800                                | 0.47                | 60.0       | 0.65         | 2830                                | 0.50                | 56.0       | 0.60         | 0.15                 | 3400                                | 0.47                | 61.0       | 0.65         |
| LS 63 M *      | 0.18                 | 2750                                | 0.53                | 65.0       | 0.80         | 2800                                | 0.55                | 65.0       | 0.70         | 0.22                 | 3400                                | 0.53                | 69.0       | 0.75         |
| LS 63 M *      | 0.25                 | 2750                                | 0.73                | 65.0       | 0.80         | 2810                                | 0.74                | 67.0       | 0.70         | 0.30                 | 3420                                | 0.65                | 72.0       | 0.80         |
| LS 71 L *      | 0.37                 | 2780                                | 0.97                | 68.0       | 0.85         | 2820                                | 0.95                | 68.0       | 0.80         | 0.44                 | 3380                                | 0.93                | 70.0       | 0.85         |
| LS 71 L *      | 0.55                 | 2750                                | 1.33                | 74.0       | 0.85         | 2810                                | 1.36                | 75.0       | 0.75         | 0.66                 | 3380                                | 1.34                | 77.0       | 0.80         |
| LS 71 L *      | 0.75                 | 2800                                | 1.69                | 77.9       | 0.87         | 2840                                | 1.66                | 78.5       | 0.80         | 0.90                 | 3410                                | 1.67                | 79.9       | 0.85         |
| LS 80 L        | 0.75                 | 2790                                | 1.85                | 70.6       | 0.88         | 2840                                | 1.75                | 72.6       | 0.82         | 0.86                 | 3425                                | 1.70                | 74.7       | 0.84         |
| LS 80 L        | 1.1                  | 2800                                | 2.60                | 74.1       | 0.87         | 2845                                | 2.50                | 75.4       | 0.81         | 1.27                 | 3435                                | 2.45                | 77.3       | 0.84         |
| LS 90 SL       | 1.5                  | 2860                                | 3.45                | 76.4       | 0.86         | 2890                                | 3.35                | 77.5       | 0.81         | 1.73                 | 3475                                | 3.30                | 78.0       | 0.85         |
| LS 90 L        | 2.2                  | 2855                                | 4.85                | 79.0       | 0.87         | 2890                                | 4.65                | 80.3       | 0.82         | 2.53                 | 3465                                | 4.60                | 80.5       | 0.86         |
| LS 100 L       | 3                    | 2835                                | 6.60                | 80.7       | 0.86         | 2870                                | 6.45                | 81.4       | 0.79         | 3.45                 | 3455                                | 6.25                | 82.8       | 0.84         |
| LS 100 L       | 3.7                  | 2890                                | 7.90                | 82.5       | 0.86         | 2910                                | 7.75                | 82.8       | 0.80         | 4.26                 | 3505                                | 7.55                | 83.6       | 0.85         |
| LS 112 M       | 4                    | 2875                                | 8.35                | 82.5       | 0.88         | 2900                                | 8.15                | 83.3       | 0.82         | 4.60                 | 3485                                | 7.95                | 84.0       | 0.86         |
| LS 132 S       | 5.5                  | 2910                                | 11.1                | 84.4       | 0.89         | 2930                                | 11.0                | 84.6       | 0.82         | 6.33                 | 3520                                | 10.6                | 85.2       | 0.88         |
| LS 132 S       | 7.5                  | 2900                                | 15.0                | 85.5       | 0.89         | 2925                                | 15.2                | 85.7       | 0.80         | 8.63                 | 3520                                | 14.3                | 86.7       | 0.87         |
| LS 132 M       | 9                    | 2925                                | 18.4                | 86.4       | 0.86         | 2940                                | 18.3                | 86.7       | 0.79         | 10.35                | 3535                                | 17.8                | 87.3       | 0.84         |
| LS 160 MP      | 11                   | 2930                                | 22.3                | 87.5       | 0.86         | 2945                                | 22.7                | 87.5       | 0.77         | 12.65                | 3540                                | 21.5                | 88.1       | 0.84         |
| LS 160 MR      | 15                   | 2925                                | 29.1                | 88.1       | 0.89         | 2945                                | 27.9                | 89.0       | 0.84         | 17.25                | 3540                                | 27.7                | 89.0       | 0.88         |
| LS 160 L       | 18.5                 | 2935                                | 35.5                | 89.0       | 0.89         | 2945                                | 35.6                | 89.4       | 0.81         | 21.28                | 3545                                | 34.2                | 89.6       | 0.87         |
| LS 180 MT      | 22                   | 2930                                | 42.6                | 89.3       | 0.88         | 2945                                | 41.0                | 90.2       | 0.83         | 25.30                | 3535                                | 40.5                | 90.2       | 0.87         |
| LS 200 LR      | 30                   | 2945                                | 57.6                | 90.2       | 0.88         | 2954                                | 54.5                | 90.9       | 0.84         | 34.50                | 3550                                | 55.0                | 90.7       | 0.87         |
| LS 200 L       | 37                   | 2925                                | 70.8                | 90.3       | 0.87         | 2945                                | 67.0                | 91.2       | 0.84         | 42.55                | 3540                                | 67.5                | 90.9       | 0.87         |
| LS 225 MT      | 45                   | 2935                                | 86.4                | 91.2       | 0.87         | 2950                                | 81.8                | 91.8       | 0.83         | 51.75                | 3545                                | 82.2                | 92.1       | 0.86         |
| <b>4 poles</b> |                      |                                     |                     |            |              |                                     |                     |            |              |                      |                                     |                     |            |              |
| LS 56 L *      | 0.09                 | 1380                                | 0.38                | 56.0       | 0.65         | 1410                                | 0.40                | 52.0       | 0.60         | 0.11                 | 1700                                | 0.36                | 62.0       | 0.60         |
| LS 63 M *      | 0.12                 | 1365                                | 0.47                | 56.0       | 0.70         | 1390                                | 0.46                | 56.0       | 0.65         | 0.15                 | 1680                                | 0.46                | 59.0       | 0.70         |
| LS 63 M *      | 0.18                 | 1375                                | 0.68                | 62.0       | 0.65         | 1400                                | 0.68                | 61.0       | 0.60         | 0.22                 | 1690                                | 0.64                | 65.0       | 0.65         |
| LS 71 M *      | 0.25                 | 1425                                | 0.78                | 70.0       | 0.70         | 1430                                | 0.84                | 69.0       | 0.60         | 0.30                 | 1720                                | 0.76                | 71.0       | 0.70         |
| LS 71 M *      | 0.37                 | 1410                                | 1.10                | 73.0       | 0.70         | 1430                                | 1.10                | 72.0       | 0.65         | 0.44                 | 1720                                | 1.06                | 75.0       | 0.70         |
| LS 71 L *      | 0.55                 | 1385                                | 1.59                | 70.0       | 0.75         | 1410                                | 1.56                | 70.0       | 0.70         | 0.66                 | 1700                                | 1.51                | 73.0       | 0.75         |
| LS 80 L        | 0.55                 | 1390                                | 1.65                | 67.5       | 0.75         | 1415                                | 1.75                | 65.5       | 0.67         | 0.63                 | 1710                                | 1.40                | 71.6       | 0.70         |
| LS 80 L        | 0.75                 | 1380                                | 2.05                | 68.3       | 0.81         | 1410                                | 2.05                | 69.0       | 0.73         | 0.86                 | 1705                                | 1.95                | 73.3       | 0.76         |
| LS 80 L        | 0.9                  | 1415                                | 2.45                | 73.0       | 0.77         | 1435                                | 2.50                | 72.0       | 0.70         | 1.04                 | 1715                                | 2.20                | 75.5       | 0.78         |
| LS 90 SL       | 1.1                  | 1420                                | 3.40                | 77.8       | 0.86         | 1440                                | 3.25                | 79.5       | 0.80         | 1.27                 | 1730                                | 2.40                | 78.8       | 0.84         |
| LS 90 L        | 1.5                  | 1425                                | 4.10                | 78.8       | 0.85         | 1445                                | 4.00                | 80.3       | 0.78         | 1.73                 | 1735                                | 3.20                | 81.2       | 0.83         |
| LS 90 L        | 1.8                  | 1410                                | 2.60                | 74.3       | 0.87         | 1435                                | 2.45                | 77.0       | 0.82         | 2.07                 | 1735                                | 3.90                | 81.8       | 0.82         |
| LS 100 L       | 2.2                  | 1425                                | 4.90                | 79.3       | 0.86         | 1445                                | 4.90                | 80.6       | 0.78         | 2.53                 | 1735                                | 4.70                | 82.4       | 0.82         |
| LS 100 L       | 3                    | 1425                                | 6.50                | 81.3       | 0.86         | 1440                                | 6.30                | 82.7       | 0.80         | 3.45                 | 1735                                | 6.15                | 83.8       | 0.84         |
| LS 112 M       | 4                    | 1420                                | 8.90                | 80.9       | 0.84         | 1440                                | 9.10                | 81.4       | 0.75         | 4.60                 | 1735                                | 8.70                | 83.4       | 0.80         |
| LS 132 S       | 5.5                  | 1440                                | 11.5                | 84.5       | 0.86         | 1456                                | 11.2                | 85.5       | 0.81         | 6.33                 | 1756                                | 11.0                | 86.7       | 0.83         |
| LS 132 M       | 7.5                  | 1445                                | 15.9                | 86.5       | 0.83         | 1415                                | 14.3                | 65.5       | 0.67         | 8.63                 | 1740                                | 14.8                | 87.9       | 0.83         |
| LS 132 M       | 9                    | 1440                                | 18.4                | 86.5       | 0.86         | 1410                                | 16.9                | 69.0       | 0.73         | 10.35                | 1745                                | 17.2                | 88.7       | 0.85         |
| LS 160 MP      | 11                   | 1450                                | 22.8                | 88.5       | 0.83         | 1435                                | 20.6                | 72.0       | 0.70         | 12.65                | 1745                                | 20.8                | 89.7       | 0.85         |
| LS 160 LR      | 15                   | 1450                                | 31.0                | 88.7       | 0.83         | 1440                                | 27.8                | 79.5       | 0.80         | 17.25                | 1745                                | 28.4                | 89.8       | 0.85         |
| LS 180 MT      | 18.5                 | 1450                                | 36.9                | 88.8       | 0.86         | 1445                                | 34.9                | 80.3       | 0.78         | 21.28                | 1762                                | 34.5                | 92.1       | 0.84         |
| LS 180 LR      | 22                   | 1460                                | 43.1                | 89.2       | 0.87         | 1435                                | 40.8                | 77.0       | 0.82         | 25.30                | 1768                                | 40.4                | 92.7       | 0.85         |
| LS 200 LR      | 30                   | 1458                                | 58.4                | 91.4       | 0.85         | 1445                                | 55.6                | 80.6       | 0.78         | 34.50                | 1764                                | 55.0                | 92.9       | 0.85         |
| LS 225 ST      | 37                   | 1472                                | 73.9                | 90.6       | 0.84         | 1440                                | 65.3                | 82.7       | 0.80         | 42.55                | 1776                                | 68.9                | 93.4       | 0.83         |
| LS 225 MR      | 45                   | 1466                                | 88.8                | 92.2       | 0.84         | 1440                                | 78.4                | 81.4       | 0.75         | 51.75                | 1770                                | 82.6                | 93.6       | 0.84         |
| <b>6 poles</b> |                      |                                     |                     |            |              |                                     |                     |            |              |                      |                                     |                     |            |              |
| LS 63 M *      | 0.09                 | 840                                 | 0.47                | 35.0       | 0.84         | 880                                 | 0.46                | 34.0       | 0.80         | 0.11                 | 1060                                | 0.44                | 45.0       | 0.70         |
| LS 71 L *      | 0.12                 | 910                                 | 0.62                | 50.0       | 0.59         | 925                                 | 0.67                | 47.0       | 0.53         | 0.14                 | 1120                                | 0.60                | 53.0       | 0.55         |
| LS 71 L *      | 0.18                 | 850                                 | 0.82                | 50.0       | 0.67         | 895                                 | 0.82                | 51.0       | 0.60         | 0.22                 | 1100                                | 0.79                | 58.0       | 0.60         |
| LS 71 L *      | 0.25                 | 830                                 | 1.09                | 49.0       | 0.71         | 890                                 | 1.05                | 52.0       | 0.64         | 0.30                 | 1080                                | 1.00                | 57.0       | 0.66         |
| LS 80 L        | 0.37                 | 945                                 | 1.25                | 63.1       | 0.70         | 958                                 | 1.35                | 60.8       | 0.63         | 0.43                 | 1154                                | 1.25                | 66.6       | 0.64         |
| LS 80 L        | 0.55                 | 952                                 | 2.05                | 63.7       | 0.64         | 960                                 | 2.35                | 57.9       | 0.56         | 0.63                 | 1156                                | 2.00                | 66.9       | 0.59         |
| LS 90 SL       | 0.75                 | 945                                 | 2.25                | 69.9       | 0.72         | 956                                 | 2.30                | 70.1       | 0.65         | 0.86                 | 1154                                | 2.25                | 72.8       | 0.67         |
| LS 90 L        | 1.1                  | 930                                 | 3.10                | 71.7       | 0.75         | 945                                 | 3.05                | 73.0       | 0.68         | 1.27                 | 1145                                | 3.00                | 75.8       | 0.70         |
| LS 100 L       | 1.5                  | 915                                 | 4.05                | 73.8       | 0.76         | 935                                 | 4.05                | 75.5       | 0.68         | 1.73                 | 1135                                | 3.85                | 78.6       | 0.72         |
| LS 112 MG      | 2.2                  | 952                                 | 5.85                | 76.5       | 0.75         | 962                                 | 5.60                | 77.9       | 0.71         | 2.53                 | 1160                                | 5.50                | 79.5       | 0.73         |
| LS 132 S       | 3                    | 954                                 | 7.80                | 78.8       | 0.74         | 964                                 | 7.65                | 79.9       | 0.68         | 3.45                 | 1160                                | 7.50                | 81.6       | 0.71         |
| LS 132 M       | 4                    | 956                                 | 9.60                | 80.0       | 0.80         | 966                                 | 9.15                | 81.6       | 0.75         | 4.60                 | 1162                                | 9.10                | 82.5       | 0.77         |
| LS 132 M       | 5.5                  | 960                                 | 13.4                | 82.5       | 0.75         | 970                                 | 13.5                | 83.4       | 0.68         | 6.33                 | 1158                                | 12.4                | 83.9       | 0.76         |
| LS 160 M       | 7.5                  | 970                                 | 17.3                | 84.4       | 0.78         | 976                                 | 17.4                | 84.5       | 0.71         | 8.63                 | 1174                                | 16.6                | 85.9       | 0.76         |
| LS 160 L       | 11                   | 960                                 | 24.1                | 85.4       | 0.81         | 968                                 | 23.6                | 86.4       | 0.75         | 12.65                | 1162                                | 22.0                | 87.8       | 0.82         |
| LS 180 LR      | 15                   | 952                                 | 32.3                | 86.0       | 0.82         | 964                                 | 31.4                | 87.3       | 0.76         | 17.25                | 1150                                | 31.4                | 87.2       | 0.79         |
| LS 200 LR      | 18.5                 | 968                                 | 39.3                | 87.8       | 0.82         | 976                                 | 36.8                | 89.0       | 0.78         | 21.28                | 1174                                | 36.9                | 89.3       | 0.81         |

\* non IMfinity® generation

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Aluminium frame

## Electrical and mechanical characteristics

## IE2 - Powered by the mains

| Type         | Rated power<br><br>P <sub>n</sub><br>kW | Rated torque<br><br>M <sub>n</sub><br>N.m | Starting torque/<br>Rated torque<br>M <sub>s</sub> /M <sub>n</sub> | Maximum torque/<br>Rated torque<br>M <sub>m</sub> /M <sub>n</sub> | Starting current/<br>Rated current<br>I <sub>s</sub> /I <sub>n</sub> | Moment of inertia<br><br>J<br>kg.m <sup>2</sup> | Weight<br><br>IM B3<br>kg | Noise<br><br>LP<br>db(A) | 400V 50Hz                                              |                                          |                                              |      |      |                           |      |      |
|--------------|-----------------------------------------|-------------------------------------------|--------------------------------------------------------------------|-------------------------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------------|---------------------------|--------------------------|--------------------------------------------------------|------------------------------------------|----------------------------------------------|------|------|---------------------------|------|------|
|              |                                         |                                           |                                                                    |                                                                   |                                                                      |                                                 |                           |                          | Rated speed<br><br>N <sub>n</sub><br>min <sup>-1</sup> | Rated current<br><br>I <sub>n</sub><br>A | Efficiency<br>IEC 60034-2-1<br>2007<br><br>η |      |      | Power factor<br><br>Cos φ |      |      |
|              |                                         |                                           |                                                                    |                                                                   |                                                                      |                                                 |                           |                          |                                                        |                                          | 4/4                                          | 3/4  | 2/4  | 4/4                       | 3/4  | 2/4  |
| 2 poles      |                                         |                                           |                                                                    |                                                                   |                                                                      |                                                 |                           |                          |                                                        |                                          |                                              |      |      |                           |      |      |
| LSES 80 L    | 0.75                                    | 2.5                                       | 3.0                                                                | 3.2                                                               | 6.4                                                                  | 0.00084                                         | 9.7                       | 56                       | 2850                                                   | 1.6                                      | 79.5                                         | 80.4 | 78.9 | 0.85                      | 0.78 | 0.66 |
| LSES 80 L    | 1.1                                     | 3.7                                       | 2.5                                                                | 3.1                                                               | 6.7                                                                  | 0.00095                                         | 9.9                       | 57                       | 2850                                                   | 2.3                                      | 80.7                                         | 82.0 | 81.0 | 0.85                      | 0.78 | 0.65 |
| LSES 90 SL   | 1.5                                     | 5                                         | 2.2                                                                | 2.9                                                               | 6.4                                                                  | 0.00201                                         | 14.4                      | 63                       | 2865                                                   | 3                                        | 83.7                                         | 85.8 | 86.1 | 0.86                      | 0.80 | 0.68 |
| LSES 90 L    | 1.8                                     | 6                                         | 3.0                                                                | 3.1                                                               | 6.9                                                                  | 0.00223                                         | 15.6                      | 63                       | 2885                                                   | 3.9                                      | 83.4                                         | 84.8 | 84.6 | 0.84                      | 0.78 | 0.66 |
| LSES 90 L    | 2.2                                     | 7.4                                       | 2.7                                                                | 2.9                                                               | 6.2                                                                  | 0.00223                                         | 15.6                      | 64                       | 2860                                                   | 4.4                                      | 83.7                                         | 85.8 | 86.1 | 0.86                      | 0.80 | 0.68 |
| LSES 100 L   | 3                                       | 10                                        | 4.4                                                                | 3.9                                                               | 8.0                                                                  | 0.00297                                         | 21.5                      | 67                       | 2855                                                   | 5.9                                      | 85.3                                         | 86.4 | 85.7 | 0.86                      | 0.79 | 0.67 |
| LSES 100 L   | 3.7                                     | 12.3                                      | 3.0                                                                | 3.2                                                               | 7.2                                                                  | 0.00364                                         | 35.2                      | 67                       | 2875                                                   | 7.15                                     | 85.8                                         | 87.4 | 87.7 | 0.87                      | 0.82 | 0.71 |
| LSES 112 M   | 4                                       | 13.3                                      | 3.4                                                                | 3.0                                                               | 7.4                                                                  | 0.00364                                         | 24.4                      | 66                       | 2875                                                   | 7.85                                     | 86.1                                         | 87.7 | 87.7 | 0.85                      | 0.79 | 0.67 |
| LSES 132 S   | 5.5                                     | 18                                        | 2.4                                                                | 3.2                                                               | 7.7                                                                  | 0.00967                                         | 35.6                      | 72                       | 2920                                                   | 10.5                                     | 87.7                                         | 88.5 | 87.7 | 0.86                      | 0.81 | 0.70 |
| LSES 132 SU  | 7.5                                     | 24.5                                      | 2.5                                                                | 3.3                                                               | 7.8                                                                  | 0.01207                                         | 42.7                      | 71                       | 2920                                                   | 14.3                                     | 88.5                                         | 89.4 | 89.1 | 0.86                      | 0.81 | 0.70 |
| LSES 132 M   | 9                                       | 29.3                                      | 2.1                                                                | 2.9                                                               | 6.6                                                                  | 0.01102                                         | 55.5                      | 67                       | 2930                                                   | 16.8                                     | 90.2                                         | 91.3 | 91.4 | 0.86                      | 0.82 | 0.73 |
| LSES 160 MP  | 11                                      | 35.8                                      | 2.4                                                                | 3.1                                                               | 6.9                                                                  | 0.01263                                         | 65                        | 71                       | 2935                                                   | 21.1                                     | 90.4                                         | 91.1 | 90.7 | 0.83                      | 0.77 | 0.67 |
| LSES 160 MR  | 15                                      | 48.8                                      | 2.4                                                                | 3.2                                                               | 7.3                                                                  | 0.01506                                         | 76.1                      | 73                       | 2935                                                   | 28.2                                     | 90.6                                         | 91.3 | 91.0 | 0.85                      | 0.80 | 0.70 |
| LSES 160 L   | 18.5                                    | 60                                        | 2.7                                                                | 3.0                                                               | 8.2                                                                  | 0.049                                           | 100                       | 69                       | 2945                                                   | 32.8                                     | 92.3                                         | 93.1 | 93.2 | 0.88                      | 0.85 | 0.77 |
| LSES 180 MT  | 22                                      | 71.6                                      | 2.6                                                                | 2.6                                                               | 7.4                                                                  | 0.0554                                          | 100                       | 68                       | 2935                                                   | 39.4                                     | 92.0                                         | 93.0 | 93.3 | 0.88                      | 0.85 | 0.78 |
| LSES 200 LR  | 30                                      | 97.1                                      | 3.1                                                                | 3.6                                                               | 8.5                                                                  | 0.0929                                          | 158                       | 74                       | 2950                                                   | 54.4                                     | 93.0                                         | 93.4 | 93.1 | 0.86                      | 0.82 | 0.74 |
| LSES 200 L   | 37                                      | 120                                       | 2.0                                                                | 2.8                                                               | 6.6                                                                  | 0.2492                                          | 198                       | 74                       | 2940                                                   | 66.4                                     | 93.3                                         | 93.9 | 93.9 | 0.86                      | 0.83 | 0.76 |
| LSES 225 MT  | 45                                      | 146                                       | 2.3                                                                | 3.3                                                               | 7.3                                                                  | 0.1389                                          | 200                       | 73                       | 2945                                                   | 81.7                                     | 93.5                                         | 94.1 | 94.1 | 0.85                      | 0.81 | 0.73 |
| LSES 250 MZ  | 55                                      | 178                                       | 2.5                                                                | 3.5                                                               | 8.0                                                                  | 0.1754                                          | 234                       | 72                       | 2945                                                   | 96.1                                     | 94.0                                         | 94.6 | 94.6 | 0.88                      | 0.85 | 0.79 |
| LSES 280 SC  | 75                                      | 241                                       | 2.3                                                                | 3.3                                                               | 8.0                                                                  | 0.4092                                          | 350                       | 79                       | 2970                                                   | 127                                      | 94.4                                         | 94.6 | 94.3 | 0.90                      | 0.88 | 0.82 |
| LSES 280 MC  | 90                                      | 289                                       | 2.5                                                                | 3.6                                                               | 8.4                                                                  | 0.476                                           | 382                       | 80                       | 2972                                                   | 152                                      | 94.7                                         | 95.0 | 94.7 | 0.90                      | 0.88 | 0.82 |
| LSES 315 SN  | 110                                     | 354                                       | 2.6                                                                | 3.1                                                               | 8.0                                                                  | 0.5343                                          | 452                       | 79                       | 2968                                                   | 186                                      | 95.0                                         | 95.4 | 95.3 | 0.90                      | 0.88 | 0.84 |
| LSES 315 MP  | 132                                     | 423                                       | 2.3                                                                | 3.2                                                               | 7.7                                                                  | 0.5784                                          | 770                       | 79                       | 2978                                                   | 228                                      | 95.2                                         | 95.2 | 94.6 | 0.88                      | 0.86 | 0.80 |
| LSES 315 MP  | 160                                     | 513                                       | 2.2                                                                | 3.3                                                               | 7.7                                                                  | 1.2646                                          | 790                       | 80                       | 2978                                                   | 275                                      | 95.4                                         | 95.5 | 93.9 | 0.88                      | 0.86 | 0.80 |
| LSES 315 MP  | 200                                     | 642                                       | 2.2                                                                | 3.5                                                               | 7.8                                                                  | 1.3841                                          | 820                       | 80                       | 2974                                                   | 342                                      | 95.6                                         | 95.8 | 95.5 | 0.88                      | 0.86 | 0.80 |
| 4 poles      |                                         |                                           |                                                                    |                                                                   |                                                                      |                                                 |                           |                          |                                                        |                                          |                                              |      |      |                           |      |      |
| LSES 80 LG   | 0.75                                    | 5                                         | 1.9                                                                | 2.8                                                               | 5.9                                                                  | 0.00265                                         | 11.6                      | 47                       | 1445                                                   | 1.7                                      | 80.9                                         | 81.5 | 80.1 | 0.78                      | 0.70 | 0.57 |
| LSES 80 LG   | 0.9                                     | 6                                         | 1.9                                                                | 2.5                                                               | 6.3                                                                  | 0.00316                                         | 14.1                      | 47                       | 1435                                                   | 1.95                                     | 80.5                                         | 81.5 | 79.8 | 0.82                      | 0.60 | 0.74 |
| LSES 90 SL   | 1.1                                     | 7.3                                       | 1.9                                                                | 2.7                                                               | 6.1                                                                  | 0.00336                                         | 13.9                      | 47                       | 1440                                                   | 2.35                                     | 82.1                                         | 83.8 | 83.5 | 0.82                      | 0.74 | 0.61 |
| LSES 90 L    | 1.5                                     | 10                                        | 2.3                                                                | 2.9                                                               | 6.3                                                                  | 0.00418                                         | 16.2                      | 47                       | 1440                                                   | 3.15                                     | 83.5                                         | 85.1 | 84.7 | 0.82                      | 0.75 | 0.62 |
| LSES 90 LU   | 1.8                                     | 11.9                                      | 2.6                                                                | 2.3                                                               | 6.6                                                                  | 0.0045                                          | 20.4                      | 47                       | 1440                                                   | 3.8                                      | 83.9                                         | 84.4 | 82.8 | 0.81                      | 0.72 | 0.57 |
| LSES 100 L   | 2.2                                     | 14.6                                      | 2.5                                                                | 3.1                                                               | 6.8                                                                  | 0.00567                                         | 22.6                      | 49                       | 1440                                                   | 4.5                                      | 85.0                                         | 86.3 | 85.9 | 0.83                      | 0.76 | 0.64 |
| LSES 100 LR  | 3                                       | 19.9                                      | 2.8                                                                | 3.2                                                               | 6.7                                                                  | 0.00677                                         | 25.8                      | 54                       | 1440                                                   | 6.25                                     | 85.8                                         | 87.1 | 86.8 | 0.81                      | 0.73 | 0.60 |
| LSES 112 MU  | 4                                       | 26.4                                      | 2.2                                                                | 3.0                                                               | 6.2                                                                  | 0.01312                                         | 34.4                      | 55                       | 1445                                                   | 7.9                                      | 87.2                                         | 88.9 | 89.3 | 0.84                      | 0.78 | 0.67 |
| LSES 132 SU  | 5.5                                     | 36.1                                      | 2.7                                                                | 3.1                                                               | 7.1                                                                  | 0.01611                                         | 42.1                      | 55                       | 1454                                                   | 11.2                                     | 88.5                                         | 89.5 | 89.2 | 0.80                      | 0.73 | 0.60 |
| LSES 132 M   | 7.5                                     | 49.3                                      | 2.6                                                                | 3.4                                                               | 7.5                                                                  | 0.02286                                         | 52.1                      | 60                       | 1452                                                   | 14.4                                     | 89.4                                         | 90.5 | 90.5 | 0.84                      | 0.78 | 0.66 |
| LSES 132 M   | 9                                       | 58.9                                      | 2.8                                                                | 3.6                                                               | 8.0                                                                  | 0.02722                                         | 59.1                      | 63                       | 1458                                                   | 17.1                                     | 90.0                                         | 91.0 | 91.0 | 0.84                      | 0.78 | 0.66 |
| LSES 160 MR  | 11                                      | 71.9                                      | 3.1                                                                | 3.7                                                               | 8.4                                                                  | 0.03574                                         | 78                        | 61                       | 1460                                                   | 20.9                                     | 90.6                                         | 91.5 | 91.3 | 0.84                      | 0.78 | 0.66 |
| LSES 160 L   | 15                                      | 97.8                                      | 2.5                                                                | 3.1                                                               | 8.1                                                                  | 0.0712                                          | 90                        | 60                       | 1464                                                   | 28.2                                     | 91.2                                         | 92.1 | 92.1 | 0.84                      | 0.79 | 0.67 |
| LSES 180 MT  | 18.5                                    | 121                                       | 2.1                                                                | 3.2                                                               | 8.2                                                                  | 0.0844                                          | 100                       | 58                       | 1464                                                   | 35.2                                     | 91.4                                         | 92.3 | 92.2 | 0.83                      | 0.77 | 0.66 |
| LSES 180 LR  | 22                                      | 143                                       | 2.6                                                                | 3.4                                                               | 8.6                                                                  | 0.0956                                          | 108                       | 60                       | 1466                                                   | 41                                       | 91.9                                         | 92.7 | 92.6 | 0.84                      | 0.79 | 0.68 |
| LSES 200 LR  | 30                                      | 196                                       | 2.0                                                                | 2.6                                                               | 7.8                                                                  | 0.1563                                          | 166                       | 64                       | 1464                                                   | 56.3                                     | 92.4                                         | 93.3 | 93.4 | 0.83                      | 0.78 | 0.69 |
| LSES 225 ST  | 37                                      | 240                                       | 2.7                                                                | 2.7                                                               | 6.3                                                                  | 0.2294                                          | 205                       | 64                       | 1472                                                   | 70.2                                     | 92.9                                         | 93.7 | 93.8 | 0.82                      | 0.77 | 0.67 |
| LSES 225 MR  | 45                                      | 292                                       | 2.3                                                                | 2.4                                                               | 6.9                                                                  | 0.2885                                          | 230                       | 70                       | 1472                                                   | 83.8                                     | 93.4                                         | 94.1 | 94.0 | 0.83                      | 0.78 | 0.68 |
| LSES 250 ME  | 55                                      | 354                                       | 2.3                                                                | 2.7                                                               | 7.3                                                                  | 0.7793                                          | 350                       | 69                       | 1484                                                   | 101                                      | 94.7                                         | 95.1 | 95.0 | 0.83                      | 0.79 | 0.70 |
| LSES 280 SD  | 75                                      | 482                                       | 2.5                                                                | 3.2                                                               | 8.2                                                                  | 0.9595                                          | 428                       | 69                       | 1486                                                   | 138                                      | 94.5                                         | 94.7 | 94.4 | 0.83                      | 0.79 | 0.69 |
| LSES 280 MD  | 90                                      | 579                                       | 2.6                                                                | 3.5                                                               | 8.3                                                                  | 1.0799                                          | 470                       | 68                       | 1484                                                   | 169                                      | 94.7                                         | 94.9 | 94.6 | 0.81                      | 0.76 | 0.65 |
| LSES 315 SP  | 110                                     | 706                                       | 3.1                                                                | 2.9                                                               | 7.6                                                                  | 2.4322                                          | 690                       | 76                       | 1488                                                   | 200                                      | 94.8                                         | 94.8 | 94.3 | 0.84                      | 0.80 | 0.70 |
| LSES 315 MP  | 132                                     | 848                                       | 3.1                                                                | 2.8                                                               | 7.3                                                                  | 3.223                                           | 740                       | 76                       | 1486                                                   | 236                                      | 95.0                                         | 95.2 | 94.8 | 0.85                      | 0.81 | 0.72 |
| LSES 315 MP  | 160                                     | 1030                                      | 2.6                                                                | 2.8                                                               | 7.2                                                                  | 3.223                                           | 740                       | 76                       | 1486                                                   | 293                                      | 95.0                                         | 95.1 | 94.6 | 0.83                      | 0.78 | 0.68 |
| LSES 315 MR  | 200                                     | 1290                                      | 3.0                                                                | 2.9                                                               | 7.3                                                                  | 3.2324                                          | 820                       | 76                       | 1486                                                   | 366                                      | 95.5                                         | 95.7 | 95.3 | 0.83                      | 0.78 | 0.68 |
| 6 poles      |                                         |                                           |                                                                    |                                                                   |                                                                      |                                                 |                           |                          |                                                        |                                          |                                              |      |      |                           |      |      |
| LSES 90 SL   | 0.75                                    | 7.5                                       | 1.9                                                                | 2.4                                                               | 4.1                                                                  | 0.00338                                         | 14.8                      | 43                       | 952                                                    | 2.05                                     | 76.6                                         | 76.7 | 73.6 | 0.68                      | 0.58 | 0.46 |
| LSES 90 L    | 1.1                                     | 11.2                                      | 1.9                                                                | 2.3                                                               | 4.3                                                                  | 0.00437                                         | 17.8                      | 53                       | 940                                                    | 2.8                                      | 79.2                                         | 80.7 | 79.7 | 0.71                      | 0.62 | 0.49 |
| LSES 100 L   | 1.5                                     | 15.2                                      | 2.0                                                                | 2.4                                                               | 4.3                                                                  | 0.00602                                         | 24.8                      | 53                       | 945                                                    | 3.9                                      | 80.6                                         | 81.8 | 80.6 | 0.69                      | 0.60 | 0.47 |
| LSES 112 MG  | 2.2                                     | 21.9                                      | 2.1                                                                | 2.4                                                               | 5.0                                                                  | 0.01523                                         | 30.4                      | 50                       | 960                                                    | 5.3                                      | 82.0                                         | 83.2 | 82.3 | 0.73                      | 0.65 | 0.52 |
| LSES 132 S   | 3                                       | 29.8                                      | 2.4                                                                | 2.7                                                               | 5.3                                                                  | 0.01922                                         | 38.4                      | 49                       | 960                                                    | 7.3                                      | 83.4                                         | 84.5 | 83.5 | 0.71                      | 0.63 | 0.50 |
| LSES 132 M   | 4                                       | 39.6                                      | 2.2                                                                | 2.6                                                               | 5.6                                                                  | 0.02528                                         | 47.7                      | 53                       | 964                                                    | 8.8                                      | 85.5                                         | 86.9 | 86.8 | 0.77                      | 0.71 | 0.59 |
| LSES 132 M   | 5.5                                     | 54.4                                      | 2.6                                                                | 2.8                                                               | 5.8                                                                  | 0.03027                                         | 54                        | 53                       | 966                                                    | 12.6                                     | 86.2                                         | 87.3 | 86.8 | 0.73                      | 0.66 | 0.53 |
| LSES 160 M   | 7.5                                     | 73.5                                      | 1.7                                                                | 2.7                                                               | 5.4                                                                  | 0.0912                                          | 82                        | 59                       | 974                                                    | 16.6                                     | 87.9                                         | 88.1 | 86.4 | 0.74                      | 0.66 | 0.53 |
| LSES 160 LUR | 11                                      | 108                                       | 1.9                                                                | 2.7                                                               | 5.9                                                                  | 0.1378                                          | 105                       | 57                       | 974                                                    | 23.7                                     | 89.2                                         | 89.5 | 88.3 | 0.75                      | 0.68 | 0.55 |
| LSES 180 L   | 15                                      | 147                                       | 2.6                                                                | 2.9                                                               | 7.3                                                                  | 0.2048                                          | 140                       | 62                       | 976                                                    | 29.6                                     | 90.0                                         | 90.9 | 90.7 | 0.81                      | 0.76 | 0.65 |
| LSES 200 LR  | 18.5                                    | 181                                       | 2.6                                                                | 2.9                                                               | 6.9                                                                  | 0.2538                                          | 165                       | 62                       | 974                                                    | 36.7                                     | 90.8                                         | 91.8 | 91.9 | 0.80                      | 0.75 | 0.64 |
| LSES 200 L   | 22                                      | 216                                       | 1.8                                                                | 2.5                                                               | 6.1                                                                  | 0.33                                            | 200                       | 62                       | 974                                                    | 42.5                                     | 91.1                                         | 92.2 | 92.5 | 0.82                      | 0.79 | 0.70 |
| LSES 225 MR  | 30                                      | 293                                       | 2.9                                                                | 3.2                                                               | 7.6                                                                  | 0.3915                                          | 222                       | 65                       | 978                                                    | 62.7                                     | 92.0                                         | 92.4 | 91.8 | 0.75                      | 0.70 | 0.59 |
| LSES 250 ME  | 37                                      | 360                                       | 2.2                                                                | 2.4                                                               | 6.1                                                                  | 0.9234                                          | 310                       | 64                       | 982                                                    | 68                                       | 92.5                                         | 93.0 | 92.9 | 0.85                      | 0.81 | 0.72 |
| LSES 280 SC  | 45                                      | 438                                       | 2.2                                                                | 2.5                                                               | 6.2                                                                  | 1.1279                                          | 377                       | 64                       | 982                                                    | 84.3                                     | 92.9                                         | 93.5 | 93.3 | 0.83                      | 0.78 | 0.68 |
| LSES 280 MC  | 55                                      | 534                                       | 2.4                                                                | 2.7                                                               | 6.5                                                                  | 1.3995                                          | 444                       | 59                       | 984                                                    | 103                                      | 93.3                                         | 93.8 | 93.6 | 0.83                      | 0.79 | 0.68 |
| LSES 315 SP  | 75                                      | 723                                       | 3.0                                                                | 2.6                                                               | 7.4                                                                  | 2.8937                                          | 630                       | 71                       | 990                                                    | 148                                      | 94.0                                         | 94.1 | 93.3 | 0.78                      | 0.73 | 0.61 |
| LSES 315 MP  | 90                                      | 868                                       | 3.1                                                                | 2.7                                                               | 7.8                                                                  | 3.4127                                          | 700                       | 75                       | 990                                                    | 172                                      | 94.5                                         | 94.5 | 93.7 | 0.80                      | 0.75 | 0.64 |
| LSES 315 MR  | 110                                     | 1060                                      | 3.0                                                                | 2.1                                                               | 7.4                                                                  | 3.0776                                          | 770                       | 73                       | 990                                                    |                                          |                                              |      |      |                           |      |      |



# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Aluminium frame

### Electrical and mechanical characteristics

### IE2 - Powered by the mains

| Type         | Rated power          | 380V 50Hz                           |                     |            |              | 415V 50Hz                           |                     |            |              | 460V 60Hz                           |                     |            |              |
|--------------|----------------------|-------------------------------------|---------------------|------------|--------------|-------------------------------------|---------------------|------------|--------------|-------------------------------------|---------------------|------------|--------------|
|              |                      | Rated speed                         | Rated current       | Efficiency | Power factor | Rated speed                         | Rated current       | Efficiency | Power factor | Rated speed                         | Rated current       | Efficiency | Power factor |
|              | P <sub>n</sub><br>kW | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4   | Cos φ<br>4/4 | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4   | Cos φ<br>4/4 | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4   | Cos φ<br>4/4 |
| 2 poles      |                      |                                     |                     |            |              |                                     |                     |            |              |                                     |                     |            |              |
| LSES 80 L    | 0.75                 | 2830                                | 1.65                | 78.7       | 0.87         | 2865                                | 1.6                 | 79.6       | 0.83         | 3475                                | 1.4                 | 80.9       | 0.82         |
| LSES 80 L    | 1.1                  | 2825                                | 2.4                 | 79.6       | 0.87         | 2865                                | 2.3                 | 81.0       | 0.83         | 3475                                | 2                   | 83.2       | 0.83         |
| LSES 90 SL   | 1.5                  | 2825                                | 4.55                | 83.2       | 0.88         | 2870                                | 4.3                 | 84.6       | 0.84         | 3485                                | 3.8                 | 86.5       | 0.84         |
| LSES 90 L    | 1.8                  | 2865                                | 4.05                | 82.3       | 0.87         | 2900                                | 3.85                | 83.9       | 0.81         | 3495                                | 3.2                 | 84.4       | 0.84         |
| LSES 90 L    | 2.2                  | 2825                                | 4.55                | 83.2       | 0.88         | 2870                                | 4.3                 | 84.6       | 0.84         | 3485                                | 3.8                 | 86.5       | 0.84         |
| LSES 100 L   | 3                    | 2830                                | 6.15                | 84.6       | 0.88         | 2875                                | 5.85                | 85.8       | 0.83         | 3485                                | 5.15                | 86.8       | 0.84         |
| LSES 100 L   | 3.7                  | 2860                                | 7.55                | 85.5       | 0.88         | 2890                                | 7.05                | 86.6       | 0.84         | 3500                                | 6.3                 | 86.6       | 0.85         |
| LSES 112 M   | 4                    | 2850                                | 8.05                | 85.8       | 0.87         | 2885                                | 7.75                | 86.6       | 0.83         | 3500                                | 6.8                 | 88.1       | 0.83         |
| LSES 132 S   | 5.5                  | 2905                                | 10.8                | 87.0       | 0.88         | 2930                                | 10.4                | 87.9       | 0.83         | 3535                                | 9.15                | 88.8       | 0.85         |
| LSES 132 SU  | 7.5                  | 2905                                | 14.6                | 88.1       | 0.88         | 2925                                | 14.1                | 88.7       | 0.83         | 3535                                | 12.4                | 89.6       | 0.85         |
| LSES 132 M   | 9                    | 2920                                | 17.6                | 89.4       | 0.87         | 2940                                | 16.5                | 90.6       | 0.84         | 3540                                | 14.6                | 91.4       | 0.85         |
| LSES 160 MP  | 11                   | 2930                                | 21.8                | 90.0       | 0.85         | 2945                                | 21.1                | 90.6       | 0.80         | 3550                                | 18.3                | 91.5       | 0.83         |
| LSES 160 MR  | 15                   | 2920                                | 29                  | 90.3       | 0.87         | 2935                                | 28                  | 90.7       | 0.82         | 3545                                | 24.4                | 91.4       | 0.85         |
| LSES 160 L   | 18.5                 | 2935                                | 34.4                | 91.6       | 0.89         | 2950                                | 32.2                | 92.6       | 0.86         | 3554                                | 28.5                | 93.2       | 0.88         |
| LSES 180 MT  | 22                   | 2925                                | 41.1                | 91.3       | 0.89         | 2945                                | 38.3                | 92.5       | 0.87         | 3545                                | 33.8                | 93.3       | 0.87         |
| LSES 200 LR  | 30                   | 2945                                | 56.2                | 92.5       | 0.88         | 2954                                | 53.1                | 93.2       | 0.84         | 3558                                | 47.1                | 93.3       | 0.86         |
| LSES 200 L   | 37                   | 2925                                | 69.1                | 92.5       | 0.87         | 2945                                | 65.5                | 93.3       | 0.84         | 3552                                | 57.7                | 93.5       | 0.86         |
| LSES 225 MT  | 45                   | 2935                                | 84.7                | 93.0       | 0.87         | 2950                                | 80.2                | 93.6       | 0.83         | 3558                                | 70.7                | 94.2       | 0.85         |
| LSES 250 MZ  | 55                   | 2940                                | 100                 | 93.4       | 0.89         | 2954                                | 93.9                | 94.2       | 0.87         | 3560                                | 83.1                | 94.6       | 0.88         |
| LSES 280 SC  | 75                   | 2964                                | 134                 | 94.0       | 0.91         | 2974                                | 124                 | 94.6       | 0.89         | 3574                                | 111                 | 94.4       | 0.90         |
| LSES 280 MC  | 90                   | 2968                                | 159                 | 94.5       | 0.91         | 2972                                | 149                 | 94.8       | 0.89         | 3574                                | 132                 | 94.8       | 0.90         |
| LSES 315 SN  | 110                  | 2962                                | 196                 | 94.6       | 0.91         | 2970                                | 180                 | 95.1       | 0.89         | 3574                                | 162                 | 95.2       | 0.90         |
| LSES 315 MP  | 132                  | 2974                                | 238                 | 95.0       | 0.89         | 2984                                | 221                 | 95.3       | 0.87         | 3580                                | 199                 | 95.0       | 0.88         |
| LSES 315 MP  | 160                  | 2976                                | 287                 | 95.2       | 0.89         | 2980                                | 268                 | 95.5       | 0.87         | 3580                                | 240                 | 95.2       | 0.88         |
| LSES 315 MP  | 200                  | 2970                                | 359                 | 95.4       | 0.89         | 2980                                | 336                 | 95.7       | 0.86         | 3580                                | 298                 | 95.7       | 0.88         |
| 4 poles      |                      |                                     |                     |            |              |                                     |                     |            |              |                                     |                     |            |              |
| LSES 80 LG   | 0.75                 | 1435                                | 1.75                | 79.7       | 0.82         | 1450                                | 1.7                 | 80.77      | 0.76         | 1754                                | 1.5                 | 82.9       | 0.75         |
| LSES 80 LG   | 0.9                  | 1430                                | 2.05                | 80.3       | 0.84         | 1440                                | 1.95                | 80.70      | 0.80         | 1750                                | 1.75                | 82.5       | 0.79         |
| LSES 90 SL   | 1.1                  | 1430                                | 2.45                | 81.4       | 0.84         | 1445                                | 2.35                | 82.53      | 0.80         | 1750                                | 2.05                | 84.9       | 0.79         |
| LSES 90 L    | 1.5                  | 1430                                | 3.25                | 82.8       | 0.85         | 1445                                | 3.1                 | 84.09      | 0.80         | 1752                                | 2.75                | 86.2       | 0.79         |
| LSES 90 LU   | 1.8                  | 1435                                | 3.95                | 82.8       | 0.84         | 1445                                | 3.75                | 84.10      | 0.79         | 1756                                | 3.3                 | 86.8       | 0.79         |
| LSES 100 L   | 2.2                  | 1435                                | 4.65                | 84.3       | 0.85         | 1450                                | 4.45                | 85.56      | 0.81         | 1754                                | 3.95                | 87.5       | 0.80         |
| LSES 100 LR  | 3                    | 1430                                | 6.35                | 85.5       | 0.84         | 1445                                | 6.2                 | 86.07      | 0.78         | 1752                                | 5.45                | 87.9       | 0.78         |
| LSES 112 MU  | 4                    | 1435                                | 8.3                 | 86.6       | 0.85         | 1450                                | 7.75                | 87.74      | 0.82         | 1756                                | 6.8                 | 89.7       | 0.82         |
| LSES 132 SU  | 5.5                  | 1445                                | 11.4                | 87.9       | 0.83         | 1458                                | 11.2                | 88.62      | 0.77         | 1762                                | 9.75                | 90.5       | 0.78         |
| LSES 132 M   | 7.5                  | 1445                                | 14.8                | 88.7       | 0.86         | 1458                                | 14.3                | 89.66      | 0.81         | 1762                                | 12.6                | 91.1       | 0.82         |
| LSES 132 M   | 9                    | 1450                                | 17.7                | 89.4       | 0.87         | 1460                                | 16.9                | 90.30      | 0.82         | 1764                                | 15                  | 91.6       | 0.83         |
| LSES 160 MR  | 11                   | 1452                                | 21.5                | 89.9       | 0.87         | 1462                                | 20.6                | 90.82      | 0.82         | 1766                                | 18.3                | 91.7       | 0.83         |
| LSES 160 L   | 15                   | 1460                                | 29.1                | 90.6       | 0.86         | 1468                                | 27.8                | 91.50      | 0.82         | 1772                                | 24.6                | 92.8       | 0.83         |
| LSES 180 MT  | 18.5                 | 1460                                | 36                  | 91.2       | 0.86         | 1468                                | 34.9                | 91.59      | 0.81         | 1770                                | 30.5                | 93.0       | 0.82         |
| LSES 180 LR  | 22                   | 1460                                | 42                  | 91.6       | 0.87         | 1468                                | 40.8                | 91.92      | 0.81         | 1772                                | 35.6                | 93.2       | 0.83         |
| LSES 200 LR  | 30                   | 1458                                | 57.9                | 92.3       | 0.85         | 1468                                | 55.6                | 92.72      | 0.81         | 1772                                | 48.9                | 93.7       | 0.82         |
| LSES 225 ST  | 37                   | 1472                                | 72.2                | 92.7       | 0.84         | 1478                                | 65.3                | 93.00      | 0.80         | 1782                                | 60.8                | 94.1       | 0.81         |
| LSES 225 MR  | 45                   | 1466                                | 86.2                | 93.1       | 0.85         | 1474                                | 78.4                | 93.57      | 0.81         | 1776                                | 72.5                | 94.4       | 0.82         |
| LSES 250 ME  | 55                   | 1482                                | 105                 | 94.3       | 0.84         | 1486                                | 98.5                | 94.93      | 0.82         | 1786                                | 88                  | 95.2       | 0.82         |
| LSES 280 SD  | 75                   | 1484                                | 143                 | 94.1       | 0.85         | 1486                                | 135                 | 94.64      | 0.81         | 1786                                | 121                 | 94.9       | 0.82         |
| LSES 280 MD  | 90                   | 1482                                | 174                 | 94.5       | 0.83         | 1488                                | 167                 | 94.70      | 0.79         | 1788                                | 149                 | 95.1       | 0.80         |
| LSES 315 SP  | 110                  | 1486                                | 207                 | 94.6       | 0.85         | 1488                                | 194                 | 95.03      | 0.82         | 1790                                | 177                 | 94.5       | 0.83         |
| LSES 315 MP  | 132                  | 1484                                | 244                 | 94.7       | 0.86         | 1488                                | 230                 | 95.00      | 0.84         | 1790                                | 207                 | 95.0       | 0.84         |
| LSES 315 MP  | 160                  | 1484                                | 301                 | 94.9       | 0.85         | 1488                                | 292                 | 94.89      | 0.81         | 1790                                | 256                 | 95.2       | 0.82         |
| LSES 315 MR  | 200                  | 1484                                | 375                 | 95.1       | 0.85         | 1488                                | 360                 | 95.41      | 0.81         | 1790                                | 318                 | 95.8       | 0.82         |
| 6 poles      |                      |                                     |                     |            |              |                                     |                     |            |              |                                     |                     |            |              |
| LSES 90 SL   | 0.75                 | 945                                 | 2.05                | 76.1       | 0.72         | 956                                 | 2.1                 | 76.2       | 0.65         | -                                   | -                   | -          | -            |
| LSES 90 L    | 1.1                  | 930                                 | 2.85                | 78.1       | 0.74         | 945                                 | 2.85                | 79.5       | 0.68         | -                                   | -                   | -          | -            |
| LSES 100 L   | 1.5                  | 930                                 | 3.95                | 79.8       | 0.73         | 950                                 | 3.9                 | 80.7       | 0.66         | -                                   | -                   | -          | -            |
| LSES 112 MG  | 2.2                  | 952                                 | 5.45                | 81.8       | 0.75         | 962                                 | 5.3                 | 82.2       | 0.71         | -                                   | -                   | -          | -            |
| LSES 132 S   | 3                    | 954                                 | 7.4                 | 83.3       | 0.74         | 964                                 | 7.35                | 83.7       | 0.68         | -                                   | -                   | -          | -            |
| LSES 132 M   | 4                    | 956                                 | 9.05                | 84.6       | 0.80         | 966                                 | 8.7                 | 85.8       | 0.75         | -                                   | -                   | -          | -            |
| LSES 132 M   | 5.5                  | 960                                 | 12.9                | 86.0       | 0.75         | 970                                 | 13                  | 86.5       | 0.68         | -                                   | -                   | -          | -            |
| LSES 160 M   | 7.5                  | 970                                 | 16.7                | 87.6       | 0.78         | 976                                 | 16.8                | 87.7       | 0.71         | -                                   | -                   | -          | -            |
| LSES 160 LUR | 11                   | 972                                 | 24.2                | 88.9       | 0.78         | 976                                 | 23.6                | 89.2       | 0.73         | -                                   | -                   | -          | -            |
| LSES 180 L   | 15                   | 972                                 | 30.7                | 89.7       | 0.83         | 978                                 | 29.2                | 90.3       | 0.79         | -                                   | -                   | -          | -            |
| LSES 200 LR  | 18.5                 | 968                                 | 38.2                | 90.4       | 0.82         | 976                                 | 35.9                | 91.2       | 0.78         | -                                   | -                   | -          | -            |
| LSES 200 L   | 22                   | 968                                 | 44.1                | 90.9       | 0.83         | 976                                 | 41.2                | 91.6       | 0.81         | -                                   | -                   | -          | -            |
| LSES 225 MR  | 30                   | 970                                 | 61.4                | 91.7       | 0.81         | 982                                 | 59.3                | 91.9       | 0.72         | -                                   | -                   | -          | -            |
| LSES 250 ME  | 37                   | 984                                 | 70.3                | 92.2       | 0.86         | 988                                 | 68.1                | 92.7       | 0.82         | -                                   | -                   | -          | -            |
| LSES 280 SC  | 45                   | 982                                 | 86.9                | 92.7       | 0.85         | 984                                 | 83.5                | 93.1       | 0.80         | -                                   | -                   | -          | -            |
| LSES 280 MC  | 55                   | 980                                 | 105                 | 93.1       | 0.85         | 986                                 | 101                 | 93.2       | 0.81         | -                                   | -                   | -          | -            |
| LSES 315 SP  | 75                   | 990                                 | 151                 | 93.9       | 0.80         | 992                                 | 146                 | 94.3       | 0.76         | -                                   | -                   | -          | -            |
| LSES 315 MP  | 90                   | 990                                 | 178                 | 94.3       | 0.82         | 992                                 | 170                 | 94.4       | 0.78         | -                                   | -                   | -          | -            |
| LSES 315 MR  | 110                  | 988                                 | 216                 | 94.5       | 0.82         | 992                                 | 205                 | 95.1       | 0.78         | -                                   | -                   | -          | -            |
| LSES 315 MR  | 132                  | 990                                 | 261                 | 94.8       | 0.81         | 990                                 | 247                 | 95.0       | 0.78         | -                                   | -                   | -          | -            |



| Type         | 400V 50Hz            |                                     |                     |              | % Rated torque M <sub>n</sub> at |       |       |       |      | 400V 87Hz Δ <sup>1</sup> |                                     |                     |              | Speed mechanical maximum <sup>2</sup> |
|--------------|----------------------|-------------------------------------|---------------------|--------------|----------------------------------|-------|-------|-------|------|--------------------------|-------------------------------------|---------------------|--------------|---------------------------------------|
|              | Rated power          | Rated speed                         | Rated current       | Power factor | 10Hz                             | 17Hz  | 25Hz  | 50Hz  | 87Hz | Rated power              | Rated speed                         | Rated current       | Power factor |                                       |
|              | P <sub>n</sub><br>kW | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | Cos φ<br>4/4 |                                  |       |       |       |      | P <sub>n</sub><br>kW     | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | Cos φ<br>4/4 |                                       |
| 2 poles      |                      |                                     |                     |              |                                  |       |       |       |      |                          |                                     |                     |              |                                       |
| LSES 80 L    | 0.75                 | 2800                                | 1.65                | 0.85         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 1.31                     | 5020                                | 2.88                | 0.85         | 13500                                 |
| LSES 80 L    | 1.1                  | 2785                                | 2.5                 | 0.85         | 85 %                             | 100 % | 100 % | 100 % | 57 % | 1.91                     | 5005                                | 4.32                | 0.85         | 13500                                 |
| LSES 90 SL   | 1.5                  | 2800                                | 3.2                 | 0.87         | 85 %                             | 100 % | 100 % | 100 % | 57 % | 2.61                     | 5020                                | 5.59                | 0.87         | 11700                                 |
| LSES 90 L    | 1.8                  | 2900                                | 3.9                 | 0.84         | 85 %                             | 100 % | 100 % | 100 % | 57 % | 3.13                     | 5085                                | 6.86                | 0.84         | 11700                                 |
| LSES 90 L    | 2.2                  | 2775                                | 4.8                 | 0.86         | 85 %                             | 100 % | 100 % | 100 % | 57 % | 3.83                     | 4995                                | 8.38                | 0.86         | 11700                                 |
| LSES 100 L   | 3                    | 2790                                | 6.2                 | 0.86         | 85 %                             | 100 % | 100 % | 100 % | 57 % | 5.22                     | 5010                                | 10.84               | 0.86         | 9900                                  |
| LSES 100 L   | 3.7                  | 2905                                | 7.15                | 0.87         | 85 %                             | 100 % | 100 % | 100 % | 57 % | 6.64                     | 5070                                | 13.37               | 0.87         | 9900                                  |
| LSES 112 M   | 4                    | 2810                                | 8.3                 | 0.85         | 85 %                             | 100 % | 100 % | 100 % | 57 % | 6.96                     | 5030                                | 14.47               | 0.85         | 9900                                  |
| LSES 132 S   | 5.5                  | 2890                                | 11.1                | 0.86         | 85 %                             | 100 % | 100 % | 100 % | 57 % | 9.57                     | 5110                                | 19.3                | 0.86         | 7600                                  |
| LSES 132 SU  | 7.5                  | 2885                                | 15.1                | 0.86         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 13.05                    | 5105                                | 26.24               | 0.86         | 7600                                  |
| LSES 132 M   | 9                    | 2900                                | 17.8                | 0.86         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 15.66                    | 5120                                | 30.98               | 0.86         | 6700                                  |
| LSES 160 MP  | 11                   | 2915                                | 21.9                | 0.83         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 19.14                    | 5135                                | 38.09               | 0.83         | 6700                                  |
| LSES 160 MR  | 15                   | 2900                                | 29.7                | 0.85         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 26.1                     | 5120                                | 51.64               | 0.85         | 6700                                  |
| LSES 160 L   | 18.5                 | 2920                                | 35.6                | 0.88         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 32.19                    | 5140                                | 61.96               | 0.88         | 6030                                  |
| LSES 180 MT  | 21.1                 | 2905                                | 40.8                | 0.88         | 82 %                             | 91 %  | 96 %  | 96 %  | 55 % | 36.77                    | 5125                                | 71.06               | 0.88         | 5670                                  |
| LSES 200 LR  | 30                   | 2930                                | 57.1                | 0.86         | 85 %                             | 90 %  | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 4500                                  |
| LSES 200 L   | 34.2                 | 2910                                | 65.5                | 0.86         | 74 %                             | 83 %  | 92 %  | 92 %  | -    | -                        | -                                   | -                   | -            | 4500                                  |
| LSES 225 MT  | 41.5                 | 2920                                | 79.7                | 0.85         | 74 %                             | 83 %  | 92 %  | 92 %  | -    | -                        | -                                   | -                   | -            | 4320                                  |
| LSES 250 MZ  | 50.5                 | 2925                                | 93.8                | 0.88         | 73 %                             | 83 %  | 92 %  | 92 %  | -    | -                        | -                                   | -                   | -            | 4320                                  |
| LSES 280 SC  | 75                   | 2966                                | 135                 | 0.90         | 85 %                             | 90 %  | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 4320                                  |
| LSES 280 MC  | 90                   | 2960                                | 163                 | 0.90         | 85 %                             | 90 %  | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 4320                                  |
| LSES 315 SN  | 110                  | 2954                                | 200                 | 0.90         | 85 %                             | 90 %  | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| LSES 315 MP  | 132                  | 2972                                | 238                 | 0.88         | 80 %                             | 90 %  | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| LSES 315 MP  | 160                  | 2972                                | 291                 | 0.88         | 80 %                             | 90 %  | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| LSES 315 MP  | 176                  | 2968                                | 319                 | 0.88         | 71 %                             | 79 %  | 88 %  | 88 %  | -    | -                        | -                                   | -                   | -            | 3600                                  |
| 4 poles      |                      |                                     |                     |              |                                  |       |       |       |      |                          |                                     |                     |              |                                       |
| LSES 80 LG   | 0.75                 | 1425                                | 1.75                | 0.78         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 1.31                     | 2535                                | 3.05                | 0.78         | 11700                                 |
| LSES 80 LG   | 0.9                  | 1400                                | 1.95                | 0.82         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 1.57                     | 2510                                | 3.64                | 0.82         | 11700                                 |
| LSES 90 SL   | 1.1                  | 1415                                | 2.5                 | 0.82         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 1.91                     | 2525                                | 4.32                | 0.82         | 11700                                 |
| LSES 90 L    | 1.5                  | 1415                                | 3.3                 | 0.82         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 2.61                     | 2525                                | 5.76                | 0.82         | 11700                                 |
| LSES 90 LU   | 1.8                  | 1435                                | 3.8                 | 0.81         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 3.13                     | 2545                                | 6.86                | 0.81         | 11700                                 |
| LSES 100 L   | 2.2                  | 1420                                | 4.8                 | 0.83         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 3.83                     | 2530                                | 8.3                 | 0.83         | 9900                                  |
| LSES 100 LR  | 3                    | 1415                                | 6.5                 | 0.81         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 5.22                     | 2525                                | 11.34               | 0.81         | 9900                                  |
| LSES 112 MU  | 4                    | 1420                                | 8.5                 | 0.84         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 6.96                     | 2530                                | 14.81               | 0.84         | 9900                                  |
| LSES 132 SU  | 5.5                  | 1435                                | 11.5                | 0.80         | 90 %                             | 90 %  | 100 % | 100 % | 57 % | 9.57                     | 2545                                | 19.98               | 0.80         | 7600                                  |
| LSES 132 M   | 7.5                  | 1435                                | 15.1                | 0.84         | 90 %                             | 90 %  | 100 % | 100 % | 57 % | 13.05                    | 2545                                | 26.24               | 0.84         | 7600                                  |
| LSES 132 M   | 9                    | 1440                                | 17.8                | 0.84         | 90 %                             | 90 %  | 100 % | 100 % | 57 % | 15.66                    | 2550                                | 30.98               | 0.84         | 7600                                  |
| LSES 160 MR  | 11                   | 1445                                | 21.9                | 0.84         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 19.14                    | 2555                                | 38.09               | 0.84         | 7600                                  |
| LSES 160 L   | 15                   | 1452                                | 29.9                | 0.84         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 26.1                     | 2562                                | 51.97               | 0.84         | 6030                                  |
| LSES 180 MT  | 18                   | 1452                                | 36.4                | 0.83         | 80 %                             | 90 %  | 100 % | 100 % | 57 % | 32.19                    | 2562                                | 63.32               | 0.83         | 5670                                  |
| LSES 180 LR  | 22                   | 1454                                | 42.4                | 0.84         | 80 %                             | 90 %  | 100 % | 100 % | 57 % | 38.28                    | 2564                                | 73.81               | 0.84         | 5670                                  |
| LSES 200 LR  | 28                   | 1450                                | 55.7                | 0.83         | 80 %                             | 89 %  | 94 %  | 94 %  | 54 % | 48.96                    | 2560                                | 97.03               | 0.83         | 4500                                  |
| LSES 225 ST  | 37                   | 1460                                | 73.5                | 0.82         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 64.38                    | 2570                                | 127.99              | 0.82         | 4320                                  |
| LSES 225 MR  | 45                   | 1460                                | 88.8                | 0.83         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 78.3                     | 2570                                | 154.57              | 0.83         | 4320                                  |
| LSES 250 ME  | 55                   | 1480                                | 108                 | 0.83         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 95.7                     | 2590                                | 187.92              | 0.83         | 4050                                  |
| LSES 280 SD  | 75                   | 1480                                | 146                 | 0.83         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 130.5                    | 2590                                | 253.95              | 0.83         | 3420                                  |
| LSES 280 MD  | 90                   | 1480                                | 176                 | 0.81         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 156.6                    | 2590                                | 306.43              | 0.81         | 3420                                  |
| LSES 315 SP  | 110                  | 1482                                | 211                 | 0.84         | 80 %                             | 90 %  | 100 % | 100 % | 57 % | 191.4                    | 2592                                | 367.38              | 0.84         | 2700                                  |
| LSES 315 MP  | 132                  | 1482                                | 250                 | 0.85         | 80 %                             | 90 %  | 100 % | 100 % | 57 % | 229.68                   | 2592                                | 435.09              | 0.85         | 2700                                  |
| LSES 315 MP  | 160                  | 1484                                | 304                 | 0.83         | 80 %                             | 90 %  | 100 % | 100 % | 57 % | 278.4                    | 2594                                | 529.9               | 0.83         | 2700                                  |
| LSES 315 MR  | 189                  | 1482                                | 356                 | 0.83         | 76 %                             | 85 %  | 95 %  | 95 %  | 54 % | 329.96                   | 2592                                | 619.6               | 0.83         | 2700                                  |
| 6 poles      |                      |                                     |                     |              |                                  |       |       |       |      |                          |                                     |                     |              |                                       |
| LSES 90 SL   | 0.75                 | 930                                 | 2.05                | 0.68         | 100 %                            | 100 % | 100 % | 100 % | 57 % | 1.31                     | 1670                                | 3.56                | 0.68         | 11700                                 |
| LSES 90 L    | 1.1                  | 910                                 | 2.9                 | 0.71         | 100 %                            | 100 % | 100 % | 100 % | 57 % | 1.91                     | 1650                                | 5.08                | 0.71         | 11700                                 |
| LSES 100 L   | 1.5                  | 915                                 | 4                   | 0.69         | 100 %                            | 100 % | 100 % | 100 % | 57 % | 2.61                     | 1655                                | 6.94                | 0.69         | 9900                                  |
| LSES 112 MG  | 2.2                  | 940                                 | 5.5                 | 0.73         | 100 %                            | 100 % | 100 % | 100 % | 57 % | 3.83                     | 1680                                | 9.65                | 0.73         | 9900                                  |
| LSES 132 S   | 3                    | 945                                 | 7.5                 | 0.71         | 100 %                            | 100 % | 100 % | 100 % | 57 % | 5.22                     | 1685                                | 13.04               | 0.71         | 7600                                  |
| LSES 132 M   | 4                    | 945                                 | 9.2                 | 0.77         | 100 %                            | 100 % | 100 % | 100 % | 57 % | 6.96                     | 1685                                | 16.08               | 0.77         | 6700                                  |
| LSES 132 M   | 5.5                  | 952                                 | 12.4                | 0.73         | 100 %                            | 100 % | 100 % | 100 % | 57 % | 9.57                     | 1692                                | 21.5                | 0.73         | 6700                                  |
| LSES 160 M   | 7.5                  | 966                                 | 16.7                | 0.74         | 100 %                            | 100 % | 100 % | 100 % | 57 % | 13.05                    | 1706                                | 29.12               | 0.74         | 6000                                  |
| LSES 160 LUR | 11                   | 966                                 | 24                  | 0.75         | 95 %                             | 100 % | 100 % | 100 % | 57 % | 19.14                    | 1706                                | 41.82               | 0.75         | 5670                                  |
| LSES 180 L   | 15                   | 966                                 | 31.2                | 0.81         | 80 %                             | 90 %  | 100 % | 100 % | 57 % | 26.1                     | 1706                                | 54.34               | 0.81         | 5670                                  |
| LSES 200 LR  | 18.5                 | 962                                 | 39.2                | 0.80         | 80 %                             | 90 %  | 100 % | 100 % | 57 % | 32.19                    | 1702                                | 68.23               | 0.80         | 4500                                  |
| LSES 200 L   | 22                   | 962                                 | 45.7                | 0.82         | 80 %                             | 90 %  | 100 % | 100 % | 57 % | 38.28                    | 1702                                | 79.57               | 0.82         | 4500                                  |
| LSES 225 MR  | 30                   | 972                                 | 63                  | 0.75         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 52.2                     | 1712                                | 109.7               | 0.75         | 4320                                  |
| LSES 250 ME  | 37                   | 982                                 | 71                  | 0.85         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 64.38                    | 1722                                | 124.43              | 0.85         | 4050                                  |
| LSES 280 SC  | 45                   | 980                                 | 87                  | 0.83         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 78.3                     | 1720                                | 151.52              | 0.83         | 3420                                  |
| LSES 280 MC  | 55                   | 978                                 | 104                 | 0.83         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 95.7                     | 1718                                | 186.23              | 0.83         | 3420                                  |
| LSES 315 SP  | 75                   | 988                                 | 152                 | 0.78         | 85 %                             | 90 %  | 100 % | 100 % | 57 % | 130.5                    | 1728                                | 265.8               | 0.78         | 2700                                  |
| LSES 315 MP  | 90                   | 988                                 | 181                 | 0.80         | 85 %                             | 90 %  | 100 % | 100 % | 57 % | 156.6                    | 1728                                | 314.89              | 0.80         | 2700                                  |
| LSES 315 MR  | 110                  | 988                                 | 217                 | 0.80         | 85 %                             | 90 %  | 100 % | 100 % | 57 % | 191.4                    | 1728                                | 377.53              | 0.80         | 2700                                  |
| LSES 315 MR  | 132                  | 986                                 | 264                 | 0.80         | 85 %                             | 90 %  | 100 % | 100 % | 57 % | 229.68                   | 1728                                | 460.49              | 0.80         | 2700                                  |

(1) Data only valid for: 400 V 50 Hz Y motors and frame size ≤ 250 mm - 2 poles

(2) See Vibrations section on page 48



- Please refer to page 38 for variable speed applications  
 - Values given with a voltage drop of 30 V at the drive output

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Aluminium frame

### Electrical and mechanical characteristics

#### IE2 - Powered by the drive

#### Summary of recommended protection devices

| Mains voltage       | Cable length       | Frame size      | Winding protection  | Insulated bearings                     |
|---------------------|--------------------|-----------------|---------------------|----------------------------------------|
| ≤ 480 V             | < 20 m             | All frame sizes | Standard            | No                                     |
|                     | > 20 m and < 100 m | ≤ 315           | Standard            | No                                     |
|                     |                    | ≥ 315           | RIS or drive filter | NDE                                    |
| > 480 V and ≤ 690 V | < 20 m             | < 250           | Standard            | No                                     |
|                     |                    | ≥ 250           | RIS or drive filter | NDE                                    |
|                     | > 20 m and < 100 m | ≤ 250           | RIS or drive filter | NDE                                    |
|                     |                    | ≥ 250           | RIS or drive filter | NDE (or DE+NDE if no filter for ≥ 315) |

**RIS:** Reinforced Insulation System.

**The filter is recommended above frame size 315.**

Standard insulation = 1500 V peak and 3500 V/μs.

Protection solutions exist (insulation for winding and bearings).

For different cable length(s) and/or voltage(s), please consult Leroy-Somer.



**REMINDER:** All 2, 4 and 6 pole motors placed on the EU market must be IE3 or IE2 and used with a variable speed drive:

- from 01/01/2015 for power ratings from 7.5 to 375 kW
- from 01/01/2017 for power ratings from 0.75 to 375 kW

#### Other drive mechanism solutions:



**LSRPM / PLSRPM:** permanent magnet synchronous motors 3 to 500 kW

Variable speed application, requiring IP55 or IP23 protection, high efficiency and/or compact dimensions.



**CPLS:** induction motors 95 to 2900 Nm

Application for variable speed operation requiring constant power over a broad speed range.



**LSMV:** induction motors 0.18 to 132 kW

Application for variable speed operation requiring constant torque over a wide speed range.



**LSK:** D.C. motors 2 to 750 kW



**UNIMOTOR FM and HD:** servomotors 0.7 to 136 Nm

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Aluminium frame

## Electrical and mechanical characteristics

## IE3 - Powered by the mains

| Type         | Rated power          | Rated torque          | Starting torque/<br>Rated torque | Maximum torque/<br>Rated torque | Starting current/<br>Rated current | Moment of inertia | Weight      | Noise       | 400V 50Hz                           |                     |                                     |             |      |              |      |      |
|--------------|----------------------|-----------------------|----------------------------------|---------------------------------|------------------------------------|-------------------|-------------|-------------|-------------------------------------|---------------------|-------------------------------------|-------------|------|--------------|------|------|
|              | P <sub>n</sub><br>kW | M <sub>n</sub><br>N.m | M <sub>d</sub> /M <sub>n</sub>   | M <sub>m</sub> /M <sub>n</sub>  | I <sub>d</sub> /I <sub>n</sub>     | J<br>kg.m²        | IM B3<br>kg | LP<br>db(A) | Rated speed                         | Rated current       | Efficiency<br>IEC 60034-2-1<br>2007 |             |      | Power factor |      |      |
|              |                      |                       |                                  |                                 |                                    |                   |             |             | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4 3/4 2/4                    | 4/4 3/4 2/4 |      |              |      |      |
| 2 poles      |                      |                       |                                  |                                 |                                    |                   |             |             |                                     |                     |                                     |             |      |              |      |      |
| LSES 80 L    | 0.75                 | 2.5                   | 3.5                              | 3.5                             | 7.8                                | 0.00095           | 9.9         | 58          | 2890                                | 1.6                 | 81.7                                | 81.7        | 79.6 | 0.83         | 0.76 | 0.64 |
| LSES 80 LG   | 1.1                  | 3.7                   | 2.6                              | 3.2                             | 6.8                                | 0.00223           | 14.1        | 64          | 2885                                | 2.25                | 83.7                                | 84.7        | 84.0 | 0.85         | 0.79 | 0.67 |
| LSES 90 SL   | 1.5                  | 5                     | 2.9                              | 3.3                             | 7.5                                | 0.00223           | 15.6        | 64          | 2890                                | 3                   | 85.0                                | 86.0        | 85.2 | 0.85         | 0.79 | 0.67 |
| LSES 90 L    | 1.8                  | 6                     | 3.1                              | 3.4                             | 7.5                                | 0.00292           | 17.8        | 67          | 2890                                | 3.75                | 85.5                                | 86.3        | 86.2 | 0.85         | 0.79 | 0.67 |
| LSES 90 LU   | 2.2                  | 7.3                   | 3.1                              | 3.4                             | 8.0                                | 0.00292           | 20.4        | 67          | 2895                                | 4.25                | 86.3                                | 87.5        | 87.2 | 0.86         | 0.80 | 0.69 |
| LSES 100 L   | 3                    | 10                    | 3.5                              | 3.5                             | 8.4                                | 0.00364           | 24.6        | 67          | 2885                                | 5.8                 | 87.3                                | 88.5        | 88.2 | 0.86         | 0.81 | 0.70 |
| LSES 100 LG  | 3.7                  | 12.1                  | 2.1                              | 3.0                             | 7.4                                | 0.00941           | 35.2        | 71          | 2920                                | 6.65                | 88.2                                | 89.1        | 89.1 | 0.89         | 0.85 | 0.77 |
| LSES 112 MG  | 4                    | 13.1                  | 2.0                              | 2.9                             | 7.0                                | 0.00941           | 32.7        | 71          | 2920                                | 7.3                 | 88.6                                | 89.7        | 89.8 | 0.89         | 0.85 | 0.77 |
| LSES 132 S   | 5.5                  | 18                    | 2.3                              | 3.1                             | 7.4                                | 0.01116           | 39.2        | 63          | 2925                                | 10.3                | 89.6                                | 90.7        | 90.7 | 0.87         | 0.83 | 0.74 |
| LSES 132 SM  | 7.5                  | 24.4                  | 2.1                              | 2.9                             | 6.8                                | 0.01102           | 55.7        | 67          | 2935                                | 13.9                | 90.7                                | 91.6        | 91.6 | 0.86         | 0.82 | 0.74 |
| LSES 132 M   | 9                    | 29.2                  | 2.2                              | 3.3                             | 7.7                                | 0.01203           | 59.3        | 67          | 2945                                | 16.6                | 91.2                                | 91.9        | 91.7 | 0.86         | 0.81 | 0.72 |
| LSES 160 MP  | 11                   | 35.7                  | 1.9                              | 2.9                             | 6.9                                | 0.0139            | 70          | 72          | 2940                                | 20.2                | 91.6                                | 92.3        | 92.1 | 0.86         | 0.82 | 0.73 |
| LSES 160 M   | 15                   | 48.6                  | 2.3                              | 2.8                             | 7.8                                | 0.049             | 95          | 69          | 2945                                | 26.7                | 92.1                                | 92.8        | 92.8 | 0.88         | 0.86 | 0.80 |
| LSES 160 L   | 18.5                 | 59.9                  | 2.8                              | 3.2                             | 7.6                                | 0.0551            | 100         | 68          | 2950                                | 32.8                | 92.6                                | 93.3        | 93.2 | 0.88         | 0.85 | 0.77 |
| LSES 180 MR  | 22                   | 71.2                  | 3.2                              | 3.2                             | 8.7                                | 0.0628            | 105         | 69          | 2950                                | 38.8                | 92.9                                | 93.6        | 93.6 | 0.88         | 0.85 | 0.77 |
| LSES 200 LR  | 30                   | 97.3                  | 2.6                              | 3.1                             | 7.6                                | 0.1106            | 170         | 73          | 2945                                | 52.2                | 93.5                                | 94.3        | 94.4 | 0.89         | 0.87 | 0.82 |
| LSES 200 L   | 37                   | 120                   | 2.0                              | 3.1                             | 7.1                                | 0.2492            | 201         | 73          | 2945                                | 63.7                | 93.9                                | 94.5        | 94.4 | 0.89         | 0.87 | 0.81 |
| LSES 225 MR  | 45                   | 146                   | 2.7                              | 3.4                             | 8.1                                | 0.1597            | 227         | 76          | 2950                                | 77.5                | 94.3                                | 94.8        | 94.8 | 0.89         | 0.86 | 0.79 |
| LSES 250 MZ  | 55                   | 178                   | 2.5                              | 3.5                             | 8.2                                | 0.1754            | 234         | 72          | 2945                                | 94.5                | 94.6                                | 95.2        | 95.2 | 0.89         | 0.86 | 0.80 |
| LSES 280 SC  | 75                   | 241                   | 2.3                              | 3.3                             | 8.1                                | 0.4092            | 350         | 79          | 2970                                | 126                 | 95.2                                | 95.4        | 95.1 | 0.90         | 0.88 | 0.82 |
| LSES 280 MC  | 90                   | 289                   | 2.5                              | 3.6                             | 8.5                                | 0.476             | 382         | 80          | 2972                                | 151                 | 95.4                                | 95.7        | 95.4 | 0.90         | 0.88 | 0.82 |
| LSES 315 SN  | 110                  | 354                   | 2.6                              | 3.1                             | 8.0                                | 0.5343            | 452         | 79          | 2968                                | 185                 | 95.5                                | 95.9        | 95.8 | 0.90         | 0.88 | 0.84 |
| LSES 315 MP  | 132                  | 423                   | 2.3                              | 3.2                             | 7.7                                | 0.5784            | 660         | 80          | 2978                                | 227                 | 95.6                                | 95.6        | 95.0 | 0.88         | 0.86 | 0.80 |
| LSES 315 MP  | 160                  | 513                   | 2.2                              | 3.3                             | 7.7                                | 1.2646            | 705         | 80          | 2978                                | 274                 | 95.8                                | 95.9        | 94.3 | 0.88         | 0.86 | 0.80 |
| LSES 315 MP  | 200                  | 642                   | 2.2                              | 3.5                             | 7.9                                | 1.3841            | 768         | 80          | 2974                                | 340                 | 96.0                                | 96.2        | 95.9 | 0.88         | 0.86 | 0.80 |
| 4 poles      |                      |                       |                                  |                                 |                                    |                   |             |             |                                     |                     |                                     |             |      |              |      |      |
| LSES 80 LG   | 0.75                 | 4.95                  | 2.2                              | 2.9                             | 6.2                                | 0.00335           | 13.6        | 48          | 1450                                | 1.65                | 83.2                                | 83.9        | 82.6 | 0.80         | 0.72 | 0.59 |
| LSES 80 LG   | 0.9                  | 5.9                   | 2.6                              | 3.1                             | 6.4                                | 0.00381           | 14.1        | 48          | 1450                                | 1.9                 | 83.5                                | 84.2        | 83.0 | 0.80         | 0.72 | 0.59 |
| LSES 90 SL   | 1.1                  | 7.25                  | 2.4                              | 3.2                             | 6.9                                | 0.00418           | 16.2        | 45          | 1450                                | 2.3                 | 84.8                                | 85.7        | 85.1 | 0.81         | 0.73 | 0.61 |
| LSES 90 LU   | 1.5                  | 9.85                  | 2.9                              | 3.7                             | 7.7                                | 0.00524           | 20.4        | 51          | 1452                                | 3.2                 | 85.6                                | 86.2        | 84.9 | 0.79         | 0.70 | 0.57 |
| LSES 100 L   | 1.8                  | 11.8                  | 2.4                              | 2.7                             | 6.6                                | 0.00561           | 22.6        | 48          | 1452                                | 3.7                 | 86.0                                | 86.5        | 85.4 | 0.82         | 0.74 | 0.62 |
| LSES 100 LR  | 2.2                  | 14.4                  | 3.2                              | 3.8                             | 8.1                                | 0.00676           | 25.8        | 47          | 1454                                | 4.6                 | 87.1                                | 87.7        | 86.7 | 0.79         | 0.71 | 0.58 |
| LSES 100 LG  | 3                    | 19.6                  | 2.5                              | 3.3                             | 7.2                                | 0.01152           | 31          | 55          | 1460                                | 6.05                | 88.3                                | 89.1        | 88.6 | 0.81         | 0.74 | 0.61 |
| LSES 112 MU  | 4                    | 26.2                  | 2.7                              | 3.1                             | 7.1                                | 0.01429           | 37          | 53          | 1458                                | 8.1                 | 88.8                                | 89.6        | 89.2 | 0.80         | 0.73 | 0.62 |
| LSES 132 SM  | 5.5                  | 35.9                  | 2.8                              | 3.6                             | 8.6                                | 0.02286           | 52          | 59          | 1462                                | 10.3                | 90.3                                | 91.1        | 90.8 | 0.85         | 0.79 | 0.68 |
| LSES 132 MU  | 7.5                  | 49.1                  | 3.0                              | 3.4                             | 8.0                                | 0.02965           | 62.6        | 61          | 1458                                | 14                  | 90.6                                | 91.7        | 92.1 | 0.86         | 0.82 | 0.73 |
| LSES 160 MR  | 9                    | 58.7                  | 3.1                              | 3.7                             | 8.9                                | 0.03574           | 77.8        | 62          | 1464                                | 16.7                | 91.2                                | 92.0        | 91.8 | 0.85         | 0.79 | 0.68 |
| LSES 160 M   | 11                   | 71.7                  | 2.3                              | 3.1                             | 7.3                                | 0.0712            | 93          | 59          | 1466                                | 20.5                | 91.6                                | 92.6        | 92.8 | 0.85         | 0.81 | 0.72 |
| LSES 160 LUR | 15                   | 97.6                  | 2.6                              | 3.5                             | 8.4                                | 0.0954            | 100         | 58          | 1468                                | 27.7                | 92.3                                | 93.1        | 93.2 | 0.85         | 0.81 | 0.71 |
| LSES 180 M   | 18.5                 | 120                   | 3.0                              | 2.9                             | 7.8                                | 0.2075            | 130         | 68          | 1468                                | 33.7                | 92.9                                | 93.7        | 93.7 | 0.85         | 0.81 | 0.72 |
| LSES 180 LUR | 22                   | 143                   | 3.3                              | 3.2                             | 8.2                                | 0.1555            | 155         | 68          | 1470                                | 40.9                | 93.2                                | 93.7        | 93.6 | 0.83         | 0.78 | 0.69 |
| LSES 200 LU  | 30                   | 194                   | 3.0                              | 2.8                             | 7.3                                | 0.2704            | 225         | 63          | 1476                                | 55.1                | 93.8                                | 94.3        | 94.1 | 0.84         | 0.80 | 0.70 |
| LSES 225 SR  | 37                   | 239                   | 3.3                              | 3.2                             | 8.0                                | 0.2897            | 236         | 63          | 1480                                | 69.8                | 94.2                                | 94.5        | 94.1 | 0.81         | 0.76 | 0.65 |
| LSES 225 MG  | 45                   | 290                   | 2.3                              | 2.9                             | 7.3                                | 0.6573            | 318         | 70          | 1484                                | 83                  | 94.6                                | 94.9        | 94.5 | 0.83         | 0.79 | 0.69 |
| LSES 250 ME  | 55                   | 354                   | 2.3                              | 2.7                             | 7.3                                | 0.7793            | 350         | 69          | 1484                                | 101                 | 94.9                                | 95.3        | 95.2 | 0.83         | 0.79 | 0.70 |
| LSES 280 SD  | 75                   | 482                   | 2.5                              | 3.2                             | 8.2                                | 0.9595            | 428         | 69          | 1486                                | 137                 | 95.2                                | 95.4        | 95.1 | 0.83         | 0.79 | 0.69 |
| LSES 280 MD  | 90                   | 579                   | 2.6                              | 3.5                             | 8.5                                | 1.0799            | 470         | 68          | 1484                                | 166                 | 95.5                                | 95.7        | 95.4 | 0.82         | 0.77 | 0.66 |
| LSES 315 SP  | 110                  | 706                   | 3.1                              | 2.9                             | 7.7                                | 2.4322            | 690         | 76          | 1488                                | 198                 | 95.6                                | 95.6        | 95.1 | 0.84         | 0.80 | 0.70 |
| LSES 315 MP  | 132                  | 848                   | 3.1                              | 2.8                             | 7.3                                | 3.223             | 740         | 76          | 1486                                | 235                 | 95.7                                | 95.9        | 95.5 | 0.85         | 0.81 | 0.72 |
| LSES 315 MP  | 160                  | 1030                  | 2.6                              | 2.8                             | 7.2                                | 3.223             | 740         | 76          | 1486                                | 291                 | 95.9                                | 96.0        | 95.5 | 0.83         | 0.78 | 0.67 |
| LSES 315 MR  | 200                  | 1290                  | 3.0                              | 2.9                             | 7.4                                | 3.2324            | 820         | 76          | 1486                                | 361                 | 96.1                                | 96.3        | 95.9 | 0.83         | 0.78 | 0.68 |
| 6 poles      |                      |                       |                                  |                                 |                                    |                   |             |             |                                     |                     |                                     |             |      |              |      |      |
| LSES 90 SL   | 0.75                 | 7.55                  | 1.9                              | 2.3                             | 4.5                                | 0.00378           | 16          | 56          | 950                                 | 1.9                 | 79.1                                | 80.1        | 78.3 | 0.72         | 0.63 | 0.50 |
| LSES 90 LU   | 1.1                  | 11                    | 2.4                              | 2.7                             | 4.9                                | 0.00519           | 21.5        | 56          | 956                                 | 2.75                | 81.9                                | 82.3        | 80.3 | 0.71         | 0.61 | 0.48 |
| LSES 100 LG  | 1.5                  | 14.8                  | 2.4                              | 2.8                             | 5.7                                | 0.01523           | 30          | 43          | 966                                 | 3.6                 | 83.5                                | 84.1        | 82.6 | 0.72         | 0.64 | 0.50 |
| LSES 112 MU  | 2.2                  | 21.7                  | 2.3                              | 2.8                             | 5.5                                | 0.01899           | 37          | 46          | 966                                 | 5.4                 | 84.5                                | 85.0        | 83.7 | 0.70         | 0.61 | 0.49 |
| LSES 132 SM  | 3                    | 29.5                  | 2.8                              | 3.2                             | 6.6                                | 0.02528           | 48          | 50          | 972                                 | 6.85                | 86.5                                | 87.0        | 85.9 | 0.73         | 0.65 | 0.53 |
| LSES 132 M   | 4                    | 39.3                  | 2.7                              | 2.9                             | 6.5                                | 0.03027           | 54          | 56          | 972                                 | 9                   | 87.4                                | 88.0        | 87.0 | 0.73         | 0.66 | 0.53 |
| LSES 132 MU  | 5.5                  | 54.4                  | 2.6                              | 2.9                             | 6.4                                | 0.03699           | 63.1        | 57          | 966                                 | 11.8                | 88.2                                | 89.4        | 89.2 | 0.76         | 0.70 | 0.58 |
| LSES 160 MU  | 7.5                  | 73.2                  | 2.0                              | 3.1                             | 6.0                                | 0.1295            | 82          | 58          | 978                                 | 18.6                | 89.6                                | 89.7        | 88.4 | 0.72         | 0.65 | 0.53 |
| LSES 180 L   | 11                   | 107                   | 3.1                              | 3.5                             | 8.7                                | 0.2048            | 130         | 62          | 982                                 | 22.6                | 91.2                                | 91.4        | 90.4 | 0.77         | 0.69 | 0.57 |
| LSES 180 LUR | 15                   | 146                   | 3.1                              | 3.2                             | 8.5                                | 0.253             | 150         | 63          | 980                                 | 30.6                | 91.5                                | 91.9        | 91.3 | 0.77         | 0.70 | 0.58 |
| LSES 200 L   | 18.5                 | 180                   | 2.2                              | 2.9                             | 7.1                                | 0.33              | 200         | 61          | 980                                 | 36.3                | 92.1                                | 92.8        | 92.6 | 0.80         | 0.75 | 0.66 |
| LSES 200 LU  | 22                   | 214                   | 2.8                              | 3.6                             | 7.4                                | 0.3901            | 236         | 62          | 980                                 | 44.6                | 92.5                                | 93.0        | 92.5 | 0.77         | 0.71 | 0.61 |
| LSES 225 MG  | 30                   | 291                   | 2.3                              | 2.5                             | 6.7                                | 0.7222            | 284         | 64          | 986                                 | 54.9                | 93.4                                | 93.8        | 93.4 | 0.84         | 0.80 | 0.70 |
| LSES 250 ME  | 37                   | 358                   | 2.4                              | 2.8                             | 7.1                                | 0.9234            | 310         | 64          | 986                                 | 66.6                | 93.9                                | 94.4        | 94.3 | 0.85         | 0.81 | 0.72 |
| LSES 280 SC  | 45                   | 437                   | 2.2                              | 2.5                             | 6.6                                | 1.1279            | 377         | 64          | 984                                 | 81.2                | 94.0                                | 94.6        | 94.5 | 0.85         | 0.82 | 0.74 |
| LSES 280 MD  | 55                   | 533                   | 2.8                              | 3.0                             | 7.7                                | 1.3995            | 444         | 59          | 986                                 | 98.7                | 94.7                                | 95.2        | 95.0 | 0.85         | 0.81 | 0.72 |
| LSES 315 SP  | 75                   | 723                   | 3.0                              | 2.6                             | 7.5                                | 2.8937            | 630         | 71          | 990                                 | 147                 | 94.9                                | 95.0        | 94.2 | 0.78         | 0.73 | 0.61 |
| LSES 315 MP  | 90                   | 868                   | 3.1                              | 2.7                             | 7.8                                | 3.4127            | 700         | 75          | 990                                 | 171                 | 95.2                                | 95.2        | 94.4 | 0.80         | 0.75 | 0.64 |
| LSES 315 MR  | 110                  | 1060                  | 3.0                              | 2.1                             | 7.5                                | 3.0776            | 770         | 72          | 990                                 | 208                 | 95.4                                | 95.6        | 95.1 | 0.80         | 0.76 | 0.66 |
| LSES 315 MR  |                      |                       |                                  |                                 |                                    |                   |             |             |                                     |                     |                                     |             |      |              |      |      |

