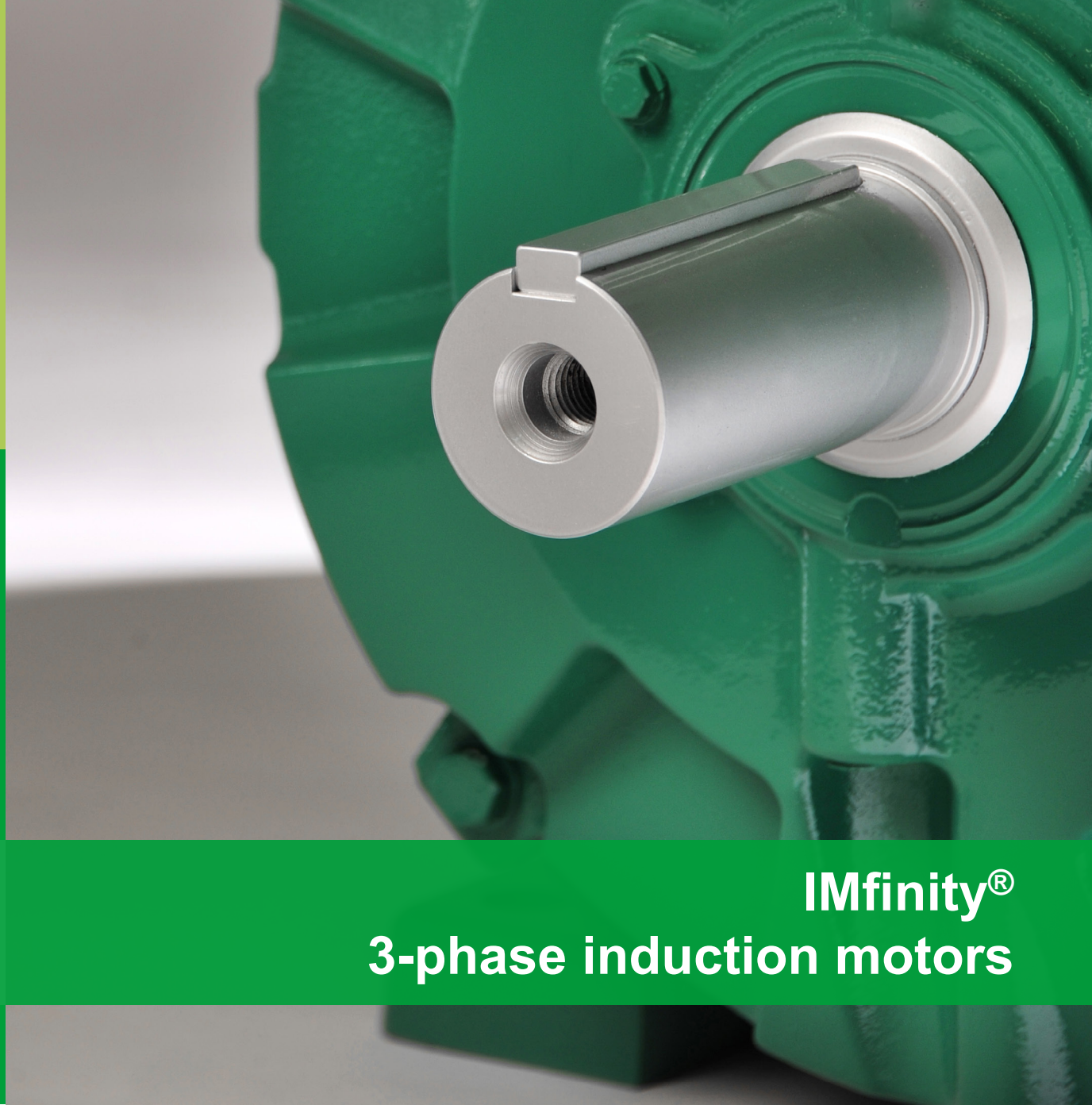


IMfinity®
3-phase induction motors

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 900 kW

LEROY-SOMER™

Nidec
All for dreams

Contents

Contents

Index

General information
Introduction

In this catalogue, Nidec 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 Nidec Leroy-Somer range.
Other motors, ranging in power from **0.045 to 2200 kW** and special construction types, are included in the Nidec Leroy-Somer motor programme.

IP55 ALUMINIUM MOTORS

NON IE EFFICIENCY

IP55 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

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

PREMIUM EFFICIENCY

IE3 IP23 PROTECTED ON MAINS*
IE3 IP23 PROTECTED ON DRIVE

SUPER PREMIUM EFFICIENCY

IE4 IP23 PROTECTED ON MAINS
IE4 IP23 PROTECTED ON DRIVE

For more information, see the "Directives and standards relating to motor efficiency" section.
*** Use outside the European Union**

General information
Quality commitment

Nidec 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

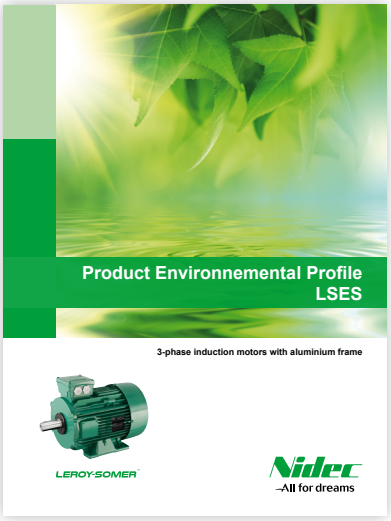
- Corrective actions and advancements

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).



Nidec 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: 2015 from the DNV**. Similarly, our environmental approach has enabled us to obtain certification ISO 14001: 2015.

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.

General information
Directive and standards relating to motor efficiency

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 (March 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 3-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 (June 2014)

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 including 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 the previous version 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%

ErP DIRECTIVE (Energy Related Product) 2009/125/EC (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 OF THE ErP EUROPEAN REGULATION (Energy Related Product EU2019/1781 + Amendment 2021/341)

This is based on standard IEC 60034- 30-1 and will define the efficiency classes. 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.

Motors concerned:

3-phase motors from 0.12 to 1000 kW with 2,4,6 and 8 poles. Operating at duty cycle S1, S3 ≥ 80% and S6 ≥ 80% are also taken into account.
Obligation to place High efficiency or Premium efficiency motors on the market:

- IE2 class for P < 0.75 kW
- IE3 class for P ≥ 0.75 kW
- IE4 class from the 1st January 2023 for P ≥ 75 kW and P ≤ 200kW (excluding 8P-, break- and ATEX-motors)

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 2014/34/EU
  - Brake motors if operating at S3

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.

CE	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.
UKCA	This label (UK Conformity Assessed) is optional, and not mandatory from the 1st January 2024, for ptoducts (included ATEX-motors) being placed on the Great Britain market (England, Scotland and Wales).
C SA US	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.
c UL us	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.

c UL us	**The UL Recognized Component 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.

CSA	**Canada:** energy efficiency conformance logo (optional).
ee	**USA:** energy efficiency conformance logo (optional).
NEMA Premium	**USA and Canada:** EISA conformance logo (optional).
CCC	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 ≤ 1.1 kW.
EAC	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.
C.E.L.	This label is mandatory for the Chinese market. It indicates that the product is conform to the regulation and the requested electrical efficiency level, and cerified by the Chinese authority.
INMETRO	This label is mandatory for the Brazilian market. It indicates that the product is certified by the authority.
ISI	This label is mandatory for the Indian market. It indicates that the product is certified according the current Indian standard : 12615-2018.

Other markings concern specific applications, such as ATEX for example. More information on the international regulations are available on the guideline ref. 5708.

APPROVALS FOR NIDEC LEROY-SOMER MOTORS (versions derived from standard construction)

Country	Initials	Certification No.	Application
CANADA	**CSA**	LR 57 008 166,631	Standard adapted range (see section “Supply voltage”) Complete motors
USA	**UL or** ꟻU	E 68554 SA 6704 E 206450	Impregnation systems Stator/rotor assemblies for sealed units Complete motors
FRANCE	**LCIE** **INERIS**	-	Sealing, shocks, safety

For approved special products, see the relevant documents.

Environment
Definition of «Index of protection» (IP)

INDEXES OF PROTECTION OF ELECTRICAL EQUIPMENT ENCLOSURES

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

1st digit: protection against solid materials			2nd digit protection against liquids			3rd digit mechanical protection		
IP	Tests	Definition	IP	Tests	Definition	IK	Tests	Definition
0		No protection	0		No protection	00		No protection
1	Ø 50 mm	Protected against solid objects larger than 50 mm (e.g. accidental contact with the hand)	1		Protected against water drops falling vertically (condensation)	01	150 g, 10 cm	Impact energy: 0.15 J
2	Ø 12 mm	Protected against solid objects larger than 12 mm (e.g. a finger)	2	15°	Protected against water drops falling at up to 15° from the vertical	02	200 g, 10 cm	Impact energy: 0.20 J
3	Ø 2.5 mm	Protected against solid objects larger than 2.5 mm (e.g. tools, wires)	3	60°	Protected against rain falling at up to 60° from the vertical	03	250 g, 15 cm	Impact energy: 0.37 J
4	Ø 1 mm	Protected against solid objects larger than 1 mm (e.g. thin tools, small wires)	4		Protected against projected water from all directions	04	250 g, 20 cm	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	350 g, 20 cm	Impact energy: 0.70 J
6		Protected against any dust penetration	6		Protected against projected water comparable to big waves	06	250 g, 40 cm	Impact energy: 1 J
			7	0.15 m, 1 m	Protected against the effects of immersion between 0.15 and 1 m	07	0.5 kg, 40 cm	Impact energy: 2 J
			8 . . m	..m	Protected against prolonged effects of immersion under pressure	08	1.25 kg, 40 cm	Impact energy: 5 J
						09	2.5 kg, 40 cm	Impact energy: 10 J
						10	5 kg, 40 cm	Impact energy: 20 J

Example :

Example of an **IP 55** machine

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:

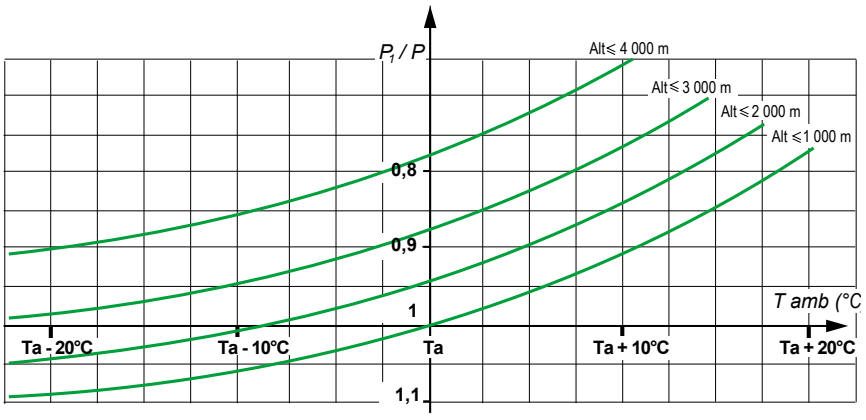
- ambient temperature within the range -20°C to +50°C
- altitude less than 1000 m
- atmospheric pressure: 1050 hPa (mbar) = (750 mm Hg)

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.

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.



NORMAL STORAGE CONDITIONS

Machines should be stored at an ambient temperature between -20°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

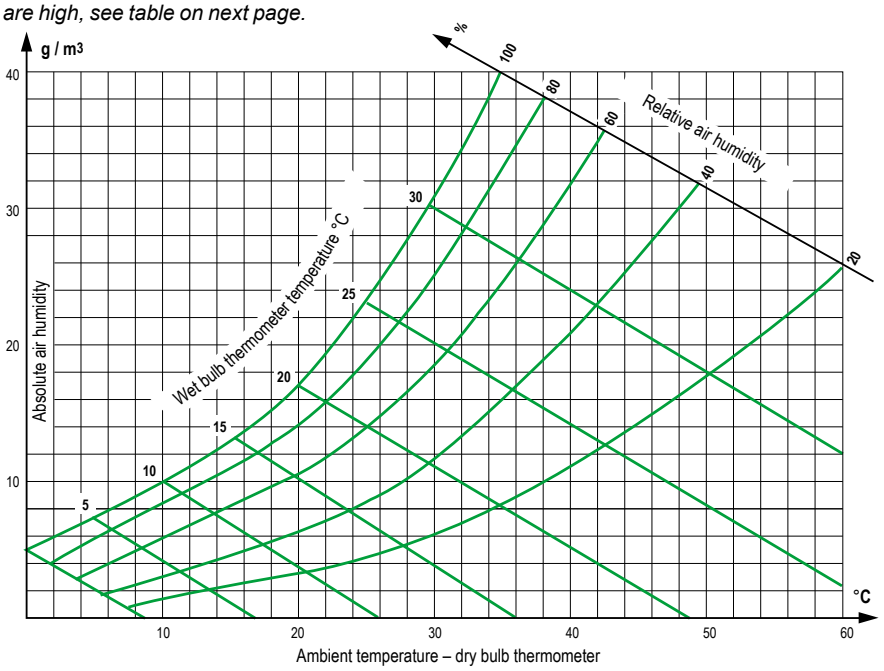
MEASURING THE HUMIDITY:

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; steelin) are too low to cause deterioration.

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 ~ 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.

Relative humidity / Ambient temperature	RH 95%	RH > 95 % [1]
θ < - 40 °C	ask for estimate (quotation)	ask for estimate (quotation)
- 20°C to + 50 °C	T Standard	TC Standard
Other ambient temperatures	ask for estimate (quotation)	ask for estimate (quotation)
Plate mark	T	TC

1. Atmosphere without high level of condensation

Standard impregnation

SPACE HEATERS

Severe climatic conditions, e.g. T amb < - 40°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.

Environment
External finish

Nidec Leroy-Somer motor painting systems
are established according to the ISO 12944, ISO 6270 and ISO 9227 standards.

Nidec Leroy-Somer standard paint colour reference:

RAL 6000

Paint brightness standard: Satin

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 Ventilation grilles	None, but must be free from grease, casting-mould coatings and dust which would affect paint adhesion

CLASSIFICATION OF THE ENVIRONMENTS

Nidec Leroy-Somer painting systems according to the categories.

ATMOSPHERIC CORROSIVE CATEGORIES	CORROSIVITY CATEGORY AS PER ISO 12944-2	Durability class	ISO 6270 Water condensation nb hours	ISO 9227 Salt mist nb hours	Nidec Leroy-Somer equivalent system	System description
Others	-	-	-	-	Unpainted	without any coat except cast iron parts
		-	-	-	Primer*	One primer coat / Ph-Zn Pu
AVERAGE	C3	Limited	48	120	C3L	One Polyurethane coat
		Medium	120	240	-	-
		High	240	480	-	-
		Very high	480	720	-	-
HIGH	C4	Limited	120	240	-	-
		Medium	240	480	C4M	One primer coat / Ph-Zn Pu
						One Polyurethane coat
					C4M-P**	One Primer coat / Ph-Zn Pu
						One Epoxy coat
		High	480	720	-	-
		Very high	720	1440	-	-
VERY HIGH	C5	Limited	240	480	-	-
		Medium	480	720	C5M	One primer coat / Ph-Zn Epoxy
						One middle coat Ph-Zn Pu
						One Polyester / Acrylic coat
		High	720	1440	-	-
		Very high	-	-	-	-

C3L = Standard for LSES aluminium, FLSES cast iron and PLSES steel motors

* *compatibilité avec peinture finale client à assurer.*
** *pour une utilisation en intérieur seulement.*

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 (5×10^{-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 CISPR 11 standard, currently in preparation, will define permissible rejection and immunity rates.

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 2014/30/EC CONCERNING ELECTROMAGNETIC COMPATIBILITY (EMC)

a - for motors only

According to amendment 1 of IEC 60034-1 section 13, 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 2014/35/EU

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 AND UKCA 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.

Great Britain left the European Union on January 31, 2020, following the ratification of the withdrawal agreement.

The new label UKCA (UK Conformity Assessed) is optional, and not mandatory from the 1st January 2024. It is for the products (included ATEX-motors) being introduced on the Great Britain market (England, Scotland and Wales).

This marking is the equivalent of the CE marking, linked to British regulations.

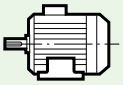
The dual CE and UKCA marking is allowed.

MOUNTINGS AND POSITIONS (IEC STANDARD 60034-7)

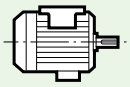
Foot mounted motors

• all frame sizes

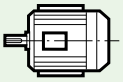
IM 1001 (IM B3)
- Horizontal shaft
- Feet on floor



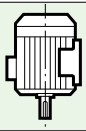
IM 1071 (IM B8)
- Horizontal shaft
- Feet on top



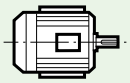
IM 1051 (IM B6)
- Horizontal shaft
- Wall mounted with feet on left when viewed from drive end



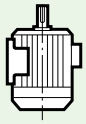
IM 1011 (IM V5)
- Vertical shaft facing down
- Feet on wall



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



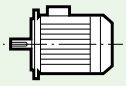
IM 1031 (IM V6)
- Vertical shaft facing up
- Feet on wall



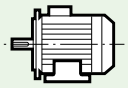
(FF) flange mounted motors

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

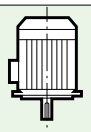
IM 3001 (IM B5)
- Horizontal shaft



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

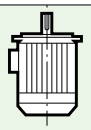


IM 3011 (IM V1)
- Vertical shaft facing down

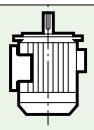


IM 2011 (IM V15)
- Vertical shaft facing down
- Feet on wall

IM 3031 (IM V3)
- Vertical shaft facing up



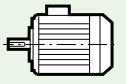
IM 2031 (IM V36)
- Vertical shaft facing up
- Feet on wall



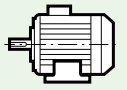
(FT) face mounted motors

• all frame sizes ≤ 160 mm

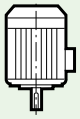
IM 3601 (IM B14)
- Horizontal shaft



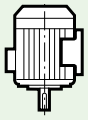
IM 2101 (IM B34)
- Horizontal shaft
- Feet on floor



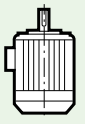
IM 3611 (IM V18)
- Vertical shaft facing down



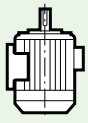
IM 2111 (IM V58)
- Vertical shaft facing down
- Feet on wall



IM 3631 (IM V19)
- Vertical shaft facing up



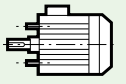
IM 2131 (IM V69)
- Vertical shaft facing up
- Feet on wall



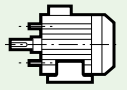
Motors without drive end shield

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 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 Nidec Leroy-Somer specifying the coupling method and the axial and radial loads if applicable

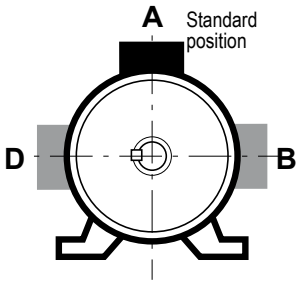
TERMINAL BOX

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.

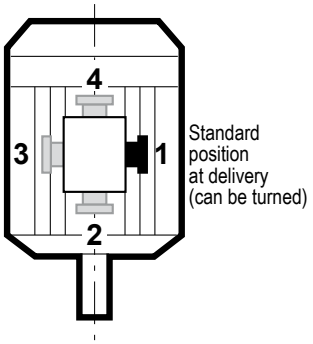
The standard position of the plug is on the right, seen from the drive end but, owing to the symmetrical construction of the box, it can usually be placed in any of the 4 directions, as shown in the table below:

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 Nidec Leroy-Somer

- : not available

Cable gland position	1	2*	3	4
LSES - FLSES - PLSES 80 to 315	◆	✶	✶	✶
PLSES 315 LG/MGU/VLG/VLGU 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

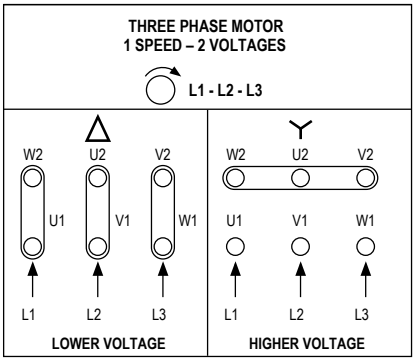
- : not available

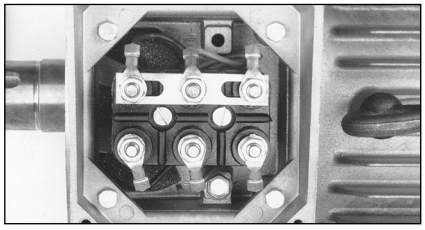
WIRING DIAGRAMS

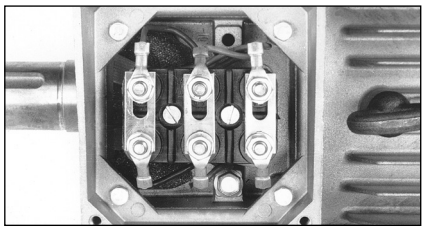
All standard motors are supplied with a wiring diagram in the terminal box.

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: ⏚ 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.

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 Fpr applied at a distance X (mm) from the shoulder of the shaft extension (length E).

Radial force acting on the drive shaft: Fpr

The radial force Fpr expressed in daN applied to the drive shaft is found by the formula.

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

where:

PN = rated motor power (kW)

D = external diameter of the drive pulley (mm)

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

k = factor depending on the type of transmission

PP = 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:

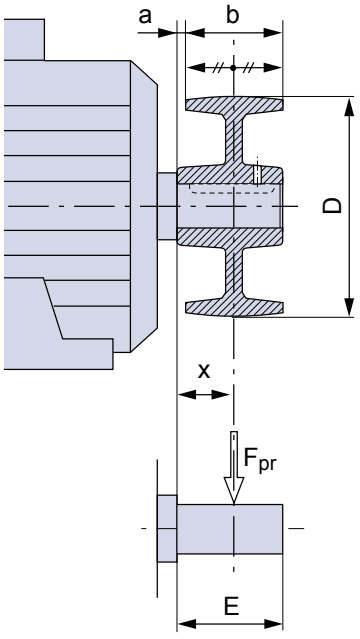
The charts on the following pages indicate, for each type of motor, the radial force FR at a distance X permissible on the drive end shaft extension, for a bearing life L10h of 25,000 hours.

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

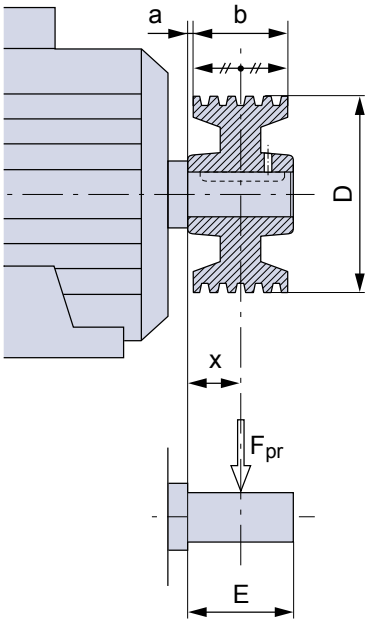
Change in bearing life depending on the radial load factor.

For a radial load Fpr (Fpr ≠ FR), applied at distance X, the bearing life L10h changes, as a rough estimate, in the ratio kR (kR = Fpr/FR) as shown in the chart below, for standard fitting arrangements.

If the load factor kR 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.

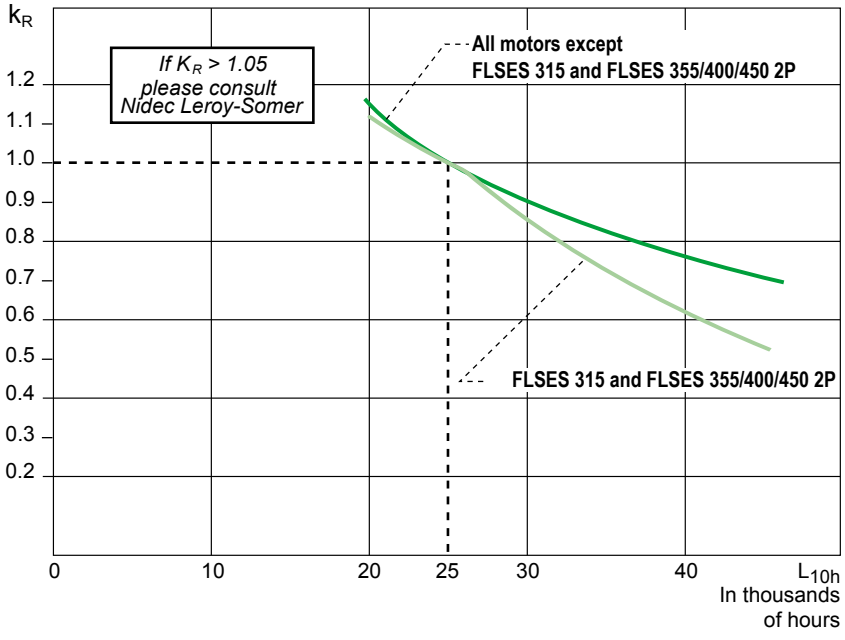


$$\begin{cases} x = a + \frac{b}{2} \\ \text{where} \\ x \le E \end{cases}$$



$$\begin{cases} x = a + \frac{b}{2} \\ \text{where} \\ x \le E \end{cases}$$

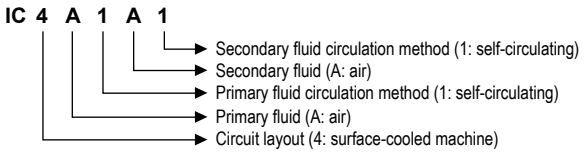
Change in bearing life L_{10h} depending on the radial load factor kR for standard fitting arrangements.



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.

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.

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).

Open machines are cooled according to the cooling method classification IC 01 (IEC 60034-6 standard) :

cooling air is blown throught the motor by a fan mounted on the shaft.

NON-VENTILATED APPLICATIONS IN CONTINUOUS OPERATION

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

IC 418 COOLING SYSTEM

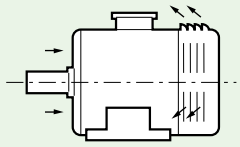
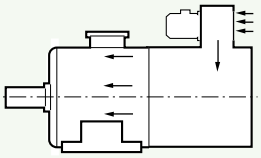
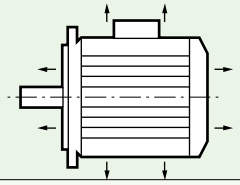
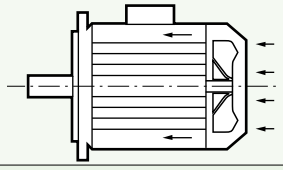
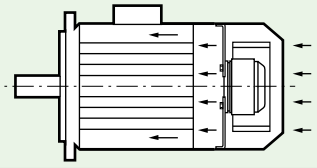
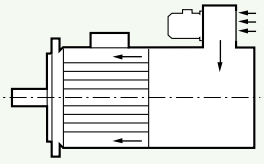
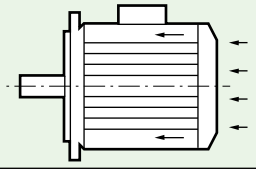
If they are placed in the air flow from a fan, these motors are capable of supplying their rated power if the speed of the air between the housing fins and the overall flow rate of the air between the fins comply with the data in the table below.

Type LSES/FLSES	2 poles		4 poles		6 poles	
	flow rate m^3/h	speed m/s	flow rate m^3/h	speed m/s	flow rate m^3/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.

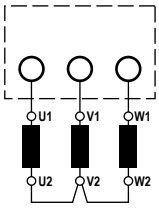
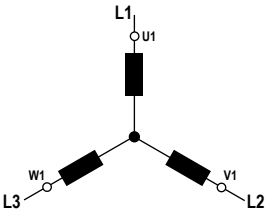
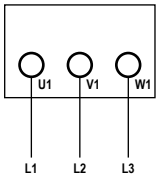
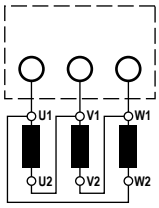
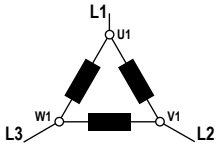
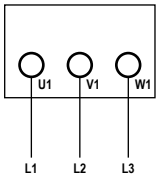
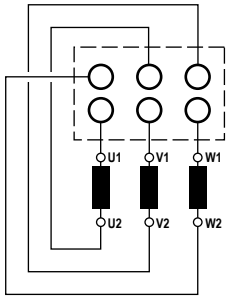
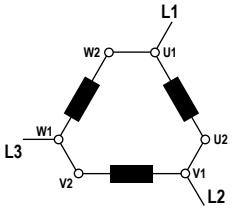
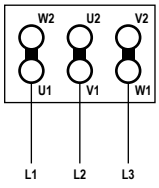
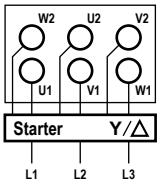
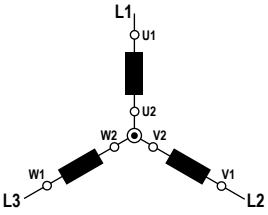
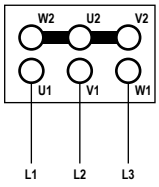
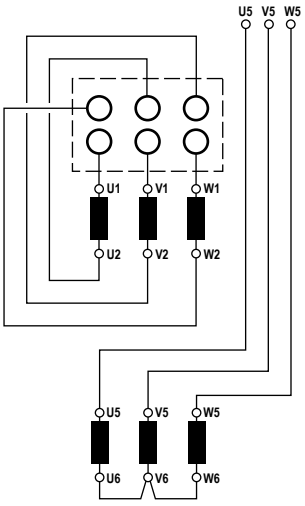
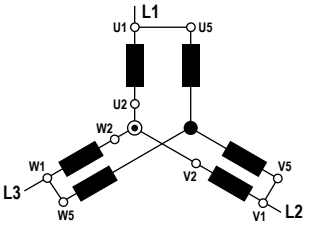
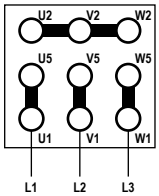
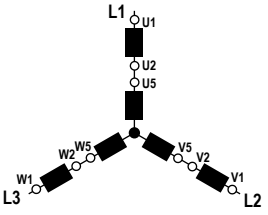
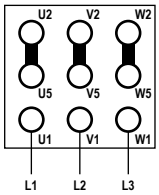
Construction
Cooling for LSES/FLSES/PLSES motors

STANDARD CODES

IC 01	Open machine, cooled using ambient fluid (air) circulating through inside the motor. Cooling air is blown throught the motor by a fan mounted on the shaft.	
IC 06	Open machine. Radial external, separately excited fan motor. Cooling air is blown throught the motor by a separate ventilation with radial fitted fan unit.	
IC 410	Enclosed machine ,surface-cooled by natural convection and radiation. No external fan.	
IC 411	Enclosed machine. Smooth or finned ventilated casing. External shaft-mounted fan.	
IC 416 A*	Enclosed machine. Smooth or finned enclosed casing. External motorized axial (A) fan supplied with the machine.	
IC 416 R*	Enclosed machine. Smooth or finned enclosed casing. External motorized radial (R) fan supplied with the machine.	
IC 418	Enclosed machine. Smooth or finned casing. No external fan. Ventilation provided by air flow coming from the driven system.	

** Features not within manufacturer's standard range.*

SINGLE SPEED MOTORS

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

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)

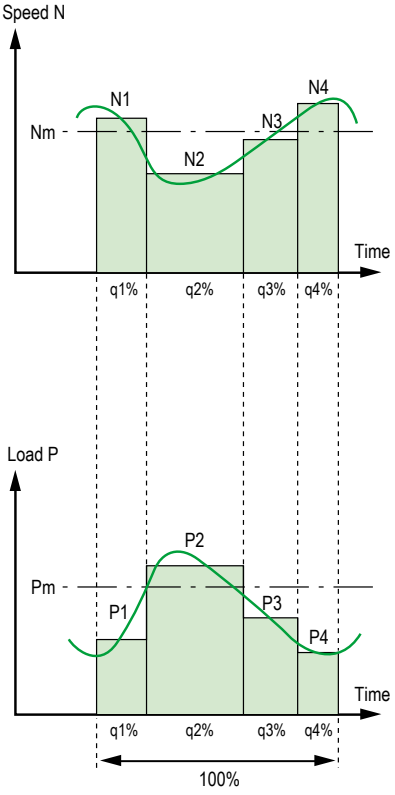
- p = 3 for ball bearings
- p = 10/3 for roller bearings

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

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

P_m: average equivalent dynamic load

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

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).

Note: 6 successive starts from the cold stage of the motor, and 2 from hot state with return to stop stage between each start.

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).

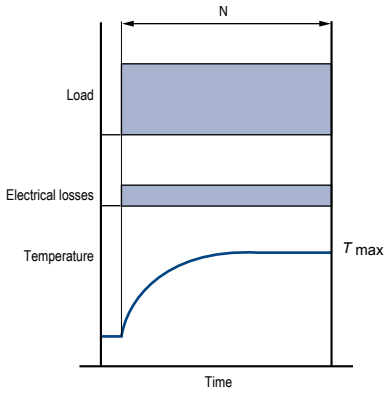
Note: for this type of duty, the appropriate full load values must be used as the basis for calculating overload.

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

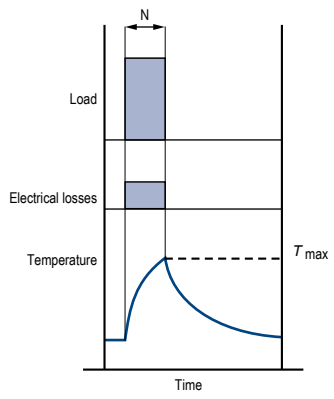
Fig. 1. - Continuous duty, Type S1.



N = operation at constant load

T_{max} = maximum temperature attained

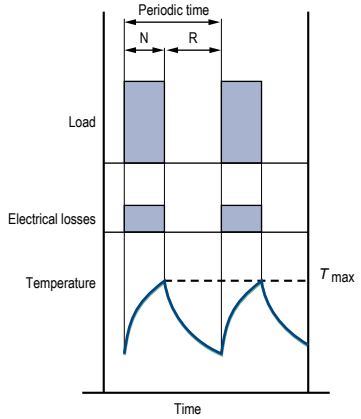
Fig. 2. - Short-time duty, Type S2.



N = operation at constant load

T_{max} = maximum temperature attained

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



N = operation at constant load

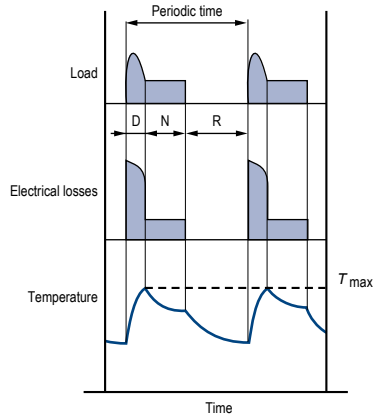
R = rest

T_{max} = maximum temperature attained

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

Operation
Duty cycle - Definitions

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



D = starting

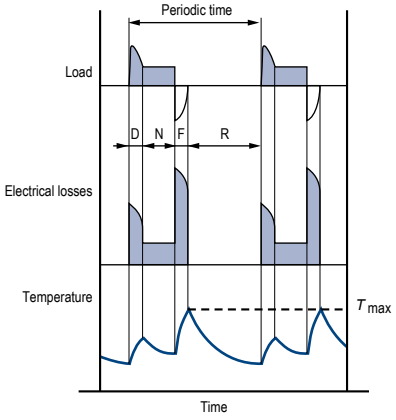
N = operation at constant load

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

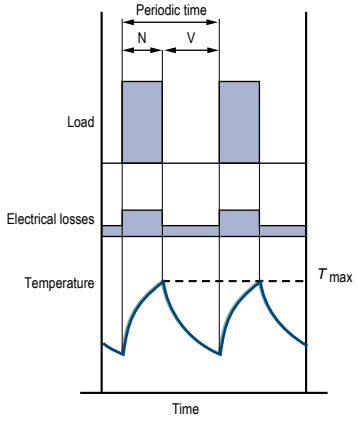
F = electrical braking

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.



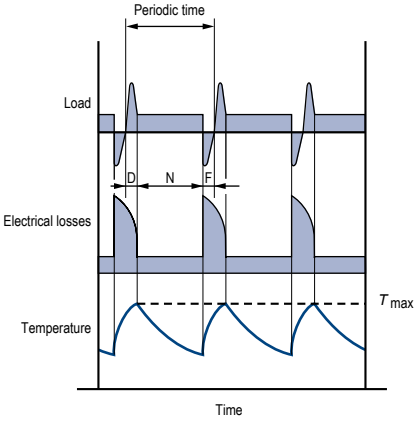
N = operation at constant load

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

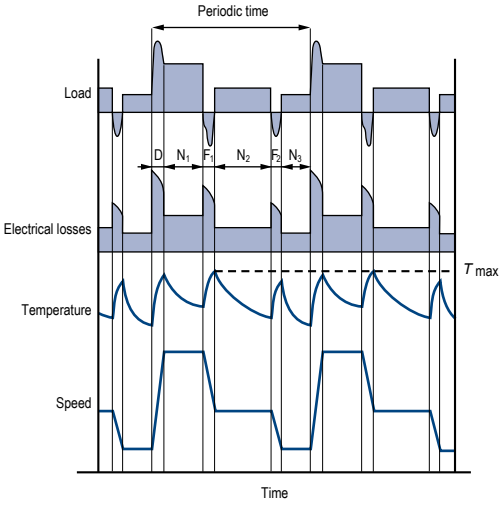
N = operation at constant load

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_1F_2 = electric braking

D = starting

$N_1N_2N_3$ = 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.

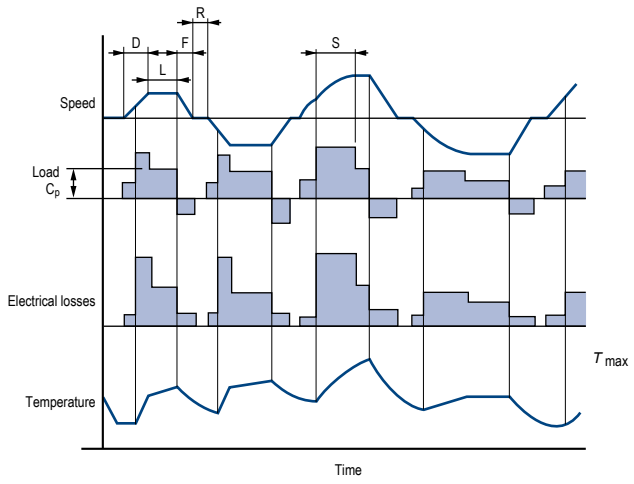
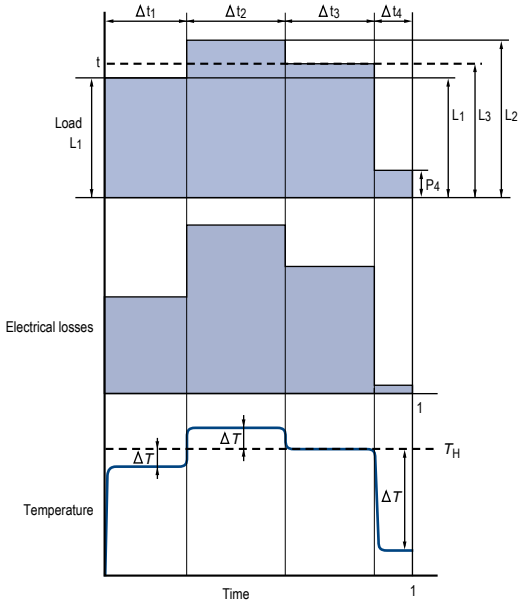


Fig. 10 - Duty at discrete constant loads, Type S10.



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

L = load

N = rated power for type S1 duty

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

t = time

T_p = total cycle time

t_i = discrete period within a cycle

Δt_i = t_i / T_p = relative duration of period within a cycle

Pu = electrical losses

H_N = temperature at rated power for type S1 duty

ΔH_i = increase or decrease in temperature rise during the ith period of the cycle

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

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 230/400 V three-phase and 230 V single-phase, with a tolerance of ±10%.

The IEC 60034-1 standard give ±2% on the frequency.

EFFECTS ON MOTOR PERFORMANCE

VOLTAGE RANGE

The characteristics of motors will of course vary with a corresponding variation in voltage of ±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)	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 V A) 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 ±5% of U_N.

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	Pu	M	N	Cos φ	Efficiency
Constant	$Pu\ \frac{f'}{f}$	M	$N\ \frac{f'}{f}$	cos φ unchanged	Efficiency unchanged
Variable	$Pu\left(\frac{u'/u}{f/f'}\right)^2$	$M\left(\frac{u'/u}{f/f'}\right)^2$	$N\ \frac{f'}{f}$	Dependent on the machine saturation state	

M = minimum and maximum values of starting torque.

USE OF 400 V - 50 HZ MOTORS ON 460 V - 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.

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

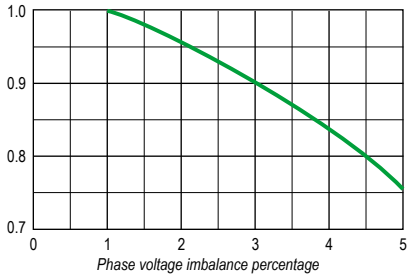
The phase imbalance for voltage is calculated as follows:

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

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

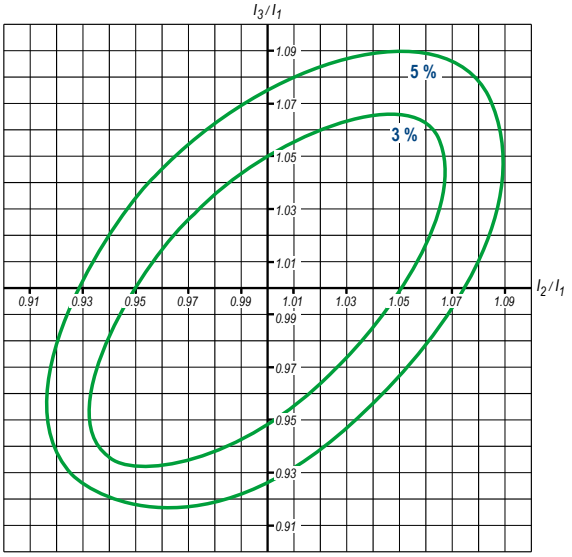


PHRASE CURRENT IMBALANCE

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 - Temperature rise and thermal reserve

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

Nidec 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 (Δθ), is calculated using the winding resistance variation method, with the formula:

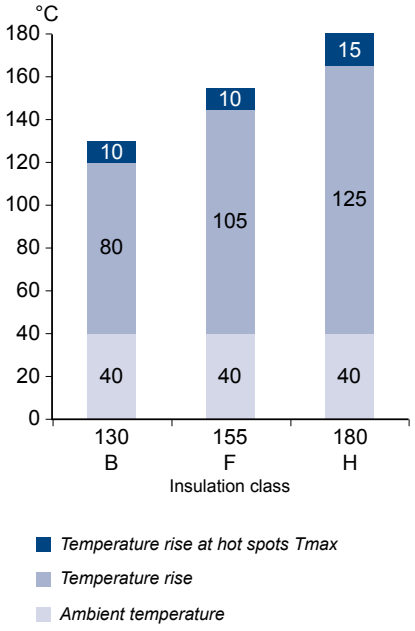
$$\Delta T = \frac{R_2 - R_1}{R_1} (235 + T_1) + (T_1 - T_2)$$

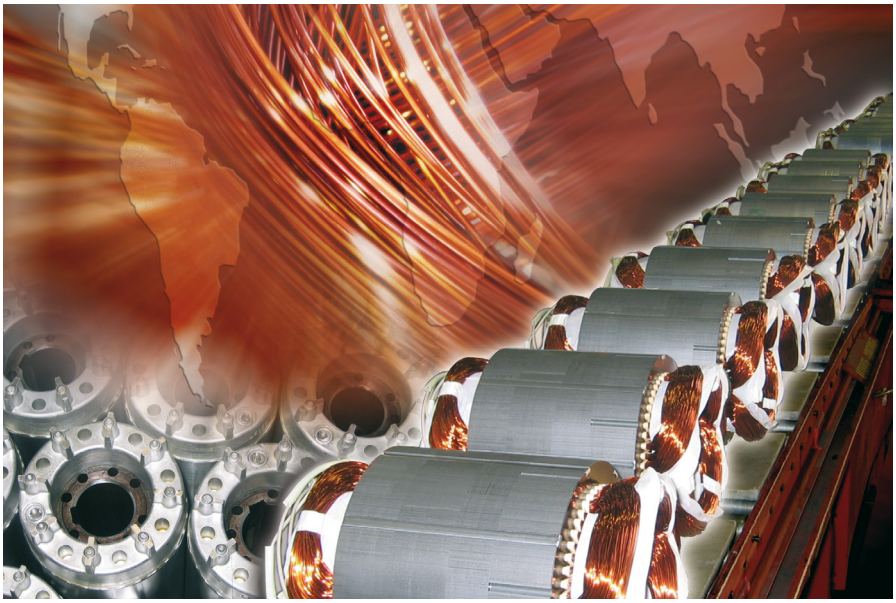
R_1: cold resistance measured at ambient temperature T_1

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 (ΔT) and maximum temperatures at hot spots (Tmax) for insulation classes (IEC 60034-1).*





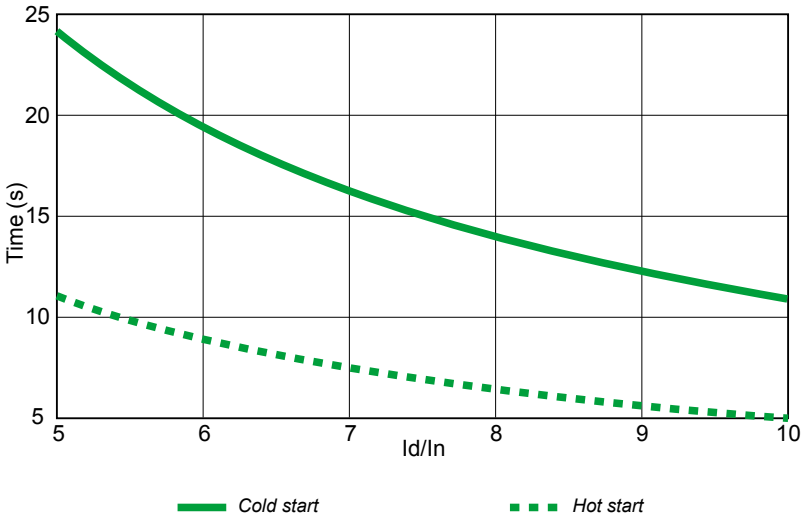
Operation
Starting times and starting current

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.