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Aluminium frame

### Electrical and mechanical characteristics

### IE3 - Powered by the mains

| Type         | Rated power          | 380V 50Hz                           |                     |            |              | 415V 50Hz                           |                     |            |              | 460V 60Hz                           |                     |            |              |
|--------------|----------------------|-------------------------------------|---------------------|------------|--------------|-------------------------------------|---------------------|------------|--------------|-------------------------------------|---------------------|------------|--------------|
|              |                      | Rated speed                         | Rated current       | Efficiency | Power factor | Rated speed                         | Rated current       | Efficiency | Power factor | Rated speed                         | Rated current       | Efficiency | Power factor |
|              | P <sub>n</sub><br>kW | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4   | Cos φ<br>4/4 | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4   | Cos φ<br>4/4 | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4   | Cos φ<br>4/4 |
| 2 poles      |                      |                                     |                     |            |              |                                     |                     |            |              |                                     |                     |            |              |
| LSES 80 L    | 0.75                 | 2875                                | 1.65                | 80.9       | 0.86         | 2900                                | 1.55                | 81.6       | 0.81         | 3505                                | 1.4                 | 82.5       | 0.80         |
| LSES 80 LG   | 1.1                  | 2870                                | 2.35                | 82.7       | 0.87         | 2895                                | 2.2                 | 84.2       | 0.83         | 3505                                | 1.95                | 84.9       | 0.83         |
| LSES 90 SL   | 1.5                  | 2880                                | 3.15                | 84.2       | 0.87         | 2900                                | 2.9                 | 85.7       | 0.83         | 3510                                | 2.65                | 86.5       | 0.83         |
| LSES 90 L    | 1.8                  | 2880                                | 3.95                | 85.0       | 0.87         | 2900                                | 3.6                 | 85.6       | 0.83         | 3510                                | 3.3                 | 86.9       | 0.83         |
| LSES 90 LU   | 2.2                  | 2875                                | 4.4                 | 85.9       | 0.88         | 2905                                | 4.2                 | 86.7       | 0.85         | 3505                                | 3.75                | 87.6       | 0.85         |
| LSES 100 L   | 3                    | 2870                                | 6                   | 87.1       | 0.88         | 2900                                | 5.65                | 87.8       | 0.84         | 3505                                | 5.1                 | 87.6       | 0.85         |
| LSES 100 LG  | 3.7                  | 2905                                | 7                   | 87.9       | 0.90         | 2925                                | 6.4                 | 88.5       | 0.88         | 3535                                | 5.8                 | 88.9       | 0.88         |
| LSES 112 MG  | 4                    | 2905                                | 7.65                | 88.1       | 0.90         | 2925                                | 7.1                 | 89.0       | 0.88         | 3535                                | 6.4                 | 89.6       | 0.88         |
| LSES 132 S   | 5.5                  | 2910                                | 10.6                | 89.2       | 0.88         | 2930                                | 10                  | 89.9       | 0.85         | 3540                                | 8.9                 | 90.7       | 0.86         |
| LSES 132 SM  | 7.5                  | 2925                                | 14.5                | 90.1       | 0.87         | 2945                                | 13.5                | 91.1       | 0.85         | 3545                                | 12.1                | 91.6       | 0.85         |
| LSES 132 M   | 9                    | 2935                                | 17.2                | 90.7       | 0.88         | 2950                                | 16.3                | 91.4       | 0.84         | 3558                                | 14.5                | 91.9       | 0.85         |
| LSES 160 MP  | 11                   | 2930                                | 21                  | 91.2       | 0.87         | 2945                                | 19.7                | 91.9       | 0.84         | 3550                                | 17.6                | 92.3       | 0.85         |
| LSES 160 M   | 15                   | 2935                                | 27.9                | 91.9       | 0.89         | 2950                                | 25.9                | 92.2       | 0.87         | 3550                                | 23.3                | 92.5       | 0.87         |
| LSES 160 L   | 18.5                 | 2945                                | 34                  | 92.4       | 0.89         | 2954                                | 32                  | 92.9       | 0.87         | 3558                                | 28.6                | 93.4       | 0.87         |
| LSES 180 MR  | 22                   | 2940                                | 40.4                | 92.7       | 0.89         | 2958                                | 38                  | 93.1       | 0.87         | 3560                                | 33.8                | 93.8       | 0.87         |
| LSES 200 LR  | 30                   | 2935                                | 55                  | 93.3       | 0.89         | 2954                                | 50.4                | 93.8       | 0.88         | 3556                                | 45.3                | 94.0       | 0.89         |
| LSES 200 L   | 37                   | 2930                                | 66.6                | 93.7       | 0.90         | 2950                                | 61.8                | 94.2       | 0.88         | 3552                                | 55.6                | 94.5       | 0.89         |
| LSES 225 MR  | 45                   | 2940                                | 81                  | 94.0       | 0.90         | 2956                                | 75.4                | 94.6       | 0.88         | 3560                                | 67.2                | 94.9       | 0.89         |
| LSES 250 MZ  | 55                   | 2940                                | 98.3                | 94.3       | 0.90         | 2954                                | 92.3                | 94.8       | 0.88         | 3560                                | 81.6                | 95.2       | 0.89         |
| LSES 280 SC  | 75                   | 2964                                | 132                 | 94.8       | 0.91         | 2974                                | 123                 | 95.4       | 0.89         | 3574                                | 110                 | 95.2       | 0.90         |
| LSES 280 MC  | 90                   | 2968                                | 158                 | 95.1       | 0.91         | 2972                                | 148                 | 95.5       | 0.89         | 3574                                | 131                 | 95.5       | 0.90         |
| LSES 315 SN  | 110                  | 2962                                | 195                 | 95.2       | 0.91         | 2970                                | 179                 | 95.6       | 0.89         | 3574                                | 161                 | 95.7       | 0.90         |
| LSES 315 MP  | 132                  | 2974                                | 237                 | 95.4       | 0.89         | 2984                                | 220                 | 95.7       | 0.87         | 3580                                | 198                 | 95.4       | 0.88         |
| LSES 315 MP  | 160                  | 2976                                | 286                 | 95.6       | 0.89         | 2980                                | 267                 | 95.9       | 0.87         | 3580                                | 239                 | 95.6       | 0.88         |
| LSES 315 MP  | 200                  | 2970                                | 357                 | 95.8       | 0.89         | 2980                                | 335                 | 96.1       | 0.86         | 3580                                | 297                 | 96.1       | 0.88         |
| 4 poles      |                      |                                     |                     |            |              |                                     |                     |            |              |                                     |                     |            |              |
| LSES 80 LG   | 0.75                 | 1440                                | 1.65                | 82.6       | 0.82         | 1452                                | 1.6                 | 83.29      | 0.78         | 1758                                | 1.45                | 85.1       | 0.76         |
| LSES 80 LG   | 0.9                  | 1440                                | 2                   | 83.0       | 0.82         | 1452                                | 1.8                 | 83.60      | 0.78         | 1758                                | 1.7                 | 85.6       | 0.76         |
| LSES 90 SL   | 1.1                  | 1445                                | 2.35                | 84.1       | 0.83         | 1454                                | 2.3                 | 85.42      | 0.79         | 1760                                | 2.05                | 86.6       | 0.78         |
| LSES 90 LU   | 1.5                  | 1445                                | 3.25                | 85.3       | 0.82         | 1456                                | 3.2                 | 85.75      | 0.77         | 1760                                | 2.8                 | 87.3       | 0.76         |
| LSES 100 L   | 1.8                  | 1445                                | 3.9                 | 85.4       | 0.83         | 1454                                | 3.9                 | 86.20      | 0.79         | 1760                                | 3.3                 | 87.0       | 0.78         |
| LSES 100 LR  | 2.2                  | 1445                                | 4.7                 | 86.7       | 0.82         | 1456                                | 4.6                 | 87.27      | 0.77         | 1760                                | 4.15                | 88.4       | 0.76         |
| LSES 100 LG  | 3                    | 1452                                | 6.2                 | 87.7       | 0.84         | 1462                                | 6.05                | 88.36      | 0.78         | 1766                                | 5.35                | 90.0       | 0.79         |
| LSES 112 MU  | 4                    | 1450                                | 8.3                 | 88.6       | 0.83         | 1462                                | 8.05                | 88.88      | 0.78         | 1764                                | 7.1                 | 90.2       | 0.79         |
| LSES 132 SM  | 5.5                  | 1456                                | 10.7                | 89.6       | 0.87         | 1466                                | 10.2                | 90.43      | 0.83         | 1768                                | 9.05                | 91.7       | 0.83         |
| LSES 132 MU  | 7.5                  | 1450                                | 14.5                | 90.4       | 0.87         | 1462                                | 13.6                | 90.90      | 0.85         | 1766                                | 12.1                | 92.0       | 0.84         |
| LSES 160 MR  | 9                    | 1458                                | 17.4                | 90.9       | 0.86         | 1466                                | 16.5                | 91.50      | 0.83         | 1768                                | 14.7                | 92.4       | 0.83         |
| LSES 160 M   | 11                   | 1462                                | 21.1                | 91.4       | 0.86         | 1470                                | 19.8                | 91.91      | 0.84         | 1774                                | 17.8                | 92.7       | 0.84         |
| LSES 160 LUR | 15                   | 1464                                | 28.7                | 92.1       | 0.86         | 1472                                | 26.8                | 92.55      | 0.84         | 1774                                | 24.2                | 93.3       | 0.83         |
| LSES 180 M   | 18.5                 | 1466                                | 35.3                | 92.6       | 0.86         | 1474                                | 33.1                | 93.16      | 0.84         | 1774                                | 29.5                | 93.8       | 0.84         |
| LSES 180 LUR | 22                   | 1466                                | 42.4                | 93.0       | 0.85         | 1474                                | 40.3                | 93.41      | 0.81         | 1770                                | 36.4                | 93.8       | 0.81         |
| LSES 200 LU  | 30                   | 1472                                | 56.8                | 93.6       | 0.85         | 1478                                | 53.9                | 94.10      | 0.82         | 1778                                | 48.1                | 94.5       | 0.83         |
| LSES 225 SR  | 37                   | 1476                                | 71.7                | 93.9       | 0.83         | 1482                                | 69.5                | 94.30      | 0.79         | 1782                                | 61.2                | 94.5       | 0.80         |
| LSES 225 MG  | 45                   | 1480                                | 86.2                | 94.3       | 0.85         | 1486                                | 80.7                | 94.94      | 0.82         | 1786                                | 72.3                | 95.0       | 0.82         |
| LSES 250 ME  | 55                   | 1482                                | 105                 | 94.6       | 0.84         | 1486                                | 98.3                | 95.13      | 0.82         | 1786                                | 87.9                | 95.4       | 0.82         |
| LSES 280 SD  | 75                   | 1484                                | 142                 | 95.0       | 0.85         | 1486                                | 134                 | 95.34      | 0.81         | 1786                                | 120                 | 95.6       | 0.82         |
| LSES 280 MD  | 90                   | 1482                                | 170                 | 95.3       | 0.84         | 1488                                | 164                 | 95.50      | 0.80         | 1788                                | 148                 | 95.7       | 0.80         |
| LSES 315 SP  | 110                  | 1486                                | 206                 | 95.4       | 0.85         | 1488                                | 193                 | 95.83      | 0.82         | 1790                                | 176                 | 95.8       | 0.82         |
| LSES 315 MP  | 132                  | 1484                                | 243                 | 95.6       | 0.86         | 1488                                | 229                 | 95.70      | 0.84         | 1790                                | 210                 | 96.2       | 0.82         |
| LSES 315 MP  | 160                  | 1484                                | 300                 | 95.8       | 0.85         | 1488                                | 289                 | 96.00      | 0.80         | 1790                                | 254                 | 96.2       | 0.82         |
| LSES 315 MR  | 200                  | 1484                                | 371                 | 96.0       | 0.85         | 1488                                | 358                 | 96.01      | 0.81         | 1790                                | 316                 | 96.4       | 0.82         |
| 6 poles      |                      |                                     |                     |            |              |                                     |                     |            |              |                                     |                     |            |              |
| LSES 90 SL   | 0.75                 | 945                                 | 1.95                | 78.9       | 0.74         | 956                                 | 1.9                 | 79.5       | 0.70         | -                                   | -                   | -          | -            |
| LSES 90 LU   | 1.1                  | 950                                 | 2.75                | 81.3       | 0.75         | 960                                 | 2.75                | 82.1       | 0.68         | -                                   | -                   | -          | -            |
| LSES 100 LG  | 1.5                  | 962                                 | 3.75                | 82.6       | 0.73         | 970                                 | 3.65                | 83.4       | 0.68         | -                                   | -                   | -          | -            |
| LSES 112 MU  | 2.2                  | 960                                 | 5.4                 | 84.3       | 0.73         | 970                                 | 5.4                 | 84.5       | 0.67         | -                                   | -                   | -          | -            |
| LSES 132 SM  | 3                    | 968                                 | 7                   | 85.8       | 0.76         | 974                                 | 6.8                 | 86.6       | 0.71         | -                                   | -                   | -          | -            |
| LSES 132 M   | 4                    | 968                                 | 9.2                 | 86.8       | 0.76         | 974                                 | 9.05                | 87.7       | 0.70         | -                                   | -                   | -          | -            |
| LSES 132 MU  | 5.5                  | 960                                 | 12.1                | 88.0       | 0.78         | 968                                 | 11.7                | 88.5       | 0.74         | -                                   | -                   | -          | -            |
| LSES 160 MU  | 7.5                  | 974                                 | 19.4                | 89.1       | 0.74         | 980                                 | 18.3                | 89.7       | 0.69         | -                                   | -                   | -          | -            |
| LSES 180 L   | 11                   | 980                                 | 23.2                | 91.2       | 0.79         | 984                                 | 22.4                | 91.3       | 0.75         | -                                   | -                   | -          | -            |
| LSES 180 LUR | 15                   | 976                                 | 31.5                | 91.2       | 0.79         | 982                                 | 30.5                | 91.6       | 0.75         | -                                   | -                   | -          | -            |
| LSES 200 L   | 18.5                 | 976                                 | 37.6                | 91.7       | 0.82         | 982                                 | 35.8                | 92.3       | 0.78         | -                                   | -                   | -          | -            |
| LSES 200 LU  | 22                   | 978                                 | 43.8                | 92.2       | 0.79         | 984                                 | 42.2                | 92.7       | 0.74         | -                                   | -                   | -          | -            |
| LSES 225 MG  | 30                   | 984                                 | 57.4                | 92.9       | 0.86         | 986                                 | 54.6                | 93.4       | 0.82         | -                                   | -                   | -          | -            |
| LSES 250 ME  | 37                   | 984                                 | 69.2                | 93.6       | 0.86         | 988                                 | 66.1                | 94.0       | 0.83         | -                                   | -                   | -          | -            |
| LSES 280 SC  | 45                   | 982                                 | 85.2                | 93.7       | 0.86         | 986                                 | 79.5                | 94.1       | 0.84         | -                                   | -                   | -          | -            |
| LSES 280 MD  | 55                   | 984                                 | 102                 | 94.3       | 0.86         | 988                                 | 96.1                | 94.8       | 0.84         | -                                   | -                   | -          | -            |
| LSES 315 SP  | 75                   | 990                                 | 149                 | 94.8       | 0.80         | 992                                 | 145                 | 95.2       | 0.76         | -                                   | -                   | -          | -            |
| LSES 315 MP  | 90                   | 990                                 | 177                 | 95.0       | 0.82         | 992                                 | 169                 | 95.1       | 0.78         | -                                   | -                   | -          | -            |
| LSES 315 MR  | 110                  | 988                                 | 215                 | 95.1       | 0.82         | 992                                 | 203                 | 95.7       | 0.78         | -                                   | -                   | -          | -            |
| LSES 315 MR  | 132                  | 990                                 | 260                 | 95.4       | 0.81         | 990                                 | 245                 | 95.5       | 0.78         | -                                   | -                   | -          | -            |



| Type         | 400V 50Hz            |                                     |                     |              | % Rated torque M <sub>n</sub> at |       |       |       |      | 400V 87Hz Δ <sup>1</sup> |                                     |                     |              | Maximum mechanical speed <sup>2</sup> |
|--------------|----------------------|-------------------------------------|---------------------|--------------|----------------------------------|-------|-------|-------|------|--------------------------|-------------------------------------|---------------------|--------------|---------------------------------------|
|              | Rated power          | Rated speed                         | Rated current       | Power factor | 10Hz                             | 17Hz  | 25Hz  | 50Hz  | 87Hz | Rated power              | Rated speed                         | Rated current       | Power factor |                                       |
|              | P <sub>n</sub><br>kW | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | Cos φ<br>4/4 |                                  |       |       |       |      | P <sub>n</sub><br>kW     | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | Cos φ<br>4/4 |                                       |
| 2 poles      |                      |                                     |                     |              |                                  |       |       |       |      |                          |                                     |                     |              |                                       |
| LSES 80 L    | 0.75                 | 2850                                | 1.65                | 0.83         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 1.31                     | 5070                                | 2.88                | 0.83         | 13500                                 |
| LSES 80 LG   | 1.1                  | 2850                                | 2.35                | 0.85         | 85 %                             | 100 % | 100 % | 100 % | 57 % | 1.91                     | 5070                                | 4.06                | 0.85         | 11700                                 |
| LSES 90 SL   | 1.5                  | 2845                                | 3.15                | 0.85         | 85 %                             | 100 % | 100 % | 100 % | 57 % | 2.61                     | 5065                                | 5.5                 | 0.85         | 11700                                 |
| LSES 90 L    | 1.8                  | 2870                                | 3.75                | 0.85         | 85 %                             | 100 % | 100 % | 100 % | 57 % | 3.13                     | 5090                                | 6.5                 | 0.85         | 11700                                 |
| LSES 90 LU   | 2.2                  | 2850                                | 4.5                 | 0.86         | 85 %                             | 100 % | 100 % | 100 % | 57 % | 3.83                     | 5070                                | 7.87                | 0.86         | 11700                                 |
| LSES 100 L   | 3                    | 2845                                | 6.1                 | 0.86         | 85 %                             | 100 % | 100 % | 100 % | 57 % | 5.22                     | 5065                                | 10.67               | 0.86         | 9900                                  |
| LSES 100 LG  | 3.7                  | 2890                                | 7.3                 | 0.89         | 85 %                             | 100 % | 100 % | 100 % | 57 % | 6.44                     | 5090                                | 12.7                | 0.89         | 9900                                  |
| LSES 112 MG  | 4                    | 2890                                | 7.9                 | 0.89         | 85 %                             | 100 % | 100 % | 100 % | 57 % | 6.96                     | 5110                                | 13.8                | 0.89         | 9900                                  |
| LSES 132 S   | 5.5                  | 2895                                | 10.9                | 0.87         | 85 %                             | 100 % | 100 % | 100 % | 57 % | 9.57                     | 5115                                | 18.96               | 0.87         | 6700                                  |
| LSES 132 SM  | 7.5                  | 2910                                | 14.7                | 0.86         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 13.05                    | 5130                                | 25.56               | 0.86         | 6700                                  |
| LSES 132 M   | 9                    | 2925                                | 17.5                | 0.86         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 15.66                    | 5145                                | 30.47               | 0.86         | 6700                                  |
| LSES 160 MP  | 11                   | 2920                                | 21.3                | 0.86         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 19.14                    | 5140                                | 37.08               | 0.86         | 6700                                  |
| LSES 160 M   | 15                   | 2920                                | 28.7                | 0.88         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 26.1                     | 5140                                | 49.94               | 0.88         | 6000                                  |
| LSES 160 L   | 18.5                 | 2930                                | 35                  | 0.88         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 32.19                    | 5150                                | 60.95               | 0.88         | 6000                                  |
| LSES 180 MR  | 22                   | 2930                                | 41.65               | 0.88         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 38.28                    | 5150                                | 72.46               | 0.88         | 5670                                  |
| LSES 200 LR  | 30                   | 2925                                | 56                  | 0.89         | 85 %                             | 90 %  | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 4500                                  |
| LSES 200 L   | 37                   | 2920                                | 69.5                | 0.89         | 80 %                             | 90 %  | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 4500                                  |
| LSES 225 MR  | 45                   | 2930                                | 83.3                | 0.89         | 80 %                             | 90 %  | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 4320                                  |
| LSES 250 MZ  | 55                   | 2925                                | 93.85               | 0.89         | 73 %                             | 83 %  | 92 %  | 100 % | -    | -                        | -                                   | -                   | -            | 4320                                  |
| LSES 280 SC  | 75                   | 2966                                | 135                 | 0.90         | 85 %                             | 90 %  | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 4050                                  |
| LSES 280 MC  | 90                   | 2960                                | 162                 | 0.90         | 85 %                             | 90 %  | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 4050                                  |
| LSES 315 SN  | 110                  | 2954                                | 199                 | 0.90         | 85 %                             | 90 %  | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| LSES 315 MP  | 132                  | 2972                                | 239                 | 0.88         | 80 %                             | 90 %  | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| LSES 315 MP  | 160                  | 2972                                | 290                 | 0.88         | 80 %                             | 90 %  | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| LSES 315 MP  | 176                  | 2968                                | 320                 | 0.88         | 71 %                             | 79 %  | 88 %  | 88 %  | -    | -                        | -                                   | -                   | -            | 3600                                  |
| 4 poles      |                      |                                     |                     |              |                                  |       |       |       |      |                          |                                     |                     |              |                                       |
| LSES 80 LG   | 0.75                 | 1430                                | 1.7                 | 0.80         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 1.31                     | 2540                                | 2.96                | 0.80         | 11700                                 |
| LSES 80 LG   | 0.9                  | 1440                                | 2.45                | 0.80         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 1.55                     | 2550                                | 3.47                | 0.80         | 11700                                 |
| LSES 90 SL   | 1.1                  | 1430                                | 2.3                 | 0.81         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 1.91                     | 2540                                | 4.23                | 0.81         | 11700                                 |
| LSES 90 LU   | 1.5                  | 1440                                | 3.3                 | 0.79         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 2.61                     | 2550                                | 5.76                | 0.79         | 11700                                 |
| LSES 100 L   | 1.8                  | 1440                                | 3.9                 | 0.82         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 3.13                     | 2550                                | 6.77                | 0.82         | 9900                                  |
| LSES 100 LR  | 2.2                  | 1435                                | 4.8                 | 0.79         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 3.83                     | 2545                                | 8.3                 | 0.79         | 9900                                  |
| LSES 100 LG  | 3                    | 1445                                | 6.4                 | 0.81         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 5.22                     | 2555                                | 11.09               | 0.81         | 9900                                  |
| LSES 112 MU  | 4                    | 1440                                | 8.4                 | 0.80         | 90 %                             | 100 % | 100 % | 100 % | 57 % | 6.96                     | 2550                                | 14.56               | 0.80         | 9900                                  |
| LSES 132 SM  | 5.5                  | 1450                                | 11                  | 0.85         | 90 %                             | 90 %  | 100 % | 100 % | 57 % | 9.57                     | 2560                                | 19.13               | 0.85         | 6700                                  |
| LSES 132 MU  | 7.5                  | 1440                                | 14.9                | 0.86         | 90 %                             | 90 %  | 100 % | 100 % | 57 % | 13.05                    | 2550                                | 25.9                | 0.86         | 6700                                  |
| LSES 160 MR  | 9                    | 1452                                | 17.8                | 0.85         | 90 %                             | 90 %  | 100 % | 100 % | 57 % | 15.66                    | 2562                                | 30.98               | 0.85         | 6000                                  |
| LSES 160 M   | 11                   | 1454                                | 21.6                | 0.85         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 19.14                    | 2564                                | 37.58               | 0.85         | 6000                                  |
| LSES 160 LUR | 15                   | 1456                                | 29.2                | 0.85         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 26.1                     | 2566                                | 50.79               | 0.85         | 5670                                  |
| LSES 180 M   | 18.5                 | 1460                                | 36.3                | 0.85         | 80 %                             | 90 %  | 100 % | 100 % | 57 % | 32.19                    | 2570                                | 63.15               | 0.85         | 5670                                  |
| LSES 180 LUR | 22                   | 1458                                | 43.6                | 0.83         | 80 %                             | 90 %  | 100 % | 100 % | 57 % | 38.28                    | 2568                                | 75.85               | 0.83         | 4500                                  |
| LSES 200 LU  | 30                   | 1468                                | 59.2                | 0.84         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 52.2                     | 2578                                | 102.93              | 0.84         | 4500                                  |
| LSES 225 SR  | 37                   | 1474                                | 73                  | 0.81         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 64.38                    | 2584                                | 126.97              | 0.81         | 4320                                  |
| LSES 225 MG  | 45                   | 1478                                | 87.8                | 0.83         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 78.3                     | 2588                                | 152.88              | 0.83         | 4050                                  |
| LSES 250 ME  | 55                   | 1480                                | 108                 | 0.83         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 95.7                     | 2590                                | 187.92              | 0.83         | 4050                                  |
| LSES 280 SD  | 75                   | 1480                                | 146                 | 0.83         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 130.5                    | 2590                                | 253.95              | 0.83         | 3420                                  |
| LSES 280 MD  | 90                   | 1480                                | 176                 | 0.82         | 85 %                             | 95 %  | 100 % | 100 % | 57 % | 156.6                    | 2590                                | 306.43              | 0.82         | 3420                                  |
| LSES 315 SP  | 110                  | 1482                                | 211                 | 0.84         | 80 %                             | 90 %  | 100 % | 100 % | 57 % | 191.4                    | 2592                                | 367.38              | 0.84         | 2700                                  |
| LSES 315 MP  | 132                  | 1482                                | 250                 | 0.85         | 80 %                             | 90 %  | 100 % | 100 % | 57 % | 229.6                    | 2592                                | 435.09              | 0.85         | 2700                                  |
| LSES 315 MP  | 160                  | 1484                                | 304                 | 0.83         | 80 %                             | 90 %  | 100 % | 100 % | 57 % | 278.4                    | 2594                                | 529.9               | 0.83         | 2700                                  |
| LSES 315 MR  | 189                  | 1482                                | 356                 | 0.83         | 80 %                             | 90 %  | 90 %  | 90 %  | 57 % | 329.96                   | 2592                                | 619.6               | 0.83         | 2700                                  |
| 6 poles      |                      |                                     |                     |              |                                  |       |       |       |      |                          |                                     |                     |              |                                       |
| LSES 90 SL   | 0.75                 | 930                                 | 1.95                | 0.7          | 100 %                            | 100 % | 100 % | 100 % | 57 % | 1.31                     | 1670                                | 3.39                | 0.72         | 11700                                 |
| LSES 90 LU   | 1.1                  | 940                                 | 2.75                | 0.7          | 100 %                            | 100 % | 100 % | 100 % | 57 % | 1.91                     | 1680                                | 4.74                | 0.71         | 11700                                 |
| LSES 100 LG  | 1.5                  | 954                                 | 3.8                 | 0.7          | 100 %                            | 100 % | 100 % | 100 % | 57 % | 2.61                     | 1694                                | 6.6                 | 0.72         | 9900                                  |
| LSES 112 MU  | 2.2                  | 954                                 | 5.5                 | 0.7          | 100 %                            | 100 % | 100 % | 100 % | 57 % | 3.83                     | 1694                                | 9.57                | 0.70         | 9900                                  |
| LSES 132 SM  | 3                    | 962                                 | 6.9                 | 0.7          | 100 %                            | 100 % | 100 % | 100 % | 57 % | 5.22                     | 1702                                | 12.02               | 0.73         | 6700                                  |
| LSES 132 M   | 4                    | 962                                 | 9.3                 | 0.7          | 100 %                            | 100 % | 100 % | 100 % | 57 % | 6.96                     | 1702                                | 16.17               | 0.73         | 6700                                  |
| LSES 132 MU  | 5.5                  | 954                                 | 12.2                | 0.8          | 100 %                            | 100 % | 100 % | 100 % | 57 % | 9.57                     | 1694                                | 21.33               | 0.76         | 6700                                  |
| LSES 160 MU  | 7.5                  | 970                                 | 16.35               | 0.8          | 100 %                            | 100 % | 100 % | 100 % | 57 % | 13.05                    | 1710                                | 28.44               | 0.76         | 6700                                  |
| LSES 180 L   | 11                   | 976                                 | 23.45               | 0.8          | 95 %                             | 100 % | 100 % | 100 % | 57 % | 19.14                    | 1716                                | 40.8                | 0.77         | 5670                                  |
| LSES 180 LUR | 15                   | 974                                 | 32                  | 0.8          | 80 %                             | 90 %  | 100 % | 100 % | 57 % | 26.1                     | 1714                                | 55.7                | 0.77         | 4500                                  |
| LSES 200 L   | 18.5                 | 972                                 | 38.2                | 0.8          | 80 %                             | 90 %  | 100 % | 100 % | 57 % | 32.19                    | 1712                                | 66.53               | 0.80         | 4500                                  |
| LSES 200 LU  | 22                   | 974                                 | 46.3                | 0.8          | 80 %                             | 90 %  | 100 % | 100 % | 57 % | 38.28                    | 1714                                | 80.59               | 0.77         | 4500                                  |
| LSES 225 MG  | 30                   | 980                                 | 58.6                | 0.8          | 90 %                             | 100 % | 100 % | 100 % | 57 % | 52.2                     | 1720                                | 101.92              | 0.84         | 4050                                  |
| LSES 250 ME  | 37                   | 982                                 | 71.5                | 0.9          | 90 %                             | 100 % | 100 % | 100 % | 57 % | 64.38                    | 1722                                | 124.43              | 0.85         | 4050                                  |
| LSES 280 SC  | 45                   | 980                                 | 87.1                | 0.9          | 90 %                             | 100 % | 100 % | 100 % | 57 % | 78.3                     | 1720                                | 151.52              | 0.85         | 3420                                  |
| LSES 280 MD  | 55                   | 984                                 | 104                 | 0.9          | 90 %                             | 100 % | 100 % | 100 % | 57 % | 95.7                     | 1724                                | 181.15              | 0.85         | 3420                                  |
| LSES 315 SP  | 75                   | 988                                 | 152                 | 0.8          | 85 %                             | 90 %  | 100 % | 100 % | 57 % | 130.5                    | 1728                                | 265.8               | 0.78         | 2700                                  |
| LSES 315 MP  | 90                   | 988                                 | 181                 | 0.8          | 85 %                             | 90 %  | 100 % | 100 % | 57 % | 156.6                    | 1728                                | 314.89              | 0.80         | 2700                                  |
| LSES 315 MR  | 110                  | 988                                 | 217                 | 0.8          | 85 %                             | 90 %  | 100 % | 100 % | 57 % | 191.4                    | 1728                                | 377.53              | 0.80         | 2700                                  |
| LSES 315 MR  | 132                  | 986                                 | 265                 | 0.8          | 85 %                             | 90 %  | 100 % | 100 % | 57 % | 229.68                   | 1726                                | 460.49              | 0.80         | 2700                                  |

(1) Data only valid for: 400 V 50 Hz Y motors and frame size ≤ 250 mm - 2 poles

(2) See Vibrations section on page 48



- Please refer to page 38 for variable speed applications  
 - Values given with a voltage drop of 30 V at the drive output

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Aluminium frame

### Electrical and mechanical characteristics

### IE3 - Powered by the drive

#### Summary of recommended protection devices

| Mains voltage       | Cable length       | Frame size      | Winding protection  | Insulated bearings                     |
|---------------------|--------------------|-----------------|---------------------|----------------------------------------|
| ≤ 480 V             | < 20 m             | All frame sizes | Standard            | No                                     |
|                     | > 20 m and < 100 m | ≤ 315           | Standard            | No                                     |
|                     |                    | ≥ 315           | RIS or drive filter | NDE                                    |
| > 480 V and ≤ 690 V | < 20 m             | < 250           | Standard            | No                                     |
|                     |                    | ≥ 250           | RIS or drive filter | NDE                                    |
|                     | > 20 m and < 100 m | ≤ 250           | RIS or drive filter | NDE                                    |
|                     |                    | ≥ 250           | RIS or drive filter | NDE (or DE+NDE if no filter for ≥ 315) |

**RIS:** Reinforced Insulation System.

**The filter is recommended above frame size 315.**

Standard insulation = 1500 V peak and 3500 V/μs.

Protection solutions exist (insulation for winding and bearings).

For different cable length(s) and/or voltage(s), please consult Leroy-Somer.



**REMINDER:** All 2, 4 and 6 pole motors placed on the EU market must be IE3 or IE2 and used with a variable speed drive:

- from 01/01/2015 for power ratings from 7.5 to 375 kW
- from 01/01/2017 for power ratings from 0.75 to 375 kW

#### Other drive mechanism solutions:



**LSRPM / PLSRPM:** permanent magnet synchronous motors 3 to 500 kW

Variable speed application, requiring IP55 or IP23 protection, high efficiency and/or compact dimensions.



**CPLS:** induction motors 95 to 2900 Nm

Application for variable speed operation requiring constant power over a broad speed range.



**LSMV:** induction motors 0.18 to 132 kW

Application for variable speed operation requiring constant torque over a broad speed range.



**LSK:** D.C. motors 2 to 750 kW



**UNIMOTOR FM and HD:** servomotors 0.7 to 136 Nm



# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Aluminium frame

### Electrical and mechanical characteristics

### Mains connection

#### DESCRIPTIVE TABLE OF TERMINAL BOXES FOR 400 V RATED SUPPLY VOLTAGE (in accordance with EN 50262)

| Series    | Type                  | No. of poles | Terminal box material | Power + auxiliaries   |                                                              |
|-----------|-----------------------|--------------|-----------------------|-----------------------|--------------------------------------------------------------|
|           |                       |              |                       | Number of drill holes | Drill hole diameter                                          |
| LS / LSES | 56-63-71              | 2; 4; 6      | Plastic               | 1 PE ISO 16           | ISO M20 x 1.5                                                |
|           | 80                    | 2; 4; 6      |                       | 1<br>+ 1 knock-out    |                                                              |
|           | 90                    | 2; 4; 6      |                       |                       |                                                              |
|           | 100                   | 2; 4; 6      |                       |                       |                                                              |
|           | 112                   | 2; 4; 6      |                       |                       |                                                              |
|           | 132*                  | 2; 4; 6      | Aluminium alloy       | 2                     | ISO M25 x 1.5                                                |
|           | 160* L/LU/LUR/M/MU    | 2; 4; 6      |                       | 3                     | 2 ISO x M40 + 1 ISO x M16                                    |
|           | 180 M/MR/MT/L/LR/LUR  | 2; 4; 6      |                       |                       | 2 ISO x M50 + 1 ISO x M16                                    |
|           | 200 L/LR/LU           | 2; 4; 6      |                       |                       | 2 ISO x M63 + 1 ISO x M16                                    |
|           | 225 ST/SG/SR/MT/MR/MG | 2; 4; 6      |                       |                       | Removable undrilled mounting plate<br>(see details page 164) |
|           | 250 MZ                | 2            |                       |                       |                                                              |
|           | 250 ME                | 4; 6         |                       |                       |                                                              |
|           | 280 SC/SD/MC/MD       | 2; 4; 6      |                       |                       |                                                              |
|           | 315 SN                | 2            |                       |                       | 0                                                            |
|           | 315 SP/MP/MR          | 2; 4; 6      |                       |                       |                                                              |

\* As an option, both ISO M25 cable glands may be replaced by 1 ISO x M25 and 1 ISO x M32 (to comply with standard DIN 42925).

#### TERMINAL BLOCKS DIRECTION OF ROTATION

Standard motors are fitted with a block of 6 terminals complying with standard NFC 51 120, with the terminal markings complying with IEC 60034-8 (or NF EN 60034-8).

When the motor is running in U1, V1, W1 or 1U, 1V, 1W from a direct mains supply L1, L2, L3, it turns clockwise when seen from the drive shaft end.

If any two of the phases are changed over, the motor will run in an anticlockwise direction (make sure that the motor has been designed to run in both directions).

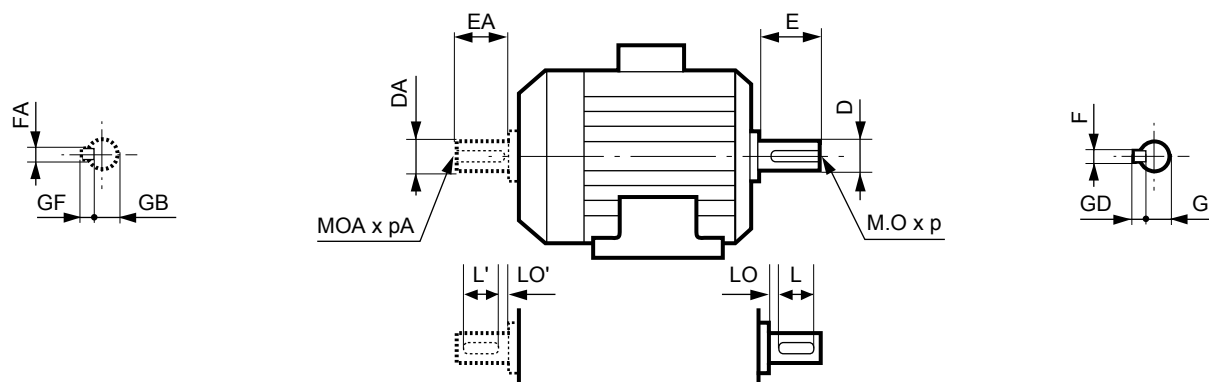
If the motor is fitted with accessories (thermal protection or space heater), these must be connected on screw dominos with labelled wires.

**Tightening torque for the nuts on the terminal blocks.**

| Terminal   | M4 | M5  | M6 | M8 | M10 | M12 | M16 |
|------------|----|-----|----|----|-----|-----|-----|
| Torque N.m | 1  | 2.5 | 4  | 10 | 20  | 35  | 65  |

| LS / LSES series | 230/400V connections |           | 400/690V connections |
|------------------|----------------------|-----------|----------------------|
|                  | No. of poles         | Terminals | Terminals            |
| 56 to 71         | 2; 4; 6              | M4        | -                    |
| 80 to 112        | 2; 4; 6              | M5        | M5                   |
| 132 S/SU         | 2; 4; 6              | M5        | M5                   |
| 132 SM/M/MU      | 2; 4; 6              | M6        | M6                   |
| 160              | 2; 4; 6              | M6        | M6                   |
| 180 M/MT/L       | 2; 4; 6              | M6        | M6                   |
| 180 MR/LR        | 4; 6                 | M8        | M6                   |
| 180 LUR          | 4                    | M8        | M6                   |
|                  | 6                    | M6        | M6                   |
| 200 L/LU         | 2; 6                 | M8        | M8                   |
| 200 LR           | 2; 4; 6              | M8        | M6                   |
| 225 ST/SG/SR     | 4                    | M10       | M8                   |
| 225 MT           | 2                    | M10       | M8                   |
| 225 MR           | 2; 4                 | M8        | M8                   |
| 225 MG           | 4                    | M10       | M8                   |
|                  | 6                    | M8        | M8                   |
| 250 ME           | 4                    | M10       | M10                  |
|                  | 6                    | M8        | M8                   |
| 250 MZ           | 2                    | M10       | M8                   |
|                  | 2                    | M12       | M10                  |
| 280 SC           | 6                    | M10       | M8                   |
| 280 MC           | 2                    | M12       | M10                  |
| 280 SD           | 4                    | M12       | M10                  |
| 280 MD           | 4                    | M12       | M10                  |
|                  | 6                    | M10       | M10                  |
| 315 SN           | 2                    | M16       | M12                  |
| 315 SP           | 4                    | M16       | M12                  |
|                  | 6                    | M12       | M10                  |
|                  | 6                    | M12       | M10                  |
| 315 MP           | 2; 4; 6              | M16       | M12                  |
|                  | 2                    | M16       | M16                  |
|                  | 2                    | M16       | M12                  |
| 315 MR           | 2; 4                 | M16       | M16                  |
|                  | 6                    | M16       | M12                  |

Dimensions in millimetres



| Type                                      | Main shaft extensions |    |      |      |     |    |    |     |     |         |    |      |      |     |    |    |     |     |
|-------------------------------------------|-----------------------|----|------|------|-----|----|----|-----|-----|---------|----|------|------|-----|----|----|-----|-----|
|                                           | 4 and 6 poles         |    |      |      |     |    |    |     |     | 2 poles |    |      |      |     |    |    |     |     |
|                                           | F                     | GD | D    | G    | E   | O  | p  | L   | LO  | F       | GD | D    | G    | E   | O  | p  | L   | LO  |
| LS 56 L                                   | 3                     | 3  | 9j6  | 7    | 20  | 4  | 10 | 16  | 3   | 3       | 3  | 9j6  | 7    | 20  | 4  | 10 | 16  | 3   |
| LS 63 M                                   | 4                     | 4  | 11j6 | 8.5  | 23  | 4  | 10 | 18  | 3.5 | 4       | 4  | 11j6 | 8.5  | 23  | 4  | 10 | 18  | 3.5 |
| LS 71 L                                   | 5                     | 5  | 14j6 | 11   | 30  | 5  | 15 | 25  | 3.5 | 5       | 5  | 14j6 | 11   | 30  | 5  | 15 | 25  | 3.5 |
| LSES 80 L/LU/LG <sup>1</sup>              | 6                     | 6  | 19j6 | 15.5 | 40  | 6  | 16 | 30  | 6   | 6       | 6  | 19j6 | 15.5 | 40  | 6  | 16 | 30  | 6   |
| LSES 90 SL/LU <sup>1</sup>                | 8                     | 7  | 24j6 | 20   | 50  | 8  | 19 | 40  | 6   | 8       | 7  | 24j6 | 20   | 50  | 8  | 19 | 40  | 6   |
| LSES 100 L/LR/LG <sup>1</sup>             | 8                     | 7  | 28j6 | 24   | 60  | 10 | 22 | 50  | 6   | 8       | 7  | 28j6 | 24   | 60  | 10 | 22 | 50  | 6   |
| LSES 112 MR/MG/MU <sup>1</sup>            | 8                     | 7  | 28j6 | 24   | 60  | 10 | 22 | 50  | 6   | 8       | 7  | 28j6 | 24   | 60  | 10 | 22 | 50  | 6   |
| LSES 112 M <sup>1</sup>                   | 8                     | 7  | 28j6 | 24   | 60  | 10 | 22 | 50  | 6   | 8       | 7  | 28j6 | 24   | 60  | 10 | 22 | 50  | 6   |
| LSES 132 S/SU/SM/M/MU <sup>1</sup>        | 10                    | 8  | 38k6 | 33   | 80  | 12 | 28 | 63  | 10  | 10      | 8  | 38k6 | 33   | 80  | 12 | 28 | 63  | 10  |
| LSES 160 MP/MR/M/MU/L/LU/LUR <sup>1</sup> | 12                    | 8  | 42k6 | 37   | 110 | 16 | 36 | 100 | 6   | 12      | 8  | 42k6 | 37   | 110 | 16 | 36 | 100 | 6   |
| LSES 180 M/MT/MR/L/LR/LUR <sup>1</sup>    | 14                    | 9  | 48k6 | 42.5 | 110 | 16 | 36 | 98  | 12  | 14      | 9  | 48k6 | 42.5 | 110 | 16 | 36 | 98  | 12  |
| LSES 200 L/LR/LU <sup>1</sup>             | 16                    | 10 | 55m6 | 49   | 110 | 20 | 42 | 97  | 13  | 16      | 10 | 55m6 | 49   | 110 | 20 | 42 | 97  | 13  |
| LSES 225 ST/MR/MT/MG <sup>1</sup>         | 18                    | 11 | 60m6 | 53   | 140 | 20 | 42 | 126 | 14  | 16      | 10 | 55m6 | 49   | 110 | 20 | 42 | 97  | 13  |
| LSES 225 SR <sup>1</sup>                  | 18                    | 11 | 60m6 | 53   | 140 | 20 | 42 | 125 | 15  | 16      | 10 | 55m6 | 49   | 110 | 20 | 42 | 97  | 13  |
| LSES 250 ME/MZ/MF                         | 18                    | 11 | 65m6 | 58   | 140 | 20 | 42 | 126 | 14  | 18      | 11 | 60m6 | 53   | 140 | 20 | 42 | 126 | 14  |
| LSES 280 SC/SD/SU/SK/MC/MD                | 20                    | 12 | 75m6 | 67.5 | 140 | 20 | 42 | 125 | 15  | 18      | 11 | 65m6 | 58   | 140 | 20 | 42 | 125 | 14  |
| LSES 315 SN/SP/MP/MR                      | 22                    | 14 | 80m6 | 71   | 170 | 20 | 42 | 155 | 15  | 18      | 11 | 65m6 | 58   | 140 | 20 | 42 | 126 | 14  |

1. The dimensions of frame sizes 80 to 225 motors concern the types LS and LSES

| Type                                   | Secondary shaft extensions |    |      |      |     |    |    |     |     |         |    |      |      |     |    |    |     |     |
|----------------------------------------|----------------------------|----|------|------|-----|----|----|-----|-----|---------|----|------|------|-----|----|----|-----|-----|
|                                        | 4 and 6 poles              |    |      |      |     |    |    |     |     | 2 poles |    |      |      |     |    |    |     |     |
|                                        | FA                         | GF | DA   | GB   | EA  | OA | pA | L'  | LO' | FA      | GF | DA   | GB   | EA  | OA | pA | L'  | LO' |
| LS 56 L                                | 3                          | 3  | 9j6  | 7    | 20  | 4  | 10 | 16  | 3   | 3       | 3  | 9j6  | 7    | 20  | 4  | 10 | 16  | 3   |
| LS 63 M                                | 4                          | 4  | 11j6 | 8.5  | 23  | 4  | 10 | 18  | 3.5 | 4       | 4  | 11j6 | 8.5  | 23  | 4  | 10 | 18  | 3.5 |
| LS 71 L                                | 5                          | 5  | 14j6 | 11   | 30  | 5  | 15 | 25  | 3.5 | 5       | 5  | 14j6 | 11   | 30  | 5  | 15 | 25  | 3.5 |
| LSES 80 L/LU/LG <sup>1</sup>           | 5                          | 5  | 14j6 | 11   | 30  | 5  | 15 | 25  | 3.5 | 5       | 5  | 14j6 | 11   | 30  | 5  | 15 | 25  | 3.5 |
| LSES 90 SL/LU <sup>1</sup>             | 6                          | 6  | 19j6 | 15.5 | 40  | 6  | 16 | 30  | 6   | 6       | 6  | 19j6 | 15.5 | 40  | 6  | 16 | 30  | 6   |
| LSES 100 L/LR/LG <sup>1</sup>          | 8                          | 7  | 24j6 | 20   | 50  | 8  | 19 | 40  | 6   | 8       | 7  | 24j6 | 20   | 50  | 8  | 19 | 40  | 6   |
| LSES 112 MR/MG/MU <sup>1</sup>         | 8                          | 7  | 24j6 | 20   | 50  | 8  | 19 | 40  | 6   | 8       | 7  | 24j6 | 20   | 50  | 8  | 19 | 40  | 6   |
| LSES 112 M <sup>1</sup>                | 8                          | 7  | 24j6 | 20   | 50  | 8  | 19 | 40  | 6   | 8       | 7  | 24j6 | 20   | 50  | 8  | 19 | 40  | 6   |
| LSES 132 S/SU/SM/M/MU <sup>1</sup>     | 8                          | 7  | 28k6 | 24   | 60  | 10 | 22 | 50  | 6   | 8       | 7  | 28k6 | 24   | 60  | 10 | 22 | 50  | 6   |
| LSES 160 MU <sup>1</sup>               | 12                         | 8  | 42k6 | 37   | 110 | 16 | 36 | 100 | 6   | 8       | 7  | 28k6 | 24   | 60  | 10 | 22 | 50  | 6   |
| LSES 160 MP/MR <sup>1</sup>            | 10                         | 8  | 38k6 | 33   | 80  | 12 | 28 | 63  | 10  | 10      | 8  | 38k6 | 33   | 80  | 12 | 28 | 63  | 10  |
| LSES 160 M/L/LU/LUR <sup>1</sup>       | 12                         | 8  | 42k6 | 37   | 110 | 16 | 36 | 100 | 6   | 12      | 8  | 42k6 | 37   | 110 | 16 | 36 | 100 | 6   |
| LSES 180 M/MT/MR/L/LR/LUR <sup>1</sup> | 14                         | 9  | 48k6 | 42.5 | 110 | 16 | 36 | 97  | 13  | 14      | 9  | 48k6 | 42.5 | 110 | 16 | 36 | 97  | 13  |
| LSES 200 L/LR/LU <sup>1</sup>          | 16                         | 10 | 55m6 | 49   | 110 | 20 | 42 | 97  | 13  | 16      | 10 | 55m6 | 49   | 110 | 20 | 42 | 97  | 13  |
| LSES 225 ST/MR/MT/MG <sup>1</sup>      | 18                         | 11 | 60m6 | 53   | 140 | 20 | 42 | 126 | 14  | 16      | 10 | 55m6 | 49   | 110 | 20 | 42 | 97  | 13  |
| LSES 225 SR <sup>1</sup>               | 18                         | 11 | 60m6 | 53   | 140 | 20 | 42 | 125 | 15  | 16      | 10 | 55m6 | 49   | 110 | 20 | 42 | 97  | 13  |
| LSES 250 ME/MZ/MF                      | 18                         | 11 | 60m6 | 53   | 140 | 20 | 42 | 126 | 14  | 18      | 11 | 60m6 | 53   | 140 | 20 | 42 | 126 | 14  |
| LSES 280 SC/SD/SU/SK/MC/MD             | 18                         | 11 | 65m6 | 58   | 140 | 20 | 42 | 126 | 14  | 18      | 11 | 65m6 | 58   | 140 | 20 | 42 | 126 | 14  |
| LSES 315 SN                            | 20                         | 12 | 75m6 | 67.5 | 140 | 20 | 42 | 125 | 15  | 18      | 11 | 65m6 | 58   | 140 | 20 | 42 | 125 | 14  |
| LSES 315 SP/MP/MR                      | 22                         | 14 | 80m6 | 71   | 170 | 20 | 42 | 155 | 15  | 18      | 11 | 65m6 | 58   | 140 | 20 | 42 | 126 | 14  |

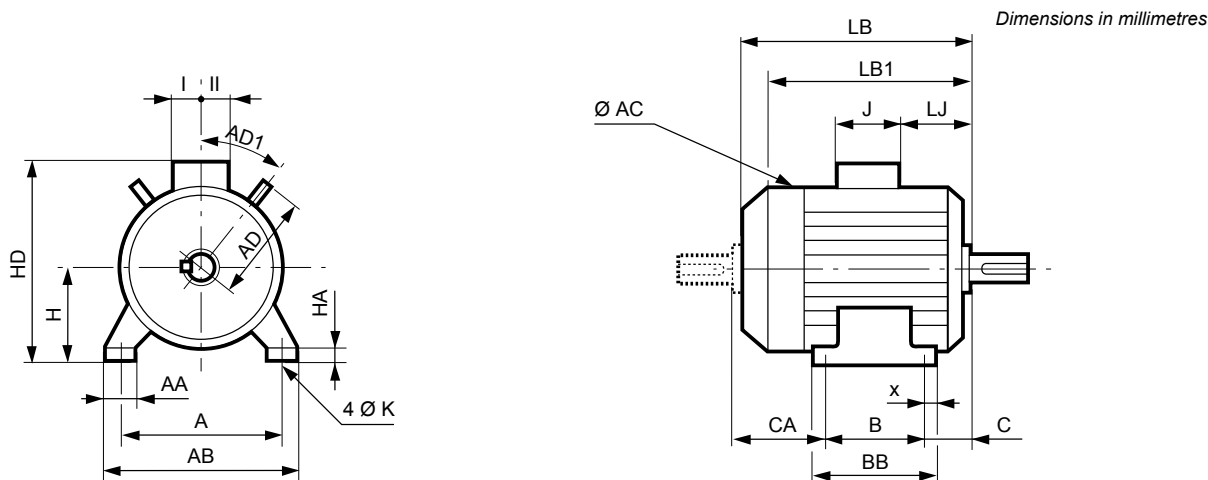
1. The dimensions of frame sizes 80 to 225 motors concern the types LS and LSES

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Aluminium frame

### Dimensions

### Foot mounted IM 1001 (IM B3)



| Type                         | Main dimensions |     |     |     |     |    |     |      |    |     |     |     |      |       |    |     |     |     |     |
|------------------------------|-----------------|-----|-----|-----|-----|----|-----|------|----|-----|-----|-----|------|-------|----|-----|-----|-----|-----|
|                              | A               | AB  | B   | BB  | C   | x  | AA  | K    | HA | H   | AC* | HD  | LB   | LB1** | LJ | J   | I   | II  | AD  |
| LS 56 L                      | 90              | 104 | 71  | 87  | 36  | 8  | 24  | 6    | 7  | 56  | 110 | 140 | 156  | 134   | 16 | 86  | 43  | 43  | -   |
| LS 63 M                      | 100             | 115 | 80  | 96  | 40  | 8  | 26  | 7    | 9  | 63  | 124 | 152 | 172  | 165   | 26 | 86  | 43  | 43  | -   |
| LS 71 L                      | 112             | 126 | 90  | 106 | 45  | 8  | 24  | 7    | 9  | 71  | 140 | 170 | 193  | 166   | 21 | 86  | 43  | 43  | -   |
| LSES 80 L <sup>†</sup>       | 125             | 157 | 100 | 120 | 50  | 10 | 29  | 9    | 10 | 80  | 170 | 205 | 215  | 177   | 26 | 86  | 43  | 43  | -   |
| LSES 80 LU <sup>†</sup>      | 125             | 157 | 100 | 120 | 50  | 10 | 29  | 9    | 10 | 80  | 170 | 205 | 267  | 232   | 26 | 86  | 43  | 43  | -   |
| LSES 80 LG <sup>†</sup>      | 125             | 157 | 100 | 125 | 50  | 14 | 31  | 9    | 10 | 80  | 189 | 215 | 247  | 204   | 26 | 86  | 43  | 43  | -   |
| LSES 90 SL/L <sup>†</sup>    | 140             | 172 | 125 | 164 | 56  | 28 | 39  | 10   | 11 | 90  | 189 | 225 | 245  | 204   | 26 | 86  | 43  | 43  | -   |
| LSES 90 LU <sup>†</sup>      | 140             | 172 | 125 | 164 | 56  | 28 | 39  | 10   | 11 | 90  | 189 | 225 | 276  | 230   | 26 | 86  | 43  | 43  | -   |
| LSES 100 L <sup>†</sup>      | 160             | 196 | 140 | 165 | 63  | 12 | 40  | 12   | 13 | 100 | 200 | 240 | 290  | 250   | 27 | 86  | 43  | 43  | 118 |
| LSES 100 LR <sup>†</sup>     | 160             | 196 | 140 | 165 | 63  | 12 | 40  | 12   | 13 | 100 | 200 | 240 | 309  | 264   | 27 | 86  | 43  | 43  | 118 |
| LSES 100 LG <sup>†</sup>     | 160             | 196 | 140 | 168 | 63  | 13 | 40  | 12   | 14 | 100 | 227 | 249 | 315  | 265   | 36 | 86  | 43  | 43  | 130 |
| LSES 112 M <sup>†</sup>      | 190             | 220 | 140 | 165 | 70  | 13 | 44  | 12   | 14 | 112 | 200 | 252 | 290  | 250   | 27 | 86  | 43  | 43  | 118 |
| LSES 112 MR <sup>†</sup>     | 190             | 220 | 140 | 165 | 70  | 13 | 44  | 12   | 14 | 112 | 200 | 252 | 309  | 264   | 27 | 86  | 43  | 43  | 118 |
| LSES 112 MU <sup>†</sup>     | 190             | 220 | 140 | 165 | 70  | 12 | 52  | 12   | 14 | 112 | 230 | 261 | 332  | 288   | 36 | 86  | 43  | 43  | -   |
| LSES 112 MG <sup>†</sup>     | 190             | 220 | 140 | 165 | 70  | 12 | 52  | 12   | 14 | 112 | 231 | 261 | 315  | 265   | 36 | 86  | 43  | 43  | -   |
| LSES 132 S <sup>†</sup>      | 216             | 250 | 140 | 170 | 89  | 15 | 42  | 12   | 16 | 132 | 227 | 304 | 351  | 306   | 32 | 126 | 63  | 63  | 130 |
| LSES 132 SU <sup>†</sup>     | 216             | 250 | 140 | 170 | 89  | 15 | 42  | 12   | 16 | 132 | 227 | 304 | 383  | 329   | 32 | 126 | 63  | 63  | 130 |
| LSES 132 SM <sup>†</sup>     | 216             | 250 | 140 | 208 | 89  | 15 | 50  | 12   | 15 | 132 | 272 | 322 | 385  | 330   | 17 | 126 | 63  | 63  | 140 |
| LSES 132 M <sup>†</sup>      | 216             | 250 | 178 | 208 | 89  | 15 | 50  | 12   | 15 | 132 | 272 | 322 | 385  | 330   | 17 | 126 | 63  | 63  | 140 |
| LSES 132 MU <sup>†</sup>     | 216             | 250 | 178 | 208 | 89  | 15 | 50  | 12   | 15 | 132 | 272 | 322 | 412  | 351   | 17 | 126 | 63  | 63  | 140 |
| LSES 132 MR <sup>†</sup>     | 216             | 250 | 178 | 208 | 89  | 15 | 50  | 12   | 15 | 132 | 272 | 322 | 441  | 369   | 17 | 126 | 63  | 63  | 140 |
| LSES 160 MP <sup>†</sup>     | 254             | 294 | 210 | 294 | 108 | 20 | 64  | 14   | 25 | 160 | 272 | 350 | 468  | 407   | 59 | 126 | 63  | 63  | 156 |
| LSES 160 MR <sup>†</sup>     | 254             | 294 | 210 | 294 | 108 | 20 | 64  | 14   | 25 | 160 | 272 | 350 | 495  | 440   | 59 | 126 | 63  | 63  | 156 |
| LSES 160 LR <sup>†</sup>     | 254             | 294 | 254 | 294 | 108 | 20 | 64  | 14   | 25 | 160 | 272 | 350 | 495  | 440   | 59 | 126 | 63  | 63  | 156 |
| LSES 160 M <sup>†</sup>      | 254             | 294 | 210 | 294 | 108 | 20 | 60  | 14.5 | 25 | 160 | 312 | 395 | 495  | 435   | 44 | 134 | 92  | 63  | 186 |
| LSES 160 MU/MUR <sup>†</sup> | 254             | 294 | 210 | 294 | 108 | 20 | 60  | 14.5 | 25 | 160 | 312 | 395 | 510  | 435   | 44 | 134 | 92  | 63  | 186 |
| LSES 160 L <sup>†</sup>      | 254             | 294 | 254 | 294 | 108 | 20 | 60  | 14.5 | 25 | 160 | 312 | 395 | 495  | 435   | 44 | 134 | 92  | 63  | 186 |
| LSES 160 LU/LUR <sup>†</sup> | 254             | 294 | 254 | 294 | 108 | 20 | 60  | 14.5 | 25 | 160 | 312 | 395 | 510  | 450   | 44 | 134 | 92  | 63  | 186 |
| LSES 180 MT <sup>†</sup>     | 279             | 324 | 241 | 316 | 121 | 20 | 79  | 14.5 | 28 | 180 | 312 | 428 | 495  | 435   | 55 | 186 | 112 | 98  | 186 |
| LSES 180 LT <sup>†</sup>     | 279             | 324 | 279 | 316 | 121 | 20 | 79  | 14.5 | 28 | 180 | 312 | 428 | 495  | 435   | 55 | 186 | 112 | 98  | 186 |
| LSES 180 MR <sup>†</sup>     | 279             | 324 | 241 | 316 | 121 | 20 | 79  | 14.5 | 28 | 180 | 312 | 428 | 520  | 451   | 55 | 186 | 112 | 98  | 186 |
| LSES 180 LR <sup>†</sup>     | 279             | 324 | 279 | 316 | 121 | 20 | 79  | 14.5 | 28 | 180 | 312 | 428 | 520  | 451   | 55 | 186 | 112 | 98  | 186 |
| LSES 180 L <sup>†</sup>      | 279             | 339 | 279 | 329 | 121 | 25 | 86  | 14.5 | 25 | 180 | 350 | 436 | 552  | 484   | 64 | 186 | 112 | 98  | -   |
| LSES 180 LUR <sup>†</sup>    | 279             | 339 | 279 | 329 | 121 | 25 | 86  | 14.5 | 25 | 180 | 350 | 436 | 614  | 484   | 64 | 186 | 112 | 98  | -   |
| LSES 180 M <sup>†</sup>      | 279             | 339 | 241 | 291 | 121 | 25 | 86  | 14.5 | 25 | 180 | 350 | 436 | 552  | 484   | 64 | 186 | 112 | 98  | -   |
| LSES 180 MUR <sup>†</sup>    | 279             | 339 | 241 | 291 | 121 | 25 | 86  | 14.5 | 25 | 180 | 350 | 436 | 614  | 522   | 64 | 186 | 112 | 98  | -   |
| LSES 200 LR <sup>†</sup>     | 318             | 378 | 305 | 365 | 133 | 30 | 108 | 18.5 | 30 | 200 | 350 | 456 | 620  | 539   | 70 | 186 | 112 | 98  | -   |
| LSES 200 L <sup>†</sup>      | 318             | 388 | 305 | 375 | 133 | 35 | 103 | 18.5 | 36 | 200 | 390 | 476 | 621  | 539   | 77 | 186 | 112 | 98  | -   |
| LSES 200 LU <sup>†</sup>     | 318             | 388 | 305 | 375 | 133 | 35 | 103 | 18.5 | 36 | 200 | 390 | 476 | 669  | 587   | 77 | 186 | 112 | 98  | -   |
| LSES 225 ST <sup>†</sup>     | 356             | 431 | 286 | 386 | 149 | 50 | 127 | 18.5 | 36 | 225 | 390 | 535 | 627  | 545   | 61 | 231 | 119 | 141 | -   |
| LSES 225 SR <sup>†</sup>     | 356             | 431 | 286 | 386 | 149 | 50 | 127 | 18.5 | 36 | 225 | 390 | 535 | 676  | 545   | 61 | 231 | 119 | 141 | -   |
| LSES 225 MT <sup>†</sup>     | 356             | 431 | 311 | 386 | 149 | 50 | 127 | 18.5 | 36 | 225 | 390 | 535 | 627  | 545   | 61 | 231 | 119 | 141 | -   |
| LSES 225 MR <sup>†</sup>     | 356             | 431 | 311 | 386 | 149 | 50 | 127 | 18.5 | 36 | 225 | 390 | 535 | 676  | 593   | 61 | 231 | 119 | 141 | -   |
| LSES 225 MG <sup>†</sup>     | 356             | 420 | 311 | 375 | 149 | 30 | 65  | 18.5 | 33 | 225 | 479 | 630 | 810  | 728   | 68 | 292 | 151 | 181 | 283 |
| LSES 250 MZ                  | 406             | 470 | 349 | 449 | 168 | 70 | 150 | 24   | 47 | 250 | 390 | 560 | 676  | 593   | 61 | 231 | 119 | 141 | -   |
| LSES 250 ME                  | 406             | 470 | 349 | 420 | 168 | 35 | 90  | 24   | 35 | 250 | 479 | 655 | 810  | 716   | 68 | 292 | 151 | 181 | 283 |
| LSES 250 MF                  | 406             | 470 | 349 | 420 | 168 | 35 | 90  | 24   | 35 | 250 | 479 | 625 | 870  | 776   | 68 | 292 | 151 | 181 | 283 |
| LSES 280 MC                  | 457             | 520 | 419 | 478 | 190 | 35 | 90  | 24   | 35 | 280 | 479 | 685 | 810  | 716   | 68 | 292 | 151 | 181 | 283 |
| LSES 280 SC                  | 457             | 520 | 368 | 478 | 190 | 35 | 90  | 24   | 35 | 280 | 479 | 685 | 810  | 716   | 68 | 292 | 151 | 181 | 283 |
| LSES 280 SK                  | 457             | 533 | 368 | 495 | 190 | 40 | 85  | 24   | 35 | 280 | 586 | 746 | 921  | 827   | 99 | 292 | 151 | 181 | -   |
| LSES 280 SU                  | 457             | 533 | 368 | 495 | 190 | 40 | 85  | 24   | 35 | 280 | 586 | 746 | 991  | 897   | 99 | 292 | 151 | 181 | -   |
| LSES 280 SD                  | 457             | 520 | 368 | 478 | 190 | 35 | 90  | 24   | 35 | 280 | 479 | 685 | 870  | 870   | 68 | 292 | 151 | 181 | 283 |
| LSES 280 MD                  | 457             | 520 | 419 | 478 | 190 | 35 | 90  | 24   | 35 | 280 | 479 | 685 | 870  | 870   | 68 | 292 | 151 | 181 | 283 |
| LSES 315 SN                  | 508             | 594 | 406 | 537 | 216 | 40 | 140 | 28   | 50 | 315 | 479 | 720 | 870  | 776   | 68 | 420 | 151 | 181 | 283 |
| LSES 315 SP                  | 508             | 594 | 406 | 537 | 216 | 40 | 114 | 28   | 70 | 315 | 586 | 870 | 947  | 845   | 61 | 420 | 180 | 235 | -   |
| LSES 315 MP                  | 508             | 594 | 457 | 537 | 216 | 40 | 114 | 28   | 70 | 315 | 586 | 870 | 947  | 845   | 61 | 420 | 180 | 235 | -   |
| LSES 315 MR                  | 508             | 594 | 457 | 537 | 216 | 40 | 114 | 28   | 70 | 315 | 586 | 870 | 1017 | 947   | 61 | 420 | 180 | 235 | -   |

\* AC: housing diameter without lifting rings

\*\* LB1: non-ventilated motor

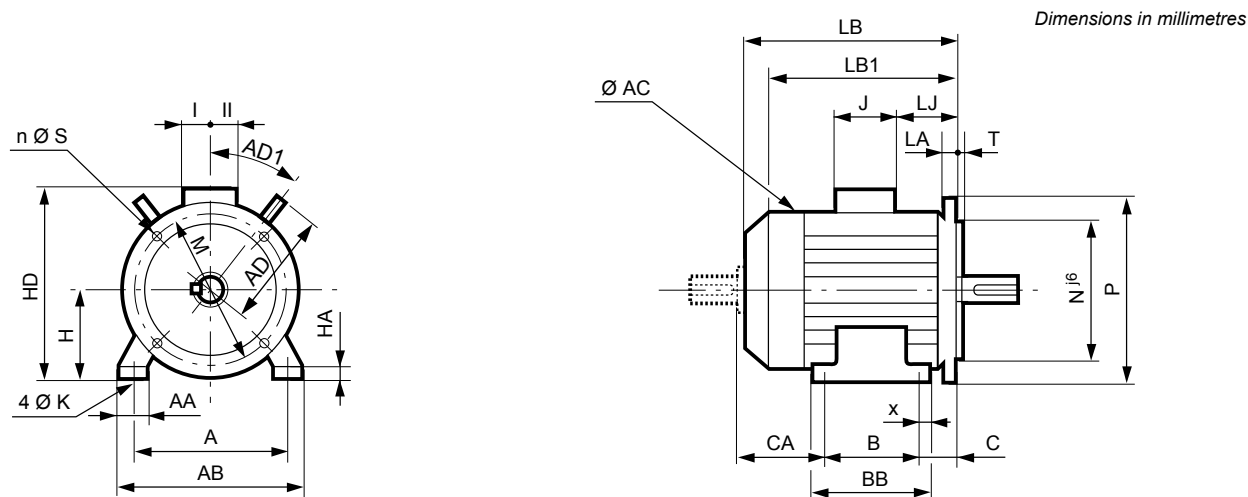
1. The dimensions of frame sizes 80 to 225 motors concern the types LS and LSES

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Aluminium frame

### Dimensions

### Foot and flange IM 2001 (IM B35)



| Type                         | Main dimensions |     |     |     |                 |    |     |      |    |     |     |     |      |       |    |     |     |     |     |     | Symb       |
|------------------------------|-----------------|-----|-----|-----|-----------------|----|-----|------|----|-----|-----|-----|------|-------|----|-----|-----|-----|-----|-----|------------|
|                              | A               | AB  | B   | BB  | C               | x  | AA  | K    | HA | H   | AC* | HD  | LB   | LB1** | LJ | J   | I   | II  | AD  | AD1 |            |
| LS 56 L                      | 90              | 104 | 71  | 87  | 36              | 8  | 25  | 6    | 7  | 56  | 110 | 140 | 156  | 134   | 16 | 86  | 43  | 43  | -   | -   | 51 FF 100  |
| LS 63 M                      | 100             | 115 | 80  | 96  | 40              | 8  | 26  | 7    | 9  | 63  | 124 | 152 | 172  | 165   | 26 | 86  | 43  | 43  | -   | -   | 55 FF 115  |
| LS 71 L                      | 112             | 125 | 90  | 106 | 45              | 8  | 24  | 7    | 9  | 71  | 140 | 170 | 193  | 166   | 26 | 86  | 43  | 43  | -   | -   | 61 FF 130  |
| LSES 80 L <sup>†</sup>       | 125             | 157 | 100 | 120 | 50              | 10 | 29  | 9    | 10 | 80  | 170 | 205 | 215  | 177   | 26 | 86  | 43  | 43  | -   | -   | 68 FF 165  |
| LSES 80 LU <sup>†</sup>      | 125             | 157 | 100 | 120 | 50              | 10 | 29  | 9    | 10 | 80  | 170 | 205 | 267  | 232   | 26 | 86  | 43  | 43  | -   | -   | 120 FF 165 |
| LSES 80 LG <sup>†</sup>      | 125             | 157 | 100 | 125 | 70 <sup>2</sup> | 14 | 31  | 9    | 10 | 80  | 189 | 215 | 267  | 224   | 26 | 86  | 43  | 43  | -   | -   | 100 FF 165 |
| LSES 90 SL <sup>†</sup>      | 140             | 172 | 125 | 164 | 56              | 28 | 39  | 10   | 11 | 90  | 189 | 225 | 265  | 224   | 26 | 86  | 43  | 43  | -   | -   | 68 FF 165  |
| LSES 90 LU <sup>†</sup>      | 140             | 172 | 125 | 164 | 56              | 28 | 39  | 10   | 11 | 90  | 189 | 225 | 296  | 250   | 26 | 86  | 43  | 43  | -   | -   | 88 FF 165  |
| LSES 100 L <sup>†</sup>      | 160             | 196 | 140 | 165 | 63              | 12 | 40  | 12   | 13 | 100 | 200 | 240 | 290  | 250   | 27 | 86  | 43  | 43  | 118 | 45  | 95 FF 215  |
| LSES 100 LR <sup>†</sup>     | 160             | 196 | 140 | 165 | 63              | 12 | 40  | 12   | 13 | 100 | 200 | 240 | 309  | 264   | 27 | 86  | 43  | 43  | 118 | 45  | 111 FF 215 |
| LSES 100 LG <sup>†</sup>     | 160             | 196 | 140 | 168 | 63              | 13 | 40  | 12   | 14 | 100 | 227 | 249 | 315  | 265   | 36 | 86  | 43  | 43  | 130 | 45  | 118 FF 215 |
| LSES 112 M <sup>†</sup>      | 190             | 220 | 140 | 165 | 70              | 13 | 44  | 12   | 14 | 112 | 200 | 252 | 290  | 250   | 27 | 86  | 43  | 43  | 118 | 45  | 88 FF 215  |
| LSES 112 MR <sup>†</sup>     | 190             | 220 | 140 | 165 | 70              | 13 | 44  | 12   | 14 | 112 | 200 | 252 | 309  | 264   | 27 | 86  | 43  | 43  | 118 | 45  | 104 FF 215 |
| LSES 112 MU <sup>†</sup>     | 190             | 220 | 140 | 165 | 70              | 12 | 52  | 12   | 14 | 112 | 230 | 261 | 332  | 288   | 36 | 86  | 43  | 43  | -   | -   | 126 FF 215 |
| LSES 112 MG <sup>†</sup>     | 190             | 220 | 140 | 165 | 70              | 12 | 52  | 12   | 14 | 112 | 231 | 261 | 315  | 265   | 36 | 86  | 43  | 43  | -   | -   | 109 FF 215 |
| LSES 132 S <sup>†</sup>      | 216             | 250 | 140 | 170 | 89              | 15 | 42  | 12   | 16 | 132 | 227 | 304 | 351  | 306   | 32 | 126 | 63  | 63  | 130 | 45  | 128 FF 265 |
| LSES 132 SU <sup>†</sup>     | 216             | 250 | 140 | 170 | 89              | 15 | 42  | 12   | 16 | 132 | 227 | 304 | 383  | 329   | 32 | 126 | 63  | 63  | 130 | 45  | 152 FF 265 |
| LSES 132 SM <sup>†</sup>     | 216             | 250 | 140 | 208 | 89              | 15 | 50  | 12   | 15 | 132 | 272 | 322 | 385  | 330   | 17 | 126 | 63  | 63  | 140 | 45  | 164 FF 265 |
| LSES 132 M <sup>†</sup>      | 216             | 250 | 178 | 208 | 89              | 15 | 50  | 12   | 15 | 132 | 272 | 322 | 385  | 330   | 17 | 126 | 63  | 63  | 140 | 45  | 126 FF 265 |
| LSES 132 MU <sup>†</sup>     | 216             | 250 | 178 | 208 | 89              | 15 | 50  | 12   | 15 | 132 | 272 | 322 | 412  | 351   | 17 | 126 | 63  | 63  | 140 | 45  | 153 FF 265 |
| LSES 132 MR <sup>†</sup>     | 216             | 250 | 178 | 208 | 89              | 15 | 50  | 12   | 15 | 132 | 272 | 322 | 441  | 369   | 17 | 126 | 63  | 63  | 140 | 45  | 182 FF 265 |
| LSES 160 MP <sup>†</sup>     | 254             | 294 | 210 | 294 | 108             | 20 | 64  | 14   | 25 | 160 | 272 | 350 | 468  | 407   | 59 | 126 | 63  | 63  | 156 | 45  | 150 FF 300 |
| LSES 160 MR <sup>†</sup>     | 254             | 294 | 210 | 294 | 108             | 20 | 64  | 14   | 25 | 160 | 272 | 350 | 495  | 440   | 59 | 126 | 63  | 63  | 156 | 45  | 182 FF 300 |
| LSES 160 LR <sup>†</sup>     | 254             | 294 | 254 | 294 | 108             | 20 | 64  | 14   | 25 | 160 | 272 | 350 | 495  | 440   | 59 | 126 | 63  | 63  | 156 | 45  | 138 FF 300 |
| LSES 160 M <sup>†</sup>      | 254             | 294 | 210 | 294 | 108             | 20 | 60  | 14.5 | 25 | 160 | 312 | 395 | 495  | 435   | 44 | 134 | 92  | 63  | 186 | 45  | 182 FF 300 |
| LSES 160 MU/MUR <sup>†</sup> | 254             | 294 | 210 | 294 | 108             | 20 | 60  | 14.5 | 25 | 160 | 312 | 395 | 510  | 435   | 44 | 134 | 92  | 63  | 186 | 45  | 197 FF 300 |
| LSES 160 L <sup>†</sup>      | 254             | 294 | 254 | 294 | 108             | 20 | 60  | 14.5 | 25 | 160 | 312 | 395 | 495  | 435   | 44 | 134 | 92  | 63  | 186 | 45  | 138 FF 300 |
| LSES 160 LU/LUR <sup>†</sup> | 254             | 294 | 254 | 294 | 108             | 20 | 60  | 14.5 | 25 | 160 | 312 | 395 | 510  | 450   | 44 | 134 | 92  | 63  | 186 | 45  | 153 FF 300 |
| LSES 180 MT <sup>†</sup>     | 279             | 324 | 241 | 316 | 121             | 20 | 79  | 14.5 | 28 | 180 | 312 | 428 | 495  | 435   | 55 | 186 | 112 | 98  | 186 | 45  | 138 FF 300 |
| LSES 180 LT <sup>†</sup>     | 279             | 324 | 279 | 316 | 121             | 20 | 79  | 14.5 | 28 | 180 | 312 | 428 | 495  | 435   | 55 | 186 | 112 | 98  | 186 | 45  | 100 FF 300 |
| LSES 180 MR <sup>†</sup>     | 279             | 324 | 241 | 316 | 121             | 20 | 79  | 14.5 | 28 | 180 | 312 | 428 | 520  | 451   | 55 | 186 | 112 | 98  | 186 | 45  | 163 FF 300 |
| LSES 180 LR <sup>†</sup>     | 279             | 324 | 279 | 316 | 121             | 20 | 79  | 14.5 | 28 | 180 | 312 | 428 | 520  | 451   | 55 | 186 | 112 | 98  | 186 | 45  | 125 FF 300 |
| LSES 180 L <sup>†</sup>      | 279             | 339 | 279 | 329 | 121             | 25 | 86  | 14.5 | 25 | 180 | 350 | 436 | 552  | 484   | 64 | 186 | 112 | 98  | -   | -   | 159 FF 300 |
| LSES 180 LUR <sup>†</sup>    | 279             | 339 | 279 | 329 | 121             | 25 | 86  | 14.5 | 25 | 180 | 350 | 436 | 614  | 484   | 64 | 186 | 112 | 98  | -   | -   | 224 FF 300 |
| LSES 180 M <sup>†</sup>      | 279             | 339 | 241 | 291 | 121             | 25 | 86  | 14.5 | 25 | 180 | 350 | 436 | 552  | 525   | 64 | 186 | 112 | 98  | -   | -   | 197 FF 300 |
| LSES 180 MUR <sup>†</sup>    | 279             | 339 | 241 | 291 | 121             | 25 | 86  | 14.5 | 25 | 180 | 350 | 436 | 614  | 522   | 64 | 186 | 112 | 98  | -   | -   | 257 FF 300 |
| LSES 200 LR <sup>†</sup>     | 318             | 378 | 305 | 365 | 133             | 30 | 108 | 18.5 | 30 | 200 | 350 | 456 | 620  | 539   | 70 | 186 | 112 | 98  | -   | -   | 194 FF 350 |
| LSES 200 L <sup>†</sup>      | 318             | 388 | 305 | 375 | 133             | 35 | 103 | 18.5 | 36 | 200 | 390 | 476 | 621  | 539   | 77 | 186 | 112 | 98  | -   | -   | 194 FF 350 |
| LSES 200 LU <sup>†</sup>     | 318             | 388 | 305 | 375 | 133             | 35 | 103 | 18.5 | 36 | 200 | 390 | 476 | 669  | 587   | 77 | 186 | 112 | 98  | -   | -   | 244 FF 350 |
| LSES 225 ST <sup>†</sup>     | 356             | 431 | 286 | 386 | 149             | 50 | 127 | 18.5 | 36 | 225 | 390 | 535 | 627  | 545   | 61 | 231 | 119 | 141 | -   | -   | 203 FF 400 |
| LSES 225 SR <sup>†</sup>     | 356             | 431 | 286 | 386 | 149             | 50 | 127 | 18.5 | 36 | 225 | 390 | 535 | 676  | 545   | 61 | 231 | 119 | 141 | -   | -   | 253 FF 400 |
| LSES 225 MT <sup>†</sup>     | 356             | 431 | 311 | 386 | 149             | 50 | 127 | 18.5 | 36 | 225 | 390 | 535 | 627  | 545   | 61 | 231 | 119 | 141 | -   | -   | 178 FF 400 |
| LSES 225 MR <sup>†</sup>     | 356             | 431 | 311 | 386 | 149             | 50 | 127 | 18.5 | 36 | 225 | 390 | 535 | 676  | 593   | 61 | 231 | 119 | 141 | -   | -   | 228 FF 400 |
| LSES 225 MG <sup>†</sup>     | 356             | 420 | 311 | 375 | 149             | 30 | 65  | 18.5 | 33 | 225 | 479 | 630 | 810  | 728   | 68 | 292 | 151 | 181 | 283 | 45  | 360 FF 400 |
| LSES 250 MZ                  | 406             | 470 | 349 | 449 | 168             | 70 | 150 | 24   | 47 | 250 | 390 | 560 | 676  | 593   | 61 | 231 | 119 | 141 | -   | -   | 171 FF 500 |
| LSES 250 ME                  | 406             | 470 | 349 | 420 | 168             | 35 | 90  | 24   | 35 | 250 | 479 | 655 | 810  | 716   | 68 | 292 | 151 | 181 | 283 | 45  | 303 FF 500 |
| LSES 250 MF                  | 406             | 470 | 349 | 420 | 168             | 35 | 90  | 24   | 35 | 250 | 479 | 625 | 870  | 776   | 68 | 292 | 151 | 181 | 283 | 45  | 363 FF 500 |
| LSES 280 MC                  | 457             | 520 | 419 | 478 | 190             | 35 | 90  | 24   | 35 | 280 | 479 | 685 | 810  | 716   | 68 | 292 | 151 | 181 | 283 | 45  | 211 FF 500 |
| LSES 280 SC                  | 457             | 520 | 368 | 478 | 190             | 35 | 90  | 24   | 35 | 280 | 479 | 685 | 810  | 716   | 68 | 292 | 151 | 181 | 283 | 45  | 262 FF 500 |
| LSES 280 SK                  | 457             | 533 | 368 | 495 | 190             | 40 | 85  | 24   | 35 | 280 | 586 | 746 | 921  | 827   | 99 | 292 | 151 | 181 | -   | -   | 379 FF 500 |
| LSES 280 SU                  | 457             | 533 | 368 | 495 | 190             | 40 | 85  | 24   | 35 | 280 | 586 | 746 | 991  | 897   | 99 | 292 | 151 | 181 | -   | -   | 449 FF 500 |
| LSES 280 SD                  | 457             | 520 | 368 | 478 | 190             | 35 | 90  | 24   | 35 | 280 | 479 | 685 | 870  | 870   | 68 | 292 | 151 | 181 | 283 | 45  | 322 FF 500 |
| LSES 280 MD                  | 457             | 520 | 419 | 478 | 190             | 35 | 90  | 24   | 35 | 280 | 479 | 685 | 870  | 870   | 68 | 292 | 151 | 181 | 283 | 45  | 271 FF 500 |
| LSES 315 SN                  | 508             | 594 | 406 | 537 | 216             | 40 | 140 | 28   | 50 | 315 | 479 | 720 | 870  | 776   | 68 | 420 | 180 | 235 | -   | -   | 258 FF 600 |
| LSES 315 SP                  | 508             | 594 | 406 | 537 | 216             | 40 | 114 | 28   | 70 | 315 | 586 | 870 | 947  | 845   | 61 | 420 | 180 | 235 | -   | -   | 341 FF 600 |
| LSES 315 MP                  | 508             | 594 | 457 | 537 | 216             | 40 | 114 | 28   | 70 | 315 | 586 | 870 | 947  | 845   | 61 | 420 | 180 | 235 | -   | -   | 290 FF 600 |
| LSES 315 MR                  | 508             | 594 | 457 | 537 | 216             | 40 | 114 | 28   | 70 | 315 | 586 | 870 | 1017 | 947   | 61 | 420 | 180 | 235 | -   | -   | 360 FF 600 |

\* AC: housing diameter without lifting rings

\*\* LB1: non-ventilated motor

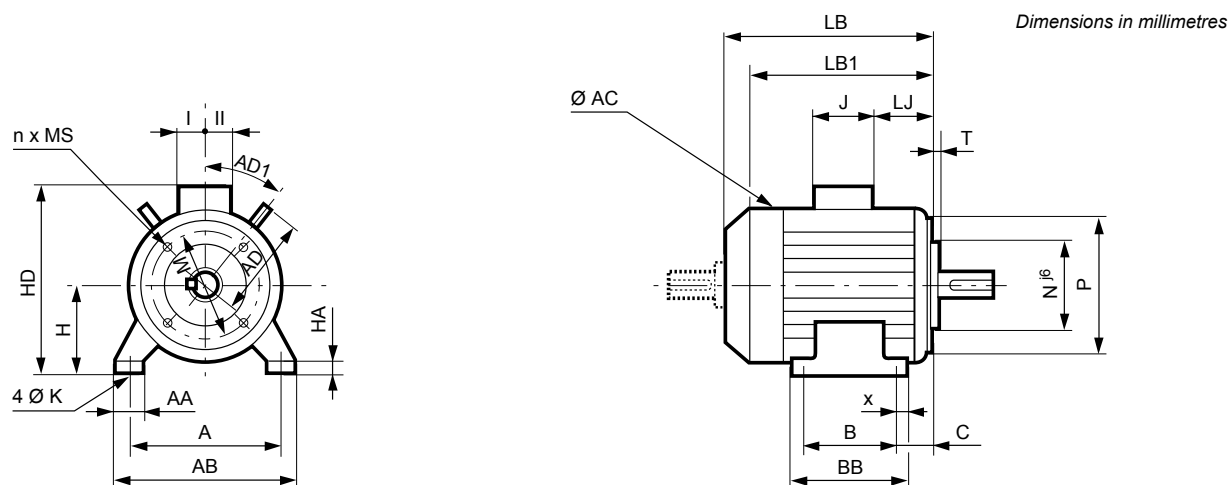
1. The dimensions of frame sizes 80 to 225 motors concern the types LS and LSES

2. Out of IEC

### Flange mounted IM 3001 (IM B5) IM 3011 (IM V1)

| IEC<br>symbol | Flange dimensions |     |     |     |   |      |      |    |
|---------------|-------------------|-----|-----|-----|---|------|------|----|
|               | M                 | N   | P   | T   | n | α°   | S    | LA |
| FF 100        | 100               | 80  | 120 | 2.5 | 4 | 45   | 7    | 5  |
| FF 115        | 115               | 95  | 140 | 3   | 4 | 45   | 10   | 10 |
| FF 130        | 130               | 110 | 160 | 3.5 | 4 | 45   | 10   | 10 |
| FF 165        | 165               | 130 | 200 | 3.5 | 4 | 45   | 12   | 10 |
| FF 165        | 165               | 130 | 200 | 3.5 | 4 | 45   | 12   | 10 |
| FF 165        | 165               | 130 | 200 | 3.5 | 4 | 45   | 12   | 10 |
| FF 165        | 165               | 130 | 200 | 3.5 | 4 | 45   | 12   | 10 |
| FF 165        | 165               | 130 | 200 | 3.5 | 4 | 45   | 12   | 10 |
| FF 215        | 215               | 180 | 250 | 4   | 4 | 45   | 14.5 | 10 |
| FF 215        | 215               | 180 | 250 | 4   | 4 | 45   | 14.5 | 10 |
| FF 215        | 215               | 180 | 250 | 4   | 4 | 45   | 14.5 | 13 |
| FF 215        | 215               | 180 | 250 | 4   | 4 | 45   | 14.5 | 10 |
| FF 215        | 215               | 180 | 250 | 4   | 4 | 45   | 14.5 | 12 |
| FF 215        | 215               | 180 | 250 | 4   | 4 | 45   | 14.5 | 11 |
| FF 215        | 215               | 180 | 250 | 4   | 4 | 45   | 14.5 | 12 |
| FF 265        | 265               | 230 | 300 | 4   | 4 | 45   | 14.5 | 14 |
| FF 265        | 265               | 230 | 300 | 4   | 4 | 45   | 14.5 | 14 |
| FF 265        | 265               | 230 | 300 | 4   | 4 | 45   | 14.5 | 14 |
| FF 265        | 265               | 230 | 300 | 4   | 4 | 45   | 14.5 | 14 |
| FF 265        | 265               | 230 | 300 | 4   | 4 | 45   | 14.5 | 14 |
| FF 265        | 265               | 230 | 300 | 4   | 4 | 45   | 14.5 | 14 |
| FF 300        | 300               | 250 | 350 | 5   | 4 | 45   | 18.5 | 15 |
| FF 300        | 300               | 250 | 350 | 5   | 4 | 45   | 18.5 | 15 |
| FF 300        | 300               | 250 | 350 | 5   | 4 | 45   | 18.5 | 15 |
| FF 300        | 300               | 250 | 350 | 5   | 4 | 45   | 18.5 | 15 |
| FF 300        | 300               | 250 | 350 | 5   | 4 | 45   | 18.5 | 15 |
| FF 300        | 300               | 250 | 350 | 5   | 4 | 45   | 18.5 | 15 |
| FF 300        | 300               | 250 | 350 | 5   | 4 | 45   | 18.5 | 15 |
| FF 300        | 300               | 250 | 350 | 5   | 4 | 45   | 18.5 | 15 |
| FF 300        | 300               | 250 | 350 | 5   | 4 | 45   | 18.5 | 15 |
| FF 300        | 300               | 250 | 350 | 5   | 4 | 45   | 18.5 | 15 |
| FF 300        | 300               | 250 | 350 | 5   | 4 | 45   | 18.5 | 15 |
| FF 300        | 300               | 250 | 350 | 5   | 4 | 45   | 18.5 | 15 |
| FF 350        | 350               | 300 | 400 | 5   | 4 | 45   | 18.5 | 15 |
| FF 350        | 350               | 300 | 400 | 5   | 4 | 45   | 18.5 | 15 |
| FF 350        | 350               | 300 | 400 | 5   | 4 | 45   | 18.5 | 15 |
| FF 400        | 400               | 350 | 450 | 5   | 8 | 22.5 | 18.5 | 16 |
| FF 400        | 400               | 350 | 450 | 5   | 8 | 22.5 | 18.5 | 16 |
| FF 400        | 400               | 350 | 450 | 5   | 8 | 22.5 | 18.5 | 16 |
| FF 400        | 400               | 350 | 450 | 5   | 8 | 22.5 | 18.5 | 16 |
| FF 500        | 500               | 450 | 550 | 5   | 8 | 22.5 | 18.5 | 18 |
| FF 500        | 500               | 450 | 550 | 5   | 8 | 22.5 | 18.5 | 22 |
| FF 500        | 500               | 450 | 550 | 5   | 8 | 22.5 | 18.5 | 22 |
| FF 500        | 500               | 450 | 550 | 5   | 8 | 22.5 | 18.5 | 22 |
| FF 500        | 500               | 450 | 550 | 5   | 8 | 22.5 | 18.5 | 18 |
| FF 500        | 500               | 450 | 550 | 5   | 8 | 22.5 | 18.5 | 22 |
| FF 500        | 500               | 450 | 550 | 5   | 8 | 22.5 | 18.5 | 22 |
| FF 600        | 600               | 550 | 660 | 6   | 8 | 22.5 | 24   | 22 |
| FF 600        | 600               | 550 | 660 | 6   | 8 | 22.5 | 24   | 22 |
| FF 600        | 600               | 550 | 660 | 6   | 8 | 22.5 | 24   | 22 |
| FF 600        | 600               | 550 | 660 | 6   | 8 | 22.5 | 24   | 22 |

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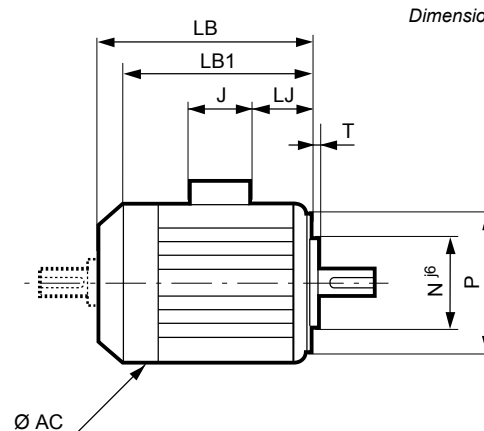
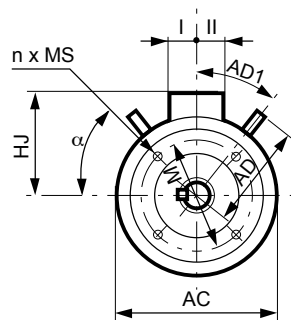
| Type                      | Main dimensions |     |     |     |     |    |    |    |    |     |     |     |     |       |    |     |    |    |     |     |
|---------------------------|-----------------|-----|-----|-----|-----|----|----|----|----|-----|-----|-----|-----|-------|----|-----|----|----|-----|-----|
|                           | A               | AB  | B   | BB  | C   | x  | AA | K  | HA | H   | AC* | HD  | LB  | LB1** | LJ | J   | I  | II | AD  | AD1 |
| LS 56 L                   | 90              | 104 | 71  | 87  | 36  | 8  | 25 | 6  | 7  | 56  | 110 | 140 | 156 | 134   | 16 | 86  | 43 | 43 | -   | 51  |
| LS 63 M                   | 100             | 115 | 80  | 96  | 40  | 8  | 26 | 7  | 9  | 63  | 124 | 152 | 172 | 165   | 26 | 86  | 43 | 43 | -   | 55  |
| LS 71 L                   | 112             | 126 | 90  | 106 | 45  | 8  | 24 | 7  | 9  | 71  | 140 | 170 | 193 | 166   | 26 | 86  | 43 | 43 | -   | 61  |
| LSES 80 L <sup>1</sup>    | 125             | 157 | 100 | 120 | 50  | 10 | 29 | 9  | 10 | 80  | 170 | 205 | 215 | 177   | 26 | 86  | 43 | 43 | -   | 68  |
| LSES 80 LU <sup>1</sup>   | 125             | 157 | 100 | 120 | 50  | 10 | 29 | 9  | 10 | 80  | 170 | 205 | 267 | 232   | 26 | 86  | 43 | 43 | -   | 120 |
| LSES 80 LG <sup>1</sup>   | 125             | 157 | 100 | 125 | 50  | 14 | 31 | 9  | 10 | 80  | 189 | 215 | 247 | 204   | 26 | 86  | 43 | 43 | -   | 100 |
| LSES 90 SL/L <sup>1</sup> | 140             | 172 | 125 | 164 | 56  | 28 | 39 | 10 | 11 | 90  | 189 | 225 | 245 | 204   | 26 | 86  | 43 | 43 | -   | 68  |
| LSES 90 LU <sup>1</sup>   | 140             | 172 | 125 | 164 | 56  | 28 | 39 | 10 | 11 | 90  | 189 | 225 | 276 | 230   | 26 | 86  | 43 | 43 | -   | 88  |
| LSES 100 L <sup>1</sup>   | 160             | 196 | 140 | 165 | 63  | 12 | 40 | 12 | 13 | 100 | 200 | 240 | 290 | 250   | 27 | 86  | 43 | 43 | 118 | 45  |
| LSES 100 LR <sup>1</sup>  | 160             | 196 | 140 | 165 | 63  | 12 | 40 | 12 | 13 | 100 | 200 | 240 | 309 | 264   | 27 | 86  | 43 | 43 | 118 | 45  |
| LSES 100 LG <sup>1</sup>  | 160             | 196 | 140 | 168 | 63  | 13 | 40 | 12 | 14 | 100 | 227 | 249 | 315 | 265   | 36 | 86  | 43 | 43 | 130 | 45  |
| LSES 112 M <sup>1</sup>   | 190             | 220 | 140 | 165 | 70  | 13 | 44 | 12 | 14 | 112 | 200 | 252 | 290 | 250   | 27 | 86  | 43 | 43 | 118 | 45  |
| LSES 112 MR <sup>1</sup>  | 190             | 220 | 140 | 165 | 70  | 13 | 44 | 12 | 14 | 112 | 200 | 252 | 309 | 264   | 27 | 86  | 43 | 43 | 118 | 45  |
| LSES 112 MU <sup>1</sup>  | 190             | 220 | 140 | 165 | 70  | 12 | 52 | 12 | 14 | 112 | 230 | 261 | 332 | 288   | 36 | 86  | 43 | 43 | -   | 126 |
| LSES 112 MG <sup>1</sup>  | 190             | 220 | 140 | 165 | 70  | 12 | 52 | 12 | 14 | 112 | 231 | 261 | 315 | 265   | 36 | 86  | 43 | 43 | -   | 109 |
| LSES 132 S <sup>1</sup>   | 216             | 250 | 140 | 170 | 89  | 15 | 42 | 12 | 16 | 132 | 227 | 304 | 351 | 306   | 32 | 126 | 63 | 63 | 130 | 45  |
| LSES 132 SU <sup>1</sup>  | 216             | 250 | 140 | 170 | 89  | 15 | 42 | 12 | 16 | 132 | 227 | 304 | 383 | 329   | 32 | 126 | 63 | 63 | 130 | 45  |
| LSES 132 SM <sup>1</sup>  | 216             | 250 | 140 | 208 | 89  | 15 | 50 | 12 | 15 | 132 | 272 | 322 | 385 | 330   | 17 | 126 | 63 | 63 | 140 | 45  |
| LSES 132 M <sup>1</sup>   | 216             | 250 | 178 | 208 | 89  | 15 | 50 | 12 | 15 | 132 | 272 | 322 | 385 | 330   | 17 | 126 | 63 | 63 | 140 | 45  |
| LSES 132 MU <sup>1</sup>  | 216             | 250 | 178 | 208 | 89  | 15 | 50 | 12 | 15 | 132 | 272 | 322 | 412 | 351   | 17 | 126 | 63 | 63 | 140 | 45  |
| LSES 132 MR <sup>1</sup>  | 216             | 250 | 178 | 208 | 89  | 15 | 50 | 12 | 15 | 132 | 272 | 322 | 441 | 369   | 17 | 126 | 63 | 63 | 140 | 45  |
| LSES 160 MP <sup>1</sup>  | 254             | 294 | 210 | 294 | 108 | 20 | 64 | 14 | 25 | 160 | 272 | 350 | 468 | 407   | 59 | 126 | 63 | 63 | 156 | 45  |
| LSES 160 MR <sup>1</sup>  | 254             | 294 | 210 | 294 | 108 | 20 | 64 | 14 | 25 | 160 | 272 | 350 | 495 | 440   | 59 | 126 | 63 | 63 | 156 | 45  |
| LSES 160 LR <sup>1</sup>  | 254             | 294 | 254 | 294 | 108 | 20 | 64 | 14 | 25 | 160 | 272 | 350 | 495 | 440   | 59 | 126 | 63 | 63 | 156 | 45  |

\* AC: housing diameter without lifting rings

\*\* LB1: non-ventilated motor

1. The dimensions of frame sizes 80 to 225 motors concern the types LS and LSES





Dimensions in millimetres

| Type                      | Main dimensions |     |       |     |    |     |    |    |     |     |
|---------------------------|-----------------|-----|-------|-----|----|-----|----|----|-----|-----|
|                           | AC*             | LB  | LB1** | HJ  | LJ | J   | I  | II | AD  | AD1 |
| LS 56 L                   | 110             | 156 | 134   | 84  | 16 | 86  | 43 | 43 | -   | -   |
| LS 63 M                   | 134             | 172 | 165   | 89  | 26 | 86  | 43 | 43 | -   | -   |
| LS 71 L                   | 140             | 193 | 166   | 99  | 21 | 86  | 43 | 43 | -   | -   |
| LSES 80 L <sup>†</sup>    | 170             | 215 | 177   | 125 | 26 | 86  | 43 | 43 | -   | -   |
| LSES 80 LU <sup>†</sup>   | 170             | 267 | 232   | 125 | 26 | 86  | 43 | 43 | -   | -   |
| LSES 80 LG <sup>†</sup>   | 189             | 245 | 204   | 135 | 26 | 86  | 43 | 43 | -   | -   |
| LSES 90 SL/L <sup>†</sup> | 189             | 245 | 204   | 135 | 26 | 86  | 43 | 43 | -   | -   |
| LSES 90 LU <sup>†</sup>   | 189             | 276 | 230   | 135 | 26 | 86  | 43 | 43 | -   | -   |
| LSES 100 L <sup>†</sup>   | 200             | 290 | 250   | 140 | 27 | 86  | 43 | 43 | 118 | 45  |
| LSES 100 LR <sup>†</sup>  | 200             | 309 | 264   | 140 | 27 | 86  | 43 | 43 | 118 | 45  |
| LSES 100 LG <sup>†</sup>  | 227             | 315 | 265   | 149 | 36 | 86  | 43 | 43 | 130 | 45  |
| LSES 112 M <sup>†</sup>   | 200             | 290 | 250   | 140 | 27 | 86  | 43 | 43 | 118 | 45  |
| LSES 112 MR <sup>†</sup>  | 200             | 309 | 264   | 140 | 27 | 86  | 43 | 43 | 118 | 45  |
| LSES 112 MU <sup>†</sup>  | 230             | 332 | 288   | 149 | 36 | 86  | 43 | 43 | -   | -   |
| LSES 112 MG <sup>†</sup>  | 231             | 315 | 265   | 149 | 36 | 86  | 43 | 43 | -   | -   |
| LSES 132 S <sup>†</sup>   | 227             | 351 | 306   | 172 | 32 | 126 | 63 | 63 | 130 | 45  |
| LSES 132 SU <sup>†</sup>  | 227             | 383 | 329   | 172 | 32 | 126 | 63 | 63 | 130 | 45  |
| LSES 132 SM <sup>†</sup>  | 272             | 385 | 330   | 190 | 17 | 126 | 63 | 63 | 140 | 45  |
| LSES 132 M <sup>†</sup>   | 272             | 385 | 330   | 190 | 17 | 126 | 63 | 63 | 140 | 45  |
| LSES 132 MU <sup>†</sup>  | 272             | 412 | 351   | 190 | 17 | 126 | 63 | 63 | 140 | 45  |
| LSES 132 MR <sup>†</sup>  | 272             | 441 | 369   | 190 | 17 | 126 | 63 | 63 | 140 | 45  |
| LSES 160 MP <sup>†</sup>  | 272             | 468 | 407   | 190 | 59 | 126 | 63 | 63 | 156 | 45  |
| LSES 160 MR <sup>†</sup>  | 272             | 495 | 440   | 190 | 59 | 126 | 63 | 63 | 156 | 45  |
| LSES 160 LR <sup>†</sup>  | 272             | 495 | 440   | 190 | 59 | 126 | 63 | 63 | 156 | 45  |

\* AC: housing diameter without lifting rings

\*\* LB1: non-ventilated motor

1. The dimensions of frame sizes 80 to 225 motors concern the types LS and LSES

| IEC symbol | Flange dimensions |     |     |     |   |    |     |
|------------|-------------------|-----|-----|-----|---|----|-----|
|            | M                 | N   | P   | T   | n | α° | MS  |
| FT 65      | 65                | 50  | 80  | 2.5 | 4 | 45 | M5  |
| FT 75      | 75                | 60  | 90  | 2.5 | 4 | 45 | M5  |
| FT 85      | 85                | 70  | 105 | 2.5 | 4 | 45 | M6  |
| FT 100     | 100               | 80  | 120 | 3   | 4 | 45 | M6  |
| FT 100     | 100               | 80  | 120 | 3   | 4 | 45 | M6  |
| FT 100     | 100               | 80  | 120 | 3   | 4 | 45 | M6  |
| FT 115     | 115               | 95  | 140 | 3   | 4 | 45 | M8  |
| FT 115     | 115               | 95  | 140 | 3   | 4 | 45 | M8  |
| FT 130     | 130               | 110 | 160 | 3.5 | 4 | 45 | M8  |
| FT 130     | 130               | 110 | 160 | 3.5 | 4 | 45 | M8  |
| FT 130     | 130               | 110 | 160 | 3.5 | 4 | 45 | M8  |
| FT 130     | 130               | 110 | 160 | 3.5 | 4 | 45 | M8  |
| FT 130     | 130               | 110 | 160 | 3.5 | 4 | 45 | M8  |
| FT 130     | 130               | 110 | 160 | 3.5 | 4 | 45 | M8  |
| FT 130     | 130               | 110 | 160 | 3.5 | 4 | 45 | M8  |
| FT 165     | 165               | 130 | 200 | 3.5 | 4 | 45 | M10 |
| FT 165     | 165               | 130 | 200 | 3.5 | 4 | 45 | M10 |
| FT 165     | 165               | 130 | 200 | 3.5 | 4 | 45 | M10 |
| FT 165     | 165               | 130 | 200 | 3.5 | 4 | 45 | M10 |
| FT 165     | 165               | 130 | 200 | 3.5 | 4 | 45 | M10 |
| FT 215     | 215               | 180 | 250 | 4   | 4 | 45 | M12 |
| FT 215     | 215               | 180 | 250 | 4   | 4 | 45 | M12 |
| FT 215     | 215               | 180 | 250 | 4   | 4 | 45 | M12 |

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Aluminium frame

### Construction

### Bearings and lubrication

#### PERMANENTLY GREASED BEARINGS

Under normal operating conditions, the service life in hours of the bearing is indicated in the table below for ambient temperatures less than 55°C.

| Series    | Type     | No. of poles | Types of permanently greased bearing |         | Bearing life according to speed of rotation |        |        |                        |        |        |                        |        |        |
|-----------|----------|--------------|--------------------------------------|---------|---------------------------------------------|--------|--------|------------------------|--------|--------|------------------------|--------|--------|
|           |          |              |                                      |         | 3000 min <sup>-1</sup>                      |        |        | 1500 min <sup>-1</sup> |        |        | 1000 min <sup>-1</sup> |        |        |
|           |          |              | N.D.E.                               | D.E.    | 25°C                                        | 40°C   | 55°C   | 25°C                   | 40°C   | 55°C   | 25°C                   | 40°C   | 55°C   |
| LS        | 56       | 2; 4; 6      | 6201 C3                              | 6201 C3 | >40000                                      | >40000 | >40000 | >40000                 | >40000 | >40000 | >40000                 | >40000 | 38500  |
|           | 63       | 2; 4; 6      | 6201 C3                              | 6202 C3 | >40000                                      | >40001 | >40002 | >40003                 | >40004 | >40005 | >40006                 | >40007 | >40008 |
|           | 71       |              |                                      |         |                                             |        |        |                        |        |        |                        |        |        |
| LS / LSES | 80 L     | 2            | 6203 CN                              | 6204 C3 | ≥40000                                      | ≥40000 | 25000  | -                      | -      | -      | -                      | -      | -      |
|           | 80 LG    | 2; 4         | 6204 C3                              | 6205 C3 | ≥40000                                      | ≥40000 | 24000  | ≥40000                 | ≥40000 | 31000  | ≥40000                 | ≥40000 | 34000  |
|           | 90 SL/L  | 2; 4; 6      |                                      |         |                                             |        |        |                        |        |        |                        |        |        |
|           | 90 LU    | 4            | 6205 C3                              | 6205 C3 | -                                           | -      | -      | ≥40000                 | ≥40000 | 30000  | -                      | -      | -      |
|           | 100 L    | 2; 4; 6      | 6205 C3                              | 6206 C3 | ≥40000                                      | ≥40000 | 22000  | ≥40000                 | ≥40000 | 30000  | ≥40000                 | ≥40000 | 33000  |
|           | 100 LR   | 4            |                                      |         |                                             |        |        |                        |        |        |                        |        |        |
|           | 112 M    | 2            | 6205 C3                              | 6206 C3 | ≥40000                                      | ≥40000 | 22000  | -                      | -      | -      | -                      | -      | -      |
|           | 112 MG   | 2; 6         |                                      |         |                                             |        |        |                        |        |        |                        |        |        |
|           | 112 MU   | 4            | 6206 C3                              | 6206 C3 | -                                           | -      | -      | ≥40000                 | ≥40000 | 30000  | -                      | -      | -      |
|           | 132 S    | 2; 6         | 6206 C3                              | 6208 C3 | ≥40000                                      | ≥40000 | 19000  | -                      | -      | -      | ≥40000                 | ≥40000 | 30000  |
|           | 132 SU   | 2; 4         |                                      |         |                                             |        |        |                        |        |        |                        |        |        |
|           | 132 SM/M | 2; 4; 6      | 6207 C3                              | 6308 C3 | ≥40000                                      | ≥40000 | 19000  | ≥40000                 | ≥40000 | 25000  | ≥40000                 | ≥40000 | 30000  |
|           | 132 MU   | 4; 6         | 6307 C3                              | 6308 C3 | -                                           | -      | -      | ≥40000                 | ≥40000 | 25000  | ≥40000                 | ≥40000 | 30000  |
|           | 160 MR   | 2; 4         | 6308 C3                              | 6309 C3 | ≥40000                                      | 35000  | 15000  | ≥40000                 | ≥40000 | 24000  | -                      | -      | -      |
|           | 160 MP   | 2; 4         | 6208 C3                              | 6309 C3 | ≥40000                                      | 35000  | 18000  | ≥40000                 | ≥40000 | 24000  | -                      | -      | -      |
|           | 160 M/MU | 6            | 6210 C3                              | 6309 C3 | ≥40000                                      | 30000  | 15000  | ≥40000                 | ≥40000 | 23000  | ≥40000                 | ≥40000 | 27000  |
|           | 160 L    | 2; 4; 6      |                                      |         |                                             |        |        |                        |        |        |                        |        |        |
|           | 160 LUR  | 4; 6         | 6210 C3                              | 6310 C3 | ≥40000                                      | 30000  | 15000  | ≥40000                 | ≥40000 | 23000  | ≥40000                 | ≥40000 | 27000  |
|           | 180 MT   | 2; 4         |                                      |         |                                             |        |        |                        |        |        |                        |        |        |
|           | 180 M    | 4            | 6212 C3                              | 6310 C3 | -                                           | -      | -      | ≥40000                 | ≥40000 | 24900  | -                      | -      | -      |
|           | 180 L    | 6            |                                      |         |                                             |        |        |                        |        |        |                        |        |        |
|           | 180 LR   | 4            | 6210 C3                              | 6310 C3 | -                                           | -      | -      | ≥40000                 | ≥40000 | 23000  | -                      | -      | -      |
|           | 180 LUR  | 4; 6         | 6312 C3                              | 6310 C3 | -                                           | -      | -      | ≥40000                 | ≥40000 | 22000  | ≥40000                 | ≥40000 | 27000  |
|           | 200 L    | 2; 6         | 6214 C3                              | 6312 C3 | ≥40000                                      | 25000  | 12500  | -                      | -      | -      | ≥40000                 | ≥40000 | 27000  |
|           | 200 LR   | 2; 4; 6      | 6312 C3                              | 6312 C3 | ≥40000                                      | 25000  | 12500  | ≥40000                 | ≥40000 | 22000  | ≥40000                 | ≥40000 | 27000  |
|           | 200 LU   | 4; 6         |                                      |         |                                             |        |        |                        |        |        |                        |        |        |
|           | 225 ST   | 4            | 6214 C3                              | 6313 C3 | -                                           | -      | -      | ≥40000                 | ≥40000 | 21000  | -                      | -      | -      |
|           | 225 MT   | 2            |                                      |         |                                             |        |        |                        |        |        |                        |        |        |
|           | 225 SR   | 4            | 6312 C3                              | 6313 C3 | -                                           | -      | -      | ≥40000                 | ≥40000 | 21000  | -                      | -      | -      |
|           | 225 MR   | 2; 4; 6      |                                      |         |                                             |        |        |                        |        |        |                        |        |        |
|           | 225 SG   | 4            | 6216 C3                              | 6314 C3 | -                                           | -      | -      | ≥40000                 | ≥40000 | 20000  | -                      | -      | -      |
|           | 225 MG   | 4; 6         |                                      |         |                                             |        |        |                        |        |        |                        |        |        |

Note: On request, all motors can be fitted with grease nipples, except the 132 S/SU.