6 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 ≥ 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.

Power - Torque - Efficiency - Power Factor (Cos φ)

DEFINITIONS

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

$$Pu = M.\omega$$

where Pu in W, M in N.m, ω in rad/s and whereω is expressed as a function of the speed of rotation in rpm by the equation:

$$\omega = 2\pi.n/60$$

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 Pu by the equation:

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

where η is the efficiency of the machine. The output power Pu at the motor shaft is expressed as a function of the phaseto-phase mains voltage (U in Volts), of the line current absorbed (I in Amps) by the equation:

$$Pu = U.I.\ \sqrt{3}\ .\ \cos\varphi\ .\ \eta$$

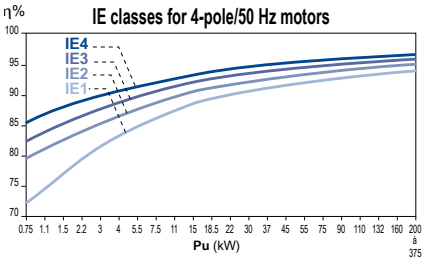
where cos φ is the power factor found from the ratio:

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

EFFICIENCY

In accordance with the agreements signed at the Rio and Buenos Aires international conferences, The new IMfinity® ranges have 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 Longer service life (x2 or 3) 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)

RATED POWER P_n IN RELATION TO DUTY CYCLE

GENERAL RULE FOR STANDARD MOTORS

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

Iterative calculation where:

$t_{d(s)}$: starting time achieved with motor rated $P_{(w)}$

n : number of (equivalent) starts per hour

fdm (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

Sp = specification

S1	OF = 1 ; n ≤ 6
S2	n = 1 operating life determined by specification (Sp)
S3	OF according to Sp; n ~ 0 (no effect of starting on temperature rise)
S4	OF according to Sp; n according to Sp; td, Pu, P according to Sp (replace n with 4n in the above formula)
S5	OF according to Sp; n = n starts + 3 n brakings = 4 n ; t_d, P_u, P as per CdC (replace n with 4n in the above formula)
S6	$P = \sqrt{\frac{\Sigma^n_1 (P^2_i \cdot t_i)}{\Sigma^n_1 t_i}}$
S7	same formula as S5 but OF = 1
S8	at high speed, same formula as in S1 at low speed, same formula as in S5
S9	S8 duty formula after complete description 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:

$$P = \sqrt{\frac{\Sigma^n_1 (P^2_i \cdot t_i)}{\Sigma^n_1 t_i}} = \sqrt{\frac{P^2_1 \cdot t_1 + P^2_2 \cdot t_2 \cdots + P^2_n \cdot t_n}{t_1 + t_2 + \cdots t_n}}$$

if, during the working time the absorbed power is:

P1 for period t1

P2 for period t2

Pn for period tn

Power values lower than 0.5 PN are replaced by 0.5 PN 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 PN:

- 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.nF + k'.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 Nidec 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: $J_{c/m}$
- Operating factor = OF
- Class of starts per hour = n
- Resistive torque during starting = M_r
- Motor speed = N

• Selection in catalogue

- Motor rated power = P_n
- Starting current Id, cosφ
- Moment of rotor inertia J_m
- Average starting torque M_{mot}
- Efficiency at $P_n(\eta P_n)$ and at P(ηP)

Calculations

- Starting time:

$$t_d = \frac{\pi}{30} \cdot N \cdot \frac{(JC/M + JM)}{M_{mot} - M_r}$$

- 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:

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

- Energy to be dissipated during operation

$$Ef = P.\ (1 - \eta P)\ .\ [(OF) \times 3600 - n \times t_d]$$

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

$$E_m = (OF)\ 3600\ .\ P_n(1 - \eta P_n)$$

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

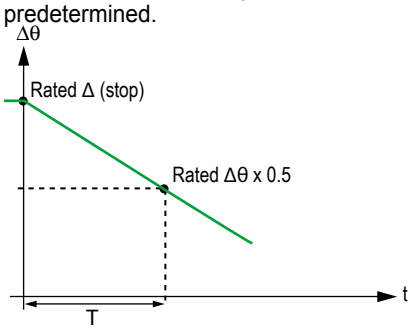
Dimensioning is correct if the following relationship is verified =

$$\boxed{E_m \geq E_d + E_f}$$

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.



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

Cooling curve Δθ = f(t)

where:

Δθ = 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.

APPLICATIONS AND CHOICE OF SOLUTIONS

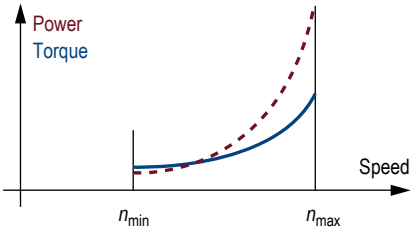
In principle, there are three typical types of load. It is essential to determine the speed range and the application torque (or power) in order to select the drive system:

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, ...

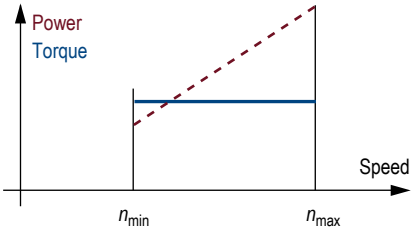


APPLICATIONS WITH CONSTANT TORQUE

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, ...

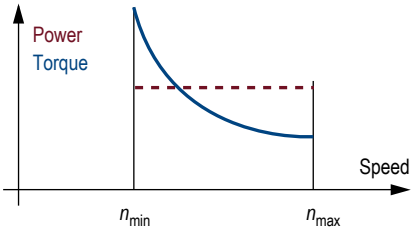


APPLICATIONS WITH CONSTANT POWER

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, ...

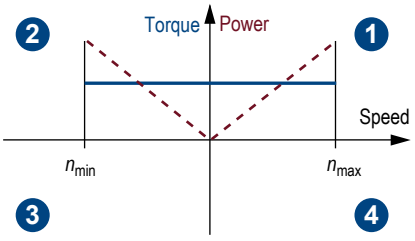


4 QUADRANTS MACHINES

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



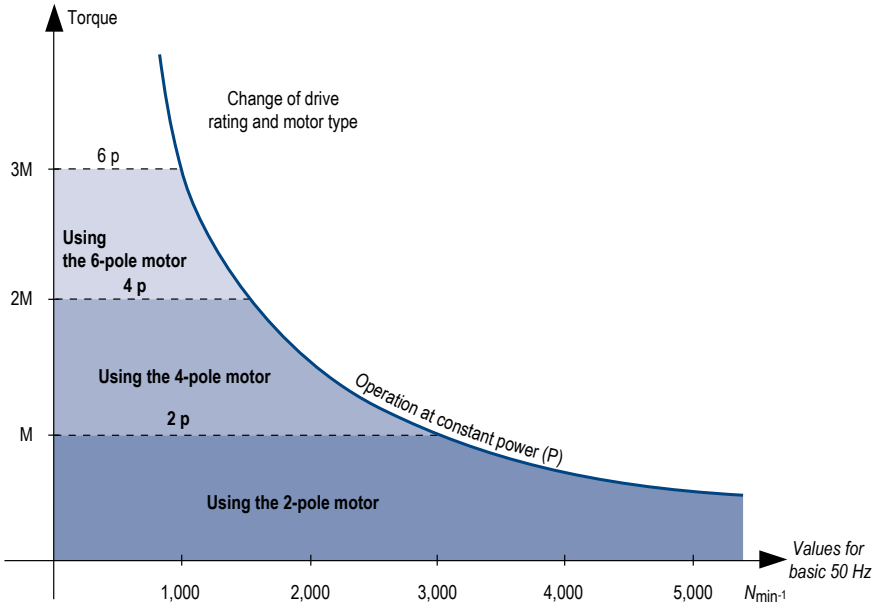
CHOICE OF INVERTER/MOTOR COMBINATION

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 Δ 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^{-1}:
  Selection: 30 kW 4P LSES motor + 100 A drive.

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

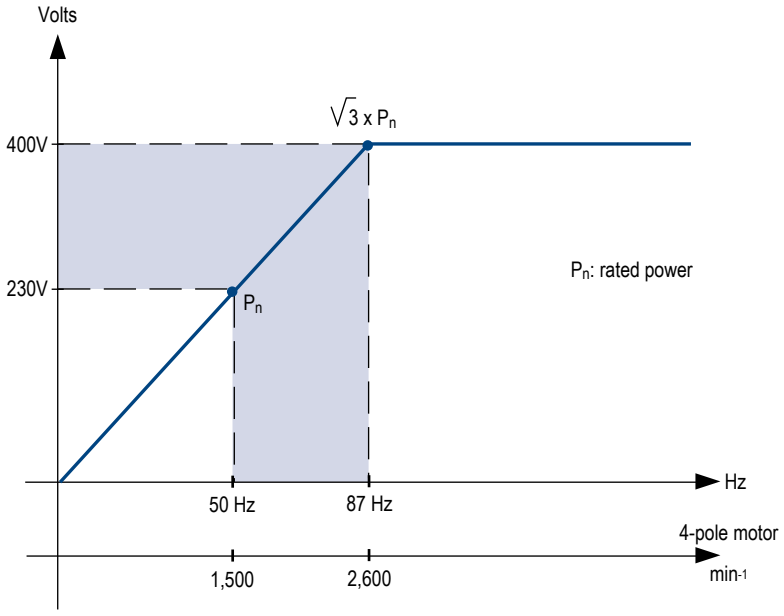
The motors in this catalogue comply with the regulation 640/2009, and its modifications, in the ErP directive.

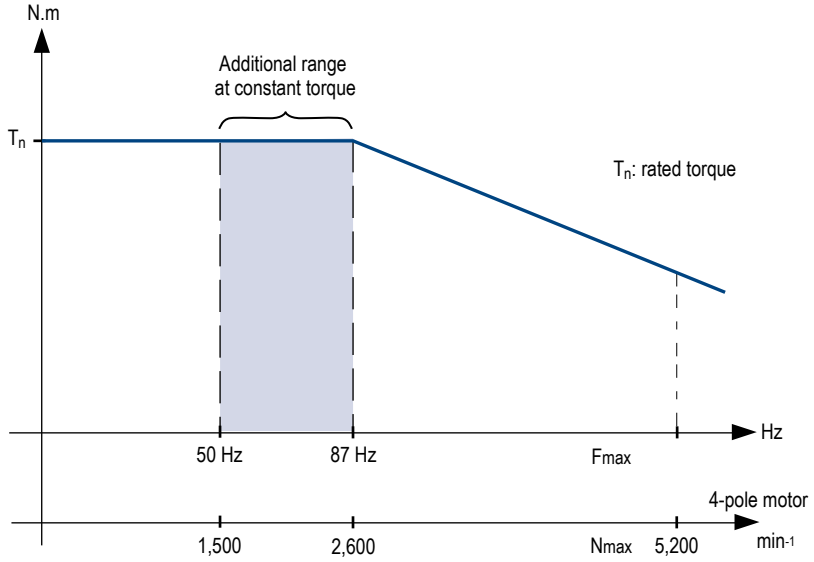
Best practices Motor-drive systems rules are available in the document part number 5626 (www.leroy-somer.com).

The Nidec Leroy-Somer range of drives is extremely well adapted to all the most demanding constraints of the market.

Characteristics of motors on drives

230 V Δ connection 400 V 50 Hz supply





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 Lp or a sound power level Lw 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

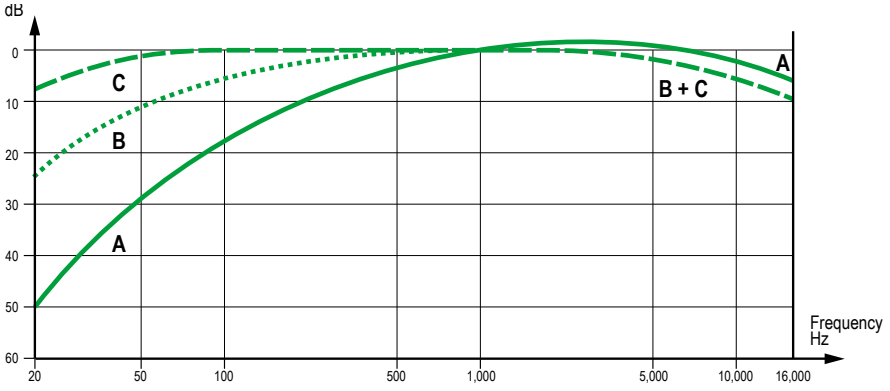
$L_p = 20\log_{10}\left(\frac{P}{P_0}\right)$ $p_0 = 2.10^{-5}$ Pa

Sound power level in dB

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

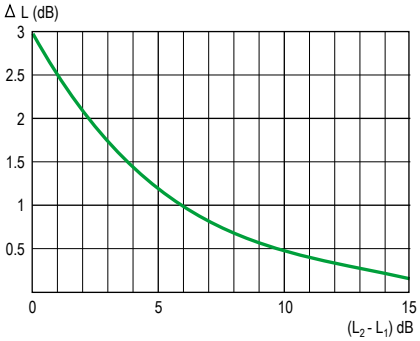
Sound intensity level in dB

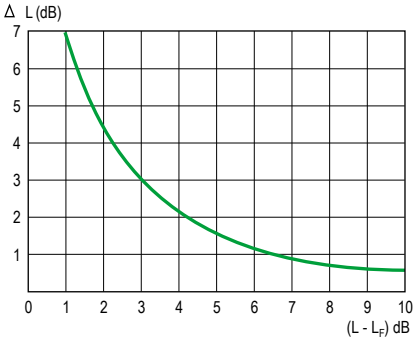
$L_W = 10\log_{10}\left(\frac{I}{I_0}\right)$ $I_0 = 10^{-12}$ W/m²



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 L1 and L2 are the separately measured levels (L2 ≥ L1), the resulting sound level LR will be obtained by the formula:

$$LR = L2 + \Delta L$$

ΔL 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 LF the background noise level, the actual sound level LR will be obtained by the calculation:

$$LR = L - \Delta L$$

ΔL 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.*

Operation
Weighted sound level [dB(A)]

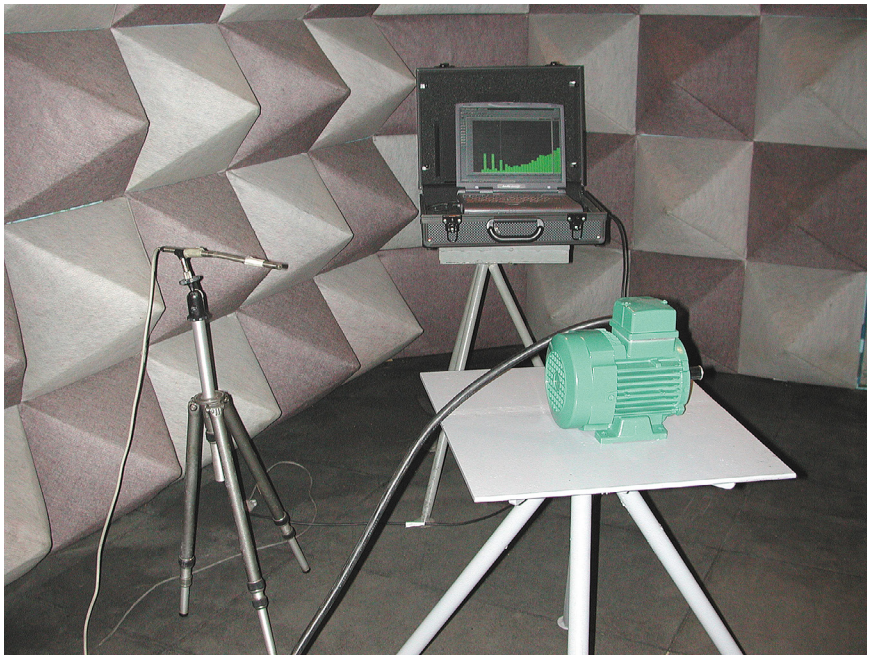
Under IEC 60034-9, the guaranteed values are given for a machine operating at no-load under normal supply conditions (IEC 60034-1), in the actual operating position, or sometimes in the direction of rotation as specified in the design.

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 (Lw) according to the standard, the level of sound is also shown as sound pressure level (Lp) 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.

The machines in this catalogue are in vibration class level A

VIBRATION LEVELS - BALANCING

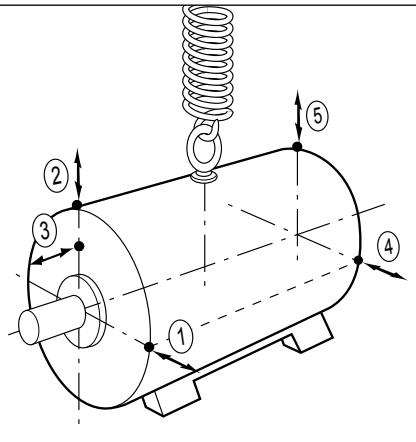
Inaccuracies due to construction (magnetic, mechanical and air-flow) lead to sinusoidal (or pseudo sinusoidal) vibrations over a wide range of frequencies. Other sources of vibrations disturb operation: bad fastening of the frame, incorrect coupling, bushing misalignment, etc.

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.

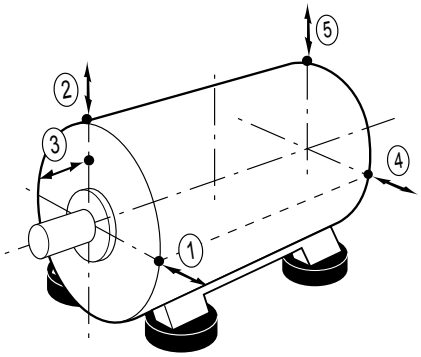
Under standard ISO 8821, rotating machines can be balanced with or without a key or with a half-key on the shaft extension.

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

- Half-key balancing: letter H (standard execution)
- Full key balancing: letter F
- No-key balancing: letter N



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".

IMfinity® motors are half-key balanced as standard. Any coupling element (pulley, coupling sleeve, slip-ring, etc.) must therefore be balanced accordingly.

Check the motor nameplate for balancing information.

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.

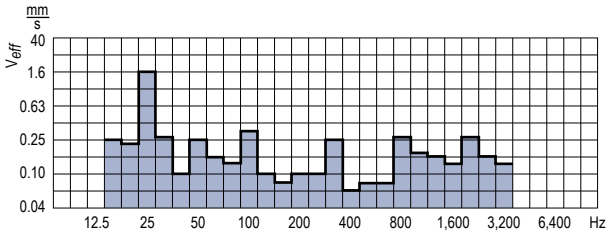
As the vibratory movements are complex and non-harmonic, it is the root mean square (rms) value of the speed of vibration which is used to express the vibration level.

Measured are the vibratory displacement amplitude (in µm) or vibratory acceleration (in m/s2). If the vibratory displacement is measured against frequency, the measured value decreases with the frequency: highfrequency vibrations cannot be measured.

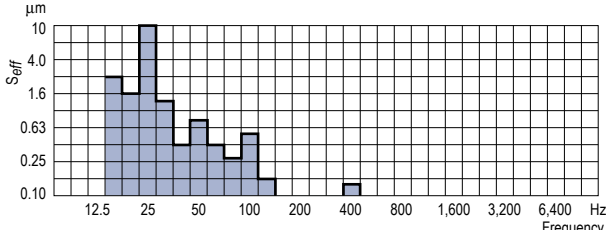
If the vibratory acceleration is measured, the measured value increases with the frequency: low-frequency vibrations (unbalanced loads) cannot be measured here.

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

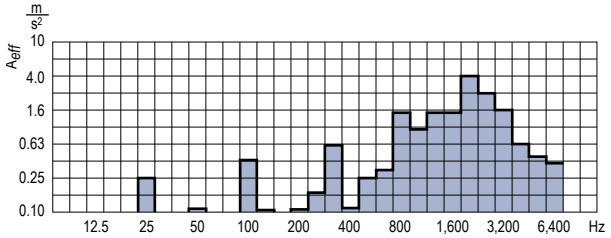
However, if preferred, the table of vibration amplitudes may still be used (for measuring sinusoidal and similar vibrations).



Vibration speed



Vibration amplitude



Vibration acceleration

MAXIMUM VIBRATION MAGNITUDE LIMITS (RMS VALUES), IN TERMS OF DISPLACEMENT, SPEED AND ACCELERATION FOR A FRAME SIZE H (IEC 60034-14 : 2018)

Vibration level	Frame size *HA* (mm)			
	HA ≤ 132		***HA*** > 132	
	Displacement µm	Speed mm/s	Displacement µm	Speed mm/s
A	45	2.8	45	2.8
B	18	1.1	29	1.8

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.

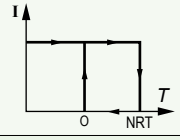
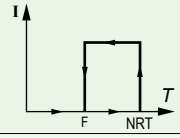
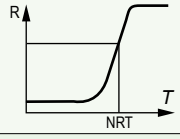
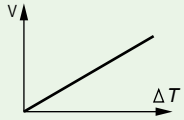
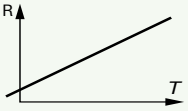
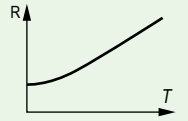
THERMAL PROTECTION

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.

The motors in this catalog are equipped with PTC sensors from frame size ≥ 160 mm

BUILT-IN INDIRECT THERMAL PROTECTIONS

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

** 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.

Starting methods for induction motors

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 D5 ELECTRONIC STARTER

Using the latest electronic control technologies to manage transient phases, the DIGISTART D5 range combines simplicity and user-friendliness while offering the user a high-performance, communicating electronic starter, and can achieve substantial energy savings.

- Range from 24 to 1250A / 200-525V or 380-690V
- Integrated bypass up to 1250 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 20 years of Nidec 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.

• 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

- Settings and diagnostics via mobile application
- Storage: save settings on USB key
- 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.

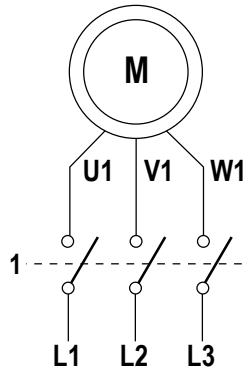
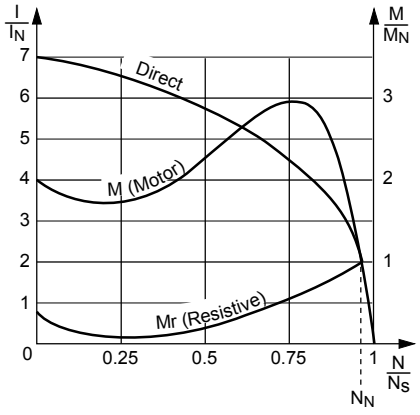
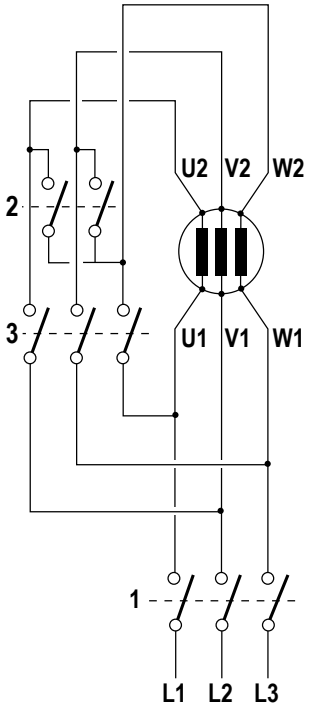
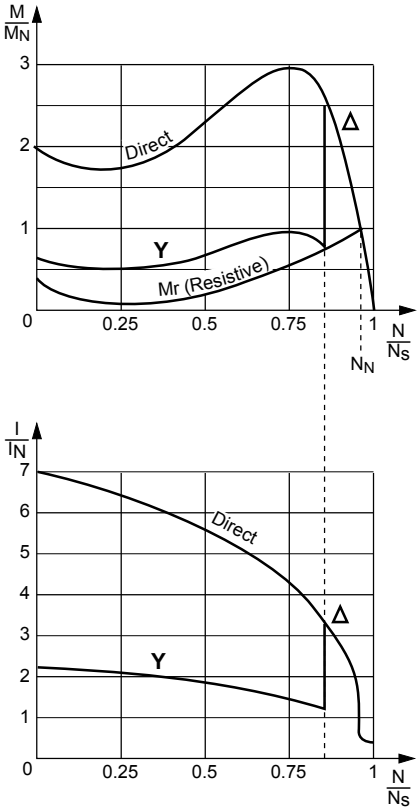
Characteristics:

– 0.25 ≤ P ≤ 7.5 kW
– 50/60 Hz
– Frequency range: 10 to 150 Hz

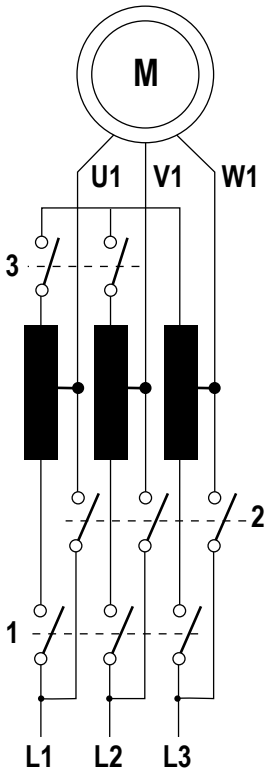
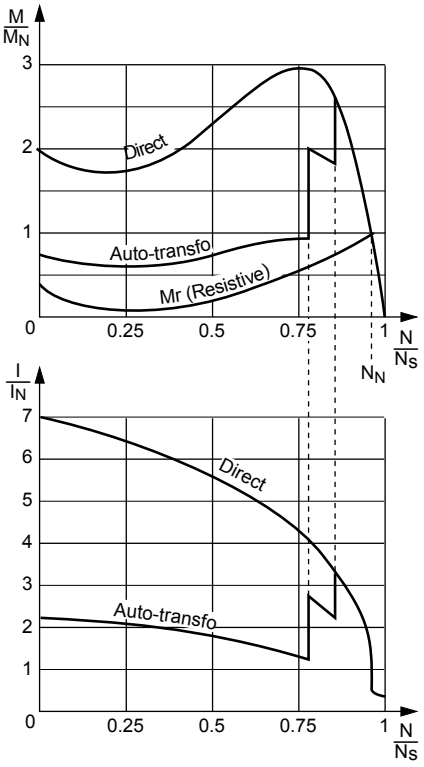
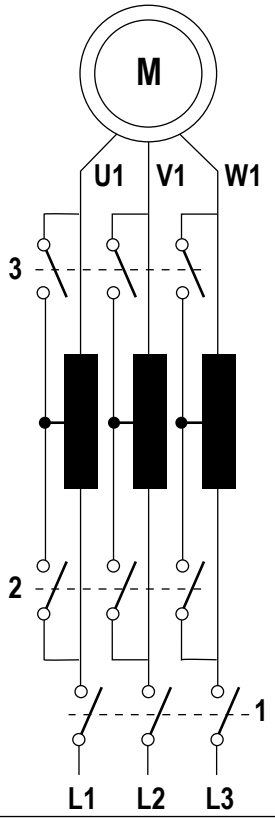
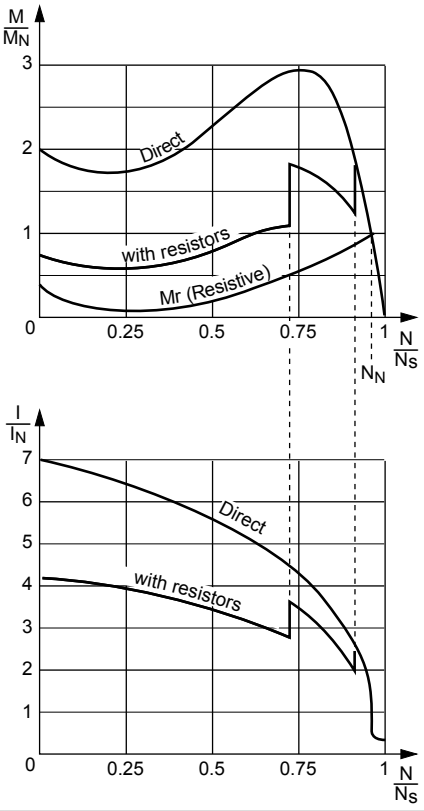
• Starting on variable speed drive

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.

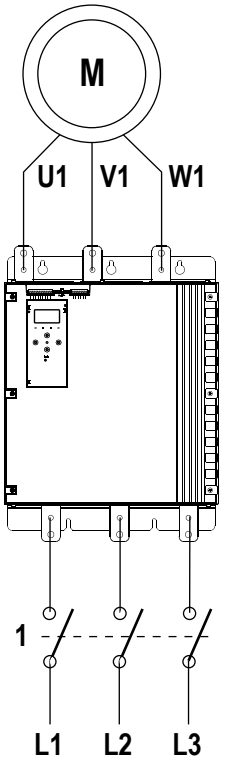
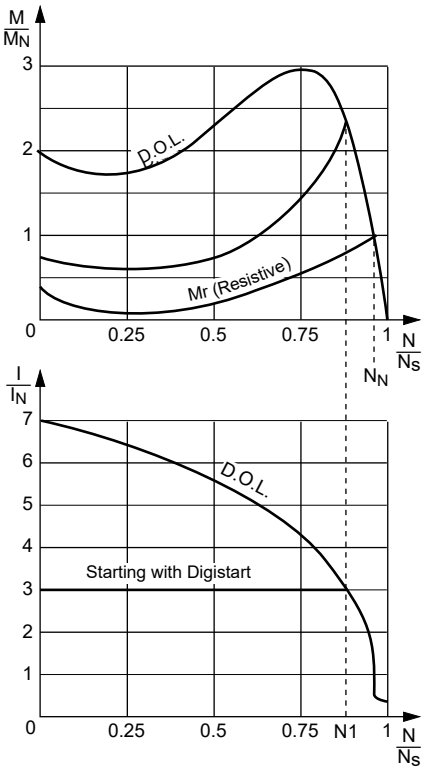
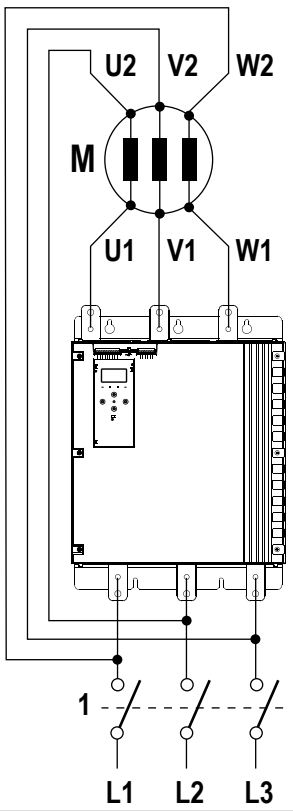
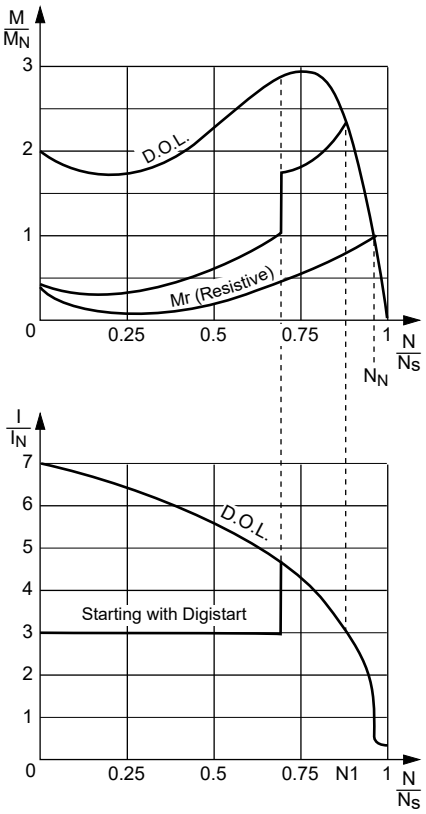
Operation
Starting methods for induction motors

Mode	Outline diagram	Characteristic curves	Number of steps	Starting torque	Starting current	Advantages
D.O.L.			1	M_D	I_D	Simplicity of the equipment High torque Minimum starting time
Star-Delta			2	$M_D / 3$	$I_D / 3$	Starting current divided by 3 Simple equipment 3 contactors including 1 two-pole

Operation
Starting methods for induction motors

Mode	Outline diagram	Characteristic curves	Number of steps	Starting torque	Starting current	Advantages
Soft starting with autotrans-former			n ≥ 3	$K^2.M_D$ $K = \frac{U_{starting}}{U_n}$	$K^2.I_D$	Can be used to select the torque Current reduction proportional to that for the torque No power cut-off
Soft starting with resistors			n	$K^2.M_D$ $K = \frac{U_{starting}}{U_n}$	$K.I_D$	Can be used to select the torque or the current No power cut-off Modest additional cost (1 contactor per step)

Operation
Starting methods for induction motors

Mode	Outline diagram	Characteristic curves	Number of steps	Starting torque	Starting current	Advantages
DIGISTART D5				K^2M_D $K = \frac{U_{starting}}{U_n}$	KI_D	Adjustable on site Choice of torque and current No power cut-off Smooth starting Compact size No maintenance High number of starts Digital Integrated motor and machine protection Serial link
DIGISTART D5 mode «6-wire»				K^2M_D $K = \frac{U_{starting}}{U_n}$	KI_D	Same advantages as the above DIGISTART Current reduced by 35% Suitable for retrofitting on installations Y-D With or without bypass

GENERAL

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

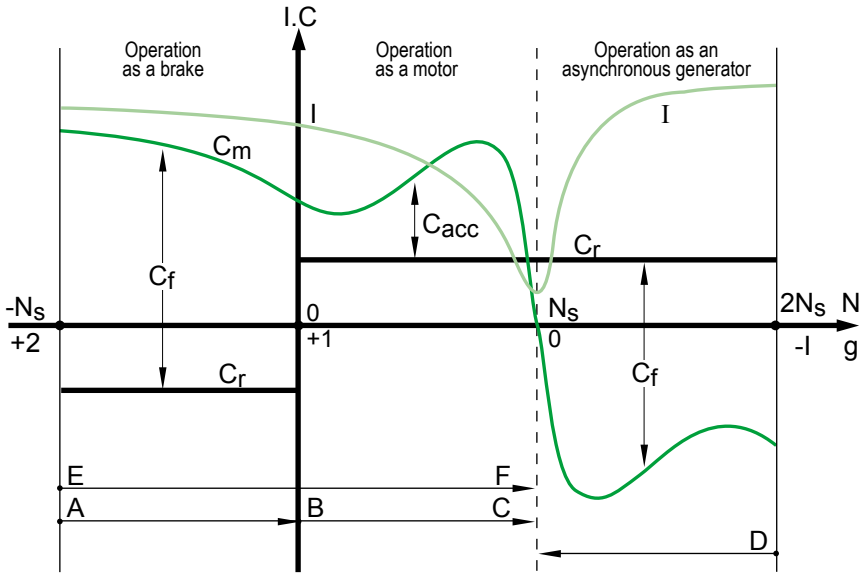
$$C_f = C_m + C_r$$

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:

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

T_f (in s) = braking time
J (in kgm^2) = moment of inertia
N (in min^{-1}) = speed of rotation
C_f (av) (in 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*	g	=	*slip*
C	=	*torque value*	N_s	=	*synchronous speed*
C_f	=	*braking torque*	AB	=	*reverse current braking*
C_r	=	resistive torque	BC	=	*starting, acceleration*
C_m	=	motor torque	DC	=	*regenerative braking*
N	=	*speed of rotation*	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.

Thermically, 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 (O, — N_S).

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

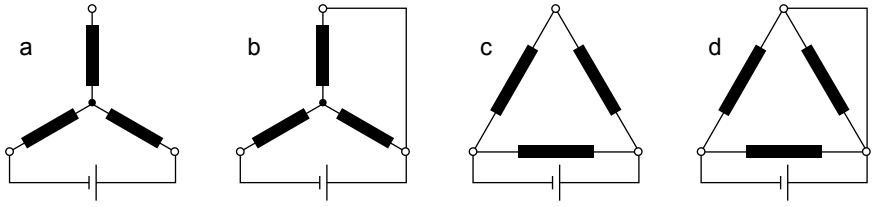
With this braking method, the induction motor is connected to the mains and braking occurs when the A.C. voltage is cut off and D.C. voltage is applied to the stator.

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 Tm = f (N) and is obtained by changing the abscissa variable to N_f = N_S — N.



Motor winding connections for D.C. voltage

The braking current is calculated using the formula:

$$I_f = k1_i \times I_d \sqrt{\frac{C_f - C_{fe}}{k_2 - Cd}}$$

The values of k1 according to the 4 couplings are:

$k1_a = 1.225$ $k1_c = 2.12$

$k1_b = 1.41$ $k1_d = 2.45$

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)

Cfe (in N.m) = external braking torque

Cd (in N.m) = starting torque

J (in kgm2) = total moment of inertia at motor shaft

N (in min-1) = 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:

Uf = k3i . k4 . If . R1

k3 values for the four diagrams are as follows:

$k3_a = 2$ $k3_b = 1.5$

$k3_c = 0.66$ $k3_d = 0.5$

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

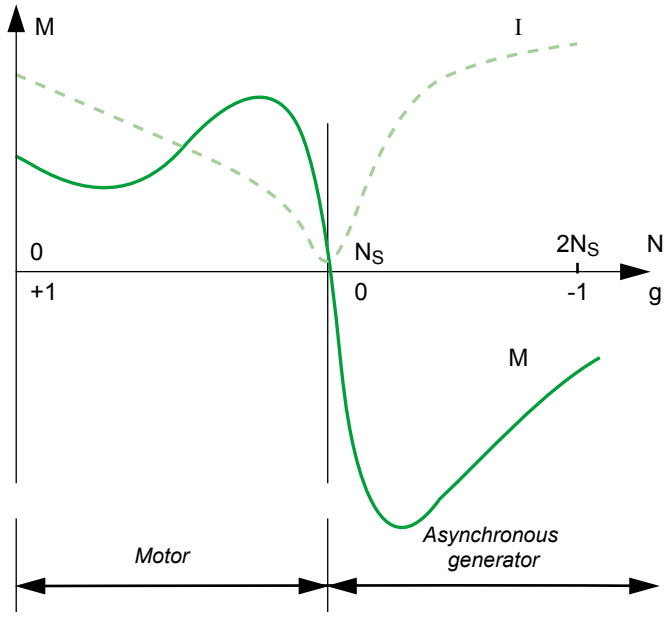
The appropriate brake is selected in the factory according to the number of motor poles, the driven inertia, the number of brakings per hour and the required braking time.

Operation as an asynchronous generator

GENERAL

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

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

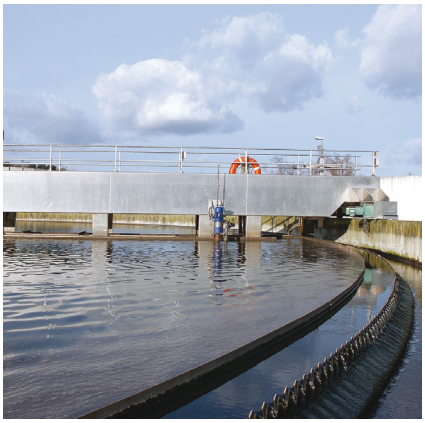
The diagram opposite shows the various operations of an asynchronous machine in relation to its slip (g) or its speed (N).

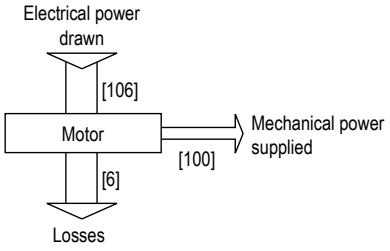
Example: Let us consider an induction motor of 45 kW, 4 poles, 50 Hz at 400 V. As a rough estimate, its characteristics as an asynchronous generator can be deduced from its rated characteristics as a motor, by applying the rules of symmetry.

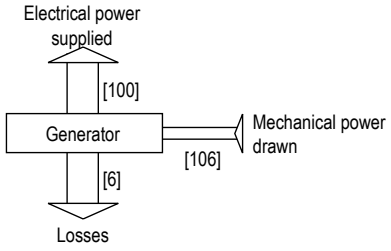
If more precise values are required, the manufacturer should be consulted.

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.

Characteristics	Motor	AG
Synchronism speed (min^{-1})	1500	1500
Rated speed (min^{-1})	1465	1535
Rated torque (m.N)	+ 287	- 287
Rated current under 400 V (A)	87 A (absorbed)	87 A (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 Ns. 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.

• 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 φ = 0.9 (and tan φ = 0.49), supplied by an asynchronous generator with cos φ of 0.8 at 50 kW (and tan φ = 0.75), it is necessary to use a bank of capacitors which supplies: (50 x 0.49) + (50 x 0.75) = 62 kvar.

Electrical and mechanical data
Identification

The information on the nameplates are standardized for the IMfinity range.

They identify the product and ensure production traceability.

Plate materials are adapted to customer applications: aluminum

or stainless steel.

Standard plates are in English and the International System is used for the value units.