**BEARINGS WITH GREASE NIPPLES**

The chart opposite shows the greasing intervals, depending on the type of motor, for standard bearing assemblies of frame size  $\geq 160$  mm fitted with grease nipples, operating at an ambient temperature of 25°C, 40°C and 55°C on a horizontal shaft machine

**SPECIAL CONSTRUCTION AND ENVIRONMENT**

For vertical shaft machines, the greasing intervals will be approximately 80% of the values stated in the table below.

Note: The quality and quantity of grease and the greasing interval are shown on the machine nameplate.

For special assemblies (motors fitted with DE roller bearings or other types), machines of frame size  $\geq 160$  mm have bearings with grease nipples.

Instructions for bearing maintenance are given on the nameplates on these machines.

The chart below is valid for motors lubricated with Polyrex EM103 grease, which is used as standard

| Series    | Type       | No. of poles | Type of bearings for greaser bearing bush |         | Quantity of grease | Greasing intervals in hours |       |      |                        |       |      |                        |       |      |
|-----------|------------|--------------|-------------------------------------------|---------|--------------------|-----------------------------|-------|------|------------------------|-------|------|------------------------|-------|------|
|           |            |              | N.D.E.                                    | D.E.    |                    | 3000 min <sup>-1</sup>      |       |      | 1500 min <sup>-1</sup> |       |      | 1000 min <sup>-1</sup> |       |      |
|           |            |              |                                           |         |                    | 25°C                        | 40°C  | 55°C | 25°C                   | 40°C  | 55°C | 25°C                   | 40°C  | 55°C |
| LS / LSES | 160 M/MU*  | 2 ; 4 ; 6    | 6210 C3                                   | 6309 C3 | 13                 | 22200                       | 11100 | 5550 | 32400                  | 16200 | 8100 | 39800                  | 19900 | 9950 |
|           | 160 L*     |              |                                           |         |                    |                             |       |      |                        |       |      |                        |       |      |
|           | 180 MR*    | 2            | 6210 C3                                   | 6310 C3 | 15                 | 19600                       | 9800  | 4900 | -                      | -     | -    | -                      | -     | -    |
|           | 180 MT*    | 2 ; 4        |                                           |         |                    |                             |       |      | 30400                  | 15200 | 7600 |                        |       |      |
|           | 180 LR*    | 4            |                                           |         |                    |                             |       |      |                        |       |      |                        |       |      |
|           | 180 LUR*   | 4 ; 6        | 6312 C3                                   | 6310 C3 | 20                 | -                           | -     | -    | 26800                  | 13400 | 6700 | 35000                  | 17500 | 8750 |
|           | 180 M*     | 4            | 6212 C3                                   | 6310 C3 | 15                 | -                           | -     | -    | 29200                  | 14600 | 7300 | -                      | -     | -    |
|           | 180 L*     | 6            |                                           |         |                    |                             |       |      | -                      | -     | -    | 37200                  | 18600 | 9300 |
|           | 200 LR*    | 2 ; 4 ; 6    | 6312 C3                                   | 6312 C3 | 20                 | 15200                       | 7600  | 3800 | 26800                  | 13400 | 6700 | 35000                  | 17500 | 8750 |
|           | 200 LU*    | 4 ; 6        |                                           |         |                    | -                           | -     | -    |                        |       |      |                        |       |      |
|           | 200 L*     | 2 ; 6        | 6214 C3                                   | 6312 C3 | 20                 | 14600                       | 7300  | 3650 | -                      | -     | -    | 34600                  | 17300 | 8650 |
|           | 225 ST*    | 4            | 6214 C3                                   | 6313 C3 | 25                 | -                           | -     | -    | 25200                  | 12600 | 6300 | -                      | -     | -    |
|           | 225 MT*    | 2            |                                           |         |                    | 10600                       | 5300  | 2650 | -                      | -     | -    |                        |       |      |
|           | 225 SR/MR* | 2 ; 4 ; 6    | 6312 C3                                   | 6313 C3 | 25                 | 13400                       | 6700  | 3350 | 25200                  | 12600 | 6300 | 33600                  | 16800 | 8400 |
|           | 225 SG*    | 4            | 6216 C3                                   | 6314 C3 | 25                 | -                           | -     | -    | 23600                  | 11800 | 5900 | -                      | -     | -    |
|           | 225 MG*    | 4 ; 6        |                                           |         |                    |                             |       |      |                        |       |      | 32200                  | 16100 | 8050 |
|           | 250 MZ     | 2            | 6312 C3                                   | 6313 C3 | 25                 | 13400                       | 6700  | 3350 | -                      | -     | -    | -                      | -     | -    |
|           | 250 ME     | 4 ; 6        | 6216 C3                                   | 6314 C3 | 25                 | -                           | -     | -    | 23600                  | 11800 | 5900 | 32200                  | 16100 | 8050 |
|           | 280 SC/MC  | 2            |                                           |         |                    | 11800                       | 5900  | 2950 | -                      | -     | -    | -                      | -     | -    |
|           | 280 SC     | 6            | 6216 C3                                   | 6316 C3 | 35                 | -                           | -     | -    | -                      | -     | -    | 32200                  | 16100 | 8050 |
|           | 280 SD/MD  | 4 ; 6        | 6218 C3                                   | 6316 C3 | 35                 | -                           | -     | -    | 20800                  | 10400 | 5200 | 29600                  | 14800 | 7400 |
|           | 315 SN     | 2            | 6216 C3                                   | 6316 C3 | 35                 | 5600                        | 2800  | 1400 | -                      | -     | -    | -                      | -     | -    |
|           | 315 MP     | 2            | 6317 C3                                   | 6317 C3 | 40                 | 5200                        | 2600  | 1300 | -                      | -     | -    | -                      | -     | -    |
|           | 315 SP     | 4            | 6317 C3                                   | 6320 C3 | 50                 | -                           | -     | -    | 15800                  | 7900  | 3950 | -                      | -     | -    |
|           | 315 MP/MR  | 4 ; 6        |                                           |         |                    |                             |       |      |                        |       |      | 21200                  | 10600 | 5300 |

\* bearing with grease nipples on request

**STANDARD BEARING FITTING ARRANGEMENTS**

| LS / LSES series                              |                      | Horizontal shaft                                                                                         | Vertical shaft                                                                                           |                                  |
|-----------------------------------------------|----------------------|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|----------------------------------|
| Foot mounted motors                           | Mounting arrangement |                                                                                                          | Shaft facing down                                                                                        | Shaft facing up                  |
|                                               |                      | B3                                                                                                       | V5                                                                                                       | V6                               |
|                                               | standard mounting    | DE bearing:<br>- located at DE for types $\leq 160$ MP/MR/LR<br>- locked for types $\geq 160$ M/MU/L/LUR | DE bearing:<br>- located at DE for types $\leq 160$ MP/MR/LR<br>- locked for types $\geq 160$ M/MU/L/LUR | DE bearing locked for all motors |
|                                               | on request           | DE bearing locked for frame $< 132$                                                                      | DE bearing locked                                                                                        |                                  |
| Flange mounted motors<br>(or foot and flange) | Mounting arrangement | B5 / B35 / B14 / B34                                                                                     | V1 / V15 / V18 / V58                                                                                     | V3 / V36 / V19 / V69             |
|                                               | standard mounting    | DE bearing locked                                                                                        | DE bearing locked                                                                                        | DE bearing locked                |

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

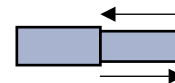
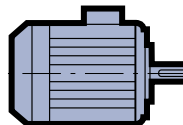
## IP55 Aluminium frame

### Construction

### Axial loads

#### HORIZONTAL MOTOR

For a bearing life  $L_{10h}$   
of 25,000 hours  
and 40,000 hours

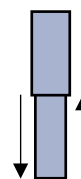
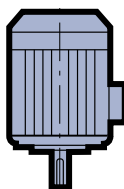


| Series    | Type     | No. of poles | Permissible axial load (in daN) on main shaft extension for standard bearing assembly |              |              |              |                        |              |              |              |                        |              |              |              |
|-----------|----------|--------------|---------------------------------------------------------------------------------------|--------------|--------------|--------------|------------------------|--------------|--------------|--------------|------------------------|--------------|--------------|--------------|
|           |          |              | IM B3 / B6<br>IM B7 / B8<br>IM B5 / B35<br>IM B14 / B34                               |              |              |              |                        |              |              |              |                        |              |              |              |
|           |          |              | 3000 min <sup>-1</sup>                                                                |              |              |              | 1500 min <sup>-1</sup> |              |              |              | 1000 min <sup>-1</sup> |              |              |              |
|           |          |              | 25,000 hours                                                                          | 40,000 hours | 25,000 hours | 40,000 hours | 25,000 hours           | 40,000 hours | 25,000 hours | 40,000 hours | 25,000 hours           | 40,000 hours | 25,000 hours | 40,000 hours |
| LS        | 56       | 2 ; 4 ; 6    | 7                                                                                     | 5            | 28           | 24           | 14                     | 10           | 35           | 30           | 17                     | 12           | 38           | 32           |
|           | 63       | 2 ; 4 ; 6    | 13                                                                                    | 9            | 34           | 29           | 18                     | 13           | 39           | 33           | 26                     | 18           | 47           | 40           |
|           | 71       | 2 ; 4 ; 6    | 13                                                                                    | 9            | 34           | 29           | 18                     | 13           | 39           | 33           | 26                     | 18           | 47           | 40           |
|           | 80 L     | 2            | 30                                                                                    | 21           | (60)         | (51)         | -                      | -            | -            | -            | -                      | -            | -            | -            |
| LS / LSES | 80 LG    | 2 ; 4        | 28                                                                                    | 19           | (68)         | (59)         | 48                     | 34           | (88)         | (74)         | -                      | -            | -            | -            |
|           | 90 SL/L  | 2 ; 4 ; 6    | 29                                                                                    | 23           | (69)         | (56)         | 45                     | 32           | (85)         | (72)         | 56                     | 40           | (96)         | (80)         |
|           | 90 LU    | 2 ; 4 ; 6    | 22                                                                                    | 13           | (72)         | (63)         | 38                     | 25           | (88)         | (75)         | 47                     | 32           | (97)         | (82)         |
|           | 100 L    | 2 ; 6        | 42                                                                                    | 28           | (92)         | (78)         | -                      | -            | -            | -            | 78                     | 57           | (128)        | (107)        |
|           | 100 LR   | 4            | -                                                                                     | -            | -            | -            | 58                     | 39           | (108)        | (90)         | -                      | -            | -            | -            |
|           | 100 LG   | 4 ; 6        | -                                                                                     | -            | -            | -            | 55                     | 38           | (105)        | (88)         | 75                     | 53           | (125)        | (103)        |
|           | 112 M    | 2            | 38                                                                                    | 25           | (88)         | (75)         | -                      | -            | -            | -            | -                      | -            | -            | -            |
|           | 112 MG   | 2 ; 6        | 37                                                                                    | 24           | (87)         | (74)         | -                      | -            | -            | -            | 126                    | 104          | (76)         | (54)         |
|           | 112 MU   | 4 ; 6        | -                                                                                     | -            | -            | -            | 54                     | 36           | (114)        | (96)         | 66                     | 45           | (126)        | (105)        |
|           | 132 S    | 2 ; 6        | 69                                                                                    | 49           | (129)        | (109)        | -                      | -            | -            | -            | 124                    | 93           | (184)        | (153)        |
|           | 132 SU   | 2 ; 4        | 65                                                                                    | 46           | (125)        | (106)        | 99                     | 73           | (159)        | (133)        | -                      | -            | -            | -            |
|           | 132 SM/M | 2 ; 4 ; 6    | 101                                                                                   | 74           | (171)        | (144)        | 148                    | 111          | (218)        | (181)        | 178                    | 134          | (248)        | (204)        |
|           | 132 MU   | 4 ; 6        | -                                                                                     | -            | -            | -            | 139                    | 103          | (219)        | (183)        | 168                    | 124          | (248)        | (204)        |
|           | 160 MP   | 2            | 140                                                                                   | 104          | (220)        | (184)        | -                      | -            | -            | -            | -                      | -            | -            | -            |
|           | 160 MR   | 2 ; 4        | 131                                                                                   | 95           | (221)        | (185)        | 193                    | 145          | (283)        | (235)        | -                      | -            | -            | -            |
|           | 160 M    | 2 ; 4 ; 6    | 132                                                                                   | 96           | 232          | 196          | 187                    | 140          | 287          | 240          | 235                    | 179          | 335          | 279          |
|           | 160 MU   | 6            | -                                                                                     | -            | -            | -            | -                      | -            | -            | -            | 219                    | 164          | 319          | 264          |
|           | 160 L    | 2 ; 4 ; 6    | 128                                                                                   | 96           | 228          | 196          | 183                    | 136          | 283          | 236          | 231                    | 175          | 331          | 275          |
|           | 160 LUR  | 4 ; 6        | -                                                                                     | -            | -            | -            | 213                    | 159          | 313          | 259          | 257                    | 193          | 357          | 293          |
|           | 180 M    | 4            | -                                                                                     | -            | -            | -            | 228                    | 174          | 291          | 237          | -                      | -            | -            | -            |
|           | 180 MR   | 2            | 156                                                                                   | 115          | 256          | 215          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|           | 180 MT   | 2 ; 4        | 159                                                                                   | 118          | 259          | 218          | 214                    | 160          | 314          | 260          | -                      | -            | -            | -            |
|           | 180 L    | 6            | -                                                                                     | -            | -            | -            | -                      | -            | -            | -            | 265                    | 201          | 328          | 264          |
|           | 180 LR   | 4            | -                                                                                     | -            | -            | -            | 203                    | 150          | 303          | 250          | -                      | -            | -            | -            |
|           | 180 LUR  | 4 ; 6        | -                                                                                     | -            | -            | -            | 224                    | 170          | 287          | 233          | 224                    | 162          | 287          | 225          |
|           | 200 L    | 2 ; 6        | 244                                                                                   | 190          | 310          | 256          | -                      | -            | -            | -            | 362                    | 278          | 428          | 344          |
|           | 200 LR   | 2 ; 4 ; 6    | 244                                                                                   | 191          | 307          | 254          | 312                    | 241          | 375          | 304          | 341                    | 258          | 404          | 321          |
|           | 200 LU   | 4 ; 6        | -                                                                                     | -            | -            | -            | 316                    | 245          | 379          | 308          | 327                    | 245          | 390          | 308          |
|           | 225 SG   | 4            | -                                                                                     | -            | -            | -            | 411                    | 321          | 481          | 391          | -                      | -            | -            | -            |
|           | 225 SR   | 4            | -                                                                                     | -            | -            | -            | 350                    | 271          | 420          | 341          | -                      | -            | -            | -            |
|           | 225 ST   | 4            | -                                                                                     | -            | -            | -            | 372                    | 292          | 438          | 358          | -                      | -            | -            | -            |
|           | 225 MG   | 4 ; 6        | -                                                                                     | -            | -            | -            | 407                    | 317          | 477          | 387          | 535                    | 426          | 605          | 496          |
|           | 225 MR   | 2 ; 4 ; 6    | 280                                                                                   | 220          | 343          | 283          | 358                    | 278          | 421          | 341          | 409                    | 315          | 472          | 378          |
|           | 225 MT   | 2            | 281                                                                                   | 221          | 347          | 287          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|           | 250 ME   | 4 ; 6        | -                                                                                     | -            | -            | -            | 400                    | 311          | 470          | 381          | 471                    | 365          | 541          | 435          |
|           | 250 MZ   | 2            | 277                                                                                   | 217          | 340          | 280          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|           | 280 SC   | 2 ; 6        | 303                                                                                   | 236          | 373          | 306          | -                      | -            | -            | -            | 461                    | 355          | 531          | 425          |
|           | 280 SD   | 4            | -                                                                                     | -            | -            | -            | 454                    | 349          | 542          | 437          | -                      | -            | -            | -            |
|           | 280 MC   | 2            | 300                                                                                   | 233          | 370          | 303          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|           | 280 MD   | 4 ; 6        | -                                                                                     | -            | -            | -            | 446                    | 342          | 534          | 430          | 524                    | 401          | 612          | 489          |
|           | 315 SN   | 2            | 357                                                                                   | 279          | 427          | 349          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|           | 315 SP   | 4 ; 6        | -                                                                                     | -            | -            | -            | 814                    | 671          | 634          | 491          | 950                    | 780          | 770          | 600          |
|           | 315 MP   | 2 ; 4 ; 6    | 487                                                                                   | 405          | 307          | 225          | 768                    | 628          | 588          | 448          | 917                    | 749          | 737          | 569          |
|           | 315 MR   | 4 ; 6        | -                                                                                     | -            | -            | -            | 770                    | 630          | 590          | 450          | 864                    | 699          | 684          | 519          |

( ): axial loads permissible with DE bearing locked

# VERTICAL MOTOR SHAFT FACING DOWN

For a bearing life  $L_{10h}$   
of 25,000 hours  
and 40,000 hours



Permissible axial load (in daN) on main shaft extension for standard bearing assembly

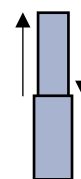
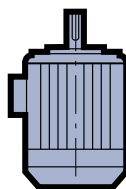
IM V5  
IM V1 / V15  
IM V18 / V58

| Series    | Type     | No. of poles | <div> <div>3000 min<sup>-1</sup></div> <div>1500 min<sup>-1</sup></div> <div>1000 min<sup>-1</sup></div> </div> |              |              |              |              |              |              |              |              |              |              |              |
|-----------|----------|--------------|-----------------------------------------------------------------------------------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
|           |          |              | 25,000 hours                                                                                                    |              |              |              | 40,000 hours |              |              |              | 25,000 hours |              |              |              |
|           |          |              | 25,000 hours                                                                                                    | 40,000 hours | 25,000 hours | 40,000 hours | 25,000 hours | 40,000 hours | 25,000 hours | 40,000 hours | 25,000 hours | 40,000 hours | 25,000 hours | 40,000 hours |
| LS        | 56       | 2 ; 4 ; 6    | 6                                                                                                               | 4            | 24           | 20           | 13           | 9            | 36           | 30           | 16           | 11           | 39           | 33           |
|           | 63       | 2 ; 4 ; 6    | 11                                                                                                              | 8            | 36           | 30           | 16           | 11           | 41           | 35           | 24           | 17           | 49           | 42           |
|           | 71       | 2 ; 4 ; 6    | 11                                                                                                              | 8            | 36           | 30           | 16           | 11           | 41           | 35           | 24           | 17           | 49           | 42           |
|           | 80 L     | 2            | 29                                                                                                              | 20           | (63)         | (54)         | -            | -            | -            | -            | -            | -            | -            | -            |
|           | 80 LG    | 2 ; 4        | 26                                                                                                              | 16           | (72)         | (62)         | 45           | 32           | (93)         | (78)         | -            | -            | -            | -            |
|           | 90 SL/L  | 2 ; 4 ; 6    | 26                                                                                                              | 16           | (73)         | (63)         | 42           | 28           | (91)         | (78)         | 53           | 37           | (101)        | (86)         |
|           | 90 LU    | 2 ; 4 ; 6    | 19                                                                                                              | 9            | (77)         | (67)         | 33           | 20           | (95)         | (82)         | 43           | 28           | (105)        | (89)         |
|           | 100 L    | 2 ; 6        | 38                                                                                                              | 24           | (98)         | (85)         | -            | -            | -            | -            | 73           | 52           | (137)        | (115)        |
|           | 100 LR   | 4            | -                                                                                                               | -            | -            | -            | 52           | 34           | (117)        | (99)         | -            | -            | -            | -            |
|           | 100 LG   | 4 ; 6        | -                                                                                                               | -            | -            | -            | 48           | 31           | (116)        | (99)         | 68           | 46           | (137)        | (115)        |
| LS / LSES | 112 M    | 2            | 35                                                                                                              | 21           | (95)         | (81)         | -            | -            | -            | -            | -            | -            | -            | -            |
|           | 112 MG   | 2 ; 6        | 31                                                                                                              | 18           | (98)         | (85)         | -            | -            | -            | -            | 68           | 47           | (138)        | (116)        |
|           | 112 MU   | 4 ; 6        | -                                                                                                               | -            | -            | -            | 45           | 28           | (128)        | (110)        | 57           | 36           | (140)        | (119)        |
|           | 132 S    | 2 ; 6        | 61                                                                                                              | 41           | (142)        | (122)        | -            | -            | -            | -            | 115          | 84           | (200)        | (169)        |
|           | 132 SU   | 2 ; 4        | 57                                                                                                              | 37           | (139)        | (120)        | 90           | 63           | (176)        | (149)        | -            | -            | -            | -            |
|           | 132 SM/M | 2 ; 4 ; 6    | 90                                                                                                              | 62           | (189)        | (161)        | 137          | 100          | (237)        | (200)        | 165          | 121          | (270)        | (226)        |
|           | 132 MU   | 4 ; 6        | -                                                                                                               | -            | -            | -            | 125          | 89           | (242)        | (206)        | 152          | 108          | (273)        | (230)        |
|           | 160 MP   | 2            | 126                                                                                                             | 90           | (243)        | (207)        | -            | -            | -            | -            | -            | -            | -            | -            |
|           | 160 MR   | 2 ; 4        | 115                                                                                                             | 80           | (246)        | (210)        | 175          | 127          | (311)        | (264)        | -            | -            | -            | -            |
|           | 160 M    | 2 ; 4 ; 6    | 111                                                                                                             | 75           | 264          | 229          | 164          | 117          | 326          | 278          | 210          | 154          | 375          | 319          |
|           | 160 MU   | 6            | -                                                                                                               | -            | -            | -            | -            | -            | -            | -            | 189          | 133          | 375          | 319          |
|           | 160 L    | 2 ; 4 ; 6    | 106                                                                                                             | 70           | 263          | 228          | 160          | 113          | 322          | 274          | 208          | 151          | 371          | 314          |
|           | 160 LUR  | 4 ; 6        | -                                                                                                               | -            | -            | -            | 186          | 131          | 363          | 309          | 227          | 162          | 417          | 352          |
|           | 180 M    | 4            | -                                                                                                               | -            | -            | -            | 187          | 132          | 361          | 306          | -            | -            | -            | -            |
|           | 180 MR   | 2            | 131                                                                                                             | 90           | 296          | 255          | -            | -            | -            | -            | -            | -            | -            | -            |
|           | 180 MT   | 2 ; 4        | 136                                                                                                             | 95           | 295          | 254          | 189          | 134          | 360          | 305          | -            | -            | -            | -            |
|           | 180 L    | 6            | -                                                                                                               | -            | -            | -            | -            | -            | -            | -            | 226          | 161          | 398          | 334          |
|           | 180 LR   | 4            | -                                                                                                               | -            | -            | -            | 177          | 122          | 355          | 300          | -            | -            | -            | -            |
|           | 180 LUR  | 4 ; 6        | -                                                                                                               | -            | -            | -            | 187          | 132          | 355          | 300          | 183          | 120          | 377          | 314          |
|           | 200 L    | 2 ; 6        | 194                                                                                                             | 139          | 384          | 330          | -            | -            | -            | -            | 308          | 223          | 524          | 439          |
|           | 200 LR   | 2 ; 4 ; 6    | 209                                                                                                             | 154          | 360          | 306          | 275          | 203          | 445          | 373          | 299          | 215          | 496          | 412          |
|           | 200 LU   | 4 ; 6        | -                                                                                                               | -            | -            | -            | 262          | 190          | 471          | 398          | 269          | 186          | 505          | 422          |
|           | 225 SG   | 4            | -                                                                                                               | -            | -            | -            | 335          | 244          | 616          | 524          | -            | -            | -            | -            |
|           | 225 SR   | 4            | -                                                                                                               | -            | -            | -            | 294          | 213          | 520          | 439          | -            | -            | -            | -            |
|           | 225 ST   | 4            | -                                                                                                               | -            | -            | -            | 322          | 241          | 519          | 438          | -            | -            | -            | -            |
|           | 225 MG   | 4 ; 6        | -                                                                                                               | -            | -            | -            | 324          | 232          | 621          | 530          | 456          | 345          | 749          | 638          |
|           | 225 MR   | 2 ; 4 ; 6    | 234                                                                                                             | 173          | 413          | 352          | 302          | 221          | 520          | 439          | 348          | 253          | 587          | 492          |
|           | 225 MT   | 2            | 240                                                                                                             | 179          | 410          | 349          | -            | -            | -            | -            | -            | -            | -            | -            |
|           | 250 ME   | 4 ; 6        | -                                                                                                               | -            | -            | -            | 305          | 214          | 632          | 541          | 378          | 270          | 712          | 604          |
|           | 250 MZ   | 2            | 228                                                                                                             | 168          | 417          | 356          | -            | -            | -            | -            | -            | -            | -            | -            |
|           | 280 SC   | 2 ; 6        | 233                                                                                                             | 165          | 488          | 420          | -            | -            | -            | -            | 348          | 240          | 728          | 621          |
|           | 280 SD   | 4            | -                                                                                                               | -            | -            | -            | 340          | 233          | 738          | 632          | -            | -            | -            | -            |
|           | 280 MC   | 2            | 221                                                                                                             | 153          | 496          | 428          | -            | -            | -            | -            | -            | -            | -            | -            |
|           | 280 MD   | 4 ; 6        | -                                                                                                               | -            | -            | -            | 319          | 213          | 745          | 639          | 391          | 265          | 853          | 728          |
|           | 315 SN   | 2            | 268                                                                                                             | 188          | 571          | 491          | -            | -            | -            | -            | -            | -            | -            | -            |
|           | 315 SP   | 4 ; 6        | -                                                                                                               | -            | -            | -            | 620          | 475          | 923          | 778          | 748          | 575          | 1074         | 901          |
|           | 315 MP   | 2 ; 4 ; 6    | 333                                                                                                             | 249          | 541          | 456          | 541          | 397          | 959          | 815          | 695          | 524          | 1088         | 917          |
|           | 315 MR   | 4 ; 6        | -                                                                                                               | -            | -            | -            | 537          | 393          | 966          | 822          | 591          | 420          | 1151         | 981          |

( ) : axial loads permissible with DE bearing locked

# VERTICAL MOTOR SHAFT FACING UP

For a bearing life  $L_{10h}$   
of 25,000 hours  
and 40,000 hours



| Series       | Type     | No. of poles | Permissible axial load (in daN) on main shaft extension for standard bearing assembly |              |              |              |                        |              |              |              |                        |              |              |              |
|--------------|----------|--------------|---------------------------------------------------------------------------------------|--------------|--------------|--------------|------------------------|--------------|--------------|--------------|------------------------|--------------|--------------|--------------|
|              |          |              | IM V6<br>IM V3 / V36<br>IM V19 / V69                                                  |              |              |              |                        |              |              |              |                        |              |              |              |
|              |          |              | 3000 min <sup>-1</sup>                                                                |              |              |              | 1500 min <sup>-1</sup> |              |              |              | 1000 min <sup>-1</sup> |              |              |              |
|              |          |              | 25,000 hours                                                                          | 40,000 hours | 25,000 hours | 40,000 hours | 25,000 hours           | 40,000 hours | 25,000 hours | 40,000 hours | 25,000 hours           | 40,000 hours | 25,000 hours | 40,000 hours |
| LS           | 56       | 2; 4; 6      | 8                                                                                     | 5            | 27           | 23           | 15                     | 10           | 34           | 29           | 18                     | 13           | 39           | 33           |
|              | 63       | 2; 4; 6      | 15                                                                                    | 10           | 32           | 22           | 20                     | 18           | 37           | 31           | 28                     | 20           | 45           | 38           |
|              | 71       | 2; 4; 6      | 15                                                                                    | 10           | 32           | 22           | 20                     | 18           | 37           | 31           | 28                     | 20           | 45           | 38           |
|              | 80 L     | 2            | (59)                                                                                  | (50)         | 33           | 24           | -                      | -            | -            | -            | -                      | -            | -            | -            |
|              | 80 LG    | 2; 4         | (66)                                                                                  | (56)         | 32           | 22           | (85)                   | (71)         | 53           | 39           | -                      | -            | -            | -            |
|              | 90 SL/L  | 2; 4; 6      | (66)                                                                                  | (56)         | 33           | 23           | (82)                   | (68)         | 51           | 38           | (93)                   | (77)         | 61           | 46           |
|              | 90 LU    | 2; 4; 6      | (69)                                                                                  | (59)         | 27           | 18           | (83)                   | (70)         | 45           | 32           | (93)                   | (77)         | 54           | 39           |
|              | 100 L    | 2; 6         | (88)                                                                                  | (74)         | 48           | 35           | -                      | -            | -            | -            | (123)                  | (102)        | 87           | 65           |
|              | 100 LR   | 4            | -                                                                                     | -            | -            | -            | (102)                  | (84)         | 67           | 49           | -                      | -            | -            | -            |
|              | 100 LG   | 4; 6         | -                                                                                     | -            | -            | -            | (98)                   | (81)         | 67           | 49           | (118)                  | (96)         | 87           | 66           |
| LS /<br>LSES | 112 M    | 2            | (84)                                                                                  | (71)         | 45           | 31           | -                      | -            | -            | -            | -                      | -            | -            | -            |
|              | 112 MG   | 2; 6         | (81)                                                                                  | (68)         | 48           | 35           | -                      | -            | -            | -            | (118)                  | (97)         | 88           | 66           |
|              | 112 MU   | 4; 6         | -                                                                                     | -            | -            | -            | (105)                  | (88)         | 68           | 50           | (117)                  | (96)         | 80           | 60           |
|              | 132 S    | 2; 6         | (121)                                                                                 | (101)        | 82           | 62           | -                      | -            | -            | -            | (175)                  | (143)        | 140          | 109          |
|              | 132 SU   | 2; 4         | (117)                                                                                 | (97)         | 79           | 60           | (150)                  | (123)        | 116          | 89           | -                      | -            | -            | -            |
|              | 132 SM/M | 2; 4; 6      | (160)                                                                                 | (132)        | 119          | 91           | (207)                  | (170)        | 167          | 130          | (235)                  | (191)        | 200          | 156          |
|              | 132 MU   | 4; 6         | -                                                                                     | -            | -            | -            | (206)                  | (169)        | 163          | 126          | (232)                  | (188)        | 193          | 150          |
|              | 160 MP   | 2            | (206)                                                                                 | (170)        | 163          | 127          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|              | 160 MR   | 2; 4         | (205)                                                                                 | (170)        | 156          | 120          | (265)                  | (217)        | 222          | 174          | -                      | -            | -            | -            |
|              | 160 M    | 2; 4; 6      | 211                                                                                   | 175          | 164          | 129          | 264                    | 217          | 226          | 178          | 310                    | 254          | 275          | 219          |
|              | 160 MU   | 6            | -                                                                                     | -            | -            | -            | -                      | -            | -            | -            | 289                    | 233          | 275          | 219          |
|              | 160 L    | 2; 4; 6      | 206                                                                                   | 170          | 163          | 128          | 260                    | 213          | 222          | 174          | 308                    | 251          | 271          | 214          |
|              | 160 LUR  | 4; 6         | -                                                                                     | -            | -            | -            | 286                    | 231          | 263          | 209          | 327                    | 262          | 317          | 252          |
|              | 180 M    | 4            | -                                                                                     | -            | -            | -            | 250                    | 195          | 298          | 243          | -                      | -            | -            | -            |
|              | 180 MR   | 2            | 231                                                                                   | 190          | 196          | 155          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|              | 180 MT   | 2; 4         | 236                                                                                   | 195          | 195          | 154          | 289                    | 234          | 260          | 205          | -                      | -            | -            | -            |
|              | 180 L    | 6            | -                                                                                     | -            | -            | -            | -                      | -            | -            | -            | 289                    | 224          | 335          | 271          |
|              | 180 LR   | 4            | -                                                                                     | -            | -            | -            | 277                    | 222          | 255          | 200          | -                      | -            | -            | -            |
|              | 180 LUR  | 4; 6         | -                                                                                     | -            | -            | -            | 250                    | 195          | 292          | 237          | 246                    | 183          | 314          | 251          |
|              | 200 L    | 2; 6         | 260                                                                                   | 205          | 318          | 264          | -                      | -            | -            | -            | 374                    | 289          | 458          | 373          |
|              | 200 LR   | 2; 4; 6      | 272                                                                                   | 217          | 297          | 243          | 338                    | 266          | 382          | 310          | 362                    | 278          | 433          | 349          |
|              | 200 LU   | 4; 6         | -                                                                                     | -            | -            | -            | 325                    | 253          | 408          | 335          | 332                    | 249          | 442          | 359          |
|              | 225 SG   | 4            | -                                                                                     | -            | -            | -            | 405                    | 314          | 546          | 454          | -                      | -            | -            | -            |
|              | 225 SR   | 4            | -                                                                                     | -            | -            | -            | 364                    | 283          | 450          | 369          | -                      | -            | -            | -            |
|              | 225 ST   | 4            | -                                                                                     | -            | -            | -            | 388                    | 307          | 453          | 372          | -                      | -            | -            | -            |
|              | 225 MG   | 4; 6         | -                                                                                     | -            | -            | -            | 394                    | 302          | 551          | 460          | 526                    | 415          | 679          | 568          |
|              | 225 MR   | 2; 4; 6      | 297                                                                                   | 236          | 350          | 289          | 365                    | 284          | 457          | 376          | 411                    | 316          | 524          | 429          |
|              | 225 MT   | 2            | 306                                                                                   | 245          | 344          | 283          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|              | 250 ME   | 4; 6         | -                                                                                     | -            | -            | -            | 375                    | 284          | 562          | 471          | 448                    | 340          | 642          | 534          |
|              | 250 MZ   | 2            | 291                                                                                   | 231          | 354          | 293          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|              | 280 SC   | 2; 6         | 303                                                                                   | 235          | 418          | 350          | -                      | -            | -            | -            | 418                    | 310          | 658          | 551          |
|              | 280 SD   | 4            | -                                                                                     | -            | -            | -            | 428                    | 321          | 650          | 544          | -                      | -            | -            | -            |
|              | 280 MC   | 2            | 291                                                                                   | 223          | 426          | 358          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|              | 280 MD   | 4; 6         | -                                                                                     | -            | -            | -            | 407                    | 301          | 657          | 551          | 479                    | 353          | 765          | 640          |
|              | 315 SN   | 2            | 338                                                                                   | 258          | 501          | 421          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|              | 315 SP   | 4; 6         | -                                                                                     | -            | -            | -            | 440                    | 295          | 1103         | 958          | 568                    | 395          | 1254         | 1081         |
|              | 315 MP   | 2; 4; 6      | 153                                                                                   | 69           | 721          | 636          | 361                    | 217          | 1139         | 995          | 515                    | 344          | 1268         | 1097         |
|              | 315 MR   | 4; 6         | -                                                                                     | -            | -            | -            | 357                    | 213          | 1146         | 1002         | 411                    | 240          | 1331         | 1161         |

( ): axial loads permissible with DE bearing locked

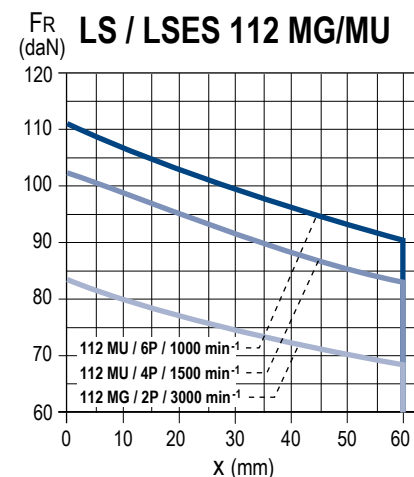
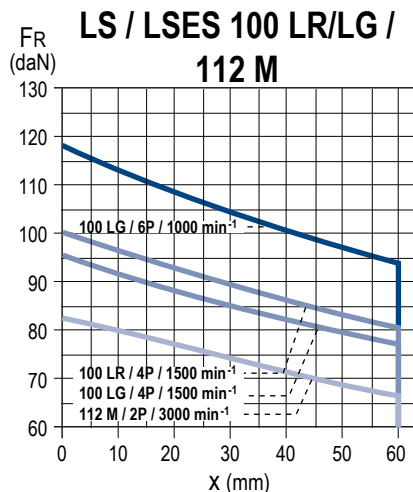
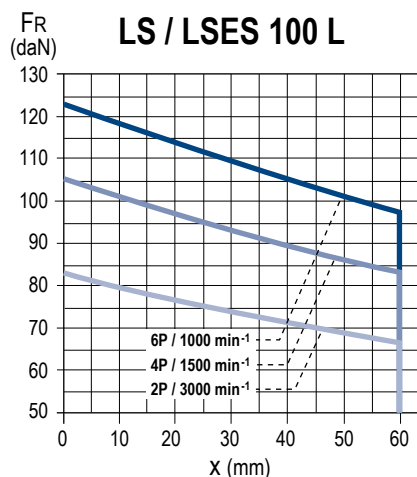
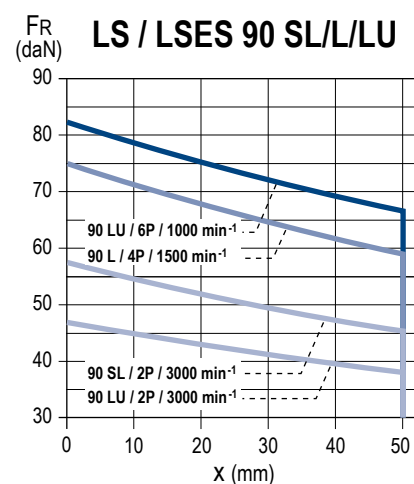
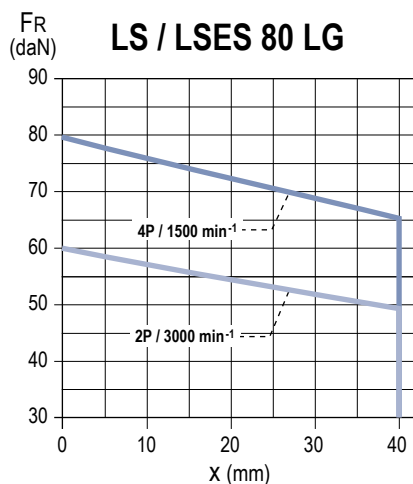
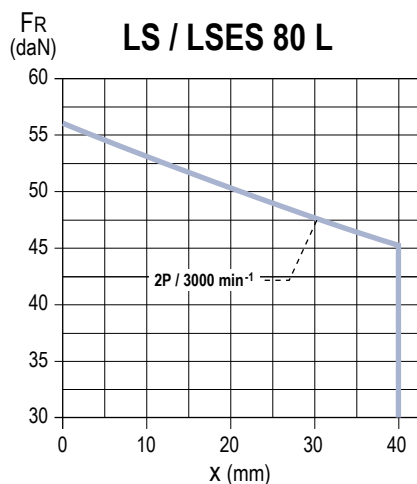
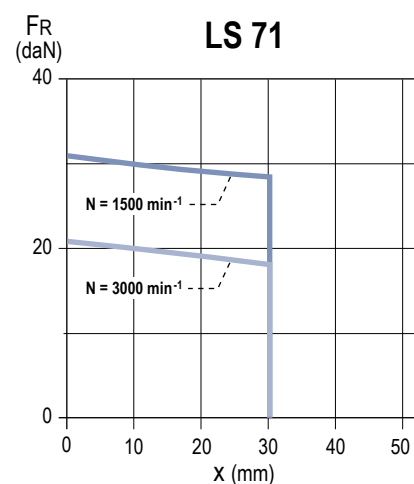
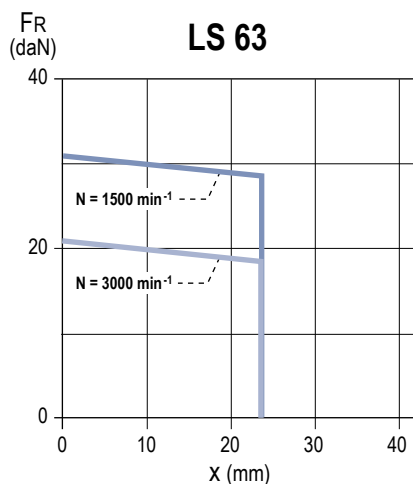
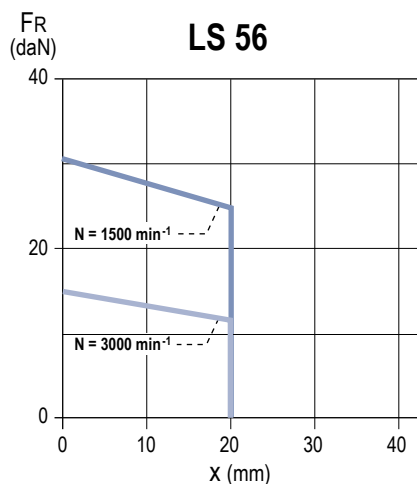


## STANDARD FITTING ARRANGEMENT

Permissible radial load on main shaft extension with a bearing life  $L_{10h}$  of 25,000 hours.

FR : Radial Force

X: Distance with respect to the shaft shoulder

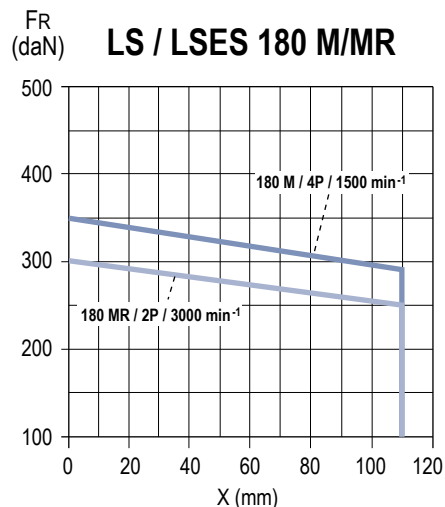
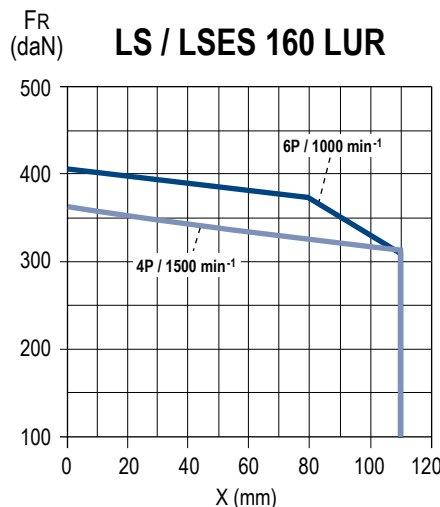
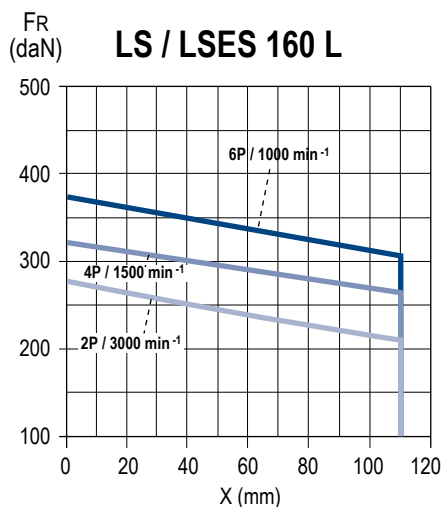
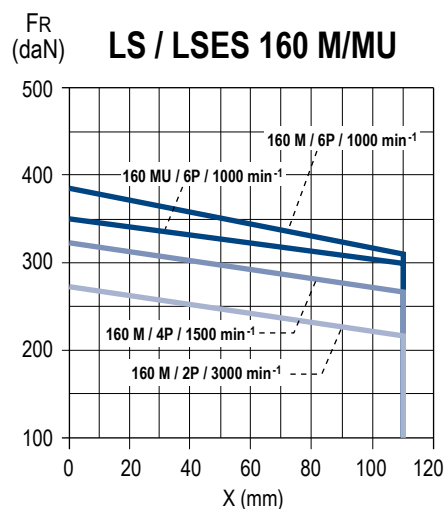
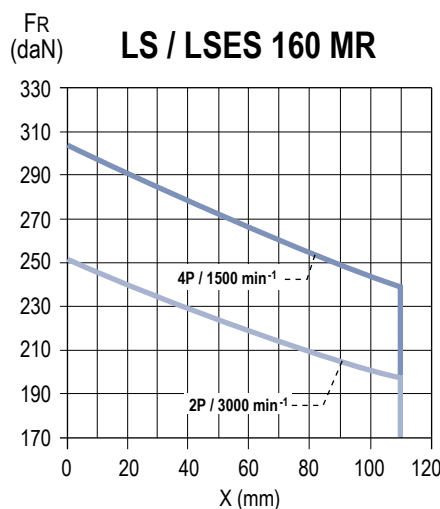
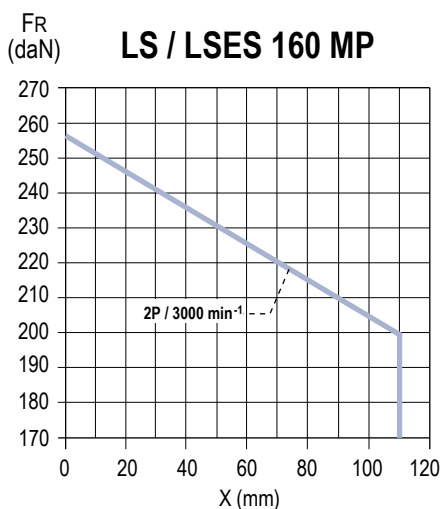
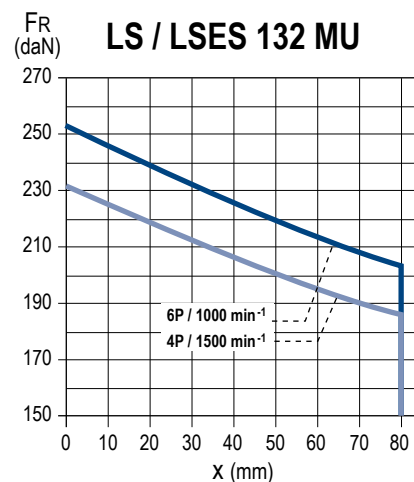
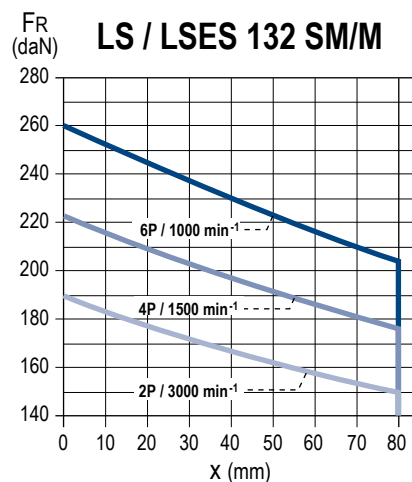
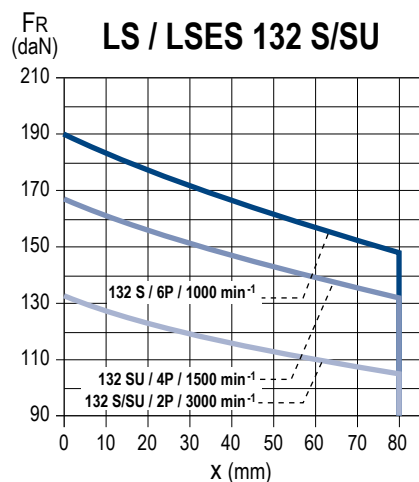


# STANDARD FITTING ARRANGEMENT

Permissible radial load on main shaft extension with a bearing life  $L_{10h}$  of 25,000 hours.

FR : Radial Force

X: Distance with respect to the shaft shoulder

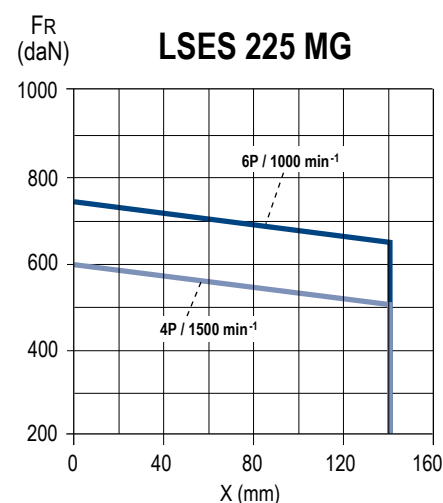
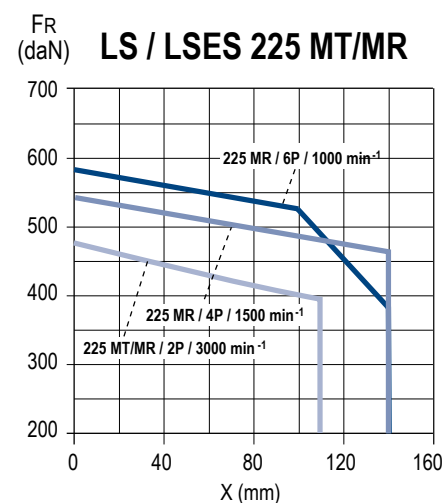
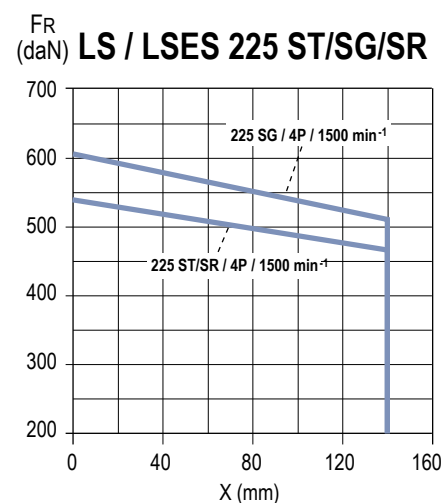
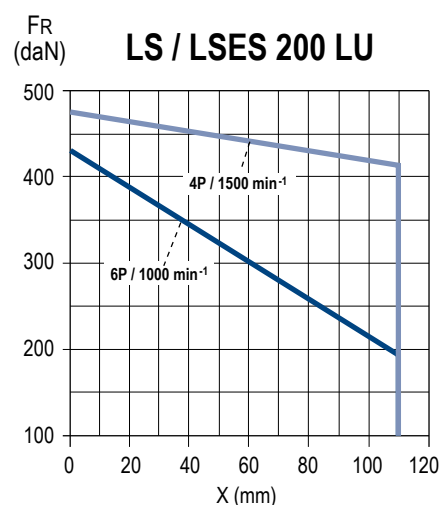
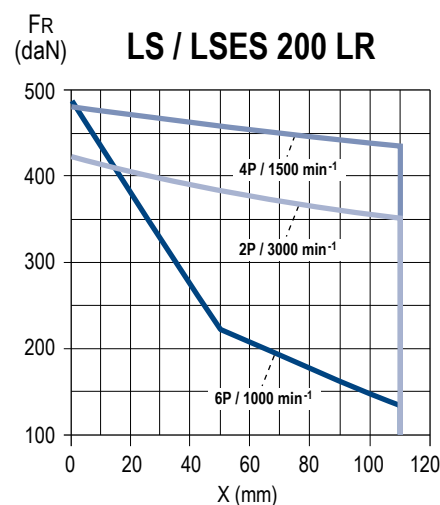
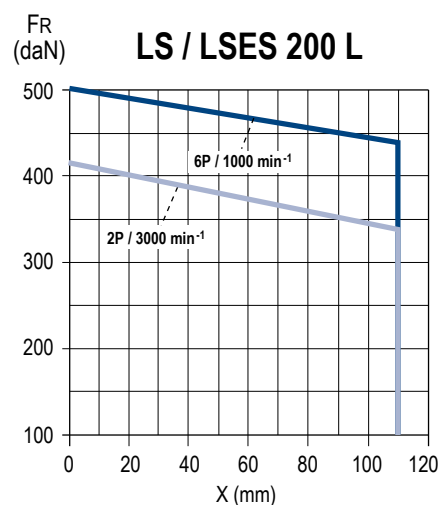
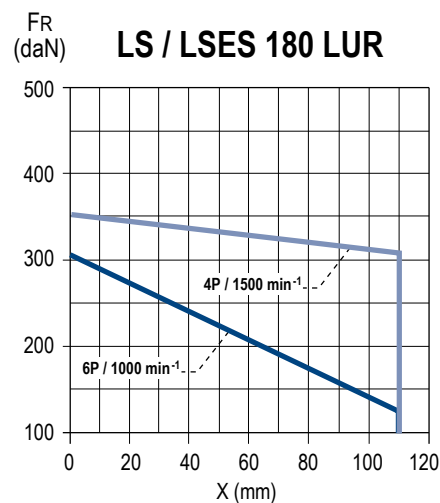
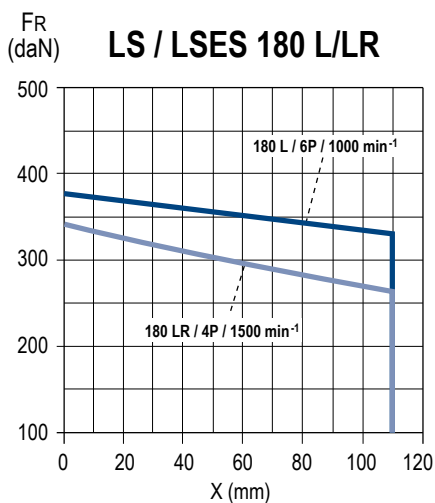
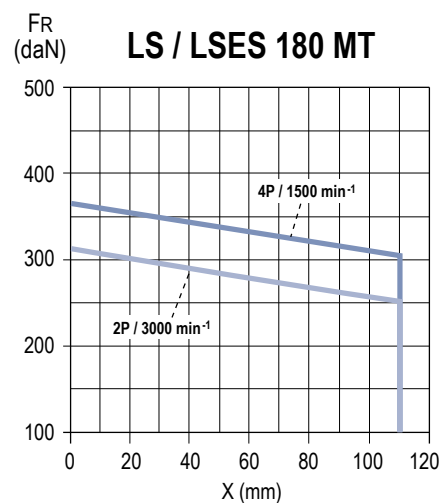


# STANDARD FITTING ARRANGEMENT

Permissible radial load on main shaft extension with a bearing life  $L_{10h}$  of 25,000 hours.

FR : Radial Force

X: Distance with respect to the shaft shoulder

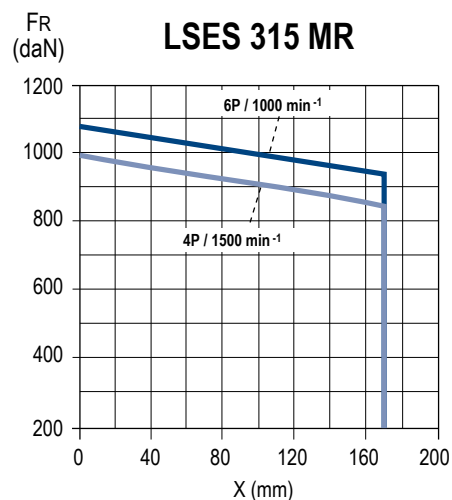
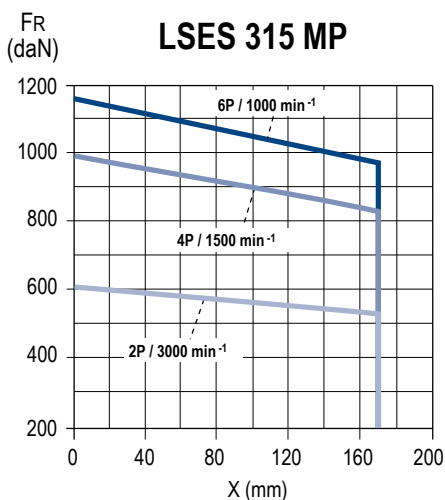
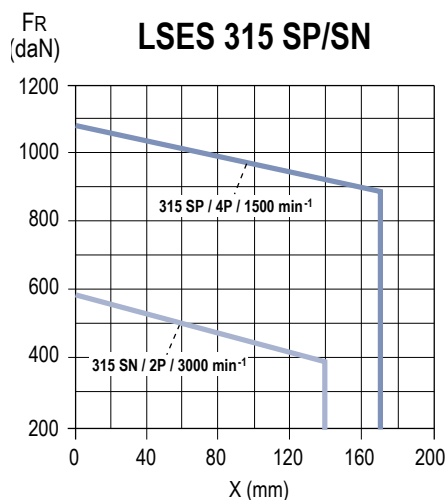
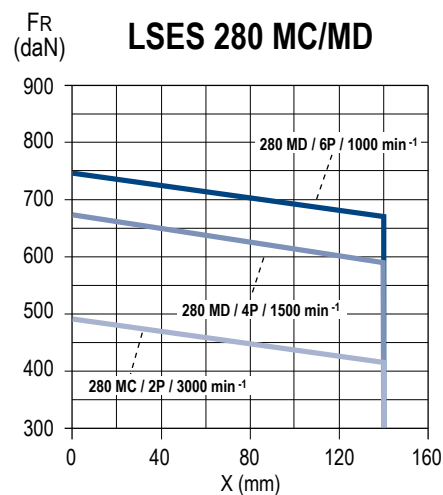
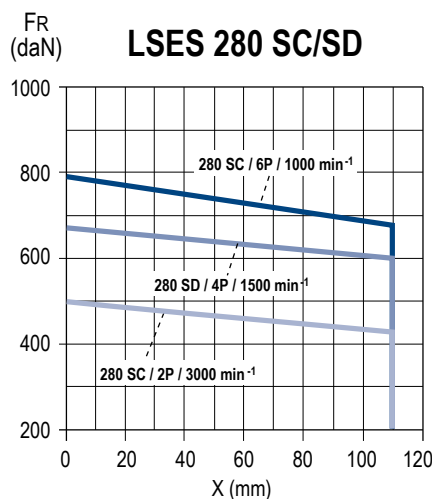
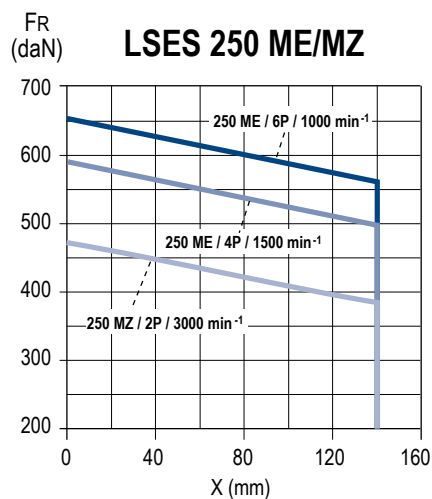


## STANDARD FITTING ARRANGEMENT

Permissible radial load on main shaft extension with a bearing life  $L_{10h}$  of 25,000 hours.

FR : Radial Force

X: Distance with respect to the shaft shoulder



## SPECIAL FITTING ARRANGEMENT

### Type of drive end roller bearings

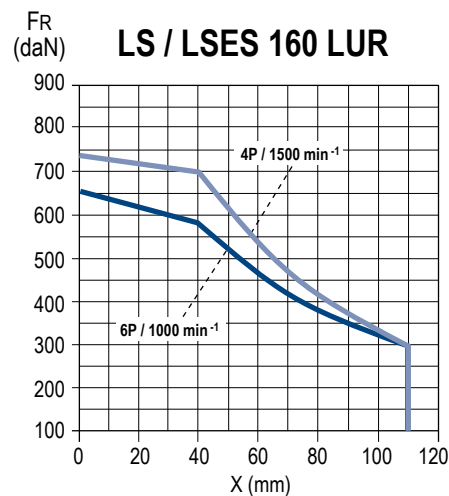
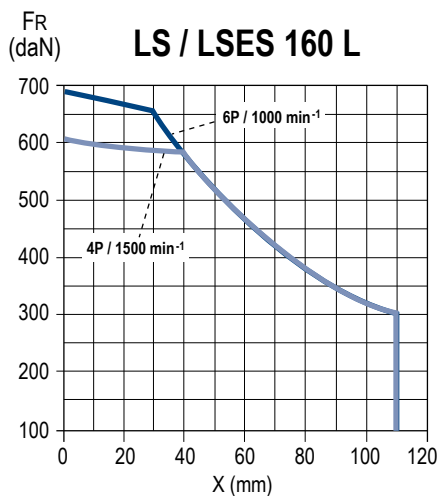
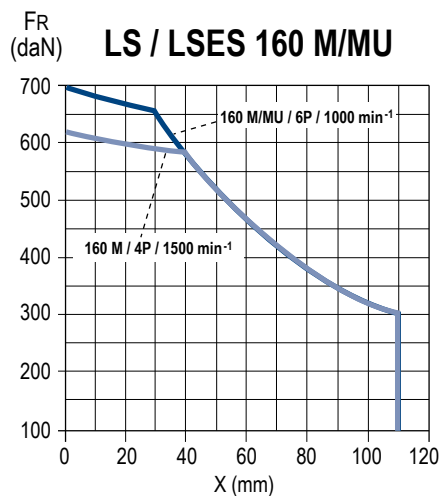
| Series    | Type      | No. of poles | Non drive end bearing (N.D.E.) | Drive end bearing (D.E.) |
|-----------|-----------|--------------|--------------------------------|--------------------------|
| LS / LSES | 160 M/MU  | 4 ; 6        | 6210 C3                        | NU 309                   |
|           | 160 L     |              |                                |                          |
|           | 180 MT    | 4            | 6210 C3                        | NU 310                   |
|           | 180 LR    |              |                                |                          |
|           | 180 LUR   | 4 ; 6        | 6312 C3                        | NU 310                   |
|           | 180 M     | 4            | 6212 C3                        | NU 310                   |
|           | 180 L     | 6            |                                |                          |
|           | 200 L     | 6            | 6214 C3                        | NU 312                   |
|           | 200 LR    | 4 ; 6        | 6312 C3                        | NU 312                   |
|           | 200 LU    |              |                                |                          |
|           | 225 ST    | 4            | 6214 C3                        | NU 313                   |
|           | 225 SR/MR | 4 ; 6        | 6312 C3                        | NU 313                   |
|           | 225 SG    | 4            | 6216 C3                        | NU 314                   |
|           | 225 MG    | 4 ; 6        |                                |                          |
|           | 250 ME    | 4 ; 6        | 6216 C3                        | NU 314                   |
|           | 280 SC    | 6            | 6216 C3                        | NU 316                   |
|           | 280 SD/MD | 4 ; 6        | 6218 C3                        | NU 316                   |
|           | 315 SP    | 4            | 6317 C3                        | NU 320                   |
|           | 315 MP/MR | 4 ; 6        |                                |                          |

## SPECIAL FITTING ARRANGEMENT

Permissible radial load on main shaft extension with a bearing life  $L_{10h}$  of 25,000 hours.

FR : Radial Force

X: Distance with respect to the shaft shoulder

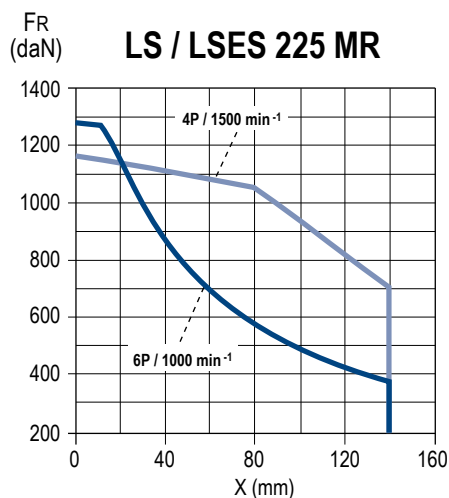
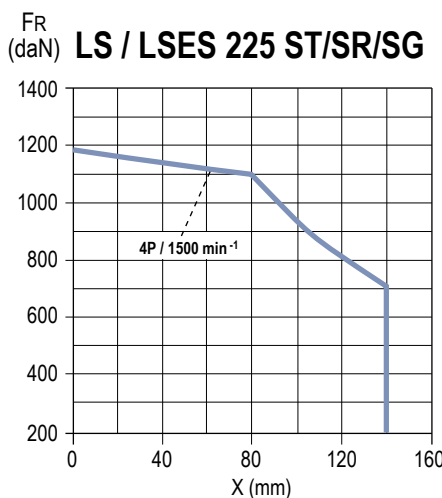
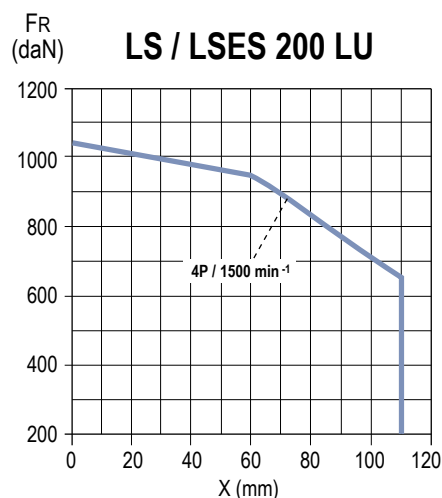
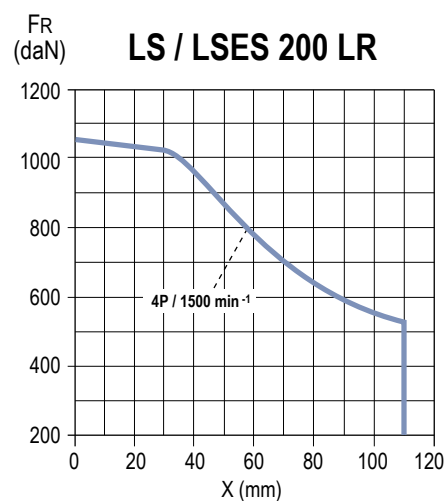
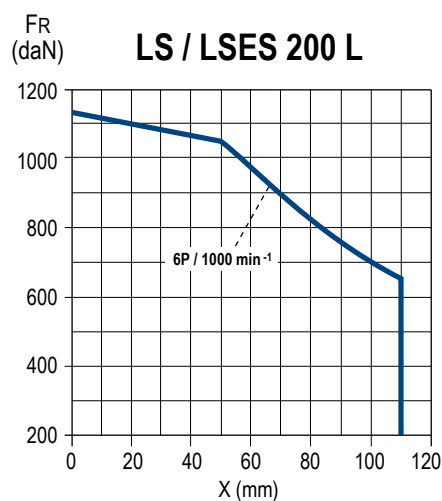
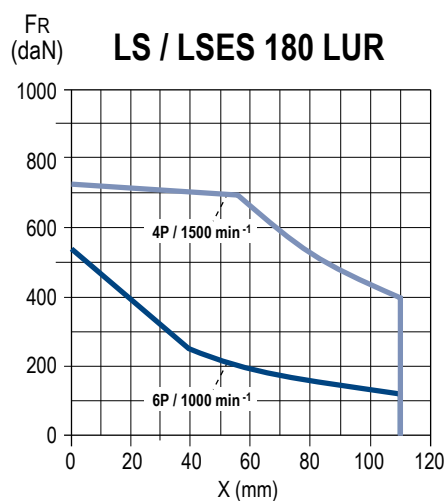
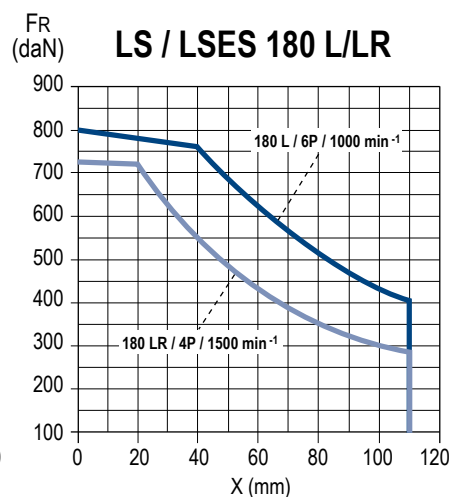
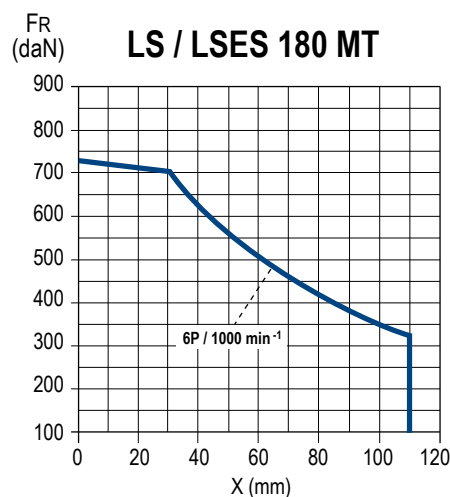
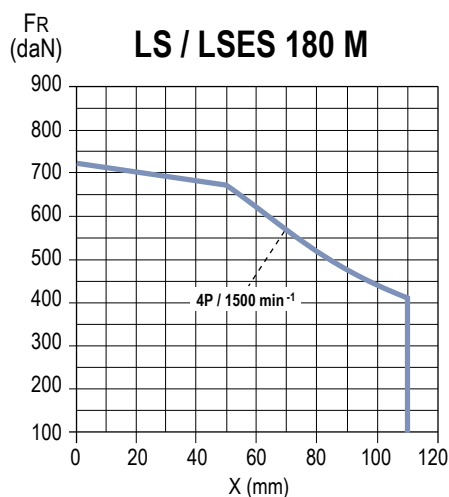


### SPECIAL FITTING ARRANGEMENT

Permissible radial load on main shaft extension with a bearing life  $L_{10h}$  of 25,000 hours.

FR : Radial Force

X: Distance with respect to the shaft shoulder



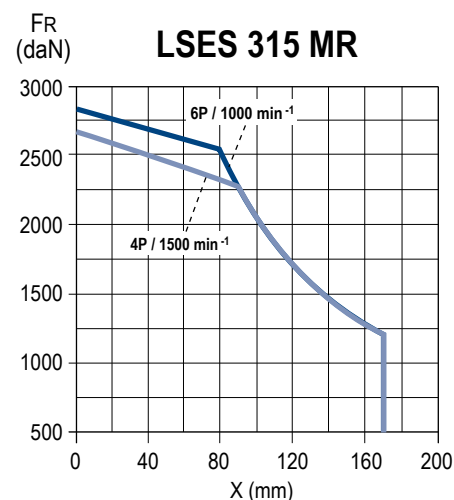
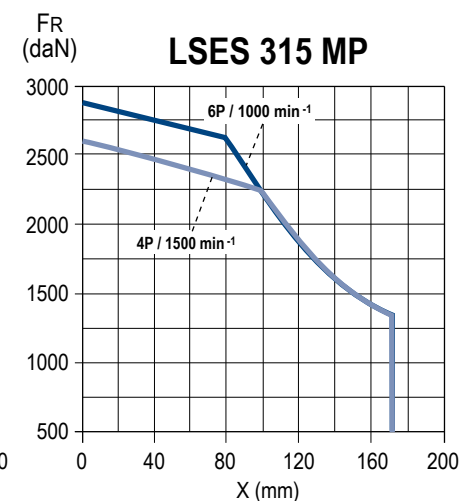
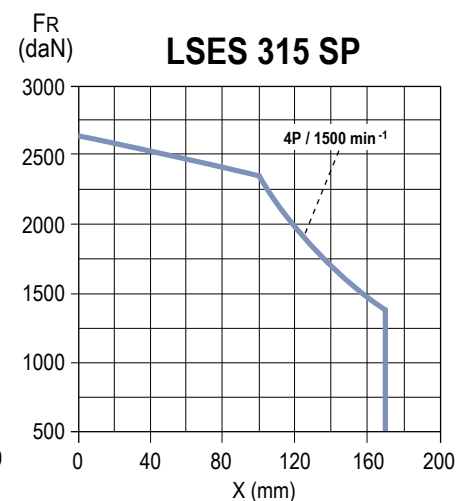
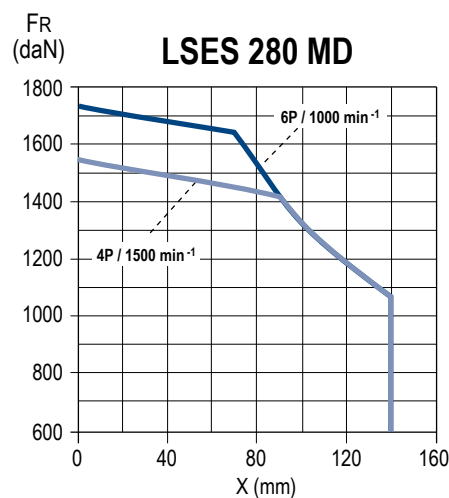
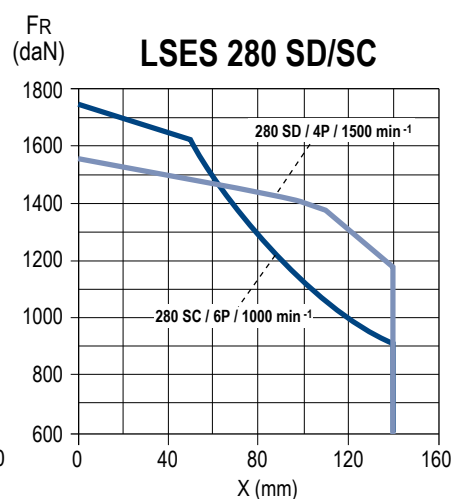
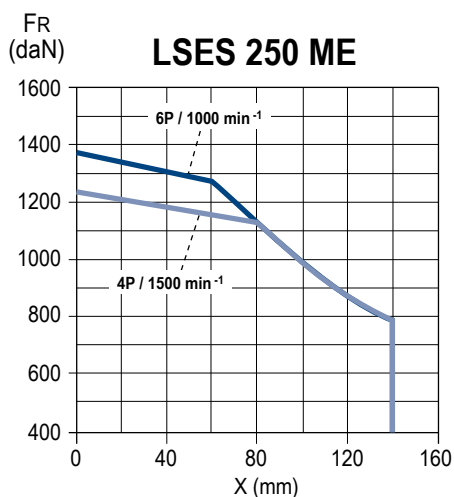
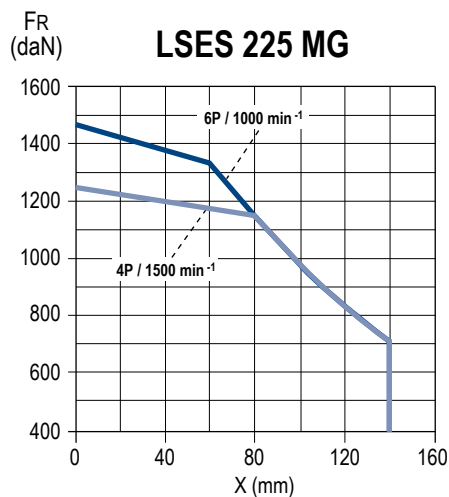


## SPECIAL FITTING ARRANGEMENT

Permissible radial load on main shaft extension with a bearing life  $L_{10h}$  of 25,000 hours.

FR : Radial Force

X: Distance with respect to the shaft shoulder



# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Aluminium frame

### Optional features

### Non-standard flanges

Optionally, Leroy-Somer motors can be fitted with flanges and faceplates that are larger or smaller than standard. This means that motors can be adapted to all types of situation without the need for costly and time-consuming modifications.

The tables below give the flange and faceplate dimensions and also indicate flange/motor compatibility.

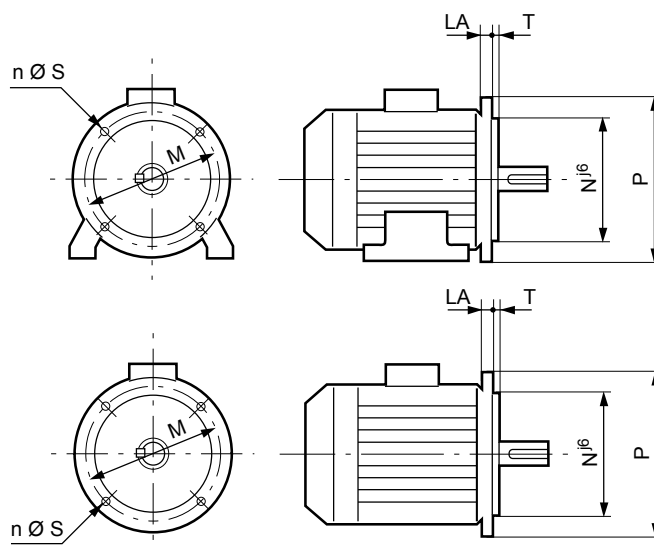
The bearing and shaft extension for each frame size remain standard.

Dimensions in millimetres

#### (FF) Flange mounted

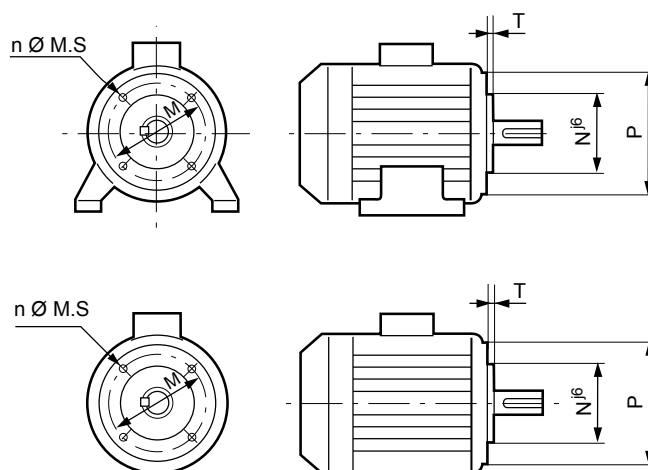
| IEC symbol | Flange dimensions |     |     |     |   |      |    |
|------------|-------------------|-----|-----|-----|---|------|----|
|            | M                 | N   | P   | T   | n | S    | LA |
| FF 100     | 100               | 80  | 120 | 2.5 | 4 | 7    | 5  |
| FF 115     | 115               | 95  | 140 | 3   | 4 | 10   | 10 |
| FF 130     | 130               | 110 | 160 | 3.5 | 4 | 10   | 10 |
| FF 165     | 165               | 130 | 200 | 3.5 | 4 | 12   | 10 |
| FF 215     | 215               | 180 | 250 | 4   | 4 | 15   | 12 |
| FF 265     | 265               | 230 | 300 | 4   | 4 | 15   | 14 |
| FF 300     | 300               | 250 | 350 | 5   | 4 | 18.5 | 14 |
| FF 350     | 350               | 300 | 400 | 5   | 4 | 18.5 | 15 |
| FF 400     | 400               | 350 | 450 | 5   | 8 | 18.5 | 16 |
| FF 500     | 500               | 450 | 550 | 5   | 8 | 18.5 | 18 |
| FF 600*    | 600               | 550 | 660 | 6   | 8 | 24   | 22 |

\* Tolerance N js6



#### (FT) Face mounted

| IEC symbol | Faceplate dimensions |     |     |     |   |     |
|------------|----------------------|-----|-----|-----|---|-----|
|            | M                    | N   | P   | T   | n | M.S |
| FT 65      | 65                   | 50  | 80  | 2.5 | 4 | M5  |
| FT 75      | 75                   | 60  | 90  | 2.5 | 4 | M5  |
| FT 85      | 85                   | 70  | 105 | 2.5 | 4 | M6  |
| FT 100     | 100                  | 80  | 120 | 3   | 4 | M6  |
| FT 115     | 115                  | 95  | 140 | 3   | 4 | M8  |
| FT 130     | 130                  | 110 | 160 | 3.5 | 4 | M8  |
| FT 165     | 165                  | 130 | 200 | 3.5 | 4 | M10 |
| FT 215     | 215                  | 180 | 250 | 4   | 4 | M12 |
| FT 265     | 265                  | 230 | 300 | 4   | 4 | M12 |



## MODIFIED FLANGES

|                |                               | (FF) Flange mounted |        |        |        |        |        |        |        |        |                  |        | (FT) Face mounted |       |       |       |        |        |        |        |        |        |
|----------------|-------------------------------|---------------------|--------|--------|--------|--------|--------|--------|--------|--------|------------------|--------|-------------------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| Motor type     | Flange type<br>Mounting forms | FF 85               | FF 100 | FF 115 | FF 130 | FF 165 | FF 215 | FF 265 | FF 300 | FF 350 | FF 400           | FF 500 | FF 600            | FT 65 | FT 75 | FT 85 | FT 100 | FT 115 | FT 130 | FT 165 | FT 215 | FT 265 |
| 56 L           | all                           |                     | ●      |        |        |        |        |        |        |        |                  |        |                   | ●     | ◆     | ◆     | ●      |        |        |        |        |        |
| 63 M           | all                           | ■                   | ■      | ●      | ◆      |        |        |        |        |        |                  |        |                   | ◆     | ●     | ◆     | ◆      | ◆      |        |        |        |        |
| 71 L           | all                           | ■                   | ■      | ■      | ●      | ◆      |        |        |        |        |                  |        |                   | ◆     | ◆     | ●     | ◆      | ◆      | ◆      |        |        |        |
| 80 L           | all                           | ■                   | ■      | ■      | ■      | ●      | ◆      |        |        |        |                  |        |                   | ◆     | ◆     | ◆     | ●      | ◆      | ◆      | ◆      |        |        |
| 80 LG          | B5/B35 <sup>(1)</sup>         | ◆                   | ◆      | ◆      | ◆      | ●      | ◆      | ■      |        |        |                  |        |                   |       |       | ◆     | ●      | ◆      | ■      | ◆      | ■      |        |
| 80 LG          | B3/B14/B34                    | ■                   | ■      | ■      | ■      | ■      | ■      | ■      |        |        |                  |        |                   |       |       | ◆     | ●      | ◆      | ◆      | ◆      | ■      |        |
| 90 SL/L/LU     | B5/B35 <sup>(1)</sup>         | ◆                   | ◆      | ◆      | ◆      | ●      | ◆      | ■      |        |        |                  |        |                   |       |       | ◆     | ◆      | ●      | ■      | ◆      | ■      |        |
| 90 SL/L/LU     | B3/B14/B34                    | ■                   | ■      | ■      | ■      | ■      | ■      | ■      |        |        |                  |        |                   |       |       | ◆     | ◆      | ●      | ◆      | ◆      | ■      |        |
| 100 L/LR       | all                           | ■                   | ■      | ■      | ■      | ■      | ●      | ■      |        |        |                  |        |                   |       |       | ◆     | ◆      | ◆      | ●      | ◆      | ◆      |        |
| 100 LG         | all                           |                     |        |        | ■      | ■      | ●      | ◆      |        |        |                  |        |                   |       |       |       |        | ◆      | ●      | ◆      | ◆      |        |
| 112 M/MR       | all                           | ■                   | ■      | ■      | ■      | ■      | ●      | ■      |        |        |                  |        |                   |       |       | ◆     | ◆      | ◆      | ●      | ◆      | ◆      |        |
| 112 MG/MU      | all                           |                     |        |        | ■      | ■      | ●      | ◆      |        |        |                  |        |                   |       |       |       |        | ◆      | ●      | ◆      | ◆      |        |
| 132 S/SU       | all                           |                     |        |        |        | ■      | ◆      | ●      |        |        |                  |        |                   |       |       |       |        |        | ◆      | ●      | ◆      |        |
| 132 SM/M/MU    | all                           |                     |        |        |        | ■      | ■      | ●      | ◆      |        |                  |        |                   |       |       |       |        |        | ■      | ●      | ■      |        |
| 160 MR/LR/MP   | all                           |                     |        |        |        |        | ◆      | ■      | ●      | ■      |                  |        |                   |       |       |       |        |        |        |        | ●      |        |
| 160 M/MU/L/LUR | all                           |                     |        |        |        |        |        | ◆      | ●      | ◆      |                  |        |                   |       |       |       |        |        |        |        |        |        |
| 180            | all                           |                     |        |        |        |        |        | ◆      | ●      | ◆      | ◆ <sup>(1)</sup> |        |                   |       |       |       |        |        |        |        |        |        |
| 200            | all                           |                     |        |        |        |        |        |        | ◆      | ●      | ◆                |        |                   |       |       |       |        |        |        |        |        |        |
| 225            | all                           |                     |        |        |        |        |        |        |        |        | ●                | ◆      |                   |       |       |       |        |        |        |        |        |        |
| 250            | all                           |                     |        |        |        |        |        |        |        |        | ◆                | ●      |                   |       |       |       |        |        |        |        |        |        |
| 280            | all                           |                     |        |        |        |        |        |        |        |        | ◆                | ●      | ◆                 |       |       |       |        |        |        |        |        |        |
| 315            | all                           |                     |        |        |        |        |        |        |        |        |                  |        | ●                 |       |       |       |        |        |        |        |        |        |

● Standard

■ Adapted shaft

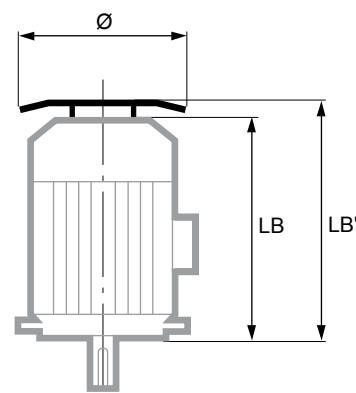
◆ Adaptable without shaft modifications

<sup>(1)</sup> Dimension C need not comply with IEC 60072

## DRIP COVER FOR OPERATION IN VERTICAL POSITION, SHAFT END FACING DOWN

Dimensions in millimetres

| Motor type   | LB'       | Ø   |
|--------------|-----------|-----|
| 80           | LB + 20   | 145 |
| 90           | LB + 20   | 185 |
| 100          | LB + 20   | 185 |
| 112 MR       | LB + 20   | 185 |
| 112 MG/MU    | LB + 25   | 210 |
| 132 S/SU     | LB + 25   | 210 |
| 132 M/MU     | LB + 30   | 240 |
| 160 MP/LR    | LB + 30   | 240 |
| 160 M/L/LU   | LB + 36.5 | 265 |
| 180 MT/LR    | LB + 36.5 | 265 |
| 180 L        | LB + 36.5 | 305 |
| 200 LR       | LB + 36.5 | 305 |
| 200 L        | LB + 36.5 | 350 |
| 225          | LB + 36.5 | 350 |
| 250 MZ       | LB + 36.5 | 350 |
| 250 ME       | LB + 55   | 420 |
| 280          | LB + 55   | 420 |
| 315 SN       | LB + 55   | 420 |
| 315 SP/MP/MR | LB + 76.5 | 505 |



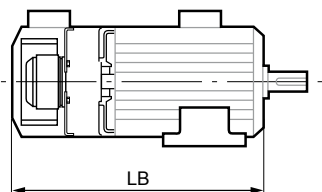
## BRAKE MOTORS, FORCED VENTILATION

The integration of high-efficiency motors within a process often requires accessories to make operation easier:

- Forced ventilation for motors used at high or low speeds.
- Holding brakes for maintaining the rotor in the stop position without needing to leave the motor switched on.
- Emergency stop brakes to immobilise loads in case of failure of the motor torque control or loss of power supply.

Notes:

- Without forced ventilation, there is a possibility of overspeed with optional class B balancing.
- The motor temperature is monitored by sensors built into the windings.



| LSES series | LB dimensions with Forced Ventilation |                      |
|-------------|---------------------------------------|----------------------|
|             | Foot or face mounted motors           | Flange mounted motor |
| 80 L        | 317                                   |                      |
| 80 LG       | 331                                   | 351                  |
| 90 S        | 304                                   | 324                  |
| 90 L        | 331                                   | 351                  |
| 100 L       | 373                                   |                      |
| 100 LR      | 373                                   |                      |
| 112 MR      | 412                                   |                      |
| 112 MG      | 412                                   |                      |
| 112 MU      | 412                                   |                      |
| 132 S       | 453                                   |                      |
| 132 SU      | 453                                   |                      |
| 132 M       | 458                                   |                      |
| 132 MU      | 458                                   |                      |
| 160 MP      | 709                                   |                      |
| 160 MR      | 730                                   |                      |
| 160 L       | 687                                   |                      |
| 160 M       | 687                                   |                      |
| 180 MT      | 702                                   |                      |
| 180 LR      | 702                                   |                      |
| 180 L       | 741                                   |                      |
| 200 LR      | 796                                   |                      |
| 200 L       | 802                                   |                      |
| 225 MR      | 853.5                                 |                      |
| 225 ST      | 808.5                                 |                      |
| 225 MT      | 808.5                                 |                      |
| 250 ME      | 1012                                  |                      |
| 250 MZ      | 853.5                                 |                      |
| 280 MD      | 1072                                  |                      |
| 280 SC      | 1012                                  |                      |
| 280 MC      | 1012                                  |                      |
| 315 SN      | 1072                                  |                      |
| 315 SP      | 1181                                  |                      |
| 315 MP      | 1181                                  |                      |
| 315 MR      | 1251                                  |                      |

## MOTORS WITH SPACE HEATERS

| Type                    | Power (W) |
|-------------------------|-----------|
| 80 L                    | 16        |
| 80 LG to 160 MP/LR      | 25        |
| 160 M/L to 225 ST/MT/MR | 52        |
| 250 MZ                  | 52        |
| 250 ME/MF               | 84        |
| 280 SC/MC/MD            | 84        |
| 315 SN                  | 84        |
| 315 MP/MR               | 108       |

The space heaters use 200/240 V single-phase, 50 or 60 Hz.

## MOTORS WITH REMOVABLE CONNECTOR

The removable connector option allows quick, safe and simple motor connection.

It can be used in numerous processes (automotive, food industries, etc.) where machine changeover times need to be kept to a minimum.

The male part of the connector is fitted instead of or on the motor terminal box, depending on which other options are selected. The connector socket is connected to the stator coils.

The female part of the connector is connected to the mains supply.

Up to 10 contacts can be mounted on the connectors, to cover power ratings up to 11 kW within an acceptable maximum current of 40 A.

For higher power ratings, please consult Leroy-Somer.



## INTEGRATED VARIABLE SPEED MOTORS: COMMANDER ID300

The Commander ID300 is the association of a 3-phase induction motor of IMfinity® range and an integrated high performance variable speed drive.

It can be used with a large panel of options for motor and drive, that allows the product to perfectly suit application needs.

Commander ID300 operates on all mains supplies (200 Volts to 480 Volts 50/60 Hz).

The variable speed drive offers a decentralised solution on the machine, the product being designed to operate in industrial conditions (resin-encapsulated electronics).

Commander ID300 complies with the European CE marking standards and North American standards, UL for the USA and c(UL)us for Canada.



## LIFTING THE MOTOR ONLY (not coupled to the machine)

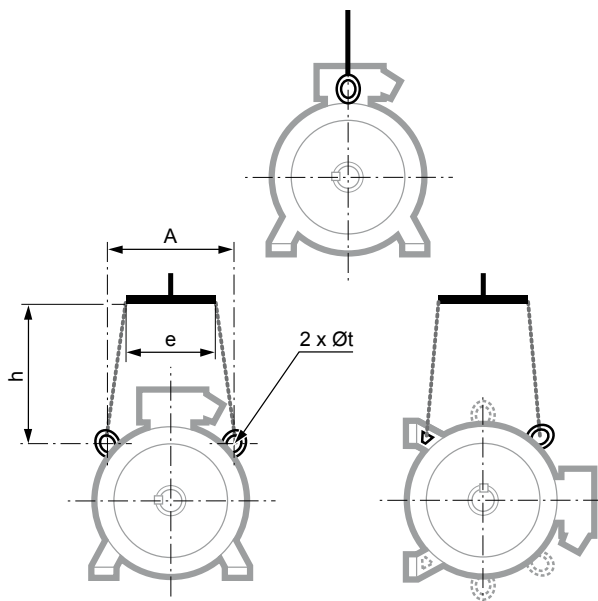
The regulations stipulate that over 25 kg, suitable handling equipment must be used.

All our motors are fitted with grab handles, making them easier to handle without risk. A diagram of the sling hoisting method appears below with the required dimensions.

To prevent any damage to the motor during handling (for example: switching the motor from horizontal to vertical), it is essential to follow these instructions.

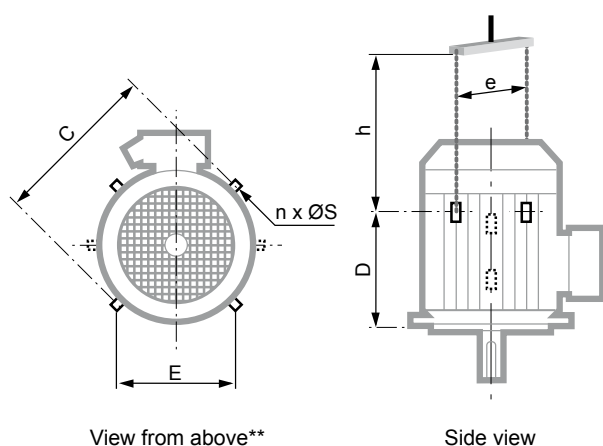
### HORIZONTAL POSITION

Dimensions in millimetres



| LS / LSES Series | Horizontal position |       |       |    |
|------------------|---------------------|-------|-------|----|
|                  | A                   | e min | h min | Øt |
| 100 L/LR/LG      | 165                 | 165   | 150   | 9  |
| 112 M/MR         | 165                 | 165   | 150   | 9  |
| 112 MG/MU        | -                   | -     | -     | 9  |
| 132 S/SU         | 180                 | 180   | 150   | 9  |
| 132 M/MU         | 200                 | 180   | 150   | 14 |
| 160 MP/MR/LR     | 200                 | 180   | 110   | 14 |
| 160 M/MU/L/LUR   | 200                 | 260   | 150   | 14 |
| 180 M/MUR/L/LUR  | 200                 | 260   | 150   | 14 |
| 200 L/LR         | 270                 | 260   | 150   | 14 |
| 200 LU           | 270                 | 260   | 150   | 14 |
| 225 SR/MR        | 270                 | 260   | 150   | 14 |
| 225 S/SG/M/MG    | 360                 | 380   | 200   | 30 |
| 250 MZ           | 360                 | 380   | 200   | 30 |
| 250 ME           | 400                 | 400   | 500   | 30 |
| 280 SC/SD/MC/MD  | 400                 | 400   | 500   | 30 |
| 315 SN           | 400                 | 400   | 500   | 30 |
| 315 SP/MP/MR     | 360                 | 380   | 500   | 17 |

### VERTICAL POSITION



View from above\*\*

Side view

| LS / LSES Series | Vertical position |     |     |     |    |        |       |
|------------------|-------------------|-----|-----|-----|----|--------|-------|
|                  | C                 | E   | D   | n** | ØS | e min* | h min |
| 160 M/MU/L/LUR   | 320               | 200 | 230 | 2   | 14 | 320    | 350   |
| 180 MR           | 320               | 200 | 230 | 2   | 14 | 320    | 270   |
| 180 M/L/LUR      | 390               | 265 | 290 | 2   | 14 | 390    | 320   |
| 200 L/LR         | 410               | 300 | 295 | 2   | 14 | 410    | 450   |
| 200 LU           | 410               | 300 | 295 | 2   | 14 | 410    | 450   |
| 225 SR/MR        | 480               | 360 | 405 | 4   | 30 | 540    | 350   |
| 225 S/SG/M/MG    | 480               | 360 | 405 | 4   | 30 | 500    | 500   |
| 250 MZ           | 480               | 360 | 405 | 4   | 30 | 590    | 550   |
| 250 ME           | 480               | 360 | 405 | 4   | 30 | 500    | 500   |
| 280 SC/SD/MC/MD  | 480               | 360 | 405 | 4   | 30 | 500    | 500   |
| 315 SN           | 480               | 360 | 405 | 4   | 30 | 500    | 500   |
| 315 SP/MP/MR     | 630               | -   | 570 | 2   | 30 | 630    | 550   |

\* if the motor is fitted with a drip cover, allow an additional 50 to 100 mm to avoid damaging it when the load is swung.

\*\* if n = 2, the lifting rings form a 90° angle with respect to the terminal box axis.

If n = 4, this angle becomes 45°.

Separate ring ≤ 25 kg

Built-in ring > 25 kg

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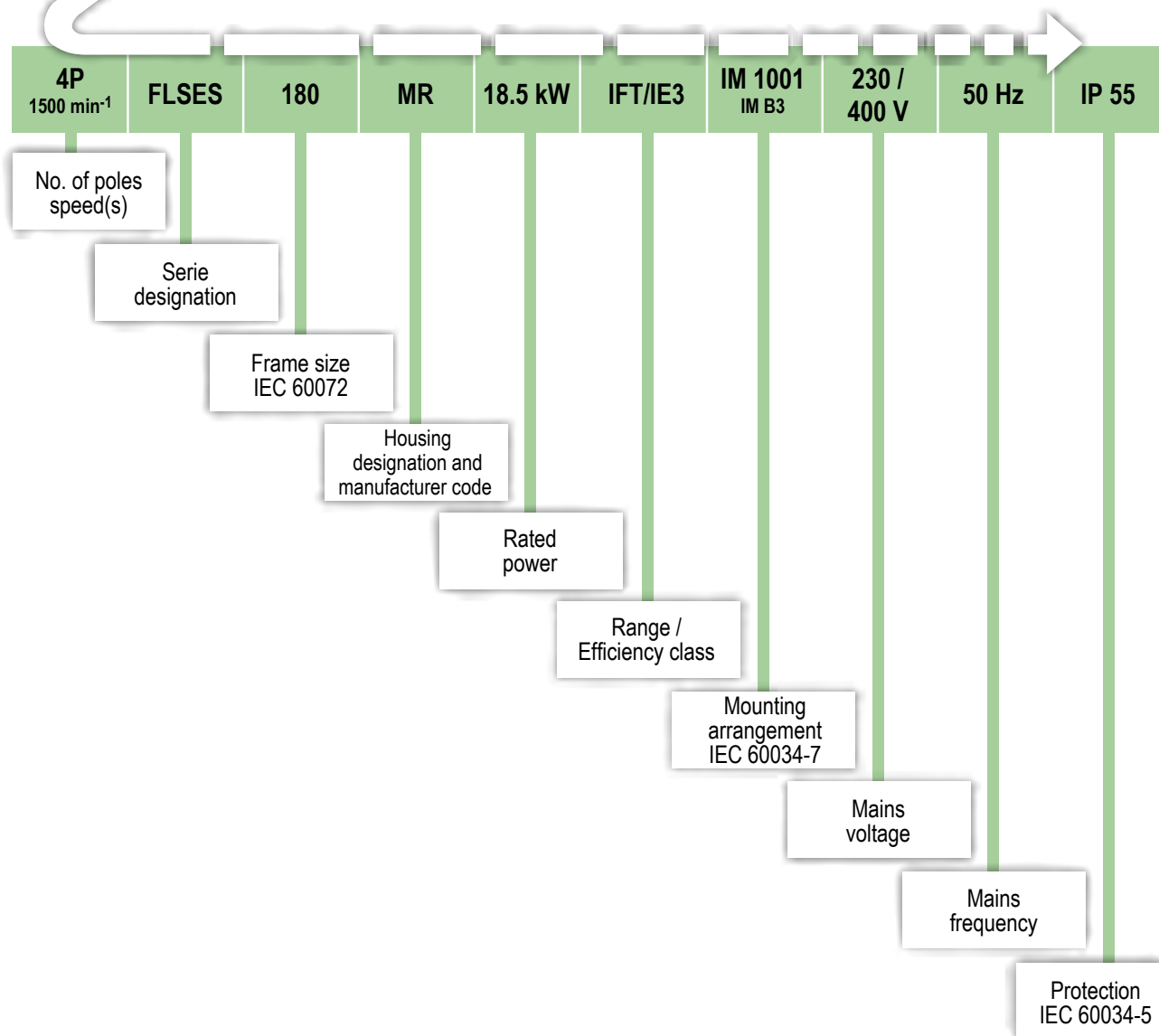




IP 55  
Cl. F -  $\Delta T$  80 K

The complete motor **reference** described below will enable you to **order** the desired equipment.