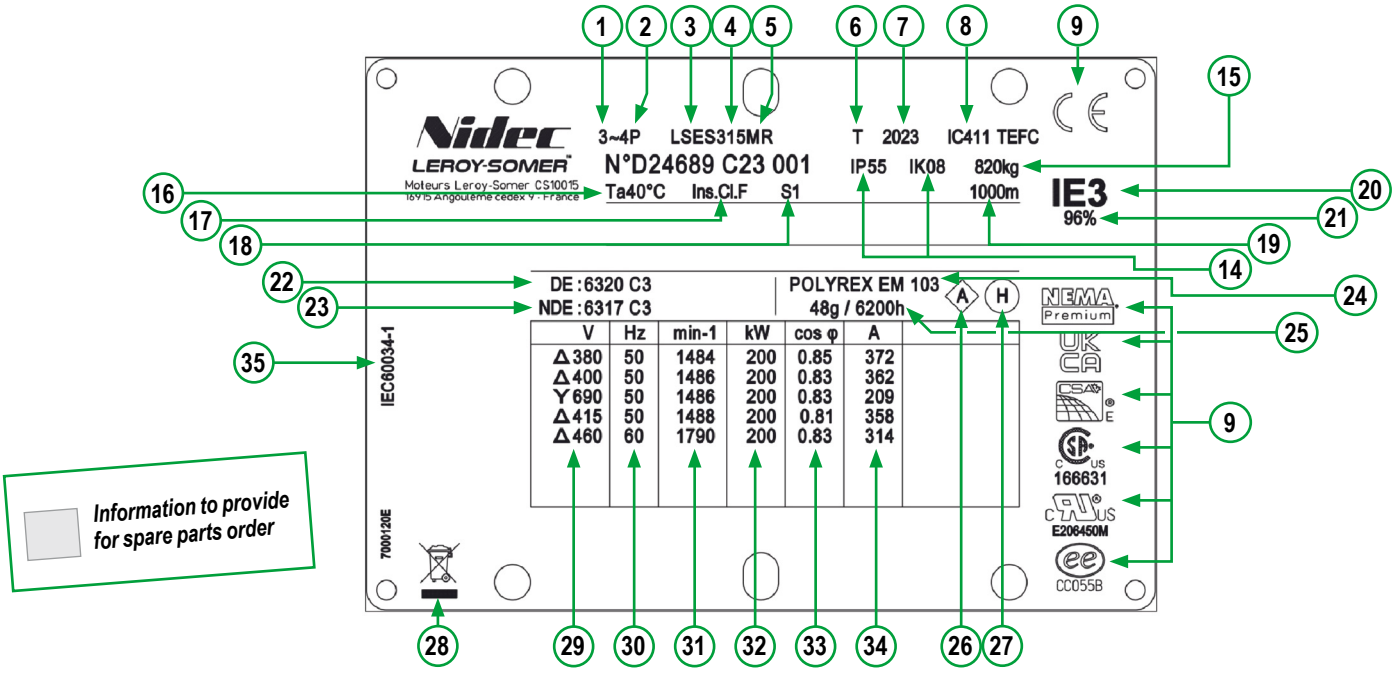
Some additional acronyms may be used, depending on the options of the motor:

- **SGR** (Shaft Grounding Ring): when an AEGIS ring is used
- **RIS** (Reinforced Insulation System): when winding insulation is reinforced
- **IB:** next to the bearing type indicate that the bearing is insulated

DEFINITION OF SYMBOLS USED ON NAMEPLATES

Nameplate for motors powered by mains

1. **3**: three-phase A.C. motor
2. **4**: number of poles
3. **LSES**: series
4. **315**: frame size in mm
5. **MR**: housing type (1st letter 'M' is standardized, the 'R' after is the additional manufacturer designation)
6. **T**: impregnation index
7. **2023**: year of production
8. **IC411**: cooling mode = self-ventilated
9. **CE, UKCA, CURUS, UL, CSA, NEMA Premium, VIK,...**: reference standard and certification used for the design
10. **D24689**: motor serial number
11. **C**: month of production (A = January)
12. **23**: year of production
13. **001**: production order no. (2 or 3 digits)
14. **IP55 - IK08**: degree of protection 'sealing - impact resistance'
15. **820 kg**: motor weight
16. **Ta40° C**: contractual operating ambient temperature
17. **Ins.Cl.F**: insulation class F
18. **S1**: duty (operating) factor
19. **1000m**: maximum installation altitude
20. **IE3**: efficiency class
21. **96%**: efficiency at 4/4 load
22. **DE:6320C3**: drive end, drive end bearing
23. **NDE:6316C3**: non drive end bearing, bearing on end opposite the drive
24. **Polyrex EM 103**: type of grease
25. **48g / 6200h**: mass of grease at each regreasing / regreasing interval
26. Ⓐ: vibration level
27. Ⓗ: balancing mode
28. **symbole DEE**: motor to be sent to separate collection facilities for recovery and recycling.
29. **Δ 380 V**: rated voltage and connection type (Δ or Y)
30. **50 Hz**: supply frequency
31. **1484 min^{-1}**: nominal rotation speed (rpm)
32. **200 kW**: rated power
33. **0.85**: power factor (cos φ)
34. **372**: rated current (A)
35. **IEC60034-1**: reference standard used for motor design



Electrical and mechanical data
Identification

Nameplate for motor powered by the drive *(depending on motor series):*

For information, some data can be reminded on the drive nameplate (refer to nameplate for motors powered by mains).

A 'Enclosure Designation' for the definition of motor enclosure according to NEMA standards
TEFC: self-ventilated with cooling from outside the housing
ODP: self-ventilated with cooling from inside the housing
TENV: cooling from outside the housing, without fan

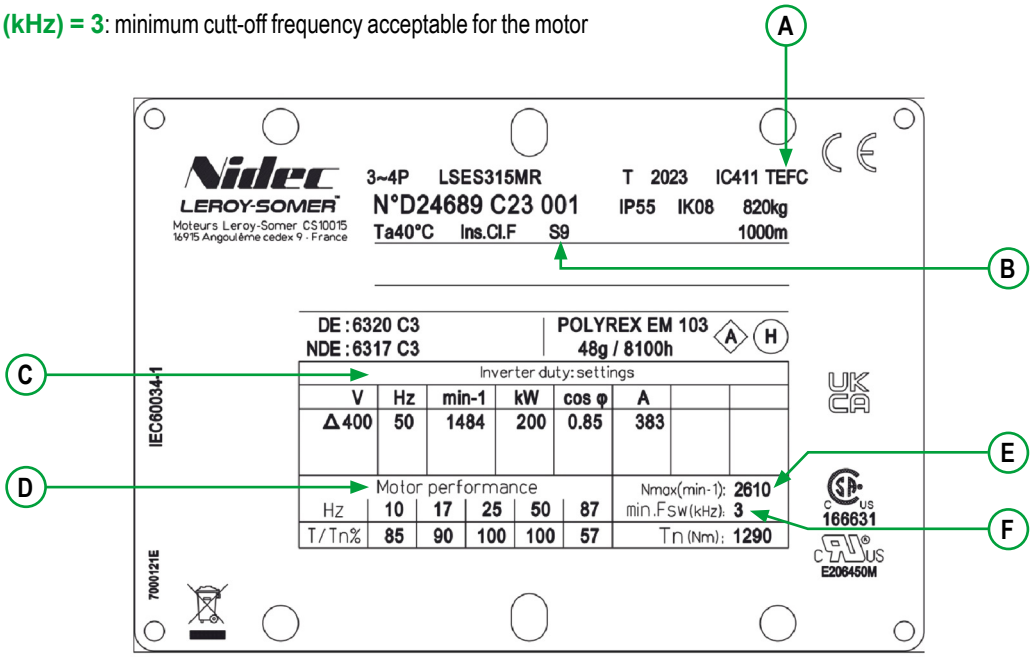
B **S9**: duty (operating) factor

C **Inverter duty - settings**: parameter setting the frequency inverter

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

E **Nmax (min^{-1}): 2610**: maximum mechanical speed acceptable for the motor (information needed when Vmax < 1.2 x plated Vmax

F **Min. Fsw (kHz) = 3**: minimum cutt-off frequency acceptable for the motor



Note : the images used are intended to describe the information processed. Plate dimensions and data location may differ according to product size.

Plated values given for information only.

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.

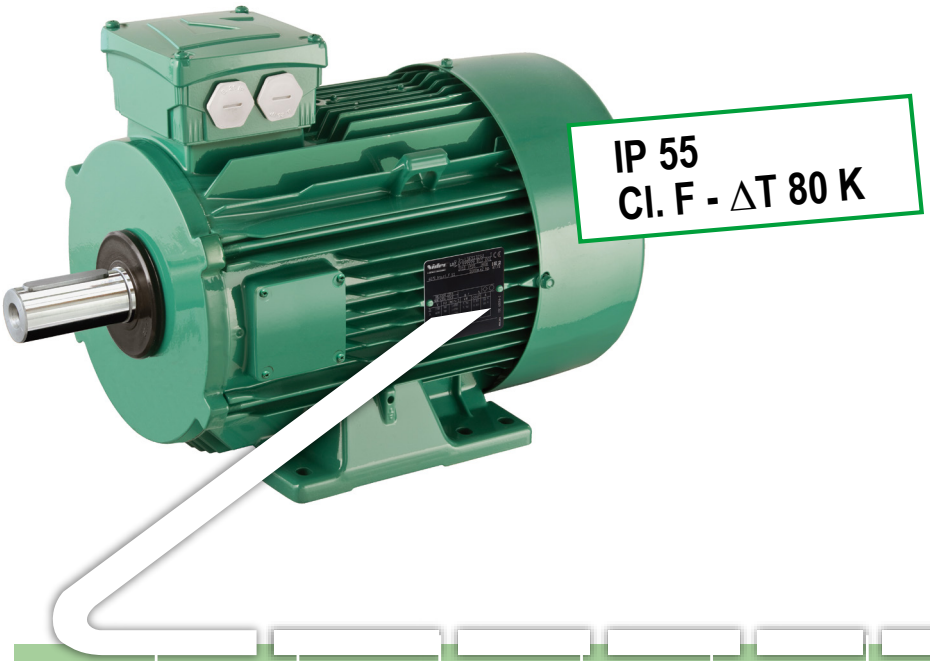
The following table provides a clear vision of compliance of the motors with the different European and North- American regulations and standards.

		Plate marking	CE	cURus	cCSAus	CSAE	ee (CC055B) only IE3	NEMA Premium only IE3	EAC
Aluminium motors LS / LSES	Power < 7.5 kW	2 & 4 P	Standard	Standard	Option	Option	Standard[1]	Standard[1]	Option
		6 P	Standard	Standard	Option	Option	Option	Option	Option
	Power ≥ 7.5 kW	2 & 4 P	Standard	Standard	Standard	Standard	Standard	Standard	Option
		6 P	Standard	Standard	Standard	Option	Option	Option	Option
CILS cast iron motors	Power > 11 kW (excludingIE3 75≥p≥200kW, non CE)	2 & 4 P	Standard	-	-	-	-	-	Option
FLSES cast iron motors	Power > 0.75 kW	2, 4 & 6 P	Standard	Standard	-	-	-	-	Option
PLSES IP 23 Drip-proof motors	Power > 55 kW	2 & 4 P	Standard	Standard	-	-	-	-	Option

1. 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.

General information
Designation



4P	LSES	180	MT	18.5 kW	IFT/IE3	IM 1001	230 / 400 V	50 Hz
1500 min-1						IM B3		

- No. of poles speed(s)
- Series designation
- Frame size IEC 60072
- Housing designation and manufacturer code
- Rated power
- Range / Efficiency class
- Mounting type IEC 60034-7
- Mains voltage
- Mains frequency

Commercial product designation definition

General information
Description

In the standard version. the motors are wound 400 V / 50 Hz:
- power ratings ≤ 5.5 kW: Y connection; 230 / 400 V
- power ratings ≥ 7.5 kW: connection D; 400 / 690 V

Component	Materials	Remarks
Housing with cooling fins	Aluminium alloy	- with integral or screw-on feet, or without feet - 4 or 6 fixing holes for housings with feet - lifting rings for frame size ≥ 100 - earth terminal with an optional jumper screw
Stator	Insulated low-carbon magnetic steel laminations Electroplated copper	- low carbon content guarantees long-term lamination pack stability - semi-enclosed slots - class F insulation
Rotor	Insulated low-carbon magnetic steel laminations	- inclined cage bars - rotor cage pressure die-cast in aluminium (or alloy for special applications) - shrink-fitted to shaft - rotor balanced dynamically, 1/2 key
Shaft	Steel	- for frame size ≤ 160 MP - LR: • tapped hole • closed keyway - for frame size ≥ 160 M - L: • tapped hole • open keyway
End shields	Aluminium alloy	- 56 - 63 - 71 front and rear - 80 - 90 NDE shield
	Cast iron	- 80 - 90 DE shield and optional for 80 and 90 NDE shield - 100 to 315 DE shield and NDE shield
Bearings and lubrication		- permanently greased bearings frame size 56 to 225 - regreasable bearings frame size 250 to 315 - bearings preloaded at non drive end
Labyrinth seal **Lipseals**	Plastic or steel Synthetic rubber	- lipseal or deflector at drive end for all flange mounted motors - lipseal, deflector or labyrinth seal for foot mounted motors
Fan	Composite material or aluminium alloy	- 2 directions of rotation: straight blades
Fan cover	Composite material or pressed steel	- fitted, on request, with a drip cover for operation in vertical position, shaft end facing down (steel cover)
Terminal box	Composite material or aluminium alloy	- IP 55 - can be turned at 90° - fitted with a terminal block with 6 steel terminals as standard (brass as an option) - terminal box fitted with threaded plugs, supplied without cable glands (cable glands as an option) - 1 earth terminal in each terminal box - fixing system consisting of a cover with captive screws

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	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 2014			Power factor		
	P_n kW	M_n N.m	M_d/M_n	M_m/M_n	I_d/I_n	J kg.m²	IM B3 kg	LP db(A)	N_n min⁻¹	I_n A	η 4/4	η 3/4	η 2/4	Cos φ 4/4	Cos φ 3/4	Cos φ 2/4
2 poles																
LS 80L	0.75	2.55	2.15	2.4	5.05	0.00070	8.4	56	2820	1.75	72.10	73.40	71.50	0.85	0.77	0.64
LS 80L	1.1	3.70	2.35	2.6	5.3	0.00090	9.7	56	2830	2.5	75.00	76.33	74.90	0.84	0.77	0.63
LS 90SL	1.5	4.95	2.5	3	6.1	0.0014	13.5	66	2880	3.35	77.20	77.80	76.30	0.84	0.77	0.66
LS 90L	2.2	7.30	2.75	2.9	6.17	0.0021	15.7	67	2870	4.6	79.70	81.10	80.60	0.86	0.80	0.69
LS 100L	3	10	2.85	2.9	6	0.0022	19.5	70	2860	6.45	81.50	82.70	81.50	0.82	0.75	0.62
LS 100L	3.7	12.2	3.65	3.9	8.05	0.0029	24.8	66	2905	7.8	82.70	83.20	82.00	0.83	0.76	0.65
LS 112M	4	13.2	3.55	3.55	7.9	0.0029	24.8	66	2890	8.2	83.10	84.00	83.30	0.85	0.79	0.68
LS 132S	5.5	18	2.3	3.15	7.35	0.0079	35.8	63	2925	11	84.70	85.00	83.30	0.85	0.79	0.67
LS 132S	7.5	24.4	2.65	3.5	8.33	0.0096	39.4	63	2915	14.6	86.00	86.60	85.50	0.86	0.79	0.67
LS 132M	9	29.3	2.15	2.95	6.55	0.011	50.7	71	2935	18	86.80	87.40	86.60	0.83	0.77	0.66
LS 160MP	11	35.8	2.2	3.05	6.77	0.0126	61.2	74	2935	22	89.20	89.40	88.20	0.81	0.74	0.63
LS 160MR	15	48.8	2.65	3.25	7.81	0.015	72.9	75	2935	27.9	90.10	90.70	90.10	0.86	0.82	0.73
LS 160L	18.5	60	2.7	3.36	7.54	0.044	100	72	2945	34.3	91.80	92.50	92.20	0.85	0.81	0.71
LS 180MT	22	71.5	2.65	3.2	7.3	0.052	105	73	2940	41.6	89.90	90.60	90.30	0.85	0.81	0.72
LS 200LR	30	97.1	3.05	3.55	8.25	0.0901	158	74	2950	55.8	90.70	91.10	90.80	0.86	0.82	0.74
LS 200L	37	120	1.95	2.75	6.45	0.117	198	74	2940	67.9	91.20	91.80	91.80	0.86	0.83	0.76
LS 225MT	45	146	2.25	3.3	7.15	0.1389	200	73	2950	83.3	91.70	92.30	92.30	0.85	0.81	0.73
4 poles																
LS 80L	0.55	3.75	2.15	2.3	3.9	0.00128	8.2	61	1405	1.7	66.90	64.60	57.30	0.71	0.59	0.46
LS 80L	0.75	5.1	1.8	2.15	4.25	0.00164	9.2	61	1400	2.05	69.30	68.80	64.00	0.77	0.67	0.53
LS 80L	0.9	6.05	3.1	3.1	5.33	0.0024	11.8	61	1420	2.55	74.30	73.70	69.60	0.69	0.58	0.45
LS 90SL	1.1	7.35	1.5	2.15	4.5	0.00265	12	48	1425	2.5	76.10	78.40	77.60	0.84	0.77	0.64
LS 90L	1.5	10	1.9	2.4	5.25	0.00337	13.8	49	1430	3.3	79.30	80.80	79.80	0.83	0.75	0.62
LS 90L	1.8	12	2	2.55	5.6	0.0038	14.8	54	1435	3.95	79.90	81.30	80.00	0.82	0.74	0.60
LS 100L	2.2	14.6	2.3	2.7	5.7	0.0043	18.8	52	1435	4.8	80.20	81.60	80.40	0.82	0.74	0.61
LS 100L	3	20	2.6	3.1	6.65	0.0057	22.5	50	1435	6.35	82.20	83.70	83.00	0.83	0.76	0.64
LS 112M	4	26.7	2.65	3.05	5.85	0.0062	22.8	51	1430	8.95	81.40	82.40	80.60	0.79	0.70	0.55
LS 132S	5.5	36.1	2.41	3.06	6.33	0.0145	38.3	58	1456	11.5	86.40	87.70	87.60	0.81	0.74	0.60
LS 132M	7.5	49.6	2.29	2.99	5.9	0.0192	47.9	63	1445	15.6	86.40	87.70	87.60	0.80	0.74	0.60
LS 132M	9	59.5	2.4	2.95	6.64	0.0228	51.8	63	1445	17.7	88.10	89.60	89.90	0.83	0.77	0.65
LS 160MP	11	72.3	2.9	3.3	6.85	0.0278	66	63	1450	22.1	88.80	89.70	89.30	0.81	0.72	0.58
LS 160LR	15	98.4	2.85	3.35	7.45	0.0357	79	64	1456	30	89.10	89.90	89.40	0.81	0.73	0.59
LS 180MT	18.5	121	2.1	3.15	7.95	0.0844	100	58	1464	36	89.30	90.10	90.10	0.83	0.77	0.66
LS 180LR	22	143	2.6	3.35	8.35	0.0956	108	60	1466	41.9	89.90	90.70	90.60	0.84	0.79	0.68
LS 200LR	30	196	1.95	2.55	7.6	0.1563	166	64	1464	57.4	90.70	91.60	91.70	0.83	0.78	0.69
LS 225ST	37	240	2.65	2.7	6.14	0.2294	205	64	1474	71	91.90	92.60	92.70	0.82	0.77	0.67
LS 225MR	45	292	2.25	2.35	6.72	0.2885	230	70	1472	85.7	92.30	93.00	92.90	0.82	0.78	0.68
6 poles																
LS 80L	0.37	3.7	2.1	2.45	3.85	0.0032	8.8	41	954	1.30	61.70	58.50	50.30	0.66	0.55	0.44
LS 80L	0.55	5.5	2.55	2.95	3.4	0.0042	10.6	41	956	2.15	61.00	56.80	47.40	0.60	0.50	0.40
LS 90SL	0.75	7.5	1.9	2.4	3.7	0.0033	14.8	43	952	2.25	70.00	70.20	66.80	0.68	0.58	0.44
LS 90L	1.1	11.2	1.85	2.2	3.85	0.0038	16	56	940	3.05	72.90	74.00	72.20	0.71	0.61	0.47
LS 100L	1.5	15.2	1.98	2.28	3.75	0.00437	20.3	70	940	4.00	75.20	77.10	76.00	0.72	0.62	0.48
LS 112MG	2.2	21.9	2.05	2.4	4.75	0.0152	30.4	50	960	5.60	77.70	78.90	78.00	0.73	0.65	0.52
LS 132S	3	29.8	2.35	2.65	5	0.0192	38.4	49	960	7.65	79.70	80.71	79.80	0.71	0.63	0.50
LS 132M	4	39.6	2.15	2.6	5.35	0.02528	47.8	53	964	9.25	81.40	82.80	82.60	0.77	0.71	0.59
LS 132M	5.5	54.4	2.55	2.75	5.6	0.03027	54	58	966	13.10	83.10	84.20	83.60	0.73	0.66	0.53
LS 160M	7.5	73.5	1.7	2.7	5.2	0.0884	82	59	974	17.20	84.70	84.85	83.30	0.74	0.66	0.53
LS 160L	11	109	1.85	2.55	5.23	0.116	90	59	968	23.70	86.40	87.30	86.80	0.78	0.72	0.59
LS 180LR	15	149	1.8	2.5	4.75	0.139	108	59	960	31.90	87.00	88.20	87.80	0.78	0.73	0.61
LS 200LR	18.5	181	2.6	2.85	6.65	0.25	165	58	974	37.70	88.60	89.60	89.70	0.80	0.75	0.64

Electrical and mechanical characteristics
Non IE efficiency - Powered by the mains

Type	Rated power at 50Hz	380V / 50Hz				415V / 50Hz				460V / 60Hz				
		Rated speed	Rated current	Efficiency	Power factor	Rated speed	Rated current	Efficiency	Power factor	Rated power at 60Hz	Rated speed	Rated current	Efficiency	Power factor
	P_n kW	N_n min^{-1}	I_n A	η 4/4	Cos φ 4/4	N_n min^{-1}	I_n A	η 4/4	Cos φ 4/4	P_n kW	N_n min^{-1}	I_n A	η 4/4	Cos φ 4/4
2 poles														
LS 80L	0.75	2790	1.85	70.60	0.88	2840	1.75	72.60	0.82	0.86	3425	1.7	74.70	0.84
LS 80L	1.1	2800	2.6	74.10	0.87	2845	2.5	75.40	0.81	1.26	3435	2.45	77.30	0.84
LS 90SL	1.5	2860	3.45	76.40	0.86	2890	3.35	77.50	0.81	1.72	3475	3.25	78.00	0.85
LS 90L	2.2	2840	4.85	79.70	0.86	2890	4.6	80.10	0.83	2.53	3465	4.55	80.70	0.86
LS 100L	3	2835	6.6	80.70	0.86	2870	6.45	81.40	0.79	3.45	3455	6.25	82.80	0.84
LS 100L	3.7	2890	7.9	82.50	0.86	2910	7.75	82.80	0.80	4.26	3505	7.55	83.60	0.85
LS 112M	4	2875	8.35	82.50	0.85	2900	8.15	83.30	0.82	4.6	3485	7.95	84.00	0.86
LS 132S	5.5	2910	11.1	84.40	0.89	2930	11	84.60	0.82	6.3	3520	10.6	85.20	0.88
LS 132S	7.5	2900	15	85.50	0.89	2925	15.2	85.60	0.80	8.6	3510	14.1	86.60	0.89
LS 132M	9	2925	18.4	86.40	0.86	2940	18.3	86.73	0.79	10.3	3535	17.7	87.30	0.84
LS 160MP	11	2930	21.9	89.10	0.86	2945	22.3	88.90	0.77	12.6	3540	21.1	89.70	0.84
LS 160MR	15	2925	28.6	89.50	0.89	2945	27.5	90.30	0.84	17.2	3540	27.2	90.40	0.88
LS 160L	18.5	2935	35.6	91.20	0.87	2954	34.1	92.00	0.82	21	3545	34.4	89.20	0.87
LS 180MT	22	2930	42.6	89.30	0.88	2945	41	90.20	0.83	25	3545	39.7	90.60	0.87
LS 200LR	30	2945	57.6	90.20	0.88	2954	54.5	90.90	0.84	34	3550	54.2	90.10	0.87
LS 200L	37	2925	70.8	90.30	0.87	2945	67	91.20	0.84	42	3540	66.6	90.90	0.87
LS 225MT	45	2935	86.4	91.20	0.87	2950	81.8	91.80	0.83	52	3545	82.6	92.10	0.86
4 poles														
LS 80L	0.55	1390	1.65	67.50	0.75	1415	1.75	65.50	0.67	0.63	1710	1.6	71.60	0.70
LS 80L	0.75	1380	2.05	68.30	0.81	1410	2.05	69.00	0.73	0.86	1710	1.95	73.30	0.76
LS 80L	0.9	1405	2.5	74.30	0.74	1430	2.65	73.60	0.64	1.04	1720	2.4	76.70	0.70
LS 90SL	1.1	1410	2.6	74.30	0.87	1435	2.45	76.90	0.82	1.26	1730	2.4	78.80	0.84
LS 90L	1.5	1420	3.4	78.10	0.86	1440	3.25	79.60	0.80	1.72	1735	3.2	81.20	0.83
LS 90L	1.8	1425	4.1	78.80	0.85	1445	4	80.70	0.78	2.07	1735	3.9	81.80	0.82
LS 100L	2.2	1425	4.9	79.30	0.86	1445	4.9	80.60	0.78	2.53	1735	4.7	82.40	0.82
LS 100L	3	1425	6.5	81.30	0.86	1440	6.3	82.70	0.80	3.45	1735	6.15	83.80	0.84
LS 112M	4	1420	8.9	80.90	0.84	1440	9.1	81.40	0.75	4.6	1735	8.7	83.40	0.80
LS 132S	5.5	1450	11.4	85.90	0.86	1458	11.6	85.20	0.77	6.3	1756	11	86.70	0.83
LS 132M	7.5	1440	16	85.50	0.83	1450	16.5	86.70	0.73	8.6	1750	14.9	88.00	0.82
LS 132M	9	1435	18.2	87.20	0.86	1452	17.4	89.50	0.81	10.3	1745	17.1	89.40	0.85
LS 160MP	11	1440	22.1	88.00	0.86	1454	21.5	89.30	0.80	12.6	1750	20.9	90.20	0.84
LS 160LR	15	1450	31	88.70	0.83	1458	32.2	88.90	0.73	17.2	1756	29.6	90.40	0.81
LS 180MT	18.5	1460	36.9	88.80	0.86	1468	35.7	89.50	0.81	21	1762	34	92.10	0.84
LS 180LR	22	1460	43.1	89.20	0.87	1468	41.7	89.90	0.81	25	1768	39.9	92.70	0.85
LS 200LR	30	1458	58.4	91.43	0.85	1468	56.6	91.00	0.81	34	1764	54.2	92.90	0.85
LS 225ST	37	1468	73.4	91.20	0.84	1478	69.8	92.20	0.80	42	1774	68.7	92.30	0.83
LS 225MR	45	1466	89.1	91.80	0.84	1474	84.7	92.50	0.80	52	1770	83.7	92.60	0.84
6 poles														
LS 80L	0.37	945	1.25	63.10	0.70	958	1.35	60.80	0.63	0.43	1154	1.25	66.60	0.64
LS 80L	0.55	952	2.05	63.70	0.64	960	2.35	57.90	0.56	0.63	1156	2	66.90	0.59
LS 90SL	0.75	945	2.25	69.90	0.72	956	2.3	70.10	0.65	0.86	1154	2.2	72.80	0.67
LS 90L	1.1	930	3.1	71.70	0.75	945	3.05	73.00	0.68	1.26	1145	3	75.80	0.70
LS 100L	1.5	925	4.05	73.80	0.76	945	4.05	75.50	0.68	1.72	1140	3.8	78.60	0.72
LS 112MG	2.2	952	5.85	76.50	0.75	962	5.6	77.90	0.71	2.53	1160	5.5	79.50	0.73
LS 132S	3	954	7.8	78.80	0.74	964	7.65	79.90	0.68	3.45	1160	7.5	81.60	0.71
LS 132M	4	956	9.6	80.00	0.80	966	9.15	81.60	0.75	4.6	1162	9.1	82.50	0.77
LS 132M	5.5	960	13.4	82.50	0.75	970	13.5	83.40	0.68	6.3	1158	12.4	83.90	0.76
LS 160M	7.5	970	17.3	84.44	0.78	976	17.4	84.55	0.71	8.6	1174	16.6	85.90	0.76
LS 160L	11	962	24.1	85.70	0.81	972	23.3	86.60	0.76	12.6	1162	22.1	87.80	0.82
LS 180LR	15	952	32.2	85.90	0.82	966	31.1	87.30	0.77	17.2	1150	31.4	86.90	0.79
LS 200LR	18.5	968	39.3	87.80	0.82	976	36.8	89.00	0.78	21	1174	36.4	89.30	0.81

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	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 2014			Power factor		
	P_n kW	M_n N.m	M_d/M_n	M_m/M_n	I_d/I_n	J kg.m²	IM B3 kg	LP db(A)	N_n min⁻¹	I_n A	η 4/4	η 3/4	η 2/4	Cos φ 4/4	Cos φ 3/4	Cos φ 2/4
2 poles																
LSES 56 M	**0.12**	0.40	3.8	4.3	3.8	0.00015	3.8	-	2850	0.50	62.0	58.0	50.0	0.55	0.50	0.40
LSES 63 M	**0.18**	0.60	3.0	3.5	4.8	0.00019	4.8	-	2800	0.50	70.0	69.0	65.0	0.75	0.70	0.55
LSES 63 M	**0.25**	0.90	2.9	3.3	5.1	0.00025	6.0	-	2810	0.65	71.0	71.0	66.0	0.80	0.70	0.60
LSES 71 M	**0.37**	1.3	2.7	2.7	4.7	0.00035	6.4	-	2810	0.95	72.0	71.0	67.0	0.80	0.70	0.60
LSES 71 M	**0.55**	1.9	2.6	2.7	4.8	0.00045	7.3	-	2790	1.30	75.0	75.0	73.0	0.80	0.75	0.60
4 poles																
LSES 63 M	**0.12**	0.8	2.4	2.4	3.3	0.00035	4.8	-	1390	0.42	62.0	60.0	53.0	0.65	0.55	0.45
LSES 63 M	**0.18**	1.3	2.1	2.1	3.5	0.00048	5.0	-	1390	0.60	65.0	64.0	60.0	0.70	0.60	0.50
LSES 71 M	**0.25**	1.7	2.1	2.6	4.5	0.00068	6.4	-	1420	0.75	71.0	69.0	65.0	0.65	0.55	0.45
LSES 71 M	**0.37**	2.5	2.1	2.6	4.6	0.00085	7.3	-	1410	1.05	73.0	72.0	69.0	0.70	0.60	0.50
LSES 71 LR	**0.55**	3.7	2.7	3.1	5.4	0.00110	8.3	-	1420	1.45	78.0	77.0	74.0	0.70	0.60	0.45
LSES 80 LG	**0.55**	3.6	2.1	3.1	6.2	0.00265	11.6	-	1454	1.25	82.8	83.4	81.6	0.78	0.70	0.56
6 poles																
LSES 71 LR	**0.12**	1.3	2.3	2.4	2.5	0.00130	7.9	-	930	0.65	53.0	49.0	41.0	0.55	0.45	0.35
LSES 71 M	**0.18**	2	2.2	2.3	2.8	0.00070	6.5	-	910	0.80	58.0	56.0	50.0	0.60	0.50	0.40
LSES 71 M	**0.25**	2.7	2.0	2.0	2.9	0.00110	7.6	-	905	0.95	63.0	63.0	58.0	0.60	0.50	0.40
LSES 80 LG	**0.37**	3.7	1.8	2.3	6.1	0.00265	11.6	-	958	0.95	79.5	80.1	76.9	0.69	0.60	0.47
LSES 80 LG	**0.55**	5.5	2.0	2.3	4.8	0.00265	11.6	-	956	1.45	78.6	78.8	75.9	0.69	0.59	0.46

Electrical and mechanical characteristics
IE2 - Powered by the mains

Type	Rated power at 50Hz	380V / 50Hz				415V / 50Hz				460V / 60Hz				
		Rated speed	Rated current	Efficiency	Power factor	Rated speed	Rated current	Efficiency	Power factor	Rated speed	Rated torque at 60Hz	Rated current	Efficiency	Power factor
	P_n kW	N_n min^{-1}	I_n A	η 4/4	Cos φ 4/4	N_n min^{-1}	I_n A	η 4/4	Cos φ 4/4	N_n min^{-1}	M_n Nm	I_n A	η 4/4	Cos φ 4/4
2 poles														
LSES 56 M	**0.12**	2840	0.46	64.0	0.60	2860	0.55	59.0	0.55		3460	0.46	64.0	0.55
LSES 63 M	**0.18**	2760	0.50	69.0	0.80	2810	0.50	69.0	0.75		3420	0.46	70.0	0.75
LSES 63 M	**0.25**	2780	0.65	71.0	0.80	2830	0.65	71.0	0.75		3430	0.60	72.0	0.75
LSES 71 M	**0.37**	2780	0.95	71.0	0.85	2830	0.95	72.0	0.75		3440	0.85	73.0	0.75
LSES 71 M	**0.55**	2760	1.35	74.0	0.85	2810	1.30	75.0	0.80		3430	1.15	77.0	0.80
4 poles														
LSES 63 M	**0.12**	1370	0.42	62.0	0.70	1400	0.42	61.0	0.60		1710	0.40	64.0	0.60
LSES 63 M	**0.18**	1390	0.60	65.0	0.70	1390	0.60	65.0	0.70		1390	0.60	65.0	0.70
LSES 71 M	**0.25**	1410	0.75	71.0	0.70	1430	0.80	70.0	0.65		1730	0.70	72.0	0.60
LSES 71 M	**0.37**	1400	1.05	73.0	0.75	1420	1.05	73.0	0.65		1730	0.95	75.0	0.65
LSES 71 LR	**0.55**	1410	1.45	77.0	0.75	1430	1.50	77.0	0.65		1730	1.35	79.0	0.65
LSES 80 LG	**0.55**	1445	1.25	81.9	0.81	1458	1.20	83.0	0.76		1754	1.10	84.4	0.78
6 poles														
LSES 71 LR	**0.12**	915	0.6	54.0	0.55	935	0.65	51.0	0.50		1140	0.60	54.0	0.45
LSES 71 M	**0.18**	895	0.8	57.0	0.60	920	0.80	57.0	0.55		1130	0.70	60.0	0.50
LSES 71 M	**0.25**	880	1.0	62.0	0.60	915	0.95	63.0	0.55		1120	0.85	67.0	0.55
LSES 80 LG	**0.37**	952	1.0	78.9	0.73	962	1.00	79.7	0.66		1156	0.90	79.2	0.71
LSES 80 LG	**0.55**	950	1.5	78.1	0.72	960	1.45	78.6	0.66		1152	1.30	78.6	0.71

IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency
IP55 Aluminium frame
Electrical and mechanical characteristics
IE2 - Powered by the drive

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 2014			Power factor		
	P_n kW	M_n N.m	M_d/M_n	M_m/M_n	I_d/I_n	J kg.m²	IM B3 kg	LP db(A)	N_n min⁻¹	I_n A	η 4/4	η 3/4	η 2/4	Cos φ 4/4	Cos φ 3/4	Cos φ 2/4
2 poles																
LSES 80 L	**0.75**	2.5	3.45	3.45	7.75	0.00095	10.4	58	2890	1.6	82.40	82.40	80.20	0.83	0.76	0.64
LSES 80 LG	**1.1**	3.65	2.65	3.25	7.00	0.00223	14.1	64	2885	2.2	85.60	86.90	86.70	0.85	0.80	0.69
LSES 90 SL	**1.5**	4.95	2.95	3.25	7.45	0.00223	15.6	64	2890	3	85.30	86.30	85.50	0.84	0.78	0.67
LSES 90 L	**1.8**	5.95	3.11	3.39	7.52	0.00292	15.6	67	2900	3.75	85.60	86.30	85.60	0.81	0.74	0.61
LSES 90 LU	**2.2**	7.25	3.1	3.4	8	0.00292	20.4	67	2895	4.25	86.90	88.10	87.80	0.86	0.80	0.69
LSES 100 L	**3**	10	3.53	3.43	8.35	0.00364	24.6	67	2885	5.8	87.10	88.30	88.00	0.86	0.81	0.71
LSES 100 LG	**3.7**	12.1	2.08	3.02	7.39	0.00941	32.4	71	2930	6.7	89.30	90.20	89.90	0.89	0.85	0.77
LSES 112 MG	**4**	13.1	2	2.9	7.1	0.00941	32.7	71	2920	7.2	89.00	90.10	90.10	0.90	0.86	0.78
LSES 112 MU	**5.5**	18	2.3	3.05	7.55	0.01116	34.4	63	2925	10.1	89.40	90.50	90.50	0.88	0.84	0.75
LSES 132 S	**5.5**	18	2.3	3.05	7.55	0.01116	39.2	63	2925	10.1	89.40	90.50	90.50	0.88	0.84	0.75
LSES 132 SM	**7.5**	24.4	2.1	2.9	6.8	0.01102	55.7	67	2935	13.8	91.20	92.10	92.10	0.86	0.83	0.74
LSES 132 M	**9**	29.2	2.15	3.25	7.65	0.01203	59.3	67	2945	16.7	91.70	92.40	92.20	0.85	0.81	0.72
LSES 132 MU	**11**	35.7	1.9	2.9	6.95	0.0139	62.6	72	2940	19.9	91.50	92.30	92.10	0.87	0.83	0.74
LSES 160 MP	**11**	35.7	1.9	2.9	6.95	0.0139	70.5	72	2940	19.9	91.50	92.30	92.10	0.87	0.83	0.74
LSES 160 M	**15**	48.6	2.3	2.75	7.86	0.049	95	69	2945	26.5	91.90	92.60	92.60	0.89	0.87	0.81
LSES 160 L	**18.5**	59.9	2.8	3.15	7.6	0.0551	100	68	2950	32.8	92.60	93.30	93.20	0.88	0.84	0.76
LSES 180 MR	**22**	71.1	3.15	3.15	8.67	0.0628	110	69	2954	38.7	93.20	93.90	94.00	0.88	0.85	0.77
LSES 200 LR	**30**	97.3	2.6	3.05	7.65	0.1106	170	73	2945	51.5	93.50	94.20	94.40	0.90	0.88	0.83
LSES 200 L	**37**	120	2	3.05	7.08	0.2492	201	73	2945	63.9	93.90	94.50	94.40	0.89	0.87	0.81
LSES 225 MR	**45**	145	2.67	3.42	7.88	0.1597	227	76	2962	79.7	94.80	95.10	94.70	0.86	0.82	0.73
LSES 250 MZ	**55**	178	2.45	3.45	7.9	0.1754	234	72	2954	97.5	94.70	95.20	95.20	0.86	0.82	0.74
4 poles																
LSES 80 LG	**0.75**	4.95	2.2	2.95	6.39	0.00335	13.6	48	1450	1.6	83.60	84.30	83.00	0.81	0.73	0.59
LSES 80 LG	**0.9**	5.9	2.58	3.08	6.26	0.00381	13.7	48	1452	1.95	83.80	84.40	83.80	0.79	0.70	0.57
LSES 90 SL	**1.1**	7.25	2.45	3.2	6.90	0.00418	16.2	45	1450	2.3	84.80	85.70	85.00	0.81	0.74	0.61
LSES 90 LU	**1.5**	9.85	2.9	3.7	7.65	0.00524	20.4	51	1452	3.2	85.60	86.20	85.10	0.79	0.70	0.57
LSES 100 L	**1.8**	11.8	2.41	2.73	6.42	0.00561	23.7	48	1456	3.8	86.60	87.30	86.10	0.79	0.71	0.57
LSES 100 LR	**2.2**	14.4	3.2	3.75	7.96	0.00676	25.8	47	1454	4.65	87.10	87.70	86.70	0.78	0.70	0.57
LSES 100 LG	**3**	19.6	2.45	3.25	7.21	0.01152	29.5	55	1464	6	89.20	89.90	89.90	0.81	0.74	0.61
LSES 112 MU	**4**	26.2	2.7	3.1	7.23	0.01312	37	54	1456	7.9	88.90	89.80	89.60	0.82	0.77	0.65
LSES 132 SM	**5.5**	35.9	2.8	3.6	8.39	0.02286	52	59	1462	10.5	90.30	91.00	90.60	0.84	0.77	0.62
LSES 132 M	**7.5**	48.9	3.25	3.95	8.90	0.027223	59.1	62	1464	14.6	90.6	91.2	90.7	0.82	0.75	0.73
LSES 160 MR	**9**	58.7	3.1	3.65	8.69	0.03574	77.8	62	1464	17	91.00	91.80	91.70	0.84	0.78	0.67
LSES 160 M	**11**	71.7	2.25	3.05	7.36	0.0712	93	59	1466	20.2	91.40	92.40	92.60	0.86	0.82	0.73
LSES 160 L	**15**	97.3	2.96	3.95	9.25	0.0679	90	60	1472	28.3	92.20	92.70	92.30	0.83	0.77	0.65
LSES 180 M	**18.5**	120	2.95	2.85	7.75	0.1333	130	68	1468	33.9	92.80	93.60	93.50	0.85	0.81	0.72
LSES 180 LUR	**22**	143	3.25	3.15	8.16	0.1555	155	68	1470	41.1	93.00	93.40	93.30	0.83	0.79	0.69
LSES 200 LU	**30**	194	3	2.8	7.31	0.2704	225	63	1476	55	93.70	94.30	94.10	0.84	0.79	0.70
LSES 225 SR	**37**	239	3.25	3.15	7.95	0.2897	236	63	1480	70.2	93.90	94.20	93.80	0.81	0.76	0.65
LSES 225 MG	**45**	289	2.31	2.86	7.25	0.6573	318	70	1486	83.6	94.80	95.00	94.50	0.82	0.77	0.66
LSES 250 ME	**55**	354	2.3	2.7	7.3	0.7793	350	69	1484	101	94.70	95.10	95.00	0.83	0.79	0.70
6 poles																
LSES 90 SL	**0.75**	7.5	1.86	2.32	4.34	0.00378	15.9	56	952	1.95	79.20	80.00	79.10	0.71	0.62	0.48
LSES 90 LU	**1.1**	11	2.35	2.7	4.85	0.00519	21.5	56	956	2.75	81.90	92.30	80.30	0.70	0.61	0.47
LSES 100 LG	**1.5**	14.8	2.35	2.8	5.65	0.01523	30.1	43	966	3.6	83.80	84.40	82.90	0.72	0.63	0.50
LSES 112 MU	**2.2**	21.7	2.3	2.75	5.45	0.01899	37.3	46	966	5.4	84.30	84.80	83.50	0.70	0.61	0.49
LSES 132 SM	**3**	29.5	2.75	3.15	6.6	0.02528	48	50	972	6.8	87.50	88.00	86.90	0.73	0.65	0.53
LSES 132 M	**4**	39.3	2.65	2.9	6.41	0.03027	53.8	56	972	9.05	87.40	88.10	87.10	0.73	0.65	0.53
LSES 132 MU	**5.5**	54.4	2.6	2.85	6.4	0.03699	63.4	57	966	11.7	88.10	89.20	89.10	0.77	0.70	0.58
LSES 160 MU	**7.5**	73.2	2.0	3.05	6.93	0.1295	90	58	978	16.1	89.60	89.74	88.38	0.75	0.67	0.54
LSES 180 L	**11**	107	3.05	3.45	8.65	0.2048	130	62	982	22.6	91.10	91.30	90.30	0.77	0.70	0.57
LSES 180 LUR	**15**	146	3.05	3.15	8.42	0.253	165	63	980	30.7	91.50	91.90	91.30	0.77	0.70	0.58
LSES 200 L	**18.5**	180	2.2	2.85	7.07	0.33	200	61	980	36.2	92.10	92.80	92.60	0.80	0.75	0.66
LSES 200 LU	**22**	214	2.8	3.55	7.35	0.3901	236	62	980	44.6	92.50	92.96	92.53	0.77	0.71	0.61
LSES 225 MG	**30**	291	2.25	2.45	6.6	0.7222	284	64	986	55.3	93.30	93.70	93.30	0.84	0.80	0.70
LSES 250 ME	**37**	358	2.35	2.8	7.07	0.9234	310	64	986	66.9	93.90	94.40	94.30	0.85	0.81	0.72
LSES 280 SC	**45**	437	2.2	2.45	6.62	1.1279	377	64	984	80.4	93.90	94.50	94.50	0.86	0.83	0.74
LSES 280 MD	**55**	533	2.8	3	7.66	1.3995	444	59	986	98.6	94.70	95.20	95.00	0.85	0.81	0.72

Note: for motors from 75kW upwards, see IP55 IE4 cast iron range

Electrical and mechanical characteristics
IE3 - Powered by the mains

Type	Rated power at 50Hz	380V / 50Hz				415V / 50Hz				460V / 60Hz				
		Rated speed	Rated current	Efficiency	Power factor	Rated speed	Rated current	Efficiency	Power factor	Rated speed	Rated torque at 60Hz	Rated current	Efficiency	Power factor
	P_n kW	N_n min^{-1}	I_n A	η 4/4	Cos φ 4/4	N_n min^{-1}	I_n A	η 4/4	Cos φ 4/4	N_n min^{-1}	M_n Nm	I_n A	η 4/4	Cos φ 4/4
2 poles														
LSES 80 L	**0.75**	2875	1.65	81.60	0.85	2900	1.55	82.30	0.81	3505	2.04	1.40	83.30	0.80
LSES 80 LG	**1.1**	2865	2.25	84.60	0.87	2895	2.1	86.20	0.84	3505	3	1.90	87.00	0.83
LSES 90 SL	**1.5**	2880	3.15	84.40	0.86	2900	2.9	86.10	0.83	3510	4.08	2.65	86.90	0.82
LSES 90 L	**1.8**	2885	3.85	85.00	0.84	2910	3.75	85.70	0.78	3515	4.89	3.30	86.90	0.82
LSES 90 LU	**2.2**	2875	4.4	85.90	0.88	2905	4.1	87.30	0.85	3505	5.99	3.70	88.20	0.85
LSES 100 L	**3**	2870	5.95	87.10	0.88	2900	5.65	87.60	0.84	-	-	-	-	-
LSES 100 LG	**3.7**	2915	7.05	88.60	0.90	2935	6.35	89.80	0.88	3545	9.97	5.85	90.30	0.88
LSES 112 MG	**4**	2905	7.6	88.10	0.91	2930	6.95	89.70	0.89	3535	10.81	6.25	90.00	0.89
LSES 112 MU	**5.5**	2910	10.4	89.20	0.90	2930	9.8	89.80	0.87	3540	14.84	8.75	90.70	0.87
LSES 132 S	**5.5**	2910	10.4	89.20	0.90	2930	9.8	89.80	0.87	3540	14.84	8.75	90.70	0.87
LSES 132 SM	**7.5**	2925	14.3	90.40	0.88	2945	13.4	91.50	0.85	3550	20.17	12.00	92.10	0.85
LSES 132 M	**9**	2935	17.2	91.20	0.87	2950	16.4	91.90	0.83	3558	24.16	14.40	92.40	0.85
LSES 132 MU	**11**	2930	20.8	91.20	0.88	2945	19.6	91.80	0.85	3552	29.57	17.40	92.20	0.86
LSES 160 MP	**11**	2930	20.8	91.20	0.88	2945	19.6	91.80	0.85	3552	29.57	17.40	92.20	0.86
LSES 160 M	**15**	2935	27.6	91.90	0.90	2950	25.4	92.20	0.89	3550	40.35	22.90	92.40	0.89
LSES 160 L	**18.5**	2945	34.1	92.40	0.89	2954	32.2	92.90	0.86	3558	49.65	28.60	93.40	0.87
LSES 180 MR	**22**	2945	40.6	92.60	0.89	2958	38.1	93.50	0.86	3564	58.9	33.80	94.00	0.87
LSES 200 LR	**30**	2935	54.3	93.30	0.90	2954	50	93.80	0.89	3556	80.6	44.50	94.00	0.90
LSES 200 L	**37**	2930	66.8	93.70	0.90	2950	62	94.20	0.88	3552	99.5	56.20	93.90	0.88
LSES 225 MR	**45**	2954	82.2	94.50	0.88	2962	79.5	94.90	0.83	3566	121	69.80	95.20	0.85
LSES 250 MZ	**55**	2945	101	94.20	0.88	2958	96	94.90	0.84	3564	147	84.20	95.30	0.86
4 poles														
LSES 80 LG	**0.75**	1440	1.65	82.60	0.83	1452	1.6	83.70	0.78	1758	4.07	1.45	85.10	0.77
LSES 80 LG	**0.9**	1445	2	83.30	0.82	1456	1.95	84.10	0.79	1760	4.88	1.75	85.70	0.76
LSES 90 SL	**1.1**	1445	2.35	84.10	0.84	1454	2.25	85.40	0.79	1760	5.97	2.05	86.60	0.78
LSES 90 LU	**1.5**	1445	3.25	85.30	0.82	1456	3.2	85.70	0.76	1760	8.14	2.85	87.20	0.76
LSES 100 L	**1.8**	1445	3.9	86.00	0.82	1458	3.75	86.80	0.79	1762	9.76	3.35	88.20	0.76
LSES 100 LR	**2.2**	1445	4.75	86.70	0.81	1456	4.6	87.30	0.76	-	-	-	-	-
LSES 100 LG	**3**	1456	6.2	88.70	0.83	1466	6	89.20	0.78	1770	16.2	5.25	90.50	0.79
LSES 112 MU	**4**	1452	8.05	88.60	0.85	1460	7.8	89.00	0.80	1764	21.65	7.05	90.30	0.79
LSES 132 SM	**5.5**	1456	10.8	89.70	0.85	1466	10.3	90.60	0.82	1770	29.67	9.20	91.70	0.82
LSES 132 M	**7.5**	1458	14.8	90.40	0.88	1468	14.5	90.80	0.79	1770	40.4	12.8	91.70	0.80
LSES 160 MR	**9**	1458	17.5	90.90	0.86	1466	16.7	91.30	0.84	1768	48.6	14.90	92.20	0.82
LSES 160 M	**11**	1462	20.8	91.40	0.88	1470	19.6	91.70	0.85	1774	59.2	17.60	92.50	0.85
LSES 160 L	**15**	1468	29.1	92.10	0.85	1474	28.3	92.20	0.80	1776	80.7	25.60	93.20	0.79
LSES 180 M	**18.5**	1466	34.9	92.60	0.87	1474	32.9	93.00	0.84	1774	99.6	29.50	93.60	0.84
LSES 180 LUR	**22**	1466	42.3	93.00	0.85	1474	40.5	93.20	0.81	1770	119	36.30	93.80	0.81
LSES 200 LU	**30**	1472	57.3	93.60	0.85	1478	54.1	94.10	0.82	1778	161	48.00	94.50	0.83
LSES 225 SR	**37**	1476	72.1	93.90	0.83	1482	69.4	93.90	0.79	1782	198	61.40	94.50	0.80
LSES 225 MG	**45**	1486	87.2	94.50	0.83	1488	82.5	94.90	0.80	1788	240	73.40	95.00	0.81
LSES 250 ME	**55**	1482	105	94.60	0.84	1486	98.4	94.90	0.82	1786	294	88.10	95.40	0.82
6 poles														
LSES 90 SL	**0.75**	945	1.95	78.90	0.75	956	1.95	79.70	0.68	-	-	-	-	-
LSES 90 L	**1.1**	950	2.8	81.30	0.74	960	2.8	81.90	0.67	-	-	-	-	-
LSES 100 L	**1.5**	962	3.75	82.80	0.73	970	3.65	83.70	0.68	-	-	-	-	-
LSES 112 MG	**2.2**	960	5.45	84.30	0.73	970	5.4	84.30	0.67	-	-	-	-	-
LSES 132 S	**3**	968	6.8	86.90	0.77	974	6.75	87.70	0.71	-	-	-	-	-
LSES 132 M	**4**	968	9.2	86.80	0.76	974	9.05	87.70	0.70	-	-	-	-	-
LSES 132 M	**5.5**	960	12	88.00	0.79	968	11.5	88.60	0.75	-	-	-	-	-
LSES 160 M	**7.5**	976	16.6	89.30	0.77	980	15.9	97.70	0.73	-	-	-	-	-
LSES 160 LUR	**11**	980	23.2	91.00	0.79	984	22.4	91.40	0.75	1182	88.9	20.1	91.70	0.75
LSES 180 L	**15**	976	31.6	91.20	0.79	982	30.8	91.60	0.74	1184	121	27.2	92.40	0.75
LSES 200 LR	**18.5**	976	37.4	91.70	0.82	982	35.3	92.30	0.79	-	-	-	-	-
LSES 200 L	**22**	978	43.8	92.23	0.79	984	42.2	92.74	0.74	-	-	-	-	-
LSES 225 MR	**30**	984	57.1	92.90	0.86	986	53.9	93.30	0.83	-	-	-	-	-
LSES 250 ME	**37**	984	69	93.60	0.87	988	65.9	94.10	0.83	1188	297	60.0	94.10	0.86
LSES 280 SC	**45**	982	83.9	93.70	0.87	986	78.4	94.00	0.85	1186	362	71.8	94.50	0.87
LSES 280 MD	**55**	984	102	94.30	0.87	988	96.1	94.80	0.84	1190	441	85.3	95.20	0.85

Note: for motors from 75kW upwards, see IP55 IE4 cast iron range

IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency
IP55 Aluminium frame
Electrical and mechanical characteristics
IE3 - Powered by the mains

Type	400V / 50Hz				Rated torque M_n at S1 continuous duty					400V / 87Hz Δ				Maximum mechanical speed[1]
	Rated power	Rated speed	Rated currrent	Power factor	10Hz	17Hz	25Hz	50Hz	87Hz	Rated power	Rated speed	Rated currrent	Power factor	
	P kW	N min^{-1}	I_n A	Cos φ 4/4	N.m	N.m	N.m	N.m	N.m	P kW	N min^{-1}	I_n A	Cos φ 4/4	
2 poles														
LSES 80 L	**0.75**	2875	1.7	0.85	2.5	2.5	2.5	2.5	1.4	**1.31**	5095	2.95	0.85	13500
LSES 80 LG	**1.1**	2870	2.3	0.87	3.7	3.7	3.7	3.7	2.1	**1.91**	5090	4.00	0.87	11700
LSES 90 SL	**1.5**	2880	3.3	0.86	5.0	5.0	5.0	5.0	2.8	**2.61**	5100	5.7	0.86	11700
LSES 90 L	**1.8**	2885	4.0	0.84	6.0	6.0	6.0	6.0	3.4	**1.80**	5105	6.95	0.84	
LSES 90 LU	**2.2**	2895	4.5	0.86	6.2	7.3	7.3	7.3	4.2	**3.8**	5014	7.9	0.86	11700
LSES 100 L	**3**	2885	6.1	0.86	8.5	10	10	10	5.7	**5.2**	4997	10.7	0.86	9900
LSES 112 MG	**4**	2920	7.9	0.89	11.1	13.1	13.1	13.1	7.5	**7**	5058	13.8	0.89	9900
LSES 132 S	**5.5**	2925	10.9	0.87	15.3	18.0	18.0	18.0	10.3	**9.6**	5066	19	0.87	6700
LSES 132 SM	**7.5**	2935	14.7	0.86	20.7	23.2	24.4	24.4	14	**13.1**	5084	25.6	0.86	6700
LSES 132 M	**9**	2945	17.5	0.86	24.8	27.7	29.2	29.2	16.8	**15.7**	5101	30.5	0.86	6700
LSES 160 MP	**11**	2940	21.3	0.86	30.4	33.9	35.7	35.7	20.5	**19.1**	5092	37.1	0.86	6700
LSES 160 MP	**15**	2945	28.7	0.88	41.3	46.2	48.6	48.6	27.9	**26.1**	5101	49.9	0.88	6000
LSES 160 L	**18.5**	2950	35	0.88	50.9	56.9	59.9	59.9	34.4	**32.2**	5110	61	0.88	6000
LSES 180 MR	**22**	2950	41.7	0.88	60.5	67.6	71.2	71.2	40.9	**38.3**	5110	72.5	0.88	5670
LSES 200 LR	**30**	2945	56	0.89	83	88	97	97	-	**-**	-	-	-	4500
LSES 200 LR	**37**	2945	69.5	0.89	96	108	120	120	-	**-**	-	-	-	4500
LSES 225 MR	**45**	2950	83.3	0.89	117	131	146	146	-	**-**	-	-	-	4320
LSES 250 MZ	**55**	2945	93.9	0.89	131	147	164	178	-	**-**	-	-	-	4320
4 poles														
LSES 80 LG	**0.75**	1440	1.7	0.83	5	5	5	5	2.8	**1.31**	2550	3	0.83	11700
LSES 80 LG	**0.9**	1445	2.08	0.82	5.9	5.9	5.9	5.9	3.4	**1.57**	2555	3.63	0.82	
LSES 90 SL	**1.1**	1445	2.5	0.84	7.3	7.3	7.3	7.3	4.1	**1.91**	2555	4.30	0.84	11700
LSES 90 LU	**1.5**	1445	3.45	0.82	9.8	9.8	9.8	9.8	5.6	**2.61**	2555	5.95	0.82	11700
LSES 100 L	**1.8**	1445	4.03	0.82	11.8	11.8	11.8	11.8	6.7	**3.13**	2555	7.01	0.82	
LSES 100 LR	**2.2**	1445	4.9	0.81	14.4	14.4	14.4	14.4	8.2	**3.83**	2555	8.50	0.81	9900
LSES 100 LG	**3**	1456	6.4	0.83	17.6	19.6	19.6	19.6	11.2	**5.22**	2566	11.1	0.83	9900
LSES 112 MU	**4**	1452	8.45	0.85	23.6	26.2	26.2	26.2	14.9	**6.96**	2562	14.7	0.85	9900
LSES 132 SM	**5.5**	1456	11.1	0.87	35.9	35.9	35.9	35.9	20.5	**9.57**	2566	19.3	0.87	6700
LSES 132 M	**7.5**	1458	15.4	0.85	48.9	48.9	48.9	48.9	28.1	**13.1**	2560	16.0	0.88	6700
LSES 160 MR	**9**	1458	18.2	0.86	58.7	58.7	58.7	58.7	33.5	**15.7**	2568	31.6	0.86	6000
LSES 160 MR	**11**	1462	21.7	0.88	64.5	71.7	71.7	71.7	40.9	**19.1**	2572	37.8	0.88	6000
LSES 160 L	**15**	1468	29.19	0.85	87.8	97.6	97.6	97.6	55.1	**26.1**	2578	52.2	0.85	5670
LSES 180 M	**18.5**	1466	36.4	0.87	102	120	120	120	68.4	**32.2**	2576	63.3	0.87	5670
LSES 180 LUR	**22**	1466	44.1	0.85	122	143	143	143	81.5	**38.3**	2576	76.7	0.85	4500
LSES 200 LU	**30**	1472	59.1	0.85	155	175	194	194	111	**52.2**	2582	103	0.85	4500
LSES 225 SR	**37**	1476	74.5	0.83	191	215	239	239	136	**64.4**	2586	130	0.83	4320
LSES 225 MG	**45**	1480	89.0	0.84	247	290	290	290	165	**78.3**	2590	155	0.84	4050
LSES 250 ME	**55**	1482	108	0.84	301	354	354	354	202	**95.7**	2592	188	0.84	4050
6 poles														
LSES 90 SL	**0.75**	945	2.05	0.75	7.6	7.6	7.6	7.6	4.3	**1.31**	1685	3.55	0.75	11700
LSES 90 LU	**1.1**	950	2.85	0.74	11	11	11	11	6.3	**1.91**	1690	5	0.74	11700
LSES 100 LG	**1.5**	962	3.85	0.73	14.8	14.8	14.8	14.8	8.4	**2.61**	1702	6.7	0.73	9900
LSES 112 MU	**2.2**	960	5.65	0.73	21.7	21.7	21.7	21.7	12.4	**3.83**	1700	9.85	0.73	9900
LSES 132 SM	**3**	968	7.15	0.77	29.5	29.5	29.5	29.5	16.8	**5.22**	1708	12.4	0.77	6700
LSES 132 M	**4**	968	9.55	0.76	39.3	39.3	39.3	39.3	22.4	**6.96**	1708	16.6	0.76	6700
LSES 132 MU	**5.5**	960	12.6	0.79	54.4	54.4	54.4	54.4	31	**9.57**	1700	21.9	0.79	6700
LSES 160 MU	**7.5**	974	18.7	0.79	73.2	73.2	73.2	73.2	41.7	**13.1**	1714	32.5	0.79	6700
LSES 180 L	**11**	980	23.9	0.79	96.3	107	107	107	61	**19.1**	1720	41.6	0.79	5670
LSES 180 LUR	**15**	976	32.4	0.79	131	146	146	146	83.2	**26.1**	1716	56.4	0.79	4500
LSES 200 L	**18.5**	976	38.9	0.82	162	180	180	180	103	**32.2**	1716	67.7	0.82	4500
LSES 200 LU	**22**	978	45.0	0.79	193	214	214	214	186	**38.3**	1718	78.2	0.79	4500
LSES 225 MG	**30**	984	58.9	0.86	262	291	291	291	166	**-**	-	-	-	4050
LSES 250 ME	**37**	984	71.1	0.87	322	358	358	358	204	**-**	-	-	-	4050
LSES 280 SC	**45**	982	86.9	0.87	393	437	437	437	249	**-**	-	-	-	3420
LSES 280 MD	**55**	984	105	0.87	480	533	533	533	304	**-**	-	-	-	3420

⚠ **Values given with a voltage drop of 30 V at the drive output**

Note: for motors from 75kW upwards, see IP55 IE4 cast iron range

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 + 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			
	180 M/MR/MT/L/LR/LUR	2 ; 4 ; 6		3	2 ISO x M40 + 1 ISO x M16
	200 L/LR/LU	2 ; 4 ; 6			
	225 ST/SG/SR/MT/MR/MG	2 ; 4 ; 6			2 ISO x M50 + 1 ISO x M16
	250 MZ	2			
	250 ME	4 ; 6			2 ISO x M63 + 1 ISO x M16
	280 SC/MD	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

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.

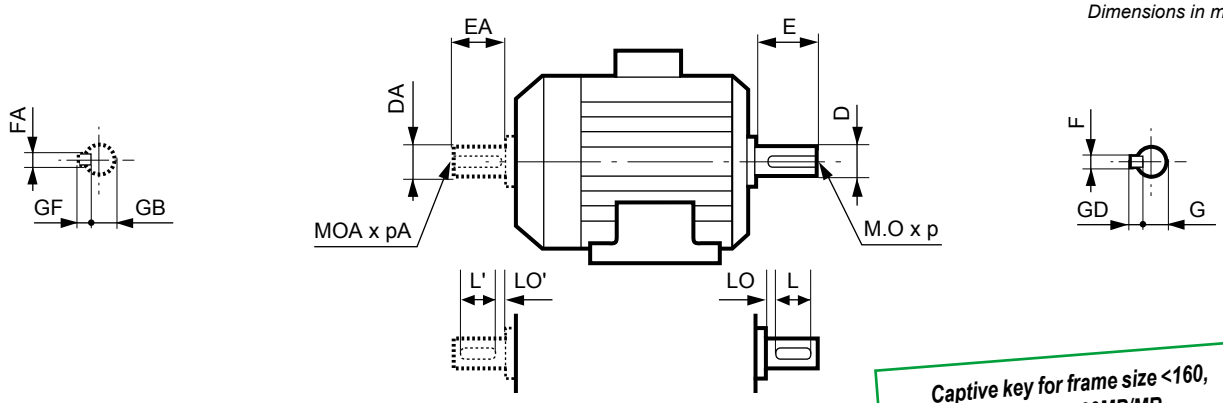
Tightening torque for the nuts on the terminal blocks.

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

LS / LSES series	No. of poles	230/400V connections	400/690V connections
		Terminals	Terminals
56 à 71	2 ; 4 ; 6	M4	-
80 à 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
280 SC	6	M10	M8
280 MD	6	M10	M10

IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency
IP55 Aluminium frame
Dimensions
Shaft extensions

Dimensions in millimetres



Captive key for frame size <160, including 160MP/MR

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 M	3	3	9j6	7	20	4x0.7	10	16	3	3	3	9j6	7	20	4x0.7	10	16	3
LS 63 M	4	4	11j6	8.5	23	4x0.7	10	18	3.5	4	4	11j6	8.5	23	4x0.7	10	18	3.5
LS 71 M/L/LR	5	5	14j6	11	30	5x0.8	15	25	3.5	5	5	14j6	11	30	5x0.8	15	25	3.5
LSES 80 L/LG[1]	6	6	19j6	15.5	40	6x1	16	30	6	6	6	19j6	15.5	40	6x1	16	30	6
LSES 90 L/LU/SL[1]	8	7	24j6	20	50	8x1.25	19	40	6	8	7	24j6	20	50	8x1.25	19	40	6
LSES 100 L/LG/LR[1]	8	7	28j6	24	60	10x1.5	22	50	6	8	7	28j6	24	60	10x1.5	22	50	6
LSES 112 M/MG/MU[1]	8	7	28j6	24	60	10x1.5	22	50	6	-	-	-	-	-	-	-	-	-
LSES 132 M/MU/S/SM/SU[1]	10	8	38k6	33	80	12x1.75	28	63	10	10	8	38k6	33	80	12x1.75	28	63	10
LSES 160 L/LUR/M/MP/MR/MU[1]	12	8	42k6	37	110	16x2	36	100	6	12	8	42k6	37	110	16x2	36	100	6
LSES 180 L/LR/LUR/M/MR/MT[1]	14	9	48k6	42.5	110	16x2	36	98	12	14	9	48k6	42.5	110	16x2	36	98	12
LSES 200 L/LR/LU[1]	16	10	55m6	49	110	20x2.5	42	97	13	16	10	55m6	49	110	20x2.5	42	97	13
LSES 225 MG/MR[1]	18	11	60m6	53	140	20x2.5	42	126	14	16	10	55m6	49	110	20x2.5	42	97	13
LSES 225 MT[1]	-	-	-	-	-	-	-	-	-	16	10	55m6	49	110	20x2.5	42	97	13
LSES 225 SR/ST[1]	18	11	60m6	53	140	20x2.5	42	126	14	-	-	-	-	-	-	-	-	-
LSES 250 ME	18	11	65m6	58	140	20x2.5	42	126	14	18	11	60m6	53	140	20x2.5	42	126	14
LSES 250 MZ	-	-	-	-	-	-	-	-	-	18	11	60m6	53	140	20x2.5	42	126	14
LSES 280 MD/SC	20	12	75m6	67.5	140	20x2.5	42	125	15	-	-	-	-	-	-	-	-	-

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

O : DIN332-DR*

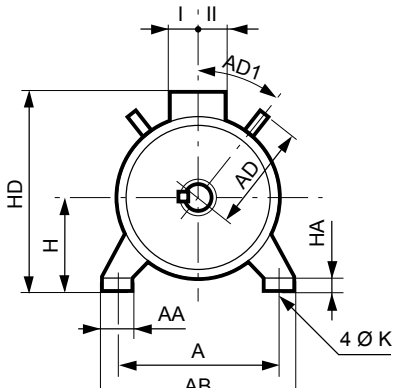
Type	Secondary shaft extensions																	
	4 and 6 poles									2 poles								
	FA	GF	DA	GB	EA	OA	pA	L'	LO'	FA	GF	DA	GB	EA	OA	pA	L'	LO'
LS 56 M	3	3	9j6	7	20	4x0.7	10	16	3	3	3	9j6	7	20	4x0.7	10	16	3
LS 63 M	4	4	11j6	8.5	23	4x0.7	10	18	3.5	4	4	11j6	8.5	23	4x0.7	10	18	3.5
LS 71 M/L/LR	5	5	14j6	11	30	5x0.8	15	25	3.5	5	5	14j6	11	30	5x0.8	15	25	3.5
LSES 80 L/LG[1]	5	5	14j6	11	30	5x0.8	15	25	3.5	5	5	14j6	11	30	5x0.8	15	25	3.5
LSES 90 L/LU/SL[1]	6	6	19j6	15.5	40	6x1	16	30	6	6	6	19j6	15.5	40	6x1	16	30	6
LSES 100 L/LG/LR[1]	8	7	24j6	20	50	8x1.25	19	40	6	8	7	24j6	20	50	8x1.25	19	40	6
LSES 112 M/MG/MU[1]	8	7	24j6	20	50	8x1.25	19	40	6	8	7	24j6	20	50	8x1.25	19	40	6
LSES 132 M/MU/S/SM/SU[1]	8	7	28j6	24	60	10x1.5	22	50	6	8	7	28j6	24	60	10x1.5	22	50	6
LSES 160 MP/MR[1]	10	8	38k6	33	80	12x1.75	28	63	10	10	8	38k6	33	80	12x1.75	28	63	10
LSES 160 L/LUR/M/MU[1]	12	8	42k6	37	110	16x2	36	100	6	12	8	42k6	37	110	16x2	36	100	6
LSES 180 L/LR/LUR/M/MT[1]	14	9	48k6	42.5	110	16x2	36	97	13	14	9	48k6	42.5	110	16x2	36	97	13
LSES 200 L/LR/LU[1]	16	10	55m6	49	110	20x2.5	42	97	13	16	10	55m6	49	110	20x2.5	42	97	13
LSES 225 MG/MR[1]	18	11	60m6	53	140	20x2.5	42	126	14	16	10	55m6	49	110	20x2.5	42	97	13
LSES 225 MT[1]	-	-	-	-	-	-	-	-	-	16	10	55m6	49	110	20x2.5	42	97	13
LSES 225 SR/ST[1]	18	11	60m6	53	140	20x2.5	42	125	15	-	-	-	-	-	-	-	-	-
LSES 250 ME	18	11	60m6	53	140	20x2.5	42	126	14	18	11	60m6	53	140	20x2.5	42	126	14
LSES 250 MZ	-	-	-	-	-	-	-	-	-	18	11	60m6	53	140	20x2.5	42	126	14
LSES 280 MD/SC	18	11	65m6	58	140	20x2.5	42	126	14	-	-	-	-	-	-	-	-	-
LSES 280 SD	18	11	65m6	58	140	20x2.5	42	126	14	-	-	-	-	-	-	-	-	-

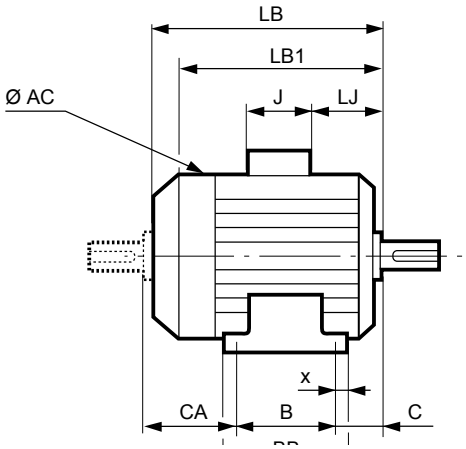
1. The dimensions of frame sizes 80 to 225 motors concern the types LS and LSES

The dimensions given above for secondary shaft extensions can be used to guide motor offers. These are only available on request.

Dimensions
Foot mounted IM 1001 (IM B3)

Dimensions in millimetres



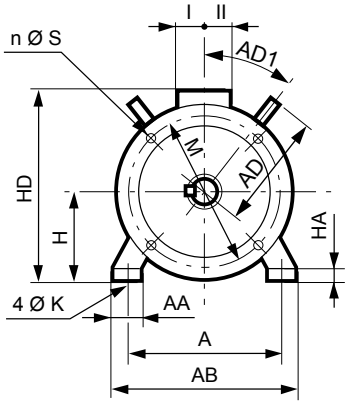


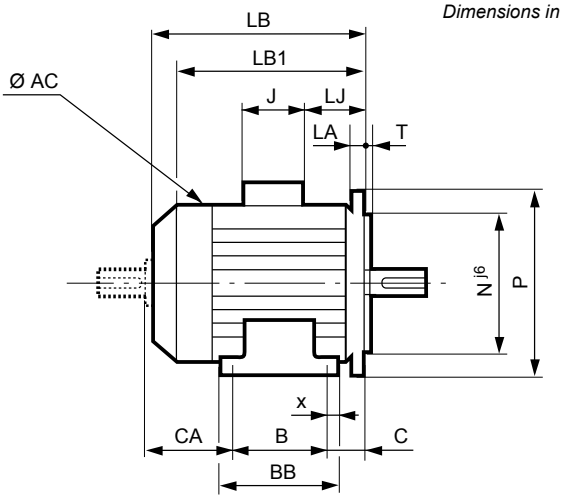
Type	Main dimensions																		
	A	AB	B	BB	C	x	AA	K	HA	H	AC*	HD	LB	LJ	J	I	II	AD	AD1
LSES 56 M	90	104	71	87	36	8	24	6	7	56	110	140	156	16	86	43	43	-	-
LSES 63 M	100	115	80	96	40	8	26	7	9	63	124	152	172	26	86	43	43	-	-
LSES71M	112	126	90	106	45	8	24	7	9	71	140	170	193	21	86	43	43	-	-
LSES 71 LR	112	126	90	104	45	7.5	23	7	9	71	140	171	233	27	80	40	40	-	-
LSES 80 L[1]	125	157	100	120	50	10	29	9	10	80	170	207	215	23.5	90	53	53	-	-
LSES 80 LG[1]	125	157	100	125	50	14	31	9	10	80	189	217	247	23.5	90	53	53	-	-
LSES 90 L[1]	140	172	125	164	56	28	39	10	11	90	189	227	245	23.5	90	53	53	-	-
LSES 90 LU[1]	140	172	125	164	56	28	39	10	11	90	189	227	276	23.5	90	53	53	-	-
LSES 90 SL[1]	140	172	125	164	56	28	39	10	11	90	189	227	245	23.5	90	53	53	-	-
LSES 100 L[1]	160	196	140	165	63	12	40	12	13	100	200	242	290	23.5	90	53	53	118	45
LSES 100 LG[1]	160	196	140	168	63	13	40	12	14	100	227	251	305	22.5	90	53	53	130	45
LSES 100 LR[1]	160	196	140	165	63	12	40	12	13	100	200	242	309	23.5	90	53	53	118	45
LSES 112 M[1]	190	220	140	165	70	13	44	12	14	112	200	254	290	23.5	90	53	53	118	45
LSES 112 MG[1]	190	220	140	165	60	12	52	12	14	112	235	263	305	22.5	90	53	53	-	-
LSES 112 MU[1]	190	220	140	165	60	12	52	12	14	112	235	263	322	22.5	90	53	53	-	-
LSES 132 M[1]	216	250	178	208	89	15	50	12	15	132	272	322	385	16.5	126	63	63	140	45
LSES 132 MU[1]	216	250	178	208	89	15	50	12	15	132	272	322	412	16.5	126	63	63	140	45
LSES 132 S[1]	216	250	140	170	89	15	42	12	16	132	227	304	351	32	126	63	63	130	45
LSES 132 SM[1]	216	250	140	208	89	15	50	12	15	132	272	322	385	16.5	126	63	63	140	45
LSES 132 SU[1]	216	250	140	170	89	15	42	12	16	132	227	304	383	32	126	63	63	130	45
LSES 160 L[1]	254	294	254	294	108	20	60	14.5	25	160	312	395	495	44	134	92	63	186	45
LSES 160 LUR[1]	254	294	254	294	108	20	60	14.5	25	160	312	395	510	44	134	92	63	186	45
LSES 160 M[1]	254	294	210	294	108	20	60	14.5	25	160	312	395	495	44	134	92	63	186	45
LSES 160 MP[1]	254	294	210	294	108	20	64	14	25	160	272	350	468	59	126	63	63	156	45
LSES 160 MR[1]	254	294	210	294	108	20	64	14	25	160	272	350	495	59	126	63	63	156	45
LSES 160 MU[1]	254	294	210	294	108	20	60	14.5	25	160	312	395	510	44	134	92	63	186	45
LSES 180 L[1]	279	339	279	329	121	25	86	14.5	25	180	350	436	552	64	186	112	98	-	-
LSES 180 LR[1]	279	324	279	316	121	20	79	14.5	28	180	312	428	520	55	186	112	98	186	45
LSES 180 LUR[1]	279	339	279	329	121	25	86	14.5	25	180	350	436	614	64	186	112	98	-	-
LSES 180 M[1]	279	339	241	291	121	25	86	14.5	25	180	350	436	552	64	186	112	98	-	-
LSES 180 MR[1]	279	324	241	316	121	20	79	14.5	28	180	312	428	520	55	186	112	98	186	45
LSES 180 MT[1]	279	324	241	316	121	20	79	14.5	28	180	312	428	495	55	186	112	98	186	45
LSES 200 L[1]	318	388	305	375	133	35	103	18.5	36	200	390	476	620.5	77	186	112	98	-	-
LSES 200 LR[1]	318	378	305	365	133	30	108	18.5	30	200	350	456	620	70	186	112	98	-	-
LSES 200 LU[1]	318	388	305	375	133	35	103	18.5	36	200	390	476	669.5	77	186	112	98	-	-
LSES 225 MG[1]	356	420	311	375	149	30	65	18.5	33	225	479	630	810	68	292	151	181	283	45
LSES 225 MR[1]	356	431	311	386	149	50	127	18.5	36	225	390	535	676	61	231	119	141	-	-
LSES 225 MT[1]	356	431	311	386	149	50	127	18.5	36	225	390	535	627	61	231	119	141	-	-
LSES 225 SR[1]	356	431	286	386	149	50	127	18.5	36	225	390	535	676	61	231	119	141	-	-
LSES 225 ST[1]	356	431	286	386	149	50	127	18.5	36	225	390	535	627	61	231	119	141	-	-
LSES 250 ME	406	470	349	420	168	35	90	24	35	250	479	655	810	68	292	151	181	283	45
LSES 250 MZ	406	470	349	449	168	70	150	24	47	250	390	560	676	61	231	119	141	-	-
LSES 280 MD	457	520	419	478	190	35	90	24	35	280	479	685	870	68	292	151	181	283	45
LSES 280 SC	457	520	368	478	190	35	90	24	35	280	479	685	810	68	292	151	181	283	45

** AC: housing diameter without lifting rings*
1. The dimensions of frame sizes 80 to 225 motors concern the types LSES

IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency
IP55 Aluminium frame
Dimensions
Foot and flange IM 2001 (IM B35)

Dimensions in millimetres



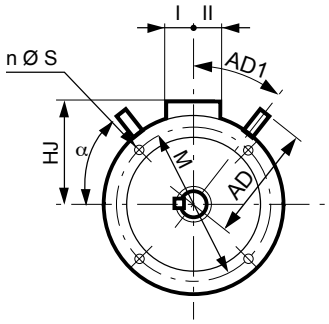


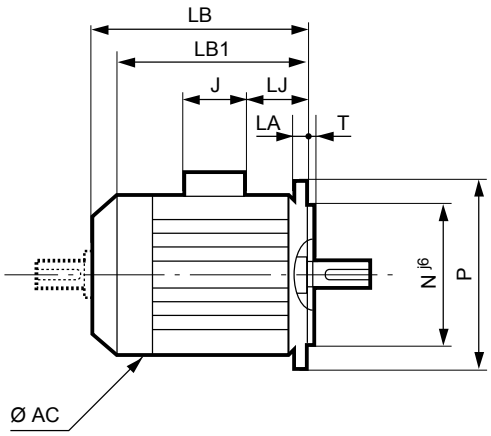
Type	Main dimensions																			
	A	AB	B	BB	C	x	AA	K	HA	H	AC*	HD	LB	LJ	J	I	II	AD	AD1	Symb
LS 56 M	90	104	71	87	36	8	25	6	7	56	110	140	156	16	86	43	43	-	-	FF 100
LS 63 M	100	115	80	96	40	8	26	7	9	63	124	152	172	26	86	43	43	-	-	FF 115
LS 71 M/L	112	125	90	106	45	8	24	7	9	71	140	170	193	26	86	43	43	-	-	FF 130
LSES 71 LR	112	126	90	104	45	7	23	7	9	71	140	171	233	27	80	40	40	-	-	FF130
LSES 80 L[1]	125	157	100	120	50	10	29	9	10	80	170	207	215	23.5	90	53	53	-	-	FF165
LSES 80 LG[1]	125	157	100	125	50	14	31	9	10	80	189	217	247	23.5	90	53	53	-	-	FF165
LSES 90 L[1]	140	172	125	164	*56*	28	39	10	11	90	189	227	245	23.5	90	53	53	-	-	FF165
LSES 90 LU[1]	140	172	125	164	56	28	39	10	11	90	189	227	276	23.5	90	53	53	-	-	FF165
LSES 90 SL[1]	140	172	125	164	56	28	39	10	11	90	189	227	245	23.5	90	53	53	-	-	FF165
LSES 100 L[1]	160	196	140	165	63	12	40	12	13	100	200	242	290	23.5	90	53	53	118	45	FF215
LSES 100 LG[1]	160	196	140	168	63	13	40	12	14	100	227	251	305	22.5	90	53	53	130	45	FF215
LSES 100 LR	160	196	140	165	63	12	40	12	13	100	200	242	309	23.5	90	53	53	118	45	FF215
LSES 112 M[1]	190	220	140	165	70	13	44	12	14	112	200	254	290	23.5	90	53	53	118	45	FF215
LSES 112 MG[1]	190	220	140	165	60	12	52	12	14	112	235	263	305	22.5	90	53	53	-	-	FF215
LSES 112 MU[1]	190	220	140	165	60	12	52	12	14	112	235	263	322	22.5	90	53	53	-	-	FF215
LSES 132 M[1]	216	250	178	208	89	15	50	12	15	132	272	322	385	16.5	126	63	63	140	45	FF265
LSES 132 MU[1]	216	250	178	208	89	15	50	12	15	132	272	322	412	16.5	126	63	63	140	45	FF265
LSES 132 S[1]	216	250	140	170	89	15	42	12	16	132	227	304	351	32	126	63	63	130	45	FF265
LSES 132 SM[1]	216	250	140	208	89	15	50	12	15	132	272	322	385	16.5	126	63	63	140	45	FF265
LSES 132 SU[1]	216	250	140	170	89	15	42	12	16	132	227	304	383	32	126	63	63	130	45	FF265
LSES 160 L[1]	254	294	254	294	108	20	60	14.5	25	160	312	395	495	44	134	92	63	186	45	FF300
LSES 160 LUR[1]	254	294	254	294	108	20	60	14.5	25	160	312	395	510	44	134	92	63	186	45	FF300
LSES 160 M[1]	254	294	210	294	108	20	60	14.5	25	160	312	395	495	44	134	92	63	186	45	FF300
LSES 160 MP[1]	254	294	210	294	108	20	64	14	25	160	272	350	468	59	126	63	63	156	45	FF300
LSES 160 MR[1]	254	294	210	294	108	20	64	14	25	160	272	350	495	59	126	63	63	156	45	FF300
LSES 160 MU[1]	254	294	210	294	108	20	60	14.5	25	160	312	395	510	44	134	92	63	186	45	FF300
LSES 180 L[1]	279	339	279	329	121	25	86	14.5	25	180	350	436	552	64	186	112	98	-	-	FF300
LSES 180 LR[1]	279	324	279	316	121	20	79	14.5	28	180	312	428	520	55	186	112	98	186	45	FF300
LSES 180 LUR[1]	279	339	279	329	121	25	86	14.5	25	180	350	436	614	64	186	112	98	-	-	FF300
LSES 180 M[1]	279	339	241	291	121	25	86	14.5	25	180	350	436	552	64	186	112	98	-	-	FF300
LSES 180 MR[1]	279	324	241	316	121	20	79	14.5	28	180	312	428	520	55	186	112	98	186	45	FF300
LSES 180 MT[1]	279	324	241	316	121	20	79	14.5	28	180	312	428	495	55	186	112	98	186	45	FF300
LSES 200 L[1]	318	388	305	375	133	35	103	18.5	36	200	390	476	620.5	77	186	112	98	-	-	FF350
LSES 200 LR[1]	318	378	305	365	133	30	108	18.5	30	200	350	456	620	70	186	112	98	-	-	FF350
LSES 200 LU[1]	318	388	305	375	133	35	103	18.5	36	200	390	476	669.5	77	186	112	98	-	-	FF350
LSES 225 MG[1]	356	420	311	375	149	30	65	18.5	33	225	479	630	810	68	292	151	181	283	45	FF400
LSES 225 MR[1]	356	431	311	386	149	50	127	18.5	36	225	390	535	676	61	231	119	141	-	-	FF400
LSES 225 MT[1]	356	431	311	386	149	50	127	18.5	36	225	390	535	627	61	231	119	141	-	-	FF400
LSES 225 SR[1]	356	431	286	386	149	50	127	18.5	36	225	390	535	676	61	231	119	141	-	-	FF400
LSES 225 ST[1]	356	431	286	386	149	50	127	18.5	36	225	390	535	627	61	231	119	141	-	-	FF400
LSES 250 ME	406	470	349	420	168	35	90	24	35	250	479	655	810	68	292	151	181	283	45	FF500
LSES 250 MZ	406	470	349	449	168	70	150	24	47	250	390	560	676	61	231	119	141	-	-	FF500
LSES 280 MD	457	520	419	478	190	35	90	24	35	280	479	685	870	68	292	151	181	283	45	FF500
LSES 280 SC	457	520	368	478	190	35	90	24	35	280	479	685	810	68	292	151	181	283	45	FF500

AC: housing diameter without lifting rings
1. The dimensions of frame sizes 80 to 225 motors concern the types LS and LSES

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

Dimensions in millimetres





Type	Main dimensions								
	AC*	LB	HJ	LJ	J	I	II	AD	AD1
LS 56 M	110	156	84	16	86	43	43	-	-
LS 63 M	124	172	89	26	96	43	43	-	-
LS 71 M/L	140	193	99	26	86	43	43	-	-
LSES 71 LR	140	233	100	27	80	40	40	-	-
LSES 80 L[1]	170	215	127	23.5	90	53	53	-	-
LSES 80 LG[1]	189	267	137	43.5	90	53	53	-	-
LSES 90 L[1]	189	265	137	43.5	90	53	53	-	-
LSES 90 LU[1]	189	296	137	43.5	90	53	53	-	-
LSES 90 SL[1]	189	265	137	43.5	90	53	53	-	-
LSES 100 L[1]	200	290	142	23.5	90	53	53	-	-
LSES 100 LG[1]	235	305	151	23.5	90	53	53	-	-
LSES 100 LR[1]	200	309	142	23.5	90	53	53	-	-
LSES 112 M[1]	200	290	142	23.5	90	53	53	-	-
LSES 112 MG[1]	235	315	151	33.5	90	53	53	-	-
LSES 112 MU[1]	235	332	151	33.5	90	53	53	-	-
LSES 132 M[1]	272	385	190	16.5	126	63	63	140	45
LSES 132 MU[1]	272	412	190	16.5	126	63	63	140	45
LSES 132 S[1]	227	351	172	32	126	63	63	130	45
LSES 132 SM[1]	272	385	190	16.5	126	63	63	140	45
LSES 132 SU[1]	227	383	172	32	126	63	63	130	45
LSES 160 L[1]	312	495	235	44	134	92	63	186	45
LSES 160 LUR[1]	312	510	235	44	134	92	63	186	45
LSES 160 M[1]	312	495	235	45	134	92	63	186	45
LSES 160 MP[1]	272	468	190	59	126	63	63	186	45
LSES 160 MR[1]	272	495	190	59	126	63	63	186	45
LSES 160 MU[1]	312	510	235	45	134	92	63	186	45
LSES 180 L[1]	350	552	256	64	186	112	98	-	-
LSES 180 LR[1]	312	520	248	54	186	112	98	186	45
LSES 180 LUR[1]	350	614	256	64	186	112	98	-	-
LSES 180 M[1]	350	552	256	64	186	112	98	-	-
LSES 180 MR[1]	312	520	248	54	186	112	98	186	45
LSES 180 MT[1]	312	495	248	54	186	112	98	186	45
LSES 200 L[1]	390	620.5	276	77.5	186	112	98	-	-
LSES 200 LR[1]	350	620	256	70	186	112	98	-	-
LSES 200 LU	390	669.5	276	77.5	186	112	98	-	-
LSES 225 MG[1]	479	810	405	68	292	151	181	283	45
LSES 225 MR[1]	390	676	310	61	231	119	141	-	-
LSES 225 MT[1]	390	627	310	61	231	119	141	-	-
LSES 225 SR[1]	390	676	310	61	231	119	141	-	-
LSES 225 ST[1]	390	627	310	61	231	119	141	-	-
LSES 250 ME	479	810	405	68	292	151	181	283	45
LSES 250 MZ	390	676	310	61	231	119	141	-	-
LSES 280 MD	479	870	405	68	292	151	181	283	45
LSES 280 SC	479	810	405	68	292	151	181	283	45

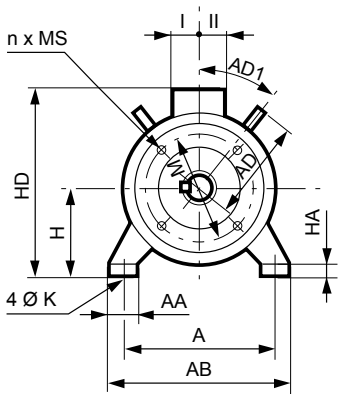
IEC symbol	Flange dimensions							
	M	N	P	T	n	°	S	LA
FF 100	100	80	120	2.5	4	45	7	5
FF 115	115	95	140	3	4	45	10	10
FF 130	130	110	160	3.5	4	45	10	10
FF 130	130	110	160	3.5	4	45	10	10
FF165	165	130	200	3.5	4	45	12	10
FF165	165	130	200	3.5	4	45	12	10
FF165	165	130	200	3.5	4	45	12	10
FF165	165	130	200	3.5	4	45	12	10
FF165	165	130	200	3.5	4	45	12	10
FF215	215	180	250	4	4	45	14.5	12
FF215	215	180	250	4	4	45	14.5	12
FF215	215	180	250	4	4	45	14.5	12
FF215	215	180	250	4	4	45	14.5	12
FF215	215	180	250	4	4	45	14.5	13
FF215	215	180	250	4	4	45	14.5	13
FF265	265	230	300	4	4	45	14.5	14
FF265	265	230	300	4	4	45	14.5	14
FF265	265	230	300	4	4	45	14.5	14
FF265	265	230	300	4	4	45	14.5	14
FF265	265	230	300	4	4	45	14.5	14
FF300	300	250	350	5	4	45	18.5	15
FF300	300	250	350	5	4	45	18.5	15
FF300	300	250	350	5	4	45	18.5	15
FF300	300	250	350	5	4	45	18.5	14
FF300	300	250	350	5	4	45	18.5	14
FF300	300	250	350	5	4	45	18.5	15
FF300	300	250	350	5	4	45	18.5	15
FF300	300	250	350	5	4	45	18.5	15
FF300	300	250	350	5	4	45	18.5	15
FF300	300	250	350	5	4	45	18.5	15
FF300	300	250	350	5	4	45	18.5	15
FF350	350	300	400	5	4	45	18.5	15
FF350	350	300	400	5	4	45	18.5	15
FF350	350	300	400	5	4	45	18.5	15
FF400	400	350	450	5	8	22.5	18.5	16
FF400	400	350	450	5	8	22.5	18.5	16
FF400	400	350	450	5	8	22.5	18.5	16
FF400	400	350	450	5	8	22.5	18.5	16
FF400	400	350	450	5	8	22.5	18.5	16
FF500	500	450	550	5	8	22.5	18.5	22
FF500	500	450	550	5	8	22.5	18.5	18
FF500	500	450	550	5	8	22.5	18.5	22
FF500	500	450	550	5	8	22.5	18.5	22