The selection method consists of following the terms in the designation.



| Component                  | Materials                                                                                                                                    | Remarks                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Housing with cooling fins  | Cast iron                                                                                                                                    | - lifting rings for frame size $\geq 90$<br>- earth terminal with an optional jumper screw                                                                                                                                                                                                                                                                                                          |
| Stator                     | Insulated low-carbon magnetic steel laminations<br>Electroplated copper                                                                      | - low carbon content guarantees long-term lamination pack stability<br>- welded laminations<br>- semi-enclosed slots<br>- class F insulation                                                                                                                                                                                                                                                        |
| Rotor                      | Insulated low-carbon magnetic steel laminations<br>Aluminium                                                                                 | - inclined cage bars<br>- rotor cage pressure die-cast in aluminium (or alloy for special applications).<br>or soldered in copper, or keyed for soldered rotors<br>- shrink-fitted to shaft<br>- rotor balanced dynamically, class A, 1/2 key                                                                                                                                                       |
| Shaft                      | Steel                                                                                                                                        | - for frame size $\leq 132$ :<br>• closed keyway<br>- for frame size $\leq 160$ :<br>• tapped hole<br>- for frame size $\geq 160$ :<br>• open keyway                                                                                                                                                                                                                                                |
| End shields                | Cast iron                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                     |
| Bearings and lubrication   |                                                                                                                                              | - permanently greased bearings frame size 80 to 225<br>- regreasable bearings frame size 250 to 450<br>- bearings preloaded at NDE up to 315 S, preloaded at DE from size 315 M upwards                                                                                                                                                                                                             |
| Labyrinth seal<br>Lipseals | Plastic or steel<br>Synthetic rubber                                                                                                         | - labyrinth seal at drive end for foot mounted motors, frame size $\leq 132$<br>- lipseal at drive end for foot and flange mounted or flange mounted motors, frame size $\leq 132$<br>- lipseal at drive end and non drive end for frame sizes 160 to 250 inclusive<br>- decompression grooves for 280 M to 355 LD<br>- labyrinth seal at drive end and non drive end for frame sizes $\geq 355$ LK |
| Fan                        | Composite up to size 280 inclusive<br>Metal from 315 ST upwards                                                                              | - 2 directions of rotation: straight blades                                                                                                                                                                                                                                                                                                                                                         |
| Fan cover                  | Pressed steel                                                                                                                                | - fitted. on request, with a drip cover for operation in vertical position, shaft end facing down                                                                                                                                                                                                                                                                                                   |
| Terminal box               | Cast iron body and cover for all frame sizes<br>(pour les hauteurs d'axe 355 LK, 400 et 450, le corps et le couvercle peuvent être en acier) | - IP 55<br>- fitted with a block with 6 terminals up to 355 LD, 6 or 12 terminals for frame sizes 355LK/400/450<br>- terminal box fitted with threaded plugs up to 132<br>- from the 160 to the 355, undrilled cable gland mounting plate (nozzle and cable gland as options)<br>- 1 earth terminal in each terminal box                                                                            |

In the standard version. the motors are wound 400 V 50 Hz:

- power ratings  $\leq 5.5$  kW: Y connection
- power ratings  $\geq 7.5$  kW:  $\Delta$  connection

## Other construction types

### CORROBLOC FINISH

The CORROBLOC finish is a top coat for the basic cast iron motor described above. In addition to the basic construction. Its special finishes resist corrosion in particularly harsh environments, and these qualities are enhanced with age.

| Component       | Materials                            | Remarks                                                              |
|-----------------|--------------------------------------|----------------------------------------------------------------------|
| Stator - Rotor  |                                      | - dielectric and anti-corrosion protection for frame sizes 80 to 132 |
| Nameplate       | Stainless steel                      | - nameplate: indelible marking                                       |
| Screws          | Stainless steel                      | - captive screws for terminal box cover (frame size $\leq 132$ )     |
| Terminal box    | Cast iron body and cover ou en acier | - terminal box with brass buttons for frame size $\leq 132$          |
| Cable gland     | Brass                                | - option                                                             |
| External finish |                                      | - system IIIa (see External finish section) = C4M                    |

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Cast iron frame

## Electrical and mechanical characteristics

## IE2 - Powered by the mains

| Type          | Rated power | Rated torque | Starting torque/<br>Rated torque | Maximum torque/<br>Rated torque | Starting intensity/<br>Rated intensity | Moment of inertia | Weight | Noise | 400V 50Hz   |               |                                  |                  |       |              |      |      |
|---------------|-------------|--------------|----------------------------------|---------------------------------|----------------------------------------|-------------------|--------|-------|-------------|---------------|----------------------------------|------------------|-------|--------------|------|------|
|               |             |              |                                  |                                 |                                        |                   |        |       | Rated speed | Rated current | Efficiency IEC 60034-2-1 2007    |                  |       | Power factor |      |      |
|               |             |              |                                  |                                 |                                        |                   |        |       |             |               | N <sub>n</sub> min <sup>-1</sup> | I <sub>n</sub> A | 4/4   | 3/4          | 2/4  | 4/4  |
| 2 poles       |             |              |                                  |                                 |                                        |                   |        |       |             |               |                                  |                  |       |              |      |      |
| FLSES 80 L    | 0.75        | 2.5          | 2.7                              | 3.2                             | 6.3                                    | 0.00084           | 15.9   | 59    | 2845        | 1.6           | 79.8                             | 80.8             | 79.3  | 0.86         | 0.79 | 0.67 |
| FLSES 80 L    | 1.1         | 3.7          | 2.7                              | 3.1                             | 6.4                                    | 0.00095           | 16.2   | 60    | 2850        | 2.3           | 81.0                             | 82.4             | 81.6  | 0.85         | 0.78 | 0.66 |
| FLSES 90 SL   | 1.5         | 5            | 2.6                              | 2.7                             | 6.3                                    | 0.00201           | 22.8   | 67    | 2855        | 3             | 82.9                             | 84.9             | 85.1  | 0.87         | 0.82 | 0.72 |
| FLSES 90 L    | 2.2         | 7.4          | 2.6                              | 2.8                             | 6.4                                    | 0.00223           | 23.9   | 67    | 2855        | 4.4           | 83.5                             | 85.4             | 85.6  | 0.86         | 0.8  | 0.68 |
| FLSES 100 L   | 3           | 10           | 4.4                              | 3.9                             | 8.0                                    | 0.00297           | 31.9   | 67    | 2855        | 5.9           | 84.7                             | 86.0             | 85.7  | 0.87         | 0.8  | 0.68 |
| FLSES 112 MG  | 4           | 13.1         | 1.9                              | 3.1                             | 7.4                                    | 0.00822           | 42.2   | 66    | 2925        | 7.6           | 88.3                             | 89.0             | 88.1  | 0.86         | 0.81 | 0.7  |
| FLSES 132 SM  | 5.5         | 18           | 1.8                              | 2.7                             | 5.9                                    | 0.00898           | 66.6   | 66    | 2925        | 10.3          | 89.9                             | 90.9             | 90.7  | 0.86         | 0.83 | 0.74 |
| FLSES 132 SM  | 7.5         | 24.5         | 1.8                              | 2.5                             | 5.9                                    | 0.00974           | 69.4   | 67    | 2920        | 13.9          | 89.3                             | 90.7             | 90.8  | 0.87         | 0.83 | 0.75 |
| FLSES 132 M   | 9           | 29.4         | 1.9                              | 2.8                             | 6.5                                    | 0.01102           | 74.4   | 67    | 2925        | 16.8          | 90.3                             | 91.5             | 91.7  | 0.86         | 0.83 | 0.74 |
| FLSES 160 M   | 11          | 35.6         | 2.8                              | 3.2                             | 7.8                                    | 0.049             | 112    | 68    | 2950        | 20.3          | 90.8                             | 91.3             | 90.9  | 0.86         | 0.82 | 0.74 |
| FLSES 160 M   | 15          | 48.6         | 3.0                              | 2.8                             | 7.0                                    | 0.049             | 120    | 69    | 2945        | 26.7          | 91.2                             | 92.0             | 92.1  | 0.89         | 0.87 | 0.81 |
| FLSES 160 L   | 18.5        | 60.2         | 2.6                              | 3.0                             | 7.7                                    | 0.0551            | 129    | 69    | 2935        | 32.7          | 91.5                             | 92.5             | 92.9  | 0.89         | 0.87 | 0.81 |
| FLSES 180 M   | 22          | 71.5         | 3.0                              | 3.1                             | 8.0                                    | 0.1333            | 162    | 68    | 2940        | 39.3          | 92.0                             | 93.0             | 93.2  | 0.88         | 0.86 | 0.79 |
| FLSES 200 LU  | 30          | 97.1         | 2.1                              | 3.1                             | 7.2                                    | 0.2035            | 210    | 71    | 2950        | 53.9          | 92.6                             | 93.0             | 92.7  | 0.87         | 0.84 | 0.77 |
| FLSES 200 LU  | 37          | 120          | 2.1                              | 3.4                             | 6.9                                    | 0.1388            | 230    | 75    | 2945        | 65.2          | 93.0                             | 93.6             | 93.5  | 0.88         | 0.86 | 0.80 |
| FLSES 225 MR  | 45          | 146          | 2.6                              | 3.4                             | 8.1                                    | 0.1597            | 254    | 71    | 2952        | 80.6          | 93.5                             | 94.1             | 94.1  | 0.86         | 0.84 | 0.78 |
| FLSES 250 M   | 55          | 177          | 2.1                              | 3.2                             | 7.7                                    | 0.3356            | 378    | 79    | 2968        | 95.8          | 94.0                             | 94.1             | 93.2  | 0.88         | 0.85 | 0.79 |
| FLSES 280 S   | 75          | 241          | 2.1                              | 2.7                             | 7.0                                    | 0.48              | 565    | 79    | 2966        | 127           | 93.8                             | 94.1             | 94.0  | 0.91         | 0.89 | 0.85 |
| FLSES 280 M   | 90          | 290          | 2.2                              | 2.8                             | 7.4                                    | 0.57              | 615    | 80    | 2967        | 153           | 94.1                             | 94.4             | 94.3  | 0.90         | 0.89 | 0.85 |
| FLSES 315 S   | 110         | 353          | 1.9                              | 2.7                             | 6.5                                    | 1.17              | 940    | 82    | 2975        | 187           | 94.3                             | 94.3             | 94.0  | 0.90         | 0.89 | 0.84 |
| FLSES 315 M   | 132         | 424          | 2.0                              | 2.4                             | 6.7                                    | 1.25              | 1015   | 82    | 2975        | 223           | 94.6                             | 94.6             | 94.3  | 0.90         | 0.89 | 0.84 |
| FLSES 315 LA  | 160         | 514          | 2.0                              | 2.9                             | 6.5                                    | 1.34              | 1088   | 82    | 2975        | 274           | 94.8                             | 94.8             | 94.5  | 0.89         | 0.87 | 0.83 |
| FLSES 315 LB  | 200         | 642          | 2.1                              | 2.8                             | 6.8                                    | 1.45              | 1150   | 82    | 2973        | 337           | 95.0                             | 95.0             | 94.7  | 0.90         | 0.88 | 0.84 |
| FLSES 355 LA  | 250         | 802          | 2.2                              | 2.8                             | 6.9                                    | 3.02              | 1590   | 83    | 2978        | 428           | 95.0                             | 95.0             | 94.7  | 0.88         | 0.86 | 0.80 |
| FLSES 355 LB  | 315         | 1008         | 2.6                              | 3.0                             | 7.6                                    | 3.62              | 1740   | 84    | 2983        | 544           | 95.0                             | 95.0             | 94.7  | 0.88         | 0.86 | 0.82 |
| FLSES 355 LC  | 355         | 1137         | 2.5                              | 2.7                             | 6.9                                    | 3.64              | 1750   | 84    | 2981        | 620           | 95.0                             | 95.0             | 94.7  | 0.87         | 0.85 | 0.81 |
| FLSES 355 LD  | 400         | 1282         | 2.0                              | 2.6                             | 7.0                                    | 3.7               | 1770   | 84    | 2989        | 683           | 95.0                             | 95.0             | 94.7  | 0.89         | 0.87 | 0.81 |
| FLSES 355 LKB | 450         | 1438         | 2.3                              | 4.35                            | 11.5                                   | 8.95              | 2550   | 94    | 2989        | 777           | 95.0                             | 95.2             | 93.2  | 0.88         | 0.85 | 0.78 |
| FLSES 400 LB  | 560         | 1790         | 1.94                             | 3.70                            | 9.6                                    | 8.95              | 2560   | 94    | 2987        | 967           | 95.0                             | 95.2             | 93.9  | 0.88         | 0.85 | 0.78 |
| 4 poles       |             |              |                                  |                                 |                                        |                   |        |       |             |               |                                  |                  |       |              |      |      |
| FLSES 80 LG   | 0.75        | 5            | 2.0                              | 2.9                             | 5.7                                    | 0.00265           | 20     | 45    | 1445        | 1.7           | 80.9                             | 81.7             | 80.1  | 0.79         | 0.71 | 0.57 |
| FLSES 90 SL   | 1.1         | 7.3          | 2.0                              | 2.8                             | 5.8                                    | 0.00336           | 22.3   | 51    | 1440        | 2.4           | 81.8                             | 83.3             | 82.4  | 0.81         | 0.74 | 0.60 |
| FLSES 90 L    | 1.5         | 10           | 2.4                              | 2.9                             | 6.7                                    | 0.00418           | 24.6   | 49    | 1440        | 3.2           | 83.0                             | 84.5             | 84.1  | 0.82         | 0.75 | 0.62 |
| FLSES 100 L   | 2.2         | 14.5         | 2.6                              | 3.2                             | 6.7                                    | 0.00567           | 33.2   | 50    | 1445        | 4.6           | 85.1                             | 86.2             | 85.8  | 0.82         | 0.75 | 0.62 |
| FLSES 100 LG  | 3           | 19.8         | 2.3                              | 2.8                             | 6.7                                    | 0.01152           | 40     | 50    | 1450        | 6.1           | 86.3                             | 87.6             | 87.3  | 0.83         | 0.75 | 0.62 |
| FLSES 112 MU  | 4           | 26.3         | 2.0                              | 2.8                             | 6.2                                    | 0.01312           | 46.4   | 50    | 1450        | 7.9           | 87.4                             | 89.1             | 89.6  | 0.84         | 0.79 | 0.69 |
| FLSES 132 SM  | 5.5         | 36           | 2.5                              | 3.2                             | 7.4                                    | 0.01925           | 66.3   | 60    | 1458        | 10.7          | 88.6                             | 89.7             | 89.5  | 0.83         | 0.77 | 0.65 |
| FLSES 132 M   | 7.5         | 49.3         | 2.5                              | 3.1                             | 7.2                                    | 0.02286           | 71     | 60    | 1454        | 14.4          | 89.1                             | 90.3             | 90.5  | 0.85         | 0.79 | 0.68 |
| FLSES 132 M   | 9           | 59.1         | 2.8                              | 3.4                             | 7.8                                    | 0.02722           | 78     | 61    | 1454        | 17.5          | 89.7                             | 90.7             | 90.6  | 0.83         | 0.77 | 0.65 |
| FLSES 160 M   | 11          | 71.6         | 2.3                              | 2.7                             | 7.7                                    | 0.0601            | 114    | 55    | 1468        | 20.9          | 90.6                             | 91.5             | 91.5  | 0.84         | 0.79 | 0.68 |
| FLSES 160 L   | 15          | 98           | 2.5                              | 3.4                             | 7.7                                    | 0.0551            | 115    | 59    | 1462        | 28.3          | 91.1                             | 92.1             | 92.2  | 0.84         | 0.79 | 0.68 |
| FLSES 180 MT  | 18.5        | 121          | 2.7                              | 3.3                             | 8.0                                    | 0.0844            | 135    | 58    | 1464        | 34.7          | 91.4                             | 92.2             | 92.2  | 0.84         | 0.79 | 0.67 |
| FLSES 180 L   | 22          | 143          | 3.0                              | 3.0                             | 7.6                                    | 0.1333            | 170    | 70    | 1466        | 41            | 92.3                             | 93.1             | 93.1  | 0.84         | 0.80 | 0.70 |
| FLSES 200 LU  | 30          | 195          | 2.6                              | 2.2                             | 6.3                                    | 0.2035            | 250    | 66    | 1470        | 56.3          | 92.7                             | 93.4             | 93.4  | 0.83         | 0.79 | 0.69 |
| FLSES 225 SR  | 37          | 240          | 2.7                              | 2.7                             | 6.6                                    | 0.2467            | 275    | 66    | 1470        | 69.5          | 93.0                             | 93.8             | 93.9  | 0.83         | 0.79 | 0.69 |
| FLSES 225 M   | 45          | 290          | 2.1                              | 2.7                             | 6.7                                    | 0.6482            | 380    | 65    | 1484        | 83.9          | 93.5                             | 93.9             | 93.8  | 0.83         | 0.79 | 0.70 |
| FLSES 250 MR  | 55          | 354          | 2.1                              | 2.5                             | 6.9                                    | 0.7701            | 440    | 67    | 1482        | 102           | 94.0                             | 94.4             | 94.3  | 0.83         | 0.79 | 0.70 |
| FLSES 280 S   | 75          | 482          | 2.5                              | 2.8                             | 7.8                                    | 0.85              | 595    | 74    | 1484        | 137           | 94.0                             | 94.2             | 93.9  | 0.84         | 0.80 | 0.71 |
| FLSES 280 M   | 90          | 579          | 2.7                              | 2.7                             | 7.8                                    | 0.98              | 605    | 74    | 1483        | 164           | 94.2                             | 94.4             | 94.1  | 0.84         | 0.82 | 0.72 |
| FLSES 315 S   | 110         | 707          | 2.1                              | 2.7                             | 6.9                                    | 1.84              | 930    | 74    | 1486        | 200           | 94.5                             | 94.7             | 94.3  | 0.84         | 0.81 | 0.72 |
| FLSES 315 M   | 132         | 848          | 2.8                              | 2.8                             | 6.8                                    | 2.09              | 985    | 74    | 1487        | 237           | 94.7                             | 94.9             | 94.5  | 0.85         | 0.82 | 0.76 |
| FLSES 315 LA  | 160         | 1030         | 2.3                              | 2.6                             | 6.3                                    | 2.35              | 1045   | 74    | 1484        | 286           | 94.9                             | 95.1             | 94.7  | 0.85         | 0.85 | 0.78 |
| FLSES 315 LB  | 200         | 1285         | 2.7                              | 2.9                             | 7.2                                    | 2.86              | 1245   | 74    | 1486        | 357           | 95.1                             | 95.3             | 94.9  | 0.85         | 0.83 | 0.76 |
| FLSES 355 LA  | 250         | 1604         | 2.6                              | 3.1                             | 7.5                                    | 4.9               | 1445   | 80    | 1488        | 441           | 95.1                             | 95.3             | 94.9  | 0.86         | 0.82 | 0.71 |
| FLSES 355 LAL | 280         | 1798         | 2.4                              | 2.9                             | 7.4                                    | 5.8               | 1560   | 80    | 1487        | 488           | 95.1                             | 95.3             | 94.9  | 0.87         | 0.85 | 0.78 |
| FLSES 355 LB  | 315         | 2020         | 2.5                              | 2.9                             | 7.5                                    | 6.56              | 1720   | 80    | 1488        | 550           | 95.1                             | 95.3             | 94.9  | 0.87         | 0.81 | 0.71 |
| FLSES 355 LC  | 355         | 2280         | 2.4                              | 2.8                             | 7.5                                    | 6.56              | 1720   | 80    | 1487        | 612           | 95.1                             | 95.3             | 94.9  | 0.88         | 0.86 | 0.80 |
| FLSES 355 LD  | 400         | 2577         | 1.9                              | 2.7                             | 7.7                                    | 6.6               | 1750   | 80    | 1488        | 690           | 95.1                             | 95.3             | 94.9  | 0.88         | 0.87 | 0.83 |
| FLSES 355 LKB | 450         | 2882         | 1.77                             | 2.69                            | 6.9                                    | 13.75             | 2350   | 84    | 1491        | 804           | 95.1                             | 95.3             | 94.6  | 0.85         | 0.83 | 0.75 |
| FLSES 400 LB  | 500         | 3205         | 1.59                             | 2.42                            | 6.2                                    | 13.75             | 2400   | 84    | 1490        | 883           | 95.1                             | 95.5             | 94.9  | 0.86         | 0.84 | 0.76 |
| FLSES 450 LA  | 550         | 3520         | 1.48                             | 2.19                            | 6.7                                    | 23.70             | 3100   | 84    | 1492        | 950           | 95.1                             | 95.5             | 95.0  | 0.88         | 0.87 | 0.82 |
| FLSES 450 LB  | 675         | 4323         | 1.67                             | 2.74                            | 6.9                                    | 26.55             | 3775   | 84    | 1491        | 1192          | 95.1                             | 95.6             | 95.3  | 0.86         | 0.85 | 0.80 |
| FLSES 450 LD  | 800         | 5117         | 2.10                             | 2.90                            | 8.5                                    | 34.80             | 4400   | 84    | 1493        | 1397          | 95.1                             | 95.6             | 95.2  | 0.87         | 0.85 | 0.77 |
| FLSES 450 LD  | 900         | 5761         | 1.90                             | 2.60                            | 7.6                                    | 34.80             | 4400   | 84    | 1492        | 1571          | 95.1                             | 95.5             | 95.0  | 0.87         | 0.85 | 0.77 |
| 6 poles       |             |              |                                  |                                 |                                        |                   |        |       |             |               |                                  |                  |       |              |      |      |
| FLSES 90 SL   | 0.75        | 7.6          | 2.0                              | 2.3                             | 4.2                                    | 0.00338           | 23.1   | 44    | 945         | 2             | 78.2                             | 78.90            | 76.50 | 0.70         | 0.61 | 0.48 |
| FLSES 90 L    | 1.1         | 11.2         | 1.9                              | 2.4                             | 4.3                                    | 0.00437           | 26.1   | 42    | 940         | 2.9           | 79.1                             | 80.50            | 79.20 | 0.71         | 0.62 | 0.49 |
| FLSES 100 LG  | 1.5         | 14.9         | 1.8                              | 2.3                             | 4.5                                    | 0.01363           | 39.2   | 42    | 960         | 3.8           | 81.6                             | 82.80            | 81.70 | 0.71         | 0.64 | 0.51 |
| FLSES 112 MG  | 2.2         | 21.9         | 1.9                              | 2.4                             | 4.9                                    | 0.01523           | 42.5   | 43    | 960         | 5.4           | 81.8                             | 82.90            | 81.70 |              |      |      |

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Cast iron frame

## Electrical and mechanical characteristics

## IE2 - Powered by the mains

| Type          | Rated power | 380V 50Hz      |               |              |                      | 415V 50Hz      |               |              |                      | 460V 60Hz      |               |              |                      |
|---------------|-------------|----------------|---------------|--------------|----------------------|----------------|---------------|--------------|----------------------|----------------|---------------|--------------|----------------------|
|               |             | Rated speed    | Rated current | Efficiency   | Power factor         | Rated speed    | Rated current | Efficiency   | Power factor         | Rated speed    | Rated current | Efficiency   | Power factor         |
|               |             | $N_{min^{-1}}$ | $I_A$         | $\eta_{4/4}$ | $\cos \varphi_{4/4}$ | $N_{min^{-1}}$ | $I_A$         | $\eta_{4/4}$ | $\cos \varphi_{4/4}$ | $N_{min^{-1}}$ | $I_A$         | $\eta_{4/4}$ | $\cos \varphi_{4/4}$ |
| 2 poles       |             |                |               |              |                      |                |               |              |                      |                |               |              |                      |
| FLSES 80 L    | 0.75        | 2815           | 1.65          | 78.6         | 0.88                 | 2860           | 1.55          | 80.2         | 0.84                 | 3470           | 1.4           | 81.7         | 0.83                 |
| FLSES 80 L    | 1.1         | 2820           | 2.4           | 79.6         | 0.87                 | 2860           | 2.25          | 81.3         | 0.83                 | 3475           | 2.05          | 83.0         | 0.82                 |
| FLSES 90 SL   | 1.5         | 2830           | 3.15          | 81.5         | 0.89                 | 2875           | 2.9           | 83.8         | 0.86                 | 3485           | 2.6           | 85.4         | 0.85                 |
| FLSES 90 L    | 2.2         | 2825           | 4.65          | 83.2         | 0.88                 | 2870           | 4.3           | 84.1         | 0.84                 | 3485           | 3.85          | 86.1         | 0.84                 |
| FLSES 100 L   | 3           | 2830           | 6.15          | 84.6         | 0.88                 | 2875           | 5.85          | 85.8         | 0.83                 | 3485           | 5.15          | 86.8         | 0.84                 |
| FLSES 112 MG  | 4           | 2910           | 7.85          | 87.8         | 0.88                 | 2930           | 7.5           | 88.5         | 0.84                 | 3535           | 6.6           | 89.6         | 0.85                 |
| FLSES 132 SM  | 5.5         | 2910           | 10.8          | 88.7         | 0.87                 | 2930           | 9.95          | 90.2         | 0.85                 | 3540           | 8.9           | 90.7         | 0.85                 |
| FLSES 132 SM  | 7.5         | 2900           | 14.7          | 88.1         | 0.88                 | 2925           | 13.7          | 89.7         | 0.85                 | 3535           | 12.1          | 90.5         | 0.86                 |
| FLSES 132 M   | 9           | 2915           | 17.4          | 89.6         | 0.88                 | 2940           | 16.3          | 90.8         | 0.85                 | 3540           | 14.5          | 91.9         | 0.85                 |
| FLSES 160 M   | 11          | 2940           | 21.1          | 90.0         | 0.88                 | 2954           | 19.9          | 91.2         | 0.85                 | 3554           | 17.7          | 91.3         | 0.85                 |
| FLSES 160 M   | 15          | 2930           | 28.1          | 90.3         | 0.90                 | 2950           | 25.6          | 92.3         | 0.88                 | 3554           | 22.7          | 92.8         | 0.89                 |
| FLSES 160 L   | 18.5        | 2935           | 34.7          | 90.9         | 0.90                 | 2945           | 31.6          | 92.5         | 0.88                 | 3550           | 28.1          | 93.0         | 0.89                 |
| FLSES 180 MR  | 22          | 2925           | 41            | 91.3         | 0.89                 | 2945           | 37.7          | 92.3         | 0.88                 | 3554           | 33.8          | 93.0         | 0.88                 |
| FLSES 200 LU  | 30          | 2945           | 56.2          | 92.0         | 0.88                 | 2954           | 51.8          | 93.9         | 0.86                 | 3554           | 46.2          | 94.0         | 0.87                 |
| FLSES 200 LU  | 37          | 2935           | 68.5          | 92.5         | 0.89                 | 2950           | 62.9          | 94.2         | 0.87                 | 3552           | 56.1          | 94.1         | 0.88                 |
| FLSES 225 MR  | 45          | 2940           | 83.4          | 93.0         | 0.88                 | 2956           | 75.8          | 94.6         | 0.87                 | 3558           | 67.9          | 94.6         | 0.88                 |
| FLSES 250 M   | 55          | 2966           | 99.7          | 93.7         | 0.89                 | 2972           | 87.5          | 94.4         | 0.87                 | 3574           | 83.2          | 94.3         | 0.88                 |
| FLSES 280 S   | 75          | 2962           | 133           | 93.8         | 0.91                 | 2958           | 123           | 93.9         | 0.90                 | 3566           | 111           | 93.6         | 0.91                 |
| FLSES 280 M   | 90          | 2961           | 160           | 94.1         | 0.91                 | 2971           | 148           | 94.2         | 0.90                 | 3567           | 131           | 94.5         | 0.91                 |
| FLSES 315 S   | 110         | 3574           | 197           | 94.3         | 0.90                 | 2978           | 182           | 94.4         | 0.89                 | 3576           | 164           | 94.5         | 0.89                 |
| FLSES 315 M   | 132         | 2974           | 236           | 94.6         | 0.90                 | 2978           | 218           | 94.6         | 0.89                 | 3576           | 196           | 95.0         | 0.89                 |
| FLSES 315 LA  | 160         | 2973           | 285           | 94.8         | 0.90                 | 2977           | 264           | 94.9         | 0.89                 | 3575           | 237           | 95.2         | 0.89                 |
| FLSES 315 LB  | 200         | 2973           | 355           | 95.0         | 0.90                 | 2977           | 329           | 95.1         | 0.89                 | 3575           | 296           | 95.4         | 0.89                 |
| FLSES 355 LA  | 250         | 2976           | 449           | 95.0         | 0.89                 | 2982           | 416           | 95.1         | 0.88                 | 3578           | 374           | 95.4         | 0.88                 |
| FLSES 355 LB  | 315         | 2981           | 566           | 95.0         | 0.89                 | 2985           | 524           | 95.1         | 0.88                 | 3583           | 471           | 95.4         | 0.88                 |
| FLSES 355 LC  | 355         | 2979           | 645           | 95.0         | 0.88                 | 2983           | 597           | 95.1         | 0.87                 | 3581           | 537           | 95.4         | 0.87                 |
| FLSES 355 LD  | 400         | 2987           | 710           | 95.0         | 0.90                 | 2991           | 657           | 95.1         | 0.89                 | 3589           | 591           | 95.4         | 0.89                 |
| FLSES 355 LKB | 450         | 2988           | 809           | 95.0         | 0.89                 | 2990           | 767           | 95.0         | 0.86                 | 3590           | 673           | 95.4         | 0.88                 |
| FLSES 400 LB  | 560         | 2986           | 995           | 95.0         | 0.90                 | 2989           | 943           | 95.0         | 0.87                 | 3588           | 823           | 95.4         | 0.89                 |
| 4 poles       |             |                |               |              |                      |                |               |              |                      |                |               |              |                      |
| FLSES 80 LG   | 0.75        | 1435           | 1.75          | 80.3         | 0.82                 | 1450           | 1.7           | 81.0         | 0.76                 | 1756           | 1.5           | 83.5         | 0.75                 |
| FLSES 90 SL   | 1.1         | 1430           | 2.45          | 81.4         | 0.84                 | 1445           | 2.35          | 82.2         | 0.79                 | 1752           | 2.1           | 84.6         | 0.78                 |
| FLSES 90 L    | 1.5         | 1430           | 3.25          | 82.8         | 0.85                 | 1445           | 3.1           | 83.4         | 0.80                 | 1750           | 2.8           | 85.6         | 0.79                 |
| FLSES 100 L   | 2.2         | 1435           | 4.65          | 84.3         | 0.85                 | 1450           | 4.45          | 85.4         | 0.80                 | 1752           | 4             | 87.1         | 0.80                 |
| FLSES 100 LG  | 3           | 1440           | 6.2           | 85.5         | 0.86                 | 1456           | 5.95          | 86.7         | 0.81                 | 1756           | 5.4           | 87.5         | 0.80                 |
| FLSES 112 MU  | 4           | 1440           | 8.2           | 86.6         | 0.86                 | 1454           | 7.65          | 88.1         | 0.83                 | 1758           | 7.05          | 89.4         | 0.80                 |
| FLSES 132 SM  | 5.5         | 1450           | 11            | 87.9         | 0.86                 | 1460           | 10.6          | 88.9         | 0.81                 | 1764           | 9.45          | 90.3         | 0.81                 |
| FLSES 132 M   | 7.5         | 1445           | 14.8          | 88.7         | 0.87                 | 1458           | 14.2          | 89.5         | 0.82                 | 1762           | 12.5          | 90.9         | 0.83                 |
| FLSES 132 M   | 9           | 1450           | 17.8          | 89.0         | 0.86                 | 1458           | 17.3          | 89.9         | 0.81                 | 1764           | 15.2          | 91.3         | 0.82                 |
| FLSES 160 M   | 11          | 1464           | 21.4          | 90.5         | 0.86                 | 1472           | 20.5          | 91.3         | 0.82                 | 1772           | 18            | 92.2         | 0.83                 |
| FLSES 160 L   | 15          | 1458           | 29.1          | 90.6         | 0.87                 | 1468           | 27.9          | 91.2         | 0.82                 | 1770           | 24.5          | 92.4         | 0.83                 |
| FLSES 180 MT  | 18.5        | 1460           | 36            | 91.2         | 0.85                 | 1468           | 34.5          | 91.3         | 0.82                 | 1770           | 30.2          | 92.7         | 0.83                 |
| FLSES 180 L   | 22          | 1462           | 42.4          | 91.8         | 0.86                 | 1470           | 40            | 92.5         | 0.83                 | 1772           | 35.6          | 93.4         | 0.83                 |
| FLSES 200 LU  | 30          | 1456           | 58.2          | 92.3         | 0.85                 | 1474           | 52.3          | 93.1         | 0.81                 | 1780           | 48.8          | 93.8         | 0.82                 |
| FLSES 225 SR  | 37          | 1466           | 71.6          | 92.4         | 0.85                 | 1474           | 64.1          | 93.4         | 0.81                 | 1776           | 60.1          | 94.2         | 0.82                 |
| FLSES 225 M   | 45          | 1482           | 85.2          | 93.1         | 0.85                 | 1486           | 80.5          | 94.9         | 0.82                 | 1788           | 71.4          | 95.1         | 0.83                 |
| FLSES 250 MR  | 55          | 1480           | 107           | 93.5         | 0.84                 | 1484           | 99.3          | 94.2         | 0.82                 | 1784           | 88.3          | 95.3         | 0.82                 |
| FLSES 280 S   | 75          | 1482           | 143           | 94.0         | 0.85                 | 1486           | 134           | 94.1         | 0.83                 | 1784           | 119           | 94.5         | 0.84                 |
| FLSES 280 M   | 90          | 1481           | 169           | 94.2         | 0.86                 | 1485           | 158           | 94.3         | 0.84                 | 1785           | 141           | 94.5         | 0.85                 |
| FLSES 315 S   | 110         | 1483           | 208           | 94.5         | 0.85                 | 1487           | 193           | 95.5         | 0.83                 | 1786           | 173           | 95.0         | 0.84                 |
| FLSES 315 M   | 132         | 1484           | 246           | 94.7         | 0.86                 | 1487           | 231           | 94.8         | 0.84                 | 1787           | 205           | 95.0         | 0.85                 |
| FLSES 315 LA  | 160         | 1482           | 298           | 94.9         | 0.86                 | 1486           | 279           | 95.0         | 0.84                 | 1784           | 248           | 95.2         | 0.85                 |
| FLSES 315 LB  | 200         | 1483           | 372           | 95.1         | 0.86                 | 1487           | 348           | 95.2         | 0.84                 | 1784           | 310           | 95.4         | 0.85                 |
| FLSES 355 LA  | 250         | 1487           | 459           | 95.1         | 0.87                 | 1490           | 430           | 95.2         | 0.85                 | 1788           | 382           | 95.4         | 0.86                 |
| FLSES 355 LAL | 280         | 1486           | 508           | 95.1         | 0.88                 | 1489           | 476           | 95.2         | 0.86                 | 1787           | 423           | 95.4         | 0.87                 |
| FLSES 355 LB  | 315         | 1485           | 572           | 95.1         | 0.88                 | 1488           | 535           | 95.2         | 0.86                 | 1787           | 476           | 95.4         | 0.87                 |
| FLSES 355 LC  | 355         | 1484           | 637           | 95.1         | 0.89                 | 1488           | 596           | 95.2         | 0.87                 | 1787           | 531           | 95.4         | 0.88                 |
| FLSES 355 LD  | 400         | 1486           | 743           | 95.1         | 0.86                 | 1487           | 696           | 95.2         | 0.84                 | 1788           | 619           | 95.4         | 0.85                 |
| FLSES 355 LKB | 450         | 1490           | 827           | 95.1         | 0.87                 | 1491           | 794           | 95.1         | 0.83                 | 1792           | 694           | 95.8         | 0.85                 |
| FLSES 400 LB  | 500         | 1489           | 930           | 95.1         | 0.86                 | 1490           | 882           | 95.1         | 0.83                 | 1791           | 771           | 95.8         | 0.85                 |
| FLSES 450 LA  | 550         | 1491           | 988           | 95.1         | 0.89                 | 1492           | 926           | 95.1         | 0.87                 | 1793           | 819           | 95.8         | 0.88                 |
| FLSES 450 LB  | 675         | 1490           | 1241          | 95.1         | 0.87                 | 1492           | 1163          | 95.1         | 0.85                 | 1792           | 1028          | 95.8         | 0.86                 |
| FLSES 450 LD  | 800         | 1492           | 1437          | 95.1         | 0.89                 | 1494           | 1378          | 95.1         | 0.85                 | 1794           | 1205          | 95.8         | 0.87                 |
| FLSES 450 LD  | 900         | 1491           | 1636          | 95.1         | 0.88                 | 1493           | 1551          | 95.1         | 0.85                 | 1793           | 1355          | 95.8         | 0.87                 |
| 6 poles       |             |                |               |              |                      |                |               |              |                      |                |               |              |                      |
| FLSES 90 SL   | 0.75        | 940            | 2             | 77.1         | 0.74                 | 954            | 1.95          | 78.1         | 0.68                 | -              | -             | -            | -                    |
| FLSES 90 L    | 1.1         | 930            | 2.9           | 78.1         | 0.74                 | 950            | 2.85          | 79.3         | 0.68                 | -              | -             | -            | -                    |
| FLSES 100 LG  | 1.5         | 954            | 3.8           | 80.4         | 0.74                 | 966            | 3.65          | 81.9         | 0.70                 | -              | -             | -            | -                    |
| FLSES 112 MG  | 2.2         | 954            | 5.5           | 81.8         | 0.75                 | 964            | 5.4           | 82.0         | 0.69                 | -              | -             | -            | -                    |
| FLSES 132 SM  | 3           | 960            | 7.05          | 84.2         | 0.77                 | 968            | 6.75          | 85.6         | 0.72                 | -              | -             | -            | -                    |
| FLSES 132 M   | 4           | 954            | 9.15          | 84.6         | 0.79                 | 966            | 8.8           | 85.9         | 0.74                 | -              | -             | -            | -                    |
| FLSES 132 M   | 5.5         | 960            | 13            | 86.0         | 0.75                 | 970            | 13            | 86.4         | 0.68                 | -              | -             | -            | -                    |
| FLSES 160 M   | 7.5         | 970            | 16.7          | 87.3         | 0.78                 | 978            | 16.9          | 87.4         | 0.71                 | -              | -             | -            | -                    |
| FLSES 160 LUR | 11          | 972            | 24            | 88.7         | 0.79                 | 978            | 23.4          | 88.8         | 0.74                 | -              | -             | -            | -                    |
| FLSES 180 L   | 15          | 968            | 31            | 89.7         | 0.82                 | 976            | 29.6          | 90.2         | 0.78                 | -              | -             | -            | -                    |
| FLSES 200 LU  | 18.5        | 974            | 38.5          | 90.4         | 0.81                 | 980            | 37.6          | 90.8         | 0.75                 | -              | -             | -            | -                    |
| FLSES 200 LU  | 22          | 966            | 44.8          | 90.8         | 0.82                 | 976            | 42.2          | 91.3         | 0.80                 | -              | -             | -            | -                    |
| FLSES 225 M   | 30          | 984            | 58            | 91.7         | 0.86                 | 986            | 54.5          | 92.3         | 0.83                 | -              | -             | -            | -                    |
| FLSES 250 M   | 37          | 984            | 70.5          | 92.3         | 0.87                 | 986            | 66.9          | 92.8         | 0.83                 | -              | -             | -            | -                    |
| FLSES 280 S   | 45          | 984            | 85            | 92.7         | 0.87                 | 987            | 81            | 92.8         | 0.83                 | 1186           | 71            | 93.6         | 0.85                 |
| FLSES 280 M   | 55          | 984            | 104           | 93.1</       |                      |                |               |              |                      |                |               |              |                      |



# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Cast iron frame

## Electrical and mechanical characteristics

## IE2 - Powered by the drive

| Type          | 400V 50Hz            |                                     |                     |                   | % Rated torque $M_n$ at |       |       |       |      | 400V 87Hz $\Delta^1$ |                                     |                     |                   | Speed mechanical maximum <sup>2</sup> |
|---------------|----------------------|-------------------------------------|---------------------|-------------------|-------------------------|-------|-------|-------|------|----------------------|-------------------------------------|---------------------|-------------------|---------------------------------------|
|               | Rated power          | Rated speed                         | Rated current       | Power factor      | 10Hz                    | 17Hz  | 25Hz  | 50Hz  | 87Hz | Rated power          | Rated speed                         | Rated current       | Power factor      |                                       |
|               | P <sub>n</sub><br>kW | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | Cos $\phi$<br>4/4 |                         |       |       |       |      | P <sub>n</sub><br>kW | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | Cos $\phi$<br>4/4 |                                       |
| 2 poles       |                      |                                     |                     |                   |                         |       |       |       |      |                      |                                     |                     |                   |                                       |
| FLSES 80 L    | 0.75                 | 2775                                | 1.8                 | 0.86              | 90 %                    | 100 % | 100 % | 100 % | 57 % | 1.31                 | 4995                                | 3.13                | 0.86              | 13500                                 |
| FLSES 80 L    | 1.1                  | 2775                                | 2.6                 | 0.85              | 85 %                    | 100 % | 100 % | 100 % | 57 % | 1.91                 | 4995                                | 4.56                | 0.85              | 13500                                 |
| FLSES 90 SL   | 1.5                  | 2790                                | 3.45                | 0.87              | 85 %                    | 100 % | 100 % | 100 % | 57 % | 2.61                 | 5010                                | 5.99                | 0.87              | 11700                                 |
| FLSES 90 L    | 2.2                  | 2775                                | 5.1                 | 0.86              | 85 %                    | 100 % | 100 % | 100 % | 57 % | 3.83                 | 4995                                | 8.85                | 0.86              | 11700                                 |
| FLSES 100 L   | 3                    | 2790                                | 6.6                 | 0.87              | 85 %                    | 100 % | 100 % | 100 % | 57 % | 5.22                 | 5010                                | 11.44               | 0.87              | 9900                                  |
| FLSES 112 MU  | 4                    | 2895                                | 8.4                 | 0.86              | 85 %                    | 100 % | 100 % | 100 % | 57 % | 6.96                 | 5115                                | 14.65               | 0.86              | 9900                                  |
| FLSES 132 SM  | 5.5                  | 2890                                | 11.8                | 0.86              | 85 %                    | 100 % | 100 % | 100 % | 57 % | 9.57                 | 5110                                | 20.55               | 0.86              | 6700                                  |
| FLSES 132 SM  | 7.5                  | 2875                                | 16.2                | 0.87              | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 13.05                | 5095                                | 28.24               | 0.87              | 6700                                  |
| FLSES 132 M   | 9                    | 2900                                | 19                  | 0.86              | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 15.66                | 5120                                | 33.06               | 0.86              | 6700                                  |
| FLSES 160 M   | 11                   | 2935                                | 22.5                | 0.86              | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 19.14                | 5155                                | 39.14               | 0.86              | 6030                                  |
| FLSES 160 M   | 15                   | 2925                                | 30.1                | 0.89              | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 26.1                 | 5145                                | 52.36               | 0.89              | 6030                                  |
| FLSES 160 L   | 18.5                 | 2905                                | 37.4                | 0.89              | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 32.19                | 5125                                | 65.05               | 0.89              | 5670                                  |
| FLSES 180 M   | 22                   | 2905                                | 42.7                | 0.88              | 81 %                    | 90 %  | 95 %  | 100 % | 54 % | 36.27                | 5125                                | 74.34               | 0.88              | 5670                                  |
| FLSES 200 LU  | 30                   | 2935                                | 59.7                | 0.87              | 85 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 4500                                  |
| FLSES 200 LU  | 37                   | 2920                                | 74                  | 0.88              | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 4500                                  |
| FLSES 225 MR  | 45                   | 2930                                | 88.6                | 0.86              | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 4320                                  |
| FLSES 250 M   | 55                   | 2960                                | 108                 | 0.88              | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 4050                                  |
| FLSES 280 S   | 75                   | 2964                                | 135                 | 0.91              | 79 %                    | 89 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 3580                                  |
| FLSES 280 M   | 90                   | 2965                                | 164                 | 0.91              | 79 %                    | 89 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 3580                                  |
| FLSES 315 S   | 110                  | 2976                                | 202                 | 0.90              | 79 %                    | 89 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 3580                                  |
| FLSES 315 M   | 132                  | 2976                                | 243                 | 0.90              | 79 %                    | 89 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 3580                                  |
| FLSES 315 LA  | 160                  | 2975                                | 293                 | 0.90              | 79 %                    | 89 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 3580                                  |
| FLSES 315 LB  | 200                  | 2975                                | 365                 | 0.90              | 79 %                    | 89 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 3580                                  |
| FLSES 355 LA  | 250                  | 2978                                | 461                 | 0.89              | 98 %                    | 100 % | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 3580                                  |
| FLSES 355 LB  | 315                  | 2983                                | 580                 | 0.89              | 79 %                    | 89 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 3600                                  |
| FLSES 355 LC  | 355                  | 2981                                | 663                 | 0.88              | 79 %                    | 89 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 3580                                  |
| FLSES 355 LD  | 400                  | 2984                                | 720                 | 0.90              | 90 %                    | 95 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 3600                                  |
| FLSES 355 LKB | 450                  | 2989                                | 837                 | 0.89              | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 3600                                  |
| FLSES 400 LB  | 560                  | 2987                                | 1036                | 0.89              | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 3600                                  |
| 4 poles       |                      |                                     |                     |                   |                         |       |       |       |      |                      |                                     |                     |                   |                                       |
| FLSES 80 LG   | 0.75                 | 1425                                | 1.9                 | 0.79              | 90 %                    | 100 % | 100 % | 100 % | 57 % | 1.31                 | 2535                                | 3.31                | 0.79              | 11700                                 |
| FLSES 90 SL   | 1.1                  | 1420                                | 2.6                 | 0.81              | 90 %                    | 100 % | 100 % | 100 % | 57 % | 1.91                 | 2530                                | 4.56                | 0.81              | 11700                                 |
| FLSES 90 L    | 1.5                  | 1415                                | 3.5                 | 0.82              | 90 %                    | 100 % | 100 % | 100 % | 57 % | 2.61                 | 2525                                | 6.17                | 0.82              | 9900                                  |
| FLSES 100 L   | 2.2                  | 1420                                | 5.1                 | 0.82              | 90 %                    | 100 % | 100 % | 100 % | 57 % | 3.83                 | 2530                                | 8.85                | 0.82              | 9900                                  |
| FLSES 100 LG  | 3                    | 1435                                | 6.6                 | 0.83              | 90 %                    | 100 % | 100 % | 100 % | 57 % | 5.22                 | 2545                                | 11.53               | 0.83              | 9900                                  |
| FLSES 112 MU  | 4                    | 1425                                | 9                   | 0.84              | 90 %                    | 100 % | 100 % | 100 % | 57 % | 6.96                 | 2535                                | 15.64               | 0.84              | 9900                                  |
| FLSES 132 SM  | 5.5                  | 1440                                | 12                  | 0.83              | 90 %                    | 90 %  | 100 % | 100 % | 57 % | 9.57                 | 2550                                | 20.91               | 0.83              | 6700                                  |
| FLSES 132 M   | 7.5                  | 1435                                | 16                  | 0.85              | 90 %                    | 90 %  | 100 % | 100 % | 57 % | 13.05                | 2545                                | 27.88               | 0.85              | 6700                                  |
| FLSES 132 M   | 9                    | 1440                                | 19.3                | 0.83              | 90 %                    | 90 %  | 100 % | 100 % | 57 % | 15.66                | 2550                                | 33.6                | 0.83              | 6700                                  |
| FLSES 160 M   | 11                   | 1456                                | 23.1                | 0.84              | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 19.14                | 2566                                | 40.21               | 0.84              | 6030                                  |
| FLSES 160 L   | 15                   | 1450                                | 31.3                | 0.85              | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 26.1                 | 2560                                | 54.5                | 0.85              | 6030                                  |
| FLSES 180 MT  | 18.5                 | 1450                                | 38.1                | 0.84              | 79 %                    | 89 %  | 99 %  | 100 % | 57 % | 31.73                | 2560                                | 66.23               | 0.84              | 6030                                  |
| FLSES 180 L   | 22                   | 1452                                | 46.2                | 0.84              | 80 %                    | 90 %  | 100 % | 100 % | 57 % | 38.28                | 2562                                | 80.42               | 0.84              | 6030                                  |
| FLSES 200 LU  | 30                   | 1458                                | 63                  | 0.83              | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 52.2                 | 2568                                | 109.54              | 0.83              | 4500                                  |
| FLSES 225 SR  | 37                   | 1458                                | 77.5                | 0.83              | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 64.38                | 2568                                | 134.92              | 0.83              | 4320                                  |
| FLSES 225 M   | 45                   | 1478                                | 92.9                | 0.84              | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 78.3                 | 2588                                | 161.73              | 0.84              | 4050                                  |
| FLSES 250 MR  | 55                   | 1476                                | 114                 | 0.83              | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 95.7                 | 2586                                | 198.36              | 0.83              | 4050                                  |
| FLSES 280 S   | 75                   | 1485                                | 148                 | 0.84              | 79 %                    | 89 %  | 100 % | 100 % | 56 % | -                    | -                                   | -                   | -                 | 2610                                  |
| FLSES 280 M   | 90                   | 1485                                | 177                 | 0.84              | 79 %                    | 89 %  | 100 % | 100 % | 57 % | -                    | -                                   | -                   | -                 | 2610                                  |
| FLSES 315 S   | 110                  | 1486                                | 210                 | 0.86              | 90 %                    | 100 % | 100 % | 100 % | 57 % | -                    | -                                   | -                   | -                 | 2610                                  |
| FLSES 315 M   | 132                  | 1487                                | 250                 | 0.87              | 96 %                    | 100 % | 100 % | 100 % | 57 % | -                    | -                                   | -                   | -                 | 2610                                  |
| FLSES 315 LA  | 160                  | 1484                                | 303                 | 0.87              | 95 %                    | 99 %  | 100 % | 100 % | 57 % | -                    | -                                   | -                   | -                 | 2610                                  |
| FLSES 315 LB  | 200                  | 1486                                | 374                 | 0.87              | 94 %                    | 98 %  | 100 % | 100 % | 55 % | -                    | -                                   | -                   | -                 | 2610                                  |
| FLSES 355 LA  | 250                  | 1488                                | 465                 | 0.87              | 98 %                    | 100 % | 100 % | 100 % | 57 % | -                    | -                                   | -                   | -                 | 2610                                  |
| FLSES 355 LAL | 280                  | 1487                                | 507                 | 0.87              | 96 %                    | 99 %  | 100 % | 100 % | 58 % | -                    | -                                   | -                   | -                 | 2610                                  |
| FLSES 355 LB  | 315                  | 1488                                | 594                 | 0.87              | 79 %                    | 89 %  | 100 % | 100 % | 57 % | -                    | -                                   | -                   | -                 | 2610                                  |
| FLSES 355 LC  | 355                  | 1487                                | 670                 | 0.87              | 78 %                    | 89 %  | 100 % | 100 % | 57 % | -                    | -                                   | -                   | -                 | 2610                                  |
| FLSES 355 LD  | 400                  | 1491                                | 720                 | 0.89              | 85 %                    | 87 %  | 100 % | 100 % | 57 % | 400                  | 2610                                | 740                 | 0.89              | 2610                                  |
| FLSES 355 LKB | 450                  | 1491                                | 858                 | 0.86              | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 1800                                  |
| FLSES 400 LB  | 500                  | 1490                                | 943                 | 0.87              | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 1800                                  |
| FLSES 450 LA  | 550                  | 1492                                | 1011                | 0.89              | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 1800                                  |
| FLSES 450 LB  | 675                  | 1491                                | 1268                | 0.87              | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 1800                                  |
| FLSES 450 LD  | 800                  | 1493                                | 1478                | 0.88              | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 1800                                  |
| FLSES 450 LD  | 900                  | 1492                                | 1666                | 0.88              | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -                 | 1800                                  |
| 6 poles       |                      |                                     |                     |                   |                         |       |       |       |      |                      |                                     |                     |                   |                                       |
| FLSES 90 SL   | 0.75                 | 925                                 | 2.1                 | 0.70              | 100 %                   | 100 % | 100 % | 100 % | 57 % | 1.31                 | 1665                                | 3.66                | 0.70              | 11700                                 |
| FLSES 90 L    | 1.1                  | 915                                 | 3.1                 | 0.71              | 100 %                   | 100 % | 100 % | 100 % | 57 % | 1.91                 | 1655                                | 5.36                | 0.71              | 11700                                 |
| FLSES 100 LG  | 1.5                  | 945                                 | 4.15                | 0.71              | 100 %                   | 100 % | 100 % | 100 % | 57 % | 2.61                 | 1685                                | 7.24                | 0.71              | 9900                                  |
| FLSES 112 M   | 2.2                  | 940                                 | 5.9                 | 0.72              | 100 %                   | 100 % | 100 % | 100 % | 57 % | 3.83                 | 1680                                | 10.28               | 0.72              | 9900                                  |
| FLSES 132 SM  | 3                    | 952                                 | 7.5                 | 0.74              | 100 %                   | 100 % | 100 % | 100 % | 57 % | 5.22                 | 1692                                | 13.13               | 0.74              | 6700                                  |
| FLSES 132 M   | 4                    | 945                                 | 9.8                 | 0.77              | 100 %                   | 100 % | 100 % | 100 % | 57 % | 6.96                 | 1685                                | 17.07               | 0.77              | 6700                                  |
| FLSES 132 M   | 5.5                  | 952                                 | 13.8                | 0.73              | 100 %                   | 100 % | 100 % | 100 % | 57 % | 9.57                 | 1692                                | 23.95               | 0.73              | 6700                                  |
| FLSES 160 M   | 7.5                  | 966                                 | 17.8                | 0.74              | 100 %                   | 100 % | 100 % | 100 % | 57 % | 13.05                | 1706                                | 30.92               | 0.74              | 6030                                  |
| FLSES 160 LUR | 11                   | 966                                 | 25.5                | 0.76              | 95 %                    | 100 % | 100 % | 100 % | 57 % | 19.14                | 1706                                | 44.32               | 0.76              | 6030                                  |
| FLSES 180 L   | 15                   | 964                                 | 33.5                | 0.80              | 80 %                    | 90 %  | 100 % | 100 % | 57 % | 26.1                 | 1704                                | 58.26               | 0.80              | 6030                                  |
| FLSES 200 LU  | 18.5                 | 968                                 | 40.9                | 0.78              | 80 %                    | 90 %  | 100 % | 100 % | 57 % | 32.19                | 1708                                | 71.12               | 0.78              | 4500                                  |
| FLSES 200 LU  | 22                   | 958                                 | 49.1                | 0.81              | 80 %                    | 90 %  | 100 % | 100 % | 57 % | 38.28                | 1698                                | 85.42               | 0.81              | 4500                                  |
| FLSES 225 MG  | 30                   | 980                                 | 61.7                | 0.84              | 90 %                    | 100 % | 100 % | 100 % | 57 % | 52.20                | 1720                                | 107.4               | 0.84              | 4050                                  |
| FLSES 250 M   | 37                   | 982                                 | 75.4                | 0.85              | 90 %                    | 100 % | 100 % | 100 % | 57 % | 64.38                | 1722                                | 131.17              | 0.85              | 4050                                  |
| FLSES 280 S   | 45                   | 986                                 | 89                  | 0.9               | 79 %                    | 89 %  |       |       |      |                      |                                     |                     |                   |                                       |

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Cast iron frame

### Electrical and mechanical characteristics

#### IE2 - Powered by the drive

#### Summary of recommended protection devices

| Mains voltage       | Cable length       | Frame size      | Winding protection  | Insulated bearings                     |
|---------------------|--------------------|-----------------|---------------------|----------------------------------------|
| ≤ 480 V             | < 20 m             | All frame sizes | Standard            | No                                     |
|                     | > 20 m and < 100 m | ≤ 315           | Standard            | No                                     |
|                     |                    | ≥ 315           | RIS or drive filter | NDE                                    |
| > 480 V and ≤ 690 V | < 20 m             | < 250           | Standard            | No                                     |
|                     |                    | ≥ 250           | RIS or drive filter | NDE                                    |
|                     | > 20 m and < 100 m | ≤ 250           | RIS or drive filter | NDE                                    |
|                     |                    | ≥ 250           | RIS or drive filter | NDE                                    |
|                     |                    |                 |                     | NDE (or DE+NDE if no filter for ≥ 315) |

**RIS:** Reinforced Insulation System.

**The filter is recommended above frame size 315.**

Standard insulation = 1500 V peak and 3500 V/μs.

Protection solutions exist (insulation for winding and bearings).

For different cable length(s) and/or voltage(s), please consult Leroy-Somer.

Motors of frame size ≥ 280 with RIS option are no longer cURus.



**REMINDER:** All 2, 4 and 6 pole motors placed on the EU market must be IE3 or IE2 and used with a variable speed drive:

- from 01/01/2015 for power ratings from 7.5 to 375 kW
- from 01/01/2017 for power ratings from 0.75 to 375 kW

#### Other drive mechanism solutions:



**LSRPM / PLSRPM:** permanent magnet synchronous motors 3 to 500 kW

Variable speed application, requiring IP55 or IP23 protection, high efficiency and/or compact dimensions.



**CPLS:** induction motors 95 to 2900 Nm

Application for variable speed operation requiring constant power over a wide speed range



**LSMV:** induction motors 0.18 to 132 kW

Application for variable speed operation requiring constant torque over a wide speed range.



**LSK:** D.C. motors 2 to 750 kW



**UNIMOTOR FM and HD:** servomotors 0.7 to 136 Nm



# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Cast iron frame

## Electrical and mechanical characteristics

## IE3 - Powered by the mains

| Type           | Rated power          | Rated torque          | Starting torque/<br>Rated torque | Maximum torque/<br>Rated torque | Starting current/<br>Rated current | Moment of inertia      | Weight      | Noise       | 400V 50Hz                           |                     |                                     |          |          |                      |
|----------------|----------------------|-----------------------|----------------------------------|---------------------------------|------------------------------------|------------------------|-------------|-------------|-------------------------------------|---------------------|-------------------------------------|----------|----------|----------------------|
|                |                      |                       |                                  |                                 |                                    |                        |             |             | Rated speed                         | Rated current       | Efficiency<br>IEC 60034-2-1<br>2007 |          |          | Power factor         |
|                | P <sub>n</sub><br>kW | M <sub>n</sub><br>N.m | M <sub>d</sub> /M <sub>n</sub>   | M <sub>m</sub> /M <sub>n</sub>  | I <sub>d</sub> /I <sub>n</sub>     | J<br>kg.m <sup>2</sup> | IM B3<br>kg | LP<br>db(A) | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4                            | η<br>3/4 | η<br>2/4 | Cos φ<br>4/4 3/4 2/4 |
| <b>2 poles</b> |                      |                       |                                  |                                 |                                    |                        |             |             |                                     |                     |                                     |          |          |                      |
| FLSES 80 L     | 0.75                 | 2.5                   | 2.8                              | 3.6                             | 7.0                                | 0.00095                | 16.2        | 59          | 2885                                | 1.6                 | 81.7                                | 81.8     | 79.6     | 0.83 0.76 0.62       |
| FLSES 80 LG    | 1.1                  | 3.65                  | 2.4                              | 3.2                             | 6.6                                | 0.00201                | 22.5        | 59          | 2885                                | 2.25                | 83.7                                | 84.5     | 83.7     | 0.85 0.79 0.68       |
| FLSES 90 SL    | 1.5                  | 4.95                  | 2.9                              | 3.0                             | 7.0                                | 0.00223                | 24          | 68          | 2890                                | 3                   | 85.0                                | 86.0     | 85.3     | 0.85 0.79 0.68       |
| FLSES 90 LU    | 2.2                  | 7.25                  | 3.4                              | 3.2                             | 8.1                                | 0.00292                | 28.2        | 70          | 2895                                | 4.3                 | 86.3                                | 87.5     | 87.4     | 0.86 0.80 0.70       |
| FLSES 100 L    | 3                    | 9.9                   | 3.2                              | 3.6                             | 8.1                                | 0.00364                | 35.2        | 66          | 2895                                | 5.75                | 87.3                                | 88.3     | 88.0     | 0.86 0.81 0.70       |
| FLSES 112 MG   | 4                    | 13.1                  | 2.1                              | 3.0                             | 7.2                                | 0.00941                | 44.8        | 66          | 2920                                | 7.5                 | 88.5                                | 89.2     | 88.6     | 0.87 0.82 0.72       |
| FLSES 132 SM   | 5.5                  | 17.9                  | 2.0                              | 2.8                             | 6.5                                | 0.00974                | 69.3        | 67          | 2935                                | 10.2                | 89.6                                | 90.4     | 90.0     | 0.87 0.83 0.74       |
| FLSES 132 SM   | 7.5                  | 24.4                  | 2.1                              | 2.9                             | 6.9                                | 0.01102                | 74.6        | 67          | 2940                                | 13.9                | 90.7                                | 91.5     | 91.3     | 0.86 0.82 0.73       |
| FLSES 132 M    | 9                    | 29.2                  | 2.5                              | 3.2                             | 7.6                                | 0.01203                | 78.2        | 67          | 2940                                | 16.8                | 91.3                                | 92.0     | 91.7     | 0.85 0.80 0.72       |
| FLSES 160 M    | 11                   | 35.5                  | 3.4                              | 3.1                             | 8.5                                | 0.0712                 | 120         | 68          | 2956                                | 19.3                | 92.2                                | 92.6     | 92.1     | 0.89 0.86 0.79       |
| FLSES 160 M    | 15                   | 48.6                  | 2.9                              | 2.9                             | 7.3                                | 0.0551                 | 133         | 68          | 2950                                | 26.7                | 92.4                                | 93.1     | 93.1     | 0.88 0.85 0.79       |
| FLSES 160 LUR  | 18.5                 | 59.9                  | 2.9                              | 2.8                             | 7.4                                | 0.0626                 | 135         | 69          | 2950                                | 32.9                | 92.5                                | 93.2     | 93.2     | 0.88 0.86 0.79       |
| FLSES 180 MUR  | 22                   | 71.2                  | 3.0                              | 3.4                             | 8.1                                | 0.1012                 | 195         | 74          | 2952                                | 38                  | 93.6                                | 94.1     | 93.8     | 0.89 0.87 0.81       |
| FLSES 200 LU   | 30                   | 97.1                  | 2.1                              | 3.1                             | 7.3                                | 0.1186                 | 210         | 71          | 2950                                | 53.1                | 93.9                                | 94.3     | 94.0     | 0.87 0.84 0.77       |
| FLSES 200 LU   | 37                   | 120                   | 2.1                              | 3.4                             | 7.0                                | 0.1388                 | 230         | 75          | 2945                                | 64.5                | 94.0                                | 94.6     | 94.5     | 0.88 0.86 0.80       |
| FLSES 225 MR   | 45                   | 146                   | 2.3                              | 3.1                             | 7.5                                | 0.1597                 | 254         | 71          | 2950                                | 78.2                | 94.2                                | 94.8     | 94.8     | 0.88 0.86 0.80       |
| FLSES 250 M    | 55                   | 177                   | 2.1                              | 3.2                             | 7.7                                | 0.3356                 | 378         | 78          | 2968                                | 95.3                | 94.5                                | 94.6     | 93.7     | 0.88 0.85 0.79       |
| FLSES 280 S    | 75                   | 241                   | 2.1                              | 2.7                             | 7.0                                | 0.48                   | 565         | 79          | 2966                                | 126                 | 94.9                                | 95.3     | 95.2     | 0.91 0.89 0.85       |
| FLSES 280 M    | 90                   | 290                   | 2.2                              | 2.8                             | 7.4                                | 0.57                   | 615         | 80          | 2967                                | 151                 | 95.3                                | 95.7     | 95.5     | 0.90 0.89 0.85       |
| FLSES 315 S    | 110                  | 353                   | 2.1                              | 2.6                             | 6.7                                | 1.17                   | 940         | 82          | 2975                                | 185                 | 95.7                                | 95.5     | 94.6     | 0.90 0.89 0.84       |
| FLSES 315 M    | 132                  | 424                   | 2.1                              | 2.5                             | 6.7                                | 1.25                   | 1015        | 82          | 2975                                | 221                 | 96.0                                | 96.1     | 95.6     | 0.90 0.89 0.84       |
| FLSES 315 LA   | 160                  | 514                   | 2.0                              | 2.9                             | 6.6                                | 1.34                   | 1088        | 82          | 2975                                | 270                 | 96.0                                | 96.1     | 95.6     | 0.90 0.89 0.84       |
| FLSES 315 LB   | 200                  | 643                   | 2.1                              | 2.9                             | 6.9                                | 1.45                   | 1150        | 82          | 2973                                | 334                 | 96.3                                | 96.5     | 96.0     | 0.90 0.88 0.84       |
| FLSES 355 LA   | 250                  | 802                   | 2.2                              | 2.9                             | 6.8                                | 3.02                   | 1590        | 83          | 2978                                | 428                 | 96.0                                | 96.0     | 95.3     | 0.88 0.86 0.80       |
| FLSES 355 LB   | 315                  | 1008                  | 2.6                              | 3.0                             | 7.8                                | 3.62                   | 1740        | 84          | 2983                                | 537                 | 96.3                                | 96.5     | 96.4     | 0.88 0.86 0.81       |
| FLSES 355 LC   | 355                  | 1137                  | 2.8                              | 2.7                             | 7.0                                | 3.64                   | 1740        | 84          | 2981                                | 612                 | 96.3                                | 96.4     | 96.2     | 0.87 0.86 0.80       |
| FLSES 355 LD   | 400                  | 1278                  | 1.9                              | 2.6                             | 7.0                                | 3.7                    | 1770        | 84          | 2989                                | 670                 | 97.0                                | 97.1     | 96.9     | 0.89 0.88 0.85       |
| FLSES 355 LKB* | 450                  | 1438                  | 2.3                              | 4.35                            | 11.5                               | 8.95                   | 2550        | 94          | 2989                                | 774                 | 95.3                                | 94.7     | 93.4     | 0.88 0.85 0.78       |
| FLSES 400 LB   | 560                  | 1790                  | 1.94                             | 3.70                            | 9.6                                | 8.95                   | 2560        | 94          | 2987                                | 959                 | 95.8                                | 95.2     | 94.0     | 0.88 0.85 0.78       |
| * IE2 motors   |                      |                       |                                  |                                 |                                    |                        |             |             |                                     |                     |                                     |          |          |                      |
| <b>4 poles</b> |                      |                       |                                  |                                 |                                    |                        |             |             |                                     |                     |                                     |          |          |                      |
| FLSES 80 LG    | 0.75                 | 4.95                  | 2.2                              | 3.1                             | 6.6                                | 0.00335                | 22          | 57          | 1450                                | 1.65                | 83.2                                | 84.0     | 82.9     | 0.80 0.72 0.59       |
| FLSES 90 SL    | 1.1                  | 7.25                  | 2.4                              | 3.2                             | 7.5                                | 0.00418                | 24.6        | 48          | 1450                                | 2.3                 | 84.8                                | 85.7     | 84.9     | 0.81 0.74 0.61       |
| FLSES 90 LU    | 1.5                  | 9.85                  | 2.8                              | 3.6                             | 7.5                                | 0.00524                | 28.2        | 51          | 1454                                | 3.2                 | 85.6                                | 86.0     | 84.5     | 0.79 0.71 0.57       |
| FLSES 100 LR   | 2.2                  | 14.5                  | 3.5                              | 3.9                             | 8.3                                | 0.00676                | 36.4        | 49          | 1452                                | 4.6                 | 86.9                                | 87.4     | 86.3     | 0.79 0.71 0.57       |
| FLSES 100 LG   | 3                    | 19.6                  | 2.5                              | 3.3                             | 7.2                                | 0.01152                | 42.2        | 50          | 1460                                | 6.05                | 88.3                                | 89.1     | 88.6     | 0.81 0.74 0.61       |
| FLSES 112 MU   | 4                    | 26.2                  | 2.7                              | 3.1                             | 7.1                                | 0.01429                | 48.9        | 50          | 1458                                | 8.1                 | 88.8                                | 89.6     | 89.2     | 0.80 0.73 0.62       |
| FLSES 132 SM   | 5.5                  | 35.9                  | 2.9                              | 3.7                             | 8.4                                | 0.02286                | 70.9        | 60          | 1462                                | 10.5                | 90.1                                | 90.7     | 90.2     | 0.84 0.78 0.67       |
| FLSES 132 MR   | 7.5                  | 49.1                  | 2.8                              | 3.4                             | 8.5                                | 0.03313                | 89.4        | 61          | 1460                                | 13.8                | 90.6                                | 91.5     | 91.3     | 0.86 0.81 0.71       |
| FLSES 160 M    | 9                    | 58.5                  | 2.4                              | 3.1                             | 8.3                                | 0.0601                 | 105         | 59          | 1468                                | 16.7                | 91.3                                | 92.0     | 91.7     | 0.85 0.80 0.70       |
| FLSES 160 M    | 11                   | 71.7                  | 2.3                              | 2.9                             | 7.6                                | 0.0712                 | 115         | 59          | 1466                                | 20.1                | 91.7                                | 92.7     | 92.8     | 0.86 0.82 0.73       |
| FLSES 160 LUR  | 15                   | 97.4                  | 2.3                              | 3.2                             | 8.0                                | 0.0954                 | 140         | 58          | 1470                                | 27.5                | 92.3                                | 93.0     | 92.9     | 0.85 0.81 0.72       |
| FLSES 180 M    | 18.5                 | 120                   | 3.1                              | 3.4                             | 8.1                                | 0.1333                 | 165         | 67          | 1470                                | 34.1                | 92.8                                | 93.5     | 93.4     | 0.84 0.80 0.71       |
| FLSES 180 LUR  | 22                   | 143                   | 3.3                              | 3.3                             | 7.9                                | 0.1555                 | 190         | 68          | 1470                                | 41.2                | 93.2                                | 93.8     | 93.6     | 0.83 0.79 0.69       |
| FLSES 200 LU   | 30                   | 194                   | 3.1                              | 2.9                             | 7.3                                | 0.2035                 | 250         | 64          | 1474                                | 54.9                | 93.9                                | 94.4     | 94.2     | 0.84 0.80 0.70       |
| FLSES 225 S    | 37                   | 238                   | 2.0                              | 2.7                             | 6.8                                | 0.5753                 | 355         | 65          | 1484                                | 67.5                | 94.0                                | 94.4     | 94.1     | 0.84 0.80 0.71       |
| FLSES 225 M    | 45                   | 290                   | 2.1                              | 2.7                             | 6.8                                | 0.6482                 | 380         | 64          | 1484                                | 82.9                | 94.7                                | 95.1     | 95.0     | 0.83 0.79 0.70       |
| FLSES 250 MR   | 55                   | 354                   | 2.1                              | 2.5                             | 6.9                                | 0.7701                 | 440         | 67          | 1482                                | 101                 | 94.8                                | 95.2     | 95.1     | 0.83 0.79 0.70       |
| FLSES 280 S    | 75                   | 482                   | 2.5                              | 2.8                             | 7.6                                | 0.85                   | 595         | 74          | 1484                                | 137                 | 95.0                                | 95.1     | 94.4     | 0.84 0.80 0.71       |
| FLSES 280 M    | 90                   | 579                   | 2.7                              | 2.7                             | 7.8                                | 0.98                   | 645         | 74          | 1483                                | 162                 | 95.2                                | 95.4     | 95.0     | 0.84 0.82 0.72       |
| FLSES 315 S    | 110                  | 707                   | 2.1                              | 2.7                             | 7.0                                | 1.84                   | 930         | 74          | 1486                                | 195                 | 95.6                                | 95.7     | 95.2     | 0.85 0.81 0.72       |
| FLSES 315 M    | 132                  | 848                   | 2.8                              | 2.8                             | 6.8                                | 2.09                   | 985         | 74          | 1487                                | 234                 | 95.9                                | 95.9     | 95.6     | 0.85 0.82 0.76       |
| FLSES 315 LA   | 160                  | 1030                  | 2.3                              | 2.5                             | 6.6                                | 2.35                   | 1045        | 74          | 1484                                | 277                 | 96.0                                | 96.3     | 96.0     | 0.87 0.85 0.78       |
| FLSES 315 LB   | 200                  | 1287                  | 2.7                              | 2.9                             | 7.2                                | 2.86                   | 1245        | 74          | 1486                                | 354                 | 96.2                                | 96.4     | 96.0     | 0.85 0.81 0.72       |
| FLSES 355 LA   | 250                  | 1604                  | 2.6                              | 3.1                             | 7.5                                | 4.9                    | 1445        | 80          | 1488                                | 436                 | 96.3                                | 96.4     | 94.6     | 0.86 0.82 0.71       |
| FLSES 355 LAL  | 280                  | 1798                  | 2.4                              | 2.9                             | 7.4                                | 5.8                    | 1560        | 80          | 1487                                | 483                 | 96.2                                | 96.5     | 96.3     | 0.87 0.84 0.77       |
| FLSES 355 LB   | 315                  | 2020                  | 2.5                              | 2.9                             | 7.5                                | 6.56                   | 1720        | 80          | 1488                                | 549                 | 96.3                                | 96.5     | 96.0     | 0.87 0.83 0.75       |
| FLSES 355 LC   | 355                  | 2280                  | 2.4                              | 2.7                             | 7.5                                | 6.56                   | 1720        | 80          | 1487                                | 607                 | 96.3                                | 96.6     | 96.4     | 0.88 0.84 0.76       |
| FLSES 355 LD   | 400                  | 2577                  | 1.7                              | 2.7                             | 7.8                                | 6.6                    | 1750        | 80          | 1488                                | 680                 | 96.4                                | 96.7     | 96.6     | 0.85 0.82 0.75       |
| FLSES 355 LKB  | 450                  | 2882                  | 1.77                             | 2.69                            | 6.9                                | 13.75                  | 2350        | 84          | 1491                                | 794                 | 96.2                                | 96.3     | 94.6     | 0.85 0.83 0.75       |
| FLSES 400 LB   | 500                  | 3205                  | 1.59                             | 2.42                            | 6.2                                | 13.75                  | 2400        | 84          | 1490                                | 873                 | 96.1                                | 96.2     | 94.9     | 0.86 0.84 0.76       |
| FLSES 450 LA   | 550                  | 3520                  | 1.48                             | 2.19                            | 6.7                                | 23.70                  | 3100        | 84          | 1492                                | 936                 | 96.4                                | 96.6     | 96.2     | 0.88 0.87 0.82       |
| FLSES 450 LB   | 675                  | 4323                  | 1.67                             | 2.74                            | 6.9                                | 26.55                  | 3775        | 84          | 1491                                | 1174                | 96.5                                | 96.6     | 96.4     | 0.86 0.85 0.80       |
| FLSES 450 LD   | 800                  | 5117                  | 2.10                             | 2.90                            | 8.5                                | 34.80                  | 4400        | 84          | 1493                                | 1368                | 97.0                                | 96.8     | 96.4     | 0.87 0.85 0.77       |
| FLSES 450 LD   | 900                  | 5761                  | 1.90                             | 2.60                            | 7.6                                | 34.80                  | 4400        | 84          | 1492                                | 1543                | 96.8                                | 96.6     | 96.4     | 0.87 0.85 0.77       |
| <b>6 poles</b> |                      |                       |                                  |                                 |                                    |                        |             |             |                                     |                     |                                     |          |          |                      |
| FLSES 90 SL    | 0.75                 | 7.55                  | 1.9                              | 2.3                             | 4.5                                | 0.00378                | 24.2        | 40          | 950                                 | 1.9                 | 79.1                                | 80.1     | 78.3     | 0.72 0.63 0.50       |
| FLSES 90 LU    | 1.1                  | 11                    | 2.3                              | 2.6                             | 4.8                                | 0.00519                | 29.3        | 57          | 954                                 | 2.75                | 81.7                                | 82.3     | 80.4     | 0.71 0.62 0.48       |
| FLSES 100 LG   | 1.5                  | 14.8                  | 2.4                              | 2.8                             | 5.7                                | 0.01523                | 41.3        | 47          | 966                                 | 3.6                 | 83.5                                | 84.1     | 82.6     | 0.72 0.64 0.50       |
| FLSES 112 MU   | 2.2                  | 21.7                  | 2.3                              | 2.8                             | 5.6                                | 0.01899                | 49          | 45          | 968                                 | 5.35                | 84.5                                | 85.1     | 83.6     | 0.70 0.62 0.49       |
| FLSES 132 SM   | 3                    | 29.5                  | 2.7                              | 3.1                             | 6.4                                | 0.02528                | 65          | 50          | 972                                 | 6.85                | 86.5                                | 86.9     | 85.6     | 0.73 0.66 0.53       |
| FLSES 132 M    | 4                    | 39.4                  | 2.4                              | 2.9                             | 6.3                                | 0.03027                | 72.7        | 54          | 970                                 | 9.15                | 87.3                                | 87.9     | 86.7     | 0.72 0.65 0.53       |
| FLSES 132 MU   | 5.5                  | 54.4                  | 2.7                              | 2.8                             | 6.3                                | 0.03699                | 87          | 55          | 966                                 | 11.9                | 88.2                                | 89.3     | 89.0     | 0.76 0.70 0.58       |
| FLSES 160 MU   | 7.5                  | 73.2                  | 2.0                              | 3.1                             | 6.5                                | 0.1295                 | 117         | 57          | 978                                 | 17.4                | 89.5                                | 89.6     | 88.3     | 0.77 0.70 0.57       |
| FLSES 180 L    | 11                   | 107                   | 3.0                              | 3.8                             | 8.2                                | 0.2048                 | 170         | 61          | 982                                 | 22.6                | 91.0                                | 91.2     | 90.3     | 0.77 0.70 0.58       |
| FLSES 180 LUR  | 15                   | 146                   | 3.3                              | 2.8                             | 7.5                                | 0.253                  | 202         | 60          | 978                                 | 31.9                | 91.3                                | 91.6     | 90.9     | 0.74 0.68 0.56       |
| FLSES 200 LU   | 18.5                 | 181                   | 2.5                              | 3.0                             | 7.0                                | 0.2588                 | 210         | 60          | 978                                 | 36.6                | 91.9                                | 92.6     | 92.4     | 0.79 0.74 0.64       |
| FLSES 200 LU   | 22                   | 214                   | 2.8                              | 3.6                             | 7.4                                | 0.2588                 | 245         | 62          | 980                                 | 44.6                | 92.5                                | 93.0     | 92.5     | 0.77 0.71 0.61       |

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Cast iron frame

## Electrical and mechanical characteristics

## IE3 - Powered by the mains

| Type          | Rated power          | 380V 50Hz                           |                     |            |              | 415V 50Hz                           |                     |            |              | 460V 60Hz                           |                     |            |              |
|---------------|----------------------|-------------------------------------|---------------------|------------|--------------|-------------------------------------|---------------------|------------|--------------|-------------------------------------|---------------------|------------|--------------|
|               |                      | Rated speed                         | Rated current       | Efficiency | Power factor | Rated speed                         | Rated current       | Efficiency | Power factor | Rated speed                         | Rated current       | Efficiency | Power factor |
|               | P <sub>n</sub><br>kW | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4   | Cos φ<br>4/4 | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4   | Cos φ<br>4/4 | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4   | Cos φ<br>4/4 |
| 2 poles       |                      |                                     |                     |            |              |                                     |                     |            |              |                                     |                     |            |              |
| FLSES 80 L    | 0.75                 | 2870                                | 1.65                | 81.4       | 0.85         | 2895                                | 1.6                 | 82.1       | 0.80         | 3505                                | 1.4                 | 82.7       | 0.80         |
| FLSES 80 LG   | 1.1                  | 2865                                | 2.35                | 82.7       | 0.87         | 2890                                | 2.2                 | 84.1       | 0.83         | 3500                                | 1.95                | 84.8       | 0.83         |
| FLSES 90 SL   | 1.5                  | 2870                                | 3.1                 | 84.2       | 0.87         | 2900                                | 2.95                | 85.2       | 0.83         | 3505                                | 2.65                | 86.0       | 0.83         |
| FLSES 90 LU   | 2.2                  | 2875                                | 4.45                | 85.9       | 0.88         | 2905                                | 4.15                | 86.9       | 0.84         | 3510                                | 3.7                 | 87.6       | 0.85         |
| FLSES 100 L   | 3                    | 2870                                | 5.95                | 87.1       | 0.88         | 2900                                | 5.6                 | 87.5       | 0.85         | 3515                                | 5.05                | 88.3       | 0.85         |
| FLSES 112 MG  | 4                    | 2910                                | 7.75                | 88.1       | 0.89         | 2935                                | 7.35                | 88.9       | 0.85         | 3540                                | 6.6                 | 89.2       | 0.86         |
| FLSES 132 SM  | 5.5                  | 2925                                | 10.6                | 89.2       | 0.88         | 2940                                | 9.85                | 90.1       | 0.86         | 3545                                | 8.9                 | 90.8       | 0.86         |
| FLSES 132 SM  | 7.5                  | 2930                                | 14.6                | 90.1       | 0.87         | 2945                                | 13.6                | 91.0       | 0.85         | 3550                                | 12.3                | 90.6       | 0.85         |
| FLSES 132 M   | 9                    | 2935                                | 17.3                | 91.1       | 0.87         | 2950                                | 16.5                | 91.4       | 0.83         | 3554                                | 14.6                | 92.3       | 0.84         |
| FLSES 160 M   | 11                   | 2950                                | 20.2                | 91.8       | 0.90         | 2960                                | 18.8                | 92.5       | 0.88         | 3562                                | 17                  | 92.4       | 0.88         |
| FLSES 160 M   | 15                   | 2940                                | 27.8                | 92.0       | 0.89         | 2956                                | 25.7                | 92.7       | 0.87         | 3556                                | 23                  | 93.2       | 0.88         |
| FLSES 160 LUR | 18.5                 | 2935                                | 34.1                | 92.4       | 0.89         | 2952                                | 31.8                | 92.7       | 0.87         | 3558                                | 28.4                | 93.2       | 0.87         |
| FLSES 180 MUR | 22                   | 2945                                | 40                  | 93.0       | 0.90         | 2958                                | 37.1                | 93.8       | 0.88         | 3560                                | 33.1                | 93.8       | 0.88         |
| FLSES 200 LU  | 30                   | 2945                                | 55.3                | 93.5       | 0.88         | 2954                                | 51.7                | 94.0       | 0.86         | 3554                                | 46.4                | 94.0       | 0.87         |
| FLSES 200 LU  | 37                   | 2935                                | 67.6                | 93.7       | 0.89         | 2950                                | 62.8                | 94.3       | 0.87         | 3552                                | 56.3                | 94.2       | 0.88         |
| FLSES 225 MR  | 45                   | 2940                                | 81.7                | 94.0       | 0.89         | 2956                                | 75.7                | 94.6       | 0.87         | 3558                                | 68.1                | 94.6       | 0.88         |
| FLSES 250 M   | 55                   | 2966                                | 99.1                | 94.3       | 0.89         | 2972                                | 87.2                | 94.6       | 0.87         | 3574                                | 83.3                | 94.3       | 0.88         |
| FLSES 280 S   | 75                   | 2962                                | 132                 | 94.7       | 0.91         | 2968                                | 122                 | 95.2       | 0.90         | 3566                                | 110                 | 94.1       | 0.91         |
| FLSES 280 M   | 90                   | 2961                                | 158                 | 95.0       | 0.91         | 2971                                | 146                 | 95.5       | 0.90         | 3567                                | 132                 | 95.0       | 0.90         |
| FLSES 315 S   | 110                  | 2972                                | 195                 | 95.2       | 0.90         | 2977                                | 178                 | 95.5       | 0.90         | 3575                                | 161                 | 95.0       | 0.90         |
| FLSES 315 M   | 132                  | 2971                                | 233                 | 95.7       | 0.90         | 2976                                | 213                 | 96.0       | 0.90         | 3575                                | 193                 | 95.4       | 0.90         |
| FLSES 315 LA  | 160                  | 2971                                | 281                 | 96.0       | 0.90         | 2976                                | 260                 | 96.2       | 0.89         | 3575                                | 233                 | 95.8       | 0.90         |
| FLSES 315 LB  | 200                  | 2969                                | 351                 | 96.3       | 0.90         | 2974                                | 324                 | 96.6       | 0.89         | 3575                                | 291                 | 95.8       | 0.90         |
| FLSES 355 LA  | 250                  | 2976                                | 445                 | 95.9       | 0.89         | 2982                                | 411                 | 96.2       | 0.88         | 3578                                | 372                 | 95.8       | 0.88         |
| FLSES 355 LB  | 315                  | 2979                                | 562                 | 95.8       | 0.89         | 2985                                | 524                 | 96.2       | 0.87         | 3583                                | 469                 | 95.8       | 0.88         |
| FLSES 355 LC  | 355                  | 2977                                | 640                 | 95.8       | 0.88         | 2983                                | 596                 | 96.3       | 0.86         | 3581                                | 535                 | 95.8       | 0.87         |
| FLSES 355 LD  | 400                  | 2987                                | 694                 | 97.0       | 0.90         | 2991                                | 647                 | 96.8       | 0.89         | 3589                                | 585                 | 96.5       | 0.89         |
| FLSES 355 LKB | 450                  | 2988                                | 806                 | 95.3       | 0.89         | 2990                                | 765                 | 95.2       | 0.86         | 3590                                | 673                 | 95.3       | 0.88         |
| FLSES 400 LB  | 560                  | 2986                                | 987                 | 95.8       | 0.90         | 2989                                | 936                 | 95.7       | 0.87         | 3588                                | 823                 | 95.9       | 0.89         |
| 4 poles       |                      |                                     |                     |            |              |                                     |                     |            |              |                                     |                     |            |              |
| FLSES 80 LG   | 0.75                 | 1450                                | 1.65                | 82.6       | 0.83         | 1454                                | 1.6                 | 83.4       | 0.78         | 1758                                | 1.45                | 85.4       | 0.76         |
| FLSES 90 SL   | 1.1                  | 1450                                | 2.35                | 84.1       | 0.84         | 1454                                | 2.3                 | 84.9       | 0.79         | 1758                                | 2.05                | 86.4       | 0.78         |
| FLSES 90 LU   | 1.5                  | 1454                                | 3.25                | 85.3       | 0.82         | 1458                                | 3.15                | 85.9       | 0.77         | 1762                                | 2.8                 | 87.3       | 0.77         |
| FLSES 100 LR  | 2.2                  | 1452                                | 4.7                 | 86.7       | 0.81         | 1456                                | 4.65                | 87.1       | 0.76         | 1762                                | 4.1                 | 88.3       | 0.76         |
| FLSES 100 LG  | 3                    | 1460                                | 6.2                 | 87.7       | 0.84         | 1462                                | 6.05                | 88.4       | 0.78         | 1766                                | 5.35                | 90.0       | 0.79         |
| FLSES 112 MU  | 4                    | 1458                                | 8.3                 | 88.6       | 0.83         | 1462                                | 8.05                | 88.9       | 0.78         | 1764                                | 7.45                | 85.5       | 0.79         |
| FLSES 132 SM  | 5.5                  | 1462                                | 10.9                | 89.6       | 0.86         | 1466                                | 10.3                | 90.2       | 0.82         | 1768                                | 9.25                | 91.2       | 0.82         |
| FLSES 132 MR  | 7.5                  | 1460                                | 14.5                | 90.4       | 0.87         | 1464                                | 13.5                | 91.0       | 0.85         | 1768                                | 12.2                | 91.7       | 0.85         |
| FLSES 160 M   | 9                    | 1468                                | 17.3                | 90.9       | 0.87         | 1472                                | 16.4                | 91.7       | 0.83         | 1772                                | 14.6                | 92.4       | 0.84         |
| FLSES 160 M   | 11                   | 1466                                | 21                  | 91.4       | 0.87         | 1468                                | 19.5                | 92.2       | 0.85         | 1772                                | 17.5                | 92.9       | 0.85         |
| FLSES 160 LUR | 15                   | 1470                                | 28.7                | 92.1       | 0.87         | 1474                                | 26.9                | 92.6       | 0.84         | 1774                                | 24.1                | 93.3       | 0.84         |
| FLSES 180 M   | 18.5                 | 1470                                | 35.6                | 92.6       | 0.86         | 1472                                | 33.5                | 93.0       | 0.83         | 1774                                | 29.9                | 93.6       | 0.83         |
| FLSES 180 LUR | 22                   | 1470                                | 42.4                | 93.0       | 0.85         | 1474                                | 40.1                | 93.4       | 0.82         | 1776                                | 36.3                | 93.8       | 0.81         |
| FLSES 200 LU  | 30                   | 1474                                | 56.8                | 93.6       | 0.85         | 1476                                | 53.7                | 94.2       | 0.82         | 1780                                | 48.3                | 94.5       | 0.83         |
| FLSES 225 S   | 37                   | 1484                                | 70.4                | 93.9       | 0.85         | 1486                                | 65.8                | 94.5       | 0.83         | 1786                                | 59.4                | 94.5       | 0.83         |
| FLSES 225 M   | 45                   | 1484                                | 85.9                | 94.3       | 0.84         | 1486                                | 80.7                | 95.0       | 0.82         | 1788                                | 72.2                | 95.1       | 0.82         |
| FLSES 250 MR  | 55                   | 1482                                | 105                 | 94.6       | 0.84         | 1484                                | 98.4                | 95.0       | 0.82         | 1784                                | 88.3                | 95.3       | 0.82         |
| FLSES 280 S   | 75                   | 1483                                | 142                 | 94.7       | 0.85         | 1486                                | 133                 | 94.8       | 0.83         | 1784                                | 117                 | 95.4       | 0.84         |
| FLSES 280 M   | 90                   | 1481                                | 168                 | 95.0       | 0.86         | 1485                                | 159                 | 95.1       | 0.83         | 1783                                | 141                 | 95.4       | 0.84         |
| FLSES 315 S   | 110                  | 1486                                | 204                 | 95.4       | 0.86         | 1487                                | 194                 | 95.4       | 0.83         | 1786                                | 172                 | 95.8       | 0.84         |
| FLSES 315 M   | 132                  | 1484                                | 241                 | 95.6       | 0.87         | 1487                                | 229                 | 95.8       | 0.84         | 1787                                | 203                 | 96.0       | 0.85         |
| FLSES 315 LA  | 160                  | 1482                                | 292                 | 95.8       | 0.87         | 1486                                | 276                 | 96.1       | 0.84         | 1784                                | 249                 | 96.2       | 0.85         |
| FLSES 315 LB  | 200                  | 1483                                | 364                 | 96.0       | 0.87         | 1487                                | 345                 | 96.0       | 0.84         | 1786                                | 307                 | 96.2       | 0.85         |
| FLSES 355 LA  | 250                  | 1487                                | 450                 | 96.0       | 0.88         | 1490                                | 425                 | 96.2       | 0.85         | 1788                                | 379                 | 96.2       | 0.86         |
| FLSES 355 LAL | 280                  | 1487                                | 503                 | 96.0       | 0.88         | 1488                                | 471                 | 96.1       | 0.86         | 1787                                | 420                 | 96.2       | 0.87         |
| FLSES 355 LB  | 315                  | 1488                                | 567                 | 96.0       | 0.88         | 1489                                | 530                 | 96.3       | 0.86         | 1787                                | 472                 | 96.2       | 0.87         |
| FLSES 355 LC  | 355                  | 1487                                | 631                 | 96.0       | 0.89         | 1488                                | 592                 | 96.0       | 0.87         | 1786                                | 532                 | 96.2       | 0.87         |
| FLSES 355 LD  | 400                  | 1488                                | 736                 | 96.3       | 0.86         | 1489                                | 690                 | 96.6       | 0.84         | 1790                                | 607                 | 96.2       | 0.86         |
| FLSES 355 LKB | 450                  | 1490                                | 817                 | 96.2       | 0.87         | 1491                                | 784                 | 96.2       | 0.83         | 1792                                | 689                 | 96.4       | 0.85         |
| FLSES 400 LB  | 500                  | 1489                                | 919                 | 96.1       | 0.86         | 1490                                | 871                 | 96.2       | 0.83         | 1791                                | 766                 | 96.4       | 0.85         |
| FLSES 450 LA  | 550                  | 1491                                | 974                 | 96.4       | 0.89         | 1492                                | 912                 | 96.4       | 0.87         | 1793                                | 812                 | 96.6       | 0.88         |
| FLSES 450 LB  | 675                  | 1490                                | 1222                | 96.5       | 0.87         | 1492                                | 1145                | 96.5       | 0.85         | 1792                                | 1019                | 96.7       | 0.86         |
| FLSES 450 LD  | 800                  | 1492                                | 1408                | 97.0       | 0.89         | 1494                                | 1350                | 97.0       | 0.85         | 1794                                | 1189                | 97.1       | 0.87         |
| FLSES 450 LD  | 900                  | 1491                                | 1605                | 96.8       | 0.88         | 1493                                | 1522                | 96.8       | 0.85         | 1793                                | 1340                | 96.9       | 0.87         |
| 6 poles       |                      |                                     |                     |            |              |                                     |                     |            |              |                                     |                     |            |              |
| FLSES 90 SL   | 0.75                 | 945                                 | 1.9                 | 78.9       | 0.75         | 956                                 | 1.9                 | 79.5       | 0.70         | -                                   | -                   | -          | -            |
| FLSES 90 LU   | 1.1                  | 945                                 | 2.8                 | 81.0       | 0.74         | 958                                 | 2.75                | 81.8       | 0.68         | -                                   | -                   | -          | -            |
| FLSES 100 LG  | 1.5                  | 962                                 | 3.65                | 83.0       | 0.75         | 970                                 | 3.55                | 83.8       | 0.70         | -                                   | -                   | -          | -            |
| FLSES 112 MU  | 2.2                  | 962                                 | 5.4                 | 84.3       | 0.73         | 972                                 | 5.35                | 84.7       | 0.68         | -                                   | -                   | -          | -            |
| FLSES 132 SM  | 3                    | 970                                 | 7                   | 85.6       | 0.76         | 974                                 | 6.85                | 86.0       | 0.71         | -                                   | -                   | -          | -            |
| FLSES 132 M   | 4                    | 966                                 | 9.3                 | 86.8       | 0.75         | 972                                 | 9.15                | 87.9       | 0.69         | -                                   | -                   | -          | -            |
| FLSES 132 MU  | 5.5                  | 962                                 | 12.1                | 88.0       | 0.78         | 970                                 | 11.7                | 88.5       | 0.74         | -                                   | -                   | -          | -            |
| FLSES 160 MU  | 7.5                  | 974                                 | 18.1                | 89.1       | 0.79         | 980                                 | 17.1                | 89.6       | 0.74         | -                                   | -                   | -          | -            |
| FLSES 180 L   | 11                   | 978                                 | 23.2                | 90.6       | 0.79         | 984                                 | 22.3                | 91.2       | 0.75         | -                                   | -                   | -          | -            |
| FLSES 180 LUR | 15                   | 976                                 | 32.7                | 91.2       | 0.76         | 982                                 | 31.7                | 91.4       | 0.72         | -                                   | -                   | -          | -            |
| FLSES 200 LU  | 18.5                 | 974                                 | 37.8                | 91.7       | 0.81         | 980                                 | 36                  | 92.1       | 0.78         | -                                   | -                   | -          | -            |
| FLSES 200 LU  | 22                   | 978                                 | 43.8                | 92.2       | 0.79         | 984                                 | 40.5                | 92.7       | 0.77         | -                                   | -                   | -          | -            |
| FLSES 225 M   | 30                   | 984                                 | 57.3                | 92.9       | 0.86         | 986                                 | 53.9                | 93.3       | 0.83         | -                                   | -                   | -          | -            |
| FLSES 250 M   | 37                   | 984                                 | 70.5                | 93.4       | 0.85         | 986                                 | 67                  | 93.7       | 0.82         | -                                   | -                   | -          | -            |
| FLSES 280 S   | 45                   | 984                                 | 84                  | 93.7       | 0.87         | 987                                 | 80                  | 94.2       | 0.84         | 1186                                | 71                  | 94.5       | 0.85         |
|               |                      |                                     |                     |            |              |                                     |                     |            |              |                                     |                     |            |              |

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Cast iron frame

## Electrical and mechanical characteristics

## IE3 - Powered by the drive

| Type          | 400V 50Hz            |                                     |                     |              | % Rated torque $M_n$ at |       |       |       |      | 400V 87Hz $\Delta^1$ |                                     |                     |              | Maximum mechanical speed <sup>2</sup> |
|---------------|----------------------|-------------------------------------|---------------------|--------------|-------------------------|-------|-------|-------|------|----------------------|-------------------------------------|---------------------|--------------|---------------------------------------|
|               | Rated power          | Rated speed                         | Rated current       | Power factor | 10Hz                    | 17Hz  | 25Hz  | 50Hz  | 87Hz | Rated power          | Rated speed                         | Rated current       | Power factor |                                       |
|               | P <sub>n</sub><br>kW | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | Cos φ<br>4/4 |                         |       |       |       |      | P <sub>n</sub><br>kW | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | Cos φ<br>4/4 |                                       |
| 2 poles       |                      |                                     |                     |              |                         |       |       |       |      |                      |                                     |                     |              |                                       |
| FLSES 80 L    | 0.75                 | 2845                                | 1.75                | 0.83         | 90 %                    | 100 % | 100 % | 100 % | 57 % | 1.31                 | 5065                                | 3.04                | 0.83         | 13500                                 |
| FLSES 80 LG   | 1.1                  | 2845                                | 2.46                | 0.85         | 85 %                    | 100 % | 100 % | 100 % | 57 % | 1.91                 | 5065                                | 4.29                | 0.85         | 13500                                 |
| FLSES 90 SL   | 1.5                  | 2850                                | 3.4                 | 0.85         | 85 %                    | 100 % | 100 % | 100 % | 57 % | 2.61                 | 5070                                | 5.9                 | 0.85         | 11700                                 |
| FLSES 90 LU   | 2.2                  | 2850                                | 4.72                | 0.86         | 85 %                    | 100 % | 100 % | 100 % | 57 % | 3.83                 | 5070                                | 8.22                | 0.86         | 11700                                 |
| FLSES 100 L   | 3                    | 2855                                | 6.45                | 0.86         | 85 %                    | 100 % | 100 % | 100 % | 57 % | 5.22                 | 5075                                | 11.26               | 0.86         | 9900                                  |
| FLSES 112 MG  | 4                    | 2900                                | 8.5                 | 0.87         | 85 %                    | 100 % | 100 % | 100 % | 57 % | 6.96                 | 5120                                | 14.74               | 0.87         | 9900                                  |
| FLSES 132 SM  | 5.5                  | 2910                                | 11.6                | 0.87         | 85 %                    | 100 % | 100 % | 100 % | 57 % | 9.57                 | 5130                                | 20.19               | 0.87         | 6700                                  |
| FLSES 132 SM  | 7.5                  | 2915                                | 15.5                | 0.86         | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 13.05                | 5135                                | 26.98               | 0.86         | 6700                                  |
| FLSES 132 M   | 9                    | 2935                                | 17.9                | 0.87         | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 15.70                | 5155                                | 31.20               | 0.87         | 6700                                  |
| FLSES 160 M   | 11                   | 2945                                | 21.9                | 0.89         | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 19.14                | 5165                                | 38.24               | 0.89         | 6030                                  |
| FLSES 160 M   | 15                   | 2935                                | 30.1                | 0.88         | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 26.10                | 5155                                | 52.36               | 0.88         | 6030                                  |
| FLSES 160 LUR | 18.5                 | 2925                                | 37.4                | 0.88         | 85 %                    | 95 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 4500                                  |
| FLSES 180 MUR | 22                   | 2935                                | 43.5                | 0.89         | 85 %                    | 95 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 5670                                  |
| FLSES 200 LU  | 30                   | 2935                                | 59.6                | 0.87         | 85 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 4500                                  |
| FLSES 200 LU  | 37                   | 2920                                | 73.9                | 0.88         | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 4700                                  |
| FLSES 225 MR  | 45                   | 2930                                | 88.6                | 0.88         | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 4320                                  |
| FLSES 250 M   | 55                   | 2960                                | 107.8               | 0.88         | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 4050                                  |
| FLSES 280 S   | 75                   | 2960                                | 135                 | 0.91         | 75 %                    | 85 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 3580                                  |
| FLSES 280 M   | 90                   | 2961                                | 164                 | 0.91         | 75 %                    | 85 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 3580                                  |
| FLSES 315 S   | 110                  | 2972                                | 202                 | 0.90         | 75 %                    | 85 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 3580                                  |
| FLSES 315 M   | 132                  | 2972                                | 243                 | 0.90         | 75 %                    | 85 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 3580                                  |
| FLSES 315 LA  | 160                  | 2971                                | 293                 | 0.90         | 75 %                    | 85 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 3600                                  |
| FLSES 315 LB  | 200                  | 2971                                | 365                 | 0.90         | 75 %                    | 85 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 3580                                  |
| FLSES 355 LA  | 250                  | 2976                                | 461                 | 0.89         | 73 %                    | 96 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 3580                                  |
| FLSES 355 LB  | 315                  | 2979                                | 580                 | 0.89         | 75 %                    | 85 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 3600                                  |
| FLSES 355 LC  | 355                  | 2977                                | 663                 | 0.88         | 75 %                    | 85 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 3580                                  |
| FLSES 355 LD  | 400                  | 2984                                | 718                 | 0.90         | 90 %                    | 95 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 3600                                  |
| FLSES 355 LKB | 450                  | 2989                                | 837                 | 0.89         | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 3600                                  |
| FLSES 400 LB  | 560                  | 2987                                | 1036                | 0.89         | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 3600                                  |
| 4 poles       |                      |                                     |                     |              |                         |       |       |       |      |                      |                                     |                     |              |                                       |
| FLSES 80 LG   | 0.75                 | 1435                                | 1.8                 | 0.80         | 90 %                    | 100 % | 100 % | 100 % | 57 % | 1.31                 | 2545                                | 3.13                | 0.80         | 13500                                 |
| FLSES 90 SL   | 1.1                  | 1430                                | 2.6                 | 0.81         | 90 %                    | 100 % | 100 % | 100 % | 57 % | 1.91                 | 2540                                | 4.47                | 0.81         | 11700                                 |
| FLSES 90 LU   | 1.5                  | 1435                                | 3.5                 | 0.79         | 90 %                    | 100 % | 100 % | 100 % | 57 % | 2.61                 | 2545                                | 6.08                | 0.79         | 11700                                 |
| FLSES 100 LR  | 2.2                  | 1440                                | 5                   | 0.79         | 90 %                    | 100 % | 100 % | 100 % | 57 % | 3.83                 | 2550                                | 8.76                | 0.79         | 9900                                  |
| FLSES 100 LG  | 3                    | 1445                                | 6.7                 | 0.81         | 90 %                    | 100 % | 100 % | 100 % | 57 % | 5.22                 | 2555                                | 11.71               | 0.81         | 9900                                  |
| FLSES 112 MU  | 4                    | 1440                                | 8.8                 | 0.80         | 90 %                    | 100 % | 100 % | 100 % | 57 % | 6.96                 | 2550                                | 15.37               | 0.80         | 9900                                  |
| FLSES 132 SM  | 5.5                  | 1450                                | 11.6                | 0.84         | 90 %                    | 90 %  | 100 % | 100 % | 57 % | 9.57                 | 2560                                | 20.19               | 0.84         | 6700                                  |
| FLSES 132 MR  | 7.5                  | 1445                                | 15.7                | 0.86         | 90 %                    | 90 %  | 100 % | 100 % | 57 % | 13.05                | 2555                                | 27.34               | 0.86         | 6700                                  |
| FLSES 160 M   | 9                    | 1462                                | 17.9                | 0.87         | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 15.70                | 2572                                | 31.20               | 0.87         | 6030                                  |
| FLSES 160 M   | 11                   | 1454                                | 22.7                | 0.86         | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 19.14                | 2564                                | 39.49               | 0.86         | 6030                                  |
| FLSES 160 LUR | 15                   | 1458                                | 30.7                | 0.85         | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 26.10                | 2568                                | 53.43               | 0.85         | 5670                                  |
| FLSES 180 M   | 18.5                 | 1458                                | 38.3                | 0.84         | 80 %                    | 90 %  | 100 % | 100 % | 57 % | 32.19                | 2568                                | 66.66               | 0.84         | 5670                                  |
| FLSES 180 LUR | 22                   | 1460                                | 46                  | 0.83         | 80 %                    | 90 %  | 100 % | 100 % | 57 % | 38.28                | 2570                                | 80.06               | 0.83         | 4500                                  |
| FLSES 200 LU  | 30                   | 1466                                | 61.7                | 0.84         | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 52.20                | 2576                                | 107.4               | 0.84         | 4500                                  |
| FLSES 225 S   | 37                   | 1476                                | 76.1                | 0.84         | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 64.38                | 2586                                | 132.42              | 0.84         | 4320                                  |
| FLSES 225 M   | 45                   | 1478                                | 92.9                | 0.83         | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 78.30                | 2588                                | 161.73              | 0.83         | 4320                                  |
| FLSES 250 MR  | 55                   | 1476                                | 114                 | 0.83         | 85 %                    | 95 %  | 100 % | 100 % | 57 % | 95.70                | 2586                                | 198.36              | 0.83         | 4050                                  |
| FLSES 280 S   | 75                   | 1485                                | 148                 | 0.84         | 75 %                    | 85 %  | 100 % | 100 % | 56 % | -                    | -                                   | -                   | -            | 2610                                  |
| FLSES 280 M   | 90                   | 1485                                | 177                 | 0.84         | 75 %                    | 85 %  | 100 % | 100 % | 57 % | -                    | -                                   | -                   | -            | 2610                                  |
| FLSES 315 S   | 110                  | 1486                                | 210                 | 0.86         | 90 %                    | 100 % | 100 % | 100 % | 57 % | -                    | -                                   | -                   | -            | 2610                                  |
| FLSES 315 M   | 132                  | 1487                                | 250                 | 0.87         | 96 %                    | 97 %  | 100 % | 100 % | 57 % | -                    | -                                   | -                   | -            | 2610                                  |
| FLSES 315 LA  | 160                  | 1484                                | 303                 | 0.87         | 91 %                    | 94 %  | 100 % | 100 % | 57 % | -                    | -                                   | -                   | -            | 2610                                  |
| FLSES 315 LB  | 200                  | 1486                                | 374                 | 0.87         | 89 %                    | 93 %  | 100 % | 100 % | 55 % | -                    | -                                   | -                   | -            | 2610                                  |
| FLSES 355 LA  | 250                  | 1488                                | 465                 | 0.87         | 93 %                    | 95 %  | 100 % | 100 % | 57 % | -                    | -                                   | -                   | -            | 2610                                  |
| FLSES 355 LAL | 280                  | 1487                                | 507                 | 0.87         | 92 %                    | 95 %  | 100 % | 100 % | 58 % | -                    | -                                   | -                   | -            | 2610                                  |
| FLSES 355 LB  | 315                  | 1488                                | 594                 | 0.87         | 75 %                    | 85 %  | 100 % | 100 % | 57 % | -                    | -                                   | -                   | -            | 2610                                  |
| FLSES 355 LC  | 355                  | 1487                                | 670                 | 0.87         | 75 %                    | 85 %  | 100 % | 100 % | 57 % | -                    | -                                   | -                   | -            | 2610                                  |
| FLSES 355 LD  | 400                  | 1491                                | 718                 | 0.89         | 85 %                    | 87 %  | 100 % | 100 % | 57 % | 400                  | 2610                                | 736                 | 0.90         | 2610                                  |
| FLSES 355 LKB | 450                  | 1491                                | 858                 | 0.86         | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 1800                                  |
| FLSES 400 LB  | 500                  | 1490                                | 943                 | 0.87         | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 1800                                  |
| FLSES 450 LA  | 550                  | 1492                                | 1011                | 0.89         | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 1800                                  |
| FLSES 450 LB  | 675                  | 1491                                | 1268                | 0.87         | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 1800                                  |
| FLSES 450 LD  | 800                  | 1493                                | 1478                | 0.88         | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 1800                                  |
| FLSES 450 LD  | 900                  | 1492                                | 1666                | 0.88         | 80 %                    | 90 %  | 100 % | 100 % | -    | -                    | -                                   | -                   | -            | 1800                                  |
| 6 poles       |                      |                                     |                     |              |                         |       |       |       |      |                      |                                     |                     |              |                                       |
| FLSES 90 SL   | 0.75                 | 930                                 | 2.05                | 0.72         | 100 %                   | 100 % | 100 % | 100 % | 57 % | 1.31                 | 1670                                | 3.57                | 0.72         | 11700                                 |
| FLSES 90 LU   | 1.1                  | 935                                 | 3.9                 | 0.71         | 100 %                   | 100 % | 100 % | 100 % | 57 % | 1.91                 | 1675                                | 5.09                | 0.71         | 11700                                 |
| FLSES 100 LG  | 1.5                  | 954                                 | 3.9                 | 0.72         | 100 %                   | 100 % | 100 % | 100 % | 57 % | 2.61                 | 1694                                | 6.79                | 0.72         | 9900                                  |
| FLSES 112 MU  | 2.2                  | 954                                 | 5.75                | 0.70         | 100 %                   | 100 % | 100 % | 100 % | 57 % | 3.83                 | 1694                                | 10.01               | 0.70         | 9900                                  |
| FLSES 132 SM  | 3                    | 962                                 | 7.3                 | 0.73         | 100 %                   | 100 % | 100 % | 100 % | 57 % | 5.22                 | 1702                                | 12.69               | 0.73         | 6700                                  |
| FLSES 132 M   | 4                    | 960                                 | 9.9                 | 0.72         | 100 %                   | 100 % | 100 % | 100 % | 57 % | 6.96                 | 1700                                | 17.24               | 0.72         | 6700                                  |
| FLSES 132 MU  | 5.5                  | 954                                 | 13.05               | 0.76         | 100 %                   | 100 % | 100 % | 100 % | 57 % | 9.57                 | 1694                                | 22.7                | 0.76         | 6700                                  |
| FLSES 160 MU  | 7.5                  | 970                                 | 17.35               | 0.77         | 100 %                   | 100 % | 100 % | 100 % | 57 % | 13.05                | 1710                                | 30.2                | 0.77         | 6030                                  |
| FLSES 180 L   | 11                   | 976                                 | 24.65               | 0.77         | 95 %                    | 100 % | 100 % | 100 % | 57 % | 19.14                | 1716                                | 42.89               | 0.77         | 5670                                  |
| FLSES 180 LUR | 15                   | 972                                 | 35.2                | 0.74         | 80 %                    | 90 %  | 100 % | 100 % | 57 % | 26.1                 | 1712                                | 61.3                | 0.74         | 4500                                  |
| FLSES 200 LU  | 18.5                 | 970                                 | 40.5                | 0.79         | 80 %                    | 90 %  | 100 % | 100 % | 57 % | 32.19                | 1710                                | 70.59               | 0.79         | 4500                                  |
| FLSES 200 LU  | 22                   | 976                                 | 48.7                | 0.77         | 80 %                    | 90 %  | 100 % | 100 % | 57 % | 38.28                | 1716                                | 84.71               | 0.77         | 4500                                  |
| FLSES 225 M   | 30                   | 980                                 | 61.7                | 0.84         | 90 %                    | 100 % | 100 % | 100 % | 57 % | 52.2                 | 1720                                | 107.4               | 0.84         | 4050                                  |
| FLSES 250 M   | 37                   | 982                                 | 75.4                | 0.84         | 90 %                    | 100 % | 100 % | 100 % | 57 % | 64.38                | 1722                                | 131.17              | 0.84         | 4050                                  |
| FLSES 280 S   | 45                   | 986                                 | 89                  | 0.85         |                         |       |       |       |      |                      |                                     |                     |              |                                       |

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Cast iron frame

### Electrical and mechanical characteristics

### IE3 - Powered by the drive

#### Summary of recommended protection devices

| Mains voltage       | Cable length       | Frame size      | Winding protection  | Insulated bearings                     |
|---------------------|--------------------|-----------------|---------------------|----------------------------------------|
| ≤ 480 V             | < 20 m             | All frame sizes | Standard            | No                                     |
|                     | > 20 m and < 100 m | ≤ 315           | Standard            | No                                     |
|                     |                    | ≥ 315           | RIS or drive filter | NDE                                    |
| > 480 V and ≤ 690 V | < 20 m             | < 250           | Standard            | No                                     |
|                     |                    | ≥ 250           | RIS or drive filter | NDE                                    |
|                     | > 20 m and < 100 m | ≤ 250           | RIS or drive filter | NDE                                    |
|                     |                    | ≥ 250           | RIS or drive filter | NDE                                    |
|                     |                    |                 |                     | NDE (or DE+NDE if no filter for ≥ 315) |

**RIS:** Reinforced Insulation System.

**The filter is recommended above frame size 315.**

Standard insulation = **1500 V peak and 3500 V/μs.**

Protection solutions exist (insulation for winding and bearings).

For different cable length(s) and/or voltage(s), please consult Leroy-Somer.



**REMINDER:** All 2, 4 and 6 pole motors placed on the EU market must be IE3 or IE2 and used with a variable speed drive:

- from 01/01/2015 for power ratings from 7.5 to 375 kW
- from 01/01/2017 for power ratings from 0.75 to 375 kW

#### Other drive mechanism solutions:



**LSRPM / PLSRPM:** permanent magnet synchronous motors 3 to 500 kW

Variable speed application, requiring IP55 or IP23 protection, high efficiency and/or compact dimensions.



**CPLS:** induction motors 95 to 2900 Nm

Application for variable speed operation requiring constant power over a wide speed range



**LSMV:** induction motors 0.18 to 132 kW

Application for variable speed operation requiring constant torque over a wide speed range.



**LSK:** D.C. motors 2 to 750 kW



**UNIMOTOR FM and HD:** servomotors 0.7 to 136 Nm



# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Cast iron frame

## Electrical and mechanical characteristics

## IE4 - Powered by the mains

| Type         | Rated power          | Rated torque          | Starting torque/<br>Rated torque | Maximum torque/<br>Rated torque | Starting intensity/<br>Rated intensity | Moment of inertia      | Weight      | Noise (50Hz) | 400V 50Hz                           |                     |                               |      |      |              |      |      |
|--------------|----------------------|-----------------------|----------------------------------|---------------------------------|----------------------------------------|------------------------|-------------|--------------|-------------------------------------|---------------------|-------------------------------|------|------|--------------|------|------|
|              |                      |                       |                                  |                                 |                                        |                        |             |              | Rated speed                         | Rated current       | Efficiency IEC 60034-2-1 2007 |      |      | Power factor |      |      |
|              | P <sub>n</sub><br>kW | M <sub>n</sub><br>N.m | M <sub>d</sub> /M <sub>n</sub>   | M <sub>m</sub> /M <sub>n</sub>  | I <sub>d</sub> /I <sub>n</sub>         | J<br>kg.m <sup>2</sup> | IM B3<br>kg | LP<br>db(A)  | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η                             |      |      | Cos φ        |      |      |
|              |                      |                       |                                  |                                 |                                        |                        |             |              |                                     |                     | 4/4                           | 3/4  | 2/4  | 4/4          | 3/4  | 2/4  |
| 2 poles      |                      |                       |                                  |                                 |                                        |                        |             |              |                                     |                     |                               |      |      |              |      |      |
| FLSES 280 M  | 75                   | 241                   | 2.6                              | 3.4                             | 8.9                                    | 0.57                   | 615         | 80           | 2977                                | 126                 | 95.6                          | 95.9 | 95.8 | 0.90         | 0.89 | 0.85 |
| FLSES 315 S  | 90                   | 288                   | 2.5                              | 3.1                             | 8.1                                    | 1.17                   | 940         | 80           | 2982                                | 150                 | 96.0                          | 96.0 | 95.5 | 0.90         | 0.89 | 0.85 |
| FLSES 315 M  | 110                  | 352                   | 2.5                              | 3.0                             | 8.0                                    | 1.25                   | 1015        | 80           | 2984                                | 186                 | 96.1                          | 96.2 | 95.7 | 0.89         | 0.88 | 0.83 |
| FLSES 315 LA | 132                  | 423                   | 2.5                              | 3.4                             | 8.0                                    | 1.34                   | 1070        | 80           | 2983                                | 222                 | 96.5                          | 96.6 | 96.2 | 0.89         | 0.88 | 0.83 |
| FLSES 315 LA | 160                  | 514                   | 2.1                              | 2.8                             | 6.7                                    | 1.34                   | 1070        | 80           | 2972                                | 266                 | 96.4                          | 96.5 | 96.1 | 0.90         | 0.89 | 0.84 |
| FLSES 315 LB | 200                  | 642                   | 2.1                              | 2.9                             | 6.9                                    | 1.45                   | 1150        | 80           | 2973                                | 332                 | 96.5                          | 96.7 | 96.5 | 0.90         | 0.88 | 0.84 |
| FLSES 355 LB | 250                  | 799                   | 3.2                              | 3.8                             | 9.7                                    | 3.62                   | 1650        | 83           | 2988                                | 434                 | 96.6                          | 96.6 | 96.4 | 0.86         | 0.84 | 0.89 |
| FLSES 355 LB | 315                  | 1009                  | 2.6                              | 3.0                             | 7.9                                    | 3.62                   | 1650        | 83           | 2982                                | 534                 | 96.8                          | 96.8 | 96.6 | 0.88         | 0.86 | 0.81 |
| FLSES 355 LC | 355                  | 1137                  | 2.8                              | 2.7                             | 7.2                                    | 3.64                   | 1660        | 83           | 2981                                | 610                 | 96.6                          | 96.7 | 96.5 | 0.87         | 0.86 | 0.80 |

|                |     |      |     |     |     |      |      |    |      |     |      |      |      |      |      |      |
|----------------|-----|------|-----|-----|-----|------|------|----|------|-----|------|------|------|------|------|------|
| <b>4 poles</b> |     |      |     |     |     |      |      |    |      |     |      |      |      |      |      |      |
| FLSES 315 S    | 75  | 481  | 2.7 | 4.5 | 9.6 | 1.84 | 940  | 67 | 1490 | 137 | 96.2 | 96.3 | 95.8 | 0.82 | 0.79 | 0.70 |
| FLSES 315 S    | 90  | 577  | 2.5 | 4.1 | 8.4 | 1.84 | 940  | 67 | 1490 | 163 | 96.1 | 96.2 | 95.7 | 0.83 | 0.81 | 0.70 |
| FLSES 315 M    | 110 | 706  | 3.3 | 3.3 | 8.0 | 2.09 | 980  | 70 | 1488 | 199 | 96.3 | 96.3 | 96.0 | 0.83 | 0.81 | 0.74 |
| FLSES 315 LA   | 132 | 848  | 2.8 | 3.1 | 7.8 | 2.35 | 1055 | 70 | 1487 | 230 | 96.4 | 96.7 | 96.5 | 0.86 | 0.84 | 0.77 |
| FLSES 315 LB   | 160 | 1028 | 3.4 | 3.8 | 8.8 | 2.86 | 1245 | 70 | 1487 | 288 | 96.7 | 96.9 | 96.5 | 0.83 | 0.79 | 0.71 |
| FLSES 355 LAL  | 200 | 1281 | 3.3 | 4.1 | 9.8 | 5.80 | 1560 | 74 | 1491 | 364 | 96.7 | 97.0 | 96.8 | 0.82 | 0.80 | 0.71 |
| FLSES 355 LB   | 250 | 1602 | 3.0 | 3.7 | 9.4 | 6.56 | 1650 | 74 | 1490 | 439 | 96.7 | 96.9 | 96.6 | 0.85 | 0.82 | 0.75 |
| FLSES 355 LB   | 280 | 1793 | 2.8 | 4.3 | 8.7 | 6.56 | 1720 | 80 | 1491 | 492 | 96.7 | 96.5 | 96.0 | 0.85 | 0.82 | 0.66 |
| FLSES 355 LC   | 315 | 2022 | 2.7 | 3.1 | 8.4 | 6.60 | 1700 | 74 | 1488 | 540 | 96.7 | 97.0 | 96.9 | 0.87 | 0.85 | 0.79 |
| FLSES 355 LD   | 355 | 2271 | 1.9 | 3.2 | 8.8 | 6.60 | 1765 | 75 | 1493 | 594 | 96.9 | 97.1 | 95.5 | 0.89 | 0.86 | 0.80 |

| Type           | Rated power          | 380V 50Hz                           |                     |            |              | 415V 50Hz                           |                     |            |              | 460V 60Hz                           |                     |            |              |
|----------------|----------------------|-------------------------------------|---------------------|------------|--------------|-------------------------------------|---------------------|------------|--------------|-------------------------------------|---------------------|------------|--------------|
|                |                      | Rated speed                         | Rated current       | Efficiency | Power factor | Rated speed                         | Rated current       | Efficiency | Power factor | Rated speed                         | Rated current       | Efficiency | Power factor |
|                | P <sub>n</sub><br>kW | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4   | Cos φ<br>4/4 | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4   | Cos φ<br>4/4 | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4   | Cos φ<br>4/4 |
| <b>2 poles</b> |                      |                                     |                     |            |              |                                     |                     |            |              |                                     |                     |            |              |
| FLSES 280 M    | 75                   | 2967                                | 131                 | 95.6       | 0.91         | 2976                                | 122                 | 95.6       | 0.895        | 1572                                | 110                 | 95.4       | 0.90         |
| FLSES 315 S    | 90                   | 2977                                | 159                 | 95.8       | 0.90         | 2981                                | 147                 | 96.0       | 0.89         | 3584                                | 133                 | 95.4       | 0.89         |
| FLSES 315 M    | 110                  | 2975                                | 193                 | 96.0       | 0.90         | 2979                                | 179                 | 96.0       | 0.89         | 3583                                | 162                 | 95.6       | 0.89         |
| FLSES 315 LA   | 132                  | 2975                                | 232                 | 96.2       | 0.90         | 2979                                | 214                 | 96.4       | 0.89         | 3583                                | 194                 | 95.8       | 0.89         |
| FLSES 315 LA   | 160                  | 2970                                | 284                 | 96.3       | 0.89         | 2975                                | 260                 | 96.3       | 0.89         | 3581                                | 233                 | 95.8       | 0.90         |
| FLSES 315 LB   | 200                  | 2969                                | 350                 | 96.5       | 0.90         | 2974                                | 324                 | 96.6       | 0.89         | 3580                                | 293                 | 96.2       | 0.89         |
| FLSES 355 LB   | 250                  | 2984                                | 452                 | 96.6       | 0.87         | 2989                                | 424                 | 96.6       | 0.85         | 3586                                | 378                 | 96.4       | 0.86         |
| FLSES 355 LB   | 315                  | 2978                                | 564                 | 96.5       | 0.88         | 2984                                | 521                 | 96.7       | 0.87         | 3582                                | 467                 | 96.2       | 0.88         |
| FLSES 355 LC   | 355                  | 2977                                | 635                 | 96.5       | 0.88         | 2982                                | 586                 | 96.8       | 0.87         | 3582                                | 532                 | 96.2       | 0.87         |
| <b>4 poles</b> |                      |                                     |                     |            |              |                                     |                     |            |              |                                     |                     |            |              |
| FLSES 315 S    | 75                   | 1487                                | 143                 | 96.1       | 0.83         | 1491                                | 134                 | 96.3       | 0.81         | 1792                                | 121                 | 96.2       | 0.81         |
| FLSES 315 S    | 90                   | 1488                                | 169                 | 96.1       | 0.84         | 1491                                | 161                 | 96.2       | 0.81         | 1791                                | 145                 | 96.2       | 0.81         |
| FLSES 315 M    | 110                  | 1487                                | 205                 | 96.0       | 0.85         | 1490                                | 194                 | 96.1       | 0.82         | 1791                                | 173                 | 96.2       | 0.83         |
| FLSES 315 LA   | 132                  | 1485                                | 239                 | 96.4       | 0.87         | 1488                                | 224                 | 96.5       | 0.85         | 1788                                | 202                 | 96.5       | 0.85         |
| FLSES 315 LB   | 160                  | 1486                                | 300                 | 96.6       | 0.84         | 1488                                | 281                 | 96.6       | 0.82         | 1787                                | 251                 | 96.5       | 0.83         |
| FLSES 355 LAL  | 200                  | 1488                                | 374                 | 96.7       | 0.84         | 1490                                | 355                 | 96.7       | 0.81         | 1791                                | 317                 | 96.6       | 0.82         |
| FLSES 355 LB   | 250                  | 1488                                | 454                 | 96.7       | 0.865        | 1491                                | 428                 | 96.8       | 0.84         | 1791                                | 381                 | 96.8       | 0.85         |
| FLSES 355 LB   | 280                  | 1488                                | 512                 | 96.7       | 0.86         | 1489                                | 479                 | 96.8       | 0.84         | 1789                                | 427                 | 96.8       | 0.85         |
| FLSES 355 LC   | 315                  | 1489                                | 562                 | 96.7       | 0.88         | 1489                                | 526                 | 96.8       | 0.86         | 1788                                | 469                 | 96.8       | 0.87         |
| FLSES 355 LD   | 355                  | 1490                                | 634                 | 96.7       | 0.88         | 1494                                | 580                 | 96.8       | 0.88         | 1793                                | 523                 | 96.8       | 0.88         |

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Cast iron frame

### Electrical and mechanical characteristics

#### IE4 - Powered by the drive

| Type          | 400V 50Hz            |                                     |                     |                 | % Rated torque M <sub>n</sub> at |      |      |      |      | Speed<br>mechanical<br>maximum |
|---------------|----------------------|-------------------------------------|---------------------|-----------------|----------------------------------|------|------|------|------|--------------------------------|
|               | Rated<br>power       | Rated<br>speed                      | Rated<br>current    | Power<br>factor | 10Hz                             | 17Hz | 25Hz | 50Hz | 60Hz |                                |
|               | P <sub>n</sub><br>kW | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | Cos φ<br>4/4    |                                  |      |      |      |      |                                |
| 2 poles       |                      |                                     |                     |                 |                                  |      |      |      |      |                                |
| FLSES 280 M   | 75                   | 2977                                | 137                 | 0.91            | 241                              | 241  | 241  | 241  | 200  | 3600                           |
| FLSES 315 S   | 90                   | 2982                                | 166                 | 0.90            | 288                              | 288  | 288  | 288  | 226  | 3600                           |
| FLSES 315 M   | 110                  | 2984                                | 212                 | 0.90            | 352                              | 352  | 352  | 352  | 292  | 3600                           |
| FLSES 315 LA  | 132                  | 2983                                | 240                 | 0.90            | 423                              | 423  | 423  | 423  | 350  | 3600                           |
| FLSES 315 LA  | 160                  | 2972                                | 293                 | 0.89            | 467                              | 490  | 514  | 514  | 424  | 3600                           |
| FLSES 315 LB  | 200                  | 2973                                | 365                 | 0.90            | 575                              | 600  | 642  | 642  | 530  | 3600                           |
| FLSES 355 LB  | 250                  | 2988                                | 460                 | 0.87            | 799                              | 799  | 799  | 799  | 665  | 3600                           |
| FLSES 355 LB  | 315                  | 2982                                | 580                 | 0.88            | 850                              | 930  | 1009 | 1009 | 840  | 3600                           |
| FLSES 355 LC  | 355                  | 2981                                | 630                 | 0.88            | 1000                             | 1070 | 1137 | 1137 | 950  | 3600                           |
| 4 poles       |                      |                                     |                     |                 |                                  |      |      |      |      |                                |
| FLSES 315 S   | 75                   | 1490                                | 142                 | 0.83            | 450                              | 465  | 481  | 481  | 401  | 2610                           |
| FLSES 315 S   | 90                   | 1488                                | 173                 | 0.84            | 577                              | 577  | 577  | 577  | 481  | 2610                           |
| FLSES 315 M   | 110                  | 1487                                | 212                 | 0.85            | 706                              | 706  | 706  | 706  | 588  | 2610                           |
| FLSES 315 LA  | 132                  | 1487                                | 260                 | 0.87            | 840                              | 870  | 884  | 884  | 737  | 2610                           |
| FLSES 315 LB  | 160                  | 1487                                | 316                 | 0.84            | 900                              | 950  | 1028 | 1028 | 857  | 2610                           |
| FLSES 355 LAL | 200                  | 1491                                | 381                 | 0.84            | 1281                             | 1281 | 1281 | 1281 | 1068 | 2610                           |
| FLSES 355 LB  | 250                  | 1490                                | 460                 | 0.87            | 1500                             | 1602 | 1602 | 1602 | 1335 | 2610                           |
| FLSES 355 LB  | 280                  | 1491                                | 531                 | 0.86            | 1650                             | 1703 | 1793 | 1793 | 1040 | 2610                           |
| FLSES 355 LC  | 315                  | 1488                                | 570                 | 0.88            | 1620                             | 1825 | 2022 | 2022 | 1685 | 2610                           |
| FLSES 355 LD  | 355                  | 1493                                | 635                 | 0.88            | 2000                             | 2100 | 2271 | 2271 | 1893 | 2610                           |

### Summary of recommended protection devices

| Mains voltage       | Cable length       | Frame size      | Winding protection  | Insulated bearings                     |
|---------------------|--------------------|-----------------|---------------------|----------------------------------------|
| ≤ 480 V             | < 20 m             | All frame sizes | Standard            | No                                     |
|                     | > 20 m and < 100 m | ≤ 315           | Standard            | No                                     |
|                     |                    | ≥ 315           | RIS or drive filter | NDE                                    |
| > 480 V and ≤ 690 V | < 20 m             | < 250           | Standard            | No                                     |
|                     |                    | ≥ 250           | RIS or drive filter | NDE                                    |
|                     | > 20 m and < 100 m | ≤ 250           | RIS or drive filter | NDE                                    |
|                     |                    | ≥ 250           | RIS or drive filter | NDE (or DE+NDE if no filter for ≥ 315) |

**RIS:** Reinforced Insulation System.

**The filter is recommended above frame size 315.**

Standard insulation = **1500 V peak and 3500 V/μs.**

Protection solutions exist (insulation for winding and bearings).

For different cable length(s) and/or voltage(s), please consult Leroy-Somer.



# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Cast iron frame

### Electrical and mechanical characteristics

### Mains connection

#### DESCRIPTIVE TABLE OF TERMINAL BOXES FOR 400 V RATED SUPPLY VOLTAGE (in accordance with EN 50262)

| Series | Type        | No. of poles | Terminal box material | Power + auxiliaries     |                                                              |
|--------|-------------|--------------|-----------------------|-------------------------|--------------------------------------------------------------|
|        |             |              |                       | Number of drill holes   | Drill hole diameter*                                         |
| FLSES  | 80          | 2 ; 4        | Cast iron             | 1<br>(2 if auxiliaries) | ISO M20 X 1.5                                                |
|        | 90          | 2; 4; 6      |                       |                         |                                                              |
|        | 100         | 2; 4; 6      |                       |                         |                                                              |
|        | 112         | 2; 4; 6      |                       | 2                       | ISO M25 X 1.5                                                |
|        | 132         | 2; 4; 6      |                       |                         |                                                              |
|        | 160         | 2; 4; 6      |                       | 0                       | Removable undrilled mounting plate<br>(see details page 164) |
|        | 180         | 2; 4; 6      |                       |                         |                                                              |
|        | 200         | 2; 4; 6      |                       |                         |                                                              |
|        | 225         | 2; 4; 6      |                       |                         |                                                              |
|        | 250         | 2; 4; 6      |                       |                         |                                                              |
|        | 280         | 2; 4; 6      |                       |                         |                                                              |
|        | 315         | 2; 4; 6      |                       |                         |                                                              |
|        | 355/400/450 | 2; 4; 6      |                       |                         |                                                              |

\* As an option, both ISO M25 cable glands may be replaced by 1 ISO x M25 and 1 ISO x M32 (to comply with standard DIN 42925).

#### TERMINAL BLOCKS DIRECTION OF ROTATION

Standard motors are fitted with a block of 6 terminals complying with standard NFC 51 120, with the terminal markings complying with IEC 60034-8 (or NF EN 60034-8).

When the motor is running in U1, V1, W1 or 1U, 1V, 1W from a direct mains supply L1, L2, L3, it turns clockwise when seen from the drive shaft end.

If any two of the phases are changed over, the motor will run in an anticlockwise direction (make sure that the motor has been designed to run in both directions).

If the motor is fitted with accessories (thermal protection or space heater), these must be connected on screw dominos with labelled wires.

#### Tightening torque for the nuts on the terminal blocks

| Terminal   | M5  | M6 | M8 | M10 | M12 | M14 | M16 |
|------------|-----|----|----|-----|-----|-----|-----|
| Torque N.m | 2.5 | 4  | 10 | 20  | 35  | 50  | 65  |

| Series | Type         | 230/400V connections |           | 400/690V connections |
|--------|--------------|----------------------|-----------|----------------------|
|        |              | No. of poles         | Terminals | Terminals            |
| FLSES  | 80 to 112    | 2 ; 4 ; 6            | M5        | M5                   |
|        | 132 S to 160 | 2 ; 4 ; 6            | M6        | M6                   |
|        | 180 L        | 6                    | M6        | M6                   |
|        | 180 M        | 4                    | M8        | M6                   |
|        | 180 LUR      | 6                    | M6        | M6                   |
|        | 180 MUR      | 2 ; 4                | M8        | M6                   |
|        | 200 LU       | 2 (30 kW) ; 4 ; 6    | M8        | M8                   |
|        |              | 2 (37 kW)            | M10       | M8                   |
|        | 225 M        | 4                    | M10       | M8                   |
|        |              | 6                    | M8        |                      |
|        | 225 to 250   | 2                    | M10       | M8                   |
|        |              | 4                    |           | M10                  |
|        | 250 M        | 6                    | M8        | M8                   |
|        | 280 to 315   | 2 ; 4 ; 6            | M12       | M12                  |
|        | 355 L        | 2 ; 4 ; 6            | M12       | M12                  |
|        | 355 LK       | 4 ; 6                | M14       | M14                  |
|        | 355 LKB      | 2                    | M14       | M14                  |
|        |              | 4                    |           |                      |
|        | 355 LKC      | 6                    | M14       | M14                  |
|        | 400 LB       | 2 ; 4                | M14       | M14                  |
|        | 450 LA       | 4 ; 6                | M14       | M14                  |
|        | 450 LB       | 4 ; 6                | M14       | M14                  |
|        | 450 LC       | 6                    | M14       | M14                  |
|        | 450 LD       | 4                    | M14       | M14                  |

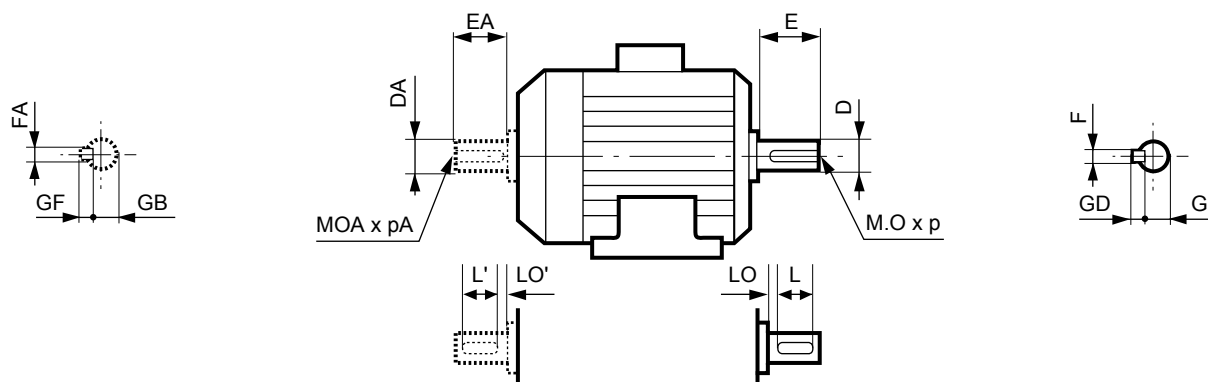
# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Cast iron frame

### Dimensions

### Shaft extensions

Dimensions in millimetres



| Type                  | Main shaft extensions |    |       |      |     |    |    |     |    |         |    |      |      |     |    |    |     |    |
|-----------------------|-----------------------|----|-------|------|-----|----|----|-----|----|---------|----|------|------|-----|----|----|-----|----|
|                       | 4 and 6 poles         |    |       |      |     |    |    |     |    | 2 poles |    |      |      |     |    |    |     |    |
|                       | F                     | GD | D     | G    | E   | O  | p  | L   | LO | F       | GD | D    | G    | E   | O  | p  | L   | LO |
| FLSES 80 L/LG/LU      | 6                     | 6  | 19j6  | 15.5 | 40  | 6  | 16 | 30  | 6  | 6       | 6  | 19j6 | 15.5 | 40  | 6  | 16 | 30  | 6  |
| FLSES 90 S/L/LU       | 8                     | 7  | 24j6  | 20   | 50  | 8  | 19 | 40  | 6  | 8       | 7  | 24j6 | 20   | 50  | 8  | 19 | 40  | 6  |
| FLSES 90 SL           | 8                     | 7  | 24j6  | 20   | 50  | 8  | 19 | 40  | 6  | 8       | 7  | 24j6 | 20   | 50  | 8  | 19 | 40  | 6  |
| FLSES 100 L           | 8                     | 7  | 28j6  | 24   | 60  | 10 | 22 | 50  | 6  | 8       | 7  | 28j6 | 24   | 60  | 10 | 22 | 50  | 6  |
| FLSES 100 LG          | 8                     | 7  | 28j6  | 24   | 60  | 10 | 22 | 50  | 6  | 8       | 7  | 28j6 | 24   | 60  | 10 | 22 | 50  | 6  |
| FLSES 100 LR          | 8                     | 7  | 28j6  | 24   | 60  | 10 | 22 | 50  | 6  | 8       | 7  | 28j6 | 24   | 60  | 10 | 22 | 50  | 6  |
| FLSES 112 M/MG/MU     | 8                     | 7  | 28j6  | 24   | 60  | 10 | 22 | 50  | 6  | 8       | 7  | 28j6 | 24   | 60  | 10 | 22 | 50  | 6  |
| FLSES 132 S/M/MR/MU   | 10                    | 8  | 38k6  | 33   | 80  | 12 | 28 | 63  | 10 | 10      | 8  | 38k6 | 33   | 80  | 12 | 28 | 63  | 10 |
| FLSES 132 SM          | 10                    | 8  | 38k6  | 33   | 80  | 12 | 28 | 63  | 10 | 10      | 8  | 38k6 | 33   | 80  | 12 | 28 | 63  | 10 |
| FLSES 160 M/L/LU      | 12                    | 8  | 42k6  | 37   | 110 | 16 | 36 | 100 | 6  | 12      | 8  | 42k6 | 37   | 110 | 16 | 36 | 90  | 6  |
| FLSES 160 MU          | 12                    | 8  | 42k6  | 37   | 110 | 16 | 36 | 90  | 20 | 12      | 8  | 42k6 | 37   | 110 | 16 | 36 | 90  | 20 |
| FLSES 160 LUR         | 12                    | 8  | 42k6  | 37   | 110 | 16 | 36 | 90  | 20 | 12      | 8  | 42k6 | 37   | 110 | 16 | 36 | 90  | 20 |
| FLSES 180 MT          | 14                    | 9  | 48k6  | 42.5 | 110 | 16 | 36 | 90  | 20 | 14      | 9  | 48k6 | 42.5 | 110 | 16 | 36 | 90  | 20 |
| FLSES 180 MUR         | 14                    | 9  | 48k6  | 42.5 | 110 | 16 | 36 | 90  | 20 | 14      | 9  | 48k6 | 42.5 | 110 | 16 | 36 | 98  | 12 |
| FLSES 180 M/MR/L/LUR  | 14                    | 9  | 48k6  | 42.5 | 110 | 16 | 36 | 98  | 12 | 14      | 9  | 48k6 | 42.5 | 110 | 16 | 36 | 98  | 12 |
| FLSES 200 LU          | 16                    | 10 | 55m6  | 49   | 110 | 20 | 42 | 90  | 20 | 16      | 10 | 55m6 | 49   | 110 | 20 | 42 | 90  | 20 |
| FLSES 225 SR/M/MR/S   | 18                    | 11 | 60m6  | 53   | 140 | 20 | 42 | 125 | 15 | 16      | 10 | 55m6 | 49   | 110 | 20 | 42 | 90  | 20 |
| FLSES 225 SG          | 18                    | 11 | 60m6  | 53   | 140 | 20 | 42 | 125 | 15 | 16      | 10 | 55m6 | 49   | 110 | 20 | 42 | 125 | 15 |
| FLSES 250 M           | 18                    | 11 | 65m6  | 58   | 140 | 20 | 42 | 125 | 15 | 18      | 11 | 60m6 | 53   | 140 | 20 | 42 | 125 | 15 |
| FLSES 250 MR          | 18                    | 11 | 65m6  | 58   | 140 | 20 | 42 | 125 | 15 | 18      | 11 | 65m6 | 58   | 140 | 20 | 42 | 125 | 15 |
| FLSES 280 S/M         | 20                    | 12 | 75m6  | 67.5 | 140 | 20 | 42 | 125 | 15 | 18      | 11 | 65m6 | 58   | 140 | 20 | 42 | 125 | 15 |
| FLSES 315 S/M         | 22                    | 14 | 80m6  | 71   | 170 | 20 | 42 | 140 | 30 | 18      | 11 | 65m6 | 58   | 140 | 20 | 42 | 125 | 15 |
| FLSES 315 LA/LB       | 25                    | 14 | 90m6  | 81   | 170 | 24 | 50 | 140 | 30 | 20      | 12 | 70m6 | 62.5 | 140 | 20 | 42 | 125 | 15 |
| FLSES 355 LA/LB/LC/LD | 28                    | 16 | 100m6 | 90   | 210 | 24 | 50 | 180 | 30 | 22      | 14 | 80m6 | 71   | 170 | 20 | 42 | 140 | 30 |
| FLSES 355 LAL         | 28                    | 16 | 100m6 | 90   | 210 | 24 | 50 | 180 | 30 | -       | -  | -    | -    | -   | -  | -  | -   | -  |
| FLSES 355 LKB         | 28                    | 16 | 100m6 | 90   | 210 | 24 | 50 | 180 | 30 | 22      | 14 | 80m6 | 71   | 170 | 20 | 42 | 140 | 30 |
| FLSES 355 LKC         | 28                    | 16 | 100m6 | 90   | 210 | 24 | 50 | 180 | 30 | -       | -  | -    | -    | -   | -  | -  | -   | -  |
| FLSES 400 LB          | 28                    | 16 | 110m6 | 100  | 210 | 24 | 50 | 180 | 30 | 22      | 14 | 80m6 | 71   | 170 | 20 | 42 | 140 | 30 |
| FLSES 450 LA          | 32                    | 18 | 120m6 | 109  | 210 | 24 | 50 | 180 | 30 | -       | -  | -    | -    | -   | -  | -  | -   | -  |
| FLSES 450 LB          | 32                    | 18 | 120m6 | 109  | 210 | 24 | 50 | 180 | 30 | -       | -  | -    | -    | -   | -  | -  | -   | -  |
| FLSES 450 LC          | 32                    | 18 | 120m6 | 109  | 210 | 24 | 50 | 180 | 30 | -       | -  | -    | -    | -   | -  | -  | -   | -  |
| FLSES 450 LD          | 32                    | 18 | 120m6 | 109  | 210 | 24 | 50 | 180 | 30 | -       | -  | -    | -    | -   | -  | -  | -   | -  |

| Type                  | Secondary shaft extensions |    |       |      |     |    |    |     |     |         |    |      |      |     |    |    |     |     |
|-----------------------|----------------------------|----|-------|------|-----|----|----|-----|-----|---------|----|------|------|-----|----|----|-----|-----|
|                       | 4 and 6 poles              |    |       |      |     |    |    |     |     | 2 poles |    |      |      |     |    |    |     |     |
|                       | FA                         | GF | DA    | GB   | EA  | OA | pA | L'  | LO' | FA      | GF | DA   | GB   | EA  | OA | pA | L'  | LO' |
| FLSES 80 L/LG/LU      | 5                          | 5  | 14j6  | 11   | 30  | 5  | 15 | 25  | 3.5 | 5       | 5  | 14j6 | 11   | 30  | 5  | 15 | 25  | 3.5 |
| FLSES 90 S/L/LU       | 6                          | 6  | 19j6  | 15.5 | 40  | 6  | 16 | 30  | 6   | 6       | 6  | 19j6 | 15.5 | 40  | 6  | 16 | 30  | 6   |
| FLSES 90 SL           | 6                          | 6  | 19j6  | 15.5 | 40  | 6  | 16 | 30  | 6   | 6       | 6  | 19j6 | 15.5 | 40  | 6  | 16 | 30  | 6   |
| FLSES 100 L           | 8                          | 7  | 24j6  | 20   | 50  | 8  | 19 | 40  | 6   | 8       | 7  | 24j6 | 20   | 50  | 8  | 19 | 40  | 6   |
| FLSES 100 LG          | 8                          | 7  | 24j6  | 20   | 50  | 8  | 19 | 40  | 6   | 8       | 7  | 24j6 | 20   | 50  | 8  | 19 | 40  | 6   |
| FLSES 100 LR          | 8                          | 7  | 24j6  | 20   | 50  | 8  | 19 | 40  | 6   | 8       | 7  | 24j6 | 20   | 50  | 8  | 19 | 40  | 6   |
| FLSES 112 M/MG/MU     | 8                          | 7  | 24j6  | 20   | 50  | 8  | 19 | 40  | 6   | 8       | 7  | 24j6 | 20   | 50  | 8  | 19 | 40  | 6   |
| FLSES 132 S/M/MR/MU   | 8                          | 7  | 28k6  | 24   | 60  | 10 | 22 | 50  | 6   | 8       | 7  | 28k6 | 24   | 60  | 10 | 22 | 50  | 6   |
| FLSES 132 SM          | 8                          | 7  | 28k6  | 24   | 60  | 10 | 22 | 50  | 6   | 8       | 7  | 28k6 | 24   | 60  | 10 | 22 | 50  | 6   |
| FLSES 160 M/L/LU      | 12                         | 8  | 42k6  | 37   | 110 | 16 | 36 | 100 | 6   | 12      | 8  | 42k6 | 37   | 110 | 16 | 36 | 100 | 6   |
| FLSES 160 MU          | 12                         | 8  | 42k6  | 37   | 110 | 16 | 36 | 100 | 6   | 12      | 8  | 42k6 | 37   | 110 | 16 | 36 | 100 | 6   |
| FLSES 160 LUR         | 12                         | 8  | 42k6  | 37   | 110 | 16 | 36 | 90  | 20  | 12      | 8  | 42k6 | 37   | 110 | 16 | 36 | 90  | 20  |
| FLSES 180 MT          | 14                         | 9  | 48k6  | 42.5 | 110 | 16 | 36 | 90  | 20  | 14      | 9  | 48k6 | 42.5 | 110 | 16 | 36 | 90  | 20  |
| FLSES 180 MUR         | 14                         | 9  | 48k6  | 42.5 | 110 | 16 | 36 | 90  | 20  | 14      | 9  | 48k6 | 42.5 | 110 | 16 | 36 | 90  | 20  |
| FLSES 180 M/MR/L/LUR  | 14                         | 9  | 48k6  | 42.5 | 110 | 16 | 36 | 98  | 12  | 14      | 9  | 48k6 | 42.5 | 110 | 16 | 36 | 98  | 12  |
| FLSES 200 LU          | 16                         | 10 | 55m6  | 49   | 110 | 20 | 42 | 90  | 20  | 16      | 10 | 55m6 | 49   | 110 | 20 | 42 | 90  | 20  |
| FLSES 225 SR/M/MR/S   | 18                         | 11 | 60m6  | 53   | 140 | 20 | 42 | 125 | 15  | 16      | 10 | 55m6 | 49   | 110 | 20 | 42 | 90  | 20  |
| FLSES 225 SG          | 18                         | 11 | 60m6  | 53   | 140 | 20 | 42 | 125 | 15  | 16      | 10 | 55m6 | 49   | 110 | 20 | 42 | 125 | 15  |
| FLSES 250 M           | 18                         | 11 | 60m6  | 53   | 140 | 20 | 42 | 125 | 15  | 18      | 11 | 60m6 | 53   | 140 | 20 | 42 | 125 | 15  |
| FLSES 250 MR          | 18                         | 11 | 60m6  | 53   | 140 | 20 | 42 | 125 | 15  | 18      | 11 | 60m6 | 53   | 140 | 20 | 42 | 125 | 15  |
| FLSES 280 S/M         | 20                         | 12 | 60m6  | 53   | 140 | 20 | 42 | 125 | 15  | 18      | 11 | 60m6 | 53   | 140 | 20 | 42 | 125 | 15  |
| FLSES 315 S/M         | 20                         | 12 | 70m6  | 62.5 | 140 | 20 | 42 | 125 | 15  | 18      | 11 | 65m6 | 58   | 140 | 20 | 42 | 125 | 15  |
| FLSES 315 LA/LB       | 20                         | 12 | 70m6  | 62.5 | 140 | 20 | 42 | 125 | 15  | 20      | 12 | 70m6 | 62.5 | 140 | 20 | 42 | 125 | 15  |
| FLSES 355 LA/LB/LC/LD | 28                         | 16 | 100m6 | 90   | 210 | 24 | 50 | 180 | 30  | 22      | 14 | 80m6 | 71   | 170 | 20 | 42 | 140 | 30  |
| FLSES 355 LAL         | 28                         | 16 | 100m6 | 90   | 210 | 24 | 50 | 180 | 30  | -       | -  | -    | -    | -   | -  | -  | -   | -   |
| FLSES 355 LKB         | 28                         | 16 | 100m6 | 90   | 210 | 24 | 50 | 180 | 30  | 22      | 14 | 80m6 | 71   | 170 | 20 | 42 | 140 | 30  |
| FLSES 355 LKC         | 28                         | 16 | 100m6 | 90   | 210 | 24 | 50 | 180 | 30  | -       | -  | -    | -    | -   | -  | -  | -   | -   |
| FLSES 400 LB          | 28                         | 16 | 110m6 | 100  | 210 | 24 | 50 | 180 | 30  | 22      | 14 | 80m6 | 71   | 170 | 20 | 42 | 140 | 30  |
| FLSES 450 LA          | 32                         | 18 | 120m6 | 109  | 210 | 24 | 50 | 180 | 30  | -       | -  | -    | -    | -   | -  | -  | -   | -   |
| FLSES 450 LB          | 32                         | 18 | 120m6 | 109  | 210 | 24 | 50 | 180 | 30  | -       | -  | -    | -    | -   | -  | -  | -   | -   |
| FLSES 450 LC          | 32                         | 18 | 120m6 | 109  | 210 | 24 | 50 | 180 | 30  | -       | -  | -    | -    | -   | -  | -  | -   | -   |
| FLSES 450 LD          | 32                         | 18 | 120m6 | 109  | 210 | 24 | 50 | 180 | 30  | -       | -  | -    | -    | -   | -  | -  | -   | -   |

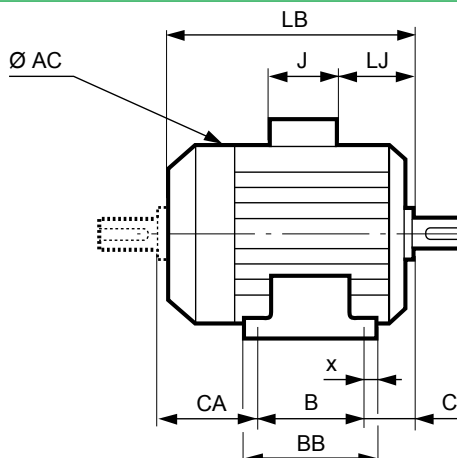
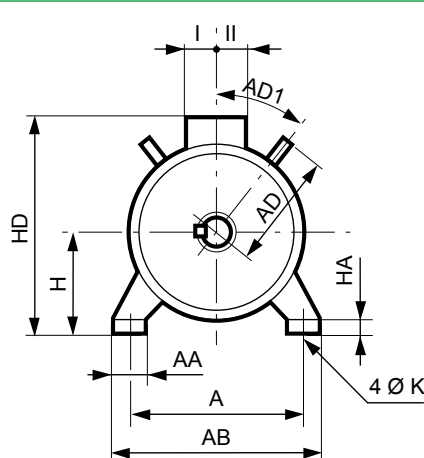
IP55 CAST IRON MOTORS

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Cast iron frame

## Dimensions

## Foot mounted IM 1001 (IM B3)



Dimensions in millimetres

| Type            | Main dimensions |     |      |      |     |    |     |      |    |     |     |      |      |      |     |     |     |     |      |     |
|-----------------|-----------------|-----|------|------|-----|----|-----|------|----|-----|-----|------|------|------|-----|-----|-----|-----|------|-----|
|                 | A               | AB  | B    | BB   | C   | x  | AA  | K    | HA | H   | AC* | HD   | LB   | LJ   | J   | I   | II  | AD  | AD1  | CA  |
| FLSES 80 L      | 125             | 157 | 100  | 130  | 50  | 18 | 34  | 10   | 10 | 80  | 170 | 228  | 212  | 7    | 136 | 68  | 68  | -   | -    | 68  |
| FLSES 80 LU     | 125             | 157 | 100  | 130  | 50  | 18 | 34  | 10   | 11 | 80  | 170 | 228  | 267  | 7    | 136 | 68  | 68  | -   | -    | 120 |
| FLSES 80 LG     | 125             | 170 | 100  | 138  | 50  | 22 | 39  | 10   | 10 | 80  | 203 | 238  | 245  | 8    | 136 | 68  | 68  | 135 | 41   | 100 |
| FLSES 90 L      | 140             | 170 | 125  | 162  | 56  | 28 | 33  | 10   | 10 | 90  | 196 | 248  | 246  | 8    | 136 | 68  | 68  | 135 | 41   | 68  |
| FLSES 90 LU     | 140             | 170 | 125  | 162  | 56  | 28 | 33  | 10   | 10 | 90  | 196 | 248  | 266  | 8    | 136 | 68  | 68  | 135 | 41   | 88  |
| FLSES 90 SL     | 140             | 170 | 125  | 162  | 56  | 28 | 33  | 10   | 10 | 90  | 196 | 248  | 246  | 8    | 136 | 68  | 68  | 135 | 41   | 93  |
| FLSES 90 S      | 140             | 170 | 100  | 162  | 56  | 28 | 33  | 10   | 10 | 90  | 196 | 248  | 246  | 8    | 136 | 68  | 68  | 135 | 41   | 95  |
| FLSES 100 L     | 160             | 196 | 140  | 185  | 63  | 29 | 40  | 12   | 13 | 100 | 204 | 258  | 290  | 8    | 136 | 68  | 68  | 135 | 41   | 92  |
| FLSES 100 LR    | 160             | 196 | 140  | 185  | 63  | 29 | 40  | 12   | 13 | 100 | 230 | 258  | 318  | 8    | 136 | 68  | 68  | 135 | 41   | 109 |
| FLSES 100 LG    | 160             | 200 | 140  | 176  | 63  | 24 | 45  | 12   | 11 | 100 | 204 | 283  | 309  | 18   | 136 | 68  | 68  | 148 | 41   | 120 |
| FLSES 100 LK    | 160             | 200 | 140  | 174  | 63  | 22 | 38  | 12   | 11 | 100 | 248 | 282  | 319  | 44   | 136 | 68  | 68  | -   | -    | 120 |
| FLSES 112 M     | 190             | 230 | 140  | 186  | 70  | 32 | 48  | 12   | 12 | 112 | 230 | 294  | 309  | 18   | 136 | 68  | 68  | 148 | 41   | 109 |
| FLSES 112 MG    | 190             | 230 | 140  | 186  | 70  | 32 | 48  | 12   | 12 | 112 | 230 | 294  | 309  | 18   | 136 | 68  | 68  | 148 | 41   | 109 |
| FLSES 112 MU    | 190             | 230 | 140  | 186  | 70  | 32 | 48  | 12   | 12 | 112 | 230 | 294  | 332  | 18   | 136 | 68  | 68  | 148 | 41   | 128 |
| FLSES 132 M     | 216             | 255 | 178  | 240  | 89  | 50 | 63  | 12   | 16 | 132 | 270 | 335  | 385  | 22   | 136 | 68  | 68  | 165 | 37.5 | 126 |
| FLSES 132 MR    | 216             | 255 | 178  | 240  | 89  | 50 | 63  | 12   | 16 | 132 | 270 | 335  | 441  | 22   | 136 | 68  | 68  | 165 | 37.5 | 182 |
| FLSES 132 MU    | 216             | 255 | 178  | 240  | 89  | 50 | 63  | 12   | 16 | 132 | 270 | 335  | 426  | 22   | 136 | 68  | 68  | 165 | 37.5 | 153 |
| FLSES 132 SM    | 216             | 255 | 140  | 240  | 89  | 50 | 63  | 12   | 16 | 132 | 270 | 335  | 385  | 22   | 136 | 68  | 68  | 165 | 37.5 | 164 |
| FLSES 132 S     | 216             | 255 | 140  | 240  | 89  | 50 | 63  | 12   | 16 | 132 | 270 | 335  | 385  | 22   | 136 | 68  | 68  | 165 | 37.5 | 164 |
| FLSES 160 MUR   | 254             | 294 | 210  | 294  | 108 | 20 | 65  | 14.5 | 20 | 160 | 315 | 436  | 510  | 30   | 246 | 126 | 148 | -   | -    | 197 |
| FLSES 160 LUR   | 254             | 294 | 254  | 294  | 108 | 20 | 65  | 14.5 | 20 | 160 | 315 | 436  | 510  | 30   | 246 | 126 | 148 | -   | -    | 153 |
| FLSES 160 MU    | 254             | 294 | 210  | 294  | 108 | 20 | 65  | 14.5 | 20 | 160 | 315 | 436  | 510  | 30   | 246 | 126 | 148 | -   | -    | 197 |
| FLSES 160 LU    | 254             | 294 | 254  | 294  | 108 | 20 | 65  | 14.5 | 20 | 160 | 315 | 436  | 510  | 30   | 246 | 126 | 148 | -   | -    | 153 |
| FLSES 160 M     | 254             | 294 | 210  | 294  | 108 | 20 | 65  | 14.5 | 20 | 160 | 315 | 436  | 495  | 30   | 246 | 126 | 148 | -   | -    | 182 |
| FLSES 160 L     | 254             | 294 | 254  | 294  | 108 | 20 | 65  | 14.5 | 20 | 160 | 315 | 436  | 495  | 30   | 246 | 126 | 148 | -   | -    | 138 |
| FLSES 180 M     | 276             | 330 | 241  | 330  | 121 | 28 | 70  | 14.5 | 28 | 180 | 353 | 477  | 552  | 43   | 244 | 126 | 148 | -   | -    | 197 |
| FLSES 180 L     | 279             | 330 | 279  | 330  | 121 | 28 | 70  | 14.5 | 28 | 180 | 353 | 477  | 552  | 43   | 244 | 126 | 148 | -   | -    | 159 |
| FLSES 180 MUR   | 279             | 330 | 241  | 330  | 121 | 28 | 70  | 14.5 | 28 | 180 | 353 | 477  | 614  | 43   | 244 | 126 | 148 | -   | -    | 262 |
| FLSES 180 LUR   | 279             | 330 | 279  | 330  | 121 | 28 | 70  | 14.5 | 28 | 180 | 353 | 477  | 614  | 43   | 244 | 126 | 148 | -   | -    | 224 |
| FLSES 180 M     | 279             | 330 | 241  | 330  | 121 | 28 | 70  | 14.5 | 28 | 180 | 353 | 477  | 552  | 43   | 244 | 126 | 148 | -   | -    | 197 |
| FLSES 180 L     | 279             | 330 | 279  | 330  | 121 | 28 | 70  | 14.5 | 28 | 180 | 353 | 477  | 552  | 43   | 244 | 126 | 148 | -   | -    | 159 |
| FLSES 180 MT    | 279             | 324 | 241  | 290  | 121 | 25 | 80  | 14.5 | 25 | 180 | 315 | 456  | 510  | 31   | 246 | 126 | 148 | 200 | 45   | 155 |
| FLSES 200 LU    | 318             | 374 | 305  | 360  | 133 | 28 | 60  | 18.5 | 17 | 200 | 373 | 528  | 669  | 49   | 246 | 126 | 148 | 230 | 45   | 244 |
| FLSES 225 S     | 356             | 426 | 286  | 375  | 149 | 32 | 80  | 18.5 | 27 | 225 | 487 | 652  | 779  | 70   | 352 | 175 | 212 | -   | -    | 351 |
| FLSES 225 M     | 356             | 426 | 311  | 375  | 149 | 32 | 80  | 18.5 | 27 | 225 | 487 | 652  | 779  | 70   | 352 | 175 | 212 | -   | -    | 326 |
| FLSES 225 SR    | 356             | 426 | 286  | 375  | 149 | 32 | 70  | 18.5 | 17 | 225 | 391 | 553  | 676  | 56   | 246 | 126 | 148 | -   | -    | 253 |
| FLSES 225 MR    | 356             | 426 | 311  | 375  | 149 | 32 | 70  | 18.5 | 17 | 225 | 391 | 553  | 676  | 56   | 246 | 126 | 148 | -   | -    | 228 |
| FLSES 250 M     | 406             | 476 | 349  | 413  | 168 | 32 | 80  | 24   | 27 | 250 | 487 | 677  | 779  | 70   | 352 | 175 | 212 | -   | -    | 269 |
| FLSES 250 S/M   | 406             | 476 | 349  | 413  | 168 | 32 | 80  | 24   | 27 | 250 | 487 | 677  | 779  | 70   | 352 | 175 | 212 | -   | -    | 269 |
| FLSES 250 MR    | 406             | 476 | 349  | 413  | 168 | 32 | 80  | 24   | 27 | 250 | 487 | 677  | 859  | 71   | 352 | 175 | 212 | -   | -    | 408 |
| FLSES 280 M     | 457             | 527 | 419  | 486  | 190 | 33 | 80  | 24   | 30 | 280 | 481 | 729  | 959  | 69.5 | 352 | 176 | 305 | -   | -    | 45  |
| FLSES 280 S     | 457             | 527 | 368  | 486  | 190 | 33 | 80  | 24   | 30 | 280 | 481 | 729  | 959  | 69.5 | 352 | 176 | 305 | -   | -    | 45  |
| FLSES 315 LA    | 508             | 600 | 508  | 610  | 216 | 58 | 100 | 28   | 35 | 315 | 600 | 840  | 1177 | 101  | 452 | 219 | 269 | 343 | 45   |     |
| FLSES 315 LB    | 508             | 600 | 508  | 610  | 216 | 58 | 100 | 28   | 35 | 315 | 600 | 840  | 1177 | 101  | 452 | 219 | 269 | 343 | 45   |     |
| FLSES 315 M     | 508             | 600 | 457  | 610  | 216 | 58 | 100 | 28   | 35 | 315 | 600 | 840  | 1177 | 101  | 452 | 219 | 269 | 343 | 45   |     |
| FLSES 315 S     | 508             | 600 | 406  | 610  | 216 | 58 | 100 | 28   | 35 | 315 | 600 | 840  | 1177 | 101  | 452 | 219 | 269 | 343 | 45   |     |
| FLSES 355 LA    | 610             | 710 | 630  | 756  | 254 | 76 | 100 | 28   | 35 | 355 | 688 | 922  | 1303 | 121  | 452 | 219 | 269 | -   | -    |     |
| FLSES 355 LAL   | 610             | 710 | 630  | 756  | 254 | 76 | 100 | 28   | 35 | 355 | 688 | 925  | 1303 | 121  | 452 | 219 | 269 | -   | -    |     |
| FLSES 355 LB    | 610             | 710 | 630  | 756  | 254 | 76 | 100 | 28   | 35 | 355 | 688 | 922  | 1303 | 121  | 452 | 219 | 269 | -   | -    |     |
| FLSES 355 LC/LD | 610             | 710 | 630  | 756  | 254 | 76 | 100 | 28   | 35 | 355 | 688 | 922  | 1303 | 121  | 452 | 219 | 269 | -   | -    |     |
| FLSES 355 LK    | 610             | 750 | 630  | 815  | 254 | 40 | 128 | 28   | 45 | 355 | 787 | 1117 | 1702 | 52   | 700 | 224 | 396 | -   | -    |     |
| FLSES 355 LKB   | 610             | 750 | 630  | 815  | 254 | 40 | 128 | 28   | 45 | 355 | 787 | 1117 | 1702 | 52   | 700 | 224 | 396 | -   | -    |     |
| FLSES 355 LKC   | 610             | 750 | 630  | 815  | 254 | 40 | 128 | 28   | 45 | 355 | 787 | 1117 | 1702 | 52   | 700 | 224 | 396 | -   | -    |     |
| FLSES 400 LB    | 686             | 800 | 710  | 815  | 280 | 65 | 128 | 35   | 45 | 400 | 787 | 1162 | 1702 | 52   | 700 | 224 | 396 | -   | -    |     |
| FLSES 450 LA    | 750             | 890 | 800  | 950  | 315 | 94 | 140 | 35   | 45 | 450 | 877 | 1260 | 1740 | 68   | 700 | 224 | 396 | -   | -    |     |
| FLSES 450 LB    | 750             | 890 | 800  | 950  | 315 | 94 | 140 | 35   | 45 | 450 | 877 | 1260 | 1740 | 68   | 700 | 224 | 396 | -   | -    |     |
| FLSES 450 LC    | 750             | 890 | 1000 | 1170 | 315 | 94 | 140 | 35   | 45 | 450 | 877 | 1260 | 2088 | 68   | 700 | 224 | 396 | -   | -    |     |
| FLSES 450 LD    | 750             | 890 | 1000 | 1170 | 315 | 94 | 140 | 35   | 45 | 450 | 877 | 1260 | 2088 | 68   | 700 | 224 | 396 | -   | -    |     |

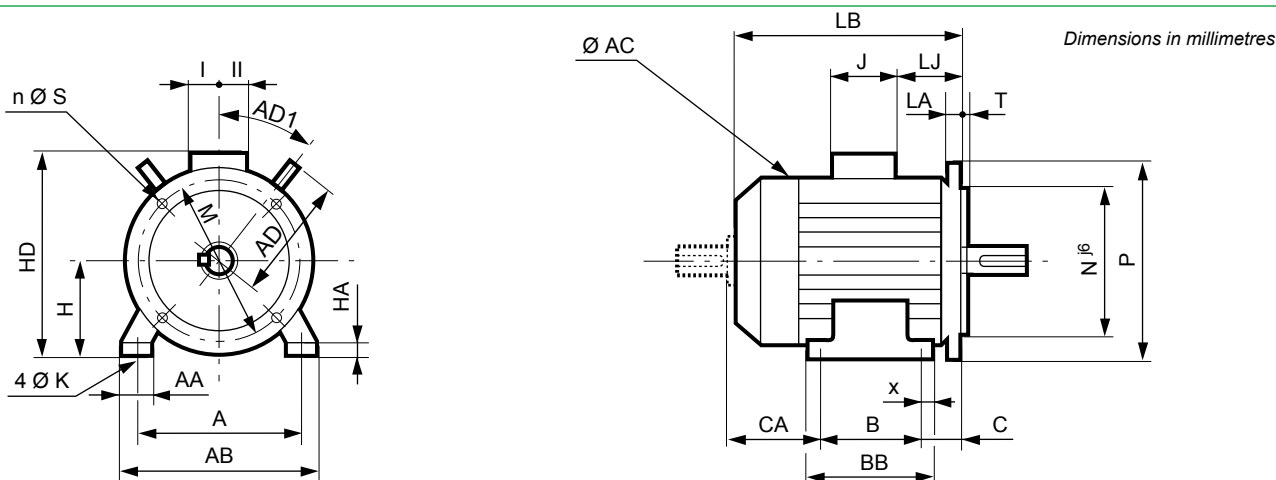
\* AC: housing diameter without lifting rings

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Cast iron frame

### Dimensions

### Foot and flange mounted IM 2001 ( IM B35)



| Type            | Main dimensions |     |      |      |                 |    |     |      |    |     |     |      |      |      |     |     |     |     |      |     |         |
|-----------------|-----------------|-----|------|------|-----------------|----|-----|------|----|-----|-----|------|------|------|-----|-----|-----|-----|------|-----|---------|
|                 | A               | AB  | B    | BB   | C               | x  | AA  | K    | HA | H   | AC* | HD   | LB   | LJ   | J   | I   | II  | AD  | AD1  | CA  | Symb    |
| FLSES 80 L      | 125             | 157 | 100  | 130  | 50              | 18 | 34  | 10   | 10 | 80  | 170 | 228  | 212  | 7    | 136 | 68  | 68  | -   | -    | 68  | FF 165  |
| FLSES 80 LU     | 125             | 157 | 100  | 130  | 50              | 18 | 34  | 10   | 11 | 80  | 170 | 228  | 267  | 7    | 136 | 68  | 68  | -   | -    | 120 | FF 165  |
| FLSES 80 LG     | 125             | 170 | 100  | 138  | 70 <sup>1</sup> | 22 | 39  | 10   | 10 | 80  | 203 | 238  | 265  | 28   | 136 | 68  | 68  | 135 | 41   | 100 | FF 165  |
| FLSES 90 L      | 140             | 170 | 125  | 162  | 56              | 28 | 33  | 10   | 10 | 90  | 196 | 248  | 266  | 28   | 136 | 68  | 68  | 135 | 41   | 68  | FF 165  |
| FLSES 90 LU     | 140             | 170 | 125  | 162  | 56              | 28 | 33  | 10   | 10 | 90  | 196 | 248  | 286  | 28   | 136 | 68  | 68  | 135 | 41   | 88  | FF 165  |
| FLSES 90 SL     | 140             | 170 | 125  | 162  | 56              | 28 | 33  | 10   | 10 | 90  | 196 | 248  | 266  | 28   | 136 | 68  | 68  | 135 | 41   | 93  | FF 165  |
| FLSES 90 S      | 140             | 170 | 100  | 162  | 56              | 28 | 33  | 10   | 10 | 90  | 196 | 248  | 266  | 28   | 136 | 68  | 68  | 135 | 41   | 95  | FF 165  |
| FLSES 100 L     | 160             | 196 | 140  | 185  | 63              | 29 | 40  | 12   | 13 | 100 | 204 | 258  | 290  | 8    | 136 | 68  | 68  | 135 | 41   | 92  | FF 215  |
| FLSES 100 LR    | 160             | 196 | 140  | 185  | 63              | 29 | 40  | 12   | 13 | 100 | 204 | 258  | 318  | 8    | 136 | 68  | 68  | 135 | 41   | 120 | FF 215  |
| FLSES 100 LG    | 160             | 200 | 140  | 176  | 63              | 24 | 45  | 12   | 11 | 100 | 230 | 283  | 309  | 18   | 136 | 68  | 68  | 148 | 41   | 109 | FF 215  |
| FLSES 100 LK    | 160             | 200 | 140  | 174  | 63              | 22 | 38  | 12   | 11 | 100 | 248 | 282  | 319  | 44   | 136 | 68  | 68  | -   | -    | 120 | FF 215  |
| FLSES 112 M     | 190             | 230 | 140  | 186  | 70              | 32 | 48  | 12   | 12 | 112 | 230 | 294  | 309  | 18   | 136 | 68  | 68  | 148 | 41   | 109 | FF 215  |
| FLSES 112 MG    | 190             | 230 | 140  | 186  | 70              | 32 | 48  | 12   | 12 | 112 | 230 | 294  | 309  | 18   | 136 | 68  | 68  | 148 | 41   | 109 | FF 215  |
| FLSES 112 MU    | 190             | 230 | 140  | 186  | 70              | 32 | 48  | 12   | 12 | 112 | 230 | 294  | 332  | 18   | 136 | 68  | 68  | 148 | 41   | 128 | FF 215  |
| FLSES 132 M     | 216             | 255 | 178  | 240  | 89              | 50 | 63  | 12   | 16 | 132 | 270 | 335  | 385  | 22   | 136 | 68  | 68  | 165 | 37.5 | 126 | FF 265  |
| FLSES 132 MR    | 216             | 255 | 178  | 240  | 89              | 50 | 63  | 12   | 16 | 132 | 270 | 335  | 441  | 22   | 136 | 68  | 68  | 165 | 37.5 | 182 | FF 265  |
| FLSES 132 MU    | 216             | 255 | 178  | 240  | 89              | 50 | 63  | 12   | 16 | 132 | 270 | 335  | 412  | 22   | 136 | 68  | 68  | 165 | 37.5 | 153 | FF 265  |
| FLSES 132 SM    | 216             | 255 | 140  | 240  | 89              | 50 | 63  | 12   | 16 | 132 | 270 | 335  | 385  | 22   | 136 | 68  | 68  | 165 | 37.5 | 164 | FF 265  |
| FLSES 132 S     | 216             | 255 | 140  | 240  | 89              | 50 | 63  | 12   | 16 | 132 | 270 | 335  | 385  | 22   | 136 | 68  | 68  | 165 | 37.5 | 164 | FF 265  |
| FLSES 160 MUR   | 254             | 294 | 210  | 294  | 108             | 20 | 65  | 14.5 | 20 | 160 | 315 | 436  | 510  | 30   | 246 | 126 | 148 | -   | -    | 197 | FF 300  |
| FLSES 160 LUR   | 254             | 294 | 254  | 294  | 108             | 20 | 65  | 14.5 | 20 | 160 | 315 | 436  | 510  | 30   | 246 | 126 | 148 | -   | -    | 153 | FF 300  |
| FLSES 160 MU    | 254             | 294 | 210  | 294  | 108             | 20 | 65  | 14.5 | 20 | 160 | 315 | 436  | 510  | 30   | 246 | 126 | 148 | -   | -    | 197 | FF 300  |
| FLSES 160 LU    | 254             | 294 | 254  | 294  | 108             | 20 | 65  | 14.5 | 20 | 160 | 315 | 436  | 510  | 30   | 246 | 126 | 148 | -   | -    | 153 | FF 300  |
| FLSES 160 M     | 254             | 294 | 210  | 294  | 108             | 20 | 65  | 14.5 | 20 | 160 | 315 | 436  | 495  | 30   | 246 | 126 | 148 | -   | -    | 182 | FF 300  |
| FLSES 160 L     | 254             | 294 | 254  | 294  | 108             | 20 | 65  | 14.5 | 20 | 160 | 315 | 436  | 495  | 30   | 246 | 126 | 148 | -   | -    | 138 | FF 300  |
| FLSES 180 M     | 279             | 330 | 241  | 330  | 121             | 28 | 70  | 14.5 | 28 | 180 | 353 | 477  | 552  | 43   | 244 | 126 | 148 | -   | -    | 197 | FF 300  |
| FLSES 180 L     | 279             | 330 | 279  | 330  | 121             | 28 | 70  | 14.5 | 28 | 180 | 353 | 477  | 552  | 43   | 244 | 126 | 148 | -   | -    | 159 | FF 300  |
| FLSES 180 MUR   | 279             | 330 | 241  | 330  | 121             | 28 | 70  | 14.5 | 28 | 180 | 353 | 477  | 614  | 43   | 244 | 126 | 148 | -   | -    | 262 | FF 300  |
| FLSES 180 LUR   | 279             | 330 | 279  | 330  | 121             | 28 | 70  | 14.5 | 28 | 180 | 353 | 477  | 614  | 43   | 244 | 126 | 148 | -   | -    | 224 | FF 300  |
| FLSES 180 M     | 279             | 330 | 241  | 330  | 121             | 28 | 70  | 14.5 | 28 | 180 | 353 | 477  | 552  | 43   | 244 | 126 | 148 | -   | -    | 197 | FF 300  |
| FLSES 180 L     | 279             | 330 | 279  | 330  | 121             | 28 | 70  | 14.5 | 28 | 180 | 353 | 477  | 552  | 43   | 244 | 126 | 148 | -   | -    | 159 | FF 300  |
| FLSES 180 MT    | 279             | 324 | 241  | 290  | 121             | 25 | 80  | 14.5 | 25 | 180 | 315 | 456  | 510  | 31   | 246 | 126 | 148 | 200 | 45   | 155 | FF 300  |
| FLSES 200 LU    | 318             | 374 | 305  | 360  | 133             | 28 | 60  | 18.5 | 17 | 200 | 373 | 528  | 669  | 49   | 246 | 126 | 148 | 230 | 45   | 244 | FF 350  |
| FLSES 225 S     | 356             | 426 | 286  | 375  | 149             | 32 | 80  | 18.5 | 27 | 225 | 487 | 652  | 779  | 70   | 352 | 175 | 212 | -   | -    | 351 | FF 400  |
| FLSES 225 M     | 356             | 426 | 311  | 375  | 149             | 32 | 80  | 18.5 | 27 | 225 | 487 | 652  | 779  | 70   | 352 | 175 | 212 | -   | -    | 326 | FF 400  |
| FLSES 225 SR    | 356             | 426 | 286  | 375  | 149             | 32 | 70  | 18.5 | 17 | 225 | 391 | 553  | 676  | 56   | 246 | 126 | 148 | -   | -    | 253 | FF 400  |
| FLSES 225 MR    | 356             | 426 | 311  | 375  | 149             | 32 | 70  | 18.5 | 17 | 225 | 391 | 553  | 676  | 56   | 246 | 126 | 148 | -   | -    | 228 | FF 400  |
| FLSES 250 M     | 406             | 476 | 349  | 413  | 168             | 32 | 80  | 24   | 27 | 250 | 487 | 677  | 779  | 70   | 352 | 175 | 212 | -   | -    | 269 | FF 500  |
| FLSES 250 S/M   | 406             | 476 | 349  | 413  | 168             | 32 | 80  | 24   | 27 | 250 | 487 | 677  | 779  | 70   | 352 | 175 | 212 | -   | -    | 269 | FF 500  |
| FLSES 250 MR    | 406             | 476 | 349  | 413  | 168             | 32 | 80  | 24   | 27 | 250 | 487 | 677  | 859  | 71   | 352 | 175 | 212 | -   | -    | 408 | FF 500  |
| FLSES 280 M     | 457             | 527 | 419  | 483  | 190             | 32 | 80  | 24   | 26 | 280 | 540 | 719  | 959  | 69.5 | 352 | 173 | 210 | -   | -    | -   | FF 500  |
| FLSES 280 S     | 457             | 527 | 368  | 432  | 190             | 32 | 80  | 24   | 26 | 280 | 540 | 719  | 959  | 69.5 | 352 | 173 | 210 | -   | -    | -   | FF 500  |
| FLSES 315 LA    | 508             | 600 | 508  | 610  | 216             | 58 | 100 | 28   | 35 | 315 | 600 | 840  | 1177 | 101  | 452 | 219 | 269 | 343 | 45   | -   | FF 600  |
| FLSES 315 LB    | 508             | 600 | 508  | 610  | 216             | 58 | 100 | 28   | 35 | 315 | 600 | 840  | 1177 | 101  | 452 | 219 | 269 | 343 | 45   | -   | FF 600  |
| FLSES 315 M     | 508             | 600 | 457  | 610  | 216             | 58 | 100 | 28   | 35 | 315 | 600 | 840  | 1177 | 101  | 452 | 219 | 269 | 343 | 45   | -   | FF 600  |
| FLSES 315 S     | 508             | 600 | 406  | 610  | 216             | 58 | 100 | 28   | 35 | 315 | 600 | 840  | 1177 | 101  | 452 | 219 | 269 | 343 | 45   | -   | FF 600  |
| FLSES 355 LA    | 610             | 710 | 630  | 756  | 254             | 76 | 100 | 28   | 35 | 355 | 688 | 922  | 1303 | 121  | 452 | 219 | 269 | -   | -    | -   | FF 740  |
| FLSES 355 LAL   | 610             | 710 | 630  | 756  | 254             | 76 | 100 | 28   | 35 | 355 | 688 | 925  | 1303 | 121  | 452 | 219 | 269 | -   | -    | -   | FF 740  |
| FLSES 355 LB    | 610             | 710 | 630  | 756  | 254             | 76 | 100 | 28   | 35 | 355 | 688 | 922  | 1303 | 121  | 452 | 219 | 269 | -   | -    | -   | FF 740  |
| FLSES 355 LC/LD | 610             | 710 | 630  | 756  | 254             | 76 | 100 | 28   | 35 | 355 | 688 | 922  | 1303 | 121  | 452 | 219 | 269 | -   | -    | -   | FF 740  |
| FLSES 355 LK    | 610             | 750 | 630  | 815  | 254             | 40 | 128 | 28   | 45 | 355 | 787 | 1117 | 1702 | 52   | 700 | 224 | 396 | -   | -    | -   | FF 740  |
| FLSES 355 LKB   | 610             | 750 | 630  | 815  | 254             | 40 | 128 | 28   | 45 | 355 | 787 | 1117 | 1702 | 52   | 700 | 224 | 396 | 484 | 55   | 825 | FF 740  |
| FLSES 355 LKC   | 610             | 750 | 630  | 815  | 254             | 40 | 128 | 28   | 45 | 355 | 787 | 1117 | 1702 | 52   | 700 | 224 | 396 | 484 | 55   | 825 | FF 740  |
| FLSES 400 LB    | 686             | 800 | 710  | 815  | 280             | 65 | 128 | 35   | 45 | 400 | 787 | 1162 | 1702 | 52   | 700 | 224 | 396 | 484 | 55   | 720 | FF 940  |
| FLSES 450 LA    | 750             | 890 | 800  | 950  | 315             | 94 | 140 | 35   | 45 | 450 | 877 | 1260 | 1740 | 68   | 700 | 224 | 396 | 532 | 55   | 630 | FF 1080 |
| FLSES 450 LB    | 750             | 890 | 800  | 950  | 315             | 94 | 140 | 35   | 45 | 450 | 877 | 1260 | 1740 | 68   | 700 | 224 | 396 | 532 | 55   | 630 | FF 1080 |
| FLSES 450 LC    | 750             | 890 | 1000 | 1170 | 315             | 94 | 140 | 35   | 45 | 450 | 877 | 1260 | 2088 | 68   | 700 | 224 | 396 | 505 | 67.5 | 780 | FF 1080 |
| FLSES 450 LD    | 750             | 890 | 1000 | 1170 | 315             | 94 | 140 | 35   | 45 | 450 | 877 | 1260 | 2088 | 68   | 700 | 244 | 396 | 505 | 67.5 | 780 | FF 1080 |

\* AC: housing diameter without lifting rings

1. Out of IEC

IP55 CAST IRON MOTORS

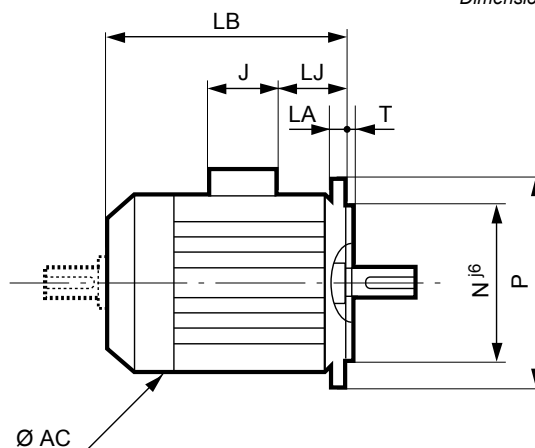
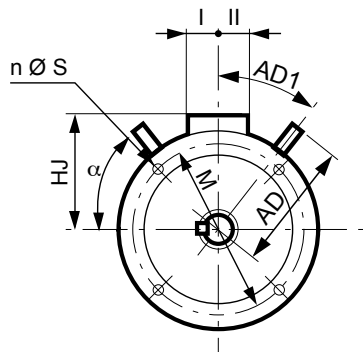
# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Cast iron frame

### Dimensions

### Flange mounted IM 3001 (IM B5) IM 3011 (IM V1)

Dimensions in millimetres



| IEC symbol | Flange dimensions |      |      |     |   |      |      |    |
|------------|-------------------|------|------|-----|---|------|------|----|
|            | M                 | N    | P    | T   | n | α°   | S    | LA |
| FF 165     | 165               | 130  | 200  | 3.5 | 4 | 45   | 12   | 10 |
| FF 165     | 165               | 130  | 200  | 3.5 | 4 | 45   | 12   | 10 |
| FF 165     | 165               | 130  | 200  | 3.5 | 4 | 45   | 12   | 10 |
| FF 165     | 165               | 130  | 200  | 3.5 | 4 | 45   | 12   | 10 |
| FF 165     | 165               | 130  | 200  | 3.5 | 4 | 45   | 12   | 10 |
| FF 165     | 165               | 130  | 200  | 3.5 | 4 | 45   | 12   | 10 |
| FF 165     | 165               | 130  | 200  | 3.5 | 4 | 45   | 12   | 10 |
| FF 215     | 215               | 180  | 250  | 4   | 4 | 45   | 14.5 | 13 |
| FF 215     | 215               | 180  | 250  | 4   | 4 | 45   | 14.5 | 10 |
| FF 215     | 215               | 180  | 250  | 4   | 4 | 45   | 14.5 | 10 |
| FF 215     | 215               | 180  | 250  | 4   | 4 | 45   | 14.5 | 13 |
| FF 215     | 215               | 180  | 250  | 4   | 4 | 45   | 14.5 | 13 |
| FF 215     | 215               | 180  | 250  | 4   | 4 | 45   | 14.5 | 13 |
| FF 215     | 215               | 180  | 250  | 4   | 4 | 45   | 14.5 | 13 |
| FF 215     | 215               | 180  | 250  | 4   | 4 | 45   | 14.5 | 13 |
| FF 265     | 265               | 230  | 300  | 4   | 4 | 45   | 14.5 | 14 |
| FF 265     | 265               | 230  | 300  | 4   | 4 | 45   | 14.5 | 14 |
| FF 265     | 265               | 230  | 300  | 4   | 4 | 45   | 14.5 | 14 |
| FF 265     | 265               | 230  | 300  | 4   | 4 | 45   | 14.5 | 14 |
| FF 265     | 265               | 230  | 300  | 4   | 4 | 45   | 14.5 | 14 |
| FF 265     | 265               | 230  | 300  | 4   | 4 | 45   | 14.5 | 14 |
| FF 300     | 300               | 250  | 350  | 5   | 4 | 45   | 18.5 | 15 |
| FF 300     | 300               | 250  | 350  | 5   | 4 | 45   | 18.5 | 15 |
| FF 300     | 300               | 250  | 350  | 5   | 4 | 45   | 18.5 | 15 |
| FF 300     | 300               | 250  | 350  | 5   | 4 | 45   | 18.5 | 15 |
| FF 300     | 300               | 250  | 350  | 5   | 4 | 45   | 18.5 | 15 |
| FF 300     | 300               | 250  | 350  | 5   | 4 | 45   | 18.5 | 15 |
| FF 300     | 300               | 250  | 350  | 5   | 4 | 45   | 18.5 | 15 |
| FF 300     | 300               | 250  | 350  | 5   | 4 | 45   | 18.5 | 15 |
| FF 300     | 300               | 250  | 350  | 5   | 4 | 45   | 18.5 | 15 |
| FF 300     | 300               | 250  | 350  | 5   | 4 | 45   | 18.5 | 15 |
| FF 300     | 300               | 250  | 350  | 5   | 4 | 45   | 18.5 | 15 |
| FF 300     | 300               | 250  | 350  | 5   | 4 | 45   | 18.5 | 15 |
| FF 300     | 300               | 250  | 350  | 5   | 4 | 45   | 18.5 | 15 |
| FF 350     | 350               | 300  | 400  | 5   | 4 | 45   | 18.5 | 15 |
| FF 400     | 400               | 350  | 450  | 5   | 8 | 22.5 | 18.5 | 16 |
| FF 400     | 400               | 350  | 450  | 5   | 8 | 22.5 | 18.5 | 16 |
| FF 400     | 400               | 350  | 450  | 5   | 8 | 22.5 | 18.5 | 16 |
| FF 400     | 400               | 350  | 450  | 5   | 8 | 22.5 | 18.5 | 16 |
| FF 500     | 500               | 450  | 550  | 5   | 8 | 22.5 | 18.5 | 18 |
| FF 500     | 500               | 450  | 550  | 5   | 8 | 22.5 | 18.5 | 18 |
| FF 500     | 500               | 450  | 550  | 5   | 8 | 22.5 | 18.5 | 18 |
| FF 500     | 500               | 450  | 550  | 5   | 8 | 22.5 | 18.5 | 18 |
| FF 500     | 500               | 450  | 550  | 5   | 8 | 22.5 | 18.5 | 18 |
| FF 600     | 600               | 550  | 660  | 6   | 8 | 22.5 | 24   | 25 |
| FF 600     | 600               | 550  | 660  | 6   | 8 | 22.5 | 24   | 25 |
| FF 600     | 600               | 550  | 660  | 6   | 8 | 22.5 | 24   | 25 |
| FF 600     | 600               | 550  | 660  | 6   | 8 | 22.5 | 24   | 25 |
| FF 600     | 600               | 550  | 660  | 6   | 8 | 22.5 | 24   | 25 |
| FF 740     | 740               | 680  | 800  | 6   | 8 | 22.5 | 24   | 25 |
| FF 740     | 740               | 680  | 800  | 6   | 8 | 22.5 | 24   | 25 |
| FF 740     | 740               | 680  | 800  | 6   | 8 | 22.5 | 24   | 25 |
| FF 740     | 740               | 680  | 800  | 6   | 8 | 22.5 | 24   | 25 |
| FF 740     | 740               | 680  | 800  | 6   | 8 | 22.5 | 24   | 25 |
| FF 740     | 740               | 680  | 800  | 6   | 8 | 22.5 | 24   | 25 |
| FF 740     | 740               | 680  | 800  | 6   | 8 | 22.5 | 24   | 25 |
| FF 740     | 740               | 680  | 800  | 6   | 8 | 22.5 | 24   | 25 |
| FF 940     | 940               | 880  | 1000 | 6   | 8 | 22.5 | 28   | 28 |
| FF 1080    | 1080              | 1000 | 1150 | 6   | 8 | 22.5 | 28   | 30 |
| FF 1080    | 1080              | 1000 | 1150 | 6   | 8 | 22.5 | 28   | 30 |
| FF 1080    | 1080              | 1000 | 1150 | 6   | 8 | 22.5 | 28   | 30 |
| FF 1080    | 1080              | 1000 | 1150 | 6   | 8 | 22.5 | 28   | 30 |

\* AC: housing diameter without lifting rings

| Type            | Main dimensions |      |     |      |     |     |     |     |      |
|-----------------|-----------------|------|-----|------|-----|-----|-----|-----|------|
|                 | AC*             | LB   | HJ  | LJ   | J   | I   | II  | AD  | AD1  |
| FLSES 80 L      | 170             | 212  | 148 | 7    | 136 | 68  | 68  | -   | -    |
| FLSES 80 LU     | 170             | 267  | 148 | 7    | 136 | 68  | 68  | -   | -    |
| FLSES 80 LG     | 203             | 265  | 158 | 28   | 136 | 68  | 68  | 135 | 41   |
| FLSES 90 L      | 196             | 266  | 158 | 28   | 136 | 68  | 68  | 135 | 41   |
| FLSES 90 LU     | 196             | 286  | 158 | 28   | 136 | 68  | 68  | 135 | 41   |
| FLSES 90 SL     | 196             | 266  | 158 | 28   | 136 | 68  | 68  | 135 | 41   |
| FLSES 90 S      | 196             | 266  | 158 | 28   | 136 | 68  | 68  | 135 | 41   |
| FLSES 100 L     | 204             | 290  | 158 | 8    | 136 | 68  | 68  | 135 | 41   |
| FLSES 100 LR    | 204             | 318  | 158 | 8    | 136 | 68  | 68  | 135 | 41   |
| FLSES 100 LG    | 230             | 309  | 182 | 18   | 136 | 68  | 68  | 148 | 41   |
| FLSES 100 LK    | 248             | 319  | 182 | 44   | 136 | 68  | 68  | -   | -    |
| FLSES 112 M     | 230             | 309  | 182 | 18   | 136 | 68  | 68  | 148 | 41   |
| FLSES 112 MG    | 230             | 309  | 182 | 18   | 136 | 68  | 68  | 148 | 41   |
| FLSES 112 MU    | 230             | 332  | 182 | 18   | 136 | 68  | 68  | 148 | 41   |
| FLSES 132 M     | 270             | 385  | 203 | 22   | 136 | 68  | 68  | 165 | 37.5 |
| FLSES 132 MR    | 270             | 441  | 203 | 22   | 136 | 68  | 68  | 165 | 37.5 |
| FLSES 132 MU    | 270             | 412  | 203 | 22   | 136 | 68  | 68  | 165 | 37.5 |
| FLSES 132 SM    | 270             | 385  | 203 | 22   | 136 | 68  | 68  | 165 | 37.5 |
| FLSES 132 S     | 270             | 385  | 203 | 22   | 136 | 68  | 68  | 165 | 37.5 |
| FLSES 160 MUR   | 315             | 510  | 276 | 30   | 246 | 126 | 148 | -   | -    |
| FLSES 160 LUR   | 315             | 510  | 276 | 30   | 246 | 126 | 148 | -   | -    |
| FLSES 160 MU    | 315             | 510  | 276 | 30   | 246 | 126 | 148 | -   | -    |
| FLSES 160 LU    | 315             | 510  | 276 | 30   | 246 | 126 | 148 | -   | -    |
| FLSES 160 M     | 315             | 495  | 276 | 30   | 246 | 126 | 148 | -   | -    |
| FLSES 160 L     | 315             | 495  | 276 | 30   | 246 | 126 | 148 | -   | -    |
| FLSES 180 M     | 353             | 552  | 297 | 43   | 244 | 126 | 148 | -   | -    |
| FLSES 180 L     | 353             | 552  | 297 | 43   | 244 | 126 | 148 | -   | -    |
| FLSES 180 MUR   | 353             | 614  | 297 | 43   | 244 | 126 | 148 | -   | -    |
| FLSES 180 LUR   | 353             | 614  | 297 | 43   | 244 | 126 | 148 | -   | -    |
| FLSES 180 M     | 353             | 552  | 297 | 43   | 244 | 126 | 148 | -   | -    |
| FLSES 180 L     | 353             | 552  | 297 | 43   | 244 | 126 | 148 | -   | -    |
| FLSES 180 MT    | 315             | 510  | 276 | 31   | 246 | 126 | 148 | 200 | 45   |
| FLSES 200 LU    | 373             | 669  | 328 | 49   | 246 | 126 | 148 | 230 | 45   |
| FLSES 225 S     | 487             | 779  | 427 | 70   | 352 | 175 | 212 | -   | -    |
| FLSES 225 M     | 487             | 779  | 427 | 70   | 352 | 175 | 212 | -   | -    |
| FLSES 225 SR    | 391             | 676  | 328 | 56   | 246 | 126 | 148 | -   | -    |
| FLSES 225 MR    | 391             | 676  | 328 | 56   | 246 | 126 | 148 | -   | -    |
| FLSES 250 M     | 487             | 779  | 427 | 70   | 352 | 175 | 212 | -   | -    |
| FLSES 250 S/M   | 487             | 779  | 427 | 70   | 352 | 175 | 212 | -   | -    |
| FLSES 250 MR    | 487             | 859  | 427 | 71   | 352 | 175 | 212 | -   | -    |
| FLSES 280 M     | 540             | 959  | 439 | 69.5 | 352 | 173 | 210 | -   | -    |
| FLSES 280 S     | 540             | 959  | 439 | 69.5 | 352 | 173 | 210 | -   | -    |
| FLSES 315 LA    | 600             | 1177 | 525 | 101  | 452 | 219 | 269 | 343 | 45   |
| FLSES 315 LB    | 600             | 1177 | 525 | 101  | 452 | 219 | 269 | 343 | 45   |
| FLSES 315 M     | 600             | 1177 | 525 | 101  | 452 | 219 | 269 | 343 | 45   |
| FLSES 315 S     | 600             | 1177 | 525 | 101  | 452 | 219 | 269 | 343 | 45   |
| FLSES 355 LA    | 688             | 1303 | 567 | 121  | 452 | 219 | 269 | -   | -    |
| FLSES 355 LAL   | 688             | 1303 | 567 | 121  | 452 | 219 | 269 | -   | -    |
| FLSES 355 LB    | 688             | 1303 | 567 | 121  | 452 | 219 | 269 | -   | -    |
| FLSES 355 LC/LD | 688             | 1303 | 567 | 121  | 452 | 219 | 269 | -   | -    |
| FLSES 355 LK    | 787             | 1702 | 762 | 52   | 700 | 224 | 396 | -   | -    |
| FLSES 355 LKB   | 787             | 1702 | 762 | 52   | 700 | 224 | 396 | 456 | 67.5 |
| FLSES 355 LKC   | 787             | 1702 | 762 | 52   | 700 | 224 | 396 | 456 | 67.5 |
| FLSES 400 LB    | 787             | 1702 | 762 | 52   | 700 | 224 | 396 | 456 | 67.5 |
| FLSES 450 LA    | 877             | 1740 | 810 | 68   | 700 | 224 | 396 | 517 | 67.5 |
| FLSES 450 LB    | 877             | 1740 | 810 | 68   | 700 | 224 | 396 | 517 | 67.5 |
| FLSES 450 LC    | 877             | 1740 | 810 | 68   | 700 | 224 | 396 | 517 | 67.5 |
| FLSES 450 LD    | 877             | 1740 | 810 | 68   | 700 | 224 | 396 | 517 | 67.5 |