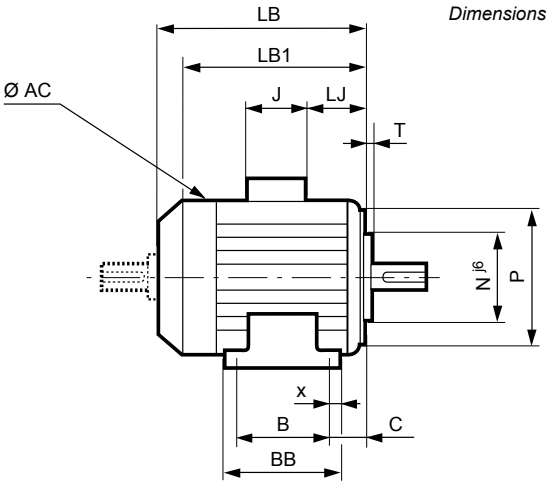
AC: housing diameter without lifting rings
1. The dimensions of frame sizes 80 to 225 motors concern the types LS and LSES

For a frame size ≥ 250 mm for IM 3001 use. please consult Nidec Leroy-Somer
Dimensions of shaft extensions identical to those for foot mounted motors

IMfinity® 3-phase induction motors - IE2 - IE3 - IE4 - Non IE Efficiency
IP55 Aluminium frame
Dimensions
Foot and face IM 2101 (IM B34)

Dimensions in millimetres



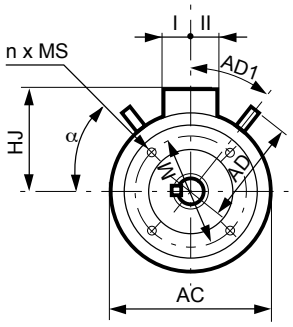


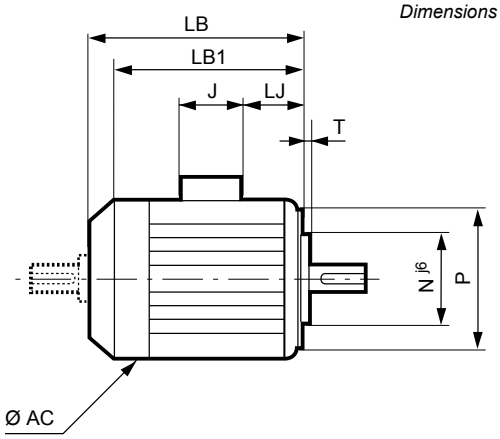
Type	Main dimensions																			
	A	AB	B	BB	C	x	AA	K	HA	H	AC*	HD	LB	LJ	J	I	II	AD	AD1	Symb
LS 56 M	90	104	71	87	36	8	25	6	7	56	110	140	156	16	86	43	43	-	-	FT 65
LS 63 M	100	115	80	96	40	8	26	7	9	63	124	152	172	26	86	43	43	-	-	FT 75
LS 71 M/L	112	126	90	106	45	8	24	7	9	71	140	170	193	26	86	43	43	-	-	FT 85
LSES 71 LR	112	126	90	104	45	7	23	7	9	71	140	171	233	27	80	40	40	-	-	FT 85
LSES 80 L[1]	125	157	100	120	50	10	29	9	10	80	170	205	215	26	86	43	43	-	-	FT100
LSES 80 LG[1]	125	157	100	125	50	14	31	9	10	80	189	215	247	26	86	43	43	-	-	FT100
LSES 90 L[1]	140	172	125	164	56	28	39	10	11	90	189	225	245	26	86	43	43	-	-	FT115
LSES 90 LU[1]	140	172	125	164	56	28	39	10	11	90	189	225	276	26	86	43	43	-	-	FT115
LSES 90 SL[1]	140	172	125	164	56	28	39	10	11	90	189	225	245	26	86	43	43	-	-	FT115
LSES 100 L[1]	160	196	140	165	63	12	40	12	13	100	200	240	290	26	86	43	43	118	45	FT130
LSES 100 LG[1]	160	196	140	168	63	13	40	12	14	100	227	249	315	35	86	43	43	130	45	FT130
LSES 100 LR[1]	160	196	140	165	63	12	40	12	13	100	200	240	309	26	86	43	43	118	45	FT130
LSES 112 M[1]	190	220	140	165	70	13	44	12	14	112	200	254	290	23,5	90	53	53	118	45	FT130
LSES 112 MG[1]	190	220	140	165	70	12	52	12	14	112	235	261	315	35	86	43	43	-	-	FT130
LSES 112 MU[1]	190	220	140	165	70	12	52	12	14	112	235	261	332	35	86	43	43	-	-	FT130
LSES 132 M[1]	216	250	178	208	89	15	50	12	15	132	272	322	385	17	126	63	63	140	45	FT165
LSES 132 MU[1]	216	250	178	208	89	15	50	12	15	132	272	322	412	17	126	63	63	140	45	FT165
LSES 132 S[1]	216	250	140	170	89	15	42	12	16	132	227	304	351	32	126	63	63	130	45	FT165
LSES 132 SM[1]	216	250	140	208	89	15	50	12	15	132	272	322	385	17	126	63	63	140	45	FT165
LSES 132 SU[1]	216	250	140	170	89	15	42	12	16	132	227	304	383	32	126	63	63	130	45	FT165
LSES 160 MP[1]	254	294	210	294	108	20	64	14	25	160	272	350	468	59	126	63	63	156	45	FT215
LSES 160 MR[1]	254	294	210	294	108	20	64	14	25	160	272	350	495	59	126	63	63	156	45	FT215

** AC: housing diameter without lifting rings*
1. The dimensions of frame sizes 80 to 225 motors concern the types LS and LSES

Dimensions
Face mounted IM 3601 (IM B14)

Dimensions in millimetres





Type	Main dimensions								
	AC*	LB	HJ	LJ	J	I	II	AD	AD1
LS 56 M	110	156	84	16	86	43	43	-	-
LS 63 M	134	172	89	26	86	43	43	-	-
LS 71 M/L	140	193	99	21	86	43	43	-	-
LSES 71 LR	140	233	100	27	80	40	40	-	-
LSES 80 L[1]	170	215	125	26	86	43	43	-	-
LSES 80 LG[1]	189	247	135	26	86	43	43	-	-
LSES 90 L[1]	189	245	135	26	86	43	43	-	-
LSES 90 LU[1]	189	276	135	26	86	43	43	-	-
LSES 90 SL[1]	189	245	135	26	86	43	43	-	-
LSES 100 L[1]	200	290	140	26	86	43	43	118	45
LSES 100 LG[1]	227	315	149	35	86	43	43	130	45
LSES 100 LR[1]	200	309	140	26	86	43	43	118	45
LSES 112 M[1]	200	290	142	23.5	90	53	53	-	-
LSES 112 MG[1]	235	315	149	35	86	43	43	-	-
LSES 112 MU[1]	235	332	149	35	86	43	43	-	-
LSES 132 M[1]	272	385	190	17	126	63	63	140	45
LSES 132 MU[1]	272	412	190	17	126	63	63	140	45
LSES 132 S[1]	227	351	172	32	126	63	63	130	45
LSES 132 SM[1]	272	385	190	17	126	63	63	140	45
LSES 132 SU[1]	227	383	172	32	126	63	63	130	45
LSES 160 MP[1]	272	468	190	59	126	63	63	156	45
LSES 160 MR[1]	272	495	190	59	126	63	63	156	45

IEC symbol	Flange dimensions						
	M	N	P	T	n	°	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 85	85	70	105	2.5	4	45	M6
FT100	100	80	120	3	4	45	M6
FT100	100	80	120	3	4	45	M6
FT115	115	95	140	3	4	45	M8
FT115	115	95	140	3	4	45	M8
FT115	115	95	140	3	4	45	M8
FT130	130	110	160	3.5	4	45	M8
FT130	130	110	160	3.5	4	45	M8
FT130	130	110	160	3.5	4	45	M8
FT130	130	110	160	3.5	4	45	M8
FT130	130	110	160	3.5	4	45	M8
FT130	130	110	160	3.5	4	45	M8
FT165	165	130	200	3.5	4	45	M10
FT165	165	130	200	3.5	4	45	M10
FT165	165	130	200	3.5	4	45	M10
FT165	165	130	200	3.5	4	45	M10
FT165	165	130	200	3.5	4	45	M10
FT215	215	180	250	4	4	45	M12
FT215	215	180	250	4	4	45	M12

AC: housing diameter without lifting rings
1. The dimensions of frame sizes 80 to 225 motors concern the types LS and LSES

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								
					2P : 3000 min^{-1}			4P : 1500 min^{-1}			6P : 1000 min^{-1}		
			N.D.E.	D.E.	25°C	40°C	55°C	25°C	40°C	55°C	25°C	40°C	55°C
LS / LSES	56 M	2 ; 4 ; 6	6201 C3	6201 C3	>40 000	>40 000	>40 000	>40 000	>40 000	>40 000	>40 000	>40 000	38 500
	63 M 71 M/L	2 ; 4 ; 6	6201 C3	6202 C3	>40 000	>40 001	>40 002	>400 03	>40 004	>40 005	>40 006	>40 007	>40 008
	80 L	2	6203 C3	6204 C3	≥40 000	≥40 000	25 000	-	-	-	-	-	-
	80 LG	2 ; 4	6204 C3	6205 C3	≥40 000	≥40 000	24 000	≥40 000	≥40 000	31 000	-	-	-
	90 SL/L	2 ; 4 ; 6									≥40 000	≥40 000	34 000
	90 LU	4	6205 C3	6205 C3	-	-	-	≥40 000	≥40 000	30 000	-	-	-
	100 L	2 ; 4 ; 6	6205 C3	6206 C3	≥40 000	≥40 000	22 000	≥40 000	≥40 000	30 000	≥40 000	≥40 000	33 000
	100 LR	4			-	-	-				-	-	-
	100 LG	4	6206	6205	-	-	-	≥40 000	≥40 000	30 000	-	-	-
	112 M	2	6205 C3	6206 C3	≥40 000	≥40 000	22 000	-	-	-	-	-	-
	112 MG	2 ; 6									≥40 000	≥40 000	33 000
	112 MU	4	6206 C3	6206 C3	-	-	-	≥40 000	≥40 000	30 000	-	-	-
	132 S	2 ; 6	6206 C3	6208 C3	≥40 000	≥40 000	19 000	-	-	-	≥40 000	≥40 000	30000
	132 SU	2 ; 4						≥40 000	≥40 000	25 000	-	-	-
	132 SM/M	2 ; 4 ; 6	6207 C3	6308 C3	≥40 000	≥40 000	19 000	≥40 000	≥40 000	25 000	≥40 000	≥40 000	30 000
	132 MU	4 ; 6	6307 C3	6308 C3	-	-	-	≥40 000	≥40 000	25 000	≥40 000	≥40 000	30 000
	160 MR	2 ; 4	6308 C3	6309 C3	≥40 000	35 000	15 000	≥40 000	≥40 000	24 000	-	-	-
	160 MP	2 ; 4	6208 C3	6309 C3	≥40 000	35 000	18 000	≥40 000	≥40 000	24 000	-	-	-
	160 M/MU	6	6210 C3	6309 C3	-	-	-	-	-	-	≥40 000	≥40 000	27 000
	160 L	2 ; 4 ; 6			≥40 000	30 000	15 000	≥40 000	≥40 000	23 000			
	160 LUR	4 ; 6	6210 C3	6310 C3	-	-	-	≥40 000	≥40 000	23 000	≥40 000	≥40 000	27 000
	180 MT	2 ; 4			≥40 000	30 000	15 000				-	-	-
	180 MR	2	6212 C3	6310 C3	-	-	-	-	-	-	-	-	-
	180 M	4						≥40 000	≥40 000	24 900	-	-	-
	180 L	6						-	-	-	≥40 000	≥40 000	28 000
	180 LR	4	6210 C3	6310 C3	-	-	-	≥40 000	≥40 000	23 000	-	-	-
	180 LUR	4 ; 6	6312 C3	6310 C3	-	-	-	≥40 000	≥40 000	22 000	≥40 000	≥40 000	27 000
	200 L	2 ; 6	6214 C3	6312 C3	≥40 000	25 000	12 500	-	-	-	≥40 000	≥40 000	27 000
	200 LR	2 ; 4 ; 6	6312 C3	6312 C3	≥40 000	25 000	12 500	≥40 000	≥40 000	22 000	≥40 000	≥40 000	27 000
	200 LU	4 ; 6			-	-	-						
	225 ST	4	6214 C3	6313 C3	-	-	-	≥40 000	≥40 000	21 000	-	-	-
	225 MT	2			≥40 000	22 000	11 000	-	-	-			
	225 SR	4	6312 C3	6313 C3	-	-	-	≥40 000	≥40 000	21 000	-	-	-
	225 MR	2 ; 4 ; 6			≥40 000	22 000	11 000				≥40 000	≥40 000	26 000
	225 MG	4 ; 6	6216 C3	6314 C3	-	-	-	≥40 000	≥40 000	20 000	≥40 000	≥40 000	25 000

BEARINGS WITH GREASE NIPPLES

The chart opposite shows the greasing intervals, depending on the type of motor, for standard bearing assemblies of frame size ≥ 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 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 ≥ 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 bearings for greaser bearing bush		Quantity of grease	Greasing intervals in hours								
						2P : 3000 min^{-1}			4P : 1500 min^{-1}			6P : 1000 min^{-1}		
			N.D.E.	D.E.	g	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	22 200	11 100	5 550	32 400	16 200	8 100	39 800	19 900	9 950
	160 L*													
	180 MR*	2	6210 C3	6310 C3	15	19 600	9 800	4 900	-	-	-	-	-	-
	180 MT*	2 ; 4							30 400	15 200	7 600			
	180 LR*	4				-	-	-						
	180 LUR*	4 ; 6	6312 C3	6310 C3	20	-	-	-	26 800	13 400	6 700	35 000	17 500	8 750
	180 M*	4	6212 C3	6310 C3	15	-	-	-	29 200	14 600	7 300	-	-	-
	180 L*	6							-	-	-	37 200	18 600	9 300
	200 LR*	2 ; 4 ; 6	6312 C3	6312 C3	20	15 200	7 600	3 800	26 800	13 400	6 700	35 000	17 500	8 750
	200 LU*	4 ; 6				-	-	-						
	200 L*	2 ; 6	6214 C3	6312 C3	20	14 600	7 300	3 650	-	-	-	34 600	17 300	8 650
	225 ST*	4	6214 C3	6313 C3	25	-	-	-	25 200	12 600	6 300	-	-	-
	225 MT*	2				10 600	5 300	2 650	-	-	-			
	225 SR/MR*	2 ; 4 ; 6	6312 C3	6313 C3	25	13 400	6 700	3 350	25 200	12 600	6 300	33 600	16 800	8 400
	225 MG*	4 ; 6	6216 C3	6314 C3	25	-	-	-	23 600	11 800	5 900	32 200	16 100	8 050
	250 MZ	2	6312 C3	6313 C3	25	13 400	6 700	3 350	-	-	-	-	-	-
	250 ME	4 ; 6	6216 C3	6314 C3	25	-	-	-	23 600	11 800	5 900	32 200	16 100	8 050
	280 SC	6	6216 C3	6316 C3	35	-	-	-	-	-	-	32 200	16 100	8 050
	280 MD	4 ; 6	6218 C3	6316 C3	35	-	-	-	-	-	-	29 600	14 800	7 400

** bearing with grease nipples on request*

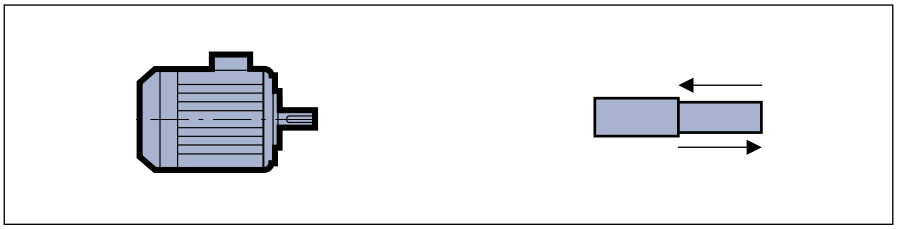
STANDARD BEARING FITTING ARRANGEMENTS

LS / LSES series		Horizontal shaft	Vertical shaft	
			Shaft facing down	Shaft facing up
Foot mounted motors	Mounting arrangement	B3	V5	V6
	standard mounting	DE bearing: - located at DE for types ≤ 160MP/MR/LR - locked for types ≥ 160M/MU/L/LUR	DE bearing locked	DE bearing locked
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	DE bearing locked	DE bearing locked

Construction
Axial loads

HORIZONTAL MOTOR

For a bearing life L_{10h} of 25,000 hours and 40,000 hours



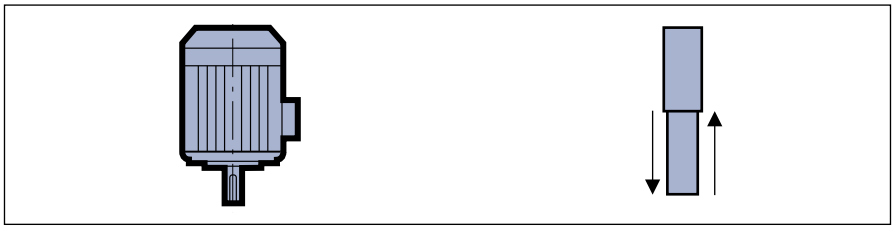
Series	Type	No. of poles	Permissible axial load (in daN) on main shaft extension for standard bearing assembly IM B3 / B6 IM B7 / B8 IM B5 / B35 IM B14 / B34											
			2P : 3000 min-1				4P : 1500 min-1				6P : 1000 min-1			
			→		←		→		←		→		←	
			25 000 hours	40 000 hours	25 000 hours	40 000 hours	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 M	2 ; 4 ; 6	7	5	28	24	14	10	35	30	17	12	38	32
	63 M	2 ; 4 ; 6	13	9	34	29	18	13	39	33	26	18	47	40
	71 M/L	2 ; 4 ; 6	13	9	34	29	18	13	39	33	26	18	47	40
LS / LSES	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 ; 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	6	303	236	373	306	-	-	-	-	461	355	531	425
	280 MD	6	-	-	-	-	446	342	534	430	524	401	612	489

( ): axial loads permissible with DE bearing locked

Construction
Axial loads

VERTICAL MOTOR
SHAFT FACING DOWN

For a bearing life L_{10h}
of 25,000 hours
and 40,000 hours



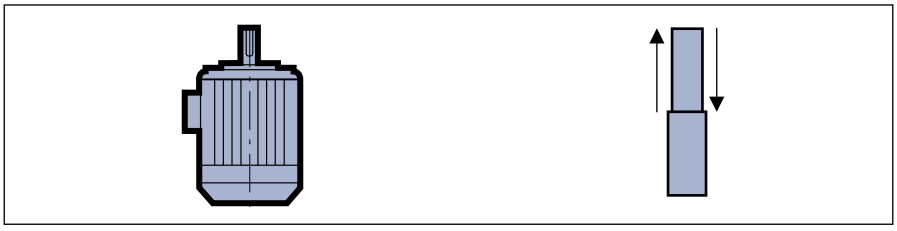
Series	Type	No. of poles	Permissible axial load (in daN) on main shaft extension for standard bearing assembly IM V5 IM V1 / V15 IM V18 / V58											
			2P : 3000 min-1				4P : 1500 min-1				6P : 1000 min-1			
			25 000 hours	40 000 hours	25 000 hours	40 000 hours	25 000 hours	40 000 hours	25 000 hours	40 000 hours	25 000 hours	40 000 hours	25 000 hours	40 000 hours
LS	56 M	2 ; 4 ; 6	6	4	24	20	13	9	36	30	16	11	39	33
	63 M	2 ; 4 ; 6	11	8	36	30	16	11	41	35	24	17	49	42
	71 M/L	2 ; 4 ; 6	11	8	36	30	16	11	41	35	24	17	49	42
LS / LSES	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)
	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 MD	4 ; 6	-	-	-	-	319	213	745	639	391	265	853	728

( ): axial loads permissible with DE bearing locked

Construction
Axial loads

VERTICAL MOTOR SHAFT FACING UP

For a bearing life L_{10h} of 25,000 hours and 40,000 hours



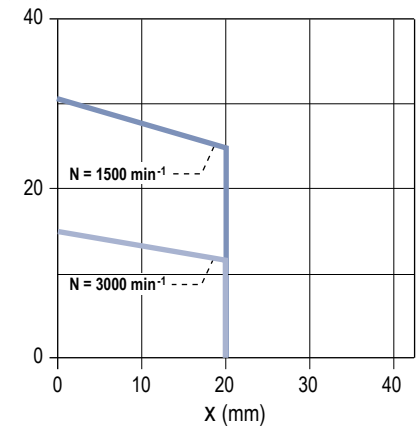
Series	Type	No. of poles	Permissible axial load (in daN) on main shaft extension for standard bearing assembly IM V6 IM V3 / V36 IM V19 / V69											
			2P : 3000 min-1				4P : 1500 min-1				6P : 1000 min-1			
			25 000 hours	40 000 hours	25 000 hours	40 000 hours	25 000 hours	40 000 hours	25 000 hours	40 000 hours	25 000 hours	40 000 hours	25 000 hours	40 000 hours
LS	56 M	2 ; 4 ; 6	8	5	27	23	15	10	34	29	18	13	39	33
	63 M	2 ; 4 ; 6	15	10	32	22	20	18	37	31	28	20	45	38
	71 M/L	2 ; 4 ; 6	15	10	32	22	20	18	37	31	28	20	45	38
LS / LSES	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
	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	6	303	235	418	350	-	-	-	-	418	310	658	551
	280 MD	6	-	-	-	-	407	301	657	551	479	353	765	640

( ): axial loads permissible with DE bearing locked

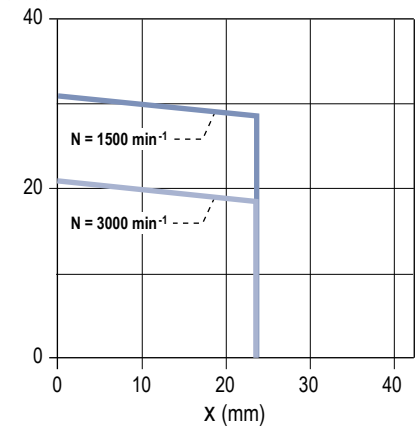
STANDARD FITTING ARRANGEMENT

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

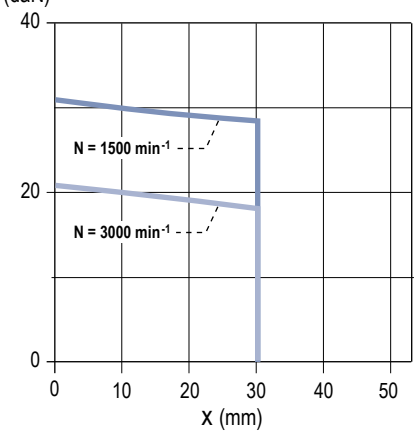
LS 56 M



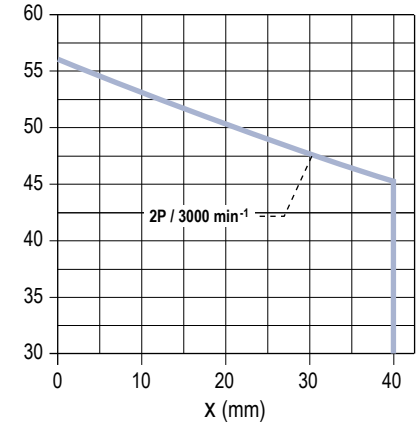
LS 63 M



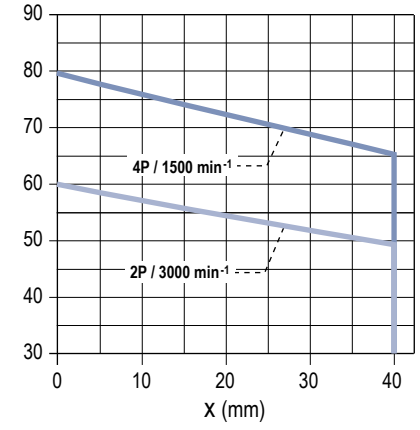
LS 71 M/L



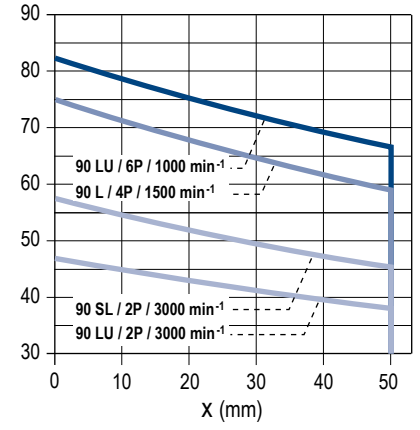
LS / LSES 80 L



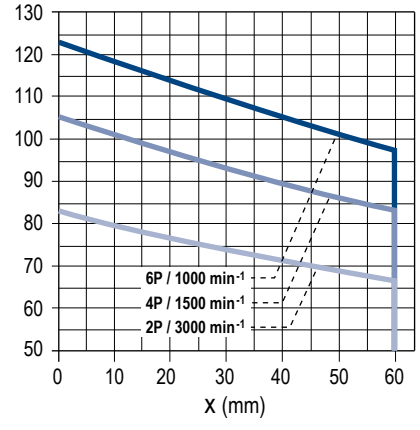
LS / LSES 80 LG



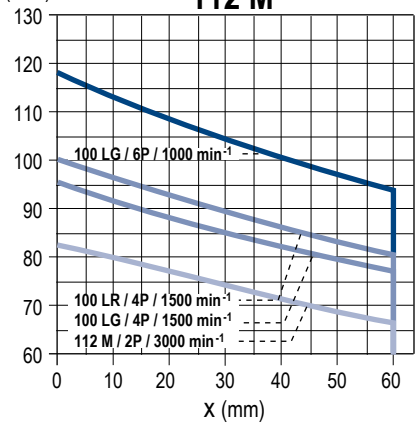
LS / LSES 90 SL/L/LU



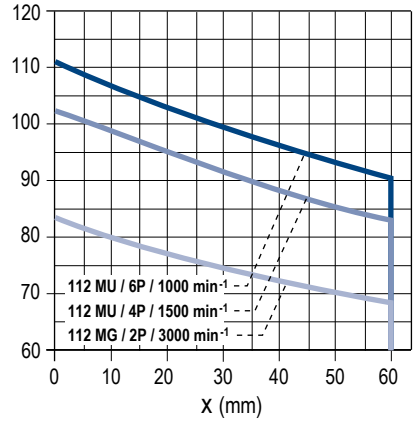
LS / LSES 100 L



LS / LSES 100 LR/LG / 112 M



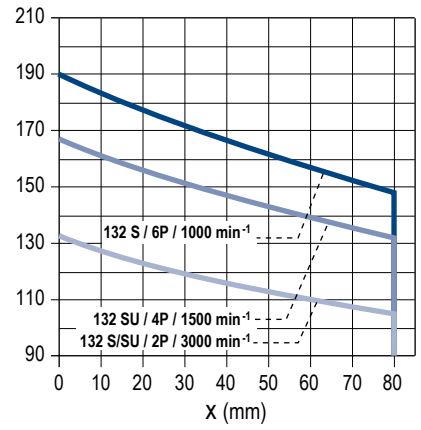
LS / LSES 112 MG/MU



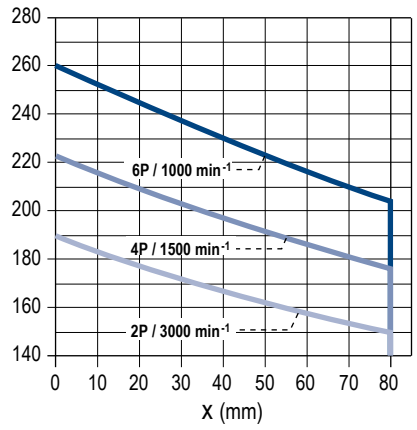
STANDARD FITTING ARRANGEMENT

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

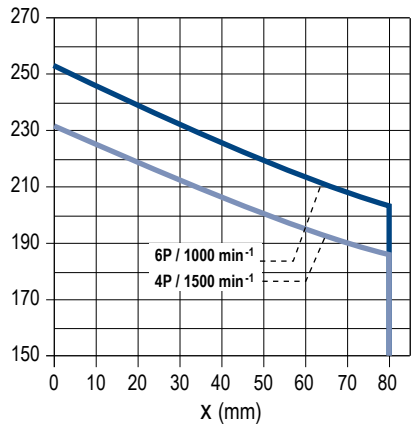
LS / LSES 132 S/SU



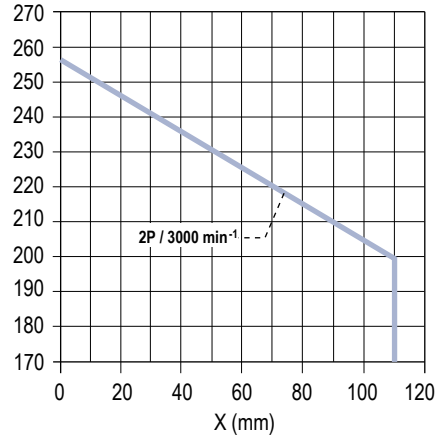
LS / LSES 132 SM/M



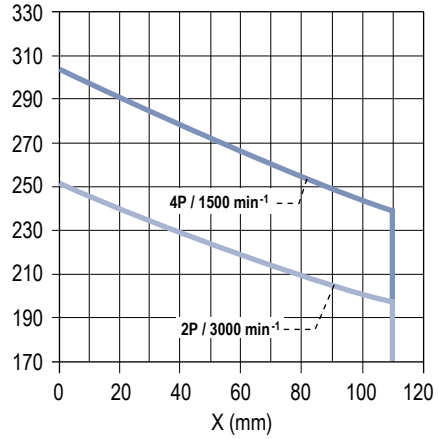
LS / LSES 132 MU



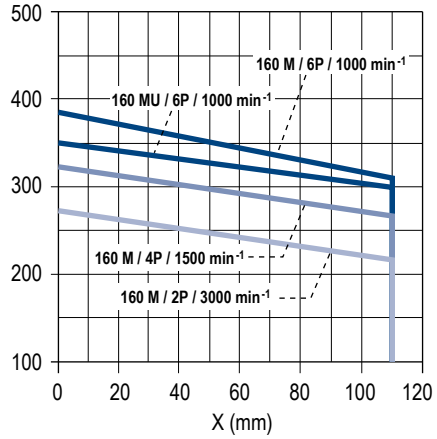
LS / LSES 160 MP



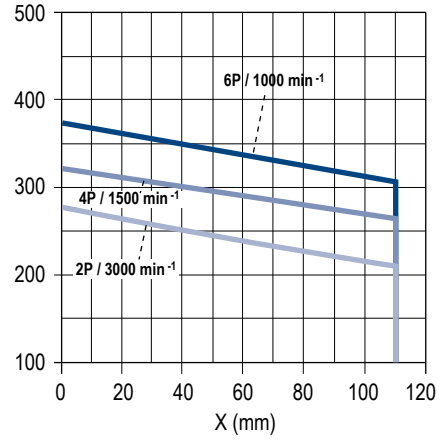
LS / LSES 160 MR



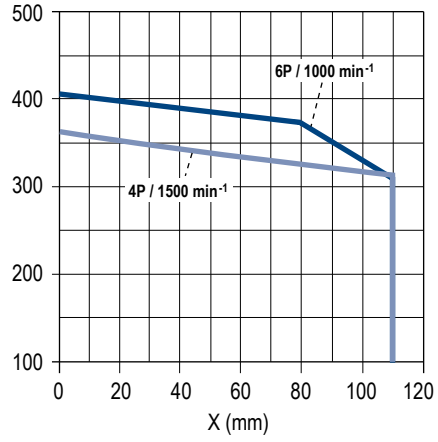
LS / LSES 160 M/MU



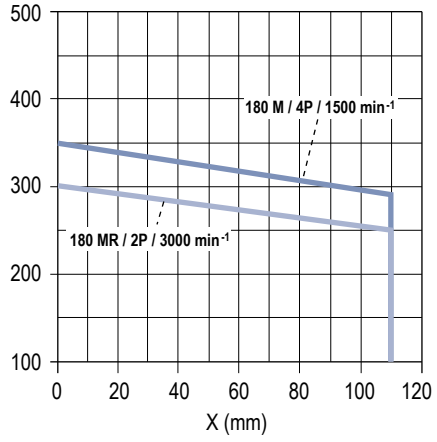
LS / LSES 160 L



LS / LSES 160 LUR



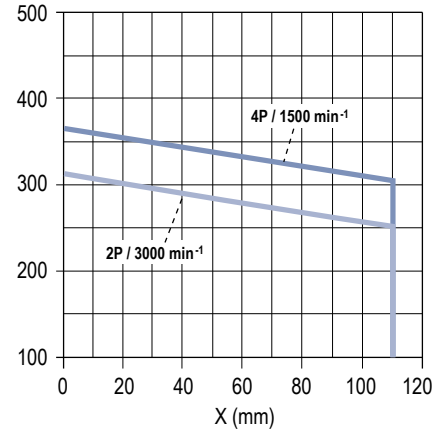
LS / LSES 180 M/MR



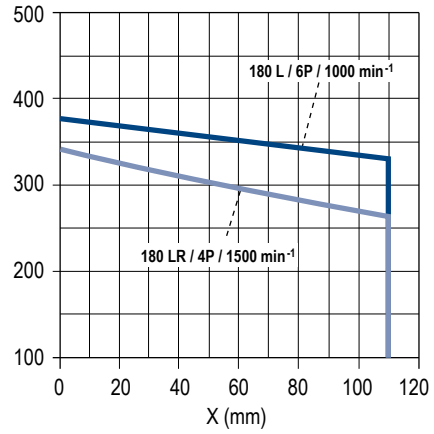
STANDARD FITTING ARRANGEMENT

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

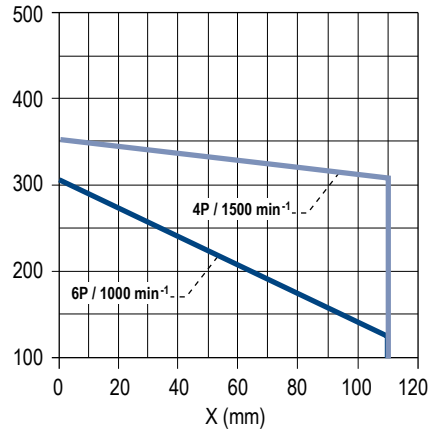
LS / LSES 180 MT



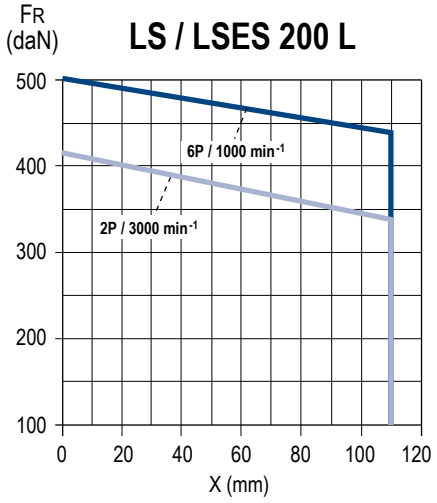
LS / LSES 180 L/LR



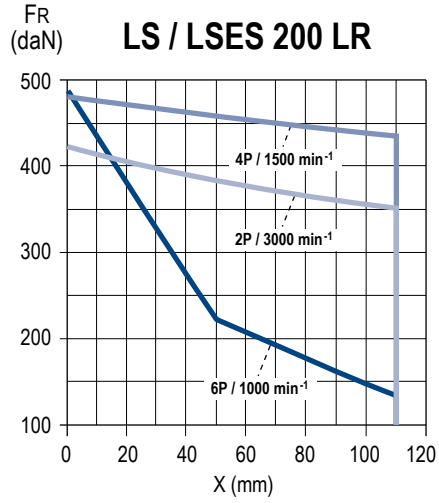
LS / LSES 180 LUR



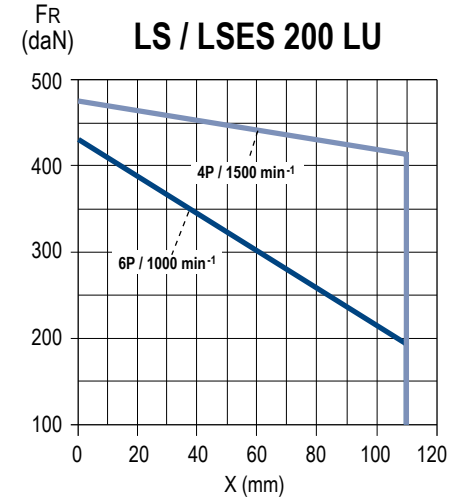
LS / LSES 200 L



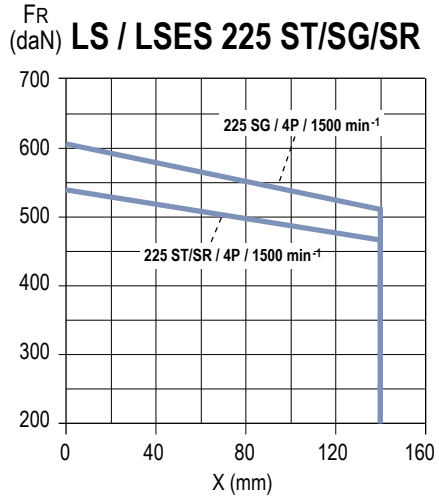
LS / LSES 200 LR



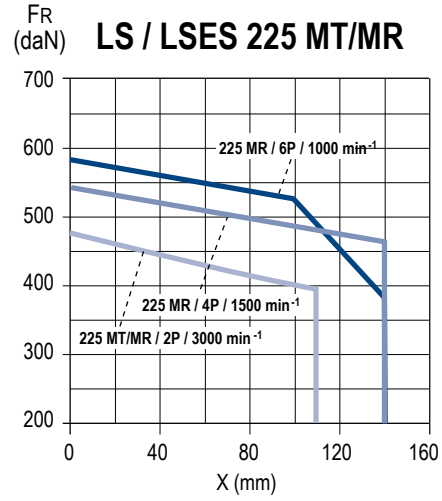
LS / LSES 200 LU



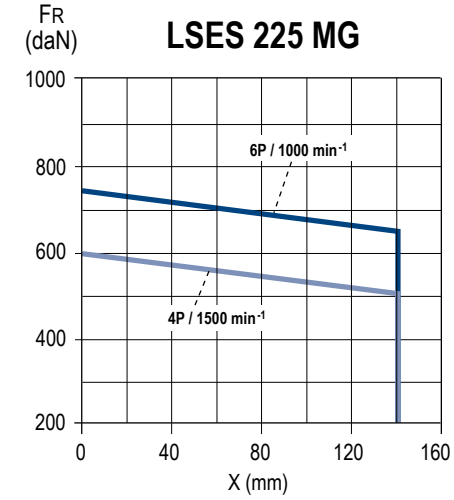
LS / LSES 225 ST/SG/SR



LS / LSES 225 MT/MR

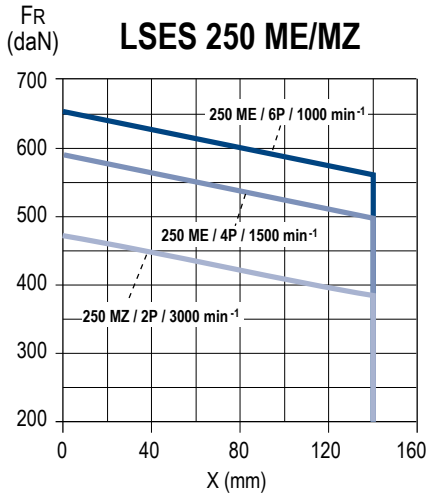


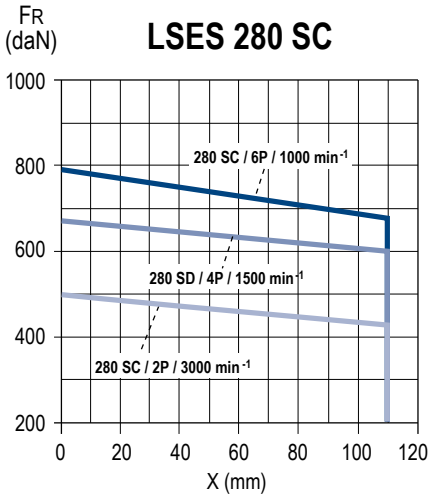
LSES 225 MG

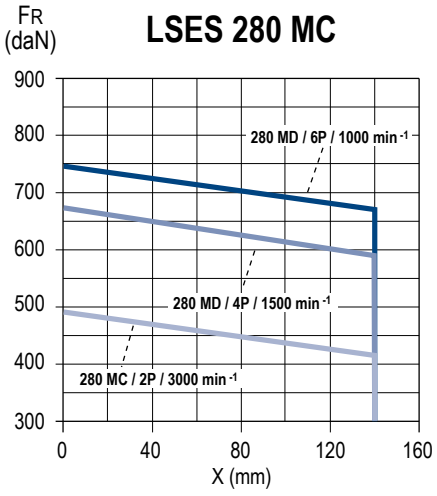


STANDARD FITTING ARRANGEMENT

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







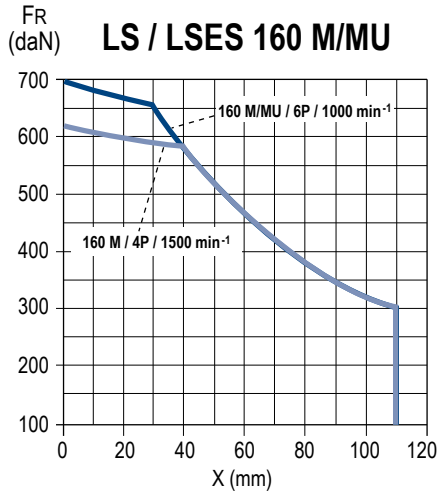
SPECIAL FITTING ARRANGEMENT

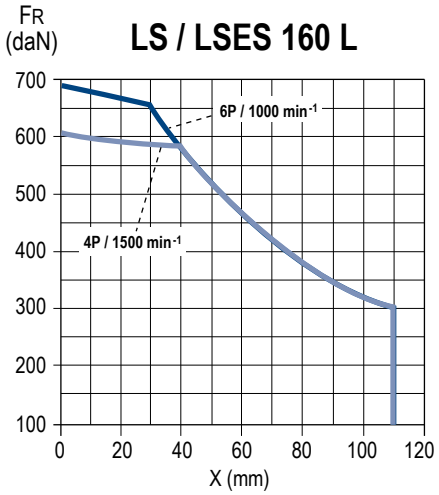
Type of drive end roller bearings

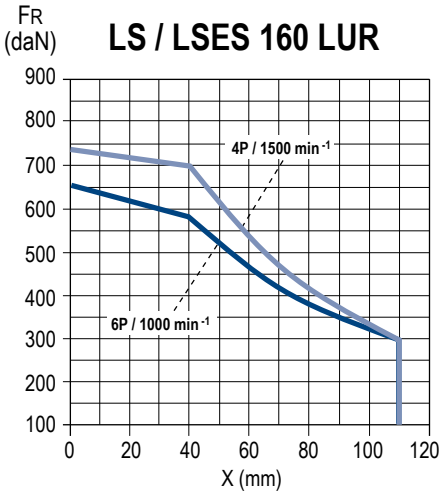
Series	Type	No. of poles	Non drive end bearing (N.D.E.)	Drive end bearing (D.E.)
LS / LSES	160 M/MU	4 ; 6	6210 C3	NU 309
	160 L			
	180 MT	4	6210 C3	NU 310
	180 LR			
	180 LUR	4 ; 6	6312 C3	NU 310
	180 M	4	6212 C3	NU 310
	180 L	6		
	200 L	6	6214 C3	NU 312
	200 LR	4 ; 6	6312 C3	NU 312
	200 LU			
	225 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 MD	6	6218 C3	NU 316