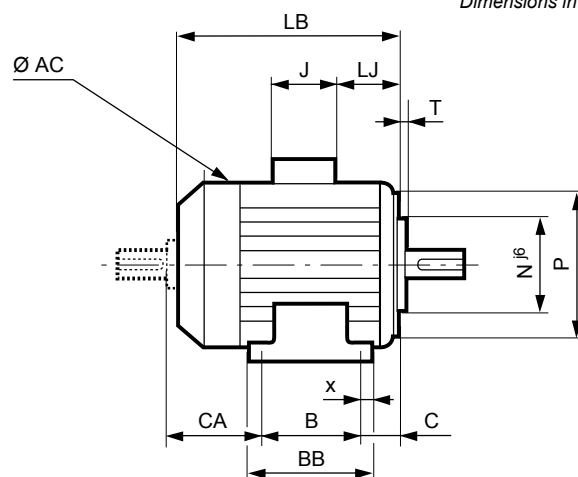
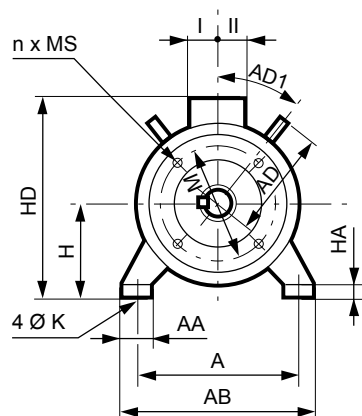
# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Cast iron frame

### Dimensions

### Foot and face mounted IM 2101 ( IM B34)

Dimensions in millimetres

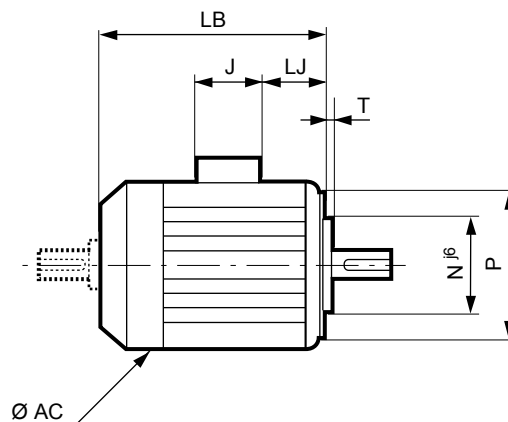
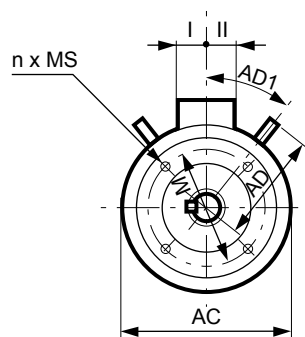


| Type         | Main dimensions |     |     |     |    |    |    |    |    |     |     |     |     |    |     |    |    |     |      |     |
|--------------|-----------------|-----|-----|-----|----|----|----|----|----|-----|-----|-----|-----|----|-----|----|----|-----|------|-----|
|              | A               | AB  | B   | BB  | C  | x  | AA | K  | HA | H   | AC* | HD  | LB  | LJ | J   | I  | II | AD  | AD1  | CA  |
| FLSES 80 L   | 125             | 157 | 100 | 130 | 50 | 18 | 34 | 10 | 10 | 80  | 170 | 228 | 212 | 7  | 136 | 68 | 68 | -   | -    | 68  |
| FLSES 80 LU  | 125             | 157 | 100 | 130 | 50 | 18 | 34 | 10 | 10 | 80  | 170 | 228 | 212 | 7  | 136 | 68 | 68 | -   | -    | 120 |
| FLSES 80 LG  | 125             | 170 | 100 | 138 | 50 | 22 | 39 | 10 | 10 | 80  | 203 | 238 | 245 | 8  | 136 | 68 | 68 | 135 | 41   | 100 |
| FLSES 90 L   | 140             | 170 | 125 | 162 | 56 | 28 | 33 | 10 | 10 | 90  | 196 | 248 | 246 | 8  | 136 | 68 | 68 | 135 | 41   | 68  |
| FLSES 90 LU  | 140             | 170 | 125 | 162 | 56 | 28 | 33 | 10 | 10 | 90  | 196 | 248 | 266 | 8  | 136 | 68 | 68 | 135 | 41   | 88  |
| FLSES 90 SL  | 140             | 170 | 100 | 162 | 56 | 28 | 33 | 10 | 10 | 90  | 196 | 248 | 246 | 8  | 136 | 68 | 68 | 135 | 41   | 93  |
| FLSES 90 S   | 140             | 170 | 100 | 162 | 56 | 28 | 33 | 10 | 10 | 90  | 196 | 248 | 246 | 8  | 136 | 68 | 68 | 135 | 41   | 95  |
| FLSES 100 L  | 160             | 196 | 140 | 185 | 63 | 29 | 40 | 12 | 13 | 100 | 204 | 258 | 290 | 8  | 136 | 68 | 68 | 135 | 41   | 92  |
| FLSES 100 LR | 160             | 196 | 140 | 185 | 63 | 29 | 40 | 12 | 13 | 100 | 204 | 258 | 318 | 8  | 136 | 68 | 68 | 135 | 41   | 120 |
| FLSES 100 LG | 160             | 200 | 140 | 176 | 63 | 24 | 45 | 12 | 11 | 100 | 230 | 283 | 309 | 18 | 136 | 68 | 68 | 148 | 41   | 109 |
| FLSES 100 LK | 160             | 200 | 140 | 174 | 63 | 22 | 38 | 12 | 11 | 100 | 248 | 283 | 319 | 44 | 136 | 68 | 68 | -   | -    | 120 |
| FLSES 112 M  | 190             | 230 | 140 | 186 | 70 | 32 | 48 | 12 | 12 | 112 | 230 | 294 | 309 | 18 | 136 | 68 | 68 | 148 | 41   | 109 |
| FLSES 112 MG | 190             | 230 | 140 | 186 | 70 | 32 | 48 | 12 | 12 | 112 | 230 | 294 | 309 | 18 | 136 | 68 | 68 | 148 | 41   | 109 |
| FLSES 112 MU | 190             | 230 | 140 | 186 | 70 | 32 | 48 | 12 | 12 | 112 | 230 | 294 | 332 | 18 | 136 | 68 | 68 | 148 | 41   | 128 |
| FLSES 132 M  | 216             | 255 | 178 | 240 | 89 | 50 | 63 | 12 | 16 | 132 | 270 | 335 | 385 | 22 | 136 | 68 | 68 | 165 | 37.5 | 126 |
| FLSES 132 MR | 216             | 255 | 178 | 240 | 89 | 50 | 63 | 12 | 16 | 132 | 270 | 335 | 441 | 22 | 136 | 68 | 68 | 165 | 37.5 | 182 |
| FLSES 132 MU | 216             | 255 | 178 | 240 | 89 | 50 | 63 | 12 | 16 | 132 | 270 | 335 | 412 | 22 | 136 | 68 | 68 | 165 | 37.5 | 153 |
| FLSES 132 SM | 216             | 255 | 140 | 240 | 89 | 50 | 63 | 12 | 16 | 132 | 270 | 335 | 385 | 22 | 136 | 68 | 68 | 165 | 37.5 | 164 |
| FLSES 132 S  | 216             | 255 | 140 | 240 | 89 | 50 | 63 | 12 | 16 | 132 | 270 | 335 | 385 | 22 | 136 | 68 | 68 | 165 | 37.5 | 164 |

\* AC: housing diameter without lifting rings



Dimensions in millimetres



| IEC symbol | Faceplate dimensions |     |     |     |   |    |     |
|------------|----------------------|-----|-----|-----|---|----|-----|
|            | M                    | N   | P   | T   | n | α° | MS  |
| FT 100     | 100                  | 80  | 120 | 3   | 4 | 45 | M6  |
| FT 100     | 100                  | 80  | 120 | 3   | 4 | 45 | M6  |
| FT 100     | 100                  | 80  | 120 | 3   | 4 | 45 | M6  |
| FT 115     | 115                  | 95  | 140 | 3   | 4 | 45 | M8  |
| FT 115     | 115                  | 95  | 140 | 3   | 4 | 45 | M8  |
| FT 115     | 115                  | 95  | 140 | 3   | 4 | 45 | M8  |
| FT 115     | 115                  | 95  | 140 | 3   | 4 | 45 | M8  |
| FT 130     | 130                  | 110 | 160 | 3.5 | 4 | 45 | M8  |
| FT 130     | 130                  | 110 | 160 | 3.5 | 4 | 45 | M8  |
| FT 130     | 130                  | 110 | 160 | 3.5 | 4 | 45 | M8  |
| FT 130     | 130                  | 110 | 160 | 3.5 | 4 | 45 | M8  |
| FT 130     | 130                  | 110 | 160 | 3.5 | 4 | 45 | M8  |
| FT 130     | 130                  | 110 | 160 | 3.5 | 4 | 45 | M8  |
| FT 130     | 130                  | 110 | 160 | 3.5 | 4 | 45 | M8  |
| FT 165     | 165                  | 130 | 200 | 3.5 | 4 | 45 | M10 |
| FT 165     | 165                  | 130 | 200 | 3.5 | 4 | 45 | M10 |
| FT 165     | 165                  | 130 | 200 | 3.5 | 4 | 45 | M10 |
| FT 165     | 165                  | 130 | 200 | 3.5 | 4 | 45 | M10 |
| FT 165     | 165                  | 130 | 200 | 3.5 | 4 | 45 | M10 |

\* AC: housing diameter without lifting rings

| Type         | Main dimensions |     |     |    |     |    |    |     |      |
|--------------|-----------------|-----|-----|----|-----|----|----|-----|------|
|              | AC*             | LB  | HJ  | LJ | J   | I  | II | AD  | AD1  |
| FLSES 80 L   | 170             | 212 | 148 | 7  | 136 | 68 | 68 | -   | -    |
| FLSES 80 LU  | 170             | 267 | 148 | 7  | 136 | 68 | 68 | -   | -    |
| FLSES 80 LG  | 203             | 245 | 158 | 8  | 136 | 68 | 68 | 135 | 41   |
| FLSES 90 L   | 196             | 246 | 158 | 8  | 136 | 68 | 68 | 135 | 41   |
| FLSES 90 LU  | 196             | 266 | 158 | 8  | 136 | 68 | 68 | 135 | 41   |
| FLSES 90 SL  | 196             | 246 | 158 | 8  | 136 | 68 | 68 | 135 | 41   |
| FLSES 90 S   | 196             | 246 | 158 | 8  | 136 | 68 | 68 | 135 | 41   |
| FLSES 100 L  | 204             | 290 | 158 | 8  | 136 | 68 | 68 | 135 | 41   |
| FLSES 100 LR | 230             | 318 | 158 | 18 | 136 | 68 | 68 | 135 | 41   |
| FLSES 100 LG | 204             | 309 | 182 | 8  | 136 | 68 | 68 | 148 | 41   |
| FLSES 100 LK | 248             | 319 | 182 | 44 | 136 | 68 | 68 | -   | -    |
| FLSES 112 M  | 230             | 309 | 182 | 18 | 136 | 68 | 68 | 148 | 41   |
| FLSES 112 MG | 230             | 309 | 182 | 18 | 136 | 68 | 68 | 148 | 41   |
| FLSES 112 MU | 230             | 332 | 182 | 18 | 136 | 68 | 68 | 148 | 41   |
| FLSES 132 M  | 270             | 385 | 203 | 22 | 136 | 68 | 68 | 165 | 37.5 |
| FLSES 132 MR | 270             | 441 | 203 | 22 | 136 | 68 | 68 | 165 | 37.5 |
| FLSES 132 MU | 270             | 412 | 203 | 22 | 136 | 68 | 68 | 165 | 37.5 |
| FLSES 132 SM | 270             | 385 | 203 | 22 | 136 | 68 | 68 | 165 | 37.5 |
| FLSES 132 S  | 270             | 385 | 203 | 22 | 136 | 68 | 68 | 165 | 37.5 |

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Cast iron frame

### Construction

### Bearings and lubrication

#### PERMANENTLY GREASED BEARINGS

Under normal operating conditions, the service life in hours of the bearing is indicated in the table below for ambient temperatures less than 55°C.

| Series | Type     | No. of poles | Types of permanently greased bearing |         | Bearing life according to speed of rotation |        |       |                        |         |       |                        |         |       |
|--------|----------|--------------|--------------------------------------|---------|---------------------------------------------|--------|-------|------------------------|---------|-------|------------------------|---------|-------|
|        |          |              |                                      |         | 3000 min <sup>-1</sup>                      |        |       | 1500 min <sup>-1</sup> |         |       | 1000 min <sup>-1</sup> |         |       |
|        |          |              | N.D.E.                               | D.E.    | 25°C                                        | 40°C   | 55°C  | 25°C                   | 40°C    | 55°C  | 25°C                   | 40°C    | 55°C  |
| FLSES  | 80 L     | 2            | 6203 CN                              | 6204 C3 | ≥40000                                      | ≥40000 | 25000 | -                      | -       | -     | -                      | -       | -     |
|        | 80 LG    | 4            | 6204 C3                              | 6205 C3 | -                                           | -      | -     | ≥40000                 | ≥40000  | 31000 | -                      | -       | -     |
|        | 90 SL/L  | 2; 4; 6      |                                      |         | ≥40000                                      | ≥40000 | 24000 |                        |         |       | ≥40000                 | ≥40000  | 34000 |
|        | 90 LU    | 2; 6         | 6205 C3                              | 6205 C3 | ≥40000                                      | ≥40000 | 24000 | -                      | -       | -     | ≥40000                 | ≥40000  | 34000 |
|        | 100 L    | 2; 4         | 6205 C3                              | 6206 C3 | ≥40000                                      | ≥40000 | 22000 | ≥40000                 | ≥40000  | 30000 | -                      | -       | -     |
|        | 100 LG   | 4; 6         |                                      |         | -                                           | -      | -     |                        |         |       | ≥40000                 | ≥40000  | 33000 |
|        | 112 MG   | 2; 6         |                                      |         | ≥40000                                      | ≥40000 | 22000 | -                      | -       | -     |                        |         |       |
|        | 112 MU   | 4            | 6206 C3                              | 6206 C3 | -                                           | -      | -     | ≥40000                 | ≥40000  | 30000 | -                      | -       | -     |
|        | 132 SM/M | 2; 4; 6      | 6207 C3                              | 6308 C3 | ≥40000                                      | ≥40000 | 19000 | ≥40000                 | ≥40000  | 25000 | ≥40000                 | ≥40000  | 30000 |
|        | 132 MU   | 2; 4         | 6307 C3                              | 6308 C3 | ≥40000                                      | ≥40000 | 19000 | ≥40000                 | ≥40000  | 25000 | -                      | -       | -     |
|        | 132 MR   | 4; 6         | 6308 C3                              | 6308 C3 | -                                           | -      | -     | ≥40000                 | ≥40000  | 25000 | ≥40000                 | ≥40000  | 30000 |
|        | 160 M    | 2; 4; 6      | 6210 C3                              | 6309 C3 | ≥ 40000                                     | 37800  | 18900 | ≥ 40000                | ≥ 40000 | 36900 | ≥ 40000                | ≥ 40000 | 20050 |
|        | 160 MU   | 6            |                                      |         | -                                           | -      | -     | -                      | -       | -     | -                      | -       | -     |
|        | 160 LUR  | 2; 4; 6      | 6210 C3                              | 6310 C3 | ≥ 40000                                     | 24500  | 12250 | ≥ 40000                | 36400   | 18200 | ≥ 40000                | ≥ 40000 | 22450 |
|        | 180 M    | 2            | 6212 C3                              | 6310 C3 | 34000                                       | 17000  | 8500  | -                      | -       | -     | -                      | -       | -     |
|        | 180 MT   | 4            | 6210 C3                              | 6310 C3 | -                                           | -      | -     | ≥ 40000                | 35500   | 17750 | -                      | -       | -     |
|        | 180 MUR  | 2            | 6312 C3                              | 6310 C3 | ≥ 40000                                     | 22800  | 11400 | -                      | -       | -     | -                      | -       | -     |
|        | 180 L    | 4; 6         | 6212 C3                              | 6310 C3 | -                                           | -      | -     | ≥ 40000                | 39500   | 19750 | ≥ 40000                | ≥ 40000 | 29050 |
|        | 180 LUR  | 4; 6         | 6312 C3                              | 6310 C3 | -                                           | -      | -     | ≥ 40000                | ≥ 40000 | 22900 | ≥ 40000                | ≥ 40000 | 29900 |
|        | 200 LU   | 2; 4; 6      | 6312 C3                              | 6312 C3 | 28600                                       | 14300  | 7150  | ≥ 40000                | 25400   | 12700 | ≥ 40000                | 33200   | 16600 |
|        | 225 S    | 4            | 6314 C3                              | 6314 C3 | -                                           | -      | -     | ≥ 40000                | 23700   | 11850 | -                      | -       | -     |
|        | 225 SR   | 4            | 6312 C3                              | 6313 C3 | -                                           | -      | -     | ≥ 40000                | ≥ 40000 | 21500 | -                      | -       | -     |
|        | 225 M    | 4; 6         | 6314 C3                              | 6314 C3 | -                                           | -      | -     | ≥ 40000                | 23700   | 11850 | ≥ 40000                | 25600   | 12800 |
|        | 225 MR   | 2            | 6312 C3                              | 6313 C3 | ≥ 40000                                     | 22800  | 11400 | -                      | -       | -     | -                      | -       | -     |

Note: On request, all motors can be fitted with grease nipples.

**BEARINGS WITH GREASE NIPPLES**

The chart opposite shows the greasing intervals, depending on the type of motor, for standard bearing assemblies of frame size  $\geq 160$  mm fitted with grease nipples, operating at an ambient temperature of 25°C, 40°C and 55°C on a horizontal shaft machine.

The chart below is valid for FLSES motors lubricated with Polyrex EM103 grease which is used as standard.

**SPECIAL CONSTRUCTION AND ENVIRONMENT**

For vertical shaft machines, the greasing intervals will be approximately 80% of the values stated in the table below.

Note: The quality and quantity of grease and the greasing interval are shown on the machine nameplate.

For special assemblies (motors fitted with DE roller bearings or other types), machines of frame size  $\geq 160$  mm have bearings with grease nipples.

Instructions for bearing maintenance are given on the nameplates on these machines.

| Series | Type            | No. of poles | Type of bearing for bearings with grease nipples |         | Quantity of grease<br>g | Greasing intervals in hours |       |      |                        |       |      |                        |       |       |
|--------|-----------------|--------------|--------------------------------------------------|---------|-------------------------|-----------------------------|-------|------|------------------------|-------|------|------------------------|-------|-------|
|        |                 |              |                                                  |         |                         | 3000 min <sup>-1</sup>      |       |      | 1500 min <sup>-1</sup> |       |      | 1000 min <sup>-1</sup> |       |       |
|        |                 |              | N.D.E.                                           | D.E.    |                         | 25°C                        | 40°C  | 55°C | 25°C                   | 40°C  | 55°C | 25°C                   | 40°C  | 55°C  |
| FLSES  | 160 M*          | 2; 4; 6      | 6210 C3                                          | 6309 C3 | 13                      | 22200                       | 11100 | 5550 | 32400                  | 16200 | 8100 | 39800                  | 19900 | 9950  |
|        | 160 MU          | 6            |                                                  |         |                         | -                           | -     | -    | -                      | -     | -    | 23400                  | 11700 | 5850  |
|        | 160 LUR*        | 2; 4; 6      | 6210 C3                                          | 6310 C3 | 15                      | 19600                       | 9800  | 4900 | 30400                  | 15200 | 7600 | 38200                  | 19100 | 6600  |
|        | 180 M*          | 2            | 6212 C3                                          | 6310 C3 | 15                      | 18000                       | 9000  | 4500 | -                      | -     | -    | -                      | -     | -     |
|        | 180 MT*         | 4            | 6210 C3                                          | 6310 C3 | 15                      | -                           | -     | -    | 30400                  | 15200 | 7600 | -                      | -     | -     |
|        | 180 MUR*        | 2            | 6312 C3                                          | 6310 C3 | 15                      | 10600                       | 5300  | 2650 | -                      | -     | -    | -                      | -     | -     |
|        | 180 L*          | 4; 6         | 6212 C3                                          | 6310 C3 | 20                      | -                           | -     | -    | 29200                  | 14600 | 7300 | 37200                  | 18600 | 9300  |
|        | 180 LUR*        | 4; 6         | 6312 C3                                          | 6310 C3 | 20                      | -                           | -     | -    | 26800                  | 13400 | 6700 | 35000                  | 17500 | 8750  |
|        | 200 LU*         | 2; 4; 6      | 6312 C3                                          | 6312 C3 | 20                      | 15200                       | 7600  | 3800 | 26800                  | 13400 | 6700 | 35000                  | 17500 | 8750  |
|        | 225 S*          | 4            | 6314 C3                                          | 6314 C3 | 25                      | -                           | -     | -    | 23600                  | 11800 | 5900 | -                      | -     | -     |
|        | 225 SR*         | 4            | 6312 C3                                          | 6313 C3 | 25                      | -                           | -     | -    | 25200                  | 12600 | 6300 | -                      | -     | -     |
|        | 225 M*          | 4; 6         | 6314 C3                                          | 6314 C3 | 25                      | -                           | -     | -    | 23600                  | 11800 | 5900 | 32200                  | 16100 | 8050  |
|        | 225 MR*         | 2            | 6312 C3                                          | 6313 C3 | 25                      | 13400                       | 6700  | 3350 | -                      | -     | -    | -                      | -     | -     |
|        | 250 M           | 2; 6         |                                                  |         |                         | 10400                       | 5200  | 2600 | -                      | -     | -    | 32200                  | 16100 | 8050  |
|        | 250 MR          | 4            | 6314 C3                                          | 6314 C3 | 25                      | -                           | -     | -    | 17800                  | 8900  | 4450 | -                      | -     | -     |
|        | 280 S/M         | 2; 4; 6      | 6314 C3                                          | 6316 C3 | 35                      | 7200                        | 3600  | 1800 | 21000                  | 13230 | 6615 | 29000                  | 29000 | 18270 |
|        | 315 S/M/L       | 2            | 6316 C3                                          | 6218 C3 | 35                      | 7400                        | 5880  | 2920 | -                      | -     | -    | -                      | -     | -     |
|        | 315 S/M/L       | 4; 6         | 6316 C3                                          | 6320 C3 | 50                      | -                           | -     | -    | 15600                  | 12400 | 6160 | 25000                  | 25000 | 12500 |
|        | 355 LA/LB/LC/LD | 2            | 6316 C3                                          | 6218 C3 | 35                      | 7400                        | 3700  | 1850 | -                      | -     | -    | -                      | -     | -     |
|        | 355 LA/LB/LC/LD | 4; 6         | 6316 C3                                          | 6322 C3 | 60                      | -                           | -     | -    | 13200                  | 8316  | 4160 | 22000                  | 13860 | 6930  |
|        | 355 LKB         | 4; 6         | 6324 C3                                          | 6324 C3 | 72                      | -                           | -     | -    | 7500                   | 3700  | 2800 | 20000                  | 20000 | 10000 |
|        | 355 LKB         | 2            | 6317 C4                                          | 6317 C4 | 37                      | 6600                        | 5200  | 2600 | -                      | -     | -    | -                      | -     | -     |
|        | 355 LKC         | 6            | 6324 C3                                          | 6324 C3 | 72                      | -                           | -     | -    | -                      | -     | -    | 20000                  | 17000 | 8500  |
|        | 400 LB          | 2            | 6317 C4                                          | 6317 C4 | 37                      | 6600                        | 5200  | 2600 | -                      | -     | -    | -                      | -     | -     |
|        | 400 LB          | 4            | 6324 C3                                          | 6324 C3 | 72                      | -                           | -     | -    | 7500                   | 3700  | 2800 | -                      | -     | -     |
|        | 450 LA          | 4            | 6328 C3                                          | 6328 C3 | 93                      | -                           | -     | -    | 4600                   | 2300  | 1100 | -                      | -     | -     |
|        | 450 LA          | 6            | 6328 C3                                          | 6328 C3 | 93                      | -                           | -     | -    | -                      | -     | -    | 10000                  | 6000  | 3000  |
|        | 450 LB          | 4            | 6328 C3                                          | 6328 C3 | 93                      | -                           | -     | -    | 4600                   | 2300  | 1100 | -                      | -     | -     |
|        | 450 LB          | 6            | 6328 C3                                          | 6328 C3 | 93                      | -                           | -     | -    | -                      | -     | -    | 10000                  | 6000  | 3000  |
|        | 450 LC          | 6            | 6328 C3                                          | 6328 C3 | 93                      | -                           | -     | -    | -                      | -     | -    | 10000                  | 6000  | 3000  |
|        | 450 LD          | 4            | 6328 C3                                          | 6328 C3 | 93                      | -                           | -     | -    | 4600                   | 2300  | 1100 | -                      | -     | -     |

\* bearing with grease nipples on request

**STANDARD BEARING FITTING ARRANGEMENTS**

| FLSES series                               |                      | Horizontal shaft                                                                     | Vertical shaft                            |                                                                                     |
|--------------------------------------------|----------------------|--------------------------------------------------------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------------|
|                                            |                      |                                                                                      | Shaft facing down                         | Shaft facing up                                                                     |
| Foot mounted motors                        | Mounting arrangement | B3                                                                                   | V5                                        | V6                                                                                  |
|                                            | standard mounting    | DE bearing:<br>- located at DE for frame $\leq 132$<br>- locked for frame $\geq 160$ | DE bearing locked                         | DE bearing:<br>- located at DE for frame $\leq 90$<br>- locked for frame $\geq 100$ |
|                                            | on request           | DE bearing locked for frame $< 132$                                                  |                                           | DE bearing locked for frame $< 90$                                                  |
| Flange mounted motors (or foot and flange) | Mounting arrangement | B5 / B35 / B14 / B34                                                                 | V1 / V15 / V18 / V58                      | V3 / V36 / V19 / V69                                                                |
|                                            | standard mounting    | DE bearing locked on frames 80 to 355LD                                              | DE bearing locked on frames 80 to 355LD   | DE bearing locked on frames 80 to 355LD                                             |
|                                            |                      | NDE bearing locked on frames 355LK to 450                                            | NDE bearing locked on frames 355LK to 450 | NDE bearing locked on frames 355LK to 450                                           |

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

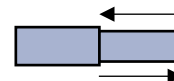
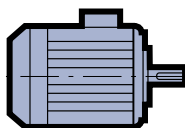
## IP55 Cast iron frame

### Construction

### Axial loads

#### HORIZONTAL MOTOR

For a bearing life  $L_{10h}$   
of 25,000 hours  
and 40,000 hours



| Series | Type            | No. of poles | Permissible axial load (in daN) on main shaft extension for standard bearing assembly |              |              |              |                        |              |              |              |                        |              |              |              |
|--------|-----------------|--------------|---------------------------------------------------------------------------------------|--------------|--------------|--------------|------------------------|--------------|--------------|--------------|------------------------|--------------|--------------|--------------|
|        |                 |              | IM B3 / B6<br>IM B7 / B8<br>IM B5 / B35<br>IM B14 / B34                               |              |              |              |                        |              |              |              |                        |              |              |              |
|        |                 |              | 3000 min <sup>-1</sup>                                                                |              |              |              | 1500 min <sup>-1</sup> |              |              |              | 1000 min <sup>-1</sup> |              |              |              |
|        |                 |              | 25,000 hours                                                                          | 40,000 hours | 25,000 hours | 40,000 hours | 25,000 hours           | 40,000 hours | 25,000 hours | 40,000 hours | 25,000 hours           | 40,000 hours | 25,000 hours | 40,000 hours |
| FLSES  | 80 L            | 2            | 30                                                                                    | 21           | (60)         | (51)         | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 80 LG           | 2; 4         | 28                                                                                    | 19           | (68)         | (59)         | 48                     | 34           | (88)         | (74)         | -                      | -            | -            | -            |
|        | 90 SL/L         | 2; 4; 6      | 29                                                                                    | 23           | (69)         | (56)         | 45                     | 32           | (85)         | (72)         | 56                     | 40           | (96)         | (80)         |
|        | 90 LU           | 2; 4; 6      | 22                                                                                    | 13           | (72)         | (63)         | 38                     | 25           | (88)         | (75)         | 47                     | 32           | (97)         | (82)         |
|        | 100 L           | 2; 4         | 40                                                                                    | 26           | (90)         | (76)         | 61                     | 43           | (111)        | (93)         | -                      | -            | -            | -            |
|        | 100 LR          | 4            | -                                                                                     | -            | -            | -            | 61                     | 43           | (111)        | (93)         | -                      | -            | -            | -            |
|        | 100 LG          | 4; 6         | -                                                                                     | -            | -            | -            | 55                     | 38           | (105)        | (88)         | 75                     | 53           | (125)        | (103)        |
|        | 112 MG          | 2; 6         | 37                                                                                    | 24           | (87)         | (74)         | -                      | -            | -            | -            | 82                     | 61           | (132)        | (111)        |
|        | 112 MU          | 4; 6         | -                                                                                     | -            | -            | -            | 54                     | 36           | (114)        | (96)         | 66                     | 45           | (126)        | (105)        |
|        | 132 SM/M        | 2; 4; 6      | 101                                                                                   | 74           | (171)        | (144)        | 146                    | 109          | (216)        | (179)        | 182                    | 138          | (252)        | (208)        |
|        | 132 MU          | 6            | -                                                                                     | -            | -            | -            | -                      | -            | -            | -            | 169                    | 126          | (249)        | (206)        |
|        | 132 MR          | 4            | -                                                                                     | -            | -            | -            | 129                    | 93           | (219)        | (183)        | -                      | -            | -            | -            |
|        | 160 M           | 2; 4         | 129                                                                                   | 94           | 229          | 194          | 187                    | 140          | 287          | 240          | 234                    | 177          | 334          | 277          |
|        | 160 MU          | 6            | -                                                                                     | -            | -            | -            | -                      | -            | -            | -            | 219                    | 164          | 319          | 264          |
|        | 160 L           | 2; 4         | 118                                                                                   | 83           | 218          | 183          | 195                    | 148          | 295          | 248          | -                      | -            | -            | -            |
|        | 160 LUR         | 2; 4; 6      | 158                                                                                   | 117          | 258          | 217          | 212                    | 158          | 312          | 258          | 257                    | 193          | 357          | 293          |
|        | 180 M           | 2; 4         | 189                                                                                   | 148          | 237          | 196          | 228                    | 174          | 291          | 237          | -                      | -            | -            | -            |
|        | 180 MT          | 4            | -                                                                                     | -            | -            | -            | 215                    | 161          | 315          | 261          | -                      | -            | -            | -            |
|        | 180 MUR         | 2            | 178                                                                                   | 137          | 241          | 200          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 180 L           | 4; 6         | -                                                                                     | -            | -            | -            | 240                    | 186          | 288          | 234          | 272                    | 208          | 320          | 256          |
|        | 180 LUR         | 4; 6         | -                                                                                     | -            | -            | -            | 224                    | 170          | 287          | 233          | 224                    | 162          | 287          | 225          |
|        | 200 LU          | 2; 4; 6      | 249                                                                                   | 196          | 312          | 259          | 316                    | 245          | 379          | 308          | 327                    | 245          | 390          | 308          |
|        | 225 S           | 4            | -                                                                                     | -            | -            | -            | 427                    | 336          | 490          | 399          | -                      | -            | -            | -            |
|        | 225 SR          | 4            | -                                                                                     | -            | -            | -            | 370                    | 290          | 433          | 353          | -                      | -            | -            | -            |
|        | 225 M           | 4; 6         | -                                                                                     | -            | -            | -            | 416                    | 325          | 496          | 405          | 511                    | 402          | 591          | 482          |
|        | 225 MR          | 2            | 280                                                                                   | 220          | 343          | 283          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 250 M           | 2; 6         | 308                                                                                   | 240          | 388          | 320          | -                      | -            | -            | -            | 506                    | 400          | 506          | 400          |
|        | 250 MR          | 4            | -                                                                                     | -            | -            | -            | 413                    | 322          | 493          | 402          | -                      | -            | -            | -            |
|        | 280 S/M         | 2; 4; 6      | 342                                                                                   | 258          | 484          | 400          | 483                    | 372          | 625          | 514          | 581                    | 445          | 723          | 587          |
|        | 315 S/M/LA/LB   | 2; 6         | 411                                                                                   | 348          | 165          | 102          | -                      | -            | -            | -            | 933                    | 761          | 687          | 515          |
|        | 315 S/M/LA/LB   | 4            | -                                                                                     | -            | -            | -            | 814                    | 670          | 568          | 424          | -                      | -            | -            | -            |
|        | 355 LA/LB/LC/LD | 2            | 393                                                                                   | 333          | 147          | 87           | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 355 LAL         | 4            | -                                                                                     | -            | -            | -            | 876                    | 724          | 630          | 478          | -                      | -            | -            | -            |
|        | 355 LA/LB/LC/LD | 4; 6         | -                                                                                     | -            | -            | -            | 876                    | 724          | 630          | 478          | 947                    | 764          | 701          | 518          |
|        | 355 LKA         | 6            | -                                                                                     | -            | -            | -            | -                      | -            | -            | -            | 937                    | 760          | 615          | 440          |
|        | 355 LKB         | 2            | 435                                                                                   | -            | 266          | -            | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 355 LKB         | 4            | -                                                                                     | -            | -            | -            | 843                    | -            | 530          | -            | -                      | -            | -            | -            |
|        | 355 LKB         | 6            | -                                                                                     | -            | -            | -            | -                      | -            | -            | -            | 897                    | 725          | 577          | 405          |
|        | 355 LKC         | 6            | -                                                                                     | -            | -            | -            | -                      | -            | -            | -            | 964                    | -            | 596          | -            |
|        | 400 LB          | 2            | 435                                                                                   | -            | 266          | -            | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 400 LB          | 4            | -                                                                                     | -            | -            | -            | 862                    | -            | 582          | -            | -                      | -            | -            | -            |
|        | 450 LA          | 4; 6         | -                                                                                     | -            | -            | -            | 1061                   | -            | 707          | -            | 1179                   | -            | 808          | -            |
|        | 450 LB/LC/LD    | 4; 6         | -                                                                                     | -            | -            | -            | 1041                   | -            | 687          | -            | 1162                   | -            | 941          | -            |

( ): axial loads permissible with DE bearing locked

# VERTICAL MOTOR SHAFT FACING DOWN

For a bearing life  $L_{10h}$   
of 25,000 hours  
and 40,000 hours



| Series | Type            | No. of poles | Permissible axial load (in daN) on main shaft extension for standard bearing assembly |                 |                 |                 |                        |                 |                 |                 |                        |                 |                 |                 |
|--------|-----------------|--------------|---------------------------------------------------------------------------------------|-----------------|-----------------|-----------------|------------------------|-----------------|-----------------|-----------------|------------------------|-----------------|-----------------|-----------------|
|        |                 |              | IM V5<br>IM V1 / V15<br>IM V18 / V58                                                  |                 |                 |                 |                        |                 |                 |                 |                        |                 |                 |                 |
|        |                 |              | 3000 min <sup>-1</sup>                                                                |                 |                 |                 | 1500 min <sup>-1</sup> |                 |                 |                 | 1000 min <sup>-1</sup> |                 |                 |                 |
|        |                 |              | 25,000<br>hours                                                                       | 40,000<br>hours | 25,000<br>hours | 40,000<br>hours | 25,000<br>hours        | 40,000<br>hours | 25,000<br>hours | 40,000<br>hours | 25,000<br>hours        | 40,000<br>hours | 25,000<br>hours | 40,000<br>hours |
| FLSES  | 80 L            | 2            | 29                                                                                    | 20              | (63)            | (54)            | -                      | -               | -               | -               | -                      | -               | -               | -               |
|        | 80 LG           | 2; 4         | 26                                                                                    | 16              | (72)            | (62)            | 45                     | 32              | (93)            | (78)            | -                      | -               | -               | -               |
|        | 90 SL/L         | 2; 4; 6      | 26                                                                                    | 16              | (73)            | (63)            | 42                     | 28              | (91)            | (78)            | 53                     | 37              | (101)           | (86)            |
|        | 90 LU           | 2; 4; 6      | 19                                                                                    | 9               | (77)            | (67)            | 33                     | 20              | (95)            | (82)            | 43                     | 28              | (105)           | (89)            |
|        | 100 L           | 2; 4         | 36                                                                                    | 23              | (96)            | (83)            | 56                     | 38              | (119)           | (101)           | -                      | -               | -               | -               |
|        | 100 LR          | 4            | -                                                                                     | -               | -               | -               | 55                     | 37              | (120)           | (102)           | -                      | -               | -               | -               |
|        | 100 LG          | 4; 6         | -                                                                                     | -               | -               | -               | 48                     | 31              | (116)           | (99)            | 68                     | 46              | (137)           | (115)           |
|        | 112 MG          | 2; 6         | 31                                                                                    | 18              | (98)            | (85)            | -                      | -               | -               | -               | 75                     | 53              | (145)           | (123)           |
|        | 112 MU          | 4; 6         | -                                                                                     | -               | -               | -               | 45                     | 28              | (128)           | (110)           | 57                     | 36              | (140)           | (119)           |
|        | 132 SM/M        | 2; 4; 6      | 90                                                                                    | 62              | (189)           | (161)           | 135                    | 98              | (235)           | (198)           | 171                    | 127             | (271)           | (227)           |
|        | 132 MU          | 6            | -                                                                                     | -               | -               | -               | -                      | -               | -               | -               | 154                    | 110             | (275)           | (231)           |
|        | 132 MR          | 4            | -                                                                                     | -               | -               | -               | 113                    | 77              | (245)           | (208)           | -                      | -               | -               | -               |
|        | 160 M           | 2; 4; 6      | 107                                                                                   | 72              | 264             | 229             | 164                    | 117             | 325             | 277             | 209                    | 152             | 374             | 317             |
|        | 160 MU          | 6            | -                                                                                     | -               | -               | -               | -                      | -               | -               | -               | 189                    | 133             | 375             | 319             |
|        | 160 L           | 2; 4         | 94                                                                                    | 59              | 256             | 221             | 174                    | 126             | 331             | 284             | -                      | -               | -               | -               |
|        | 160 LUR         | 2; 4; 6      | 133                                                                                   | 92              | 297             | 256             | 185                    | 130             | 362             | 308             | 227                    | 162             | 417             | 352             |
|        | 180 M           | 2; 4         | 160                                                                                   | 119             | 279             | 238             | 187                    | 132             | 361             | 306             | -                      | -               | -               | -               |
|        | 180 MT          | 4            | -                                                                                     | -               | -               | -               | 190                    | 135             | 361             | 306             | -                      | -               | -               | -               |
|        | 180 MUR         | 2            | 144                                                                                   | 102             | 294             | 252             | -                      | -               | -               | -               | -                      | -               | -               | -               |
|        | 180 L           | 4; 6         | -                                                                                     | -               | -               | -               | 206                    | 151             | 346             | 291             | 233                    | 169             | 391             | 326             |
|        | 180 LUR         | 4; 6         | -                                                                                     | -               | -               | -               | 187                    | 132             | 355             | 300             | 183                    | 120             | 377             | 314             |
|        | 200 LU          | 2; 4; 6      | 207                                                                                   | 153             | 375             | 320             | 262                    | 190             | 471             | 398             | 269                    | 186             | 505             | 422             |
|        | 225 S           | 4            | -                                                                                     | -               | -               | -               | 351                    | 260             | 611             | 520             | -                      | -               | -               | -               |
|        | 225 SR          | 4            | -                                                                                     | -               | -               | -               | 317                    | 236             | 520             | 438             | -                      | -               | -               | -               |
|        | 225 M           | 4; 6         | -                                                                                     | -               | -               | -               | 333                    | 241             | 627             | 535             | 428                    | 319             | 723             | 613             |
|        | 225 MR          | 2            | 234                                                                                   | 174             | 413             | 352             | -                      | -               | -               | -               | -                      | -               | -               | -               |
|        | 250 M           | 2; 6         | 247                                                                                   | 179             | 481             | 413             | -                      | -               | -               | -               | 423                    | 315             | 647             | 539             |
|        | 250 MR          | 4            | -                                                                                     | -               | -               | -               | 315                    | 223             | 639             | 547             | -                      | -               | -               | -               |
|        | 280 S/M         | 2; 4; 6      | 396                                                                                   | 307             | 484             | 395             | 507                    | 394             | 670             | 557             | 602                    | 461             | 793             | 651             |
|        | 315 S/M/LA/LB   | 2; 6         | 226                                                                                   | 156             | 417             | 347             | -                      | -               | -               | -               | -                      | -               | -               | -               |
|        | 315 S/M/LA/LB   | 4            | -                                                                                     | -               | -               | -               | 601                    | 449             | 893             | 741             | 683                    | 515             | 1042            | 873             |
|        | 355 LA/LB/LC/LD | 2            | 135                                                                                   | 65              | 524             | 454             | -                      | -               | -               | -               | -                      | -               | -               | -               |
|        | 355 LAL         | 4            | -                                                                                     | -               | -               | -               | 516                    | 350             | 1123            | 957             | -                      | -               | -               | -               |
|        | 355 LA/LB/LC/LD | 4; 6         | -                                                                                     | -               | -               | -               | 516                    | 350             | 1123            | 957             | 566                    | 364             | 1328            | 1126            |
|        | 355 LKA         | 6            | -                                                                                     | -               | -               | -               | -                      | -               | -               | -               | 650                    | 442             | 1349            | 1140            |
|        | 355 LKB         | 2            | 965                                                                                   | -               | 271             | -               | -                      | -               | -               | -               | -                      | -               | -               | -               |
|        | 355 LKB         | 4            | -                                                                                     | -               | -               | -               | 2442                   | -               | 361             | -               | -                      | -               | -               | -               |
|        | 355 LKB         | 6            | -                                                                                     | -               | -               | -               | -                      | -               | -               | -               | 393                    | 185             | 1624            | 1416            |
|        | 355 LKC         | 6            | -                                                                                     | -               | -               | -               | -                      | -               | -               | -               | 2722                   | -               | 706             | -               |
|        | 400 LB          | 2            | 965                                                                                   | -               | 271             | -               | -                      | -               | -               | -               | -                      | -               | -               | -               |
|        | 400 LB          | 4            | -                                                                                     | -               | -               | -               | 2442                   | -               | 361             | -               | -                      | -               | -               | -               |
|        | 450 LA          | 4; 6         | -                                                                                     | -               | -               | -               | 868                    | -               | 1247            | -               | 791                    | -               | 1668            | -               |
|        | 450 LB/LC/LD    | 4; 6         | -                                                                                     | -               | -               | -               | 729                    | -               | 1366            | -               | 671                    | -               | 1772            | -               |

( ): axial loads permissible with DE bearing locked

# VERTICAL MOTOR SHAFT FACING UP

For a bearing life  $L_{10h}$   
of 25,000 hours  
and 40,000 hours



| Series | Type            | No. of poles | Permissible axial load (in daN) on main shaft extension for standard bearing assembly                              |              |              |              |                        |              |              |              |                        |              |              |              |
|--------|-----------------|--------------|--------------------------------------------------------------------------------------------------------------------|--------------|--------------|--------------|------------------------|--------------|--------------|--------------|------------------------|--------------|--------------|--------------|
|        |                 |              | IM V6<br>IM V3 / V36<br>IM V19 / V69                                                                               |              |              |              |                        |              |              |              |                        |              |              |              |
|        |                 |              | 3000 min <sup>-1</sup>                                                                                             |              |              |              | 1500 min <sup>-1</sup> |              |              |              | 1000 min <sup>-1</sup> |              |              |              |
|        |                 |              | 25,000 hours                                                                                                       | 40,000 hours | 25,000 hours | 40,000 hours | 25,000 hours           | 40,000 hours | 25,000 hours | 40,000 hours | 25,000 hours           | 40,000 hours | 25,000 hours | 40,000 hours |
| FLSES  | 80 L            | 2            | (59)                                                                                                               | (50)         | 33           | 24           | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 80 LG           | 2; 4         | (66)                                                                                                               | (56)         | 32           | 22           | (85)                   | (71)         | 53           | 39           | -                      | -            | -            | -            |
|        | 90 SL/L         | 2; 4; 6      | (66)                                                                                                               | (56)         | 33           | 23           | (82)                   | (68)         | 51           | 38           | (93)                   | (77)         | 61           | 46           |
|        | 90 LU           | 2; 4; 6      | (69)                                                                                                               | (59)         | 27           | 18           | (81)                   | (76)         | 43           | 38           | (93)                   | (82)         | 55           | 32           |
|        | 100 L           | 2            | (86)                                                                                                               | (72)         | 46           | 33           | (106)                  | (88)         | 69           | 51           | -                      | -            | -            | -            |
|        | 100 LR          | 4            | -                                                                                                                  | -            | -            | -            | (105)                  | (87)         | 70           | 52           | -                      | -            | -            | -            |
|        | 100 LG          | 4; 6         | -                                                                                                                  | -            | -            | -            | (98)                   | (81)         | 67           | 49           | (118)                  | (96)         | 87           | 66           |
|        | 112 MG          | 2; 6         | (81)                                                                                                               | (68)         | 48           | 35           | -                      | -            | -            | -            | (125)                  | (103)        | 95           | 73           |
|        | 112 MU          | 4; 6         | -                                                                                                                  | -            | -            | -            | (105)                  | (88)         | 68           | 50           | (117)                  | (96)         | 80           | 60           |
|        | 132 SM/M        | 2; 4; 6      | (159)                                                                                                              | (132)        | 120          | 91           | (205)                  | (168)        | 165          | 128          | (249)                  | (205)        | 179          | 135          |
|        | 132 MU          | 6            | -                                                                                                                  | -            | -            | -            | -                      | -            | -            | -            | (234)                  | (190)        | 195          | 151          |
|        | 132 MR          | 4            | -                                                                                                                  | -            | -            | -            | (203)                  | (167)        | 155          | 118          | -                      | -            | -            | -            |
|        | 160 M           | 2; 4; 6      | 207                                                                                                                | 172          | 164          | 129          | 264                    | 217          | 225          | 177          | 309                    | 252          | 274          | 217          |
|        | 160 MU          | 6            | -                                                                                                                  | -            | -            | -            | -                      | -            | -            | -            | 289                    | 233          | 275          | 219          |
|        | 160 L           | 2; 4         | 194                                                                                                                | 159          | 156          | 121          | 274                    | 226          | 231          | 184          | -                      | -            | -            | -            |
|        | 160 LUR         | 2; 4; 6      | 233                                                                                                                | 192          | 197          | 156          | 285                    | 230          | 262          | 208          | 327                    | 262          | 317          | 252          |
|        | 180 M           | 2; 4         | 208                                                                                                                | 167          | 231          | 190          | 250                    | 195          | 298          | 243          | -                      | -            | -            | -            |
|        | 180 MT          | 4            | -                                                                                                                  | -            | -            | -            | 290                    | 235          | 261          | 206          | -                      | -            | -            | -            |
|        | 180 MUR         | 2            | 207                                                                                                                | 165          | 231          | 189          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 180 L           | 4; 6         | -                                                                                                                  | -            | -            | -            | 254                    | 199          | 298          | 243          | 281                    | 217          | 343          | 278          |
|        | 180 LUR         | 4; 6         | -                                                                                                                  | -            | -            | -            | 250                    | 195          | 292          | 237          | 246                    | 183          | 314          | 251          |
|        | 200 LU          | 2; 4; 6      | 270                                                                                                                | 216          | 312          | 257          | 325                    | 253          | 408          | 335          | 332                    | 249          | 442          | 359          |
|        | 225 S           | 4            | -                                                                                                                  | -            | -            | -            | 414                    | 323          | 548          | 457          | -                      | -            | -            | -            |
|        | 225 SR          | 4            | -                                                                                                                  | -            | -            | -            | 380                    | 299          | 457          | 375          | -                      | -            | -            | -            |
|        | 225 M           | 4; 6         | -                                                                                                                  | -            | -            | -            | 413                    | 321          | 547          | 455          | 508                    | 399          | 643          | 533          |
|        | 225 MR          | 2            | 297                                                                                                                | 237          | 350          | 289          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 250 M           | 2; 6         | 327                                                                                                                | 259          | 401          | 333          | -                      | -            | -            | -            | 423                    | 315          | 647          | 539          |
|        | 250 MR          | 4            | -                                                                                                                  | -            | -            | -            | 395                    | 303          | 559          | 467          | -                      | -            | -            | -            |
|        | 280 S/M         | 2; 4; 6      | 396                                                                                                                | 307          | 484          | 395          | 507                    | 394          | 670          | 557          | 602                    | 461          | 793          | 651          |
|        | 315 S/M/L       | 2            | 226                                                                                                                | 156          | 417          | 347          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 315 S/M/L       | 4; 6         | -                                                                                                                  | -            | -            | -            | 601                    | 449          | 893          | 741          | 683                    | 515          | 1042         | 873          |
|        | 355 LA/LB/LC/LD | 2            | 135                                                                                                                | 65           | 524          | 454          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 355 LA/LB/LC/LD | 4; 6         | -                                                                                                                  | -            | -            | -            | 516                    | 350          | 1123         | 957          | 566                    | 364          | 1328         | 1126         |
|        | 355 LKB         | 2            | 355 LK, 400 and 450: Please consult Leroy-Somer while specifying the coupling mode and any radial and axial loads. |              |              |              |                        |              |              |              |                        |              |              |              |
|        | 355 LKB         | 4; 6         |                                                                                                                    |              |              |              |                        |              |              |              |                        |              |              |              |
|        | 355 LKC         | 6            |                                                                                                                    |              |              |              |                        |              |              |              |                        |              |              |              |
|        | 400 LB          | 2            |                                                                                                                    |              |              |              |                        |              |              |              |                        |              |              |              |
|        | 400 LB          | 4            |                                                                                                                    |              |              |              |                        |              |              |              |                        |              |              |              |
|        | 450 LA          | 4; 6         |                                                                                                                    |              |              |              |                        |              |              |              |                        |              |              |              |
|        | 450 LB/LC/LD    | 4; 6         |                                                                                                                    |              |              |              |                        |              |              |              |                        |              |              |              |

400 and 450: Please consult Leroy-Somer

( ): axial loads permissible with DE bearing locked

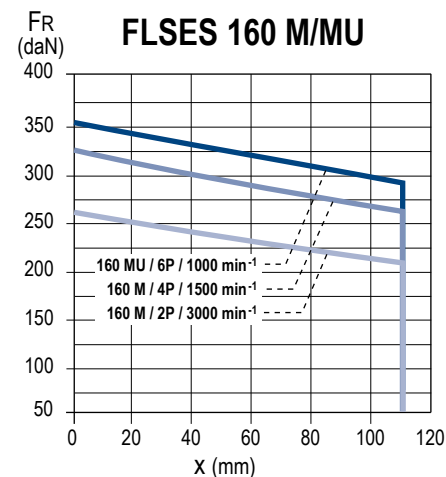
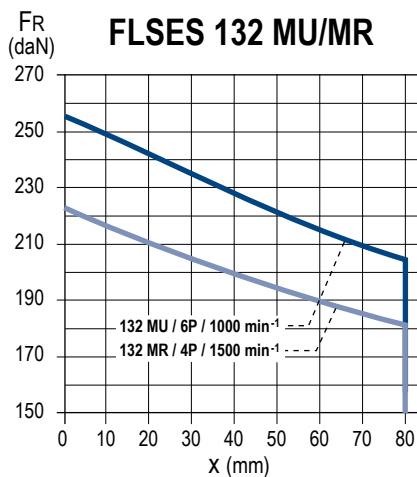
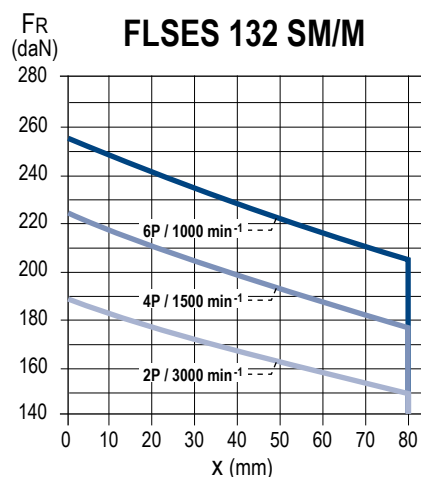
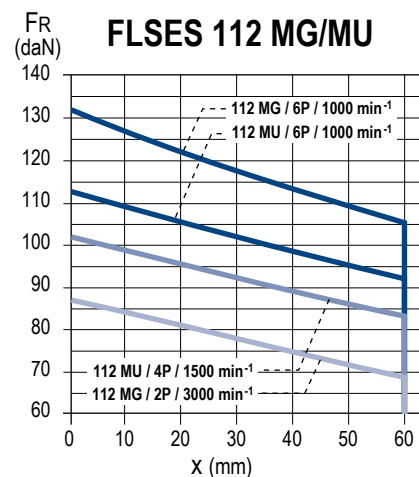
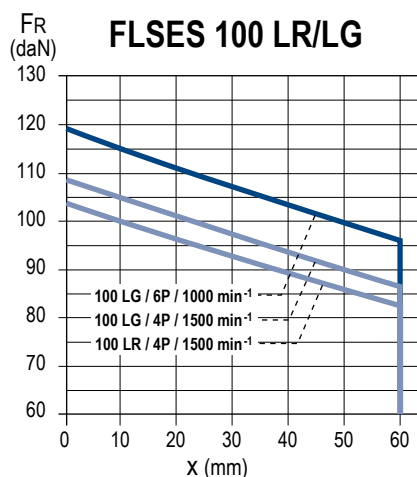
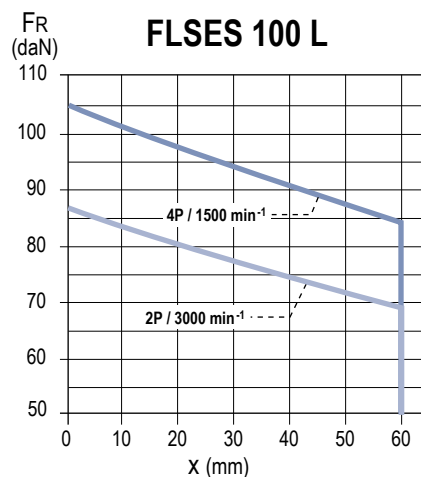
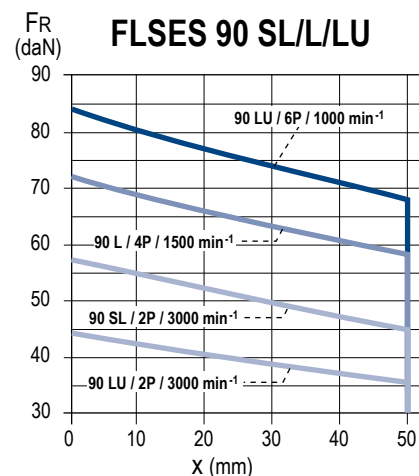
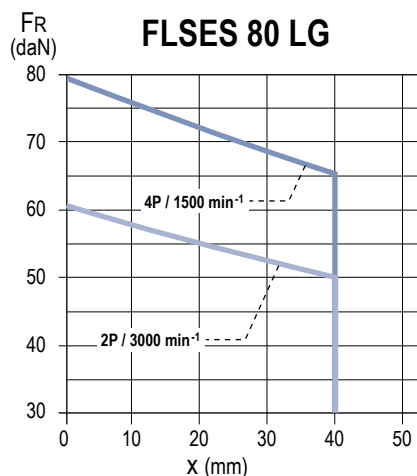
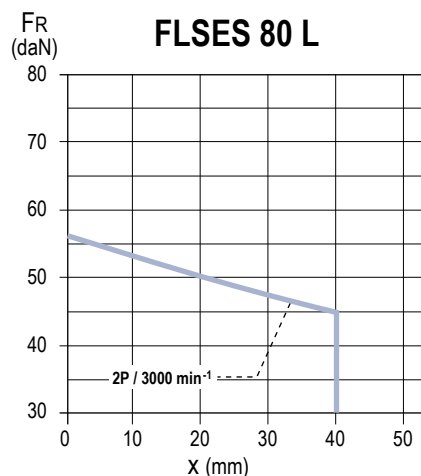


## STANDARD FITTING ARRANGEMENT

Permissible radial load on main shaft extension with a bearing life  $L_{10h}$  of 25,000 hours.

FR : Radial Force

X: Distance with respect to the shaft shoulder

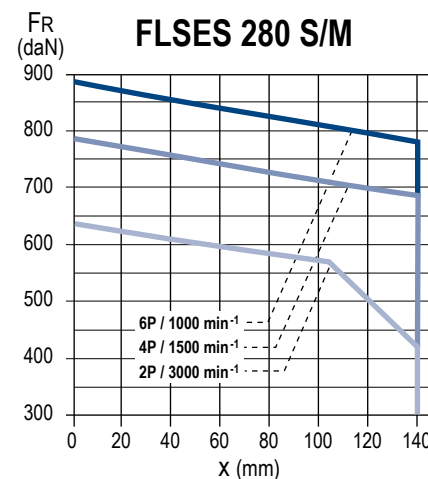
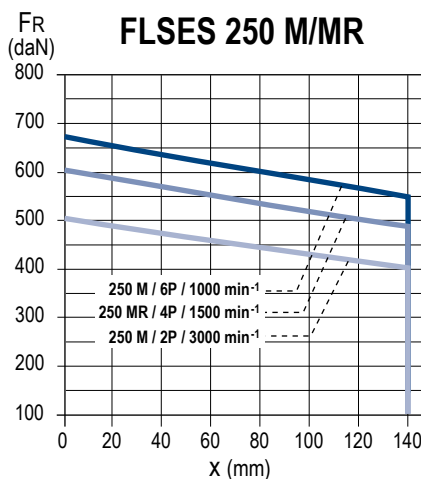
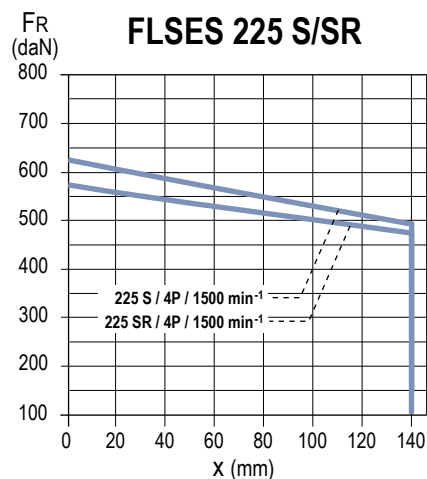
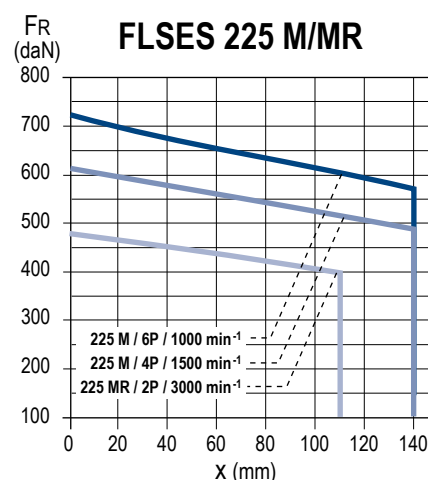
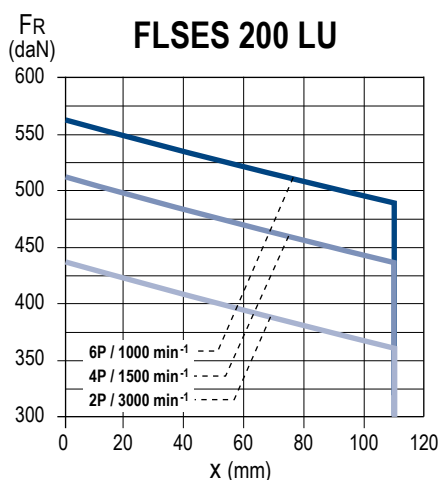
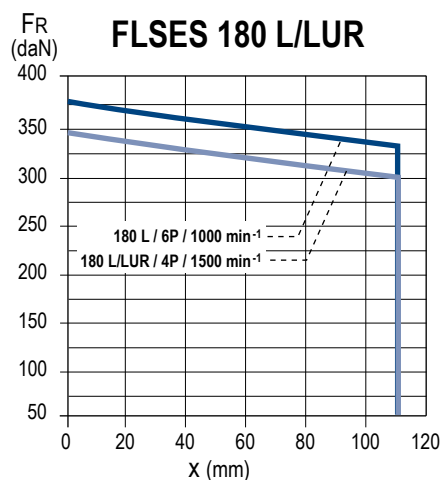
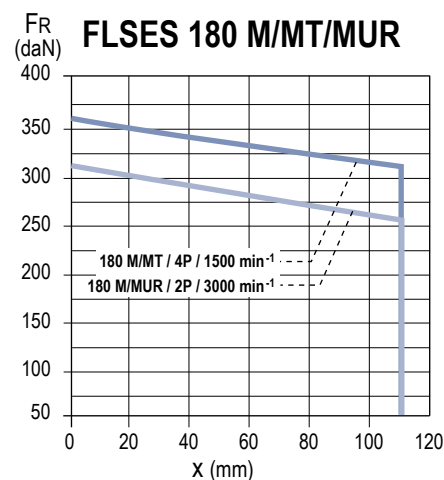
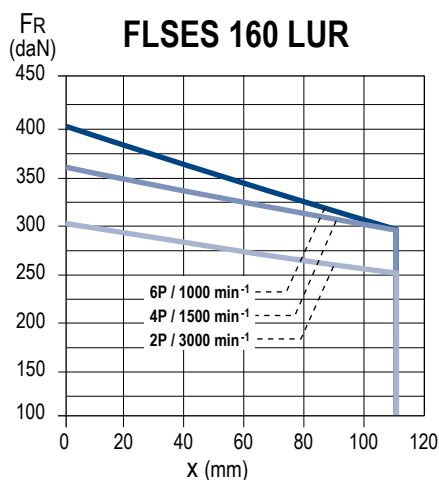
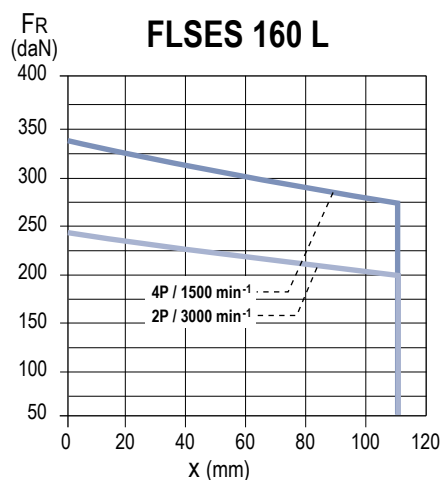


## STANDARD FITTING ARRANGEMENT

Permissible radial load on main shaft extension with a bearing life  $L_{10h}$  of 25,000 hours.

FR : Radial Force

X: Distance with respect to the shaft shoulder

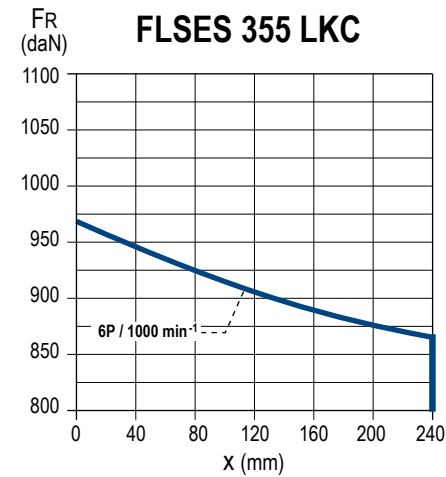
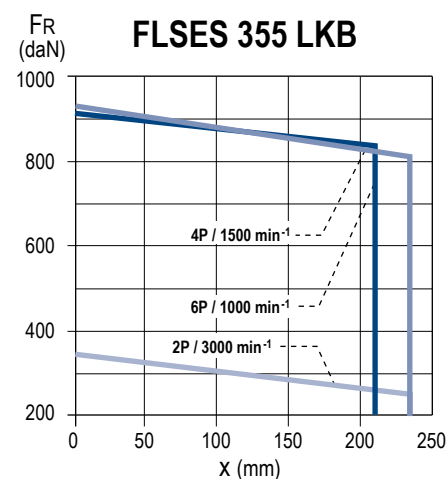
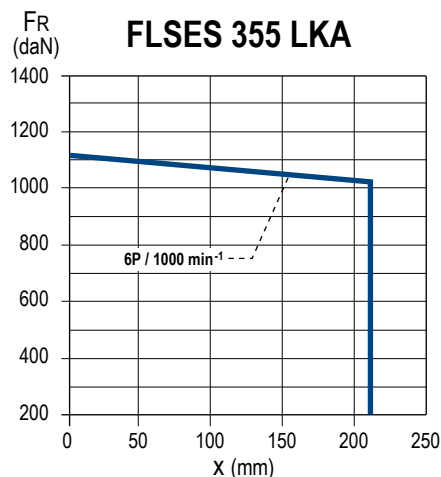
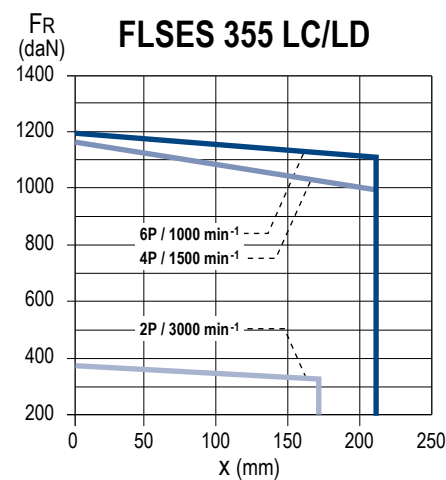
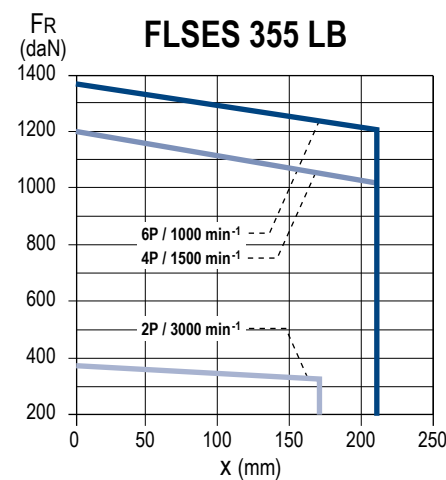
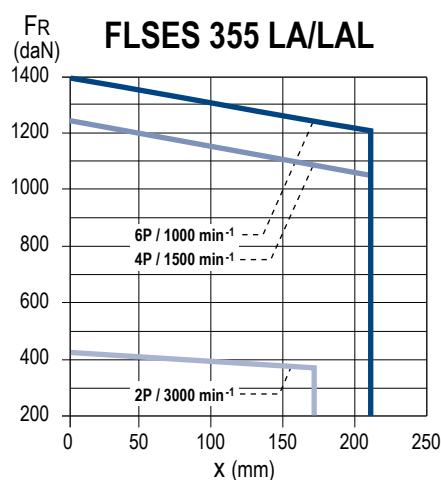
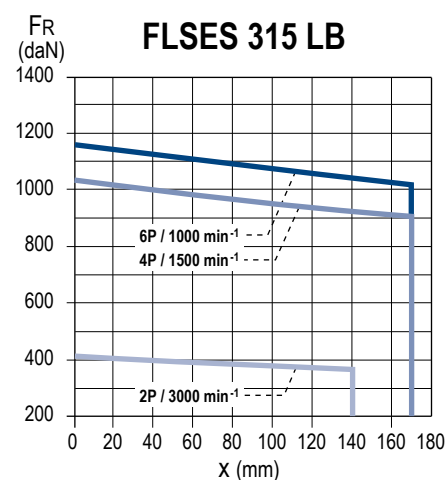
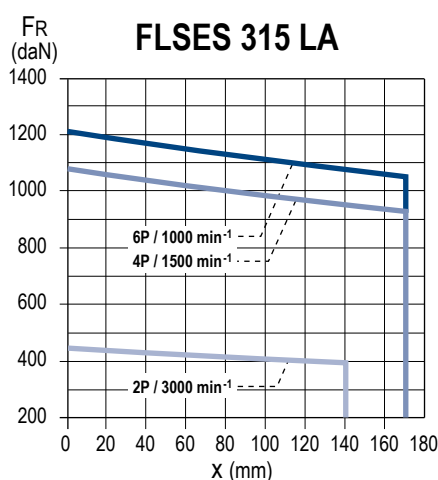
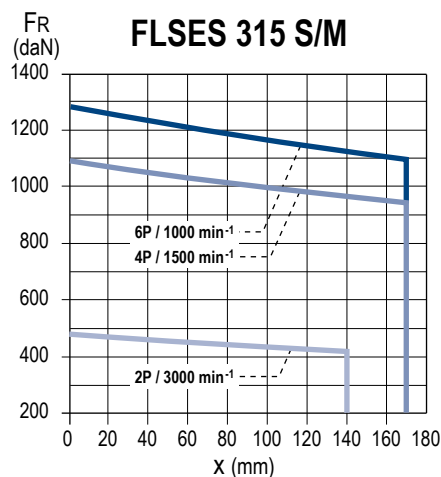


# STANDARD FITTING ARRANGEMENT

Permissible radial load on main shaft extension with a bearing life  $L_{10h}$  of 25,000 hours.

FR : Radial Force

X: Distance with respect to the shaft shoulder

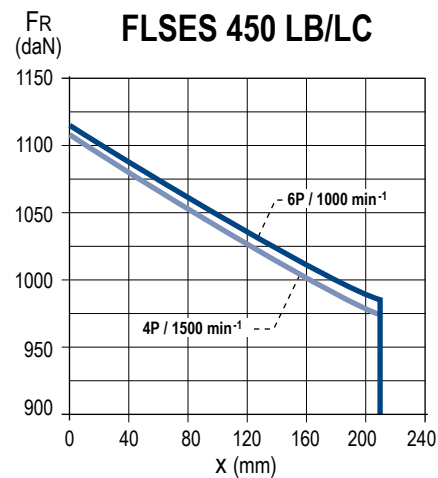
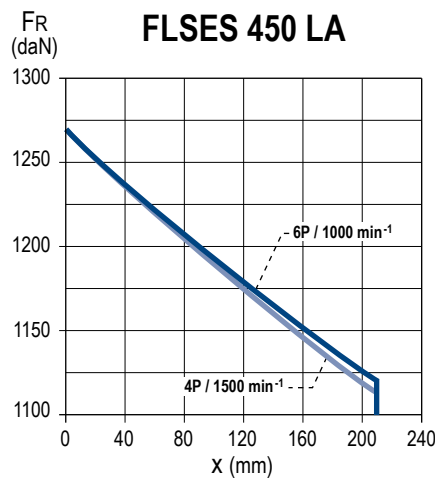
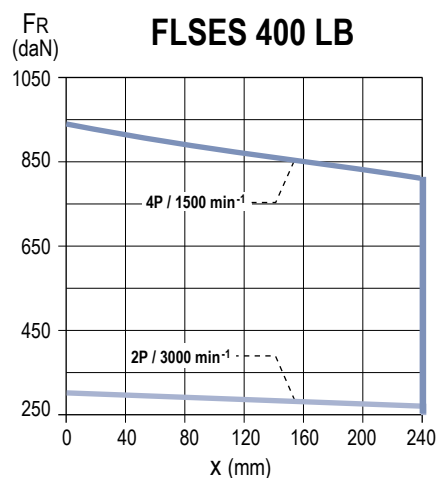


## STANDARD FITTING ARRANGEMENT

Permissible radial load on main shaft extension with a bearing life  $L_{10h}$  of 25,000 hours.

FR : Radial Force

X: Distance with respect to the shaft shoulder



# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP55 Cast iron frame

### Construction

### Radial loads

## SPECIAL FITTING ARRANGEMENT

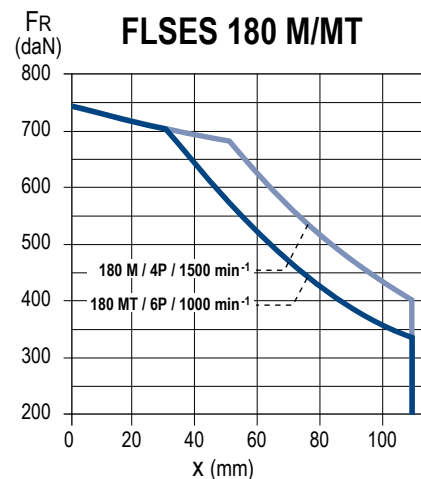
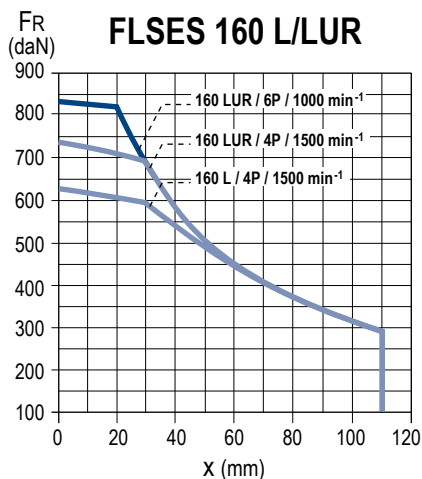
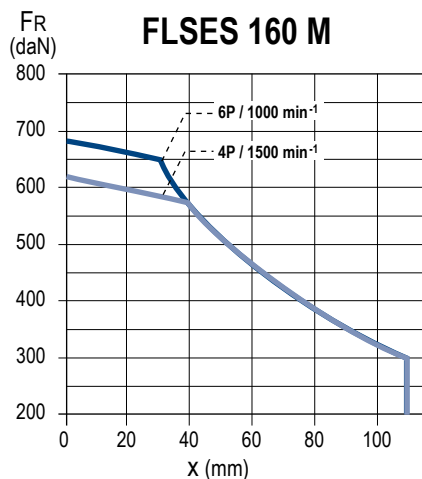
### Type of drive end roller bearings

| Series | Type      | No. of poles | Non drive end bearing<br>(N.D.E.) | Drive end bearing<br>(D.E.) |
|--------|-----------|--------------|-----------------------------------|-----------------------------|
| FLSES  | 160 M/MU  | 4 ; 6        | 6210 C3                           | NU 309                      |
|        | 160 L     | 4            |                                   |                             |
|        | 160 LUR   | 6            | 6210 C3                           | NU 310                      |
|        | 180 MT    | 4            |                                   |                             |
|        | 180 M     | 4            | 6212 C3                           | NU 310                      |
|        | 180 L     | 4 ; 6        |                                   |                             |
|        | 180 LUR   |              |                                   |                             |
|        | 200 LU    | 4 ; 6        | 6312 C3                           | NU 312                      |
|        | 225 S     | 4            | 6314 C3                           | NU 314                      |
|        | 225 SR    | 4            | 6312 C3                           | NU 313                      |
|        | 225 M     | 4 ; 6        | 6314 C3                           | NU 314                      |
|        | 225 MR    | 2            | 6312 C3                           | NU 313                      |
|        | 250 M     | 6            | 6314 C3                           | NU 314                      |
|        | 250 MR    | 4            |                                   |                             |
|        | 280 S/M   | 4 ; 6        | 6314 C3                           | NU 316                      |
|        | 315 S/M/L | 4 ; 6        | 6316 C3                           | NU 320                      |
|        | 355 L     | 4 ; 6        | 6316 C3                           | NU 322                      |
|        | 355 LKA   | 6            | 6324 C3                           | NU 324                      |
|        | 355 LKB   | 2            | 6317 C4                           | -                           |
|        | 355 LKB   | 4 ; 6        | 6324 C3                           | NU 324                      |
|        | 355 LKC   | 6            |                                   |                             |
|        | 400 LB    | 2            | 6317 C4                           | -                           |
|        | 400 LB    | 4 ; 6        | 6324 C3                           | NU 324                      |
|        | 450 LA    | 4            | 6328 C3                           | NU 328                      |
|        | 450 LA    | 6            |                                   |                             |
|        | 450 LB    | 4            |                                   |                             |
|        | 450 LB    | 6            |                                   |                             |
|        | 450 LC    | 6            |                                   |                             |
|        | 450 LD    | 4            |                                   |                             |
|        |           |              |                                   |                             |

Permissible radial load on main shaft extension with a bearing life  $L_{10h}$  of 25,000 hours.

FR : Radial Force

X: Distance with respect to the shaft shoulder

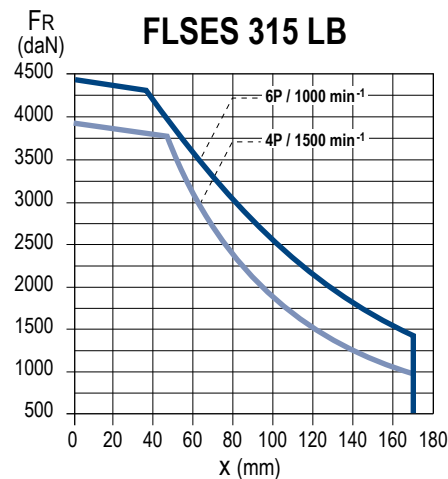
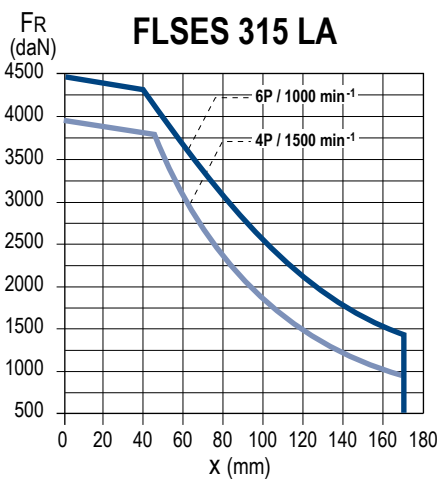
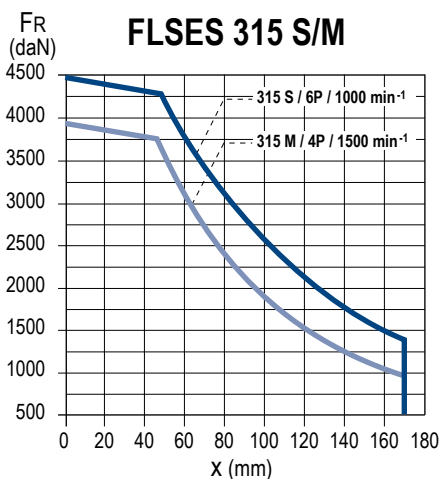
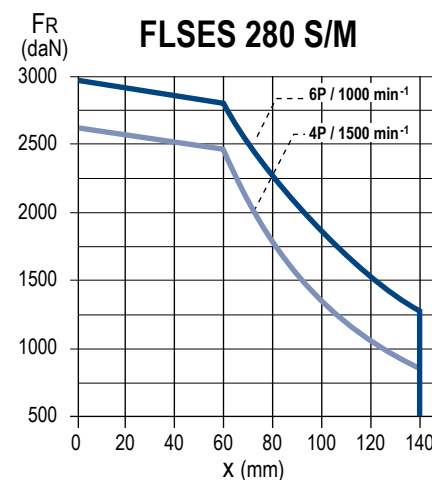
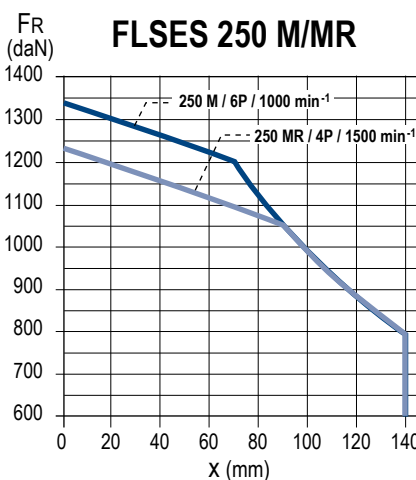
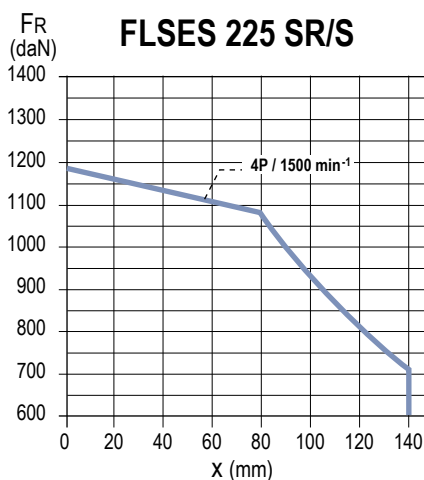
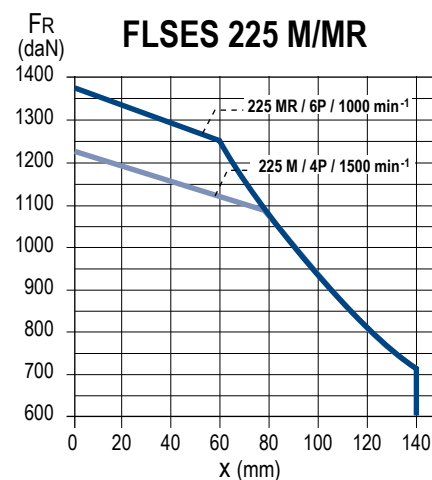
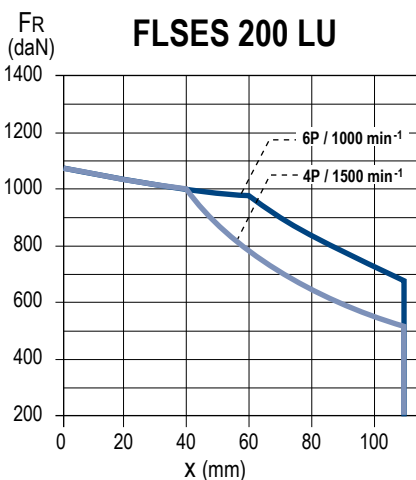
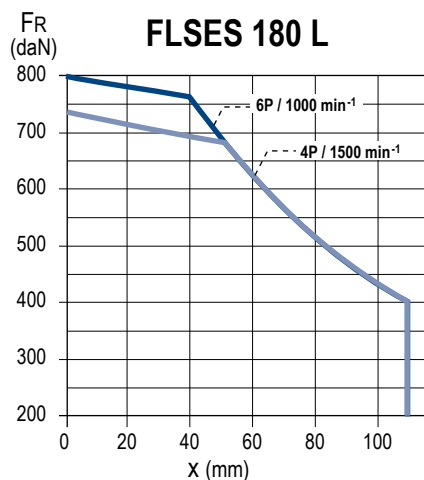


## SPECIAL FITTING ARRANGEMENT

Permissible radial load on main shaft extension with a bearing life  $L_{10h}$  of 25,000 hours.

FR : Radial Force

X: Distance with respect to the shaft shoulder



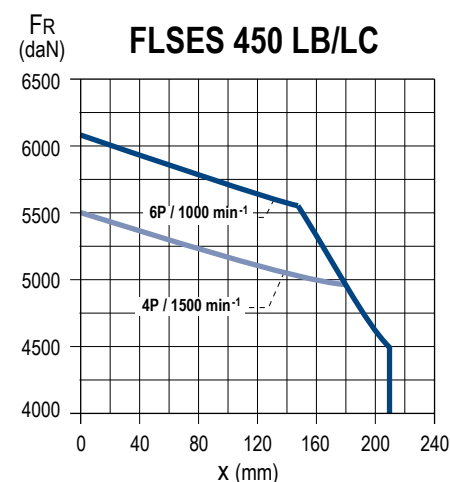
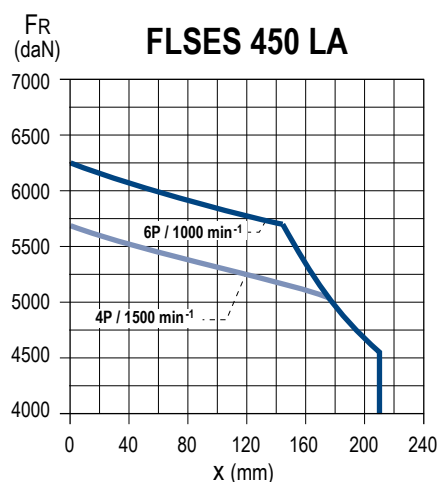
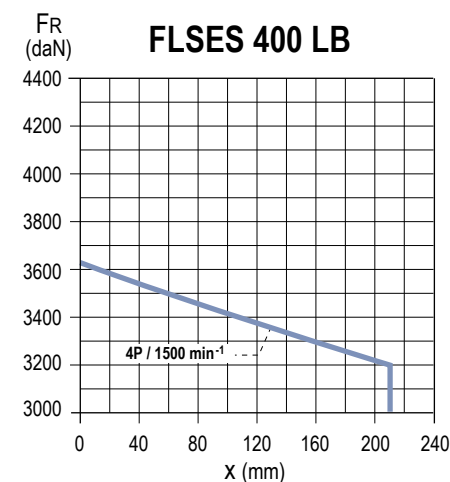
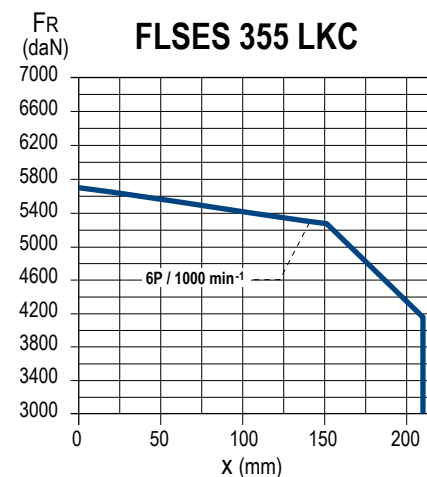
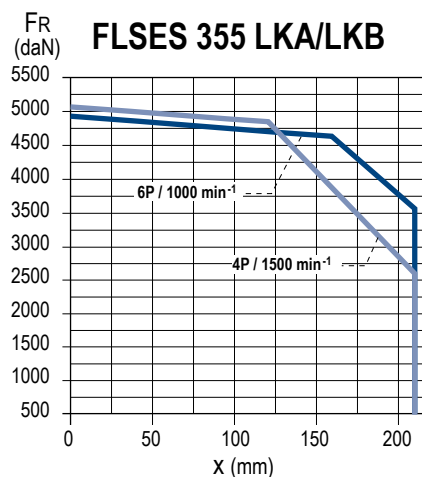
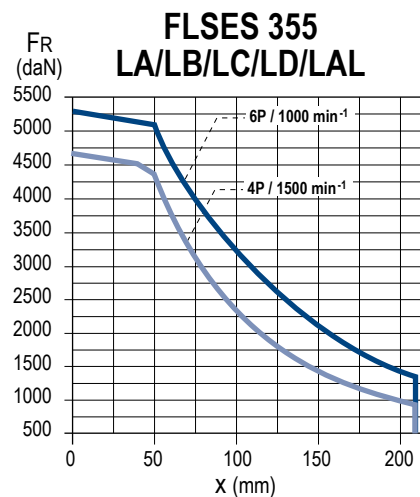
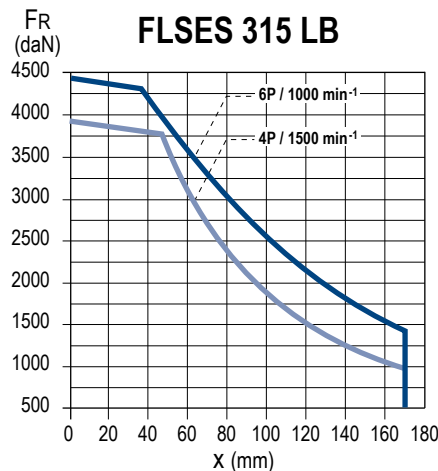
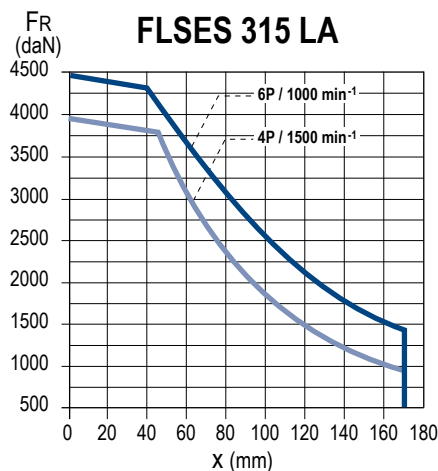


## SPECIAL FITTING ARRANGEMENT

Permissible radial load on main shaft extension with a bearing life  $L_{10h}$  of 25,000 hours.

FR : Radial Force

X: Distance with respect to the shaft shoulder



Optionally, Leroy-Somer motors can be fitted with flanges and faceplates that are larger or smaller than standard. This means that motors can be adapted to all types of situation without the need for costly and time-consuming modifications.

The tables below give the flange and faceplate dimensions and also indicate flange/motor compatibility.

The bearing and shaft extension for each frame size remain standard.

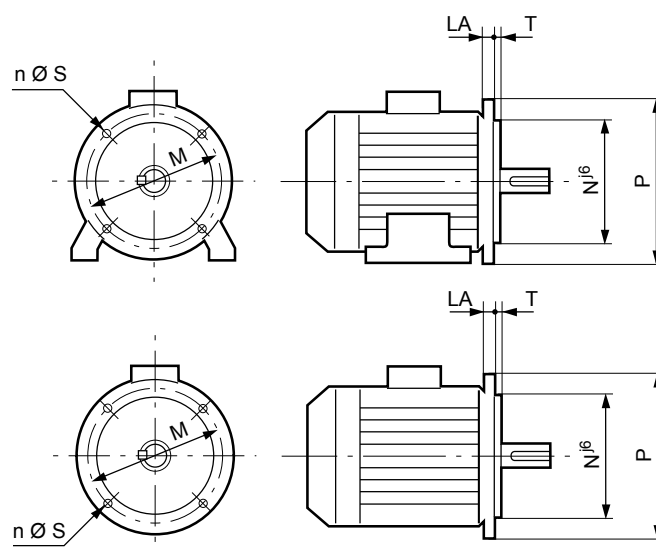
Dimensions in millimetres

#### (FF) Flange mounted

| IEC symbol | Flange dimensions |       |      |     |   |      |      |
|------------|-------------------|-------|------|-----|---|------|------|
|            | M                 | N     | P    | T   | n | S    | LA   |
| FF 115     | 115               | 95    | 140  | 3   | 4 | 10   | 10   |
| FF 130     | 130               | 110   | 160  | 3.5 | 4 | 10   | 10   |
| FF 165     | 165               | 130   | 200  | 3.5 | 4 | 12   | 10   |
| FF 215     | 215               | 180   | 250  | 4   | 4 | 15   | 12   |
| FF 265     | 265               | 230   | 300  | 4   | 4 | 15   | 14   |
| FF 300     | 300               | 250   | 350  | 5   | 4 | 18.5 | 14   |
| FF 350     | 350               | 300   | 400  | 5   | 4 | 18.5 | 15   |
| FF 400     | 400               | 350   | 450  | 5   | 8 | 18.5 | 16   |
| FF 500     | 500               | 450   | 550  | 5   | 8 | 18.5 | 18** |
| FF 600     | 600               | 550*  | 660  | 6   | 8 | 24   | 22   |
| FF 740     | 740               | 680*  | 800  | 6   | 8 | 24   | 22   |
| FF 940     | 940               | 880*  | 1000 | 6   | 8 | 28   | 28   |
| FF 1080    | 1080              | 1000* | 1150 | 6   | 8 | 28   | 30   |

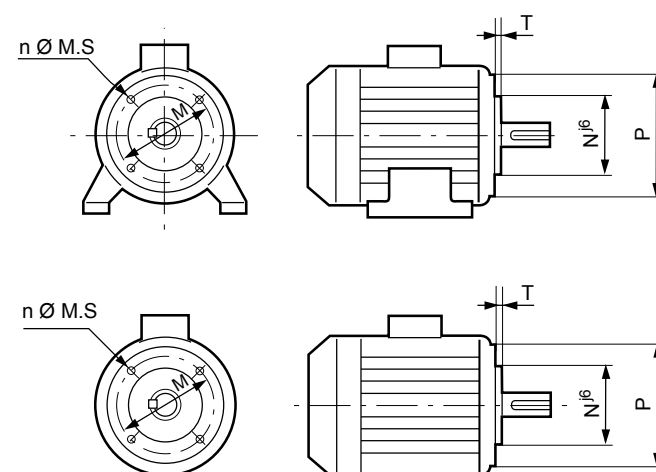
\* Tolerance N js6

\*\* LA = 22 for frame size ≥ 280



#### (FT) Face mounted

| IEC symbol | Faceplate dimensions |     |     |     |   |     |
|------------|----------------------|-----|-----|-----|---|-----|
|            | M                    | N   | P   | T   | n | M.S |
| FT 85      | 85                   | 70  | 105 | 2.5 | 4 | M6  |
| FT 100     | 100                  | 80  | 120 | 3   | 4 | M6  |
| FT 115     | 115                  | 95  | 140 | 3   | 4 | M8  |
| FT 130     | 130                  | 110 | 160 | 3.5 | 4 | M8  |
| FT 165     | 165                  | 130 | 200 | 3.5 | 4 | M10 |
| FT 215     | 215                  | 180 | 250 | 4   | 4 | M12 |
| FT 265     | 265                  | 230 | 300 | 4   | 4 | M12 |



## MODIFIED FLANGES

|                      |                               | (FF) Flange mounted |        |        |        |        |        |        |        |        |        |        | (FT) Face mounted |       |       |       |        |        |        |        |        |        |   |
|----------------------|-------------------------------|---------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------------|-------|-------|-------|--------|--------|--------|--------|--------|--------|---|
| Motor type           | Mounting forms<br>Flange type | FF 115              | FF 130 | FF 165 | FF 215 | FF 265 | FF 300 | FF 350 | FF 400 | FF 500 | FF 600 | FF 740 | FF 940            | FT 65 | FT 75 | FT 85 | FT 100 | FT 115 | FT 130 | FT 165 | FT 215 | FT 265 |   |
| FLSES 80 L/LG        | all                           | ■                   | ■      | ●      | ◆      |        |        |        |        |        |        |        |                   |       |       |       | ◆      | ●      | ◆      | ◆      | ◆      |        |   |
| FLSES 90 S/L/LU      | B5/B35 <sup>(1)</sup>         | ◆                   | ◆      | ●      | ◆      |        |        |        |        |        |        |        |                   |       |       |       |        |        |        |        |        |        |   |
| FLSES 90 S/L/LU      | B3/B14/B34                    | ■                   | ■      | ■      | ■      |        |        |        |        |        |        |        |                   |       |       |       |        | ◆      | ●      | ◆      | ■      |        |   |
| FLSES 100 L/LK       | all                           | ■                   | ■      | ■      | ●      |        |        |        |        |        |        |        |                   |       |       |       |        |        | ◆      | ●      | ◆      | ◆      |   |
| FLSES 112 M          | all                           | ■                   | ■      | ■      | ●      |        |        |        |        |        |        |        |                   |       |       |       |        |        | ◆      | ●      | ◆      | ◆      |   |
| FLSES 112 MU         | all                           |                     | ■      | ■      | ●      | ◆      |        |        |        |        |        |        |                   |       |       |       |        | ◆      | ●      | ◆      | ◆      |        |   |
| FLSES 132 S/M/MR/MU  | all                           |                     |        | ■      | ◆      | ●      |        |        |        |        |        |        |                   |       |       |       |        |        |        | ●      |        | ◆      | ◆ |
| FLSES 160 M/L/LU     | all                           |                     |        |        | ◆      | ◆      | ●      | ◆      |        |        |        |        |                   |       |       |       |        |        |        |        |        |        |   |
| FLSES 180 M/MR/L/LUR | all                           |                     |        |        |        | ◆      | ●      | ◆      |        |        |        |        |                   |       |       |       |        |        |        |        |        |        |   |
| FLSES 200 LU         | all                           |                     |        |        |        |        |        | ●      | ◆      |        |        |        |                   |       |       |       |        |        |        |        |        |        |   |
| FLSES 225 SR/M/MR    | all                           |                     |        |        |        |        |        | ◆      | ●      | ◆      |        |        |                   |       |       |       |        |        |        |        |        |        |   |
| FLSES 250 MR         | all                           |                     |        |        |        |        |        |        | ◆      | ●      |        |        |                   |       |       |       |        |        |        |        |        |        |   |
| FLSES 280 S/M        | all                           |                     |        |        |        |        |        |        | ○      | ●      |        |        |                   |       |       |       |        |        |        |        |        |        |   |
| FLSES 315 S          | all                           |                     |        |        |        |        |        |        |        | ○      | ●      |        |                   |       |       |       |        |        |        |        |        |        |   |
| FLSES 315 M/ML       | all                           |                     |        |        |        |        |        |        |        |        | ●      |        |                   |       |       |       |        |        |        |        |        |        |   |
| FLSES 355 L          | all                           |                     |        |        |        |        |        |        |        |        | ○      | ●      |                   |       |       |       |        |        |        |        |        |        |   |
| FLSES 355 LK         | all                           |                     |        |        |        |        |        |        |        |        |        | ●      | ◆                 |       |       |       |        |        |        |        |        |        |   |

● Standard

■ Modified bearing location

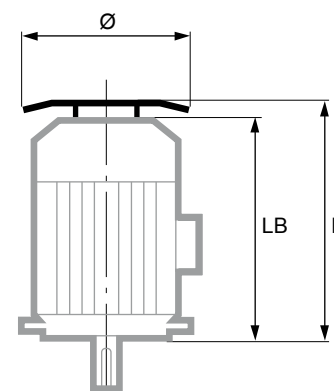
◆ Adaptable without modification

○ Please consult Leroy-Somer

## DRIP COVER FOR OPERATION IN VERTICAL POSITION, SHAFT END FACING DOWN

Dimensions in millimetres

| Motor type        | LB'      | Ø   |
|-------------------|----------|-----|
| FLSES 80          | LB + 20  | 145 |
| FLSES 90          | LB + 20  | 185 |
| FLSES 100         | LB + 20  | 185 |
| FLSES 112 MG      | LB + 20  | 185 |
| FLSES 112 MU      | LB + 25  | 210 |
| FLSES 132 S       | LB + 25  | 210 |
| FLSES 132 MR/MU/M | LB + 30  | 240 |
| FLSES 160         | LB + 60  | 320 |
| FLSES 180 M/MR    | LB + 60  | 320 |
| FLSES 180 L/LUR   | LB + 60  | 360 |
| FLSES 200 LU      | LB + 75  | 400 |
| FLSES 225 SR      | LB + 75  | 400 |
| FLSES 225 M/MR    | LB + 130 | 420 |
| FLSES 250 M       | LB + 130 | 420 |
| FLSES 280         | LB + 130 | 420 |
| FLSES 315         | LB + 118 | 620 |
| FLSES 355 L       | LB + 112 | 710 |
| FLSES 355 LK      | LB + 160 | 650 |
| FLSES 400/450     | LB + 160 | 650 |



## BRAKE MOTORS, FORCED VENTILATION

The integration of high-efficiency motors within a process often requires accessories to make operation easier:

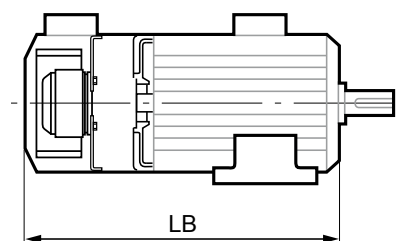
- Forced ventilation for motors used at high or low speeds.

- Holding brakes for maintaining the rotor in the stop position without needing to leave the motor switched on.
- Emergency stop brakes to immobilise loads in case of failure of the motor torque control or loss of power supply.