SPECIAL FITTING ARRANGEMENT

Permissible radial load on main shaft extension with a bearing life L_{10h} of 25,000 hours.
F_R : Radial Force
X: Distance with respect to the shaft shoulder



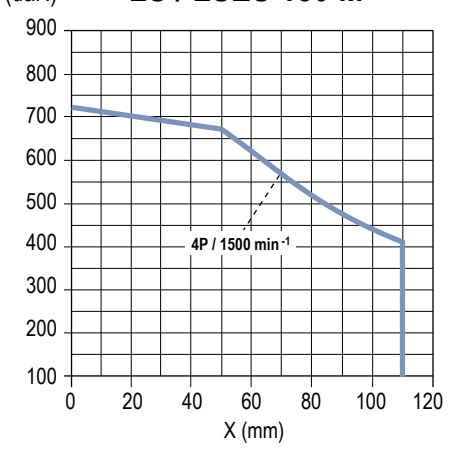




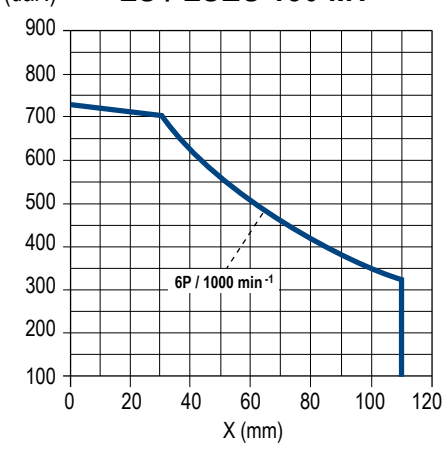
SPECIAL FITTING ARRANGEMENT

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

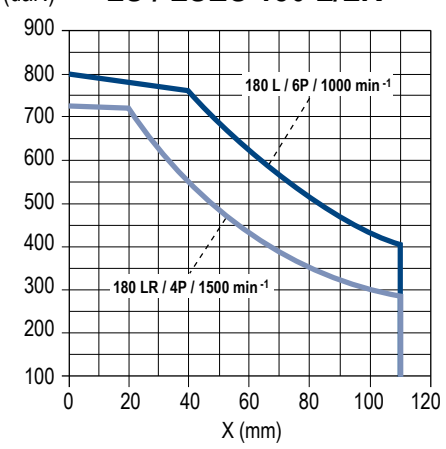
LS / LSES 180 M



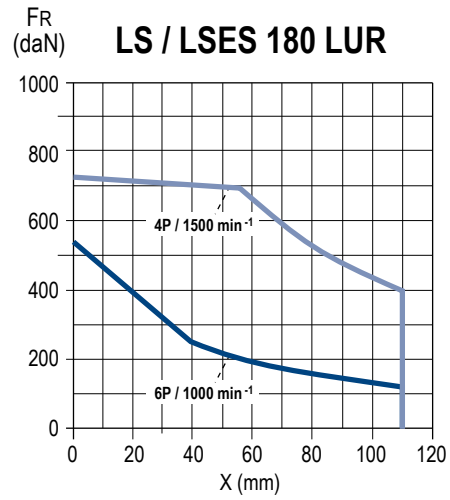
LS / LSES 180 MT



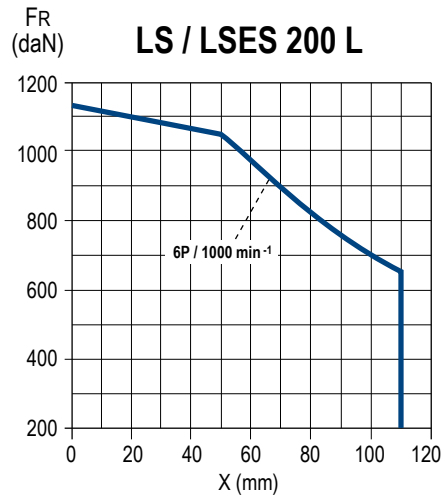
LS / LSES 180 L/LR



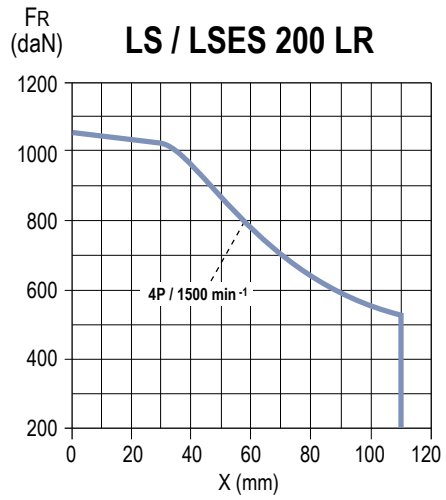
LS / LSES 180 LUR



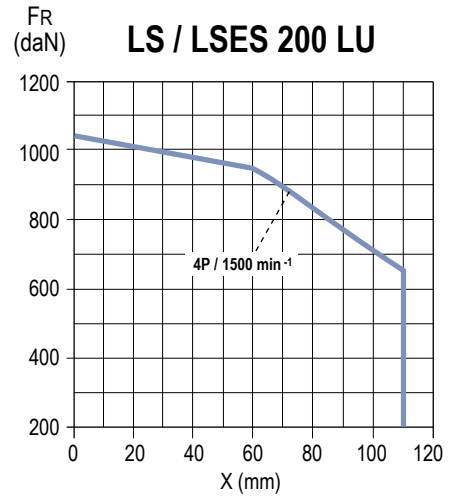
LS / LSES 200 L



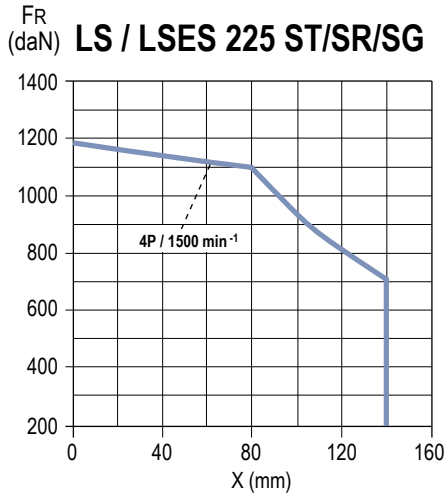
LS / LSES 200 LR



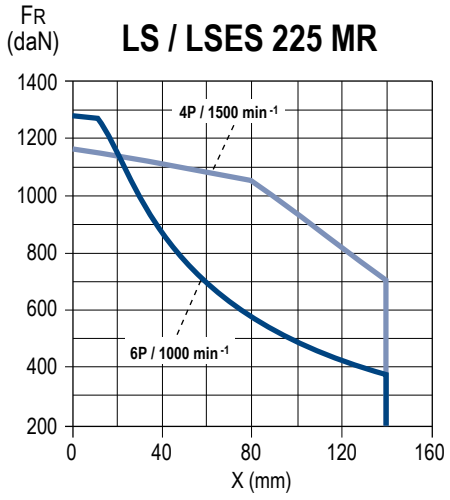
LS / LSES 200 LU



LS / LSES 225 ST/SR/SG



LS / LSES 225 MR

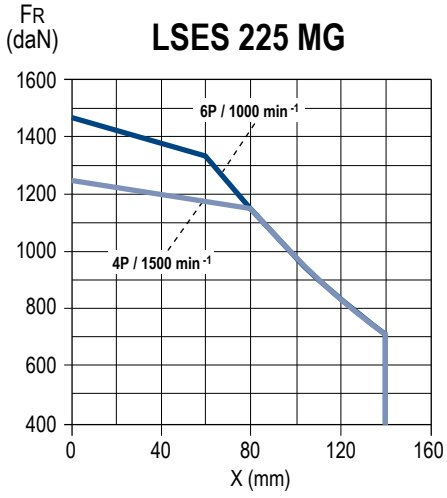


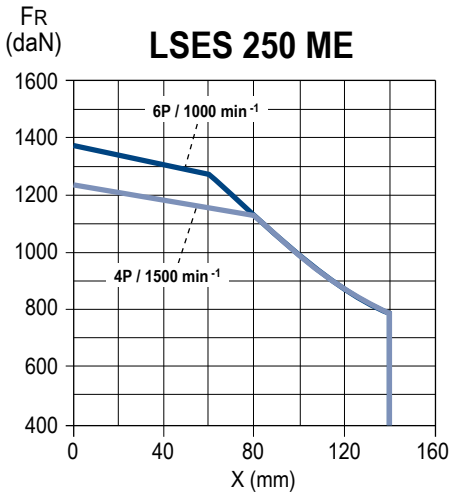
SPECIAL FITTING ARRANGEMENT

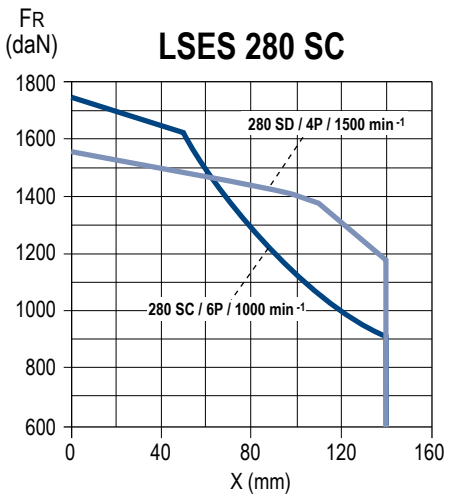
Permissible radial load on main shaft extension with a bearing life L_{10h} of 25,000 hours.

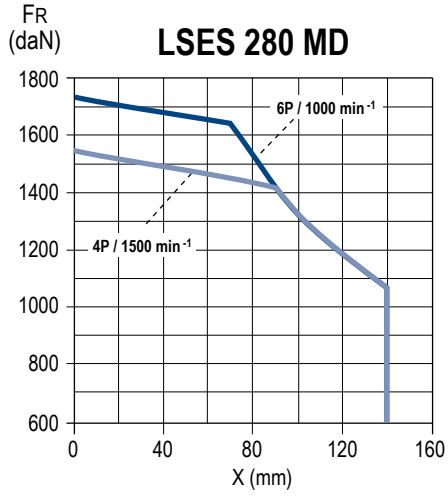
FR : Radial Force

X: Distance with respect to the shaft shoulder









Optional features
Non-standard flanges

Optionally, Nidec 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.

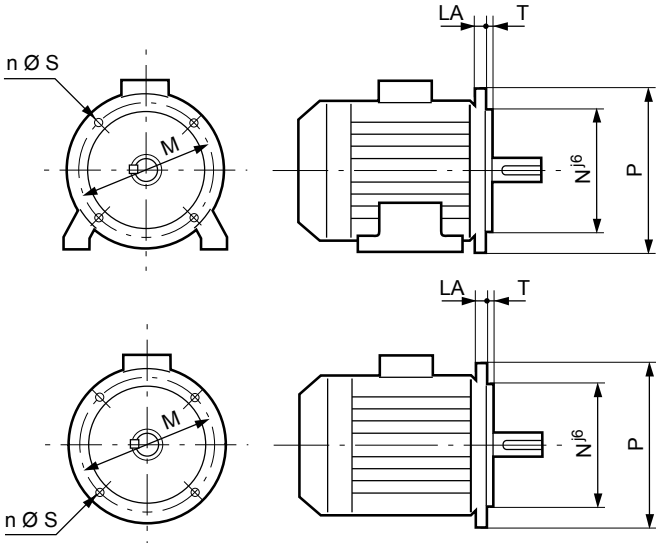
The bearing and shaft extension for each frame size remain standard.

Dimensions in millimetres

(FF) Flange mounted

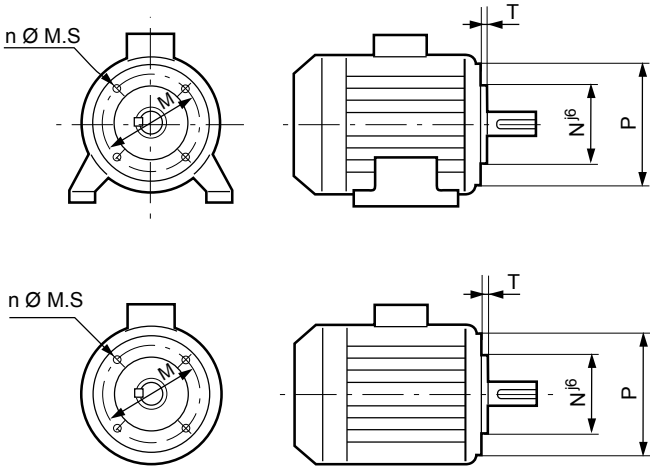
IEC symbol	Flange dimensions						
	M	N	P	T	n	S	LA
FF 100	100	80	120	2.5	4	7	5
FF 115	115	95	140	3	4	10	10
FF 130	130	110	160	3.5	4	10	10
FF 165	165	130	200	3.5	4	12	10
FF 215	215	180	250	4	4	15	12
FF 265	265	230	300	4	4	15	14
FF 300	300	250	350	5	4	18.5	14
FF 350	350	300	400	5	4	18.5	15
FF 400	400	350	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

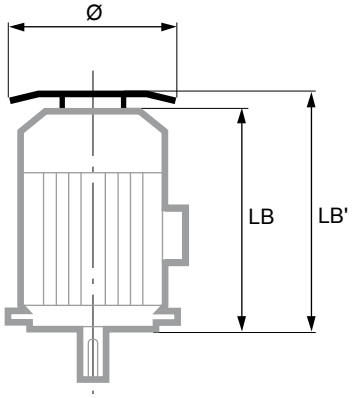
Motor type	Mounting forms \ Flange type	(FF) Flange mounted												(FT) Face mounted								
		FF 85	FF 100	FF 115	FF 130	FF 165	FF 215	FF 265	FF 300	FF 350	FF 400	FF 500	FF 600	FT 65	FT 75	FT 85	FT 100	FT 115	FT 130	FT 165	FT 215	FT 265
56 M	all		●											●	◆	◆	●					
63 M	all	■	■	●	◆									◆	●	◆	◆	◆				
71 M/L	all	■	■	■	●	◆								◆	◆	●	◆	◆	◆			
80 L	all	■	■	■	■	●	◆							◆	◆	◆	●	◆	◆	◆		
80 LG	B5/B35 (1)	◆	◆	◆	◆	●	◆	■														
80 LG	B3/B14/B34	■	■	■	■	■	■	■								◆	●	◆	◆	◆	■	
90 SL/L/LU	B5/B35 (1)	◆	◆	◆	◆	●	◆	■														
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							◆	●	◆	◆(1)											
200	all								◆	●	◆											
225	all										●	◆										
250	all										◆	●										
280	all										◆	●	◆									

● Standard ■ Adapted shaft ◆ Adaptable without shaft modifications (1) 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



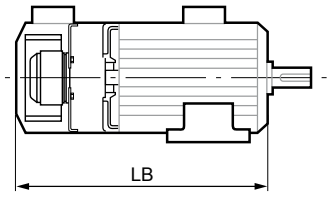
BRAKE MOTORS, FORCED VENTILATION

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 100 LR 112 MR	373	
112 MG 112 MU	412	
132 S 132 SU	453	
132 M 132 MU	458	
160 MP	709	
160 MR	730	
160 L 160 M 180 MT	687	
180 LR	702	
180 L	741	
200 LR	796	
200 L	802	
225 MR	853.5	
225 ST 225 MT	808.5	
250 ME	1012	
250 MZ	853.5	
280 MD	1072	
280 SC	1012	

MOTORS WITH SPACE HEATERS

Series LS / LSES	Power (W)
80 L to 160 MP/MR	25
160L/LUR/M/MU to 250MZ	45
225MG/250ME to 280 MD/SC	84

The space heaters use 200/240 V single-phase, 50 or 60 Hz.

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 EC marking standards and North American standards, UL for the USA and c(UL)us for Canada.

Installation and maintenance
Position of the lifting rings

LIFTING THE MOTOR ONLY
(not coupled to the machine)

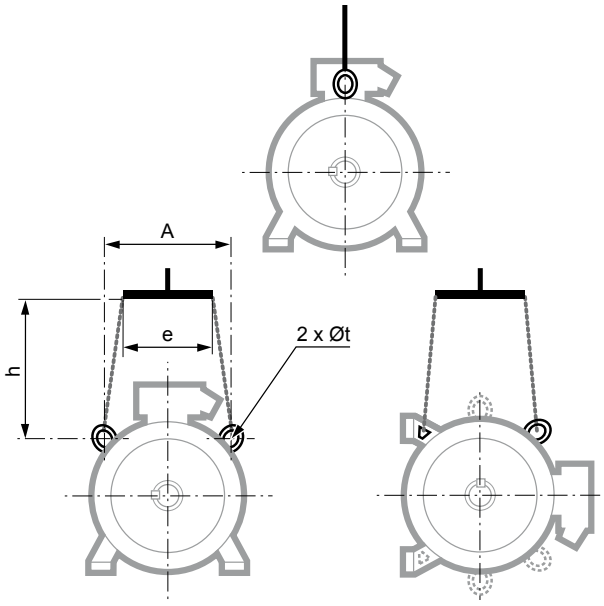
The regulations stipulate that over 25 kg, suitable handling equipment must be used.

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.

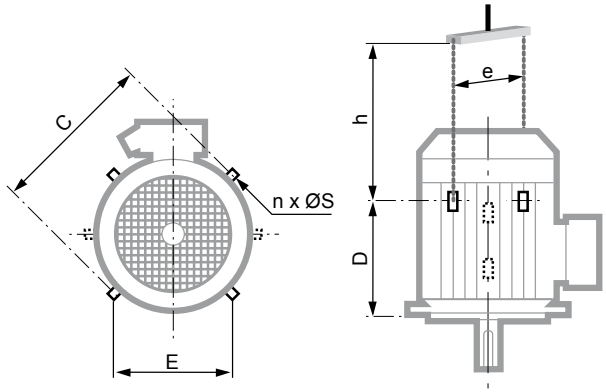
HORIZONTAL POSITION

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/MD	400	400	500	30

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/MD	480	360	405	4	30	500	500

** 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

General information
Designation

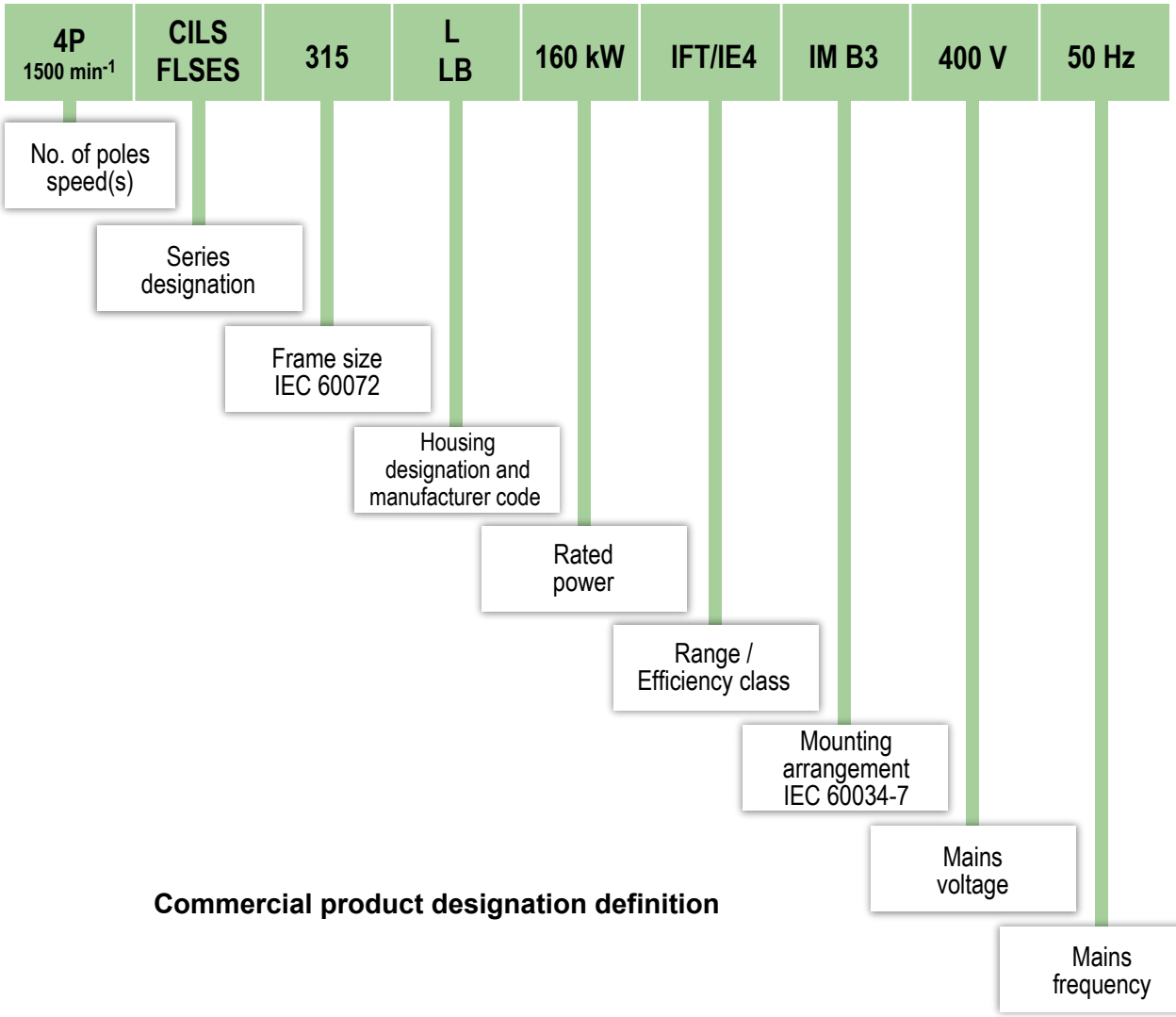
IP 55
Cl. F - ΔT 80 K

CILS

Standard applications:
designed for industrial applications to provide robustness, IE4 energy efficiency and mounting flexibility. Particularly suitable for applications of ventilation, pumping or compression.

FLSES

Advanced applications:
highly customizable for a perfect match with demanding specifications applications.



Commercial product designation definition

General information

Description

In the standard version. the motors are wound 400 V 50 Hz:
- power ratings ≤ 5.5 kW: Δ connection; 230 / 400 V
- power ratings ≥ 7.5 kW: Δ connection; 400 / 690 V

Component	Materials	Remarks
Housing with cooling fins	Cast iron	- lifting rings for frame size ≥ 90 - earth terminal with an optional jumper screw
Stator	Insulated low-carbon magnetic steel laminations Electroplated copper	- low carbon content guarantees long-term lamination pack stability - welded laminations - semi-enclosed slots - class F insulation
Rotor	Insulated low-carbon magnetic steel laminations Aluminium	- inclined cage bars - rotor cage pressure die-cast in aluminium (or alloy for special applications). or soldered in copper, or keyed for soldered rotors - shrink-fitted to shaft - rotor balanced dynamically, class A, 1/2 key
Shaft	Steel	- for frame size ≤ 132: • closed keyway - for frame size ≤ 160: • tapped hole - for frame size ≥ 160: • open keyway
End shields	Cast iron	
Bearings and lubrication		- permanently greased bearings frame size 80 to 225 - regreasable bearings frame size 250 to 450 - bearings preloaded at NDE up to 355 LA/LB/LC/LD, preloaded at DE from size 355 LKA upwards
Labyrinth seal **Lipseals**	Plastic or steel Synthetic rubber	- labyrinth seal at drive end for foot mounted motors, frame size ≤ 132 - lipseal at drive end for foot and flange mounted or flange mounted motors, frame size ≤ 132 - lipseal at drive end and non drive end for frame sizes 160 to 250 inclusive
Fan	Composite up to size 280 inclusive 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 except frames 355 LK, 400 & 450 where it can be steel	- IP 55 - fitted with a block with 6 terminals up to 355 LD, 6 or 12 terminals for frame sizes 355LK/400/450 - terminal box fitted with threaded plugs up to 132 - from the 160 to the 355, undrilled cable gland mounting plate (nozzle and cable gland as options) - 1 earth terminal in each terminal box

Other construction types

CORROBLOC FINISH (Only for FLSES range : as for CILS the nameplate is in stainless steel)

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 ≤ 132)
Terminal box	Cast iron body and cover or steel	- terminal box with brass buttons for frame size ≤ 132
Cable gland	Brass	- option
External finish		- system IIIa (see External finish section) = C4M

Electrical and mechanical characteristics
IE3 - Powered by the mains

Type	Rated power	Rated torque	Starting torque/ Rated torque	Maximum torque/ Rated torquet	Starting current/ Rated current	Moment of inertia	Weight	Noise	400V / 50Hz								
									Rated speed	Rated current	Efficiency IEC 60034-2-1 2014			Power factor			
	P_n kW	M_n N.m	M_d/M_n	M_m/M_n	I_d/I_n	J kg.m²	IM B3 kg	LP db(A)	N_n min⁻¹	I_n A	4/4	3/4	2/4	4/4	Cos φ 3/4	2/4
2 poles																	
FLSES 80L	0.75	2.5	2.8	3.6	7	0.00095	16.1	59	2885	1.6	82.60	82.70	80.50	0.82	0.75	0.62	
FLSES 80LG	1.1	3.65	2.45	3.15	6.8	0.00201	22.5	59	2885	2.2	85.60	86.60	85.90	0.85	0.79	0.68	
FLSES 90SL	1.5	4.95	2.9	3	7	0.00223	24.6	68	2890	3	85.10	86.10	85.40	0.85	0.79	0.68	
FLSES 90LU	2.2	7.25	3.4	3.25	8.15	0.00292	28.2	70	2895	4.25	87.00	88.20	88.10	0.86	0.80	0.70	
FLSES 100L	3	9.9	3.2	3.6	8.1	0.00364	35.1	66	2895	5.75	87.10	88.10	87.80	0.86	0.81	0.70	
FLSES 112MG	4	13.1	2.10	2.95	7.35	0.00941	44.8	66	2920	7.3	88.50	89.50	89.40	0.89	0.85	0.77	
FLSES 132SM	5.5	17.9	2	2.8	6.4	0.00974	69.3	67	2935	10.3	90.00	90.80	90.40	0.86	0.82	0.73	
FLSES 132SM	7.5	24.4	2.05	2.9	6.95	0.01102	74.6	67	2940	13.8	91.20	92.00	91.80	0.86	0.82	0.75	
FLSES 132M	9	29.2	2.45	3.2	7.55	0.01203	78.2	67	2940	16.8	91.30	92.00	91.70	0.85	0.80	0.72	
FLSES 160M	11	35.6	3.34	3.04	8.24	0.0712	112	68	2950	19.9	91.90	92.40	92.00	0.87	0.83	0.75	
FLSES 160M	15	48.6	2.9	2.9	7.25	0.0551	133	68	2950	26.7	92.40	93.10	93.10	0.88	0.85	0.79	
FLSES 160LUR	18.5	59.9	2.85	2.75	7.4	0.0626	135	69	2950	32.9	92.50	93.20	93.20	0.88	0.86	0.79	
FLSES 180MUR	22	71.2	3	3.4	8.05	0.1012	195	74	2952	38	93.60	94.10	93.80	0.89	0.87	0.81	
FLSES 200LU	30	97.1	2.1	3.05	7.25	0.1186	210	71	2950	53.1	93.90	94.30	94.00	0.87	0.84	0.77	
FLSES 200LU	37	120	2.05	3.35	6.95	0.1388	230	75	2945	64.5	94.00	94.60	94.50	0.88	0.86	0.80	
FLSES 225MR	45	145	2.27	3.07	7.17	0.1597	254	71	2956	81.8	94.40	94.70	94.40	0.84	0.80	0.70	
FLSES 250M	55	177	2.1	3.20	7.65	0.3356	378	78	2968	95.3	94.50	94.60	93.70	0.88	0.85	0.79	
FLSES 280S*	75	241	2.07	2.73	7	0.48	565	80	2966	125	95.00	95.30	95.30	0.91	0.89	0.85	
FLSES 280M*	90	290	2.18	2.78	7.38	0.57	615	80	2967	151	95.30	95.70	95.50	0.90	0.89	0.85	
FLSES 315S*	110	353	2.07	2.57	6.6	1.45	940	80	2975	184	95.90	95.50	94.60	0.90	0.89	0.85	
FLSES 315M*	132	424	2.07	2.5	6.7	1.25	1015	80	2975	221	96.00	96.10	95.60	0.90	0.89	0.84	
FLSES 315LA*	160	514	2.09	2.83	6.66	1.34	1070	80	2972	267	96.00	96.10	95.70	0.90	0.89	0.84	
FLSES 315LB*	200	643	2.11	2.86	6.88	1.45	1150	80	2973	334	96.30	96.50	96.30	0.90	0.88	0.84	
FLSES 355LA	250	802	2.19	2.85	6.83	3.02	1590	82	2978	428	96.00	96.00	95.30	0.88	0.86	0.80	
FLSES 355LB	315	1008	2.55	3	7.82	3.62	1650	82	2982	537	96.30	96.50	96.40	0.88	0.86	0.82	
FLSES 355LC	355	1137	2.8	2.67	7	3.64	1660	82	2981	612	96.30	96.40	96.20	0.87	0.86	0.80	
FLSES 355LD	400	1278	1.88	2.59	7	3.7	1800	82	2988	670	96.40	96.50	96.30	0.89	0.88	0.85	
FLSES 355LKB	450	1439	2.2	5.26	12.7	6.4	2800	93	2991	747	96.60	96.10	95.10	0.90	0.87	0.80	
FLSES 400LB	560	1789	1.2	5.64	9.9	7.4	2640	93	2988	902	96.84	96.35	95.18	0.93	0.91	0.87	
4 poles																	
FLSES 80LG	0.75	4.95	2.2	3.15	6.6	0.00335	22	57	1452	1.65	83.80	84.40	83.10	0.79	0.71	0.58	
FLSES 90SL	1.1	7.25	2.4	3.2	7.5	0.00418	24.6	48	1450	2.3	84.90	85.80	85.00	0.81	0.74	0.61	
FLSES 90LU	1.5	9.85	2.85	3.55	7.34	0.00524	28.2	51	1454	3.25	85.40	85.80	84.10	0.78	0.70	0.56	
FLSES 100LR	2.2	14.5	3.45	3.85	8.16	0.00676	36.4	49	1452	4.65	86.90	87.40	86.20	0.78	0.70	0.57	
FLSES 100LG	3	19.6	2.45	3.25	7.27	0.01152	40.7	50	1462	5.95	88.70	89.30	88.70	0.82	0.76	0.64	
FLSES 112MU	4	26.2	2.7	3.1	7.05	0.01429	48.7	0	1458	8.1	88.80	89.50	88.90	0.80	0.75	0.64	
FLSES 132SM	5.5	35.9	2.85	3.65	8.35	0.02286	70.9	60	1462	10.5	90.10	90.70	90.20	0.84	0.78	0.67	
FLSES 132MR	7.5	49.1	2.8	3.4	8.45	0.03313	89.4	61	1460	13.8	90.60	91.50	91.30	0.86	0.81	0.71	
FLSES 160M	9	58.5	2.35	3.05	8.25	0.0601	105	59	1468	16.7	91.20	91.90	91.70	0.85	0.80	0.70	
FLSES 160M	11	71.7	2.25	2.85	7.6	0.0712	115	59	1466	20.1	91.70	92.70	92.80	0.86	0.82	0.73	
FLSES 160LUR	15	97.4	2.3	3.2	8.04	0.0954	140	58	1470	27.2	92.30	93.00	92.90	0.86	0.82	0.72	
FLSES 180M	18.5	120	3.05	3.35	8.05	0.1333	165	67	1470	34.1	92.80	93.50	93.40	0.84	0.80	0.71	
FLSES 180LUR	22	143	3.3	3.3	7.9	0.1555	190	68	1470	41.3	93.00	93.60	93.40	0.83	0.79	0.69	
FLSES 200LU	30	194	3.05	2.9	7.25	0.2035	250	64	1474	54.9	93.90	94.40	94.20	0.84	0.80	0.70	
FLSES 225S	37	238	2	2.65	6.75	0.5753	355	65	1484	67.5	94.00	94.40	94.10	0.84	0.80	0.71	
FLSES 225M	45	289	2.11	2.71	6.68	0.6482	380	64	1486	84.4	94.90	95.20	94.90	0.81	0.76	0.66	
FLSES 250MR	55	354	2.05	2.45	6.9	0.7701	440	67	1482	101	94.80	95.20	95.10	0.83	0.79	0.70	
FLSES 280S*	75	482	2.4	2.84	7.6	0.85	600	70	1483	137	95.00	95.10	94.40	0.84	0.80	0.71	
FLSES 280M*	90	579	2.69	2.67	8.1	0.98	645	70	1485	162	95.20	95.40	95.00	0.84	0.82	0.72	
FLSES 315S*	110	707	2.07	2.66	7.1	2.02	940	75	1486	195	95.60	95.70	95.20	0.85	0.81	0.73	
FLSES 315M*	132	848	2.77	2.76	6.76	2.09	985	75	1487	234	95.90	95.90	95.60	0.85	0.82	0.76	
FLSES 315LA*	160	1030	2.3	2.55	6.48	2.72	1055	75	1485	277	96.00	96.30	96.10	0.87	0.85	0.78	
FLSES 315LB*	200	1287	2.75	3	7.2	2.86	1245	75	1485	353	96.20	96.40	96.00	0.85	0.81	0.72	
FLSES 355LA	250	1604	2.55	3.1	7.54	4.9	1445	80	1488	436	96.30	96.40	95.60	0.86	0.82	0.71	
FLSES 355LAL	280	1798	2.4	2.94	7.48	5.8	1560	80	1489	483	96.20	96.50	96.30	0.87	0.85	0.78	
FLSES 355LB	315	2020	2.46	2.9	7.5	6.56	1720	80	1489	549	96.30	96.50	96.20	0.86	0.84	0.76	
FLSES 355LC	355	2280	2.36	2.74	7.55	6.56	1740	82	1488	629	96.30	96.60	96.40	0.85	0.86	0.80	
FLSES 355LD	400	2562	1.69	2.74	7.85	6.6	1750	82	1491	680	96.40	96.70	96.60	0.88	0.87	0.83	
FLSES 355LKB	450	2880	1.47	3.47	8.46	11.5	2530	82	1490	775	96.78	96.75	96.35	0.87	0.83	0.74	
FLSES 400LB	500	3205	1.32	3.1	7.65	11.5	2630	82	1490	857	96.50	96.67	96.39	0.87	0.85	0.77	
FLSES 450LA	550	3520	1.48	2.2	6.7	23.7	3100	84	1492	936	96.40	96.60	96.20	0.88	0.87	0.82	
FLSES 450LB	675	4323	1.67	2.74	6.9	26.55	3775	84	1491	1174	96.50	96.60	96.40	0.86	0.85	0.80	
FLSES 450LD	800	5117	2.1	2.9	8.5	34.8	4400	84	1493	1368	97.00	96.80	96.40	0.87	0.85	0.77	
FLSES 450LD	900	5761	1.9	2.58	7.6	34.8	4400	84	1492	1543	96.80	96.60	96.40	0.87	0.85	0.77	
6 poles																	
FLSES 90SL	0.75	7.6	1.84	2.3	4.45	0.00378	24.2	40	950	1.9	79.10	80.10	78.30	0.72	0.63	0.49	
FLSES 90LU	1.1	11	2.25	2.55	4.8	0.00519	29.3	57	954	2.75	81.70	82.30	80.30	0.71	0.62	0.48	
FLSES 100LG	1.5	14.8	2.35	2.8	5.65	0.01523	41.3	47	966	3.6	83.80	84.40	82.90	0.72	0.63	0.50	
FLSES 112MU	2.2	21.7	2.25	2.75	5.6	0.01899	49	45	968	5.35	84.50	85.10	83.50	0.70	0.62	0.49	
FLSES 132SM	3	29.5	2.65	3.05	6.4	0.02528	66.8	50	972	6.8	87.30	87.70	86.30	0.73	0.66	0.53	
FLSES 132M	4	39.4	2.4	2.9	6.27	0.03027	72.7	54	970	9.2	86.90	87.00	85.80	0.72	0.65	0.53	
FLSES 132MU	5.5	54.4	2.65	2.8	6.36	0.03699	82.2	55	966	11.7	88.30	89.00	88.70	0.77	0.71	0.59	
FLSES 160MU	7.5	73.2	2	3.05	6.45	0.1295	117	57	978	17.4	89.50	88.70	88.30	0.77	0.67	0.57	
FLSES 180L	11	107	2.95	3.8	8.2	0.2048	170	61	982	22.6	91.00	91.30	90.30	0.77	0.70	0.58	
FLSES 180LUR	15	146	3.25	2.75	7.45	0.253	202	60	978	31.9	91.30	91.60	90.90	0.74	0.68	0.56	
FLSES 200LU	18.5	181	2.45	3	7.02	0.2588	210	60	978	36.5	91.80	92.50	92.30	0.80	0.75	0.64	
FLSES 200LU	22	214	2.8	3.55	7.35	0.2588	245	62	980	44.6	92.50	92.90	92.50	0.77	0.72	0.61	
FLSES 225M	30	291	2.2	2.45	6.55	0.8802	342	65	986	55.3	93.20	93.71	93.39	0.84	0.80	0.71	
FLSES 250M	37	358	2.45	2.65	6.95	0.9142	397	64	986	68.1	93.50	94.00	93.70	0.84	0.80	0.71	
FLSES 280S	45	436	2.9	3.1	7.57	1.06	555	64	986	82	94.10	94.40	94.00	0.84	0.80	0.70	
FLSES 280M	55	533	2.86	3.16	7.33	1.28	605	64	986	100	94.40	94.60	94.20	0.84	0.79	0.69	
FLSES 315S*	75	723	2	2.1	7	2.5	965	70	991	137	95.00	95.30	95.00	0.83	0.80	0.73	
FLSES 315M*	90	867	2.7	2	7	2.96	1035	69	991	167	95.50	95.60	95.20	0.81	0.79	0.71	
FLSES 315LA*	110	1062	2.8	2.2	6.6	3.44	1150	69	989	204	95.50	95.90	95.60	0.82	0.79	0.50	
FLSES 315LB*	132	1271	3.1	2.3	6.9	3.77	1165	67	992	247	95.60	95.80	95.60	0.80	0.76	0.67	
FLSES 355LA*	160	1539	2	2.96	7.36	8.02	1520	76	993	283	96.00	96.20	95.90	0.85	0.81	0.73	
FLSES 355LB*	200	1923	1.86	2.63	7.1	9.84	1750	76	992	345	96.00	96.20	95.90	0.87	0.84	0.77	
FLSES 355LC	250	2404	2.19	3.01	7.58	10.44	1800	76	994	457	96.20	96.20	95.80	0.82	0.78	0.67	
FLSES 355LKA	315	3029	2.06	3.1	7.83	12.56	2330	79	993	577	96.10	96.20	95.80	0.82	0.78	0.68	
FLSES 355LKB	355	3418	1.8	2.65	7	14.07	2500	79	992	644	95.80	96.00	95.60	0.83	0.78	0.68	
FLSES 355LKC	400	3859	1.7	2.5	6.6	14	2590	79	990	708	95.90	96.30	96.30	0.85	0.82	0.75	
FLSES 450LA	450	4315	2.07	3.07	7.9	33	3230	80	996	844	96.20	96.00	94.80	0.80	0.76	0.65	
FLSES 450LB	560	5369	2.17	3.05	7.9	35	3400	80	996	1076	96.30	96.10	94.90	0.78	0.72	0.62	
FLSES 450LC	630	6041	2.65	3.2	7	48	4365	80	996	1192	96.60	96.30	95.10	0.79	0.75	0.65	
FLSES 450LC	710	6815	2.35	2.85	6.3	48	4365	80	995	1327	96.50	96.50	95.00	0.80	0.76	0.66	

* Power rating 75-200kW in IE3 possible depending on product destination (product not CE marked)

IMfinity® 3-phase induction motors - IE3 - IE4
IP55 Cast iron frame
Electrical and mechanical characteristics
IE3 - Powered by the mains

Type	Rated power at 50Hz	380V / 50Hz				415V / 50Hz				460V / 60Hz				
		Rated speed	Rated current	Efficiency	Power factor	Rated speed	Rated current	Efficiency	Power factor	Rated speed	Rated torque at 60Hz	Rated current	Efficiency	Power factor
	P_n kW	N_n min^{-1}	I_n A	η 4/4	Cos φ 4/4	N_n min^{-1}	I_n A	η 4/4	Cos φ 4/4	N_n min^{-1}	M_n N_m	I_n A	η 4/4	Cos φ 4/4
2 poles														
FLSES 80L	0.75	2870	1.65	82.40	0.84	2895	1.6	83.00	0.79	3505	2.04	1.4	83.70	0.79
FLSES 80LG	1.1	2870	2.3	84.70	0.86	2895	2.15	85.90	0.83	3505	3.0	1.95	84.80	0.83
FLSES 90SL	1.5	2870	3.1	84.30	0.87	2900	2.95	85.30	0.83	3505	4.1	2.65	86.10	0.83
FLSES 90LU	2.2	2875	4.4	86.00	0.89	2905	4.1	87.50	0.85	3510	6	3.7	88.20	0.85
FLSES 100L	3	2875	5.95	87.10	0.88	2910	5.6	87.50	0.85	-	-	-	-	-
FLSES 112MG	4	2910	7.65	88.10	0.90	2930	7.15	88.90	0.88	3535	10.8	6.4	89.90	0.88
FLSES 132SM	5.5	2925	10.6	89.20	0.88	2940	9.9	90.50	0.85	3545	14.8	9	90.80	0.85
FLSES 132SM	7.5	2930	14.4	90.10	0.88	2945	13.5	91.50	0.85	3550	20.2	12	92.20	0.85
FLSES 132M	9	2935	17.3	91.10	0.87	2950	16.3	91.40	0.84	3554	24.2	14.6	92.30	0.84
FLSES 160M	11	2940	20.8	91.20	0.88	2954	19.4	92.40	0.85	3554	29.6	17.3	92.40	0.86
FLSES 160M	15	2940	27.8	92.00	0.89	2956	25.7	92.70	0.87	3556	40.3	23	93.20	0.88
FLSES 160LUR	18.5	2935	34.1	92.40	0.89	2952	31.8	92.70	0.87	3558	49.7	28.4	93.20	0.87
FLSES 180MUR	22	2945	40	93.00	0.90	2958	37.1	93.80	0.88	3560	59	33.1	93.80	0.88
FLSES 200LU	30	2945	55.3	93.50	0.88	2954	51.7	94.00	0.86	3554	80.6	46.4	94.00	0.87
FLSES 200LU	37	2935	67.6	93.70	0.89	2950	62.8	94.30	0.87	3552	99.5	56.3	94.20	0.88
FLSES 225MR	45	2950	84.2	94.30	0.86	2960	80.7	94.40	0.82	3564	121	70.6	95.10	0.84
FLSES 250M	55	2966	99.1	94.30	0.89	2972	87.2	94.60	0.87	3574	147	83.3	94.30	0.88
FLSES 280S*	75	2962	132	94.70	0.91	2968	122	95.20	0.90	3566	201	110	94.10	0.91
FLSES 280M*	90	2961	158	95.00	0.91	2971	146	95.50	0.90	3567	241	132	95.00	0.90
FLSES 315S*	110	2975	194	95.50	0.90	2979	177	95.90	0.90	3575	294	161	95.00	0.90
FLSES 315M*	132	2971	233	95.70	0.90	2976	213	96.00	0.90	3575	353	193	95.40	0.90
FLSES 315LA*	160	2969	281	96.00	0.90	2976	260	96.20	0.89	3575	427	233	95.80	0.90
FLSES 315LB*	200	2969	351	96.30	0.90	2974	324	96.60	0.89	3575	534	291	95.80	0.90
FLSES 355LA	250	2976	445	95.90	0.89	2982	410	96.30	0.88	3578	667	372	95.80	0.88
FLSES 355LB	315	2978	565	96.20	0.88	2982	523	96.40	0.87	3583	840	469	95.80	0.88
FLSES 355LC	355	2977	640	95.80	0.88	2982	589	96.30	0.87	3581	947	535	95.80	0.87
FLSES 355LD	400	2987	694	97.00	0.90	2991	647	96.80	0.89	3589	1064	585	96.10	0.89
FLSES 355LKB	450	2990	779	96.50	0.91	2991	724	96.65	0.90	3592	1196	649	96.65	0.90
FLSES 400LB	560	2987	947	96.74	0.93	2990	874	96.92	0.92	3590	1490	786	97.03	0.92
4 poles														
FLSES 80LG	0.75	1445	1.65	83.10	0.82	1454	1.6	84.00	0.78	1762	4.06	1.45	85.70	0.76
FLSES 90SL	1.1	1440	2.4	84.10	0.83	1454	2.3	84.90	0.79	1758	5.98	2.05	86.50	0.78
FLSES 90LU	1.5	1445	3.3	85.30	0.81	1456	3.2	85.60	0.76	1762	8.13	2.9	86.90	0.75
FLSES 100LR	2.2	1445	4.75	86.70	0.81	1456	4.65	87.00	0.76	-	-	-	-	-
FLSES 100LG	3	1456	6.15	88.30	0.84	1462	5.95	88.80	0.79	1768	16.2	5.2	89.90	0.80
FLSES 112MU	4	1458	8.3	88.60	0.83	1462	8.05	89.40	0.78	1764	21.65	7.65	85.50	0.77
FLSES 132SM	5.5	1456	10.9	89.60	0.86	1466	10.3	90.20	0.82	1768	29.7	9.2	91.70	0.82
FLSES 132MR	7.5	1456	14.3	90.40	0.88	1464	13.5	91.00	0.85	1768	40.5	12.1	92.00	0.85
FLSES 160M	9	1462	17.3	90.90	0.87	1472	16.5	91.60	0.83	1772	48.5	14.6	92.40	0.84
FLSES 160M	11	1462	21	91.40	0.87	1468	19.5	92.20	0.85	1772	59.3	17.5	92.90	0.85
FLSES 160LUR	15	1466	28.6	92.10	0.87	1474	26.8	92.60	0.84	1774	80.7	23.8	93.40	0.85
FLSES 180M	18.5	1464	35.6	92.60	0.86	1472	33.5	93.00	0.83	1774	99.6	29.9	93.60	0.83
FLSES 180LUR	22	1466	42.4	93.00	0.85	1474	40.2	93.20	0.82	1776	118	35.9	93.70	0.82
FLSES 200LU	30	1472	56.8	93.60	0.85	1476	53.7	94.20	0.82	1780	161	48.3	94.50	0.83
FLSES 225S	37	1482	70.5	93.90	0.85	1486	65.7	94.50	0.83	1786	198	59.4	94.50	0.83
FLSES 225M	45	1484	87	94.60	0.83	1486	82.5	95.00	0.80	1788	240	74.1	95.30	0.80
FLSES 250MR	55	1480	105	94.60	0.84	1484	98.4	95.00	0.82	1784	294	88.2	95.40	0.82
FLSES 280S*	75	1483	142	94.70	0.85	1486	133	94.80	0.83	1784	401	117	95.40	0.84
FLSES 280M*	90	1481	168	95.00	0.86	1485	159	95.10	0.83	1785	481	141	95.40	0.84
FLSES 315S*	110	1485	204	95.40	0.86	1487	194	95.40	0.83	1786	588	172	95.80	0.84
FLSES 315M*	132	1484	241	95.60	0.87	1487	229	95.80	0.84	1787	705	203	96.00	0.85
FLSES 315LA*	160	1482	288	95.80	0.88	1486	269	96.10	0.86	1784	856	249	96.20	0.85
FLSES 315LB*	200	1483	367	96.20	0.86	1486	349	96.10	0.83	1786	1069	307	96.20	0.85
FLSES 355LA	250	1487	450	96.00	0.88	1490	425	96.20	0.85	1788	1335	379	96.20	0.86
FLSES 355LAL	280	1487	503	96.00	0.88	1490	471	96.10	0.86	1787	1496	420	96.20	0.87
FLSES 355LB	315	1486	567	96.00	0.88	1488	530	96.30	0.86	1787	1683	472	96.20	0.87
FLSES 355LC	355	1486	631	96.00	0.89	1489	592	96.00	0.87	1786	1898	532	96.20	0.87
FLSES 355LD	400	1486	709	96.30	0.89	1492	678	96.60	0.85	1788	2136	607	96.20	0.86
FLSES 355LKB	450	1489	804	96.60	0.88	1491	760	96.90	0.85	1792	2398	677	97.00	0.86
FLSES 400LB	500	1488	897	96.25	0.88	1491	837	96.60	0.86	1792	2664	746	96.70	0.87
FLSES 450LA	550	1491	974	96.40	0.89	1492	912	96.40	0.87	1793	2929	812	96.60	0.88
FLSES 450LB	675	1490	1222	96.50	0.87	1492	1145	96.50	0.85	1792	3597	1019	96.70	0.86
FLSES 450LD	800	1492	1408	97.00	0.89	1494	1350	97.00	0.85	1794	4258	1189	97.10	0.87
FLSES 450LD	900	1491	1605	96.80	0.88	1493	1522	96.80	0.85	1793	4793	1340	96.90	0.87
6 poles														
FLSES 90SL	0.75	945	1.95	78.90	0.75	956	1.9	79.40	0.69	1160	6.17	1.7	82.50	0.67
FLSES 90LU	1.1	945	2.8	81.00	0.74	958	2.75	81.70	0.68	-	-	-	-	-
FLSES 100LG	1.5	962	3.7	83.30	0.74	970	3.6	84.10	0.69	-	-	-	-	-
FLSES 112MU	2.2	970	6.95	86.30	0.76	974	6.75	86.80	0.71	-	-	-	-	-
FLSES 132SM	3	966	9.3	86.80	0.75	972	9.15	87.00	0.70	-	-	-	-	-
FLSES 132M	4	962	12	88.00	0.79	970	11.5	88.50	0.75	-	-	-	-	-
FLSES 132MU	5.5	962	12.1	88.00	0.78	970	11.7	88.50	0.74	-	-	-	-	-
FLSES 160MU	7.5	974	18.2	89.10	0.79	980	17.1	89.60	0.74	-	-	-	-	-
FLSES 180L	11	978	23	90.70	0.80	984	22.3	91.20	0.75	1182	88.9	20	92.00	0.75
FLSES 180LUR	15	976	32.8	91.20	0.76	982	31.7	91.40	0.72	1182	121	28.5	91.70	0.72
FLSES 200LU	18.5	976	38	91.70	0.81	980	36	92.10	0.78	-	-	-	-	-
FLSES 200LU	22	978	43.6	92.20	0.79	984	42.2	92.70	0.74	-	-	-	-	-
FLSES 225M	30	984	57.3	92.90	0.86	986	53.9	93.26	0.83	-	-	-	-	-
FLSES 250M	37	984	70.2	93.30	0.86	986	66.5	93.70	0.83	1190	297	58.9	94.10	0.84
FLSES 280S	45	985	84.7	93.90	0.86	988	81	94.20	0.82	1186	362	71	94.50	0.85
FLSES 280M	55	984	103	94.10	0.86	988	99	94.40	0.82	1186	443	87	94.50	0.84
FLSES 315S*	75	990	143	94.60	0.84	992	134	94.80	0.82	1190	602	122	95.00	0.81
FLSES 315M*	90	987	172	94.90	0.84	992	166	95.20	0.79	1191	722	145	95.00	0.82
FLSES 315LA*	110	987	209	95.10	0.84	992	203	95.40	0.79	1191	882	176	95.80	0.82
FLSES 315LB*	132	988	256	95.40	0.82	991	243	95.70	0.79	1190	1059	217	95.80	0.80
FLSES 355LA*	160	992	295	95.80	0.86	994	276	96.00	0.84	1193	1281	247	95.80	0.85
FLSES 355LB*	200	990	362	95.90	0.87	993	337	96.10	0.86	1193	1601	301	95.80	0.87
FLSES 355LC	250	993	464	96.40	0.85	994	452	96.10	0.80	1193	2001	405	95.80	0.81
FLSES 355LKA	315	993	602	95.80	0.83	994	565	95.80	0.81	1193	2521	504	95.80	0.82
FLSES 355LKB	355	990	671	95.80	0.84	993	629	95.80	0.82	1192	2844	561	95.80	0.83
FLSES 355LKC	400	989	746	95.90	0.85	992	697	96.30	0.83	1189	3213	615	96.10	0.85
FLSES 450LA	450	995	856	96.20	0.83	996	846	96.10	0.77	1196	3593	732	96.40	0.80
FLSES 450LB	560	995	1090	96.40	0.81	996	1094	96.20	0.74	1196	4471	933	96.60	0.78
FLSES 450LC	630	995	1223	96.60	0.81	997	1195	96.50	0.76	1197	5026	1035	96.70	0.79
FLSES 450LC	710	994	1368	96.50	0.82	996	1312	96.50	0.82	1196	5669	1152	96.70	0.80

* Power rating 75-200kW in IE3 possible depending on product destination (product not CE marked)

Electrical and mechanical characteristics
IE3 - Powered by the drive

Type	400V / 50Hz				Rated torque M_n at S1 continuous duty					400V / 87Hz Δ				Maximum mechanical speed[1]
	Rated power P_n kW	Rated speed N min^{-1}	Rated current I_n A	Power factor Cos φ 4/4	10Hz N.m	17Hz N.m	25Hz N.m	50Hz N.m	87Hz N.m	Rated power P_n kW	Rated current I_n A	Efficiency Cos φ 4/4	Power factor Cos φ 4/4	
2 poles														
FLSES 80 L	0.75	2870	1.75	0.84	2.5	2.5	2.5	2.5	1.4	1.31	5090	3	0.84	13500
FLSES 80 LG	1.1	2865	2.35	0.87	3.7	3.7	3.7	3.7	2.1	1.91	5085	4.15	0.87	13500
FLSES 90 SL	1.5	2870	3.25	0.87	5.0	5	5	5	2.8	2.61	5090	5.65	0.87	11700
FLSES 90 LU	2.2	2875	4.60	0.89	7.3	7.3	7.3	7.3	4.1	3.83	5095	8	0.89	11700
FLSES 100 L	3	2870	6.25	0.89	9.9	9.9	9.9	9.9	5.6	5.22	5090	10.9	0.89	9900
FLSES 112 MG	4	2910	8.15	0.89	13.1	13.1	13.1	13.1	7.5	6.96	5130	14.2	0.89	9900
FLSES 132 SM	5.5	2925	11.1	0.88	17.9	17.9	17.9	17.9	10.2	9.57	5145	19.3	0.88	6700
FLSES 132 SM	7.5	2930	14.9	0.88	24.4	24.4	24.4	24.4	13.9	13.1	5150	25.9	0.88	6700
FLSES 132 M	9	2935	17.9	0.87	29.2	29.2	29.2	29.2	16.6	15.7	5155	31.2	0.87	5220
FLSES 160 M	11	2940	21.5	0.88	30.3	32	35.6	35.6	20.3	19.1	5160	37.4	0.88	6030
FLSES 160 M	15	2940	28.5	0.90	43.7	46.2	48.6	48.6	27.7	26.1	5160	49.7	0.90	6030
FLSES 160 LUR	18.5	2935	35.3	0.90	53.9	56.9	59.9	59.9	34.1	32.2	5155	61.5	0.90	4500
FLSES 180 MUR	22	2945	41.1	0.90	64.1	71.2	71.2	71.2	-	-	-	-	-	4500
FLSES 200 LU	30	2945	56.9	0.88	77.7	82.5	87.4	97.1	-	-	-	-	-	4500
FLSES 200 LU	37	2935	69.4	0.89	96	102	108	120	-	-	-	-	-	4700
FLSES 225 MR	45	2940	84.7	0.89	117	124	131	146	-	-	-	-	-	4320
FLSES 250 M	55	2966	102	0.89	142	150	159	177	-	-	-	-	-	4050
FLSES 280 S	75	2950	135	0.91	182	206	243	243	-	-	-	-	-	3600
FLSES 280 M	90	2965	164	0.91	218	247	291	291	-	-	-	-	-	3600
FLSES 315 S	110	2976	202	0.90	265	300	353	353	-	-	-	-	-	3600
FLSES 315 M	132	2976	243	0.90	318	360	423	423	-	-	-	-	-	3600
FLSES 315 LA	160	2971	293	0.90	385	436	513	513	-	-	-	-	-	3600
FLSES 315 LB	200	2975	365	0.90	482	546	642	642	-	-	-	-	-	3600
FLSES 355 LA	250	2978	461	0.89	748	766	802	802	-	-	-	-	-	3600
FLSES 355 LB	315	2979	580	0.89	756	857	1008	1008	-	-	-	-	-	3600
FLSES 355 LC	355	2981	663	0.88	853	966	1137	1137	-	-	-	-	-	3600
FLSES 355 LD	400	2990	720	0.91	1069	1130	1278	1278	-	-	-	-	-	3600
FLSES 355 LKB	450	2988	975	0.94	1342	1521	1789	1789	-	-	-	-	-	3600
FLSES 400 LB	560	2987	1036	0.89	1432	1611	1790	1790	-	-	-	-	-	3600
4 poles														
FLSES 80 LG	0.75	1445	1.75	0.82	5	5	5	5	2.8	1.31	2555	3.05	0.82	13500
FLSES 90 SL	1.1	1440	2.50	0.84	7.3	7.3	7.3	7.3	4.1	1.91	2550	4.3	0.84	11700
FLSES 90 LU	1.5	1445	3.45	0.81	9.8	9.8	9.8	9.8	5.6	2.61	2555	6.0	0.81	11700
FLSES 100 LR	2.2	1445	4.85	0.81	14.5	14.5	14.5	14.5	8.3	3.83	2555	8.45	0.81	9900
FLSES 100 LG	3	1456	6.4	0.84	17.6	19.6	19.6	19.6	11.2	5.22	2566	11.1	0.84	9900
FLSES 112 MU	4	1450	8.5	0.83	23.6	26.2	26.2	26.2	14.9	6.96	2560	14.8	0.83	9900
FLSES 132 SM	5.5	1456	11.2	0.86	35.9	35.9	35.9	35.9	20.5	9.57	2566	19.5	0.86	6700
FLSES 132 MR	7.5	1456	14.9	0.88	49.1	49.1	49.1	49.1	28.0	13.1	2566	25.9	0.88	6700
FLSES 160 M	9	1462	17.9	0.87	52.7	58.5	58.5	58.5	33.3	15.7	2572	31.2	0.87	2610
FLSES 160 M	11	1462	21.5	0.88	64.5	71.7	71.7	71.7	40.9	19.1	2572	37.4	0.88	6030
FLSES 160 LUR	15	1466	29.5	0.87	87.7	97.4	97.4	97.4	55.5	26.1	2576	51.4	0.87	5670
FLSES 180 M	18.5	1464	36.4	0.86	102	120	120	120	68.4	32.2	2574	63.3	0.86	5670
FLSES 180 LUR	22	1466	44.1	0.85	122	143	143	143	81.5	38.3	2576	76.7	0.85	4500
FLSES 200 LU	30	1472	58.9	0.85	155	175	194	194	111	52.2	2582	102	0.85	4500
FLSES 225 S	37	1482	72.8	0.85	202	238	238	238	136	64.4	2592	127	0.85	4320
FLSES 225 M	45	1482	88.4	0.85	247	290	290	290	165	78.3	2592	154	0.85	4320
FLSES 250 MR	55	1480	108	0.84	301	354	354	354	202	95.7	2590	188	0.84	4050
FLSES 280 S	75	1485	148	0.84	364	412	485	485	274	-	-	-	-	2610
FLSES 280 M	90	1485	177	0.84	434	494	581	581	329	-	-	-	-	2610
FLSES 315 S	110	1486	210	0.86	709	709	709	709	404	-	-	-	-	2610
FLSES 315 M	132	1487	250	0.87	815	830	852	852	486	-	-	-	-	2610
FLSES 315 LA	160	1484	303	0.87	935	970	1033	1033	585	-	-	-	-	2610
FLSES 315 LB	200	1486	374	0.87	1150	1200	1289	1289	704	-	-	-	-	2610
FLSES 355 LA	250	1488	465	0.87	1490	1530	1605	1605	915	-	-	-	-	2610
FLSES 355 LAL	280	1487	507	0.87	1650	1700	1798	1798	1036	-	-	-	-	2610
FLSES 355 LB	315	1488	594	0.87	1516	1719	2022	2022	1150	-	-	-	-	2610
FLSES 355 LC	355	1487	670	0.87	1710	1938	2280	2280	1290	-	-	-	-	2610
FLSES 355 LD	400	2562	719	0.88	2180	2370	2562	2562	1510	-	-	-	-	2610
FLSES 355 LKB	450	1489	837	0.876	2592	2736	2880	2880	1670	-	-	-	-	2610
FLSES 400 LB	500	1490	943	0.87	2564	2885	3205	3205	1834	-	-	-	-	2610
FLSES 450 LA	550	1492	1011	0.89	2816	3168	352	3520	-	-	-	-	-	1800
FLSES 450 LB	675	1491	1268	0.87	3458	3891	4323	4323	-	-	-	-	-	1800
FLSES 450 LD	800	1493	1478	0.88	4094	4606	5117	5117	-	-	-	-	-	1800
FLSES 450 LD	900	1492	1666	0.88	4609	5185	5761	5761	-	-	-	-	-	1800
6 poles														
FLSES 90 SL	0.75	945	2.05	0.75	7.6	7.6	7.6	7.6	4.3	1.31	1685	3.55	0.75	11700
FLSES 90 LU	1.1	945	2.85	0.74	11	11	11	11	6.3	1.91	1685	5	0.74	11700
FLSES 100 LG	1.5	962	3.80	0.74	14.1	14.8	14.8	14.8	8.4	2.61	1702	6.6	0.74	9900
FLSES 112 MU	2.2	962	5.65	0.74	20.6	21.7	21.7	21.7	12.4	3.83	1702	9.8	0.74	9900
FLSES 132 SM	3	970	7.1	0.76	29.5	29.5	29.5	29.5	16.8	5.22	1710	12.3	0.76	6700
FLSES 132 M	4	966	9.7	0.75	39.4	39.4	39.4	39.4	22.5	6.96	1706	16.9	0.75	6700
FLSES 132 MU	5.5	962	12.5	0.79	54.4	54.4	54.4	54.4	31	9.57	1702	21.8	0.79	6700
FLSES 160 MU	7.5	974	18.7	0.79	73.2	73.2	73.2	73.2	41.7	13.1	1714	32.5	0.79	6030
FLSES 180 L	11	978	24.0	0.80	96.3	107	107	107	61	19.1	1718	41.8	0.80	5670
FLSES 180 LUR	15	976	34.1	0.76	131	146	146	146	83.2	26.1	1716	59.3	0.76	4500
FLSES 200 LU	18.5	974	38.9	0.81	163	181	181	181	103	32.2	1714	67.7	0.81	4500
FLSES 200 LU	22	978	45.0	0.79	193	214	214	214	122	38.3	1718	78.2	0.79	4500
FLSES 225 M	30	984	58.9	0.86	262	291	291	291	166	52.2	1724	103	0.86	4050
FLSES 250 M	37	984	72.2	0.86	322	358	358	358	204	64.4	1724	126	0.86	4050
FLSES 280 S	45	986	89	0.85	327	371	436	436	247	-	-	-	-	1740
FLSES 280 M	55	986	108	0.85	400	453	533	533	302	-	-	-	-	1740
FLSES 315 S	75	990	155	0.80	575	652	723	723	412	-	-	-	-	1740
FLSES 315 M	90	991	187	0.80	650	737	867	867	494	-	-	-	-	1740
FLSES 315 LA	110	991	228	0.80	795	901	1060	1060	603	-	-	-	-	1740
FLSES 315 LB	132	990	272	0.80	955	1082	1273	1273	724	-	-	-	-	1740
FLSES 355 LA	160	993	310	0.85	1154	1307	1538	1538	878	-	-	-	-	1740
FLSES 355 LB	200	993	391	0.84	1442	1635	1923	1923	1090	-	-	-	-	1740
FLSES 355 LC	250	993	507	0.81	1803	2043	2404	2404	1370	-	-	-	-	1740
FLSES 355 LKA	315	993	631	0.82	2271	2575	3029	3029	1720	-	-	-	-	1740
FLSES 355 LKB	355	992	703	0.83	2561	2902	3414	3414	1940	-	-	-	-	1740
FLSES 355 LKC	400	990	758	0.81	3087	3472	3858	3858	2200	-	-	-	-	1200
FLSES 450 LA	450	996	911	0.81	3452	3886	4315	4315	2480	-	-	-	-	1200
FLSES 450 LB	560	996	1161	0.79	4295	4832	5369	5369	3086	-	-	-	-	1200
FLSES 450 LC	630	996	1285	0.80	4833	5437	6041	6041	3472	-	-	-	-	1200
FLSES 450 LD	710	995	1432	0.81	5452	6134	6815	6815	3917	-	-	-	-	1200

⚠ **Values given with a voltage drop of 30 V at the drive output**

Electrical and mechanical characteristics
IE4 - 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 2014			Power factor		
	P_n kW	M_n N.m	M_d/M_n	M_m/M_n	I_d/I_n	J kg.m²	IM B3 kg	LP db(A)	N_n min⁻¹	I_n A	η 4/4	η 3/4	η 2/4	Cos φ 4/4	Cos φ 3/4	Cos φ 2/4
2 poles																
FLSES 280 S	75	241	3.00	3.90	9.50	0.58	627	80	2978	125	95.6	96.2	95.8	0.89	0.86	0.78
CILS 280 S	75	241	2.15	3.20	6.90	1	810	80	2978	125	95.6	95.3	94.4	0.90	0.88	0.81
FLSES 280 MKB	90	289	2.20	2.80	7.50	0.98	840	80	2977	153	95.8	96.3	95.8	0.88	0.86	0.80
CILS 280 M	90	289	2.10	3.05	6.70	1.05	840	80	2978	153	95.8	95.6	94.7	0.89	0.87	0.79
FLSES 315 S	110	353	2.20	2.99	7.60	1.10	944	80	2977	188	96.0	96.3	95.9	0.88	0.86	0.80
CILS 315 S	110	353	2.20	3.09	6.75	1.2	890	80	2978	188	96.0	95.8	95.0	0.88	0.87	0.82
FLSES 315 M	132	423	2.10	2.78	7.03	1.24	1000	75	2978	223	96.2	96.6	96.3	0.89	0.87	0.82
CILS 315 M	132	423	2.05	2.85	6.35	1.25	940	80	2976	223	96.2	95.8	95.3	0.88	0.87	0.82
FLSES 315 LA	160	515	2.22	2.82	7.18	1.39	1050	83	2976	268	96.3	96.5	96.3	0.90	0.88	0.84
CILS 315 L	160	512	2.85	3.69	8.35	1.44	1050	80	2982	273	96.3	96.0	95.0	0.88	0.85	0.77
FLSES 315 LKB	200	640	2.60	2.91	8.10	3.15	1535	80	2986	344	96.5	96.7	96.5	0.87	0.85	0.81
CILS 315 L	200	642	2.06	2.65	6.25	1.62	1140	80	2976	329	96.5	96.3	95.8	0.91	0.90	0.86
FLSES 355 LB	250	799	3.20	3.80	9.70	3.62	1650	83	2988	434	96.6	96.6	96.4	0.86	0.84	0.89
FLSES 355 LB	315	1009	2.60	3.00	7.90	3.62	1650	83	2982	534	96.8	96.8	96.6	0.88	0.86	0.81
FLSES 355 LC	355	1137	2.80	2.70	7.20	3.64	1660	83	2981	610	96.6	96.7	96.5	0.87	0.86	0.80
4 poles																
FLSES 280 MKA	75	481	2.80	4.50	7.90	1.80	839	67	1489	132	96.0	96.1	95.6	0.86	0.83	0.74
CILS 280 S	75	481	2.81	3.41	8.80	1.82	860	70	1490	132	96.1	96.0	95.3	0.86	0.83	0.74
FLSES 280 MKB	90	577	3.00	4.10	8.10	2.00	878	67	1489	156	96.1	96.2	95.7	0.87	0.85	0.74
CILS 280 M	90	577	3.05	3.66	9.45	2.06	912	70	1490	156	96.2	96.1	95.4	0.87	0.85	0.74
FLSES 315 S	110	706	3.30	3.30	8.20	2.40	1046	70	1489	194	96.3	96.3	95.9	0.85	0.81	0.72
CILS 315 S	110	706	3.11	3.60	9.05	2.31	980	75	1490	194	96.3	96.1	95.4	0.85	0.83	0.76
FLSES 315 M	132	847	3.20	3.10	8.20	2.60	1085	70	1489	233	96.4	96.7	96.5	0.85	0.83	0.76
CILS 315 M	132	847	3.20	3.55	9.20	2.68	1090	75	1490	233	96.4	96.1	95.4	0.85	0.83	0.76
FLSES 315 LKA	160	1026	2.30	3.81	8.10	4.20	1333	70	1490	275	96.6	96.8	96.4	0.87	0.83	0.75
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
CILS 315 L	160	1026	2.90	3.20	8.40	2.92	1155	75	1488	275	96.6	96.5	95.9	0.87	0.83	0.75
FLSES 315 LKB	200	1282	2.98	4.10	8.00	5.10	1454	74	1490	336	96.7	96.8	96.4	0.86	0.82	0.74
CILS 315 L	200	1280	3.15	3.50	8.80	3.16	1240	75	1490	353	96.7	96.3	95.5	0.84	0.80	0.70
FLSES 355 LB	250	1602	3.00	3.70	9.40	6.56	1650	74	1490	439	96.7	96.9	96.6	0.85	0.82	0.75
FLSES 355 LB	280	1793	2.80	4.30	8.70	6.56	1720	80	1491	492	96.7	96.5	96.0	0.85	0.82	0.66
FLSES 355 LC	315	2022	2.70	3.10	8.40	6.60	1700	74	1488	540	96.7	97.0	96.9	0.87	0.85	0.79
FLSES 355 LD	355	2271	1.90	3.20	8.57	6.60	1765	75	1493	610	96.7	96.7	95.8	0.87	0.87	0.75

Electrical and mechanical characteristics
IE4 - Powered by the drive

Type	400V 50Hz				Rated torque M_n at S1 continuous duty					Speed mechanical maximum
	Rated power	Rated speed	Rated current	Power factor	10Hz	17Hz	25Hz	50Hz	60Hz	
	P_n kW	N_n min^{-1}	I_n A	Cos φ 4/4	N.m	N.m	N.m	N.m	N.m	
2 poles										
FLSES 280 S	75	2973	137	0.9	241	241	241	241	-	3600
CILS 280 S	75	2978	126	0.90	241	241	241	241	-	3600
FLSES 280 MKB	90	2975	165	0.89	289	289	289	289	-	3600
CILS 280 M	90	2978	151	0.89	288	288	288	288	-	3600
FLSES 315 S	110	2975	203	0.89	337	353	353	353	-	3600
CILS 315 S	110	2978	186	0.88	352	352	352	352	-	3600
FLSES 315 M	132	2973	240	0.89	384	397	423	423	-	3600
CILS 315 M	132	2976	220	0.88	423	423	423	423	-	3600
FLSES 315 LA	160	2967	295	0.9	467	480	514	514	-	
CILS 315 L	160	2982	273	0.88	467	490	514	514	-	3600
FLSES 315 LKB	200	2973	365	0.9	575	609	642	642	-	3600
CILS 315 L	200	2976	329	0.91	575	600	642	642	-	3600
FLSES 355 LB	250	2988	460	0.87	799	799	799	799	-	3600
FLSES 355 LB	315	2982	580	0.88	850	930	1009	1009	-	3600
FLSES 355 LC	355	2981	630	0.88	1000	1069	1137	1137	-	3600
4 poles										
FLSES 280 MKA	75	1490	142	0.83	450	465	481	481	-	2610
CILS 280 S	75	1490	128	0.86	450	465	481	481	-	2610
FLSES 280 MKB	90	1485	173	0.84	577	577	577	577	-	2610
CILS 280 M	90	1490	153	0.87	577	577	577	577	-	2610
FLSES 315 S	110	1487	207	0.86	705	705	705	705	-	2610
CILS 315 S	110	1490	194	0.85	706	706	706	706	-	2610
FLSES 315 M	132	1487	260	0.87	772	797	848	848	-	2610
CILS 315 M	132	1490	230	0.85	772	797	848	848	-	2610
FLSES 315 LKA	160	1487	316	0.84	900	950	1028	1028	-	2610
CILS 315 L	160	1488	275	0.87	900	950	1028	1028	-	2610
FLSES 315 LKB	200	1487	375	0.87	1126	1195	1282	1282	-	2610
CILS 315 L	200	1490	355	0.84	1281	1281	1281	1281	-	2610
FLSES 355 LB	250	1490	460	0.87	1500	1602	1602	1602	-	2610
FLSES 355 LB	280	1491	531	0.86	1650	1703	1793	1793	-	2610
FLSES 355 LC	315	1488	570	0.88	1620	1825	2022	2022	-	2610
FLSES 355 LD	355	1493	637	0.88	2000	2100	2271	2271	-	2610

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 (2 if auxiliaries)	ISO M20 X 1,5
	90	2 ; 4 ; 6			
	100	2 ; 4 ; 6			
	112	2 ; 4 ; 6			
	132	2 ; 4 ; 6		2	ISO M25 X 1,5
	160	2 ; 4 ; 6		0	Removable undrilled mounting plate (see details page 145)
	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			
CILS	280/315	2 ; 4	Cast iron	3	2 x ISO M63X1,5 + 1 x M16X1,5

** 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.

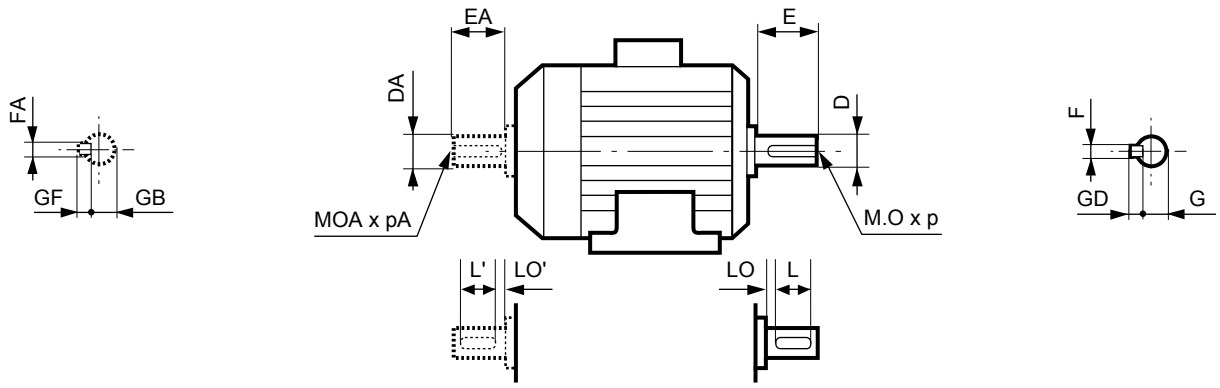
Tightening torque for the nuts on the terminal blocks

Terminal	M5	M6	M8	M10	M12	M14	M16
Torque N.m	2.5	4	10	20	35	50	65

Series	Type	No. of poles	230/400V connections	400/690V connections
			Terminals	Terminals
FLSES	80 à 112	2 ; 4 ; 6	M5	M5
	132 S à 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 à 250	2	M10	M8
		4		M10
	250 M	6	M8	M8
	280 à 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
CILS	280	2 ; 4	-	M10
	315 S	2 ; 4	-	M10
	315 M/L (160kW)	2 ; 4	-	M12
	315 L (200kW)	2 ; 4	-	M16

Dimensions
Shaft extensions

Dimensions in millimetres

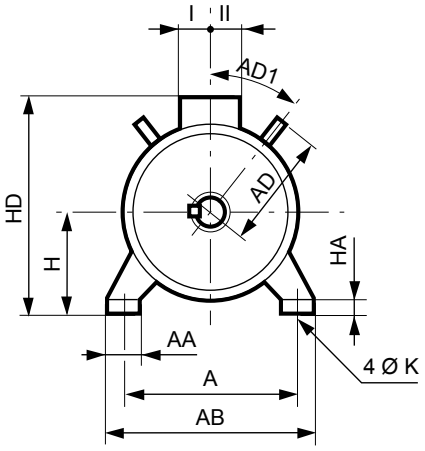


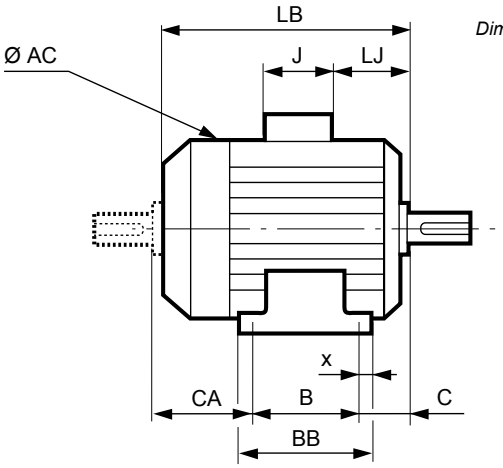
Type	Main shaft extensions																		
	4 and 6 poles									2 poles								
	F	GD	D	G	E	O	p	L	LO	F	GD	D	G	E	O	p	L	LO
FLSES 80 L/LG	6	6	19j6	15.5	40	6x1	16	30	6	6	6	19j6	15.5	40	6x1	16	30	6
FLSES 90 L/LU/SL	8	7	24j6	20	50	8x1.25	19	40	6	8	7	24j6	20	50	8x1.25	19	40	6
FLSES 100 L/LG/LR	8	7	28j6	24	60	10x1.5	22	50	6	8	7	28j6	24	60	10x1.5	22	50	6
FLSES 112 MG/MU	8	7	28j6	24	60	10x1.5	22	50	6	8	7	28j6	24	60	10x1.5	22	50	6
FLSES 132 M/MR/MU/SM	10	8	38k6	33	80	12x1.75	28	63	10	10	8	38k6	33	80	12x1.75	28	63	10
FLSES 160 L/LUR/M/MU	12	8	42k6	37	110	16x2	36	90	20	12	8	42k6	37	110	16x2	36	90	20
FLSES 180 L/LUR/M/MT/MUR	14	9	48k6	42.5	110	16x2	36	90	20	14	9	48k6	42.5	110	16x2	36	90	20
FLSES 200 LU	16	10	55m6	49	110	20x2.5	42	90	20	16	10	55m6	49	110	20x2.5	42	90	20
FLSES 225 MR	-	-	-	-	-	-	-	-	-	16	10	55m6	49	110	20x2.5	42	90	20
FLSES 225 M/S/SR	18	11	60m6	53	140	20x2.5	42	125	15	-	-	-	-	-	-	-	-	-
FLSES 250 M	18	11	65m6	58	140	20x2.5	42	125	15	18	11	60m6	53	140	20x2.5	42	125	15
FLSES 250 MR	18	11	65m6	58	140	20x2.5	42	125	15	-	-	-	-	-	-	-	-	-
FLSES 280 M	20	12	75m6	67.5	140	20x2.5	42	125	15	18	11	65m6	58	140	20x2.5	42	125	15
CILS 280 M	20	12	75m6	67.5	140	20x2.5	42	125	15	18	11	65m6	58	140	20x2.5	42	125	15
FLSES 280 S	-	-	-	-	-	-	-	-	-	18	11	65m6	58	140	20x2.5	42	125	15
CILS 280 S	20	12	75m6	67.5	140	20x2.5	42	125	15	18	11	65m6	58	140	20x2.5	42	125	15
FLSES 280 MKB	20	12	75m6	67.5	140	20x2.5	42	125	15	18	11	65m6	58	140	20x2.5	42	125	15
FLSES 280 MKA	20	12	75m6	67.5	140	20x2.5	42	125	15	-	-	-	-	-	-	-	-	-
CILS 315 M	22	14	80m6	71	170	20x2.5	42	140	30	18	11	65m6	58	140	20x2.5	42	125	15
FLSES 315 LKA	25	14	90m6	81	170	24x3	50	140	30	-	-	-	-	-	-	-	-	-
FLSES 315 LKB	25	14	90m6	81	170	24x3	50	140	30	20	12	70m6	62.5	140	20x2.5	42	125	15
FLSES 315 LA/LB/L	25	14	90m6	81	170	24x3	50	140	30	20	12	70m6	62.5	140	20x2.5	42	125	15
FLSES 315 M/S	22	14	80m6	71	170	24x3	42	140	30	18	11	65m6	58	140	20x2.5	42	125	15
CILS 315 S	22	14	80m6	71	170	20x2.5	42	140	30	18	11	65m6	58	140	20x2.5	42	125	15
FLSES 355 LA/LAL/LB/LC/LD/LKB	28	16	100m6	90	210	24x3	50	180	30	22	14	80m6	71	170	20x2.5	42	140	30
FLSES 355 LKA/LKC	28	16	100m6	90	210	24x3	50	180	30	-	-	-	-	-	-	-	-	-
CILS 315 L	25	14	90m6	81	170	24x3	50	140	30	18	11	65m6	58	140	20x2.5	42	125	15
FLSES 400 LB	28	16	110m6	100	210	24x3	50	180	30	22	14	80m6	71	170	20x2.5	42	140	30
FLSES 450 LA/LB/LC/LD	32	18	120m6	109	210	24x3	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	5	5	14j6	11	30	5x0.8	15	25	3.5	5	5	14j6	11	30	5x0.8	15	25	3.5
FLSES 80 LG	6	6	19j6	15.5	40	6x1	16	30	6	6	6	19j6	15.5	40	6x1	16	30	6
FLSES 90 L/LU/SL	6	6	19j6	15.5	40	6x1	16	30	6	6	6	19j6	15.5	40	6x1	16	30	6
FLSES 100 L/LG/LR	8	7	24j6	20	50	8x1.25	19	40	6	8	7	24j6	20	50	8x1.25	19	40	6
FLSES 112 MG/MU	8	7	24j6	20	50	8x1.25	19	40	6	8	7	24j6	20	50	8x1.25	19	40	6
FLSES 132 M/MR/MU/SM	8	7	28k6	24	60	10x1.5	22	50	6	8	7	28k6	24	60	10x1.5	22	50	6
FLSES 160 L/M/MU	12	8	42k6	37	110	16x2	36	100	6	12	8	42k6	37	110	16x2	36	100	6
FLSES 160LUR	12	8	42k6	37	110	16x2	36	90	20	12	8	42k6	37	110	16x2	36	90	20
FLSES 180 MT/MUR	14	9	48k6	42.5	110	16x2	36	90	20	14	9	48k6	42.5	110	16x2	36	90	20
FLSES 180 L/LUR/M	14	9	48k6	42.5	110	16x2	36	98	12	14	9	48k6	42.5	110	16x2	36	98	12
FLSES 200 LU	16	10	55m6	49	110	20x2.5	42	90	20	16	10	55m6	49	110	20x2.5	42	90	20
FLSES 225 M/S/SR	18	11	60m6	53	140	20x2.5	42	125	15	16	10	55m6	49	110	20x2.5	42	90	20
FLSES 225 MR	-	-	-	-	-	-	-	-	-	16	10	55m6	49	110	20x2.5	42	90	20
FLSES 250 M/MR	18	11	60m6	53	140	20x2.5	42	125	15	18	11	60m6	53	140	20x2.5	42	125	15
FLSES 280 M/S	20	12	60m6	53	140	20x2.5	42	125	15	18	11	60m6	53	140	20x2.5	42	125	15
FLSES 280 MKB	-	-	-	-	-	-	-	-	-	16	10	55m6	49	110	20x2.5	42	90	20
FLSES 280 MKA/MKB	18	11	60m6	53	140	20x2.5	42	125	15	-	-	-	-	-	-	-	-	-
FLSES 315 LKA/LKB	18	11	60m6	53	140	20x2.5	42	125	15	18	11	60m6	53	140	20x2.5	42	125	15
FLSES 315 LA/LB	25	14	90m6	81	170	24x3	50	140	30	20	12	70m6	63.5	140	20x2.5	42	125	15
FLSES 315 M/S	22	14	80m6	71	170	20	42	140	30	18	11	65m6	58	140	20x2.5	42	125	15
FLSES 355 LA/LAL/LB/LC/LD/ LKA/LKB/LKC	28	16	100m6	90	210	24x3	50	180	30	22	14	80m6	71	170	20x2.5	42	140	30
FLSES 400 LB	28	16	110m6	100	210	24x3	50	180	30	22	14	80m6	71	170	20x2.5	42	140	30
FLSES 450 LA/LB/LC/LD	32	18	120m6	109	210	24x3	50	180	30	-	-	-	-	-	-	-	-	-

The dimensions given above for secondary shaft extensions are intended as a guide for motor offers. These are only available on request.