Notes:

- Without forced ventilation, there is a possibility of overspeed with optional class B balancing.
- The motor temperature is monitored by sensors built into the windings.

| FLSES series        | LB dimensions with Forced Ventilation |                      |
|---------------------|---------------------------------------|----------------------|
|                     | Foot or face mounted motors           | Flange mounted motor |
| 80 L                | 317                                   |                      |
| 80 LG               | 331                                   | 353                  |
| 90 S                |                                       |                      |
| 90 L                |                                       |                      |
| 90 LU               |                                       |                      |
| 100 L               | 373                                   |                      |
| 100 LK              | 422                                   |                      |
| 112 MG              | 412                                   |                      |
| 112 MU              | 458                                   |                      |
| 132 S               |                                       |                      |
| 132 MR              |                                       |                      |
| 132 M               |                                       |                      |
| 132 MU              | 641                                   |                      |
| 160 M               |                                       |                      |
| 160 L               |                                       |                      |
| 160 LU              |                                       |                      |
| 180 MR              | 702                                   |                      |
| 180 M               | 641                                   |                      |
| 180 L               | 689                                   |                      |
| 180 LUR             |                                       |                      |
| 200 LU              |                                       |                      |
| 225 SR              | 819                                   |                      |
| 225 MR              | 825.5                                 |                      |
| 225 M               | 917                                   |                      |
| 250 M               |                                       |                      |
| 280 S               |                                       |                      |
| 280 M               |                                       |                      |
| 315 S               | 1167                                  |                      |
| 315 M               |                                       |                      |
| 315 LA/LB           |                                       |                      |
| 355 LA/LB/LC/LD/LAL |                                       |                      |
| 355 LKA/LKB         | 1477                                  |                      |
| 400                 | 1668                                  |                      |
| 450                 | 1995                                  |                      |
|                     | Consult Leroy-Somer                   |                      |



## MOTORS WITH SPACE HEATERS

| Type               | Power (W) |
|--------------------|-----------|
| FLSES 80 L         | 16        |
| FLSES 80 LG to 132 | 25        |
| FLSES 160 to 200   | 52        |
| FLSES 225 SR/MR    |           |
| FLSES 225 M        | 84        |
| FLSES 250 M        |           |
| FLSES 280 to 315   | 100*      |
| FLSES 355 to 450   | 150*      |

\* It is possible to increase the power when asking for estimate (quotation).

The space heaters use 200/240 V single phase, 50 or 60 Hz.

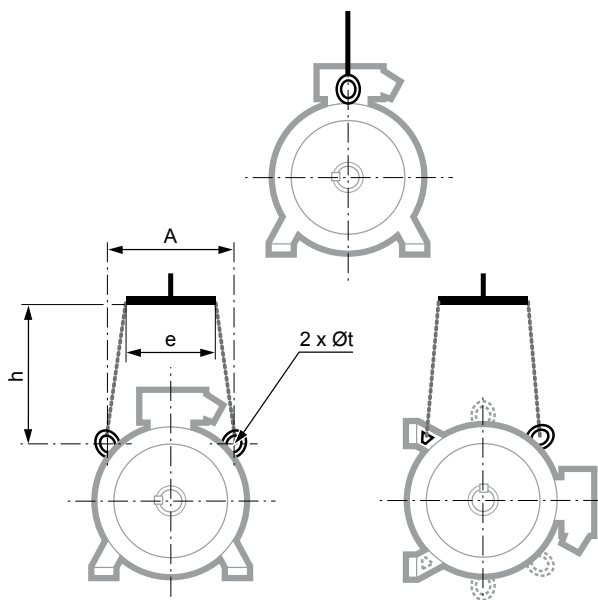
## LIFTING THE MOTOR ONLY (not coupled to the machine)

The regulations stipulate that over 25 kg, suitable handling equipment must be used.

All our motors are fitted with grab handles, making them easier to handle without risk. A diagram of the sling hoisting method appears below with the required dimensions.

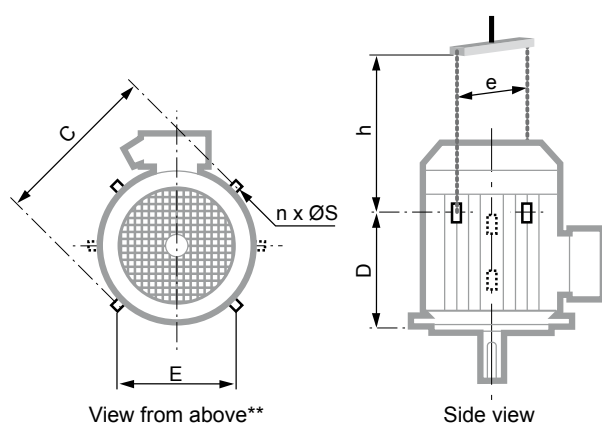
To prevent any damage to the motor during handling (for example: switching the motor from horizontal to vertical), it is essential to follow these instructions.

## HORIZONTAL POSITION



| Type                  | Horizontal position |       |       |    |
|-----------------------|---------------------|-------|-------|----|
|                       | A                   | e min | h min | Øt |
| FLSES 100             | 152                 | 200   | 150   | 22 |
| FLSES 100 LG          | 145                 | 200   | 150   | 22 |
| FLSES 112             | 145                 | 200   | 150   | 22 |
| FLSES 132             | 180                 | 200   | 150   | 25 |
| FLSES 160 M/MU        | 200                 | 260   | 150   | 14 |
| FLSES 180 M/MUR/L/LUR | 200                 | 260   | 150   | 14 |
| FLSES 200 LU          | 270                 | 260   | 150   | 14 |
| FLSES 225 SR/MR       | 270                 | 260   | 150   | 14 |
| FLSES 225 S/M         | 360                 | 380   | 200   | 30 |
| FLSES 250 M/MR        | 360                 | 380   | 200   | 30 |
| FLSES 280             | 360                 | 380   | 500   | 30 |
| FLSES 315 S/M/LA/LB   | 440                 | 400   | 500   | 60 |
| FLSES 355             | 545                 | 500   | 500   | 60 |
| FLSES 355 LK          | 685                 | 710   | 500   | 30 |
| FLSES 400             | 735                 | 710   | 500   | 30 |
| FLSES 450             | 730                 | 710   | 500   | 30 |

## VERTICAL POSITION



| Type                   | Vertical position |     |      |     |    |        |       |
|------------------------|-------------------|-----|------|-----|----|--------|-------|
|                        | C                 | E   | D    | n** | ØS | e min* | h min |
| FLSES 160 M/MU         | 320               | 200 | 230  | 2   | 14 | 320    | 350   |
| FLSES 180 M/MUR/L/LUR* | 320               | 200 | 230  | 2   | 14 | 320    | 270   |
| FLSES 200 LU           | 410               | 300 | 295  | 2   | 14 | 410    | 450   |
| FLSES 225 SR/MR        | 410               | 300 | 295  | 2   | 14 | 410    | 450   |
| FLSES 225 S/M          | 480               | 360 | 405  | 4   | 30 | 540    | 350   |
| FLSES 250 M/MR         | 480               | 360 | 405  | 4   | 30 | 590    | 550   |
| FLSES 280 S            | 480               | 360 | 585  | 4   | 30 | 590    | 550   |
| FLSES 280 M            | 480               | 360 | 585  | 4   | 30 | 590    | 550   |
| FLSES 315 S/M/LA/LB    | 620               | -   | 715  | 2   | 35 | 650    | 550   |
| FLSES 355              | 760               | -   | 750  | 2   | 35 | 800    | 550   |
| FLSES 355 LK           | 810               | 350 | 1135 | 4   | 30 | 810    | 600   |
| FLSES 400              | 810               | 350 | 1135 | 4   | 30 | 810    | 600   |
| FLSES 450              | 960               | 400 | 1170 | 4   | 30 | 960    | 750   |

\* if the motor is fitted with a drip cover, allow an additional 50 to 100 mm to avoid damaging it when the load is swung.

\*\* if n = 2, the lifting rings form an angle of 90° with respect to the terminal box axis. If n = 4, this angle becomes 45°.

Separate ring ≤ 25 kg  
Built-in ring > 25 kg

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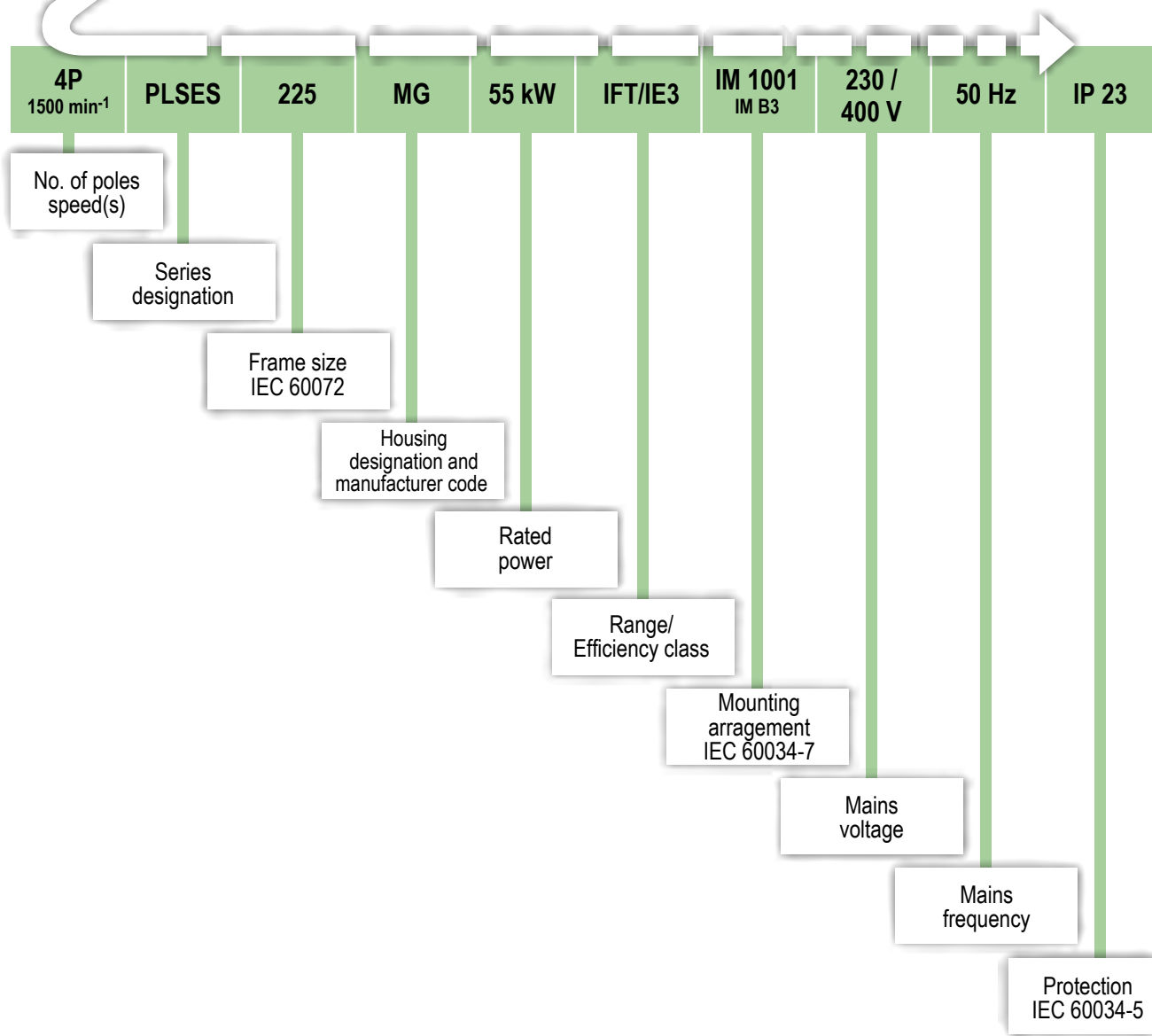




IP 23  
Cl. F -  $\Delta T$  80 K

The complete motor **reference** described below will enable you to **order** the desired equipment.

The selection method consists of following the terms in the designation.



| Component                  | Materials                                                               | Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Housing                    | Steel                                                                   | <ul style="list-style-type: none"> <li>- gravity or low pressure die casting, frame size <math>\leq 250</math></li> <li>- lifting rings</li> </ul>                                                                                                                                                                                                                                                                                                                                     |
| Stator                     | Insulated low-carbon magnetic steel laminations<br>Electroplated copper | <ul style="list-style-type: none"> <li>- low carbon content guarantees long-term lamination pack stability</li> <li>- welded laminations</li> <li>- semi-enclosed slots</li> <li>- class F insulation</li> </ul>                                                                                                                                                                                                                                                                       |
| Rotor                      | Insulated low-carbon magnetic steel laminations<br>Aluminium or copper  | <ul style="list-style-type: none"> <li>- inclined cage bars</li> <li>- rotor cage pressure die-cast in aluminium</li> <li>- rotor cage shrink-fitted to shaft</li> <li>- rotor balanced dynamically, class A, 1/2 key</li> </ul>                                                                                                                                                                                                                                                       |
| Shaft                      | Steel                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| End shields                | Cast iron or steel                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Bearings and lubrication   |                                                                         | <b>Standard mounting:</b> <ul style="list-style-type: none"> <li>- ball bearings C3 play</li> <li>- permanently greased bearings for frame size <math>\leq 200</math></li> <li>- regreasable bearings from frame size 225 upwards</li> <li>- bearings preloaded at non drive end</li> </ul>                                                                                                                                                                                            |
| Labyrinth seal<br>Lipseals | Plastic or steel<br>Synthetic rubber                                    | <ul style="list-style-type: none"> <li>- lipseal at drive end for all motors</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                |
| Fan                        | Composite<br>Aluminium or steel alloy                                   | <ul style="list-style-type: none"> <li>- bidirectional fan in motors with 2 poles (<math>P \leq 250</math> kW), 4 poles for frame size 180 to 315 except 315 MGU and LG</li> <li>- unidirectional fan (direction of rotation to be specified at time of ordering) in motors with 2 poles, for frame size 315 MGU and LG</li> </ul>                                                                                                                                                     |
| Fan cover                  | Pressed steel                                                           | <ul style="list-style-type: none"> <li>- fitted, on request, with a drip cover for operation in vertical position, shaft end facing up</li> </ul>                                                                                                                                                                                                                                                                                                                                      |
| Terminal box               | Composite<br>Aluminium alloy or steel                                   | <ul style="list-style-type: none"> <li>- can be turned in 4 directions, opposite the feet</li> <li>- fitted as standard with a terminal block with 6 steel terminals</li> <li>- terminal box comes fitted with threaded plugs for frame size <math>\leq 280</math> SD/MD, for motors 280 MG to 315 and larger sizes, terminal box comes complete with a removable undrilled cable gland support plate, without cable gland</li> <li>- 1 earth terminal in each terminal box</li> </ul> |

In the standard version, the motors are wound 400 V 50 Hz with connection  $\Delta$

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP23 Steel frame

## Electrical and mechanical characteristics

## IE2 - Powered by the mains

| Type           | Rated power          | Rated torque          | Starting torque/ Rated torque  | Maximum torque/ Rated torque   | Starting current/ Rated current | Moment of inertia      | Weight      | Noise       | 400V 50Hz                           |                     |                               |      |      |              |           |
|----------------|----------------------|-----------------------|--------------------------------|--------------------------------|---------------------------------|------------------------|-------------|-------------|-------------------------------------|---------------------|-------------------------------|------|------|--------------|-----------|
|                |                      |                       |                                |                                |                                 |                        |             |             | Rated speed                         | Rated current       | Efficiency IEC 60034-2-1 2007 |      |      | Power factor |           |
|                |                      |                       |                                |                                |                                 |                        |             |             | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η                             |      |      | Cos φ        |           |
|                | P <sub>n</sub><br>kW | M <sub>n</sub><br>N.m | M <sub>d</sub> /M <sub>n</sub> | M <sub>m</sub> /M <sub>n</sub> | I <sub>d</sub> /I <sub>n</sub>  | J<br>kg.m <sup>2</sup> | IM B3<br>kg | LP<br>db(A) |                                     |                     | 4/4                           | 3/4  | 2/4  | 4/4          | 3/4 2/4   |
| <b>2 poles</b> |                      |                       |                                |                                |                                 |                        |             |             |                                     |                     |                               |      |      |              |           |
| PLSES 225 MG   | 75                   | 241                   | 2.3                            | 2.9                            | 7.5                             | 0.335                  | 365         | 85          | 2972                                | 132                 | 94.1                          | 94.3 | 93.8 | 0.87         | 0.84 0.77 |
| PLSES 250 SF   | 90                   | 289                   | 2.5                            | 3.6                            | 8.1                             | 0.408                  | 430         | 84          | 2972                                | 156                 | 94.4                          | 94.7 | 94.4 | 0.88         | 0.86 0.80 |
| PLSES 250 MF   | 110                  | 353                   | 2.9                            | 3.7                            | 8.9                             | 0.479                  | 465         | 85          | 2974                                | 193                 | 94.6                          | 94.8 | 94.4 | 0.87         | 0.84 0.76 |
| PLSES 280 MD   | 132                  | 424                   | 2.0                            | 3.2                            | 8.2                             | 0.573                  | 500         | 83          | 2974                                | 225                 | 95.0                          | 95.4 | 95.3 | 0.89         | 0.86 0.80 |
| PLSES 315 SU   | 160                  | 513                   | 2.3                            | 3.1                            | 7.7                             | 1.050                  | 700         | 80          | 2978                                | 282                 | 95.1                          | 95.2 | 94.7 | 0.86         | 0.83 0.75 |
| PLSES 315 M    | 200                  | 641                   | 2.2                            | 3.3                            | 7.1                             | 1.120                  | 720         | 84          | 2978                                | 369                 | 95.2                          | 95.2 | 94.6 | 0.82         | 0.77 0.67 |
| PLSES 315 L    | 250                  | 803                   | 2.2                            | 2.9                            | 6.9                             | 1.260                  | 790         | 85          | 2974                                | 441                 | 95.2                          | 95.4 | 95.1 | 0.86         | 0.83 0.75 |
| PLSES 315 LD   | 280                  | 898                   | 2.2                            | 2.9                            | 6.7                             | 1.370                  | 920         | 86          | 2976                                | 493                 | 95.4                          | 95.4 | 94.8 | 0.86         | 0.83 0.76 |
| PLSES 315 LD   | 315                  | 1010                  | 2.1                            | 3.0                            | 6.5                             | 1.660                  | 930         | 87          | 2976                                | 561                 | 95.3                          | 95.5 | 95.2 | 0.85         | 0.82 0.75 |
| <b>4 poles</b> |                      |                       |                                |                                |                                 |                        |             |             |                                     |                     |                               |      |      |              |           |
| PLSES 225 MG   | 55                   | 354                   | 2.1                            | 2.9                            | 7.0                             | 0.648                  | 375         | 76          | 1484                                | 103                 | 93.9                          | 94.1 | 93.7 | 0.82         | 0.78 0.68 |
| PLSES 250 SF   | 75                   | 482                   | 2.3                            | 3.1                            | 7.6                             | 0.778                  | 430         | 76          | 1486                                | 143                 | 94.2                          | 94.4 | 94.0 | 0.80         | 0.78 0.67 |
| PLSES 250 MF   | 90                   | 579                   | 2.4                            | 3.1                            | 7.9                             | 0.956                  | 495         | 77          | 1484                                | 169                 | 94.6                          | 94.8 | 94.5 | 0.81         | 0.76 0.65 |
| PLSES 280 SGJ  | 110                  | 706                   | 3.0                            | 2.8                            | 7.2                             | 2.080                  | 680         | 79          | 1488                                | 202                 | 94.7                          | 94.7 | 94.0 | 0.83         | 0.79 0.69 |
| PLSES 280 MG   | 132                  | 847                   | 2.5                            | 2.8                            | 7.3                             | 2.290                  | 715         | 80          | 1488                                | 243                 | 94.8                          | 94.9 | 94.4 | 0.83         | 0.79 0.70 |
| PLSES 315 SUR  | 160                  | 1030                  | 2.6                            | 3.0                            | 7.1                             | 2.430                  | 750         | 80          | 1488                                | 300                 | 95.0                          | 95.0 | 94.4 | 0.81         | 0.76 0.64 |
| PLSES 315 MU   | 200                  | 1290                  | 3.1                            | 3.0                            | 7.2                             | 2.770                  | 825         | 80          | 1486                                | 374                 | 95.1                          | 95.1 | 94.1 | 0.81         | 0.75 0.64 |
| PLSES 315 LUS  | 250                  | 1610                  | 2.8                            | 2.8                            | 6.6                             | 3.240                  | 925         | 85          | 1486                                | 473                 | 95.2                          | 95.3 | 94.9 | 0.80         | 0.75 0.64 |
| PLSES 315 LU   | 280                  | 1800                  | 2.4                            | 2.2                            | 5.9                             | 3.440                  | 960         | 83          | 1484                                | 504                 | 95.6                          | 96.1 | 95.9 | 0.84         | 0.81 0.72 |

| Type          | Rated power          | 380V 50Hz                           |                     |            |              | 415V 50Hz                           |                     |            |              | 460V 60Hz                           |                     |            |              |
|---------------|----------------------|-------------------------------------|---------------------|------------|--------------|-------------------------------------|---------------------|------------|--------------|-------------------------------------|---------------------|------------|--------------|
|               |                      | Rated speed                         | Rated current       | Efficiency | Power factor | Rated speed                         | Rated current       | Efficiency | Power factor | Rated speed                         | Rated current       | Efficiency | Power factor |
|               | P <sub>n</sub><br>kW | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4   | Cos φ<br>4/4 | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4   | Cos φ<br>4/4 | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4   | Cos φ<br>4/4 |
| 2 poles       |                      |                                     |                     |            |              |                                     |                     |            |              |                                     |                     |            |              |
| PLSES 225 MG  | 75                   | 2968                                | 138                 | 93.8       | 0.88         | 2974                                | 129                 | 94.2       | 0.86         | 3576                                | 116                 | 93.8       | 0.87         |
| PLSES 250 SF  | 90                   | 2970                                | 163                 | 94.1       | 0.89         | 2974                                | 152                 | 94.5       | 0.87         | 3578                                | 137                 | 94.5       | 0.88         |
| PLSES 250 MF  | 110                  | 2974                                | 199                 | 94.3       | 0.89         | 2976                                | 188                 | 94.7       | 0.85         | 3580                                | 168                 | 94.6       | 0.87         |
| PLSES 280 MD  | 132                  | 2962                                | 236                 | 94.6       | 0.90         | 2972                                | 219                 | 95.2       | 0.88         | 3576                                | 194                 | 95.0       | 0.90         |
| PLSES 315 SU  | 160                  | 2978                                | 292                 | 94.8       | 0.88         | 2978                                | 279                 | 95.2       | 0.84         | 3582                                | 246                 | 95.1       | 0.85         |
| PLSES 315 M   | 200                  | 2974                                | 377                 | 95.0       | 0.85         | 2978                                | 374                 | 95.0       | 0.78         | 3582                                | 325                 | 95.4       | 0.81         |
| PLSES 315 L   | 250                  | 2970                                | 458                 | 95.1       | 0.87         | 2976                                | 436                 | 95.2       | 0.84         | 3578                                | 382                 | 95.5       | 0.86         |
| PLSES 315 LD  | 280                  | 2972                                | 508                 | 95.3       | 0.88         | 2978                                | 488                 | 95.3       | 0.84         | 3582                                | 427                 | 95.6       | 0.86         |
| PLSES 315 LD  | 315                  | 2972                                | 576                 | 95.3       | 0.87         | 2978                                | 555                 | 95.3       | 0.83         | 3582                                | 486                 | 95.7       | 0.85         |
| 4 poles       |                      |                                     |                     |            |              |                                     |                     |            |              |                                     |                     |            |              |
| PLSES 225 MG  | 55                   | 1482                                | 106                 | 93.5       | 0.84         | 1486                                | 101                 | 94.1       | 0.80         | 1788                                | 90.4                | 94.1       | 0.81         |
| PLSES 250 SF  | 75                   | 1482                                | 147                 | 94.0       | 0.82         | 1486                                | 142                 | 94.3       | 0.78         | 1786                                | 125                 | 94.5       | 0.80         |
| PLSES 250 MF  | 90                   | 1482                                | 174                 | 94.2       | 0.83         | 1486                                | 168                 | 94.5       | 0.79         | 1786                                | 149                 | 94.6       | 0.80         |
| PLSES 280 SGJ | 110                  | 1486                                | 207                 | 94.6       | 0.85         | 1490                                | 200                 | 94.8       | 0.81         | 1790                                | 178                 | 94.7       | 0.82         |
| PLSES 280 MG  | 132                  | 1488                                | 248                 | 94.7       | 0.85         | 1488                                | 240                 | 94.9       | 0.81         | 1790                                | 210                 | 95.0       | 0.83         |
| PLSES 315 SUR | 160                  | 1486                                | 306                 | 94.9       | 0.84         | 1488                                | 299                 | 95.0       | 0.78         | 1790                                | 265                 | 95.1       | 0.80         |
| PLSES 315 MU  | 200                  | 1486                                | 379                 | 95.1       | 0.84         | 1488                                | 377                 | 94.8       | 0.78         | 1790                                | 329                 | 95.4       | 0.80         |
| PLSES 315 LUS | 250                  | 1484                                | 480                 | 95.2       | 0.83         | 1486                                | 476                 | 95.1       | 0.77         | 1790                                | 412                 | 95.6       | 0.80         |
| PLSES 315 LU  | 280                  | 1480                                | 520                 | 95.4       | 0.86         | 1484                                | 497                 | 95.8       | 0.82         | 1788                                | 437                 | 95.9       | 0.84         |

IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency  
IP23 Steel frame  
**Electrical and mechanical characteristics**  
**IE2 - Powered by the drive**

| Type          | 400V 50Hz            |                                     |                     |              | % Rated torque M <sub>n</sub> at |       |       |       |      | 400V 87Hz Δ <sup>1</sup> |                                     |                     |              | Maximum mechanical speed <sup>2</sup> |
|---------------|----------------------|-------------------------------------|---------------------|--------------|----------------------------------|-------|-------|-------|------|--------------------------|-------------------------------------|---------------------|--------------|---------------------------------------|
|               | Rated power          | Rated speed                         | Rated current       | Power factor | 10Hz                             | 17Hz  | 25Hz  | 50Hz  | 87Hz | Rated power              | Rated speed                         | Rated current       | Power factor |                                       |
|               | P <sub>n</sub><br>kW | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | Cos φ<br>4/4 |                                  |       |       |       |      | P <sub>n</sub><br>kW     | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | Cos φ<br>4/4 |                                       |
| 2 poles       |                      |                                     |                     |              |                                  |       |       |       |      |                          |                                     |                     |              |                                       |
| PLSES 225 MG  | 75                   | 2968                                | 139                 | 0.89         | 70 %                             | 85 %  | 98 %  | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 250 SF  | 90                   | 2970                                | 165                 | 0.90         | 65 %                             | 78 %  | 90 %  | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 250 MF  | 110                  | 2974                                | 202                 | 0.89         | 65 %                             | 78 %  | 90 %  | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 280 MD  | 122                  | 2962                                | 225                 | 0.90         | 60 %                             | 72 %  | 83 %  | 92 %  | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 315 SU  | 160                  | 2978                                | 296                 | 0.88         | 70 %                             | 80 %  | 90 %  | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 315 M   | 200                  | 2974                                | 383                 | 0.85         | 65 %                             | 75 %  | 85 %  | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 315 L   | 230                  | 2970                                | 428                 | 0.87         | 51 %                             | 64 %  | 74 %  | 92 %  | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 315 LD  | 250                  | 2972                                | 463                 | 0.88         | 58 %                             | 67 %  | 72 %  | 89 %  | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 315 LD  | 280                  | 2972                                | 520                 | 0.87         | 58 %                             | 62 %  | 71 %  | 89 %  | -    | -                        | -                                   | -                   | -            | 3600                                  |
| 4 poles       |                      |                                     |                     |              |                                  |       |       |       |      |                          |                                     |                     |              |                                       |
| PLSES 225 MG  | 55                   | 1482                                | 110                 | 0.84         | 70 %                             | 90 %  | 100 % | 100 % | 57 % | 95.70                    | 2592                                | 190.55              | 0.84         | 3240                                  |
| PLSES 250 SF  | 75                   | 1482                                | 151                 | 0.82         | 66 %                             | 80 %  | 90 %  | 100 % | 57 % | 130.50                   | 2592                                | 262.68              | 0.82         | 3240                                  |
| PLSES 250 MF  | 90                   | 1482                                | 181                 | 0.82         | 61 %                             | 70 %  | 83 %  | 100 % | 57 % | 156.60                   | 2592                                | 314.25              | 0.82         | 3240                                  |
| PLSES 280 SGJ | 110                  | 1486                                | 214                 | 0.85         | 80 %                             | 100 % | 100 % | 100 % | 57 % | 191.40                   | 2596                                | 371.72              | 0.85         | 2700                                  |
| PLSES 280 MG  | 132                  | 1488                                | 253                 | 0.85         | 80 %                             | 97 %  | 100 % | 100 % | 57 % | 229.68                   | 2598                                | 440.48              | 0.85         | 2700                                  |
| PLSES 315 SUR | 160                  | 1486                                | 314                 | 0.83         | 75 %                             | 84 %  | 95 %  | 100 % | 57 % | 278.40                   | 2596                                | 546.94              | 0.83         | 3420                                  |
| PLSES 315 MU  | 200                  | 1486                                | 389                 | 0.84         | 72 %                             | 84 %  | 95 %  | 100 % | 57 % | 348.00                   | 2596                                | 677.00              | 0.84         | 3420                                  |
| PLSES 315 LUS | 250                  | 1484                                | 490                 | 0.83         | 70 %                             | 80 %  | 90 %  | 100 % | 57 % | 435.00                   | 2594                                | 852.00              | 0.83         | 3420                                  |
| PLSES 315 LU  | 260                  | 1480                                | 498                 | 0.86         | 65 %                             | 74 %  | 84 %  | 93 %  | 57 % | 452.49                   | 2590                                | 866.01              | 0.86         | 2610                                  |

(1) Data only valid for: 400V 50Hz Y motors and frame size  $\leq 250$  mm

(2) See Vibrations section on page 48

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP23 Steel frame

## Electrical and mechanical characteristics

## IE3 - Powered by the mains

| Type           | Rated power          | Rated torque          | Starting torque/<br>Rated torque | Maximum torque/<br>Rated torque | Starting current/<br>Rated current | Moment of inertia      | Weight      | Noise       | 400V 50Hz                           |                     |                               |          |          |              |              |              |
|----------------|----------------------|-----------------------|----------------------------------|---------------------------------|------------------------------------|------------------------|-------------|-------------|-------------------------------------|---------------------|-------------------------------|----------|----------|--------------|--------------|--------------|
|                |                      |                       |                                  |                                 |                                    |                        |             |             | Rated speed                         | Rated current       | Efficiency IEC 60034-2-1 2007 |          |          | Power factor |              |              |
|                | P <sub>n</sub><br>kW | M <sub>n</sub><br>N.m | M <sub>d</sub> /M <sub>n</sub>   | M <sub>m</sub> /M <sub>n</sub>  | I <sub>d</sub> /I <sub>n</sub>     | J<br>kg.m <sup>2</sup> | IM B3<br>kg | LP<br>db(A) | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4                      | η<br>3/4 | η<br>2/4 | Cos φ<br>4/4 | Cos φ<br>3/4 | Cos φ<br>2/4 |
| 2 poles        |                      |                       |                                  |                                 |                                    |                        |             |             |                                     |                     |                               |          |          |              |              |              |
| PLSES 225 MG   | 75                   | 241                   | 2.3                              | 3.2                             | 8.1                                | 0.4114                 | 405         | 83          | 2972                                | 126                 | 95.2                          | 95.3     | 94.8     | 0.90         | 0.88         | 0.82         |
| PLSES 250 SF   | 90                   | 289                   | 2.6                              | 3.5                             | 9.0                                | 0.4827                 | 450         | 84          | 2974                                | 151                 | 95.4                          | 95.5     | 95.1     | 0.90         | 0.88         | 0.82         |
| PLSES 250 MF   | 110                  | 354                   | 2.4                              | 3.0                             | 8.2                                | 0.5594                 | 490         | 84          | 2968                                | 185                 | 95.5                          | 95.9     | 95.8     | 0.90         | 0.88         | 0.84         |
| PLSES 280 MD   | 132                  | 424                   | 2.1                              | 3.4                             | 8.6                                | 0.5733                 | 500         | 83          | 2972                                | 221                 | 95.6                          | 95.8     | 95.7     | 0.87         | 0.84         | 0.77         |
| PLSES 315 SU   | 160                  | 514                   | 2.0                              | 2.9                             | 7.2                                | 1.1217                 | 710         | 79          | 2974                                | 275                 | 95.8                          | 96.0     | 95.8     | 0.88         | 0.86         | 0.80         |
| PLSES 315 MU   | 200                  | 643                   | 1.7                              | 2.4                             | 6.2                                | 1.267                  | 792         | 84          | 2970                                | 334                 | 96.0                          | 96.4     | 96.4     | 0.90         | 0.89         | 0.85         |
| PLSES 315 L    | 250                  | 804                   | 1.8                              | 2.6                             | 6.5                                | 1.3899                 | 850         | 84          | 2968                                | 421                 | 96.1                          | 96.5     | 96.4     | 0.89         | 0.88         | 0.83         |
| PLSES 315 LD   | 280                  | 900                   | 2.1                              | 2.9                             | 6.7                                | 1.6605                 | 930         | 86          | 2972                                | 471                 | 96.3                          | 96.4     | 96.1     | 0.89         | 0.87         | 0.82         |
| PLSES 315 MGU  | 315                  | 1012                  | 1.6                              | 2.3                             | 5.8                                | 2.47                   | 1082        | 81          | 2971                                | 533                 | 95.8                          | 96.3     | 96.4     | 0.89         | 0.89         | 0.88         |
| PLSES 315 LG   | 355                  | 1139                  | 1.8                              | 2.7                             | 6.8                                | 2.76                   | 1160        | 83          | 2977                                | 605                 | 96.3                          | 96.7     | 96.5     | 0.88         | 0.87         | 0.83         |
| PLSES 315 LG   | 400                  | 1282                  | 1.8                              | 2.73                            | 6.65                               | 3.1                    | 1250        | 80          | 2980                                | 674                 | 96.3                          | 96.7     | 96.5     | 0.89         | 0.88         | 0.85         |
| PLSES 315 VLG  | 450                  | 1441                  | 1.86                             | 2.78                            | 7.20                               | 3.5                    | 1340        | 80          | 2982                                | 762                 | 96.2                          | 96.4     | 96.0     | 0.88         | 0.87         | 0.82         |
| PLSES 315 VLGU | 500                  | 1605                  | 1.66                             | 2.70                            | 6.29                               | 3.5                    | 1385        | 83          | 2975                                | 862                 | 96.2                          | 96.2     | 94.6     | 0.87         | 0.86         | 0.75         |
| PLSES 355 LA   | 560                  | 1795                  | 1.0                              | 2.2                             | 5.3                                | 6.3                    | 1860        | 92          | 2980                                | 953                 | 96.4                          | 96.3     | 96.4     | 0.88         | 0.87         | 0.82         |
| PLSES 355 LB   | 630                  | 2014                  | 2.0                              | 3.86                            | 9.2                                | 8.4                    | 2050        | 92          | 2988                                | 1082                | 96.6                          | 96.7     | 96.6     | 0.87         | 0.86         | 0.81         |
| PLSES 355 LC   | 710                  | 2271                  | 1.73                             | 3.36                            | 8.2                                | 8.9                    | 2140        | 92          | 2986                                | 1178                | 96.7                          | 96.8     | 96.7     | 0.90         | 0.89         | 0.84         |
| PLSES 450 LA   | 800                  | 2554                  | 2.17                             | 3.4                             | 9.0                                | 19.5                   | 3200        | 97          | 2992                                | 1327                | 96.7                          | 96.6     | 95.7     | 0.90         | 0.89         | 0.84         |
| PLSES 450 LA   | 900                  | 2874                  | 1.93                             | 3.02                            | 8.0                                | 19.5                   | 3200        | 97          | 2991                                | 1496                | 96.5                          | 96.5     | 96.0     | 0.90         | 0.89         | 0.84         |
| PLSES 450 LA   | 1000                 | 3194                  | 1.73                             | 2.72                            | 7.0                                | 19.5                   | 3200        | 97          | 2990                                | 1662                | 96.5                          | 96.5     | 96.2     | 0.90         | 0.89         | 0.84         |
| PLSES 450 LB*  | 1120                 | 3577                  | 1.9                              | 2.8                             | 7.9                                | 21                     | 3400        | 97          | 2990                                | 1078                | 96.6                          | 96.6     | 96.0     | 0.90         | 0.89         | 0.84         |
| PLSES 450 LB*  | 1250                 | 3995                  | 1.7                              | 2.5                             | 7.0                                | 21                     | 3400        | 97          | 2988                                | 1204                | 96.5                          | 96.5     | 96.1     | 0.90         | 0.89         | 0.84         |

(\*) usable only on 690V - 50Hz mains  
values provided for this voltage

|                |     |      |      |      |     |        |      |     |      |      |      |      |      |      |      |      |
|----------------|-----|------|------|------|-----|--------|------|-----|------|------|------|------|------|------|------|------|
| <b>4 poles</b> |     |      |      |      |     |        |      |     |      |      |      |      |      |      |      |      |
| PLSES 225 MG   | 55  | 354  | 2.2  | 2.7  | 7.2 | 0.7806 | 420  | 69  | 1484 | 100  | 94.8 | 95.2 | 95.0 | 0.83 | 0.79 | 0.71 |
| PLSES 250 SF   | 75  | 483  | 2.3  | 3.2  | 8.0 | 0.9594 | 480  | 69  | 1484 | 137  | 95.0 | 95.2 | 94.7 | 0.83 | 0.78 | 0.69 |
| PLSES 250 MF   | 90  | 578  | 2.6  | 3.1  | 8.3 | 1.0809 | 510  | 70  | 1486 | 166  | 95.5 | 95.7 | 95.3 | 0.82 | 0.76 | 0.65 |
| PLSES 280 SGU  | 110 | 706  | 2.4  | 2.8  | 7.5 | 2.5287 | 765  | 80  | 1488 | 198  | 95.6 | 95.6 | 94.9 | 0.84 | 0.8  | 0.70 |
| PLSES 280 MGU  | 132 | 847  | 3.1  | 2.8  | 7.4 | 2.8582 | 792  | 79  | 1488 | 236  | 95.8 | 95.9 | 95.5 | 0.84 | 0.8  | 0.70 |
| PLSES 315 SUR  | 160 | 1030 | 2.8  | 2.9  | 7.6 | 2.8625 | 820  | 79  | 1488 | 290  | 96.1 | 96.2 | 95.6 | 0.82 | 0.78 | 0.67 |
| PLSES 315 MUR  | 200 | 1290 | 2.9  | 2.9  | 7.4 | 3.3365 | 910  | 79  | 1486 | 361  | 96.2 | 96.4 | 96.0 | 0.83 | 0.78 | 0.68 |
| PLSES 315 LUS  | 250 | 1610 | 3.0  | 2.9  | 7.4 | 3.5966 | 960  | 83  | 1486 | 450  | 96.2 | 96.4 | 95.9 | 0.83 | 0.79 | 0.70 |
| PLSES 315 LG   | 280 | 1797 | 2.3  | 2.9  | 7.2 | 6.1    | 1170 | 83  | 1488 | 511  | 96.5 | 96.8 | 96.6 | 0.82 | 0.8  | 0.72 |
| PLSES 315 LG   | 315 | 2024 | 2.0  | 2.5  | 6.6 | 6.1    | 1170 | 83  | 1486 | 555  | 96.4 | 96.7 | 96.5 | 0.85 | 0.82 | 0.74 |
| PLSES 315 LG   | 355 | 2280 | 2.2  | 2.8  | 8.1 | 6.1    | 1170 | 83  | 1487 | 650  | 96.2 | 96.3 | 96.0 | 0.82 | 0.77 | 0.66 |
| PLSES 315 VLG  | 400 | 2571 | 2.2  | 2.8  | 6.9 | 6.8    | 1327 | 83  | 1486 | 722  | 96.4 | 96.7 | 96.5 | 0.83 | 0.79 | 0.69 |
| PLSES 315 VLGU | 450 | 2890 | 2.7  | 3.0  | 7.6 | 7.3    | 1400 | 83  | 1487 | 822  | 96.4 | 96.6 | 95.1 | 0.82 | 0.79 | 0.69 |
| PLSES 355 LA   | 500 | 3205 | 1.8  | 2.0  | 6.1 | 12     | 2150 | 86  | 1490 | 905  | 96.1 | 96.2 | 96.0 | 0.83 | 0.77 | 0.71 |
| PLSES 355 LB   | 560 | 3597 | 1.63 | 1.76 | 5.4 | 12     | 2150 | 86  | 1487 | 1027 | 96.0 | 96.1 | 95.9 | 0.82 | 0.76 | 0.70 |
| PLSES 355 LB   | 600 | 3848 | 2.27 | 2.46 | 7.1 | 12     | 2150 | 86  | 1489 | 1142 | 96.0 | 96.1 | 96.0 | 0.79 | 0.73 | 0.65 |
| PLSES 400 LB   | 700 | 4484 | 1.9  | 1.71 | 6.0 | 25     | 3050 | 86  | 1491 | 1224 | 96.0 | 96.1 | 96.0 | 0.86 | 0.84 | 0.74 |
| PLSES 400 LB   | 800 | 5117 | 2.57 | 2.21 | 7.8 | 25     | 3050 | 98  | 1493 | 1414 | 96.1 | 96.2 | 96.0 | 0.85 | 0.83 | 0.73 |
| PLSES 400 LB   | 900 | 5761 | 2.4  | 2.08 | 7.2 | 25     | 3050 | 101 | 1492 | 1611 | 96.0 | 96.1 | 95.9 | 0.84 | 0.82 | 0.72 |

|                |     |      |      |      |      |    |      |    |     |      |      |      |      |      |      |      |
|----------------|-----|------|------|------|------|----|------|----|-----|------|------|------|------|------|------|------|
| <b>6 poles</b> |     |      |      |      |      |    |      |    |     |      |      |      |      |      |      |      |
| PLSES 355 LA   | 400 | 3871 | 1.5  | 2.40 | 6.1  | 13 | 1975 | 80 | 990 | 737  | 95.8 | 96.2 | 96.1 | 0.82 | 0.78 | 0.69 |
| PLSES 355 LB   | 450 | 4323 | 1.76 | 2.97 | 7.3  | 18 | 2210 | 82 | 994 | 869  | 95.8 | 96.1 | 96.1 | 0.78 | 0.72 | 0.61 |
| PLSES 400 LA   | 500 | 4808 | 2.0  | 2.43 | 6.4  | 38 | 3100 | 84 | 993 | 875  | 96.0 | 96.1 | 96.0 | 0.86 | 0.85 | 0.79 |
| PLSES 400 LA   | 560 | 5391 | 1.77 | 2.16 | 5.7  | 38 | 3100 | 84 | 992 | 980  | 95.9 | 96.0 | 95.9 | 0.86 | 0.85 | 0.80 |
| PLSES 400 LB   | 630 | 6059 | 2.0  | 2.38 | 6.29 | 38 | 3100 | 84 | 993 | 1113 | 96.1 | 96.2 | 96.1 | 0.85 | 0.84 | 0.79 |
| PLSES 400 LD   | 710 | 6819 | 2.4  | 2.65 | 7.4  | 50 | 3300 | 84 | 994 | 1331 | 96.2 | 96.3 | 96.1 | 0.80 | 0.79 | 0.74 |

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP23 Steel frame

### Electrical and mechanical characteristics

### IE3 - Powered by the mains

| Type           | Rated power | 380V 50Hz            |                                     |                     |              | 415V 50Hz    |                                     |                     |              | 460V 60Hz    |                                     |                     |              |
|----------------|-------------|----------------------|-------------------------------------|---------------------|--------------|--------------|-------------------------------------|---------------------|--------------|--------------|-------------------------------------|---------------------|--------------|
|                |             | Rated speed          | Rated current                       | Efficiency          | Power factor | Rated speed  | Rated current                       | Efficiency          | Power factor | Rated speed  | Rated current                       | Efficiency          | Power factor |
|                |             | P <sub>n</sub><br>kW | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4     | Cos φ<br>4/4 | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4     | Cos φ<br>4/4 | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | η<br>4/4     |
| 2 poles        |             |                      |                                     |                     |              |              |                                     |                     |              |              |                                     |                     |              |
| PLSES 225 MG   | 75          | 2968                 | 133                                 | 95.0                | 0.91         | 2974         | 123                                 | 95.3                | 0.89         | 3574         | 110                                 | 95.0                | 0.90         |
| PLSES 250 SF   | 90          | 2968                 | 158                                 | 95.1                | 0.91         | 2976         | 148                                 | 95.6                | 0.89         | 3576         | 132                                 | 95.3                | 0.90         |
| PLSES 250 MF   | 110         | 2968                 | 195                                 | 95.2                | 0.90         | 2972         | 178                                 | 95.8                | 0.89         | 3576         | 161                                 | 95.7                | 0.90         |
| PLSES 280 MD   | 132         | 2974                 | 227                                 | 95.4                | 0.88         | 2978         | 215                                 | 95.6                | 0.84         | 3578         | 192                                 | 95.7                | 0.87         |
| PLSES 315 SU   | 160         | 2972                 | 285                                 | 95.6                | 0.89         | 2978         | 268                                 | 95.9                | 0.87         | 3580         | 237                                 | 95.9                | 0.88         |
| PLSES 315 MU   | 200         | 2966                 | 352                                 | 95.8                | 0.90         | 2974         | 322                                 | 96.3                | 0.89         | 3576         | 289                                 | 96.3                | 0.90         |
| PLSES 315 L    | 250         | 2964                 | 443                                 | 95.8                | 0.90         | 2972         | 411                                 | 96.2                | 0.88         | 3576         | 364                                 | 96.5                | 0.89         |
| PLSES 315 LD   | 280         | 2966                 | 493                                 | 96.0                | 0.90         | 2974         | 459                                 | 96.4                | 0.88         | 3578         | 408                                 | 96.3                | 0.89         |
| PLSES 315 MGU  | 315         | 2869                 | 549                                 | 95.8                | 0.91         | 2980         | 520                                 | 95.8                | 0.88         | 3577         | 459                                 | 95.8                | 0.90         |
| PLSES 315 LG   | 355         | 2974                 | 619                                 | 95.8                | 0.91         | 2980         | 579                                 | 95.8                | 0.89         | 3577         | 517                                 | 95.8                | 0.90         |
| PLSES 315 LG   | 400         | 2972                 | 711                                 | 96.0                | 0.89         | 2980         | 656                                 | 96.4                | 0.88         | 3580         | 589                                 | 95.8                | 0.89         |
| PLSES 315 VLG  | 450         | 2972                 | 800                                 | 96.0                | 0.89         | 2981         | 738                                 | 96.4                | 0.88         | 3582         | 670                                 | 95.8                | 0.88         |
| PLSES 315 VLGU | 500         | 2972                 | 901                                 | 95.8                | 0.88         | 2977         | 843                                 | 96.0                | 0.86         | 3575         | 753                                 | 95.8                | 0.87         |
| PLSES 355 LA   | 560         | 2978                 | 993                                 | 96.3                | 0.89         | 2981         | 928                                 | 96.5                | 0.87         | 3582         | 825                                 | 96.8                | 0.88         |
| PLSES 355 LB   | 630         | 2987                 | 1113                                | 96.6                | 0.89         | 2989         | 1019                                | 96.6                | 0.84         | 3589         | 929                                 | 96.7                | 0.88         |
| PLSES 355 LC   | 710         | 2984                 | 1227                                | 96.6                | 0.91         | 2987         | 1161                                | 96.7                | 0.88         | 3587         | 1022                                | 96.9                | 0.90         |
| PLSES 450 LA   | 800         | 2991                 | 1397                                | 96.7                | 0.90         | 2993         | 1293                                | 96.7                | 0.89         | 3593         | 1153                                | 96.8                | 0.90         |
| PLSES 450 LA   | 900         | 2990                 | 1557                                | 96.5                | 0.91         | 2992         | 1426                                | 96.5                | 0.89         | 3592         | 1284                                | 96.7                | 0.91         |
| PLSES 450 LA   | 1000        | 2989                 | 1749                                | 96.5                | 0.90         | 2991         | 1620                                | 96.5                | 0.89         | 3591         | 1442                                | 96.7                | 0.90         |
|                |             |                      |                                     |                     |              |              |                                     |                     |              |              |                                     |                     |              |
| 4 poles        |             |                      |                                     |                     |              |              |                                     |                     |              |              |                                     |                     |              |
| PLSES 225 MG   | 55          | 1480                 | 105                                 | 94.6                | 0.84         | 1486         | 99.1                                | 95.0                | 0.82         | 1790         | 89.7                                | 95.4                | 0.81         |
| PLSES 250 SF   | 75          | 1484                 | 142                                 | 95.0                | 0.85         | 1488         | 136                                 | 95.1                | 0.81         | 1790         | 122                                 | 95.4                | 0.81         |
| PLSES 250 MF   | 90          | 1484                 | 171                                 | 95.3                | 0.84         | 1488         | 164                                 | 95.7                | 0.8          | 1790         | 145                                 | 95.6                | 0.81         |
| PLSES 280 SGU  | 110         | 1488                 | 206                                 | 95.4                | 0.85         | 1490         | 193                                 | 95.6                | 0.83         | 1790         | 174                                 | 95.8                | 0.83         |
| PLSES 280 MGU  | 132         | 1486                 | 247                                 | 95.6                | 0.85         | 1490         | 231                                 | 96.0                | 0.83         | 1790         | 205                                 | 96.2                | 0.84         |
| PLSES 315 SUR  | 160         | 1488                 | 300                                 | 95.8                | 0.85         | 1492         | 286                                 | 96.0                | 0.81         | 1790         | 253                                 | 96.2                | 0.82         |
| PLSES 315 MUR  | 200         | 1484                 | 371                                 | 96.0                | 0.85         | 1488         | 357                                 | 96.1                | 0.81         | 1790         | 317                                 | 96.3                | 0.82         |
| PLSES 315 LUS  | 250         | 1484                 | 466                                 | 96.0                | 0.85         | 1488         | 446                                 | 96.2                | 0.81         | 1790         | 398                                 | 96.4                | 0.82         |
| PLSES 315 LG   | 280         | 1484                 | 526                                 | 96.3                | 0.84         | 1485         | 504                                 | 96.6                | 0.80         | 1788         | 446                                 | 96.0                | 0.82         |
| PLSES 315 LG   | 315         | 1484                 | 573                                 | 96.0                | 0.87         | 1488         | 542                                 | 96.3                | 0.84         | 1787         | 484                                 | 96.2                | 0.85         |
| PLSES 315 LG   | 355         | 1486                 | 660                                 | 96.1                | 0.85         | 1489         | 651                                 | 96.0                | 0.79         | 1788         | 565                                 | 96.2                | 0.82         |
| PLSES 315 VLG  | 400         | 1485                 | 744                                 | 96.1                | 0.85         | 1489         | 713                                 | 96.4                | 0.81         | 1786         | 629                                 | 96.2                | 0.83         |
| PLSES 315 VLGU | 450         | 1485                 | 846                                 | 96.2                | 0.84         | 1488         | 813                                 | 96.3                | 0.80         | 1787         | 716                                 | 96.2                | 0.82         |
| PLSES 355 LA   | 500         | 1487                 | 942                                 | 96.0                | 0.84         | 1491         | 882                                 | 96.2                | 0.82         | 1790         | 796                                 | 96.2                | 0.82         |
| PLSES 355 LB   | 560         | 1486                 | 1082                                | 95.9                | 0.82         | 1488         | 989                                 | 96.1                | 0.82         | 1788         | 889                                 | 96.4                | 0.82         |
| PLSES 355 LB   | 600         | 1488                 | 1172                                | 96.0                | 0.81         | 1489         | 1144                                | 96.0                | 0.76         | 1790         | 978                                 | 96.3                | 0.80         |
| PLSES 400 LB   | 700         | 1490                 | 1275                                | 95.9                | 0.87         | 1492         | 1180                                | 96.0                | 0.86         | 1792         | 1061                                | 96.3                | 0.86         |
| PLSES 400 LB   | 800         | 1492                 | 1472                                | 96.0                | 0.86         | 1494         | 1397                                | 96.0                | 0.83         | 1794         | 1228                                | 96.2                | 0.85         |
| PLSES 400 LB   | 900         | 1491                 | 1656                                | 96.0                | 0.86         | 1493         | 1591                                | 96.0                | 0.82         | 1793         | 1398                                | 96.2                | 0.84         |
|                |             |                      |                                     |                     |              |              |                                     |                     |              |              |                                     |                     |              |
| 6 poles        |             |                      |                                     |                     |              |              |                                     |                     |              |              |                                     |                     |              |
| PLSES 355 LA   | 400         | 988                  | 759                                 | 95.4                | 0.84         | 992          | 716                                 | 96.0                | 0.81         | 1189         | 632                                 | 95.8                | 0.83         |
| PLSES 355 LB   | 450         | 992                  | 896                                 | 95.4                | 0.80         | 995          | 847                                 | 96.0                | 0.77         | 1192         | 747                                 | 95.8                | 0.79         |
| PLSES 400 LA   | 500         | 992                  | 921                                 | 95.9                | 0.86         | 994          | 843                                 | 96.0                | 0.86         | 1193         | 758                                 | 96.3                | 0.86         |
| PLSES 400 LA   | 560         | 991                  | 1014                                | 95.8                | 0.86         | 993          | 955                                 | 96.0                | 0.86         | 1193         | 834                                 | 96.3                | 0.86         |
| PLSES 400 LB   | 630         | 992                  | 1187                                | 96.0                | 0.86         | 994          | 1086                                | 96.1                | 0.86         | 1194         | 1163                                | 96.4                | 0.83         |
| PLSES 400 LD   | 710         | 993                  | 1369                                | 96.1                | 0.82         | 996          | 1316                                | 96.2                | 0.78         | 1195         | 1156                                | 96.4                | 0.80         |



| Type           | 400V 50Hz            |                                     |                     |              | % Rated torque M <sub>n</sub> at |      |       |       |      | 400V 87Hz Δ <sup>1</sup> |                                     |                     |              | Maximum mechanical speed <sup>2</sup> |
|----------------|----------------------|-------------------------------------|---------------------|--------------|----------------------------------|------|-------|-------|------|--------------------------|-------------------------------------|---------------------|--------------|---------------------------------------|
|                | Rated power          | Rated speed                         | Rated current       | Power factor | 10Hz                             | 17Hz | 25Hz  | 50Hz  | 87Hz | Rated power              | Rated speed                         | Rated current       | Power factor |                                       |
|                | P <sub>n</sub><br>kW | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | Cos φ<br>4/4 |                                  |      |       |       |      | P <sub>n</sub><br>kW     | N <sub>n</sub><br>min <sup>-1</sup> | I <sub>n</sub><br>A | Cos φ<br>4/4 |                                       |
| 2 poles        |                      |                                     |                     |              |                                  |      |       |       |      |                          |                                     |                     |              |                                       |
| PLSES 225 MG   | 75                   | 2968                                | 138                 | 0.90         | 77 %                             | 90 % | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 250 SF   | 90                   | 2968                                | 164                 | 0.90         | 77 %                             | 90 % | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 250 MF   | 110                  | 2968                                | 198                 | 0.91         | 77 %                             | 90 % | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 280 MD   | 132                  | 2966                                | 239                 | 0.91         | 77 %                             | 86 % | 96 %  | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 315 SU   | 160                  | 2972                                | 293                 | 0.88         | 80 %                             | 90 % | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 315 MU   | 200                  | 2966                                | 366                 | 0.90         | 70 %                             | 80 % | 85 %  | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 315 L    | 211                  | 2964                                | 386                 | 0.89         | 70 %                             | 80 % | 85 %  | 85 %  | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 315 LD   | 248                  | 2966                                | 450                 | 0.89         | 70 %                             | 80 % | 85 %  | 88 %  | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 315 MGU  | 315                  | 2972                                | 583                 | 0.90         | 75 %                             | 85 % | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3580                                  |
| PLSES 315 LG   | 355                  | 2977                                | 648                 | 0.90         | 75 %                             | 85 % | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3580                                  |
| PLSES 315 LG   | 400                  | 2977                                | 734                 | 0.88         | 75 %                             | 85 % | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 315 VLG  | 450                  | 2982                                | 817                 | 0.89         | 75 %                             | 85 % | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 315 VLGU | 500                  | 2975                                | 928                 | 0.87         | 75 %                             | 85 % | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 355 LA   | 560                  | 2980                                | 1029                | 0.89         | 80 %                             | 90 % | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 355 LB   | 630                  | 2988                                | 1169                | 0.88         | 80 %                             | 90 % | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 355 LC   | 710                  | 2986                                | 1272                | 0.91         | 80 %                             | 90 % | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 450 LA   | 800                  | 2992                                | 1433                | 0.91         | 80 %                             | 90 % | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 450 LA   | 900                  | 2991                                | 1616                | 0.91         | 80 %                             | 90 % | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 450 LA   | 1000                 | 2990                                | 1796                | 0.91         | 80 %                             | 90 % | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3600                                  |
| PLSES 450 LB*  | 1120                 | 2990                                | 1160                | 0.91         | 80 %                             | 90 % | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3000                                  |
| PLSES 450 LB*  | 1250                 | 2988                                | 1296                | 0.91         | 80 %                             | 90 % | 100 % | 100 % | -    | -                        | -                                   | -                   | -            | 3000                                  |

(\*) usable only on 690V - 50Hz mains  
values provided for this voltage

|                |     |      |      |      |      |      |       |       |      |        |      |        |      |      |
|----------------|-----|------|------|------|------|------|-------|-------|------|--------|------|--------|------|------|
| <b>4 poles</b> |     |      |      |      |      |      |       |       |      |        |      |        |      |      |
| PLSES 225 MG   | 55  | 1478 | 112  | 0.83 | 65 % | 80 % | 90 %  | 100 % | 57 % | 95.7   | 2588 | 194.79 | 0.83 | 3240 |
| PLSES 250 SF   | 75  | 1480 | 155  | 0.83 | 65 % | 80 % | 90 %  | 100 % | 57 % | 130.5  | 2590 | 269.84 | 0.83 | 3240 |
| PLSES 250 MF   | 90  | 1482 | 186  | 0.82 | 65 % | 80 % | 90 %  | 100 % | 57 % | 156.6  | 2592 | 323.45 | 0.82 | 3240 |
| PLSES 280 SGU  | 110 | 1486 | 223  | 0.84 | 70 % | 80 % | 90 %  | 100 % | 57 % | 191.4  | 2596 | 387.78 | 0.84 | 2700 |
| PLSES 280 MGU  | 132 | 1484 | 266  | 0.84 | 70 % | 80 % | 90 %  | 100 % | 57 % | 229.68 | 2594 | 462.84 | 0.84 | 2700 |
| PLSES 315 SUR  | 160 | 1486 | 320  | 0.83 | 70 % | 80 % | 90 %  | 100 % | 57 % | 278.4  | 2596 | 557.55 | 0.83 | 3420 |
| PLSES 315 MUR  | 200 | 1482 | 396  | 0.83 | 70 % | 80 % | 90 %  | 100 % | 57 % | 348    | 2592 | 689.79 | 0.83 | 3420 |
| PLSES 315 LUS  | 250 | 1482 | 499  | 0.83 | 70 % | 80 % | 90 %  | 100 % | 57 % | 435    | 2592 | 868.5  | 0.83 | 3420 |
| PLSES 315 LG   | 280 | 1488 | 535  | 0.85 | 75 % | 83 % | 100 % | 100 % | 57 % | 280    | 2610 | 535    | 0.85 | 2610 |
| PLSES 315 LG   | 315 | 1486 | 606  | 0.86 | 69 % | 75 % | 89 %  | 100 % | 58 % | 315    | 2610 | 606    | 0.86 | 2610 |
| PLSES 315 LG   | 355 | 1487 | 682  | 0.85 | 77 % | 84 % | 100 % | 100 % | 58 % | 355    | 2610 | 682    | 0.85 | 2610 |
| PLSES 315 VLG  | 400 | 1486 | 754  | 0.85 | 75 % | 86 % | 100 % | 100 % | 58 % | 400    | 2610 | 754    | 0.85 | 2610 |
| PLSES 315 VLGU | 450 | 1487 | 850  | 0.86 | 70 % | 80 % | 100 % | 100 % | 58 % | 450    | 2600 | 850    | 0.86 | 2610 |
| PLSES 355 LA   | 500 | 1490 | 974  | 0.84 | 80 % | 90 % | 100 % | 100 % | -    | -      | -    | -      | -    | 1800 |
| PLSES 355 LB   | 560 | 1487 | 1108 | 0.83 | 80 % | 90 % | 100 % | 100 % | -    | -      | -    | -      | -    | 1800 |
| PLSES 355 LB   | 600 | 1489 | 1232 | 0.80 | 80 % | 90 % | 100 % | 100 % | -    | -      | -    | -      | -    | 1800 |
| PLSES 400 LB   | 700 | 1491 | 1322 | 0.87 | 80 % | 90 % | 100 % | 100 % | -    | -      | -    | -      | -    | 1800 |
| PLSES 400 LB   | 800 | 1493 | 1526 | 0.86 | 80 % | 90 % | 100 % | 100 % | -    | -      | -    | -      | -    | 1800 |
| PLSES 400 LB   | 900 | 1492 | 1739 | 0.85 | 80 % | 90 % | 100 % | 100 % | -    | -      | -    | -      | -    | 1800 |

|                |     |     |      |      |      |      |       |       |   |   |   |   |   |      |
|----------------|-----|-----|------|------|------|------|-------|-------|---|---|---|---|---|------|
| <b>6 poles</b> |     |     |      |      |      |      |       |       |   |   |   |   |   |      |
| PLSES 355 LA   | 400 | 990 | 789  | 0.83 | 80 % | 90 % | 100 % | 100 % | - | - | - | - | - | 1200 |
| PLSES 355 LB   | 450 | 992 | 930  | 0.79 | 80 % | 90 % | 100 % | 100 % | - | - | - | - | - | 1200 |
| PLSES 400 LA   | 500 | 993 | 936  | 0.87 | 80 % | 90 % | 100 % | 100 % | - | - | - | - | - | 1200 |
| PLSES 400 LA   | 560 | 992 | 1031 | 0.87 | 80 % | 90 % | 100 % | 100 % | - | - | - | - | - | 1200 |
| PLSES 400 LB   | 630 | 993 | 1140 | 0.86 | 80 % | 90 % | 100 % | 100 % | - | - | - | - | - | 1200 |
| PLSES 400 LD   | 710 | 994 | 1360 | 0.81 | 80 % | 90 % | 100 % | 100 % | - | - | - | - | - | 1200 |

(1) Data only valid for: 400 V 50 Hz Y motors and frame size ≤ 250 mm - 2 poles

(2) See Vibrations section on page 48



- Please refer to page 38 for variable speed applications

- Values given with a voltage drop of 30 V at the drive output

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP23 Steel frame

### Electrical and mechanical characteristics

### IE3 - Powered by the drive

#### Summary of recommended protection devices

| Mains voltage       | Cable length       | Frame size      | Winding protection  | Insulated bearings                     |
|---------------------|--------------------|-----------------|---------------------|----------------------------------------|
| ≤ 480 V             | < 20 m             | All frame sizes | Standard            | No                                     |
|                     | > 20 m and < 100 m | ≤ 315           | Standard            | No                                     |
|                     |                    | ≥ 315           | RIS or drive filter | NDE                                    |
| > 480 V and ≤ 690 V | < 20 m             | < 250           | Standard            | No                                     |
|                     |                    | ≥ 250           | RIS or drive filter | NDE                                    |
|                     | > 20 m and < 100 m | ≤ 250           | RIS or drive filter | NDE                                    |
|                     |                    | ≥ 250           | RIS or drive filter | NDE                                    |
|                     |                    |                 |                     | NDE (or DE+NDE if no filter for ≥ 315) |

**RIS:** Reinforced Insulation System.

**The filter is recommended above frame size 315.**

Standard insulation = **1500 V peak and 3500 V/μs.**

Protection solutions exist (insulation for winding and bearings).

For different cable length(s) and/or voltage(s), please consult Leroy-Somer.

Motors of frame size ≥ 250 kW with RIS protection are no longer cURus.



**REMINDER:** All 2, 4 and 6 pole motors placed on the EU market must be IE3 or IE2 and used with a variable speed drive:

- from 01/01/2015 for power ratings from 7.5 to 375 kW
- from 01/01/2017 for power ratings from 0.75 to 375 kW

#### Other drive mechanism solutions:



**LSRPM / PLSRPM:** permanent magnet synchronous motors 3 to 500 kW

Variable speed application, requiring IP55 or IP23 protection, high efficiency and/or compact dimensions.



**CPLS:** induction motors 95 to 2900 Nm

Application for variable speed operation requiring constant power over a wide speed range.



**LSMV:** induction motors 0.18 to 132 kW

Application for variable speed operation requiring constant torque over a wide speed range.



**LSK:** D.C. motors 2 to 750 kW



**UNIMOTOR FM and HD:** servomotors 0.7 to 136 Nm

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP23 Steel frame

### Electrical and mechanical characteristics

### Mains connection

#### DESCRIPTION TABLE OF TERMINAL BOXES FOR A 400 V RATED SUPPLY VOLTAGE (in accordance with EN 50262)

| Series | Type                   | No. of poles | Terminal box material | Power + auxiliaries   |                                                              |
|--------|------------------------|--------------|-----------------------|-----------------------|--------------------------------------------------------------|
|        |                        |              |                       | Number of drill holes | Drill hole diameter                                          |
| PLSES  | 225                    | 2; 4         | Aluminium alloy       | 3                     | 2xM63 + 1xM16                                                |
|        | 250                    | 2; 4         |                       |                       |                                                              |
|        | 280 MD/SD              | 2; 4         |                       |                       |                                                              |
|        | 280 SG/MG - 315 to 450 | 2; 4         |                       | 0                     | Removable undrilled mounting plate<br>(see details page 164) |

#### TERMINAL BLOCKS DIRECTION OF ROTATION

Standard motors are fitted with a block of 6 terminals complying with standard NFC 51 120, with the terminal markings complying with IEC 60034-8 (or NF EN 60034-8).

When the motor is running in U1, V1, W1 or 1U, 1V, 1W from a direct mains supply L1, L2, L3, it turns clockwise when seen from the drive shaft end.

If any two of the phases are changed over, the motor will run in an anticlockwise direction (make sure that the motor has been designed to run in both directions).

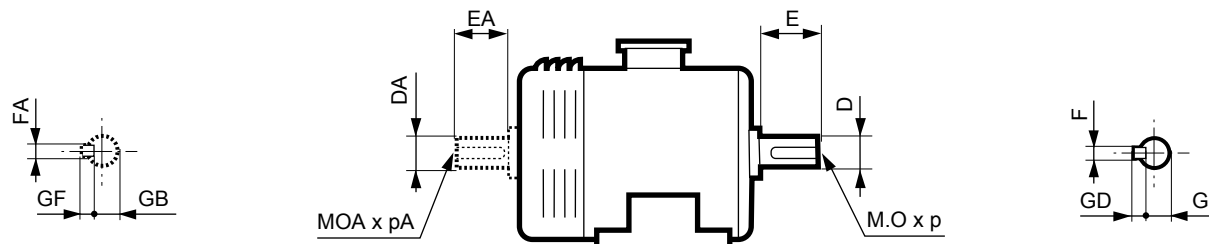
If the motor is fitted with accessories (thermal protection or space heater), these must be connected on screw dominos with labelled wires.

**Tightening torque for the nuts on the terminal blocks.**

| Terminal   | M8 | M10 | M12 | M14 | M16 |
|------------|----|-----|-----|-----|-----|
| Torque N.m | 10 | 20  | 35  | 50  | 65  |

| Series | Type                | 230/400V connections |           | 400/690V connections |
|--------|---------------------|----------------------|-----------|----------------------|
|        |                     | No. of poles         | Terminals | Terminals            |
| PLSES  | 225 MG              | 4                    | M10       | M8                   |
|        | 225 MG              | 2                    | M12       | M10                  |
|        | 250 MF              | 2; 4                 | M12       | M10                  |
|        | 280                 | 2; 4                 | M16       | M12                  |
|        | 315 SU/MU/SUR/MUR/M | 4                    | M16       | M12                  |
|        | 315 L/LD/LU/LUS     | 2; 4                 | M16       | M16                  |
|        | 315 VLG/LG/MGU      | 2; 4                 | M12       | M12                  |
|        | 315 VLGU            | 2; 4                 | M12       | M12                  |
|        | 355                 | 2; 4                 | M14       | M14                  |
|        | 355 LA              | 2                    | M14       | M14                  |
|        | 355 LA              | 6                    | M14       | M14                  |
|        | 355 LB              | 2                    | M14       | M14                  |
|        | 355 LB              | 4                    | M14       | M14                  |
|        | 355 LB              | 6                    | M14       | M14                  |
|        | 355 LC              | 2                    | M14       | M14                  |
|        | 400                 | 2; 4                 | M14       | M14                  |
|        | 400 LA              | 6                    | M14       | M14                  |
|        | 400 LB              | 4                    | M14       | M14                  |
|        | 400 LB              | 6                    | M14       | M14                  |
|        | 400 LD              | 6                    | M14       | M14                  |
|        | 450 LA              | 2                    | M14       | M14                  |
|        | 450 LB              | 2                    | M14       | M14                  |

Dimensions in millimetres



| Type                        | Main shaft extensions |    |       |      |     |    |    |         |    |      |      |     |    |    |
|-----------------------------|-----------------------|----|-------|------|-----|----|----|---------|----|------|------|-----|----|----|
|                             | 4 and 6 poles         |    |       |      |     |    |    | 2 poles |    |      |      |     |    |    |
|                             | F                     | GD | D     | G    | E   | O  | p  | F       | GD | D    | G    | E   | O  | p  |
| PLSES 225 MG                | 18                    | 11 | 65m6  | 58   | 140 | 20 | 42 | 18      | 11 | 60m6 | 53   | 140 | 20 | 42 |
| PLSES 250 MF                | 20                    | 12 | 75m6  | 67.5 | 140 | 20 | 42 | 18      | 11 | 65m6 | 58   | 140 | 20 | 42 |
| PLSES 250 SF                | 20                    | 12 | 75m6  | 67.5 | 140 | 20 | 42 | 18      | 11 | 65m6 | 58   | 140 | 20 | 42 |
| PLSES 280 MD/MGU/SGU/SGJ/MG | 22                    | 14 | 80m6  | 71   | 170 | 20 | 42 | 18      | 11 | 65m6 | 58   | 140 | 20 | 42 |
| PLSES 315 S/SU/SUR/L/M/MUR  | 25                    | 14 | 90m6  | 81   | 170 | 24 | 50 | 20      | 12 | 70m6 | 62.5 | 140 | 20 | 42 |
| PLSES 315 LD                | -                     | -  | -     | -    | -   | -  | -  | 22      | 14 | 80m6 | 71   | 170 | 20 | 42 |
| PLSES 315 LUS               | 25                    | 14 | 90m6  | 81   | 170 | 24 | 50 | -       | -  | -    | -    | -   | -  | -  |
| PLSES 315 MU                | 25                    | 14 | 90m6  | 81   | 170 | 24 | 50 | 20      | 12 | 70m6 | 62.5 | 140 | 20 | 42 |
| PLSES 315 LG/MGU/LU         | 28                    | 16 | 100m6 | 90   | 210 | 24 | 50 | 22      | 14 | 80m6 | 71   | 170 | 20 | 42 |
| PLSES 315 VLG/VLGU          | 28                    | 16 | 100m6 | 90   | 210 | 24 | 50 | 22      | 14 | 80m6 | 71   | 170 | 20 | 42 |
| PLSES 355 LA                | 28                    | 16 | 110m6 | 100  | 210 | 24 | 50 | 22      | 14 | 80m6 | 71   | 170 | 20 | 42 |
| PLSES 355 LB                | 28                    | 16 | 110m6 | 100  | 210 | 24 | 50 | 22      | 14 | 80m6 | 71   | 170 | 20 | 42 |
| PLSES 355 LC                | -                     | -  | -     | -    | -   | -  | -  | 22      | 14 | 80m6 | 71   | 170 | 20 | 42 |
| PLSES 400 LA                | 32                    | 18 | 120m6 | 109  | 210 | 24 | 50 | -       | -  | -    | -    | -   | -  | -  |
| PLSES 400 LB                | 32                    | 18 | 120m6 | 109  | 210 | 24 | 50 | -       | -  | -    | -    | -   | -  | -  |
| PLSES 400 LD                | 32                    | 18 | 120m6 | 109  | 210 | 24 | 50 | -       | -  | -    | -    | -   | -  | -  |
| PLSES 450 LA                | -                     | -  | -     | -    | -   | -  | -  | 22      | 14 | 85m6 | 76   | 170 | 20 | 42 |
| PLSES 450 LB                | -                     | -  | -     | -    | -   | -  | -  | 22      | 14 | 85m6 | 76   | 170 | 20 | 42 |

| Type                          | Secondary shaft extensions |    |       |      |     |    |    |         |    |      |      |     |    |    |
|-------------------------------|----------------------------|----|-------|------|-----|----|----|---------|----|------|------|-----|----|----|
|                               | 4 and 6 poles              |    |       |      |     |    |    | 2 poles |    |      |      |     |    |    |
|                               | FA                         | GF | DA    | GB   | EA  | OA | pA | FA      | GF | DA   | GB   | EA  | OA | pA |
| PLSES 225 MG                  | 18                         | 11 | 65m6  | 58   | 140 | 20 | 42 | 18      | 11 | 60m6 | 53   | 140 | 20 | 42 |
| PLSES 250 MF                  | 20                         | 12 | 65m6  | 58   | 140 | 20 | 42 | 18      | 11 | 65m6 | 58   | 140 | 20 | 42 |
| PLSES 250 SF                  | 18                         | 11 | 65m6  | 58   | 140 | 20 | 42 | 18      | 11 | 65m6 | 58   | 140 | 20 | 42 |
| PLSES 280 MG                  | 18                         | 11 | 65m6  | 58   | 140 | 20 | 42 | -       | -  | -    | -    | -   | -  | -  |
| PLSES 280 MD/MGU/SGU/SGJ      | 20                         | 12 | 65m6  | 58   | 140 | 20 | 42 | 18      | 11 | 65m6 | 58   | 140 | 20 | 42 |
| PLSES 315 S/SU/SUR/L/LD/M/MUR | 20                         | 12 | 75m6  | 67.5 | 140 | 20 | 42 | 18      | 11 | 70m6 | 62.5 | 140 | 20 | 42 |
| PLSES 315 LUS                 | 20                         | 12 | 75m6  | 67.5 | 140 | 20 | 42 | 18      | 11 | 70m6 | 62.5 | 140 | 20 | 42 |
| PLSES 315 MU                  | 20                         | 12 | 75m6  | 67.5 | 140 | 20 | 42 | 18      | 11 | 70m6 | 62.5 | 140 | 20 | 42 |
| PLSES 315 LG/MGU              | 22                         | 14 | 80m6  | 71   | 170 | 20 | 42 | 22      | 14 | 80m6 | 71   | 170 | 20 | 42 |
| PLSES 315 VLG/VLGU            | 22                         | 14 | 80m6  | 71   | 170 | 20 | 42 | 22      | 14 | 80m6 | 71   | 170 | 20 | 42 |
| PLSES 355 LA                  | 28                         | 16 | 110m6 | 100  | 210 | 24 | 50 | 22      | 14 | 80m6 | 71   | 170 | 20 | 42 |
| PLSES 355 LB                  | 28                         | 16 | 110m6 | 100  | 210 | 24 | 50 | 22      | 14 | 80m6 | 71   | 170 | 20 | 42 |
| PLSES 355 LC                  | -                          | -  | -     | -    | -   | -  | -  | 22      | 14 | 80m6 | 71   | 170 | 20 | 42 |
| PLSES 400 LA                  | 32                         | 18 | 120m6 | 109  | 210 | 24 | 50 | -       | -  | -    | -    | -   | -  | -  |
| PLSES 400 LB                  | 32                         | 18 | 120m6 | 109  | 210 | 24 | 50 | -       | -  | -    | -    | -   | -  | -  |
| PLSES 400 LD                  | 32                         | 18 | 120m6 | 109  | 210 | 24 | 50 | -       | -  | -    | -    | -   | -  | -  |
| PLSES 450 LA                  | -                          | -  | -     | -    | -   | -  | -  | 22      | 14 | 85m6 | 76   | 170 | 20 | 42 |
| PLSES 450 LB                  | -                          | -  | -     | -    | -   | -  | -  | 22      | 14 | 85m6 | 76   | 170 | 20 | 42 |

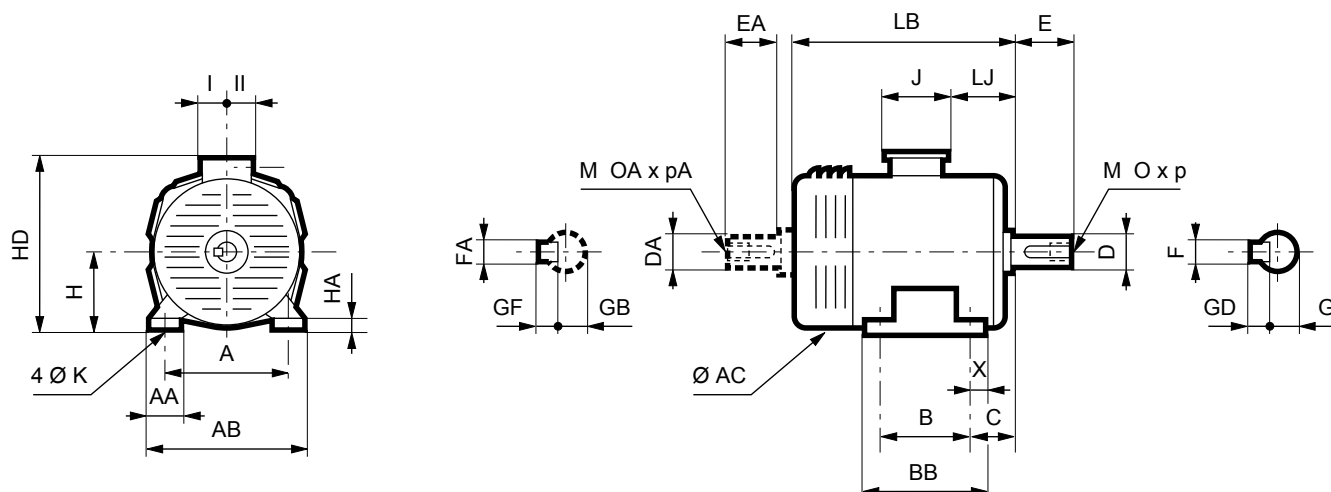
# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP23 Steel frame

### Dimensions

### Foot mounted IM 1001 (IM B3)

Dimensions in millimetres



| Type             | Main dimensions |     |      |      |     |    |     |    |    |     |     |      |      |       |     |     |     |
|------------------|-----------------|-----|------|------|-----|----|-----|----|----|-----|-----|------|------|-------|-----|-----|-----|
|                  | A               | AB  | B    | BB   | C   | X  | AA  | K  | HA | H   | AC* | HD   | LB   | LJ    | J   | I   | II  |
| PLSES 225 MG     | 356             | 416 | 311  | 351  | 149 | 20 | 60  | 19 | 26 | 225 | 443 | 629  | 824  | 175.5 | 292 | 151 | 181 |
| PLSES 250 MF     | 406             | 466 | 349  | 397  | 168 | 24 | 60  | 24 | 26 | 250 | 443 | 654  | 904  | 209   | 292 | 151 | 181 |
| PLSES 250 MP     | 406             | 470 | 349  | 400  | 168 | 26 | 94  | 24 | 40 | 250 | 490 | 643  | 779  | 157.5 | 292 | 151 | 181 |
| PLSES 250 SP     | 406             | 470 | 311  | 400  | 168 | 26 | 94  | 24 | 40 | 250 | 490 | 643  | 779  | 157.5 | 292 | 151 | 181 |
| PLSES 280 MD     | 457             | 517 | 419  | 467  | 190 | 24 | 60  | 24 | 26 | 280 | 443 | 684  | 904  | 209   | 292 | 151 | 181 |
| PLSES 280 SGJ    | 457             | 537 | 368  | 499  | 190 | 40 | 80  | 24 | 27 | 280 | 548 | 830  | 939  | 241   | 420 | 180 | 235 |
| PLSES 280 MG     | 457             | 537 | 419  | 499  | 190 | 40 | 80  | 24 | 27 | 280 | 548 | 830  | 939  | 241   | 420 | 180 | 235 |
| PLSES 280 SGU    | 457             | 537 | 368  | 499  | 190 | 40 | 80  | 24 | 27 | 280 | 600 | 830  | 1024 | 241   | 420 | 180 | 235 |
| PLSES 280 MGU    | 457             | 537 | 419  | 499  | 190 | 40 | 80  | 24 | 27 | 280 | 600 | 830  | 1024 | 241   | 420 | 180 | 235 |
| PLSES 280 SD     | 457             | 517 | 419  | 467  | 190 | 24 | 60  | 24 | 26 | 280 | 443 | 684  | 904  | 209   | 292 | 151 | 181 |
| PLSES 315 L      | 508             | 608 | 508  | 588  | 216 | 40 | 100 | 28 | 26 | 315 | 548 | 860  | 1026 | 242   | 420 | 180 | 236 |
| PLSES 315 LD     | 508             | 608 | 508  | 588  | 216 | 40 | 100 | 28 | 26 | 315 | 548 | 860  | 1086 | 242   | 420 | 180 | 236 |
| PLSES 315 LG/MGU | 508             | 608 | 508  | 588  | 216 | 40 | 100 | 28 | 26 | 315 | 624 | 876  | 1261 | 248   | 428 | 206 | 202 |
| PLSES 315 SU     | 508             | 608 | 406  | 486  | 216 | 40 | 100 | 28 | 26 | 315 | 600 | 865  | 940  | 241   | 420 | 180 | 235 |
| PLSES 315 MU     | 508             | 608 | 457  | 537  | 216 | 40 | 100 | 28 | 26 | 315 | 600 | 865  | 1024 | 241   | 420 | 180 | 235 |
| PLSES 315 LU     | 508             | 608 | 508  | 588  | 216 | 40 | 100 | 28 | 26 | 315 | 600 | 865  | 1104 | 241   | 420 | 180 | 235 |
| PLSES 315 LUS    | 508             | 608 | 508  | 588  | 216 | 40 | 100 | 28 | 26 | 315 | 600 | 865  | 1104 | 241   | 420 | 180 | 235 |
| PLSES 315 M      | 508             | 608 | 457  | 537  | 216 | 40 | 100 | 28 | 26 | 315 | 600 | 860  | 940  | 242   | 420 | 180 | 236 |
| PLSES 315 MUR    | 508             | 608 | 457  | 537  | 216 | 40 | 100 | 28 | 26 | 315 | 600 | 860  | 1106 | 242   | 420 | 180 | 236 |
| PLSES 315 S      | 508             | 608 | 406  | 486  | 216 | 40 | 100 | 28 | 26 | 315 | 600 | 860  | 881  | 242   | 420 | 180 | 236 |
| PLSES 315 SUR    | 508             | 608 | 406  | 486  | 216 | 40 | 100 | 28 | 26 | 315 | 600 | 860  | 1026 | 242   | 418 | 180 | 236 |
| PLSES 315 VLG    | 508             | 608 | 560  | 640  | 216 | 40 | 100 | 28 | 26 | 315 | 624 | 876  | 1321 | 248   | 428 | 206 | 202 |
| PLSES 315 VLGU   | 508             | 608 | 560  | 640  | 216 | 40 | 100 | 28 | 26 | 315 | 624 | 876  | 1391 | 248   | 428 | 206 | 202 |
| PLSES 355 LA     | 610             | 710 | 630  | 710  | 254 | 40 | 100 | 28 | 26 | 355 | 705 | 1078 | 1470 | 130   | 700 | 224 | 396 |
| PLSES 355 LB     | 610             | 710 | 630  | 710  | 254 | 40 | 100 | 28 | 26 | 355 | 705 | 1078 | 1470 | 130   | 700 | 224 | 396 |
| PLSES 355 LC     | 610             | 710 | 630  | 710  | 254 | 40 | 100 | 28 | 26 | 355 | 705 | 1078 | 1470 | 130   | 700 | 224 | 396 |
| PLSES 400 LA     | 686             | 806 | 710  | 800  | 280 | 45 | 120 | 35 | 26 | 400 | 795 | 1173 | 1755 | 177   | 700 | 224 | 396 |
| PLSES 400 LB     | 686             | 806 | 710  | 800  | 280 | 45 | 120 | 35 | 26 | 400 | 795 | 1173 | 1755 | 177   | 700 | 224 | 396 |
| PLSES 400 LD     | 686             | 806 | 710  | 800  | 280 | 45 | 120 | 35 | 26 | 400 | 795 | 1173 | 1755 | 177   | 700 | 224 | 396 |
| PLSES 450 LA     | 750             | 845 | 1000 | 1245 | 200 | 65 | 120 | 42 | 40 | 450 | 820 | 1223 | 1688 | 915   | 700 | 224 | 396 |
| PLSES 450 LB     | 750             | 845 | 1000 | 1245 | 200 | 65 | 120 | 42 | 40 | 450 | 820 | 1223 | 1688 | 915   | 700 | 224 | 396 |

\* AC: housing diameter without lifting rings

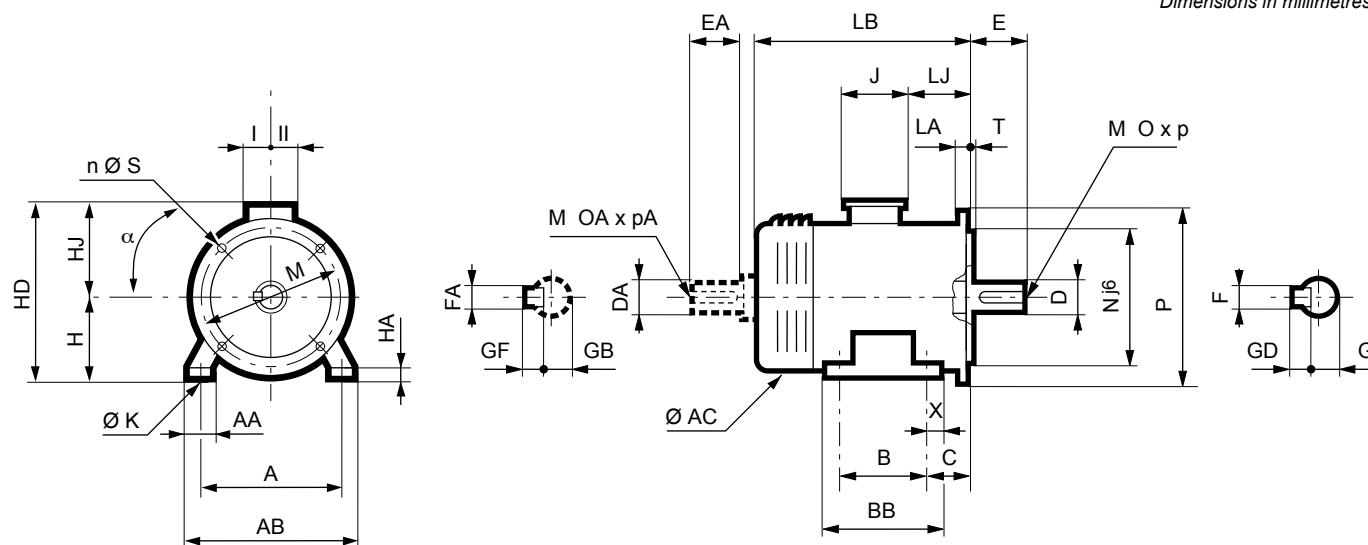
# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP23 Steel frame

### Dimensions

### Foot and flange mounted IM 2001 (IM B35)

Dimensions in millimetres



| Type                       | Main dimensions |     |      |      |     |    |     |    |    |     |     |      |     |      |       |     |     |     |         |
|----------------------------|-----------------|-----|------|------|-----|----|-----|----|----|-----|-----|------|-----|------|-------|-----|-----|-----|---------|
|                            | A               | AB  | B    | BB   | C   | X  | AA  | K  | HA | H   | AC* | HD   | HJ  | LB   | LJ    | J   | I   | II  | Symb    |
| PLSES 225 MG               | 356             | 416 | 311  | 351  | 149 | 20 | 60  | 19 | 26 | 225 | 443 | 629  | 404 | 824  | 175.5 | 292 | 151 | 181 | FF 500  |
| PLSES 250 MF <sup>1</sup>  | 406             | 466 | 349  | 397  | 168 | 24 | 60  | 24 | 26 | 250 | 443 | 654  | 404 | 904  | 209   | 292 | 151 | 181 | FF 600  |
| PLSES 250 MP <sup>1</sup>  |                 |     |      |      |     |    |     |    |    |     | 490 |      | 393 | 779  | 157.5 | 292 | 151 | 181 | FF 600  |
| PLSES 250 SF <sup>1</sup>  | 406             | 470 | 311  | 400  | 168 | 26 | 94  | 24 | 40 | 250 | 443 | 654  | 404 | 904  | 209   | 292 | 151 | 181 | FF 600  |
| PLSES 250 SP <sup>1</sup>  |                 |     |      |      |     |    |     |    |    |     | 490 |      | 393 | 779  | 157.5 | 292 | 151 | 181 | FF 600  |
| PLSES 280 MD <sup>1</sup>  | 457             | 517 | 419  | 467  | 190 | 24 | 60  | 24 | 26 | 280 | 443 | 684  | 404 | 904  | 209   | 292 | 151 | 181 | FF 600  |
| PLSES 280 SGJ <sup>1</sup> |                 |     |      |      |     |    |     |    |    |     | 548 |      | 550 | 939  | 241   | 420 | 180 | 235 | FF 600  |
| PLSES 280 MG <sup>1</sup>  |                 |     |      |      |     |    |     |    |    |     | 548 |      | 550 | 939  | 241   | 420 | 180 | 235 | FF 600  |
| PLSES 280 SGU <sup>1</sup> | 457             | 537 | 368  | 499  | 190 | 40 | 80  | 24 | 27 | 280 | 600 | 830  | 550 | 1024 | 241   | 420 | 180 | 235 | FF 600  |
| PLSES 280 MGU <sup>1</sup> | 457             | 537 | 419  | 499  | 190 | 40 | 80  | 24 | 27 | 280 | 600 | 830  | 550 | 1024 | 241   | 420 | 180 | 235 | FF 600  |
| PLSES 280 SD <sup>1</sup>  |                 |     |      |      |     |    |     |    |    |     | 443 |      | 404 | 904  | 209   | 292 | 151 | 181 | FF 600  |
| PLSES 315 L <sup>1</sup>   | 508             | 608 | 508  | 588  | 216 | 40 | 100 | 28 | 26 | 315 | 548 | 860  | 545 | 1026 | 242   | 420 | 180 | 236 | FF 740  |
| PLSES 315 LD <sup>1</sup>  | 508             | 608 | 508  | 588  | 216 | 40 | 100 | 28 | 26 | 315 | 548 | 860  | 545 | 1086 | 242   | 420 | 180 | 236 | FF 740  |
| PLSES 315 LG <sup>1</sup>  | 508             | 608 | 508  | 588  | 216 | 40 | 100 | 28 | 26 | 315 | 624 | 876  | 561 | 1261 | 248   | 428 | 206 | 202 | FF 740  |
| PLSES 315 SU <sup>1</sup>  | 508             | 608 | 406  | 486  | 216 | 40 | 100 | 28 | 26 | 315 | 600 | 865  | 550 | 939  | 241   | 420 | 180 | 235 | FF 740  |
| PLSES 315 MU <sup>1</sup>  | 508             | 608 | 457  | 588  | 216 | 40 | 100 | 27 | 26 | 315 | 600 | 865  | 550 | 939  | 241   | 420 | 180 | 235 | FF 740  |
| PLSES 315 LU <sup>1</sup>  |                 |     |      |      |     |    |     |    |    |     | 600 |      | 550 | 1104 | 241   | 420 | 180 | 235 | FF 740  |
| PLSES 315 LUS <sup>1</sup> | 508             | 608 | 508  | 588  | 216 | 40 | 100 | 28 | 26 | 315 | 600 | 865  | 550 | 1104 | 241   | 420 | 180 | 235 | FF 740  |
| PLSES 315 M <sup>1</sup>   | 508             | 608 | 457  | 537  | 216 | 40 | 100 | 28 | 26 | 315 | 600 | 860  | 545 | 940  | 242   | 420 | 180 | 236 | FF 740  |
| PLSES 315 MUR <sup>1</sup> | 508             | 608 | 457  | 537  | 216 | 40 | 100 | 28 | 26 | 315 | 600 | 860  | 545 | 1106 | 242   | 420 | 180 | 236 | FF 740  |
| PLSES 315 MGU <sup>1</sup> | 508             | 608 | 457  | 588  | 216 | 40 | 100 | 28 | 26 | 315 | 624 | 876  | 561 | 1261 | 248   | 428 | 206 | 202 | FF 740  |
| PLSES 315 S <sup>1</sup>   | 508             | 608 | 406  | 486  | 216 | 40 | 100 | 28 | 26 | 315 | 600 | 860  | 545 | 1106 | 242   | 420 | 180 | 236 | FF 740  |
| PLSES 315 SUR <sup>1</sup> | 508             | 608 | 406  | 486  | 216 | 40 | 100 | 28 | 26 | 315 | 600 | 860  | 545 | 1038 | 242   | 420 | 180 | 236 | FF 740  |
| PLSES 315 VLG <sup>1</sup> | 508             | 608 | 560  | 640  | 216 | 40 | 100 | 28 | 26 | 315 | 624 | 876  | 561 | 1321 | 248   | 428 | 206 | 202 | FF 740  |
| PLSES 315 VLGU             | 508             | 608 | 560  | 640  | 216 | 40 | 100 | 28 | 26 | 315 | 624 | 876  | 561 | 1391 | 248   | 428 | 206 | 202 | FF 740  |
| PLSES 355 LA               | 610             | 710 | 630  | 710  | 254 | 40 | 100 | 28 | 26 | 355 | 705 | 1078 | 723 | 1470 | 130   | 700 | 224 | 396 | FF 940  |
| PLSES 355 LB               | 610             | 710 | 630  | 710  | 254 | 40 | 100 | 28 | 26 | 355 | 705 | 1078 | 723 | 1470 | 130   | 700 | 224 | 396 | FF 940  |
| PLSES 355 LC               | 610             | 710 | 630  | 710  | 254 | 40 | 100 | 28 | 26 | 355 | 705 | 1078 | 723 | 1470 | 130   | 700 | 224 | 396 | FF 940  |
| PLSES 400 LA               | 686             | 806 | 710  | 800  | 280 | 45 | 120 | 35 | 26 | 400 | 795 | 1173 | 773 | 1755 | 177   | 700 | 224 | 396 | FF 940  |
| PLSES 400 LB               | 686             | 806 | 710  | 800  | 280 | 45 | 120 | 35 | 26 | 400 | 795 | 1173 | 773 | 1755 | 177   | 700 | 224 | 396 | FF 940  |
| PLSES 400 LD               | 686             | 806 | 710  | 800  | 280 | 45 | 120 | 35 | 26 | 400 | 795 | 1173 | 773 | 1755 | 177   | 700 | 224 | 396 | FF 940  |
| PLSES 450 LA               | 750             | 845 | 1000 | 1245 | 200 | 65 | 120 | 42 | 40 | 400 | 820 | 1223 | 773 | 1688 | 915   | 700 | 224 | 396 | FF 1080 |
| PLSES 450 LB               | 750             | 845 | 1000 | 1245 | 200 | 65 | 120 | 42 | 40 | 450 | 820 | 1223 | 773 | 1688 | 915   | 700 | 224 | 396 | FF 1080 |

1. For frame size  $\geq 250$  mm used as IM B5 (IM 3001), please consult Leroy-Somer.

\* AC: housing diameter without lifting rings

| IEC symbol | Flange dimensions |      |      |   |   |                |      |    |
|------------|-------------------|------|------|---|---|----------------|------|----|
|            | M                 | N    | P    | T | n | $\alpha^\circ$ | s    | LA |
| FF 400     | 400               | 350  | 450  | 5 | 8 | 22.5           | 18.5 | 16 |
| FF 500     | 500               | 450  | 550  | 5 | 8 | 22.5           | 18.5 | 18 |
| FF 600     | 600               | 550  | 660  | 6 | 8 | 22.5           | 22   | 25 |
| FF 740     | 740               | 680  | 800  | 6 | 8 | 22.5           | 22   | 25 |
| FF 940     | 940               | 880  | 1000 | 6 | 8 | 22.5           | 28   | 28 |
| FF 1080    | 1080              | 1000 | 1150 | 6 | 8 | 22.5           | 28   | 30 |



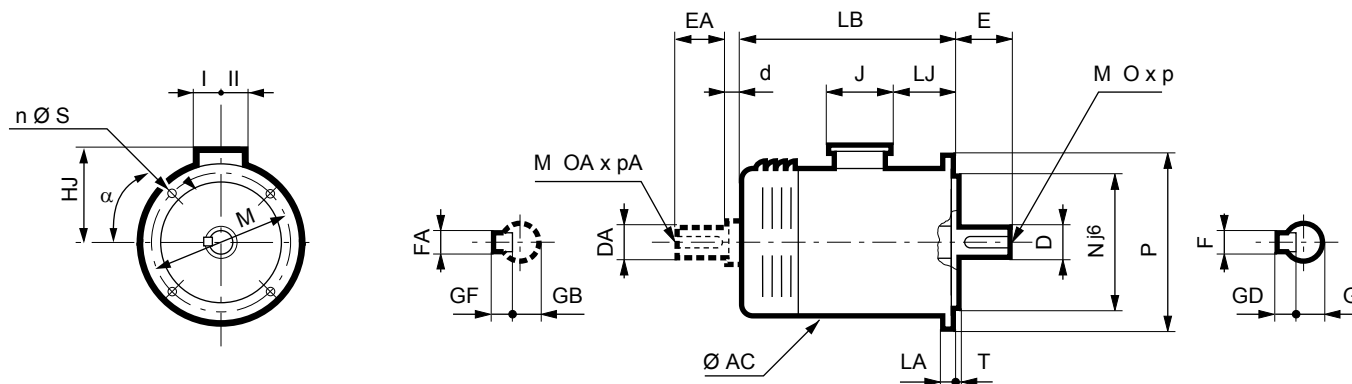
# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP23 Steel frame

### Dimensions

### Flange mounted IM 3001 (IM B5) IM 3011 (IM V1)

Dimensions in millimetres



| Type           | Main dimensions |     |      |       |     |     |     | Symb    |
|----------------|-----------------|-----|------|-------|-----|-----|-----|---------|
|                | AC              | HJ  | LB   | LJ    | J   | I   | II  |         |
| PLSES 225 MG   | 443             | 404 | 824  | 175.5 | 292 | 151 | 181 | FF 500  |
| PLSES 250 MF*  | 443             | 404 | 904  | 209   | 292 | 151 | 181 | FF 600  |
| PLSES 250 SF*  | 443             | 404 | 904  | 209   | 292 | 151 | 181 | FF 600  |
| PLSES 280 MD*  | 443             | 404 | 904  | 209   | 292 | 151 | 181 | FF 600  |
| PLSES 280 MGU* | 548             | 545 | 1038 | 242   | 418 | 180 | 236 | FF 600  |
| PLSES 280 SGU* | 548             | 545 | 1038 | 242   | 418 | 180 | 236 | FF 600  |
| PLSES 315 L*   | 548             | 545 | 1026 | 242   | 418 | 180 | 236 | FF 740  |
| PLSES 315 LD*  | 548             | 545 | 1086 | 242   | 418 | 180 | 236 | FF 740  |
| PLSES 315 LG*  | 629             | 561 | 1261 | 248   | 428 | 206 | 202 | FF 740  |
| PLSES 315 LUS* | 548             | 545 | 1106 | 242   | 418 | 180 | 236 | FF 740  |
| PLSES 315 M*   | 600             | 545 | 940  | 242   | 418 | 180 | 236 | FF 740  |
| PLSES 315 MGU* | 629             | 561 | 1261 | 248   | 428 | 206 | 202 | FF 740  |
| PLSES 315 MUR* | 600             | 545 | 1118 | 242   | 418 | 180 | 236 | FF 740  |
| PLSES 315 MU*  | 600             | 547 | 1025 | 242   | 418 | 180 | 235 | FF 740  |
| PLSES 315 S*   | 600             | 545 | 881  | 242   | 418 | 180 | 236 | FF 740  |
| PLSES 315 SU*  | 600             | 547 | 940  | 242   | 418 | 180 | 235 | FF 740  |
| PLSES 315 SUR* | 600             | 545 | 1038 | 242   | 418 | 180 | 236 | FF 740  |
| PLSES 315 VLG* | 629             | 561 | 1321 | 248   | 428 | 206 | 202 | FF 740  |
| PLSES 315 VLGU | 629             | 561 | 1391 | 248   | 428 | 206 | 202 | FF 740  |
| PLSES 355 LA   | 705             | 723 | 1470 | 130   | 700 | 224 | 396 | FF 940  |
| PLSES 355 LB   | 705             | 723 | 1470 | 130   | 700 | 224 | 396 | FF 940  |
| PLSES 355 LC   | 705             | 723 | 1470 | 130   | 700 | 224 | 396 | FF 940  |
| PLSES 400 LA   | 795             | 773 | 1755 | 177   | 700 | 224 | 396 | FF 940  |
| PLSES 400 LB   | 795             | 773 | 1755 | 177   | 700 | 224 | 396 | FF 940  |
| PLSES 400 LD   | 795             | 773 | 1755 | 177   | 700 | 224 | 396 | FF 940  |
| PLSES 450 LA   | 820             | 773 | 1856 | 915   | 700 | 224 | 396 | FF 1080 |
| PLSES 450 LB   | 820             | 773 | 1856 | 915   | 700 | 224 | 396 | FF 1080 |

\* For frame size  $\geq 250$  mm used as IM B5 (IM 3001), please consult Leroy-Somer.

| IEC symbol | Flange dimensions |      |      |   |   |                |      |    |
|------------|-------------------|------|------|---|---|----------------|------|----|
|            | M                 | N    | P    | T | n | $\alpha^\circ$ | s    | LA |
| FF 400     | 400               | 350  | 450  | 5 | 8 | 22.5           | 18.5 | 16 |
| FF 500     | 500               | 450  | 550  | 5 | 8 | 22.5           | 18.5 | 18 |
| FF 600     | 600               | 550  | 660  | 6 | 8 | 22.5           | 22   | 25 |
| FF 740     | 740               | 680  | 800  | 6 | 8 | 22.5           | 22   | 25 |
| FF 940     | 940               | 880  | 1000 | 6 | 8 | 22.5           | 28   | 28 |
| FF 940     | 940               | 880  | 1000 | 6 | 8 | 22.5           | 28   | 28 |
| FF 940     | 940               | 880  | 1000 | 6 | 8 | 22.5           | 28   | 28 |
| FF 940     | 940               | 880  | 1000 | 6 | 8 | 22.5           | 28   | 28 |
| FF 940     | 940               | 880  | 1000 | 6 | 8 | 22.5           | 28   | 28 |
| FF 940     | 940               | 880  | 1000 | 6 | 8 | 22.5           | 28   | 28 |
| FF 1080    | 1080              | 1000 | 1150 | 6 | 8 | 22.5           | 28   | 30 |
| FF 1080    | 1080              | 1000 | 1150 | 6 | 8 | 22.5           | 28   | 30 |

## BEARING WITH GREASE NIPPLES

The chart opposite shows the greasing intervals, depending on the type of motor, for standard bearing assemblies of frame size  $\geq 250$  mm fitted with grease nipples, operating at an ambient temperature of 25°C, 40°C and 55°C on a horizontal shaft machine.

The chart below is valid for **PLSES** motors lubricated with **Polyrex EM103** grease, which is used as standard.

## SPECIAL CONSTRUCTION AND ENVIRONMENT

For vertical shaft machines, the greasing intervals will be approximately 80% of the values stated in the table below.

Note: The quality and quantity of grease and the greasing interval are shown on the machine nameplate.

For special assemblies (motors fitted with DE roller bearings or other types), machines of frame size  $\geq 160$  mm have bearings with grease nipples.

Instructions for bearing maintenance are given on the nameplates on these machines.

| Series | Type         | No. of poles | Type of bearing for bearings with grease nipples* |         | Quantity of grease<br>g | 3000 min <sup>-1</sup> |      |      | Greasing intervals in hours<br>1500 min <sup>-1</sup> |       |      | 1000 min <sup>-1</sup> |       |       |
|--------|--------------|--------------|---------------------------------------------------|---------|-------------------------|------------------------|------|------|-------------------------------------------------------|-------|------|------------------------|-------|-------|
|        |              |              | N.D.E.                                            | D.E.    |                         | 25°C                   | 40°C | 55°C | 25°C                                                  | 40°C  | 55°C | 25°C                   | 40°C  | 55°C  |
|        |              |              |                                                   |         |                         |                        |      |      |                                                       |       |      |                        |       |       |
| PLSES  | 225 MG       | 2; 4         | 6314 C3                                           | 6317 C3 | 40                      | 8000                   | 4000 | 2000 | 19600                                                 | 9800  | 4900 | -                      | -     | -     |
|        | 250 SF       | 2; 4         |                                                   |         | 40                      |                        |      |      |                                                       |       |      |                        |       |       |
|        | 250 MF       | 2; 4         |                                                   |         | 40                      |                        |      |      |                                                       |       |      |                        |       |       |
|        | 280 MD       | 2            |                                                   |         | 40                      |                        |      |      |                                                       |       |      |                        |       |       |
|        | 280 SGJ      | 4            | 6316 C3                                           | 6320 C3 | 50                      | -                      | -    | -    | 15800                                                 | 7900  | 3950 | -                      | -     | -     |
|        | 280 MG       | 4            |                                                   |         | 50                      |                        |      |      |                                                       |       |      |                        |       |       |
|        | 280 SGU      | 4            |                                                   |         | 50                      |                        |      |      |                                                       |       |      |                        |       |       |
|        | 280 MGU      | 4            |                                                   |         | 50                      |                        |      |      |                                                       |       |      |                        |       |       |
|        | 315 SUR      | 4            |                                                   |         | 50                      |                        |      |      |                                                       |       |      |                        |       |       |
|        | 315 MUR      | 4            |                                                   |         | 50                      |                        |      |      |                                                       |       |      |                        |       |       |
|        | 315 LUS      | 4            |                                                   |         | 50                      |                        |      |      |                                                       |       |      |                        |       |       |
|        | 315 SU       | 2            |                                                   | 6316 C3 | 50                      | 9000                   | 4500 | 2250 | -                                                     | -     | -    | -                      | -     | -     |
|        | 315 MU       | 2            |                                                   |         | 50                      |                        |      |      |                                                       |       |      |                        |       |       |
|        | 315 L        | 2            |                                                   |         | 35                      |                        |      |      |                                                       |       |      |                        |       |       |
|        | 315 LU       | 4            |                                                   |         | 45                      |                        |      |      |                                                       |       |      |                        |       |       |
|        | 315 LD       | 2            |                                                   | 6224 C3 | 35                      | -                      | -    | -    | 9000                                                  | 4500  | 2250 | -                      | -     | -     |
|        | 315 LG/MGU   | 2            | 6219 C3                                           | 35      | 8000                    | 4000                   | 2000 | -    | -                                                     | -     | -    | -                      | -     |       |
|        |              | 4            | 6317 C3                                           | 6317 C3 | 35                      | 6500                   | 6500 | 4095 | -                                                     | -     | -    | -                      | -     | -     |
|        | 315 VLG/VLGU | 2            | 6317 C3                                           | 6322 C3 | 55                      | -                      | -    | -    | 13200                                                 | 13200 | 8316 | -                      | -     | -     |
|        |              | 4            | 6317 C3                                           | 6317 C3 | 35                      | 6500                   | 6500 | 4095 | -                                                     | -     | -    | -                      | -     | -     |
|        | 355 L        | 2            | 6317 C3                                           | 6322 C3 | 55                      | -                      | -    | -    | 13200                                                 | 13200 | 8316 | -                      | -     | -     |
|        |              | 4            | 6317 C3                                           | 6317 C3 | 35                      | 6500                   | 6500 | 4095 | -                                                     | -     | -    | -                      | -     | -     |
|        | 355 LA       | 2            | 6324 C3                                           | 6324 C3 | 72                      | -                      | -    | -    | 7500                                                  | 3700  | 2800 | -                      | -     | -     |
|        | 355 LA       | 2            | 6317 C4                                           | 6317 C4 | 35                      | 6500                   | 6500 | 4095 | -                                                     | -     | -    | -                      | -     | -     |
|        | 355 LB       | 6            | 6324 C3                                           | 6324 C3 | 72                      | -                      | -    | -    | -                                                     | -     | -    | 20000                  | 20000 | 20000 |
|        | 355 LB       | 2            | 6317 C4                                           | 6317 C4 | 35                      | 6500                   | 6500 | 4095 | -                                                     | -     | -    | -                      | -     | -     |
|        | 355 LB       | 4            | 6324 C3                                           | 6324 C3 | 72                      | -                      | -    | -    | 7500                                                  | 3700  | 2800 | -                      | -     | -     |
|        | 355 LB       | 6            |                                                   |         | 72                      | -                      | -    | -    | -                                                     | -     | -    | 20000                  | 20000 | 20000 |
|        | 355 LC       | 2            | 6317 C4                                           | 6317 C4 | 35                      | 6500                   | 6500 | 4095 | -                                                     | -     | -    | -                      | -     | -     |
|        | 400 L        | 4            | 6328 C3                                           | 6328 C3 | 93                      | -                      | -    | -    | 4600                                                  | 2300  | 1100 | -                      | -     | -     |
|        | 400 LA       | 6            |                                                   |         | 93                      | -                      | -    | -    | -                                                     | -     | -    | 18200                  | 18200 | 18500 |
|        | 400 LB       | 4            |                                                   |         | 93                      | -                      | -    | -    | 4600                                                  | 2300  | 1100 | -                      | -     | -     |
|        | 400 LB       | 6            |                                                   |         | 93                      | -                      | -    | -    | -                                                     | -     | -    | 18200                  | 18200 | 18500 |
|        | 400 LD       | 6            |                                                   |         | 93                      | -                      | -    | -    | -                                                     | -     | -    | 18200                  | 18200 | 18500 |
|        | 450 LA       | 2            | 6317 C4                                           | 6317 C4 | 35                      | 6500                   | 6500 | 4095 | -                                                     | -     | -    | -                      | -     | -     |
| 450 LB | 2            | 35           |                                                   |         | 6500                    | 6500                   | 4095 | -    | -                                                     | -     | -    | -                      | -     |       |

\* bearing with grease nipples on request

## STANDARD BEARING FITTING ARRANGEMENTS

| PLSES series                                  |                      | Horizontal shaft                                                              | Vertical shaft                                                                |                   |
|-----------------------------------------------|----------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------------|
| Foot mounted motors                           | Mounting arrangement |                                                                               | Shaft facing down                                                             | Shaft facing up   |
|                                               |                      | B3                                                                            | V5                                                                            | V6                |
|                                               | standard mounting    | DE bearing:<br>- located at DE for frame 180<br>- locked for frame $\geq 200$ | DE bearing:<br>- located at DE for frame 180<br>- locked for frame $\geq 200$ | DE bearing locked |
|                                               | on request           | DE bearing locked for frame 180                                               | DE bearing locked for frame 180                                               |                   |
| Flange mounted motors<br>(or foot and flange) | Mounting arrangement | B5 / B35                                                                      | V1 / V15                                                                      | V3 / V36          |
|                                               | standard mounting    | DE bearing locked                                                             | DE bearing locked                                                             | DE bearing locked |

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

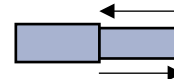
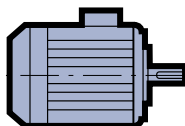
## IP23 Steel frame

### Construction

### Axial loads

## HORIZONTAL MOTOR

For a bearing life  $L_{10h}$   
of 25,000 hours  
and 40,000 hours



| Series | Type         | No. of poles | Permissible axial load (in daN) on main shaft extension for standard bearing assembly |              |              |              |                        |              |              |              |                        |              |              |              |
|--------|--------------|--------------|---------------------------------------------------------------------------------------|--------------|--------------|--------------|------------------------|--------------|--------------|--------------|------------------------|--------------|--------------|--------------|
|        |              |              | IM B3 / B6<br>IM B7 / B8<br>IM B5 / B35                                               |              |              |              |                        |              |              |              |                        |              |              |              |
|        |              |              | 3000 min <sup>-1</sup>                                                                |              |              |              | 1500 min <sup>-1</sup> |              |              |              | 1000 min <sup>-1</sup> |              |              |              |
|        |              |              | 25,000 hours                                                                          | 40,000 hours | 25,000 hours | 40,000 hours | 25,000 hours           | 40,000 hours | 25,000 hours | 40,000 hours | 25,000 hours           | 40,000 hours | 25,000 hours | 40,000 hours |
| PLSES  | 225 MG       | 2 ; 4        | 474                                                                                   | 390          | 394          | 310          | 607                    | 494          | 527          | 414          | -                      | -            | -            | -            |
|        | 250 SF       | 2 ; 4        | 469                                                                                   | 385          | 389          | 305          | 581                    | 470          | 501          | 390          | -                      | -            | -            | -            |
|        | 250 MF       | 2 ; 4        | 460                                                                                   | 377          | 380          | 297          | 554                    | 445          | 474          | 365          | -                      | -            | -            | -            |
|        | 280 MD       | 2            | 375                                                                                   | 292          | 455          | 372          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 280 SGJ      | 4            | -                                                                                     | -            | -            | -            | 812                    | 670          | 632          | 490          | -                      | -            | -            | -            |
|        | 280 MG       | 4            | -                                                                                     | -            | -            | -            | 809                    | 666          | 629          | 486          | -                      | -            | -            | -            |
|        | 280 SGU      | 4            | -                                                                                     | -            | -            | -            | 798                    | 656          | 618          | 476          | -                      | -            | -            | -            |
|        | 280 MGU      | 4            | -                                                                                     | -            | -            | -            | 794                    | 652          | 614          | 472          | -                      | -            | -            | -            |
|        | 315 L        | 2            | 457                                                                                   | 380          | 277          | 200          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 315 LD       | 2            | 375                                                                                   | 310          | 195          | 130          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 315 SU       | 2            | 472                                                                                   | 395          | 292          | 215          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 315 MU       | 2 ; 4        | 460                                                                                   | 383          | 280          | 203          | 783                    | 642          | 603          | 462          | -                      | -            | -            | -            |
|        | 315 M        | 2            | 469                                                                                   | 391          | 289          | 211          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 315 SUR      | 4            | -                                                                                     | -            | -            | -            | 787                    | 645          | 607          | 465          | -                      | -            | -            | -            |
|        | 315 MUR      | 4            | -                                                                                     | -            | -            | -            | 763                    | 623          | 583          | 443          | -                      | -            | -            | -            |
|        | 315 LG/MGU   | 2 ; 4        | 504                                                                                   | 417          | 364          | 277          | 860                    | 703          | 720          | 563          | -                      | -            | -            | -            |
|        | 315 LU       | 4            | -                                                                                     | -            | -            | -            | 630                    | 513          | 450          | 333          | -                      | -            | -            | -            |
|        | 315 LUS      | 2 ; 4        | 758                                                                                   | 618          | 578          | 438          | 755                    | 615          | 575          | 435          | -                      | -            | -            | -            |
|        | 315 VLG      | 2 ; 4        | 508                                                                                   | -            | 208          | -            | 880                    | -            | 580          | -            | -                      | -            | -            | -            |
|        | 315 VLGU     | 2 ; 4        | 530                                                                                   | -            | 250          | -            | 846                    | -            | 546          | -            | -                      | -            | -            | -            |
|        | 355 L        | 2 ; 4        | 135                                                                                   | -            | 415          | -            | 414                    | -            | 694          | -            | -                      | -            | -            | -            |
|        | 355 LA/LB/LC | 2            | 135                                                                                   | -            | 415          | -            | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 355 LB       | 4            | -                                                                                     | -            | -            | -            | 414                    | -            | 694          | -            | -                      | -            | -            | -            |
|        | 355 LA/LB    | 6            | -                                                                                     | -            | -            | -            | -                      | -            | -            | -            | 600                    | -            | 907          | -            |
|        | 400 L/LA/LB  | 4            | -                                                                                     | -            | -            | -            | 552                    | -            | 906          | -            | -                      | -            | -            | -            |
|        | 400 LB       | 4            | -                                                                                     | -            | -            | -            | 552                    | -            | 906          | -            | -                      | -            | -            | -            |
|        | 400 LA/LB/LD | 6            | -                                                                                     | -            | -            | -            | -                      | -            | -            | -            | 650                    | -            | 1020         | -            |
|        | 450 LA/LB    | 2            | 189                                                                                   | -            | 358          | -            | -                      | -            | -            | -            | -                      | -            | -            | -            |

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP23 Steel frame

### Construction

### Axial loads

#### VERTICAL MOTOR SHAFT FACING DOWN

For a bearing life  $L_{10h}$   
of 25,000 hours  
and 40,000 hours



| Series | Type         | No. of poles | Permissible axial load (in daN) on main shaft extension for standard bearing assembly |              |              |              |                        |              |              |              |                        |              |              |              |
|--------|--------------|--------------|---------------------------------------------------------------------------------------|--------------|--------------|--------------|------------------------|--------------|--------------|--------------|------------------------|--------------|--------------|--------------|
|        |              |              | IM V5<br>IM V1 / V15                                                                  |              |              |              |                        |              |              |              |                        |              |              |              |
|        |              |              | 3000 min <sup>-1</sup>                                                                |              |              |              | 1500 min <sup>-1</sup> |              |              |              | 1000 min <sup>-1</sup> |              |              |              |
|        |              |              | 25,000 hours                                                                          | 40,000 hours | 25,000 hours | 40,000 hours | 25,000 hours           | 40,000 hours | 25,000 hours | 40,000 hours | 25,000 hours           | 40,000 hours | 25,000 hours | 40,000 hours |
| PLSES  | 225 MG       | 2 ; 4        | 400                                                                                   | 315          | 506          | 421          | 506                    | 392          | 684          | 570          | -                      | -            | -            | -            |
|        | 250 SF       | 2 ; 4        | 383                                                                                   | 298          | 518          | 433          | 464                    | 351          | 694          | 581          | -                      | -            | -            | -            |
|        | 250 MF       | 2 ; 4        | 365                                                                                   | 280          | 529          | 444          | 432                    | 320          | 691          | 579          | -                      | -            | -            | -            |
|        | 280 MD       | 2            | 282                                                                                   | 198          | 605          | 520          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 280 SGJ      | 4            | -                                                                                     | -            | -            | -            | 640                    | 495          | 901          | 756          | -                      | -            | -            | -            |
|        | 280 MG       | 4            | -                                                                                     | -            | -            | -            | 624                    | 479          | 913          | 768          | -                      | -            | -            | -            |
|        | 280 SGU      | 4            | -                                                                                     | -            | -            | -            | 605                    | 460          | 929          | 784          | -                      | -            | -            | -            |
|        | 280 MGU      | 4            | -                                                                                     | -            | -            | -            | 579                    | 434          | 951          | 806          | -                      | -            | -            | -            |
|        | 315 L        | 2            | 302                                                                                   | 222          | 518          | 439          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 315 LD       | 2            | 196                                                                                   | 129          | 482          | 415          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 315 LG/MGU   | 2 ; 4        | 390                                                                                   | 300          | 550          | 457          | 610                    | 445          | 1124         | 957          | -                      | -            | -            | -            |
|        | 315 SU       | 2            | 341                                                                                   | 261          | 493          | 413          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 315 MU       | 2 ; 4        | 316                                                                                   | 236          | 507          | 428          | 568                    | 424          | 944          | 800          | -                      | -            | -            | -            |
|        | 315 M        | 2            | 337                                                                                   | 258          | 489          | 410          | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 315 SUR      | 4            | -                                                                                     | -            | -            | -            | 575                    | 427          | 947          | 803          | -                      | -            | -            | -            |
|        | 315 MUR      | 4            | -                                                                                     | -            | -            | -            | 522                    | 378          | 978          | 834          | -                      | -            | -            | -            |
|        | 315 LU       | 4            | -                                                                                     | -            | -            | -            | 374                    | 254          | 862          | 742          | -                      | -            | -            | -            |
|        | 315 VLG      | 2 ; 4        | 270                                                                                   | -            | 580          | -            | 557                    | -            | 1085         | -            | -                      | -            | -            | -            |
|        | 315 VLGU     | 2 ; 4        | 250                                                                                   | -            | 630          | -            | 483                    | -            | 1125         | -            | -                      | -            | -            | -            |
|        | 315 LUS      | 2 ; 4        | 503                                                                                   | 359          | 991          | 847          | 514                    | 370          | 973          | 829          | -                      | -            | -            | -            |
|        | 355 LA/LB/LC | 2            | 402                                                                                   | -            | 396          | -            | -                      | -            | -            | -            | -                      | -            | -            | -            |
|        | 355 LB       | 4            | -                                                                                     | -            | -            | -            | 573                    | -            | 893          | -            | -                      | -            | -            | -            |
|        | 355 LA/LB    | 6            | -                                                                                     | -            | -            | -            | -                      | -            | -            | -            | 600                    | -            | 907          | -            |
|        | 400 L/LA/LB  | 4            | -                                                                                     | -            | -            | -            | 568                    | -            | 1309         | -            | -                      | -            | -            | -            |
|        | 400 LA/LB/LD | 6            | -                                                                                     | -            | -            | -            | -                      | -            | -            | -            | 650                    | -            | 1020         | -            |
|        | 450 LA/LB    | 2            | 440                                                                                   | -            | 785          | -            | -                      | -            | -            | -            | -                      | -            | -            | -            |

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

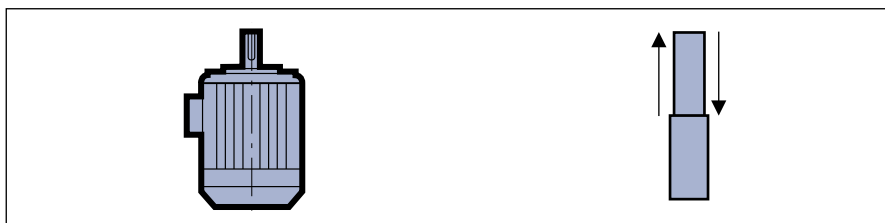
## IP23 Steel frame

### Construction

### Axial loads

#### VERTICAL MOTOR SHAFT FACING UP

For a bearing life  $L_{10h}$   
of 25,000 hours  
and 40,000 hours



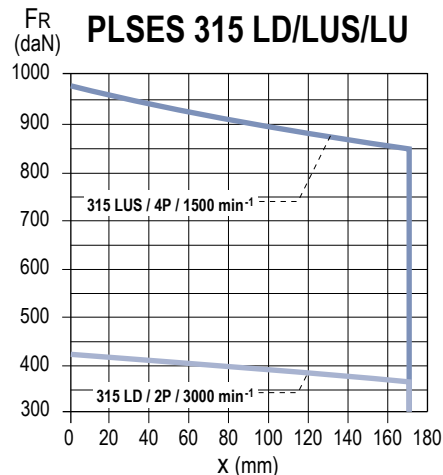
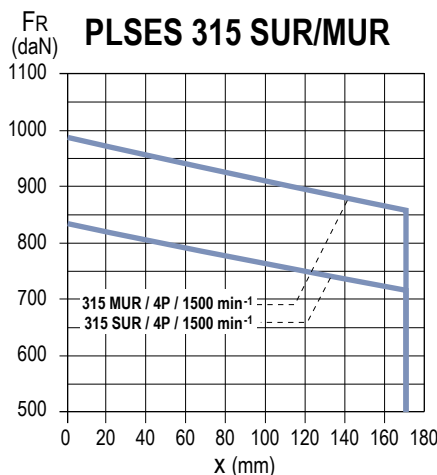
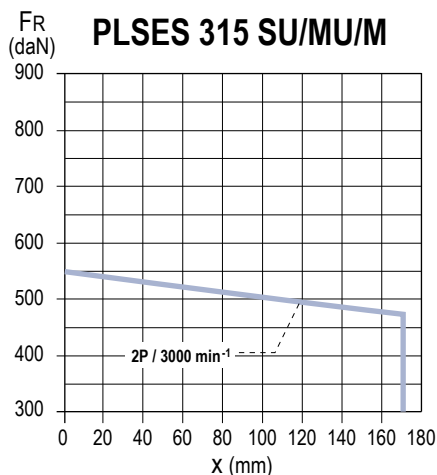
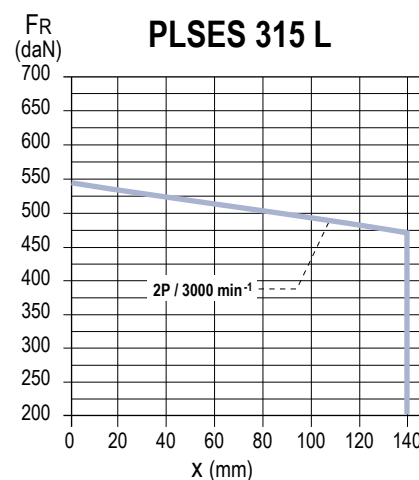
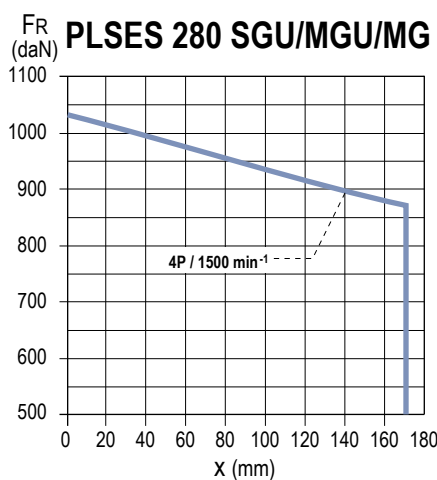
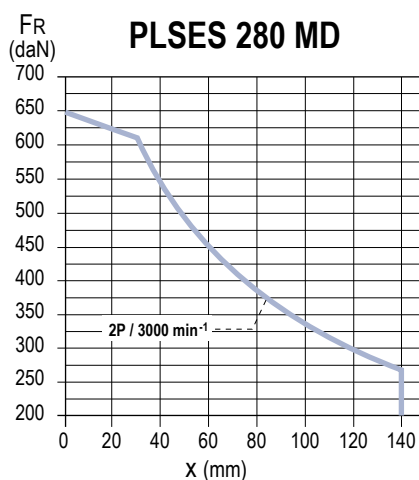
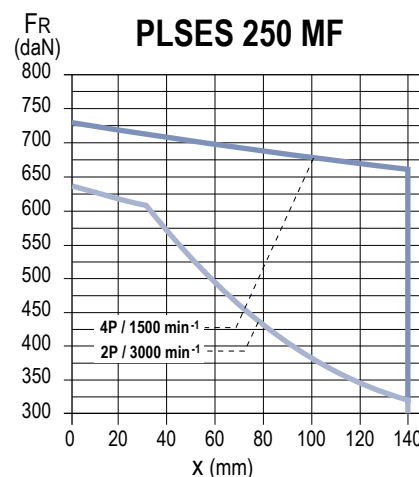
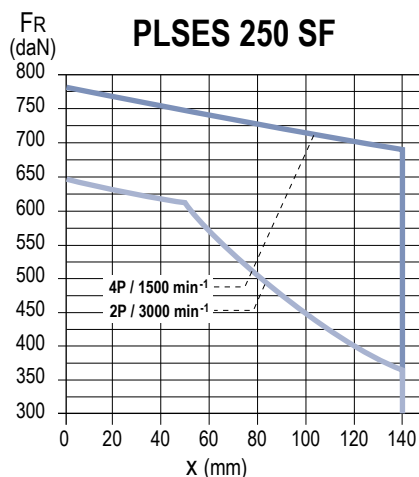
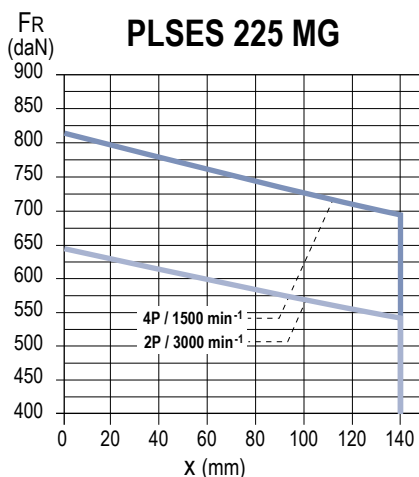
|        |             |              | Permissible axial load (in daN) on main shaft extension for standard bearing assembly                  |              |              |              |                        |              |              |              |
|--------|-------------|--------------|--------------------------------------------------------------------------------------------------------|--------------|--------------|--------------|------------------------|--------------|--------------|--------------|
|        |             |              | IM V6<br>IM V3 / V36                                                                                   |              |              |              |                        |              |              |              |
| Series | Type        | No. of poles | 3000 min <sup>-1</sup>                                                                                 |              |              |              | 1500 min <sup>-1</sup> |              |              |              |
|        |             |              | 25,000 hours                                                                                           | 40,000 hours | 25,000 hours | 40,000 hours | 25,000 hours           | 40,000 hours | 25,000 hours | 40,000 hours |
| PLSES  | 225 MG      | 2 ; 4        | 320                                                                                                    | 235          | 586          | 501          | 426                    | 312          | 764          | 650          |
|        | 250 SF      | 2 ; 4        | 303                                                                                                    | 218          | 598          | 513          | 384                    | 661          | 774          | 271          |
|        | 250 MF      | 4            | 285                                                                                                    | 200          | 609          | 524          | 352                    | 240          | 771          | 659          |
|        | 280 MD      | 2            | 362                                                                                                    | 278          | 525          | 440          | -                      | -            | -            | -            |
|        | 280 SGJ     | 4            | -                                                                                                      | -            | -            | -            | 460                    | 315          | 1081         | 936          |
|        | 280 MG      | 4            | -                                                                                                      | -            | -            | -            | 444                    | 299          | 1093         | 948          |
|        | 280 SGU     | 4            | -                                                                                                      | -            | -            | -            | 425                    | 280          | 1109         | 964          |
|        | 280 MGU     | 4            | -                                                                                                      | -            | -            | -            | 399                    | 254          | 1131         | 986          |
|        | 315 L       | 2            | 122                                                                                                    | 42           | 698          | 619          | -                      | -            | -            | -            |
|        | 315 LD      | 2            | 16                                                                                                     | 0            | 662          | 595          | -                      | -            | -            | -            |
|        | 315 SU      | 2            | 161                                                                                                    | 81           | 673          | 593          | -                      | -            | -            | -            |
|        | 315 MU      | 2 ; 4        | 136                                                                                                    | 56           | 687          | 608          | 388                    | 244          | 1124         | 980          |
|        | 315 M       | 2            | 157                                                                                                    | 78           | 669          | 590          | -                      | -            | -            | -            |
|        | 315 SUR     | 4            | -                                                                                                      | -            | -            | -            | 392                    | 247          | 1127         | 983          |
|        | 315 MUR     | 4            | -                                                                                                      | -            | -            | -            | 342                    | 198          | 1158         | 1014         |
|        | 315 LU      | 4            | -                                                                                                      | -            | -            | -            | 1042                   | 922          | 194          | 74           |
|        | 315 LUS     | 2 ; 4        | 323                                                                                                    | 179          | 1171         | 1027         | 1153                   | 1009         | 334          | 190          |
|        | 315 LG/MGU  | 2 ; 4        | 60                                                                                                     | 0            | 498          | 444          | 682                    | 518          | 1011         | 848          |
|        | 315 VLG     | 2 ; 4        | 30                                                                                                     | -            | 878          | -            | 257                    | -            | 1385         | -            |
|        | 315 VLGU    | 2 ; 4        | 260                                                                                                    | -            | 630          | -            | 183                    | -            | 1425         | -            |
|        | 355 L/LA/LB | 2 ; 4        | 600                                                                                                    | -            | 1396         | -            | 427                    | -            | 1893         | -            |
|        | 400 L/LA/LB | 4            | -                                                                                                      | -            | -            | -            | 632                    | -            | 2570         | -            |
|        | 450         | 2            | Please consult Leroy-Somer specifying the coupling method and the axial and radial loads if applicable |              |              |              |                        |              |              |              |

## STANDARD FITTING ARRANGEMENT

Permissible radial load on main shaft extension with a bearing life  $L_{10h}$  of 25,000 hours.

FR : Radial Force

X: Distance with respect to the shaft shoulder



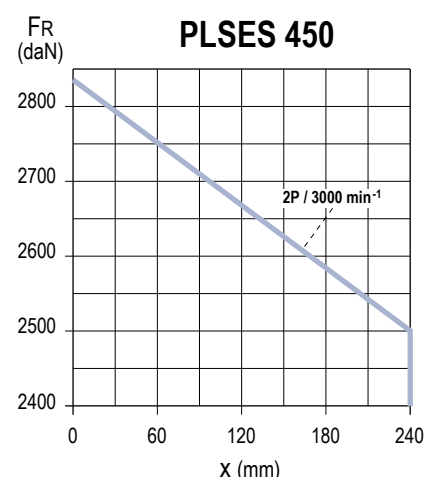
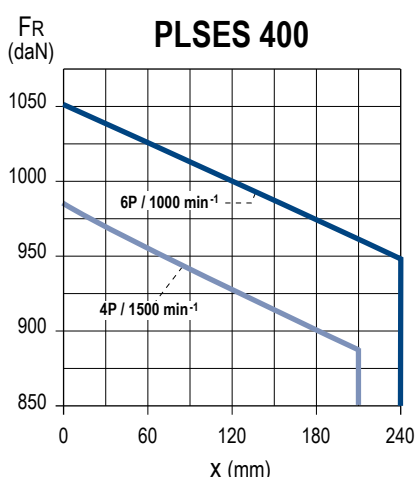
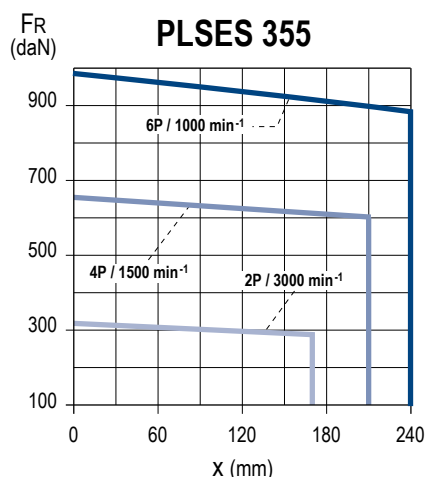
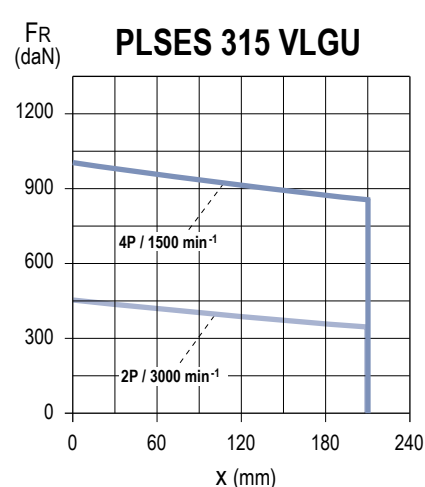
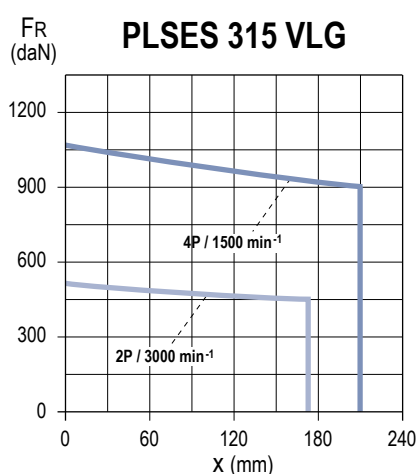
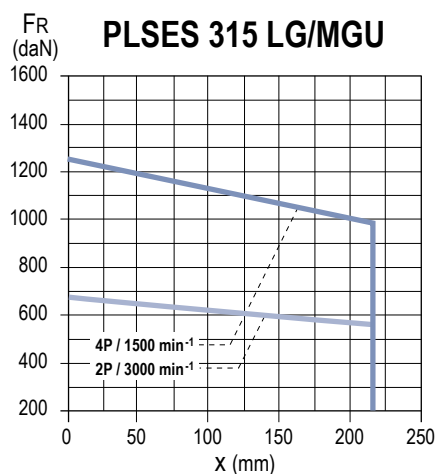


## STANDARD FITTING ARRANGEMENT

Permissible radial load on main shaft extension with a bearing life  $L_{10h}$  of 25,000 hours.

FR: Radial Force

X: Distance with respect to the shaft shoulder



## SPECIAL FITTING ARRANGEMENT

## Type of drive end roller bearings

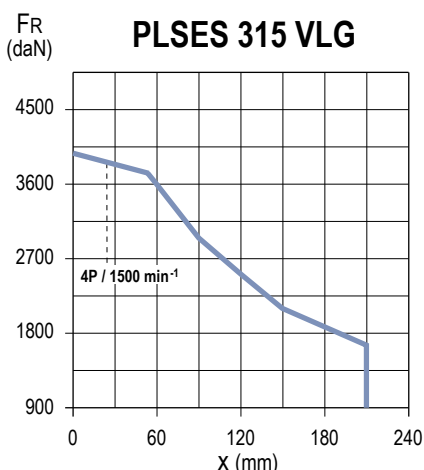
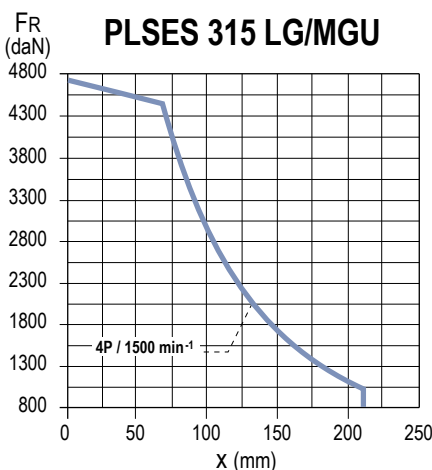
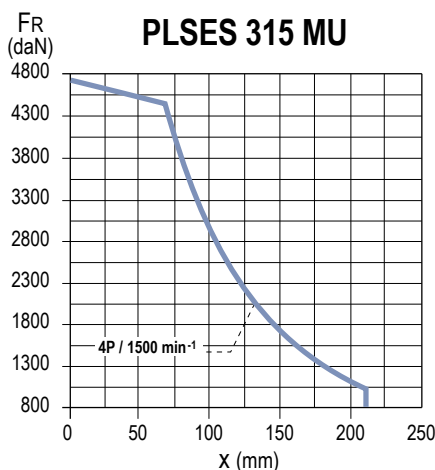
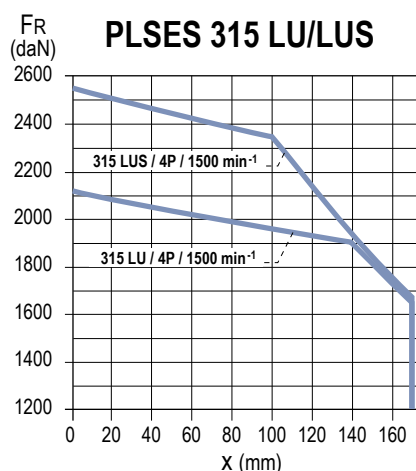
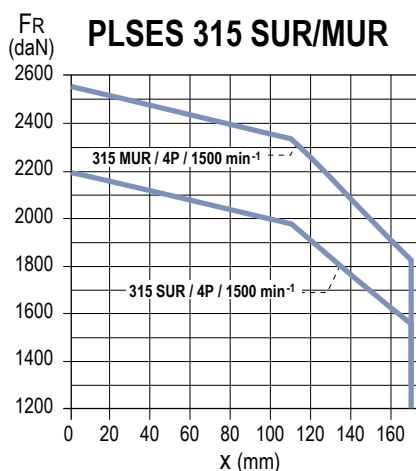
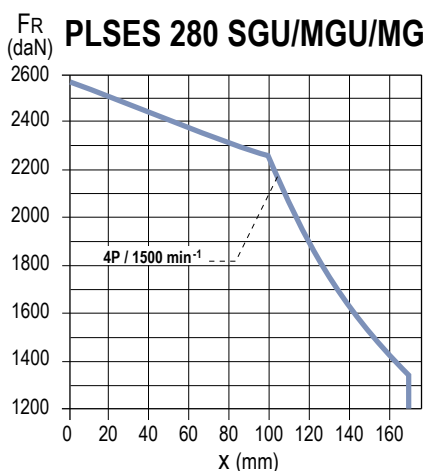
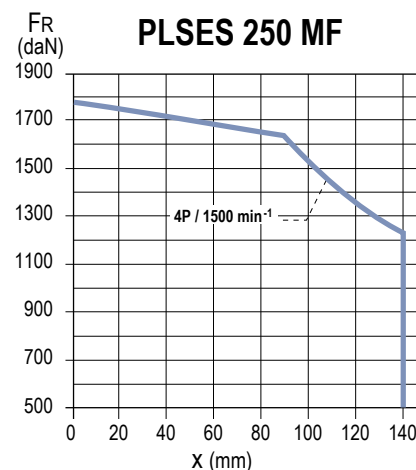
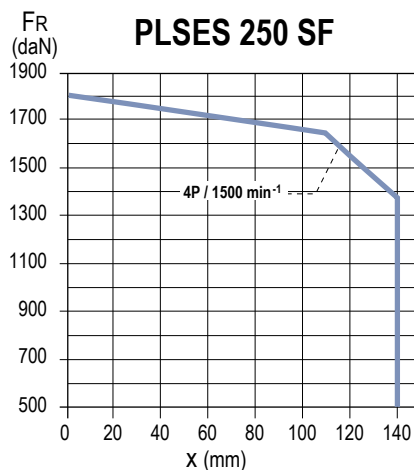
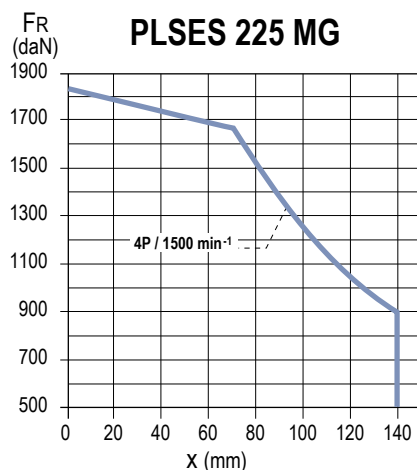
| Series | Type         | No. of poles | Non drive end bearing<br>(N.D.E.) | Drive end bearing<br>(D.E.) |
|--------|--------------|--------------|-----------------------------------|-----------------------------|
| PLSES  | 225 MG       | 4            | 6314 C3                           | NU 317                      |
|        | 250 SF       | 4            |                                   |                             |
|        | 250 MF       | 4            |                                   |                             |
|        | 280 MD       | 4            |                                   |                             |
|        | 280 SGU/SGJ  | 4            | 6316 C3                           | NU 320                      |
|        | 280 MGU      | 4            |                                   |                             |
|        | 315 SUR/SU   | 4            |                                   |                             |
|        | 315 MUR      | 4            |                                   |                             |
|        | 315 LUS      | 4            |                                   |                             |
|        | 315 L        | 4            |                                   | NU 316                      |
|        | 315 LD       | 4            |                                   | NU 219                      |
|        | 315 LG/MGU   | 4            | 6317 C3                           | NU 322                      |
|        | 315 VLG/VLGU | 4            | 6317 C3                           | NU 322                      |
|        | 355 LA       | 2            | 6317 C4                           | -                           |
|        | 355 LA       | 4 ; 6        | 6324 C3                           | NU 324                      |
|        | 355 LB       | 2            | 6317 C4                           |                             |
|        | 355 LB       | 4 ; 6        | 6324 C3                           | -                           |
|        | 355 LC       | 2            | 6317 C4                           |                             |
|        | 400 LA       | 4 ; 6        | 6328 C3                           | NU 328                      |
|        | 400 LB       | 4            |                                   |                             |
|        | 400 LB/LD    | 6            |                                   |                             |
|        | 450 LA       | 2            | 6317 C4                           | -                           |
|        | 450 LB       | 2            |                                   |                             |

## SPECIAL FITTING ARRANGEMENT

Permissible radial load on main shaft extension with a bearing life  $L_{10h}$  of 25,000 hours.

FR: Radial Force

X: Distance with respect to the shaft shoulder

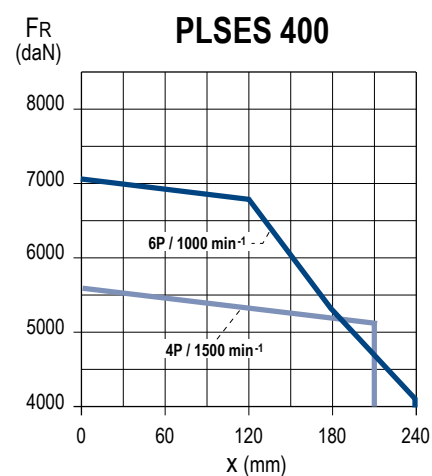
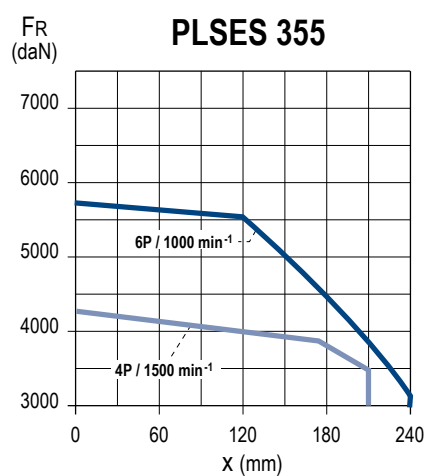
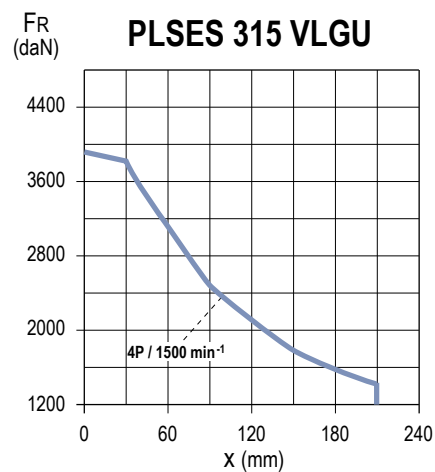


### SPECIAL FITTING ARRANGEMENT

Permissible radial load on main shaft extension with a bearing life  $L_{10h}$  of 25,000 hours.

FR: Radial Force

X: Distance with respect to the shaft shoulder



## MODIFIED FLANGES

| Motor type \ Flange type          | (FF) Flange mounted |        |        |        |        |        |        |         |
|-----------------------------------|---------------------|--------|--------|--------|--------|--------|--------|---------|
|                                   | FF 300              | FF 350 | FF 400 | FF 500 | FF 600 | FF 740 | FF 940 | FF 1080 |
| PLSES 225 MG                      |                     |        | ◆      | ●      |        |        |        |         |
| PLSES 250 SP/MP/MF                |                     |        |        | ◆      | ●      |        |        |         |
| PLSES 280 MD/MG/SGJ               |                     |        |        | ◆      | ●      |        |        |         |
| PLSES 315 S/SUR/L/LD/M/MUR/LUS/SU |                     |        |        |        | ◆      | ●      |        |         |
| PLSES 315                         |                     |        |        |        | ◆      | ●      |        |         |
| PLSES 355                         |                     |        |        |        |        | ◆      | ●      |         |
| PLSES 400                         |                     |        |        |        |        |        | ●      | ◆       |
| PLSES 450                         |                     |        |        |        |        |        |        | ●       |

● Standard

◆ Adaptable without shaft modification

## Mechanical and electrical options

### MOTORS WITH FORCED VENTILATION

The integration of high-efficiency motors within a process often requires accessories to make operation easier:

- Forced ventilation for motors used at high or low speeds.

Notes:

- Without forced ventilation, there is a possibility of overspeed with optional class B balancing.
- The motor temperature is monitored by sensors built into the windings.

### MOTORS WITH SPACE HEATERS

| Type                  | Power (W) |
|-----------------------|-----------|
| PLSES 225 to 280      | 84        |
| PLSES 315             | 100       |
| PLSES 355 / 400 / 450 | 200       |

The space heaters use 200/240 V single phase, 50 or 60 Hz.

# IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency

## IP23 Steel frame

### Installation and maintenance

#### Position of the lifting rings

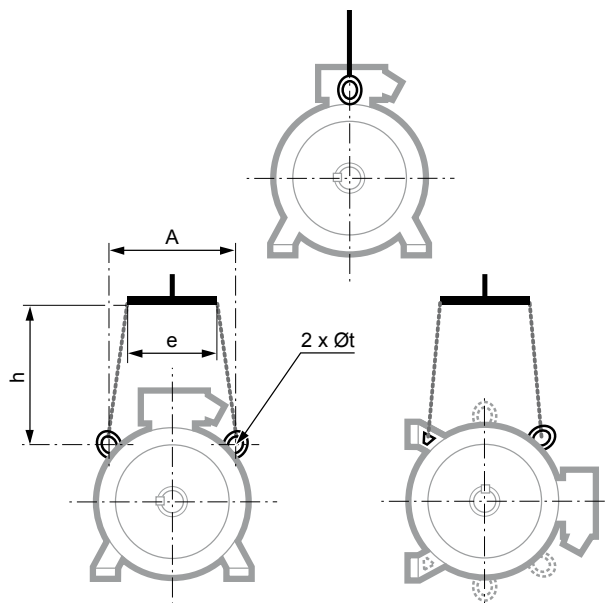
#### LIFTING THE MOTOR ONLY (not coupled to the machine)

The regulations stipulate that over 25 kg, suitable handling equipment must be used.

All our motors are fitted with grab handles, making them easier to handle without risk. A diagram of the sling hoisting method appears below with the required dimensions.

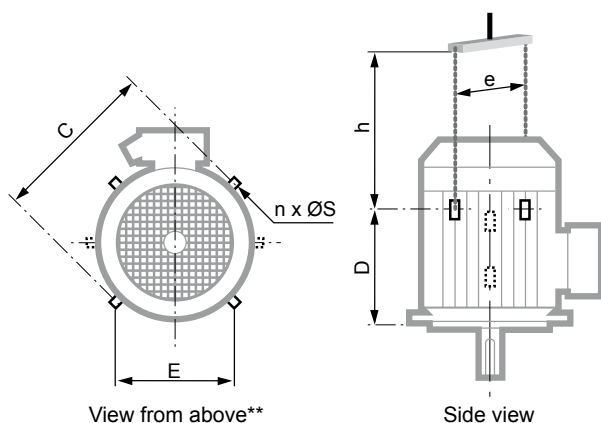
To prevent any damage to the motor during handling (for example: switching the motor from horizontal to vertical), it is essential to follow these instructions.

#### HORIZONTAL POSITION



| Type                          | Horizontal position |       |       |    |
|-------------------------------|---------------------|-------|-------|----|
|                               | A                   | e min | h min | Øt |
| PLSES 225 MG                  | 310                 | 300   | 300   | 30 |
| PLSES 250 MF/SF               | 310                 | 300   | 300   | 30 |
| PLSES 280 MD/MGU/SGU/SGJ      | 310                 | 300   | 300   | 30 |
| PLSES 315 SUR/MUR/L/LD/LUS/SU | 385                 | 380   | 500   | 30 |
| PLSES 315 LG/MGU/VLG/VLGU     | 440                 | 750   | 550   | 48 |
| PLSES 355                     | 504                 | 850   | 630   | 67 |
| PLSES 400                     | 600                 | 1010  | 750   | 67 |
| PLSES 450                     | 600                 | 1010  | 750   | 67 |

#### VERTICAL POSITION



| Type                          | Vertical position |     |     |    |        |       |
|-------------------------------|-------------------|-----|-----|----|--------|-------|
|                               | C                 | E   | n** | ØS | e min* | h min |
| PLSES 225 MG                  | 450               | 310 | 2   | 14 | 450    | 490   |
| PLSES 250 MF/SF               | 450               | 310 | 4   | 30 | 450    | 490   |
| PLSES 280 MD/MGU/SGU/SGJ      | 450               | 310 | 4   | 30 | 450    | 490   |
| PLSES 315 SUR/MUR/L/LD/LUS/SU | 500               | 385 | 4   | 30 | 500    | 500   |
| PLSES 315 LG/MGU/VLG/VLGU     | 610               | 440 | 8   | 48 | 750    | 450   |
| PLSES 355                     | 710               | 504 | 8   | 48 | 800    | 530   |
| PLSES 400                     | 850               | 600 | 8   | 67 | 900    | 640   |
| PLSES 450                     | 900               | 600 | 8   | 67 | 930    | 610   |

\* if the motor is fitted with a drip cover, allow an additional 50 to 100 mm to avoid damaging it when the load is swung.

\*\* if  $n = 2$ , the lifting rings form an angle of  $90^\circ$  with respect to the axis of the terminal box.

If  $n = 4$ , this angle becomes  $45^\circ$ .



## Notes

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## Regulation in the main countries

Several countries have already implemented energy regulations relating to electric motors. Others are in the process of drafting them.

Some regulations require products to be registered with the local authorities prior to release onto the market. In these cases, the market is monitored before starting to use the products, unlike the EU where the member states are allowed to organise monitoring on their own territory.

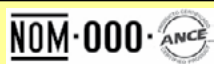
Most countries which impose product registration before release onto the market also usually require special product marking.

For Europe, there is no specific label. Only the CE mark indicates that the product conforms to all the relevant directives.

The table below summarises the main regulations existing worldwide.

These regulations are constantly changing and regular updates are necessary.

Leroy-Somer has registered some of its motor ranges in the majority of countries mentioned, depending on market requirements.

|                                                                                     | Countries    | Standard                      | Regulation             | Label if requested                                                                  | Mandatory registration | Power           | Pole nbr | 2015 | 2016 | 2017 |
|-------------------------------------------------------------------------------------|--------------|-------------------------------|------------------------|-------------------------------------------------------------------------------------|------------------------|-----------------|----------|------|------|------|
|    | EUROPE       | IEC60034-2-1<br>IEC60034-30-1 | ErP<br>640/2009        |    |                        | 0.75kW<br>375kW | 2, 4, 6  |      |      |      |
|    | SWISS        | IEC60034-2-1<br>IEC60034-30-1 | ordonnance<br>730.01   |                                                                                     |                        | 0.75kW<br>375kW | 2, 4, 6  | IE3  | IE3  | IE3  |
|    | TURKEY       | IEC60034-2-1<br>IEC60034-30   | SGM<br>2012/2          |                                                                                     |                        | 0.75kW<br>375kW | 2, 4, 6  |      |      |      |
|    | ISRAEL       | IEC60034-2-1<br>IEC60034-30-1 | SI<br>5289             |                                                                                     |                        | 0.75kW<br>185kW | 2,4,6,8  |      |      |      |
|   | USA          | MG1 112-11<br>IEEE 112-B      | EISA<br>10CFR431.31    |                                                                                     | X                      | 1 HP-<br>200HP  | 2, 4, 6  |      |      |      |
|  | CANADA       | C747-09<br>C390-10            | LC 1992<br>ch.36       |  | X                      | 1 HP-<br>200HP  | 2, 4, 6  | IE3  | IE3  | IE3  |
|  | MEXICO       | MG1 112-11<br>IEEE 112-B      | CONUEE<br>NOM-016-ENER |  | X                      | 1 HP-<br>200HP  | 2, 4, 6  |      |      |      |
|  | BRAZIL       | NBR 17094-3<br>NBR 5383-1     | INMETRO                |  | X                      | 0.75kW<br>185kW | 2,4,6,8  | IE2  | IE3  | IE3  |
|  | INDIA        | IS 12615                      |                        |                                                                                     |                        | 0.75kW<br>375kW | 2, 4, 6  | IE3  | IE3  | IE3  |
|  | South KOREA  | KSC IEC60034-2-1              | KEMCO                  |  | X                      | 0.75kW<br>200kW | 2,4,6,8  | IE3  | IE3  | IE3  |
|  | CHINA        | GB18613-2012                  | CER                    |  | X                      | 0.75kW<br>375kW | 2, 4, 6  | IE3  | IE3  | IE3  |
|  | AUSTRALIA    | IEC60034-2-1<br>IEEE 112-B    | E3                     |                                                                                     | X                      | 0.75kW<br>185kW | 2,4,6,8  | IE3  | IE3  | IE3  |
|  | NEW ZEALAND  | IEC60034-2-1<br>IEEE 112-B    | EECA                   |                                                                                     | X                      | 0.75kW<br>185kW | 2,4,6,8  | IE3  | IE3  | IE3  |
|  | JAPAN        | JIS C4034-2-1<br>JIS C4034-30 | TOP RUNNER             |  |                        | 0.20kW<br>160kW | 2, 4, 6  | IE3  | IE3  | IE3  |
|  | TAIWAN       | CNS 14400                     |                        |                                                                                     |                        | 0.75kW<br>200kW | 2, 4, 6  | IE3  | IE3  | IE3  |
|  | SAUDI ARABIA | SASO<br>IEC60034-30-1         | SEEP                   |                                                                                     | X                      | 0.75kW<br>375kW | 2, 4, 6  | IE2  | IE2  | IE3  |
|  | VIET NAM     |                               | VEESEL                 |  | X                      | ≤ 20kW          |          | IE   | IE   | IE   |

compulsory label

volontaire / volontary  
OBLIGATOIRE / COMPULSORY

## Environments and special applications

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Certain industries and processes are particularly harsh for electric motors.

To satisfy the demands of applications in harsh operating conditions, Leroy-Somer, thanks to its long experience in all types of application and feedback from users and service centres, has developed solutions suitable for the operational requirements.

### **CHEMICALS, PETROCHEMICALS, IRON & STEEL INDUSTRY, PAPER MILLS, SUGAR FACTORIES, CEMENT WORKS, ETC**

**Constraint:** corrosive environment and harsh use.



**Solution:** motor with “Corrobloc” finish for cast iron motors.

- dielectric and anti-corrosion protection of the stator (coil end turns) and rotor
- stainless steel nameplate
- stainless steel screws
- cast iron terminal box body and cover
- terminal box cover with captive screws
- brass cable gland
- paint system IIIa (C4M corrosivity category in accordance with ISO 12944-2)



Ranges of proposed motors:

- frame size 90 to 450 mm
- power rating between 0.75 and 1250 kW



## Environments and special applications

### MERCHANT NAVY APPLICATIONS ONBOARD INDUSTRIAL APPLICATIONS

- air compressors,
- refrigeration compressors,
- pumps,
- fans,
- conveyors.



**Constraint:** saline corrosion, harsh use, operational safety, conformance with classification body specifications according to type of use.

**Solution:** motors that allow any type of mechanical and electrical protection as required.

Motors for "Marine" application conform to the specifications of the IACS classification bodies (LR, RINA, BV, DNV, ABS, GL, etc): high ambient temperature, overload, increased tolerance with regard to rated voltage and frequency, over-speed, etc).



### ELECTRICAL PROPULSION

- main propulsion
- auxiliary propulsion (bow thruster unit).



**Constraint:** reduced weight and dimensions, silent operation, high specific output power, low starting current, high efficiency, conformance with classification body specifications according to type of use.

**Solution:** IP23 air-cooled motors with air/water exchangers, water-cooled motors with double housing. Magnetic circuits able to cope with a high number of starts.



## Cable gland support plates

### ZONES USED FOR DRILLING THE CABLE GLAND SUPPORT PLATES

Dimensions in millimetres

#### IP55 aluminium motors

| Motor type | Diagram | Without extension feed (standard) |
|------------|---------|-----------------------------------|
| LSES 315   | 4       | H = 170<br>L = 333                |

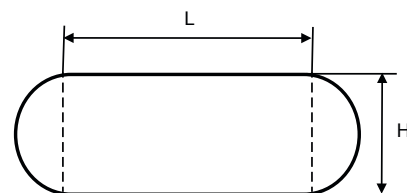


Diagram 1

#### IP55 cast iron motors

| Motor type       | Diagram | Without extension feed (standard) |
|------------------|---------|-----------------------------------|
| FLSES 160        | 3       | H = 54<br>L = 131                 |
| FLSES 180        |         |                                   |
| FLSES 200        |         |                                   |
| FLSES 225 SR/MR  | 3       | H = 80<br>L = 190                 |
| FLSES 225 S/M/SG |         |                                   |
| FLSES 250        | 3       | H = 80<br>L = 190                 |
| FLSES 280        | 3       | H = 80<br>L = 190                 |
| FLSES 315        | 1       | H = 115<br>L = 125                |
| FLSES 355 L      |         |                                   |
| FLSES 355 LK     | 2       | H = 170<br>L = 460                |
| FLSES 400        |         |                                   |
| FLSES 450        |         |                                   |

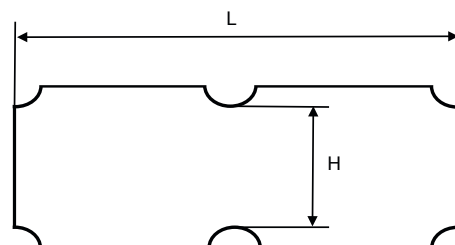


Diagram 2

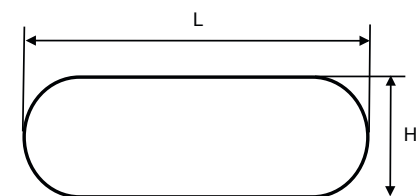


Diagram 3

#### IP23 drip-proof motors

| Motor type                | Diagram | Without extension feed (standard) |
|---------------------------|---------|-----------------------------------|
| PLSES 280 MGU/SGU         | 4       | H = 170<br>L = 333                |
| PLSES 315 L/LD/LUS/M/MUR  |         |                                   |
| PLSES 315 MU/S/SU/SUR     |         |                                   |
| PLSES 315 LG/MGU/VLG/VLGU | 1       | H = 115<br>L = 125                |
| PLSES 355                 |         |                                   |
| PLSES 400                 | 2       | H = 170<br>L = 460                |
| PLSES 450                 |         |                                   |

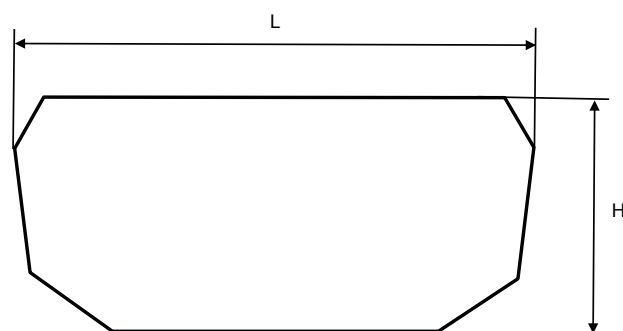


Diagram 4

## Calculating the efficiency of an induction motor

### MACHINE EFFICIENCY

Efficiency is the ratio between the output power (needed to drive a machine) and the power absorbed (power consumed). This value is therefore necessarily less than 1. The difference between the output power and the power absorbed consists of the electrical machine losses. 85% efficiency therefore means there are 15% losses.

#### Direct measurement method

With the direct method, efficiency is calculated using mechanical (torque  $C$  and speed  $\Omega$ ) and electrical (power absorbed  $P_{abs}$ ) measurements. If the measuring tools are specified (use of a torquemeter), this method has the advantage of being relatively easy. However, it does not provide any information about machine performance and the origins of the potential losses.

$$\eta = \frac{P_u}{P_{abs}} \text{ where } P_u = C \Omega$$

#### Indirect measurement methods

These methods determine efficiency by determining the machine losses. Conventionally, a distinction is made between three types of losses: joule losses (stator  $P_{js}$  and rotor  $P_{jr}$ ), iron losses ( $P_f$ ) and mechanical losses ( $P_m$ ) which are relatively easy to measure. Miscellaneous losses which are more difficult to determine, called additional losses, are added to these losses.

In standard IEC 60034-2 dated 1972 and applicable until November 2010, the method for calculating additional losses uses a fixed percentage of 0.5% of the power absorbed.

$$\eta = \frac{P_{abs} - P_{js} - P_{jr} - P_f - P_m - P_{sup}}{P_{abs}} \text{ where } P_{sup} = 0.5\% P_{abs}$$

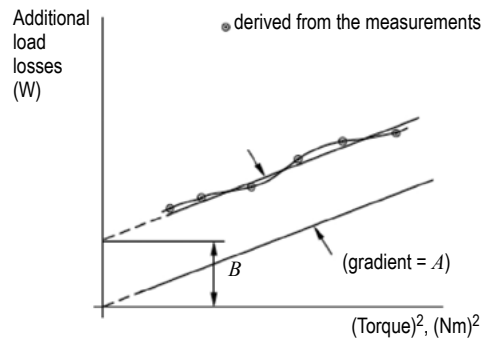
Additional losses come from a variety of sources: surface losses, busbar currents, high-frequency losses, losses linked to leakage flux, etc. They are specific to each machine and contribute to reducing efficiency but they are very complex to calculate from a quantitative point of view.

In the new standard IEC 60034-2-1 dated September 2007, these additional losses must be measured precisely. This is a similar approach to that taken by the North American (IEEE112-B) and Canadian (CSA390) standards, which deduct the additional losses from a thermally-stable on-load curve.

The residual losses are calculated at each load point: 25%, 50%, 75%, 100%, 115% and 125%:

$$P_{res} = P_{abs} - P_{js} - P_{jr} - P_f - P_m - P_u \text{ where } P_u = C \Omega$$

The straight line is drawn by approximating the curve points as closely as possible. The measure is acceptable if a correlation coefficient of 0.95 or higher can be ensured.



The line to 0 gives the additional losses at the nominal point, ie. at 100% load.

From then on, the usual equation gives the efficiency:

$$\eta = \frac{P_{abs} - P_{js} - P_{jr} - P_f - P_m - P_{sup}}{P_{abs}}$$

Note that with this method, the Joule losses must be corrected according to the temperature and the iron losses corrected according to the resistive voltage dip in the stator.



## Units of measurement and standard formulae

### ELECTRICITY AND ELECTROMAGNETISM

| Parameters                                                                                     |                                                                |                                             |            | Unit                             |                        | Units and expressions not recommended                                               |
|------------------------------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------|------------|----------------------------------|------------------------|-------------------------------------------------------------------------------------|
| French name                                                                                    | English name                                                   | Symbol                                      | Definition | SI                               | Non SI but accepted    | Conversions                                                                         |
| Fréquence<br>Période                                                                           | Frequency                                                      | $f$                                         |            | Hz (hertz)                       |                        |                                                                                     |
| Courant électrique<br>(intensité de)                                                           | Electric current                                               | $I$                                         |            | A (ampere)                       |                        |                                                                                     |
| Potentiel électrique<br>Tension                                                                | Electric potential<br>Voltage                                  | $V$<br>$U$                                  |            | V (volt)                         |                        |                                                                                     |
| Force électromotrice                                                                           | Electromotive force                                            | $E$                                         |            |                                  |                        |                                                                                     |
| Déphasage                                                                                      | Phase angle                                                    | $\varphi$                                   |            | rad                              | ° degree               |                                                                                     |
| Facteur de puissance                                                                           | Power factor                                                   | $\cos \varphi$                              |            |                                  |                        |                                                                                     |
| Réactance<br>Résistance                                                                        | Reactance<br>Resistance                                        | $X$<br>$R$                                  |            | $\Omega$ (ohm)                   |                        | $j$ is defined as $j^2 = -1$<br>$\omega$ rotational frequency = $2 \pi \cdot f$     |
| Impédance                                                                                      | Impedance                                                      | $Z$                                         |            |                                  |                        |                                                                                     |
| Inductance propre (self)                                                                       | Self inductance                                                | $L$                                         |            | H (henry)                        |                        |                                                                                     |
| Capacité                                                                                       | Capacitance                                                    | $C$                                         |            | F (farad)                        |                        |                                                                                     |
| Charge électrique,<br>Quantité d'électricité                                                   | Quantity of electricity                                        | $Q$                                         |            | C (coulomb)                      | A.h<br>1 A.h = 3 600 C |                                                                                     |
| Résistivité                                                                                    | Resistivity                                                    | $\rho$                                      |            | $\Omega \cdot m$                 |                        | $\Omega/m$                                                                          |
| Conductance                                                                                    | Conductance                                                    | $G$                                         |            | S (siemens)                      |                        | $1/\Omega = 1 \text{ S}$                                                            |
| Nombre de tours,<br>(spires) de l'enroulement<br>Nombre de phases<br>Nombre de paires de poles | N° of turns (coil)<br><br>N° of phases<br>N° of pairs of poles | $N$<br><br>$m$<br>$p$                       |            |                                  |                        |                                                                                     |
| Champ magnétique                                                                               | Magnetic field                                                 | $H$                                         |            | A/m                              |                        |                                                                                     |
| Différence de potentiel<br>magnétique<br>Force magnétomotrice<br>Solénation, courant totalisé  | Magnetic potential<br>difference<br>Magnetomotive force        | $Um$<br>$F, Fm$<br>$H$                      |            | A                                |                        | The unit AT (ampere-turns) is incorrect because it treats "turn" as a physical unit |
| Induction magnétique,<br>Densité de flux magnétique                                            | Magnetic induction<br>Magnetic flux density                    | $B$                                         |            | T (tesla) =<br>Wb/m <sup>2</sup> |                        | (gauss) 1 G = 10 <sup>-4</sup> T                                                    |
| Flux magnétique,<br>Flux d'induction magnétique                                                | Magnetic flux                                                  | $\Phi$                                      |            | Wb (weber)                       |                        | (maxwell)<br>1 max = 10 <sup>-8</sup> Wb                                            |
| Potentiel vecteur magnétique                                                                   | Magnetic vector potential                                      | $A$                                         |            | Wb/m                             |                        |                                                                                     |
| Perméabilité d'un milieu<br>Perméabilité du vide                                               | Permeability<br>Permeability of vacuum                         | $\mu = \mu_o \mu_r$<br>$\mu_o$              |            | H/m                              |                        |                                                                                     |
| Permittivité                                                                                   | Permittivity                                                   | $\varepsilon = \varepsilon_o \varepsilon_r$ |            | F/m                              |                        |                                                                                     |

## Units of measurement and standard formulae

### THERMODYNAMICS

| Parameters                                   |                                     |              |            | Unit       |                                                   | Units and expressions not recommended                                                           |
|----------------------------------------------|-------------------------------------|--------------|------------|------------|---------------------------------------------------|-------------------------------------------------------------------------------------------------|
| French name                                  | English name                        | Symbol       | Definition | SI         | Non SI but accepted                               | Conversions                                                                                     |
| Température Thermodynamique                  | Temperature Thermodynamic           | $T$          |            | K (kelvin) | temperature Celsius, $t$ , °C<br>$T = t + 273,15$ | °C: Degree Celsius<br>$t_C$ : Temp. in °C<br>$t_F$ : Temp. in °F<br>f temperature Fahrenheit °F |
| Écart de température                         | Temperature rise                    | $\Delta T$   |            | K          | °C                                                | 1 °C = 1 K                                                                                      |
| Densité de flux thermique                    | Heat flux density                   | $q, \varphi$ |            | W/m²       |                                                   |                                                                                                 |
| Conductivité thermique                       | Thermal conductivity                | $\lambda$    |            | W/m.K      |                                                   |                                                                                                 |
| Coefficient de transmission thermique global | Total heat transmission coefficient | K            |            | W/m².K     |                                                   |                                                                                                 |
| Capacité thermique                           | Heat capacity                       | $C$          |            | J/K        |                                                   |                                                                                                 |
| Capacité thermique massique                  | Specific heat capacity              | $c$          |            | J/kg.K     |                                                   |                                                                                                 |
| Energie interne                              | Internal energy                     | $U$          |            | J          |                                                   |                                                                                                 |

### NOISE AND VIBRATION

| Parameters                     |                      |        |                                                                  | Unit         |                     | Units and expressions not recommended      |
|--------------------------------|----------------------|--------|------------------------------------------------------------------|--------------|---------------------|--------------------------------------------|
| French name                    | English name         | Symbol | Definition                                                       | SI           | Non SI but accepted | Conversions                                |
| Niveau de puissance acoustique | Sound power level    | $L_w$  | $L_w = 10 \lg(P/P_o)$<br>( $P_o = 10^{-12} \text{ W}$ )          | dB (decibel) |                     | $\lg$ logarithm to base 10<br>$\lg 10 = 1$ |
| Niveau de pression acoustique  | Sound pressure level | $L_p$  | $L_p = 20 \lg(P/P_o)$<br>( $P_o = 2 \times 10^{-5} \text{ Pa}$ ) | dB           |                     |                                            |

### DIMENSIONS

| Parameters                                                     |                                       |                                 |            | Unit      |                                     | Units and expressions not recommended                                                                                        |
|----------------------------------------------------------------|---------------------------------------|---------------------------------|------------|-----------|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| French name                                                    | English name                          | Symbol                          | Definition | SI        | Non SI but accepted                 | Conversions                                                                                                                  |
| Angle (angle plan)                                             | Angle (plane angle)                   | $\alpha, \beta, T, \varphi$     |            | rad       | degree: °<br>minute: '<br>second: " | $180^\circ = \pi \text{ rad}$<br>$= 3.14 \text{ rad}$                                                                        |
| Longueur<br>Largeur<br>Hauteur<br>Rayon<br>Longueur curviligne | Length<br>Breadth<br>Height<br>Radius | $l$<br>$b$<br>$h$<br>$r$<br>$s$ |            | m (metre) | micrometre                          | cm, dm, dam, hm<br>1 inch = 1" = 25.4 mm<br>1 foot = 1" = 304.8 mm<br>$\mu\text{m}$<br>micron $\mu$<br>angström: Å = 0.10 nm |
| Aire, superficie                                               | Area                                  | $A, S$                          |            | m²        |                                     | 1 square inch = $6.45 \cdot 10^{-4} \text{ m}^2$                                                                             |
| Volume                                                         | Volume                                | $V$                             |            | m³        | litre: l<br>liter: L                | UK gallon = $4.546 \cdot 10^{-3} \text{ m}^3$<br>US gallon = $3.785 \cdot 10^{-3} \text{ m}^3$                               |

## Units of measurement and standard formulae

### MECHANICS

| Parameters                                                               |                                                                                       |                                     |                                 | Unit                                     |                                                       | Units and expressions not recommended                                                                                                        |
|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------|---------------------------------|------------------------------------------|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| English name                                                             | French name                                                                           | Symbol                              | Definition                      | SI                                       | Non SI but accepted                                   | Conversions                                                                                                                                  |
| Time                                                                     | Temps                                                                                 | $t$                                 |                                 | s (second)                               | minute: min<br>hour: h<br>day: d                      | Symbols ' and " are reserved for angles minute not written as mn                                                                             |
| Period (periodic time)                                                   | Intervalle de temps, durée<br>Période (durée d'un cycle)                              | $T$                                 |                                 |                                          |                                                       |                                                                                                                                              |
| Angular velocity<br>Circular frequency                                   | Vitesse angulaire<br>Pulsation                                                        | $\omega$                            | $\omega = \frac{d\varphi}{dt}$  | rad/s                                    |                                                       |                                                                                                                                              |
| Angular acceleration                                                     | Accélération angulaire                                                                | $\alpha$                            | $\alpha = \frac{d\omega}{dt}$   | rad/s <sup>2</sup>                       |                                                       |                                                                                                                                              |
| Speed                                                                    | Vitesse                                                                               | $u, v, w,$                          | $v = \frac{ds}{dt}$             | m/s                                      | 1 km/h =<br>0.277 778 m/s<br>1 m/min =<br>0.016 6 m/s |                                                                                                                                              |
| Velocity                                                                 | Célérité                                                                              | $c$                                 |                                 |                                          |                                                       |                                                                                                                                              |
| Acceleration                                                             | Accélération                                                                          | $a$                                 | $a = \frac{dv}{dt}$             | m/s <sup>2</sup>                         |                                                       |                                                                                                                                              |
| Acceleration of free fall                                                | Accélération de la pesanteur                                                          | $g = 9.81 \text{ m/s}^2$            | <i>in Paris</i>                 |                                          |                                                       |                                                                                                                                              |
| Revolution per minute                                                    | Vitesse de rotation                                                                   | $N$                                 |                                 | s <sup>-1</sup>                          | min <sup>-1</sup>                                     | tr/mn, RPM, TM...                                                                                                                            |
| Mass                                                                     | Masse                                                                                 | $m$                                 |                                 | kg (kilogramme)                          | tonne: t<br>1 t = 1 000 kg                            | kilo, kgs, KG...<br>1 pound: 1 lb = 0.453 6 kg                                                                                               |
| Mass density                                                             | Masse volumique                                                                       | $\rho$                              | $\frac{dm}{dV}$                 | kg/m <sup>3</sup>                        |                                                       |                                                                                                                                              |
| Linear density                                                           | Masse linéique                                                                        | $\rho_e$                            | $\frac{dm}{dL}$                 | kg/m                                     |                                                       |                                                                                                                                              |
| Surface mass                                                             | Masse surfacique                                                                      | $\rho_A$                            | $\frac{dm}{dS}$                 | kg/m <sup>2</sup>                        |                                                       |                                                                                                                                              |
| Momentum                                                                 | Quantité de mouvement                                                                 | $P$                                 | $p = m.v$                       | kg. m/s                                  |                                                       |                                                                                                                                              |
| Moment of inertia                                                        | Moment d'inertie                                                                      | $J, I$                              | $I = \sum m.r^2$                | kg.m <sup>2</sup>                        |                                                       | $J = \frac{MD^2}{4}$ kg.m <sup>2</sup><br>pound per square feet = 1 lb.ft <sup>2</sup><br>= 42.1 x 10 <sup>-3</sup> kg.m <sup>2</sup>        |
| Force<br>Weight                                                          | Force<br>Poids                                                                        | $F$<br>$G$                          | $G = m.g$                       | N (newton)                               |                                                       | kgf = kgp = 9.81 N<br>pound force = lbF = 4.448 N                                                                                            |
| Moment of force,<br>Torque                                               | Moment d'une force                                                                    | $M$<br>$T$                          | $M = F.r$                       | N.m                                      |                                                       | mdaN, mkg, m.N<br>1 mkg = 9.81 N.m<br>1 ft.lbF = 1.356 N.m<br>1 in.lbF = 0.113 N.m                                                           |
| Pressure                                                                 | Pression                                                                              | $p$                                 | $p = \frac{F}{S} = \frac{F}{A}$ | Pa (pascal)                              | bar<br>1 bar = 10 <sup>5</sup> Pa                     | 1 kgf/cm <sup>2</sup> = 0.981 bar<br>1 psi = 6 894 N/m <sup>2</sup> = 6 894 Pa<br>1 psi = 0.068 94 bar<br>1 atm = 1.013 x 10 <sup>5</sup> Pa |
| Normal stress<br>Shear stress                                            | Contrainte normale<br>Contrainte tangentielle,<br>Cission                             | $\sigma$<br>$\tau$                  |                                 | Pa<br>we use<br>MPa = 10 <sup>6</sup> Pa |                                                       | kg/mm <sup>2</sup> , 1 daN/mm <sup>2</sup> = 10 MPa<br>psi = pound per square inch<br>1 psi = 6 894 Pa                                       |
| Friction coefficient                                                     | Facteur de frottement                                                                 | $\mu$                               |                                 |                                          |                                                       | incorrectly = coefficient friction $f$                                                                                                       |
| Work<br>Energy<br>Potential energy<br>Kinetic energy<br>Quantity of heat | Travail<br>Énergie<br>Énergie potentielle<br>Énergie cinétique<br>Quantité de chaleur | $W$<br>$E$<br>$E_p$<br>$E_k$<br>$Q$ | $W = F.l$                       | J (joule)                                | Wh = 3 600 J<br>(watthour)                            | 1 N.m = 1 W.s = 1 J<br>1 kJ = 9.81 J<br>(calorie) 1 cal = 4.18 J<br>1 kJ = 1.055 J<br>(British thermal unit)                                 |
| Power                                                                    | Puissance                                                                             | $P$                                 | $P = \frac{W}{t}$               | W (watt)                                 |                                                       | 1 ch = 736 W<br>1 HP = 746 W                                                                                                                 |
| Volumetric flow                                                          | Débit volumique                                                                       | $q_v$                               | $q_v = \frac{dV}{dt}$           | m <sup>3</sup> /s                        |                                                       |                                                                                                                                              |
| Efficiency                                                               | Rendement                                                                             | $\eta$                              |                                 | < 1                                      |                                                       | %                                                                                                                                            |
| Dynamic viscosity                                                        | Viscosité dynamique                                                                   | $\eta, \mu$                         |                                 | Pa.s                                     |                                                       | poise, 1 P = 0.1 Pa.s                                                                                                                        |
| Kinematic viscosity                                                      | Viscosité cinématique                                                                 | $\nu$                               | $\nu = \frac{\eta}{\rho}$       | m <sup>2</sup> /s                        |                                                       | stokes, 1 St = 10 <sup>-4</sup> m <sup>2</sup> /s                                                                                            |

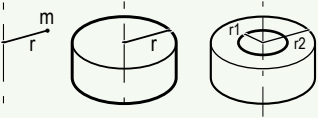
## Unit conversions

| Unit              | MKSA (International System)                                                | AGMA (US system)                                                      |
|-------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------|
| Length            | 1 m = 3,280 8 ft    1 mm = 0,0393 7 in                                     | 1 ft = 0.304 8 m    1 in = 25.4 mm                                    |
| Weight            | 1 kg = 2.204 6 lb                                                          | 1 lb = 0.453 6 kg                                                     |
| Torque            | 1 Nm = 0.737 6 lb.ft    1 N.m = 141.6 oz.in                                | 1 lb.ft = 1.356 N.m    1 oz.in = 0.007 06 N.m                         |
| Force             | 1 N = 0.224 8 lb                                                           | 1 lb = 4.448 N                                                        |
| Moment of inertia | 1 kg.m <sup>2</sup> = 23.73 lb.ft <sup>2</sup>                             | 1 lb.ft <sup>2</sup> = 0.042 14 kg.m <sup>2</sup>                     |
| Power             | 1 kW = 1.341 HP                                                            | 1 HP = 0.746 kW                                                       |
| Pressure          | 1 kPa = 0.145 05 psi                                                       | 1 psi = 6.894 kPa                                                     |
| Magnetic flux     | 1 T = 1 Wb / m <sup>2</sup> = 6.452 10 <sup>4</sup> line / in <sup>2</sup> | 1 line / in <sup>2</sup> = 1.550 10 <sup>-6</sup> Wb / m <sup>2</sup> |
| Magnetic losses   | 1 W / kg = 0.453 6 W / lb                                                  | 1 W / lb = 2.204 W / kg                                               |

| Multiples and sub-multiples                    |                                          |                                             |
|------------------------------------------------|------------------------------------------|---------------------------------------------|
| Factor by which the unit is multiplied         | Prefix to be placed before the unit name | Symbol to be placed before that of the unit |
| 10 <sup>18</sup> or 1 000 000 000 000 000 000  | exa                                      | E                                           |
| 10 <sup>15</sup> or 1 000 000 000 000 000      | peta                                     | P                                           |
| 10 <sup>12</sup> or 1 000 000 000 000          | tera                                     | T                                           |
| 10 <sup>9</sup> or 1 000 000 000               | giga                                     | G                                           |
| 10 <sup>6</sup> or 1 000 000                   | mega                                     | M                                           |
| 10 <sup>3</sup> or 1 000                       | kilo                                     | k                                           |
| 10 <sup>2</sup> or 100                         | hecto                                    | h                                           |
| 10 <sup>1</sup> or 10                          | deca                                     | da                                          |
| 10 <sup>-1</sup> or 0.1                        | deci                                     | d                                           |
| 10 <sup>-2</sup> or 0.01                       | centi                                    | c                                           |
| 10 <sup>-3</sup> or 0.001                      | milli                                    | m                                           |
| 10 <sup>-6</sup> or 0.000 001                  | micro                                    | μ                                           |
| 10 <sup>-9</sup> or 0.000 000,001              | nano                                     | n                                           |
| 10 <sup>-12</sup> or 0.000 000,000,001         | pico                                     | p                                           |
| 10 <sup>-15</sup> or 0.000 000,000,000,001     | femto                                    | f                                           |
| 10 <sup>-18</sup> or 0.000 000,000,000,000,001 | atto                                     | a                                           |

## Standard formulae used in electrical engineering

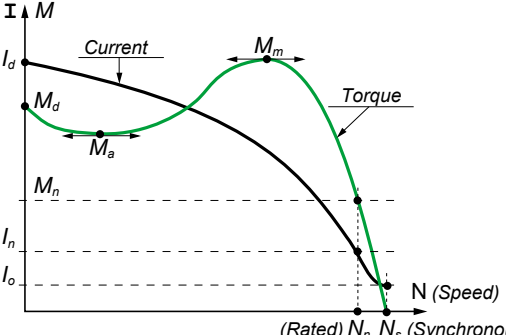
### MECHANICAL FORMULAE

| Title                                  | Formula                                                               | Unit                                                                                  | Definitions / Notes                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Force                                  | $F = m \cdot \gamma$                                                  | $F$ in N<br>$m$ in kg<br>$\gamma$ in m/s <sup>2</sup>                                 | A force $F$ is the product of a mass $m$ by an acceleration $\gamma$                                                                                                                                                                                                                                                                         |
| Weight                                 | $G = m \cdot g$                                                       | $G$ in N<br>$m$ in kg<br>$g = 9.81 \text{ m/s}^2$                                     |                                                                                                                                                                                                                                                                                                                                              |
| Torque                                 | $M = F \cdot r$                                                       | $M$ in N.m<br>$F$ in N<br>$r$ in m                                                    | The torque $M$ of a force in relation to an axis is the product of that force multiplied by the distance $r$ of the point of application of $F$ in relation to the axis.                                                                                                                                                                     |
| Power                                  | - rotating<br>$P = M \cdot \omega$<br><br>- linear<br>$P = F \cdot V$ | $P$ in W<br>$M$ in N.m<br>$\omega$ in rad/s<br><br>$P$ in W<br>$F$ in N<br>$V$ in m/s | Power $P$ is the quantity of work yielded per unit of time<br><br>$\omega = 2\pi N/60$ where $N$ is the speed of rotation in min <sup>-1</sup><br><br>$V$ = linear velocity                                                                                                                                                                  |
| Acceleration time                      | $t = J \cdot \frac{\omega}{M_a}$                                      | $t$ in s<br>$J$ in kg.m <sup>2</sup><br>$\omega$ in rad/s<br>$M_a$ in Nm              | $J$ is the moment of inertia of the system<br>$M_a$ is the moment of acceleration<br>Note: All the calculations refer to a single rotational speed $\omega$ .<br>where the inertias at speed $\omega'$ are corrected to speed $\omega$ by the following calculation:<br>$J_\omega = J_{\omega'} \cdot \left(\frac{\omega'}{\omega}\right)^2$ |
| Moment of inertia<br>Centre of gravity | $J = m \cdot r^2$                                                     |                                                                                       |                                                                                                                                                                                                                                                                                                                                              |
| Solid cylinder<br>around its axis      | $J = m \cdot \frac{r^2}{2}$                                           | $J$ in kg.m <sup>2</sup><br>$m$ in kg<br>$r$ in m                                     |                                                                                                                                                                                                                                                          |
| Hollow cylinder<br>around its axis     | $J = m \cdot \frac{r_1^2 + r_2^2}{2}$                                 |                                                                                       |                                                                                                                                                                                                                                                                                                                                              |
| Inertia of a mass in linear<br>motion  | $J = m \cdot \left(\frac{v}{\omega}\right)^2$                         | $J$ in kg.m <sup>2</sup><br>$m$ in kg<br>$v$ in m/s<br>$\omega$ in rad/s              | The moment of inertia of a mass in linear motion transformed to a rotating motion.                                                                                                                                                                                                                                                           |

## Standard formulae used in electrical engineering

### ELECTRICAL FORMULAE

| Title                                           | Formula                                                                                                                       | Unit                                                                                                                                | Definitions / Notes                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Accelerating torque                             | $M_a = \frac{M_d + 2M_a + 2M_m + M_n}{6} - M_r$ <p>General formula:</p> $M_a = \frac{1}{N_n} \int_0^{N_n} (M_{mot} - M_r) dN$ | Nm                                                                                                                                  | <p>Moment of acceleration <math>M_a</math> is the difference between the motor torque <math>M_{mot}</math> (estimated), and the resistive torque <math>M_r</math>. (<math>M_d</math>, <math>M_a</math>, <math>M_m</math>, <math>M_n</math>, see curve below)</p> <p><math>N</math> = instantaneous speed</p> <p><math>N_n</math> = rated speed</p> |
| Power required by the machine                   | $P = \frac{M \cdot \omega}{\eta_a}$                                                                                           | <p><math>P</math> in W</p> <p><math>M</math> in N.m</p> <p><math>\omega</math> in rad/s</p> <p><math>\eta_a</math> without unit</p> | <p><math>\eta_a</math> expresses the efficiency of the driven machine.</p> <p><math>M</math> is the torque required by the driven machine.</p>                                                                                                                                                                                                     |
| Power drawn by the 3-phase motor                | $P = \sqrt{3} \cdot U \cdot I \cdot \cos \varphi$                                                                             | <p><math>P</math> in W</p> <p><math>U</math> in V</p> <p><math>I</math> in A</p>                                                    | <p><math>\varphi</math> phase angle by which the current lags or leads the voltage.</p> <p><math>U</math> armature voltage.</p> <p><math>I</math> line current.</p>                                                                                                                                                                                |
| Reactive power drawn by the motor               | $Q = \sqrt{3} \cdot U \cdot I \cdot \sin \varphi$                                                                             | Q in VAR                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                    |
| Reactive power supplied by a bank of capacitors | $Q = \sqrt{3} \cdot U^2 \cdot C \cdot \omega$                                                                                 | <p><math>U</math> in V</p> <p><math>C</math> in <math>\mu</math> F</p> <p><math>\omega</math> in rad/s</p>                          | <p><math>U</math> = voltage at the capacitor terminals</p> <p><math>C</math> = capacitor capacitance</p> <p><math>\omega</math> = rotational frequency of supply phases (<math>\omega = 2\pi f</math>)</p>                                                                                                                                         |
| Apparent power                                  | $S = \sqrt{3} \cdot U \cdot I$ $S = \sqrt{P^2 + Q^2}$                                                                         | S in VA                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                    |
| Power supplied by the 3-phase motor             | $P = \sqrt{3} \cdot U \cdot I \cdot \cos \varphi \cdot \eta$                                                                  |                                                                                                                                     | $\eta$ expresses motor efficiency at the point of operation under consideration.                                                                                                                                                                                                                                                                   |
| Slip                                            | $g = \frac{N_s - N}{N_s}$                                                                                                     |                                                                                                                                     | Slip is the difference between the actual motor speed $N$ and the synchronous speed $N_s$                                                                                                                                                                                                                                                          |
| Synchronous speed                               | $N_s = \frac{120 \cdot f}{p}$                                                                                                 | <p><math>N_s</math> in <math>\text{min}^{-1}</math></p> <p><math>f</math> in Hz</p>                                                 | <p><math>p</math> = number of poles</p> <p><math>f</math> = frequency of the power supply</p>                                                                                                                                                                                                                                                      |

| Parameters                                           | Symbol                  | Unit              | Torque and current curve as a function of speed                                      |
|------------------------------------------------------|-------------------------|-------------------|--------------------------------------------------------------------------------------|
| Starting current<br>Rated current<br>No-load current | $I_d$<br>$I_n$<br>$I_o$ | A                 |  |
| Starting torque*                                     | $M_d$                   | Nm                |                                                                                      |
| Run up torque                                        | $M_a$                   |                   |                                                                                      |
| Breakdown torque                                     | $M_m$                   |                   |                                                                                      |
| Rated torque                                         | $M_n$                   |                   |                                                                                      |
| Rated speed<br>Synchronous speed                     | $N_n$<br>$N_s$          | min <sup>-1</sup> |                                                                                      |

\* Torque is the usual term for expressing the moment of a force.

## Tolerance on main performance parameters

### TOLERANCES OF ELECTROMECHANICAL CHARACTERISTICS

IEC 60034-1 specifies standard tolerances for electromechanical characteristics.

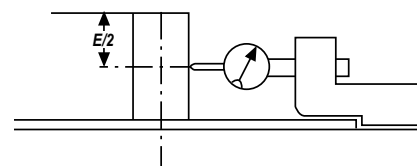
| Parameters          | Tolerances                                         |
|---------------------|----------------------------------------------------|
| Efficiency $\eta$   | machines $P \leq 150$ kW<br>machines $P > 150$ kW  |
| $\cos \varphi$      | $-1/6 (1 - \cos \varphi)$<br>(min 0.02 - max 0.07) |
| Slip $s$            | machines $P < 1$ kW<br>machines $P \geq 1$ kW      |
| Locked rotor torque | $-15\%$ , $+25\%$ of rated torque                  |
| Starting current    | $+20\%$                                            |
| Run-up torque       | $-15\%$ of rated torque                            |
| Maximum torque      | $-10\%$ of rated torque<br>$> 1.5 M_N$             |
| Moment of inertia   | $\pm 10\%$                                         |
| Noise               | $+3$ dB (A)                                        |
| Vibration           | $+10\%$ of the guaranteed class                    |

Note: IEC 60034-1 - does not specify tolerances for current  
- the tolerance is  $\pm 10\%$  in NEMA-MG1

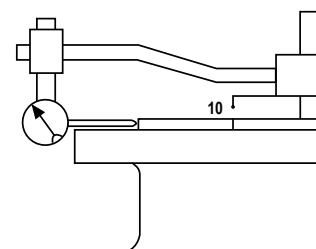
### TOLERANCES AND ADJUSTMENTS

The standard tolerances shown below are applicable to the drawing dimensions given in our catalogues. They comply fully with the requirements of IEC standard 60072-1.

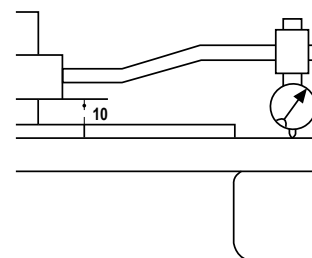
| Characteristics                                                                                                                                                                                                                                                                    | Tolerances                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| frame size $H \leq 250$<br>$\geq 280$                                                                                                                                                                                                                                              | 0, $-0.5$ mm<br>0, $-1$ mm                               |
| Diameter $\varnothing$ of the shaft extension:<br>- 11 to 28 mm<br>- 32 to 48 mm<br>- 55 mm and over                                                                                                                                                                               | j6<br>k6<br>m6                                           |
| Diameter N of flange spigots                                                                                                                                                                                                                                                       | j6 up to FF 500,<br>js6 for FF 600 and more              |
| Key width                                                                                                                                                                                                                                                                          | h9                                                       |
| Width of drive shaft keyway<br>(normal keying)                                                                                                                                                                                                                                     | N9                                                       |
| Key depth:<br>- square section<br>- rectangular section                                                                                                                                                                                                                            | h9<br>h11                                                |
| ① <b>Eccentricity of shaft in flanged motors</b> (standard class)<br>- diameter $> 10$ up to 18 mm<br>- diameter $> 18$ up to 30 mm<br>- diameter $> 30$ up to 50 mm<br>- diameter $> 50$ up to 80 mm<br>- diameter $> 80$ up to 120 mm                                            | 0.035 mm<br>0.040 mm<br>0.050 mm<br>0.060 mm<br>0.070 mm |
| ② <b>Concentricity of spigot diameter</b> and<br>③ <b>perpendicularity of mating surface of flange in relation to shaft</b> (standard class)<br>Flange (FF) or Faceplate (FT):<br>- F 55 to F 115<br>- F 130 to F 265<br>- F 300 to F 500<br>- F 600 to F 740<br>- F 940 to F 1080 | 0.08 mm<br>0.10 mm<br>0.125 mm<br>0.16 mm<br>0.20 mm     |



① **Eccentricity of shaft in flanged motors**

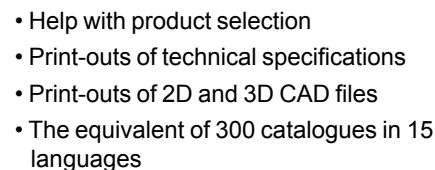


② **Concentricity of spigot diameter**



③ **Perpendicularity of mating surface of flange in relation to shaft**





<http://configureurls.leroy-somer.com>



**AVAILABILITY TIMES EX WORKS (FRANCE), IN WORKING DAYS**

Orders received, within the maximum quantity limit, by the factory on day D before 12.00 pm Central European Time, will have the following Availability.

For products with options, availability will be that of the longest lead-time item i.e. the product or its options.

If the order is received after 12.00 pm 1 working day on the mentioned availability will be added.

The maximum quantity is per line of order. Above this maximum quantity, please consult your Sales Office.

|   |       |       |       |        |                |
|---|-------|-------|-------|--------|----------------|
| D | D + 1 | D + 2 | D + 5 | D + 10 | Please consult |
|---|-------|-------|-------|--------|----------------|

The selection data in the “*Express Availability Drive systems*” catalogue specify for each family in the form of a colour code and according to the quantities per order, the product delivery time.

*Please consult Leroy-Somer.*

## Declaration of EC conformance

|                       |                                                         |                                                                                             |                                                                                |              |
|-----------------------|---------------------------------------------------------|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------|
| QUALITY<br>MANAGEMENT | PS4 : INSPECTION, MEASURING & TEST EQUIPMENT MANAGEMENT |                                                                                             | Classement / File : S4T007                                                     |              |
|                       | EU DECLARATION OF CONFORMITY AND<br>INCORPORATION       |                                                                                             | Révision : D                                                                   | Page : 2 / 2 |
|                       |                                                         |                                                                                             | Date : 06/04/2016                                                              |              |
|                       |                                                         | M <input type="checkbox"/> R <input checked="" type="checkbox"/> I <input type="checkbox"/> | Annule et remplace / Cancels and replaces :<br>S4T007 Révision C du 06/12/2012 |              |
|                       |                                                         | GP, Mansle & IM1                                                                            |                                                                                |              |

We, **MOTEURS LEROY SOMER**, boulevard Marcellin Leroy 16915 ANGOULEME cedex 9, France,  
declare, under our sole responsibility that the following products:

**(F)LS, PLS, (F)LSHT (F)LSSES\*, PLSES\*, LSMV\*** induction motor

comply with:

- European Directives :
  - Low Voltage Directive: **2014/35/EU**
  - Electromagnetic Compatibility Directive **2014/30/EU**
  - ErP Directive **2009/125/EC and regulation (EC) application :  
640/2009 and corrections (valid only for products marked with an  
asterisk\*)**
- European and International standards : **IEC-EN 60034-1:2010; 60034-2-1:2014; 60034-5:2001/A1:2007;  
60034-6:1993 ; 60034-7:1993/A1:2001; 60034-8:2007/A1:2014;  
60034-9:2005/A1:2007; 60034-14:2004 /A1:2007; 60034-30-1:  
2014 ; 60072-1:1991**

This conformity permits the use of these ranges of products in machines subject to the application of the Machinery Directive 2006/42/EC, provided that they are integrated or incorporated and/or assembled in accordance with, amongst others, the regulations of standard EN 60204 "Electrical Equipment for Machinery".

The products defined above may not be put into service until the machines in which they are incorporated have been declared as complying with the applicable Directive.

Installation of these motors must comply with the regulations, decrees, laws, orders, directives, application circulars, standards, rules or any other document relating to the installation site. LEROY-SOMER accepts no liability in the event of failure to comply with these rules and regulations.

Note: When the motors are supplied via appropriate electronic inverters and/or controlled by electronic control or monitoring devices, they must be installed by a professional who will be responsible for ensuring that the electromagnetic compatibility regulations of the country in which the product is installed are observed.

Date and Signature of technical director :

Eric VASSENT

The 08<sup>th</sup> April 2016



**Leroy-Somer**

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