Dimensions
Foot mounted IM 1001 (IM B3)



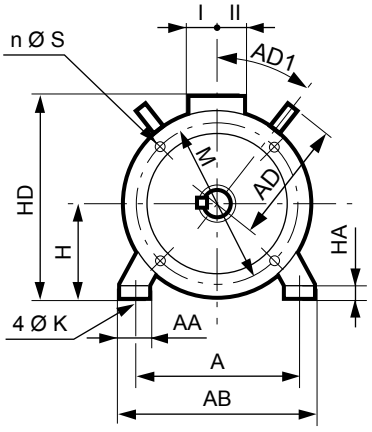


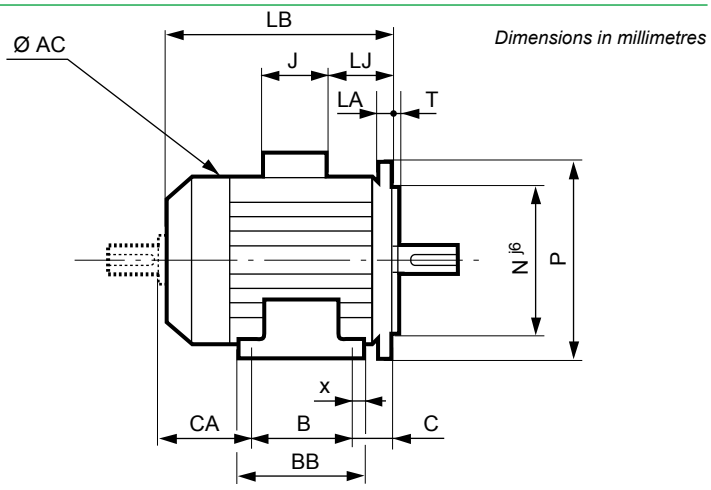
Dimensions in millimetres

Type	Main dimensions																		
	A	AB	B	BB	C	x	AA	K	HA	H	AC*	HD	LB	LJ	J	I	II	AD	AD1
FLSES 80L	125	157	100	130	50	18	34	10	10	80	170	228	212	7	136	68	68	-	-
FLSES 80LG	125	170	100	138	50	22	39	10	10	80	203	238	243	8	136	68	68	135	41
FLSES 90L	140	170	125	162	56	28	33	10	10	90	203	248	239	8.5	136	68	68	135	41
FLSES 90LU	140	170	125	162	56	28	33	10	10	90	203	248	266	8.5	136	68	68	135	41
FLSES 90SL	140	170	125	162	56	28	33	10	10	90	203	248	239	8.5	136	68	68	135	41
FLSES 100L	160	196	140	185	63	29	40	12	13	100	204	258	300	8	136	68	68	135	41
FLSES 100LG	160	196	140	168	63	13	40	12	14	100	227	264	299	0.5	136	68	68	130	45
FLSES 100LR	160	196	140	185	63	29	40	12	13	100	204	258	300	8	136	68	68	135	41
FLSES 112MG	190	230	140	186	60	32	48	12	12	112	230	294	299	8	136	68	68	148	41
FLSES 112MU	190	230	140	186	60	32	48	12	12	112	230	294	299	8	136	68	68	148	41
FLSES 132M	216	255	178	240	89	50	63	12	16	132	270	335	385	22	136	68	68	165	37.5
FLSES 132MR	216	255	178	240	89	50	63	12	16	132	270	335	447	22	136	68	68	165	37.5
FLSES 132MU	216	255	178	240	89	50	63	12	16	132	270	335	447	22	136	68	68	165	37.5
FLSES 132SM	216	255	140	240	89	50	63	12	16	132	270	335	385	22	136	68	68	165	37.5
FLSES 160L	254	294	254	294	108	20	65	14.5	20	160	315	436	495	30	246	126	148	179	45
FLSES 160LUR	254	294	254	294	108	20	65	14.5	20	160	315	436	510	30	246	126	148	179	45
FLSES 160M	254	294	210	294	108	20	65	14.5	20	160	315	436	495	30	246	126	148	179	45
FLSES 160MU	254	294	210	294	108	20	65	14.5	20	160	315	436	510	30	246	126	148	179	45
FLSES 180L	279	330	279	330	121	28	70	14.5	28	180	353	477	552	42	246	126	148	190	45
FLSES 180M	279	330	279	330	121	28	70	14.5	28	180	353	477	593	42	246	126	148	190	45
FLSES 180MT	279	330	241	330	121	28	70	14.5	28	180	353	477	552	42	246	126	148	190	45
FLSES 180LUR	279	330	241	330	115	28	70	14.5	28	180	353	477	537	36	246	126	148	190	45
FLSES 180MUR	279	324	241	290	121	25	80	14.5	25	180	315	456	545	30	246	126	148	179	45
FLSES 200LU	318	374	305	360	135	28	60	18.5	17	200	396	528	674	51	246	126	148	243	45
FLSES 225M	356	426	311	375	149	32	80	18.5	27	225	487	652	779	69.5	352	175	212	276	45
FLSES 225MR	356	426	311	375	144.5	32	70	18.5	17	225	398	553	674	51	246	126	148	243	45
FLSES 225S	356	426	286	375	149	32	80	18.5	27	225	487	652	779	69.5	352	175	212	276	45
FLSES 225SR	356	426	286	375	144.5	32	70	18.5	17	225	398	553	674	51	246	126	148	243	45
FLSES 250M	406	476	349	413	168	32	80	24	27	250	487	677	779	69.5	352	175	212	276	45
FLSES 250MR	406	476	349	413	168	32	80	24	27	250	487	677	859	69.5	352	175	212	276	45
FLSES 280M	457	527	419	486	190	33	80	24	30.5	280	475	719	959	69.5	352	175	212	305	45
CILS 280M	457	532	419	545	190	51.5	86	24	40	280	554	788.5	927	44	390	189	179	350	45
FLSES 280S	457	527	368	486	190	33	80	24	30	280	481	719	959	91	308	162	207	305	45
CILS 280S	457	532	368	545	190	51.5	86	24	40	280	554	788.5	927	44	390	189	179	350	45
FLSES 280MKA	457	527	419	508	190	43	100	24	35	280	600	-	1017	125.5	308	162	207	-	45
FLSES 280MKB	457	527	419	508	190	43	100	24	35	280	600	-	1017	125.5	308	162	207	-	45
FLSES 315LA	508	600	508	610	216	58	100	28	35	315	600	847	1177	101	452	219	269	343	45
FLSES 315LB	508	600	508	610	216	58	100	28	35	315	600	847	1177	101	452	219	269	343	45
FLSES 315M	508	600	457	610	216	58	100	28	35	315	600	847	1177	101	452	219	269	343	45
CILS 315M	508	587	457	662	216	77.5	88	28	42	315	554	823.5	1107	44	390	189	179	350	45
FLSES 315S	508	600	406	610	216	58	100	28	35	315	600	847	1177	101	452	219	269	343	45
CILS 315S	508	587	406	662	216	77.5	88	28	42	315	554	823.5	1107	44	390	189	179	350	45
FLSES 315LKA	508	600	508	610	216	58	100	28	35	315	685	-	1303	139	415	217	350	-	45
FLSES 315LKB	508	600	508	610	216	58	100	28	35	315	685	-	1303	139	415	217	350	-	45
CILS 315L	508	587	508	662	216	77.5	88	28	42	315	554	823.5	1107	44	390	189	179	350	45
FLSES 355LA	610	710	630	756	254	76	100	28	35	355	688	925	1303	121	452	219	269	-	-
FLSES 355LAL	610	710	630	756	254	76	100	28	35	355	688	925	1303	121	452	219	269	-	-
FLSES 355LB	610	710	630	756	254	76	100	28	35	355	688	925	1303	121	452	219	269	-	-
FLSES 355LC	610	710	630	756	254	76	100	28	35	355	688	925	1303	121	452	219	269	-	-
FLSES 355LD	610	710	630	756	254	76	100	28	35	355	688	925	1303	121	452	219	269	-	-
FLSES 355LKA	610	750	630	815	254	40	128	27	45	355	787	1117	1702	52	700	224	396	-	-
FLSES 355LKB	610	750	630	815	254	40	128	27	45	355	787	1117	1702	52	700	224	396	-	-
FLSES 355LKC	610	750	630	815	254	40	128	27	45	355	787	1117	1702	52	700	224	396	-	-
FLSES 400LB	686	800	710	815	280	65	128	35	45	400	787	1162	1702	52	700	224	396	-	-
FLSES 450LA	750	890	800	950	315	94	140	35	45	450	877	1260	1738	68	700	224	396	-	-
FLSES 450LB	750	890	800	950	315	94	140	35	45	450	877	1260	1738	68	700	224	396	-	-
FLSES 450LC	750	890	1000	1170	315	94	140	35	45	450	877	1260	2088	68	700	224	396	-	-
FLSES 450LD	750	890	1000	1170	315	94	140	35	45	450	877	1260	2088	68	700	224	396	-	-

** AC: housing diameter without lifting rings*

Dimensions
Foot and flange mounted IM 2001 (IM B35)





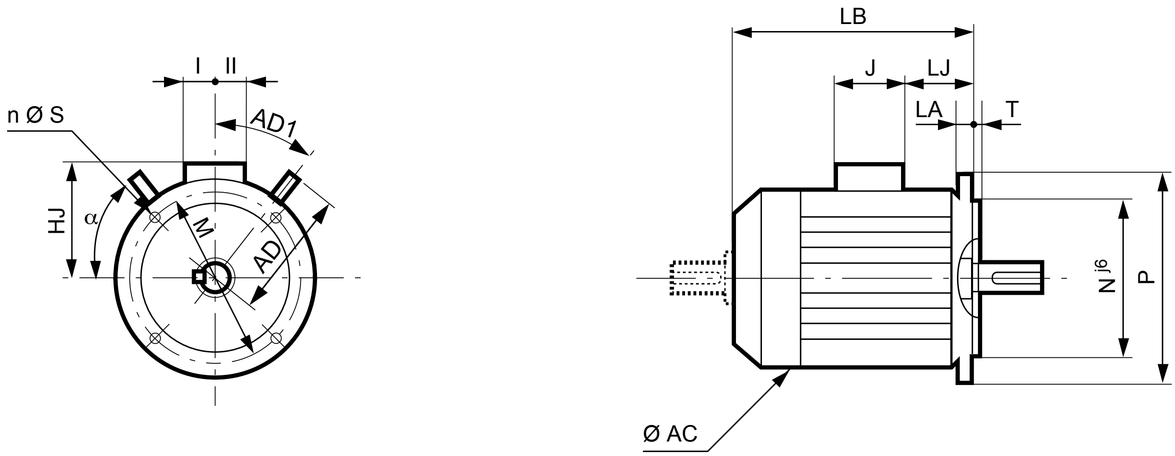
Dimensions in millimetres

Type	Main dimensions																			
	A	AB	B	BB	C	x	AA	K	HA	H	AC*	HD	LB	LJ	J	I	II	AD	AD1	Symb
FLSES 80L	125	157	100	130	50	18	34	10	10	80	170	228	212	7	136	68	68	-	-	FF165
FLSES 80LG	125	170	100	138	70	22	39	10	10	80	203	238	263	28	136	68	68	135	41	FF165
FLSES 90L	140	170	125	162	76	28	33	10	10	90	203	248	259	28.5	136	68	68	135	41	FF165
FLSES 90LU	140	170	125	162	76	28	33	10	10	90	203	248	286	28.5	136	68	68	135	41	FF165
FLSES 90SL	140	170	125	162	76	28	33	10	10	90	203	248	259	28.5	136	68	68	135	41	FF165
FLSES 100L	160	196	140	185	63	29	40	12	13	100	204	258	300	8	136	68	68	135	41	FF215
FLSES 100LG	160	196	140	168	73	13	40	12	14	100	227	264	309	9.5	136	68	68	130	45	FF215
FLSES 100LR	160	196	140	185	63	29	40	12	13	100	204	258	300	8	136	68	68	135	41	FF215
FLSES 112MG	190	230	140	186	70	32	48	12	12	112	230	294	309	18	136	68	68	148	41	FF215
FLSES 112MU	190	230	140	186	70	32	48	12	12	112	230	294	309	18	136	68	68	148	41	FF215
FLSES 132M	216	255	178	240	89	50	63	12	16	132	270	335	385	22	136	68	68	165	37.5	FF265
FLSES 132MR	216	255	178	240	89	50	63	12	16	132	270	335	447	22	136	68	68	165	37.5	FF265
FLSES 132MU	216	255	178	240	89	50	63	12	16	132	270	335	447	22	136	68	68	165	37.5	FF265
FLSES 132SM	216	255	140	240	89	50	63	12	16	132	270	335	385	22	136	68	68	165	37.5	FF265
FLSES 160L	254	294	254	294	108	20	65	14.5	20	160	315	436	495	30	246	126	148	179	45	FF300
FLSES 160LUR	254	294	254	294	108	20	65	14.5	20	160	315	436	510	30	246	126	148	179	45	FF300
FLSES 160M	254	294	210	294	108	20	65	14.5	20	160	315	436	495	30	246	126	148	179	45	FF300
FLSES 160MU	254	294	210	294	108	20	65	14.5	20	160	315	436	510	30	246	126	148	179	45	FF300
FLSES 180L	279	330	279	330	121	28	70	14.5	28	180	353	477	552	42	246	126	148	190	45	FF300
FLSES 180M	279	330	241	330	121	28	70	14.5	28	180	353	477	552	42	246	126	148	190	45	FF300
FLSES 180MT	279	330	241	330	115	28	70	14.5	28	180	353	477	537	36	246	126	148	190	45	FF300
FLSES 180LUR	279	330	279	330	121	28	70	14.5	28	180	353	477	593	42	246	126	148	190	45	FF300
FLSES 180MUR	279	324	241	290	121	25	80	14.5	25	180	315	456	545	30	246	126	148	179	45	FF300
FLSES 200LU	318	374	305	360	135	28	60	18.5	17	200	396	528	674	51	246	126	148	243	45	FF350
FLSES 225M	356	426	311	375	149	32	80	18.5	27	225	487	652	779	69.5	352	175	212	276	45	FF400
FLSES 225MR	356	426	311	375	144.5	32	70	18.5	17	225	398	553	674	51	246	126	148	243	45	FF400
FLSES 225S	356	426	286	375	149	32	80	18.5	27	225	487	652	779	69.5	352	175	212	276	45	FF400
FLSES 225SR	356	426	286	375	144.5	32	70	18.5	17	225	398	553	674	51	246	126	148	243	45	FF400
FLSES 250M	406	476	349	413	168	32	80	24	27	250	487	677	779	69.5	352	175	212	276	45	FF500
FLSES 250MR	406	476	349	413	168	32	80	24	27	250	487	677	859	69.5	352	175	212	276	45	FF500
FLSES 280M	457	527	419	486	190	33	80	24	30.5	280	475	719	959	69.5	352	175	212	305	45	FF500
CILS 280M	457	532	419	545	190	51.5	86	24	40	280	554	788.5	927	44	390	189	179	350	45	FF500
FLSES 280S	457	527	368	486	190	33	80	24	30	280	481	-	959	91	308	162	207	-	45	FF500
CILS 280S	457	532	368	545	190	51.5	86	24	40	280	554	788.5	927	44	390	189	179	350	45	FF500
FLSES 280MKA	457	527	419	508	190	33	100	24	35	280	600	-	1017	125.5	308	162	207	-	45	FF500
FLSES 280MKB	457	527	419	508	190	33	100	24	35	280	600	-	1017	125.5	308	162	207	-	45	FF500
FLSES 315LA	508	600	508	610	216	58	100	28	35	315	600	847	1177	101	452	219	269	343	45	FF600
FLSES 315LB	508	600	508	610	216	58	100	28	35	315	600	847	1177	101	452	219	269	343	45	FF600
FLSES 315M	508	600	457	610	216	58	100	28	35	315	600	847	1177	101	452	219	269	343	45	FF600
CILS 315M	508	587	457	662	216	77.5	88	28	42	315	554	823.5	1107	44	390	189	179	350	45	FF600
FLSES 315S	508	600	406	610	216	58	100	28	35	315	600	847	1177	101	452	219	269	343	45	FF600
CILS 315S	508	587	406	662	216	77.5	88	28	42	315	554	823.5	1107	44	390	189	179	350	45	FF600
FLSES 315LKA	508	600	508	610	216	58	100	28	35	315	685	-	1303	139	415	217	350	-	45	FF600
FLSES 315LKB	508	600	508	610	216	58	100	28	35	315	685	-	1303	139	415	217	350	-	45	FF600
CILS 315L	508	587	508	662	216	77.5	88	28	42	315	554	823.5	1107	44	390	189	179	350	45	FF600
FLSES 355LA	610	710	630	756	254	76	100	28	35	355	688	925	1303	121	452	219	269	-	-	FF740
FLSES 355LAL	610	710	630	756	254	76	100	28	35	355	688	925	1303	121	452	219	269	-	-	FF740
FLSES 355LB	610	710	630	756	254	76	100	28	35	355	688	925	1303	121	452	219	269	-	-	FF740
FLSES 355LC	610	710	630	756	254	76	100	28	35	355	688	925	1303	121	452	219	269	-	-	FF740
FLSES 355LD	610	710	630	756	254	76	100	28	35	355	688	925	1303	121	452	219	269	-	-	FF740
FLSES 355LKA	610	750	630	815	254	40	128	27	45	355	787	1117	1702	52	700	224	396	-	-	FF740
FLSES 355LKB	610	750	630	815	254	40	128	27	45	355	787	1117	1702	52	700	224	396	-	-	FF740
FLSES 355LKC	610	750	630	815	254	40	128	27	45	355	787	1117	1702	52	700	224	396	-	-	FF740
FLSES 400LB	686	800	710	815	280	65	128	35	45	400	787	1162	1702	52	700	224	396	-	-	FF940
FLSES 450LA	750	890	800	950	315	94	140	35	45	450	877	1260	1738	68	700	224	396	-	-	FF1080
FLSES 450LB	750	890	800	950	315	94	140	35	45	450	877	1260	1738	68	700	224	396	-	-	FF1080
FLSES 450LC	750	890	1000	1170	315	94	140	35	45	450	877	1260	2088	68	700	224	396	-	-	FF1080
FLSES 450LD	750	890	1000	1170	315	94	140	35	45	450	877	1260	2088	68	700	224	396	-	-	FF1080

** AC: housing diameter without lifting rings*

IMfinity® 3-phase induction motors - IE3 - IE4
IP55 Cast iron frame
Dimensions
Flange mounted IM 3001 (IM B5) IM 3011 (IM V1)

Dimensions in millimetres



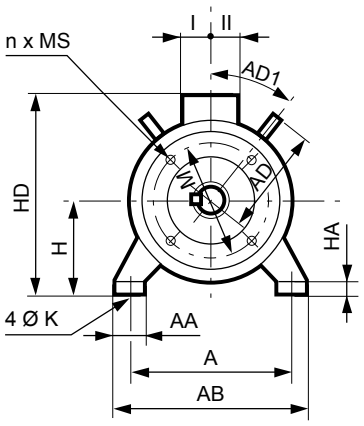
Type	Main dimensions								
	AC*	LB	HJ	LJ	J	I	II	AD	AD1
FLSES 80L	170	212	148	7	136	68	68	-	-
FLSES 80LG	203	263	158	28	136	68	68	135	41
FLSES 90L	203	259	158	28	136	68	68	135	41
FLSES 90LU	203	286	158	28	136	68	68	135	41
FLSES 90SL	203	259	158	28	136	68	68	135	41
FLSES 100L	204	300	158	8	136	68	68	135	41
FLSES 100LG	235	309	164	10.5	136	68	68	148	41
FLSES 100LR	204	300	158	8	136	68	68	135	41
FLSES 112MG	230	309	182	18	136	68	68	148	41
FLSES 112MU	230	309	182	18	136	68	68	148	41
FLSES 132M	270	385	203	22	136	68	68	165	37.5
FLSES 132MR	270	447	203	22	136	68	68	165	37.5
FLSES 132MU	270	447	203	22	136	68	68	165	37.5
FLSES 132SM	270	385	203	22	136	68	68	165	37.5
FLSES 160L	315	495	276	30	246	126	148	179	45
FLSES 160LUR	315	510	276	30	246	126	148	179	45
FLSES 160M	315	495	276	30	246	126	148	179	45
FLSES 160MU	315	510	276	30	246	126	148	179	45
FLSES 180L	353	552	297	42	246	126	148	190	45
FLSES 180M	353	552	297	42	246	126	148	190	45
FLSES 180MT	353	537	297	36	246	126	148	190	45
FLSES 180LUR	353	593	297	42	246	126	148	190	45
FLSES 180MUR	315	545	276	30	246	126	148	179	45
FLSES 200LU	398	674	328	51	246	126	148	243	45
FLSES 225M	487	779	427	69.5	352	175	212	276	45
FLSES 225MR	398	674	328	51	246	126	148	243	45
FLSES 225S	487	779	427	69.5	352	175	212	276	45
FLSES 225SR	398	674	328	51	246	126	148	243	45
FLSES 250M	487	779	427	69.5	352	175	212	276	45
FLSES 250MR	487	859	427	69.5	352	175	212	276	45
FLSES 280M	475	959	439	69.5	352	175	212	305	45
CILS 280M	554	927	508.5	44	390	189	179	350	45
FLSES 280S	481	959	454	91	308	162	207	-	45
CILS 280S	554	927	508.5	44	390	189	179	350	45
FLSES 280MKA	600	959	507	125.5	308	162	207	-	45
FLSES 280MKB	600	959	507	125.5	308	162	207	-	45
FLSES 315LA	600	1177	532	101	452	219	269	343	45
FLSES 315LB	600	1177	532	101	452	219	269	343	45
FLSES 315M	600	1177	532	101	452	219	269	343	45
CILS 315M	554	1107	508.5	44	390	189	179	350	45
FLSES 315S	600	1177	532	101	452	219	269	343	45
CILS 315S	554	1107	508.5	44	390	189	179	350	45
FLSES 315LKA	685	1303	542	139	452	217	350	-	45
FLSES 315LKB	685	1303	542	139	452	217	350	-	45
CILS 315L	554	1107	508.5	44	390	189	179	350	45
FLSES 355LA	688	1303	570	121	452	219	269	-	-
FLSES 355LAL	688	1303	570	121	452	219	269	-	-
FLSES 355LB	688	1303	570	121	452	219	269	-	-
FLSES 355LC	688	1303	570	121	452	219	269	-	-
FLSES 355LD	688	1303	570	121	452	219	269	-	-
FLSES 355LKA	787	1702	762	52	700	224	396	-	-
FLSES 355LKB	787	1702	762	52	700	224	396	-	-
FLSES 355LKC	787	1702	762	52	700	224	396	-	-
FLSES 400LB	787	1702	762	52	700	224	396	-	-
FLSES 450LA	877	1738	810	68	700	224	396	-	-
FLSES 450LB	877	1738	810	68	700	224	396	-	-
FLSES 450LC	877	2088	810	68	700	224	396	-	-
FLSES 450LD	877	2088	810	68	700	224	396	-	-

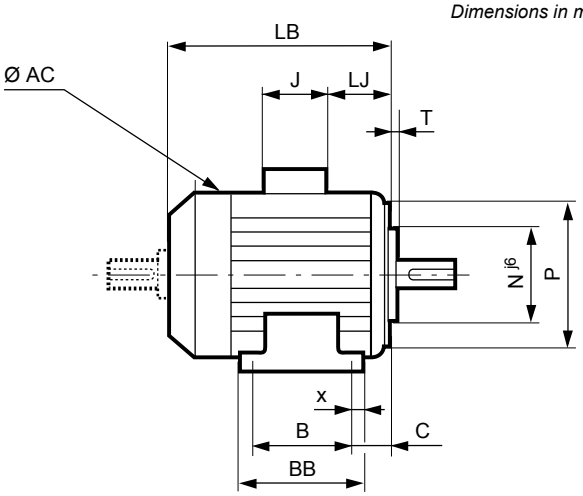
IEC symbol	Flange dimensions							
	M	N	P	T	n	°	S	LA
FF165	165	130	200	3.5	4	45	12	10
FF165	165	130	200	3.5	4	45	12	10
FF165	165	130	200	3.5	4	45	12	10
FF165	165	130	200	3.5	4	45	12	10
FF165	165	130	200	3.5	4	45	12	10
FF215	215	180	250	4	4	45	14.5	12
FF215	215	180	250	4	4	45	14.5	13
FF215	215	180	250	4	4	45	14.5	12
FF215	215	180	250	4	4	45	14.5	13
FF215	215	180	250	4	4	45	14.5	13
FF265	265	230	300	4	4	45	14.5	14
FF265	265	230	300	4	4	45	14.5	14
FF265	265	230	300	4	4	45	14.5	14
FF265	265	230	300	4	4	45	14.5	14
FF300	300	250	350	5	4	45	18.5	14
FF300	300	250	350	5	4	45	18.5	14
FF300	300	250	350	5	4	45	18.5	14
FF300	300	250	350	5	4	45	18.5	14
FF300	300	250	350	5	4	45	18.5	14
FF300	300	250	350	5	4	45	18.5	14
FF300	300	250	350	5	4	45	18.5	14
FF300	300	250	350	5	4	45	18.5	14
FF300	300	250	350	5	4	45	18.5	14
FF350	350	300	400	5	4	45	18.5	15
FF400	400	350	450	5	8	22.5	18.5	16
FF400	400	350	450	5	8	22.5	18.5	16
FF400	400	350	450	5	8	22.5	18.5	16
FF400	400	350	450	5	8	22.5	18.5	16
FF500	500	450	550	5	8	22.5	18.5	18
FF500	500	450	550	5	8	22.5	18.5	18
FF500	500	450	550	5	8	22.5	18.5	18
FF500	-	-	-	-	-	-	-	-
FF500	500	450	550	5	8	22.5	18.5	18
FF500	500	450	550	5	8	22.5	18.5	25.5
FF500	500	450	550	5	8	22.5	18.5	18
FF500	500	450	550	5	8	22.5	18.5	18
FF600	600	550	660	6	8	22.5	24	22
FF600	600	550	660	6	8	22.5	24	22
FF600	600	550	660	6	8	22.5	24	22
FF600	-	-	-	-	-	-	-	-
FF600	600	550	660	6	8	22.5	24	22
FF600	-	-	-	-	-	-	-	-
FF600	600	550	660	6	8	22.5	24	25
FF600	600	550	660	6	8	22.5	24	25
FF600	-	-	-	-	-	-	-	-
FF740	740	680	800	6	8	22.5	24	25
FF740	740	680	800	6	8	22.5	24	25
FF740	740	680	800	6	8	22.5	24	25
FF740	740	680	800	6	8	22.5	24	25
FF740	740	680	800	6	8	22.5	24	25
FF740	740	680	800	6	8	22.5	24	25
FF740	740	680	800	6	8	22.5	24	25
FF740	740	680	800	6	8	22.5	24	25
FF940	940	880	1000	6	8	22.5	28	28
FF1080	1080	1000	1150	6	8	22.5	28	30
FF1080	1080	1000	1150	6	8	22.5	28	30
FF1080	1080	1000	1150	6	8	22.5	28	30
FF1080	1080	1000	1150	6	8	22.5	28	30

** AC: housing diameter without lifting rings*

Dimensions
Foot and face mounted IM 2101 (IM B34)

Dimensions in millimetres



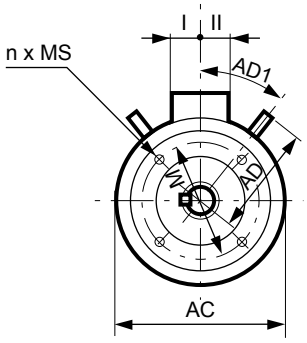


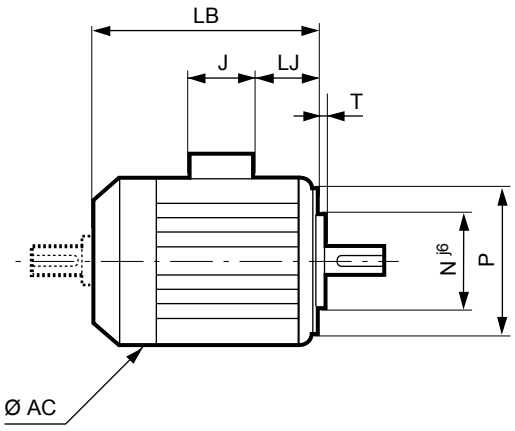
Type	Main dimensions																			
	A	AB	B	BB	C	x	AA	K	HA	H	AC*	HD	LB	LJ	J	I	II	AD	AD1	Symb
FLSES 80L	125	157	100	130	50	18	34	10	10	80	170	228	212	7	136	68	68	-	-	FT100
FLSES 80LG	125	170	100	138	50	22	39	10	10	80	203	238	243	8	136	68	68	135	41	FT100
FLSES 90L	140	170	125	162	56	28	33	10	10	90	203	248	239	8.5	136	68	68	135	41	FT115
FLSES 90LU	140	170	125	162	56	28	33	10	10	90	203	248	266	8.5	136	68	68	135	41	FT115
FLSES 90SL	140	170	125	162	56	28	33	10	10	90	203	248	239	8.5	136	68	68	135	41	FT115
FLSES 100L	160	196	140	185	63	29	40	12	13	100	204	258	300	8	136	68	68	135	41	FT130
FLSES 100LG	160	196	140	168	73	13	40	12	14	100	227	264	309	9.5	136	68	68	130	45	FT130
FLSES 100LR	160	196	140	185	63	29	40	12	13	100	204	258	300	8	136	68	68	135	41	FT130
FLSES 112MG	190	230	140	186	70	32	48	12	12	112	230	294	309	18	136	68	68	148	41	FT130
FLSES 112MU	190	230	140	186	70	32	48	12	12	112	230	294	309	18	136	68	68	148	41	FT130
FLSES 132M	216	255	178	240	89	50	63	12	16	132	270	335	385	22	136	68	68	165	37.5	FT165
FLSES 132MR	216	255	178	240	89	50	63	12	16	132	270	335	447	22	136	68	68	165	37.5	FT165
FLSES 132MU	216	255	178	240	89	50	63	12	16	132	270	335	447	22	136	68	68	165	37.5	FT165
FLSES 132SM	216	255	140	240	89	50	63	12	16	132	270	335	385	22	136	68	68	165	37.5	FT165

** AC: housing diameter without lifting rings*

Dimensions
Face mounted IM 3601 (IM B14)

Dimensions in millimetres





Type	Main dimensions								
	AC*	LB	HJ	LJ	J	I	II	AD	AD1
FLSES 80L	170	212	148	7	136	68	68	-	-
FLSES 80LG	203	243	158	8	136	68	68	135	41
FLSES 90L	203	239	158	8.5	136	68	68	135	41
FLSES 90LU	203	266	158	8.5	136	68	68	135	41
FLSES 90SL	203	239	158	8.5	136	68	68	135	41
FLSES 100L	204	300	158	8	136	68	68	135	41
FLSES 100LG	227	309	164	9.5	136	68	68	130	45
FLSES 100LR	204	300	158	8	136	68	68	135	41
FLSES 112MG	230	309	182	18	136	68	68	148	41
FLSES 112MU	230	309	182	18	136	68	68	148	41
FLSES 132M	270	385	203	22	136	68	68	165	37.5
FLSES 132MR	270	447	203	22	136	68	68	165	37.5
FLSES 132MU	270	447	203	22	136	68	68	165	37.5
FLSES 132SM	270	385	203	22	136	68	68	165	37.5

IEC symbol	Faceplate dimensions						
	M	N	P	T	n	°	MS
FT100	100	80	120	3	4	45	M6
FT100	100	80	120	3	4	45	M6
FT115	115	95	140	3	4	45	M8
FT115	115	95	140	3	4	45	M8
FT115	115	95	140	3	4	45	M8
FT130	130	110	160	3.5	4	45	M8
FT130	130	110	160	3.5	4	45	M8
FT130	130	110	160	3.5	4	45	M8
FT130	130	110	160	3.5	4	45	M8
FT130	130	110	160	3.5	4	45	M8
FT165	165	130	200	3.5	4	45	M10
FT165	165	130	200	3.5	4	45	M10
FT165	165	130	200	3.5	4	45	M10
FT165	165	130	200	3.5	4	45	M10

** AC: housing diameter without lifting rings*

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								
					2P : 3000 min^{-1}			4P : 1500 min^{-1}			6P : 1000 min^{-1}		
			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 C3	6204 C3	≥40 000	≥40 000	25 000	-	-	-	-	-	-
	80 LG	4	6204 C3	6205 C3	-	-	-	≥40 000	≥40 000	31 000	-	-	-
	90 SL/L	2 ; 4 ; 6			≥40 000	≥40000	24 000				≥40 000	≥40 000	34 000
	90 LU	2 ; 6	6205 C3	6205 C3	≥40 000	≥40 000	24 000	-	-	-	≥40 000	≥40 000	34 000
	100 L	2 ; 4	6205 C3	6206 C3	≥40 000	≥40 000	22 000	≥40 000	≥40 000	30 000	-	-	-
	100 LG	4 ; 6			-	-	-				≥40 000	≥40 000	33 000
	100 LG	4	6206 C3	6205 C3	-	-	-	≥40 000	≥40 000	30 000	-	-	-
	112 MG	2 ; 6	6205 C3	6206 C3	≥40 000	≥40 000	22 000	-	-	-	≥40 000	≥40 000	33 000
	112 MU	4	6206 C3	6206 C3	-	-	-	≥40 000	≥40 000	30 000	-	-	-
	132 SM/M	2 ; 4 ; 6	6207 C3	6308 C3	≥40 000	≥40 000	19 000	≥40 000	≥40 000	25 000	≥40 000	≥40 000	30 000
	132 MU	2 ; 4	6307 C3	6308 C3	≥40 000	≥40 000	19 000	≥40 000	≥40 000	25 000	-	-	-
	132 MR	4 ; 6	6308 C3	6308 C3	-	-	-	≥40 000	≥40 000	25 000	≥40 000	≥40 000	30 000
	160 M	2 ; 4 ; 6	6210 C3	6309 C3	≥ 40 000	37 800	18 900	≥ 40 000	≥ 40 000	36 900	≥ 40 000	≥ 40 000	20 050
	160 MU	6			-	-	-	-	-	-			
	160 LUR	2 ; 4 ; 6	6210 C3	6310 C3	≥ 40 000	24 500	12 250	≥ 40 000	36 400	18 200	≥ 40 000	≥ 40 000	22 450
	180 M	2	6212 C3	6310 C3	34 000	17 000	8 500	-	-	-	-	-	-
	180 MT	4	6210 C3	6310 C3	-	-	-	≥ 40 000	35 500	17 750	-	-	-
	180 MUR	2	6312 C3	6310 C3	≥ 40 000	22 800	11 400	-	-	-	-	-	-
	180 L	4 ; 6	6212 C3	6310 C3	-	-	-	≥ 40 000	39 500	19 750	≥ 40 000	≥ 40 000	29 050
	180 LUR	4 ; 6	6312 C3	6310 C3	-	-	-	≥ 40 000	≥ 40 000	22 900	≥ 40 000	≥ 40 000	29 900
	200 LU	2 ; 4 ; 6	6312 C3	6312 C3	28 600	14 300	7 150	≥ 40 000	25 400	12 700	≥ 40 000	33 200	16 600
	225 S	4	6314 C3	6314 C3	-	-	-	≥ 40 000	23 700	11 850	-	-	-
	225 SR	4	6312 C3	6313 C3	-	-	-	≥ 40 000	≥ 40 000	21 500	-	-	-
	225 M	4 ; 6	6314 C3	6314 C3	-	-	-	≥ 40 000	23 700	11 850	≥ 40 000	25 600	12800
	225 MR	2	6312 C3	6313 C3	≥ 40 000	22 800	11 400	-	-	-	-	-	-

BEARINGS WITH GREASE NIPPLES

The chart opposite shows the greasing intervals. depending on the type of motor. for standard bearing assemblies of frame size ≥ 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 and CILS 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 up to the FLSES 250 and 50% for higher frame sizes.

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 ≥ 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	Greasing intervals in hours								
						2P : 3000 min^{-1}			4P : 1500 min^{-1}			6P : 1000 min^{-1}		
			N.D.E.	D.E.	g	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	22 200	11 100	5 550	32 400	16 200	8 100	39 800	19 900	9 950
	160 MU	6				-	-	-	-	-	-	23 400	11 700	5 850
	160 LUR*	2 ; 4 ; 6	6210 C3	6310 C3	15	19 600	9 800	4 900	30 400	15 200	7 600	38 200	19 100	6 600
	180 M*	2	6212 C3	6310 C3	15	18 000	9 000	4 500	-	-	-	-	-	-
	180 MT*	4	6210 C3	6310 C3	15	-	-	-	30 400	15 200	7 600	-	-	-
	180 MUR*	2	6312 C3	6310 C3	15	10 600	5 300	2 650	-	-	-	-	-	-
	180 L*	4 ; 6	6212 C3	6310 C3	20	-	-	-	29 200	14 600	7 300	37 200	18 600	9 300
	180 LUR*	4 ; 6	6312 C3	6310 C3	20	-	-	-	26 800	13 400	6 700	35 000	17 500	8 750
	200 LU*	2 ; 4 ; 6	6312 C3	6312 C3	20	15 200	7 600	3 800	26 800	13 400	6 700	35 000	17 500	8 750
	225 S*	4	6314 C3	6314 C3	25	-	-	-	23 600	11 800	5 900	-	-	-
	225 SR*	4	6312 C3	6313 C3	25	-	-	-	25 200	12 600	6 300	-	-	-
	225 M*	4 ; 6	6314 C3	6314 C3	25	-	-	-	23 600	11 800	5 900	32 200	16 100	8 050
	225 MR*	2	6312 C3	6313 C3	25	13 400	6 700	3 350	-	-	-	-	-	-
	250 M	2 ; 6	6314 C3	6314 C3	25	10 400	5 200	2 600	-	-	-	32 200	16 100	8 050
	250 MR	4				-	-	-	17 800	8 900	4 450	-	-	-
	280 S	2	6314 C3	6316 C3	26 / 33	7 000	7 000	7 000	-	-	-	-	-	-
	280 M	2	6314 C3	6316 C3	26 / 33	3 700	3 700	3 700	-	-	-	-	-	-
	280 MKB	2	6316 C3	6218 C3	33 / 24	5 400	5 400	5 400	-	-	-	-	-	-
	280 S/M	4	6314 C3	6316 C3	26 / 33	-	-	-	13 230	13 230	13 230			
	280 MKA/MKB	4	6316 C3	6320 C3	33 / 50	-	-	-	15 700	15 700	15 700	-	-	-
	280 S/M	6	6314 C3	6316 C3	26 / 33							29 000	29 000	29 000
	315 SC	2	6316 C3	6320 C3	33 / 24	5 883	5 883	5 883	-	-	-	-	-	-
	315 S/M/LA/LKB	2	6316 C3	6218 C3	33 / 24	5 400	5 400	5 400	-	-	-	-	-	-
	315 LA/LB	4	6316 C3	6320 C3	33 / 50				12 400	12 400	12 400			
	315 S/M	4	6316 C3	6320 C3	33 / 50	-	-	-	15 700	15 700	15 700	-	-	-
	315 LKA/LKB	4	6316 C3	6322 C3	33 / 60	-	-	-	13 500	13 500	13 500	-	-	-
	315 S/M	6	6316 C3	6320 C3	33 / 50	-	-	-	-	-	-	12 400	12 400	12 400
	315 LA/LB	6	6316 C3	6320 C3	33 / 50	-	-	-	-	-	-	25 000	25 000	25 000
	355 LA/LB/LC/LD	2	6316 C3	6218 C3	33 / 24	3 700	3 700	3 700	-	-	-	-	-	-
	355 LA/LAL/LB/LC/LD	4	6316 C3	6322 C3	33 / 60	-	-	-	8 316	8 316	8 316	-	-	-
	355 LA/LB/LC	6	6316 C3	6322 C3	33 / 60	-	-	-	-	-	-	13 860	13 860	13 860
	355 LKA	6	6324 C3	6324 C3	72 / 72							20 000	20 000	20 000
	355 LKB	4	6324 C3	6324 C3	72 / 72	-	-	-	3 700	3 700	3 700	-	-	-
	355 LKB	6	6324 C3	6324 C3	72 / 72	-	-	-	-	-	-	20 000	20 000	20 000
	355 LKB	2	6317 C4	6317 C4	37 / 37	1 700	1 700	1 700	-	-	-	-	-	-
	355 LKC	6	6324 C3	6324 C3	72 / 72							20 000	20 000	20 000
	400 LB	2	6317 C4	6317 C4	37 / 37	1 700	1 700	1 700	-	-	-	-	-	-
	400 LB	4	6324 C3	6324 C3	72 / 72	-	-	-	3 700	3 700	3 700	-	-	-
	450 LA/LB	4	6328 C3	6328 C3	93 / 93	-	-	-	2 300	2 300	2 300	-	-	-
	450 LA/LB/LC	6	6328 C3	6328 C3	93 / 93	-	-	-	-	-	-	6 000	6 000	6 000
	450 LD	4	6328 C3	6328 C3	93 / 93	-	-	-	2 300	2 300	2 300			
CILS	280S/M + 315S/M/L	2	6314 C3	6314 C3	25	11 800	5 900	2 900	-	-	-	-	-	-
	280S/M	4	6316 C3	6316 C3	32	-	-	-	20 900	10 400	5 200	-	-	-
	315S/M/L	4	6316 C3	6319 C3	32	-	-	-	15 900	7 900	3 900	-	-	-

** bearing with grease nipples on request*

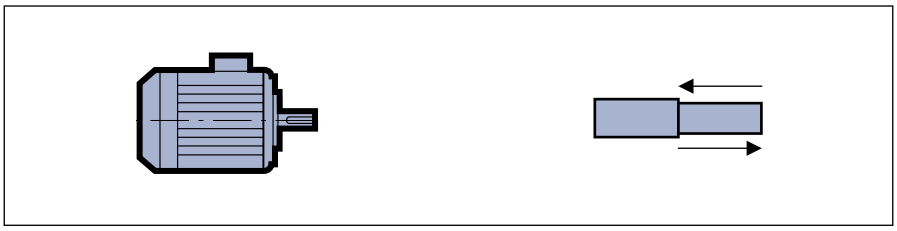
STANDARD BEARING FITTING ARRANGEMENTS

FLSES series		Horizontal shaft	Vertical shaft	
			Shaft facing down	Shaft facing up
Foot mounted motors	Mounting arrangement	B3	V5	V6
	standard mounting	DE bearing: - located at DE for frame ≤ 132 - locked for frame ≥ 160	DE bearing locked	DE bearing locked
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 355LKA to 450LD	NDE bearing locked on frames 355LKA to 450LD	NDE bearing locked on frames 355LKA to 450LD
CILS series		DE bearing locked		

Construction
Axial loads

HORIZONTAL MOTOR

For a bearing life L_{10h} of 25,000 hours and 40,000 hours



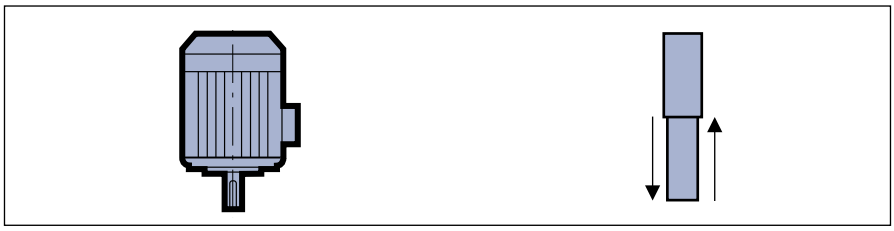
Series	Type	No. of poles	Permissible axial load (in daN) on main shaft extension for standard bearing assembly IM B3 / B6 - IM B7 / B8 - IM B5 / B35 - IM B14 / B34											
			2P : 3000 min-1				4P : 1500 min-1				6P : 1000 min-1			
			→ 25 000 hours	→ 40 000 hours	← 25 000 hours	← 40 000 hours	→ 25 000 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
	280 MKA/MKB	2	411	348	165	102	-	-	-	-	933	761	687	515
	280 MKA/MKB	4	-	-	-	-	814	670	568	424	-	-	-	-
	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	-	-	-	-
	315 LKA/LKB	2	393	333	147	87	-	-	-	-	-	-	-	-
	315 LKA/LKB	4	-	-	-	-	876	724	630	478	947	764	701	518
	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	-
CILS	280 S/M	2	478	411	178	111	-	-	-	-	-	-	-	-
	280 S/M	4					655	551	355	251	-	-	-	-
	315 S/M	2	446	381	146	81	-	-	-	-	-	-	-	-
	315 L	2	435	371	135	71	-	-	-	-	-	-	-	-
	315 S/M	4	-	-	-	-	856	714	556	414	-	-	-	-
	315 L	4	-	-	-	-	843	701	543	401	-	-	-	-

( ) : axial load permissible with DE bearing locked.

Construction
Axial loads

VERTICAL MOTOR
SHAFT FACING DOWN

For a bearing life L_{10h} of 25,000 hours and 40,000 hours



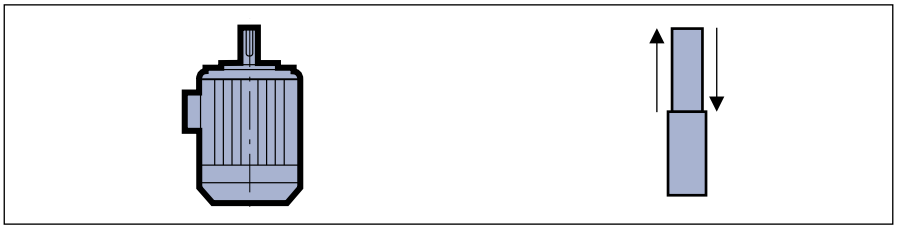
Series	Type	No. of poles	Permissible axial load (in daN) on main shaft extension for standard bearing assembly IM V5 - IM V1 / V15 - IM V18 / V58											
			2P : 3000 min-1				4P : 1500 min-1				6P : 1000 min-1			
			25 000 hours ↓	40 000 hours	25 000 hours ↑	40 000 hours	25 000 hours ↓	40 000 hours	25 000 hours ↑	40 000 hours	25 000 hours ↓	40 000 hours	25 000 hours ↑	40 000 hours
FLSES	80 L	2	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
	280 MKA/MKB	2	226	156	417	347	-	-	-	-	-	-	-	-
	280 MKA/MKB	4					601	449	893	741	683	515	1042	873
	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
	315 LKA/LKB	2	135	65	524	454	-	-	-	-	-	-	-	-
	315 LKA/LKB	4 ; 6	-	-	-	-	516	350	1123	957	566	364	1328	1126
	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	-
CILS	280 S/M	2	358	290	357	288	-	-	-	-	-	-	-	-
	280 S/M	4	-	-	-	-	496	389	599	490	-	-	-	-
	315 S/M	2	307	239	367	300	-	-	-	-	-	-	-	-
	315 L	2	267	199	387	329	-	-	-	-	-	-	-	-
	315 S/M	4	-	-	-	-	702	558	811	666	-	-	-	-
	315 L	4	-	-	-	-	661	517	840	695	-	-	-	-

( ): axial loads permissible with DE bearing locked

Construction
Axial loads

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 - IM V3 / V36 - IM V19 / V69											
			2P : 3000 min-1				4P : 1500 min-1				6P : 1000 min-1			
			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
	280 MKA/MKB	2	226	156	417	347	-	-	-	-	-	-	-	-
	280 MKA/MKB	4	-	-	-	-	601	449	893	741	683	515	1042	873
	315 S/M/L	2	226	156	417	347	-	-	-	-	-	-	-	-
	315 S/M/L	4 ; 6	-	-	-	-	601	449	893	741	683	515	1042	873
	315 LKA/LKB	2	135	65	524	454	-	-	-	-	-	-	-	-
	315 LKA/LKB	4	-	-	-	-	516	350	1123	957	566	364	1328	1126
	355 LA/LB/LC/LD	2	135	65	524	454	-	-	-	-	-	-	-	-
	355 LA/LB/LC/LD/LAL	4 ; 6	-	-	-	-	516	350	1123	957	566	364	1328	1126
	355 LKB	2	355 LK, 400 and 450: Please consult Nidec 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												
	280 S/M	2	58	-	657	588	-	-	-	-	-	-	-	-
	280 S/M	4	-	-	-	-	218	111	899	791	-	-	-	-
	315 S/M	4	-	-	-	-	196	89	914	807	-	-	-	-
	315 L	2	-	-	667	600	-	-	-	-	-	-	-	-
	315 S/M	4	-	-	-	-	402	258	1111	966	-	-	-	-
	315 L	4	-	-	-	-	361	217	1140	995	-	-	-	-

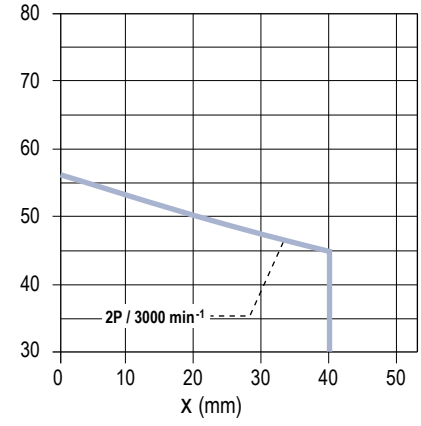
FLSES 400 and 450: Please consult Nidec Leroy-Somer

( ): axial loads permissible with DE bearing locked

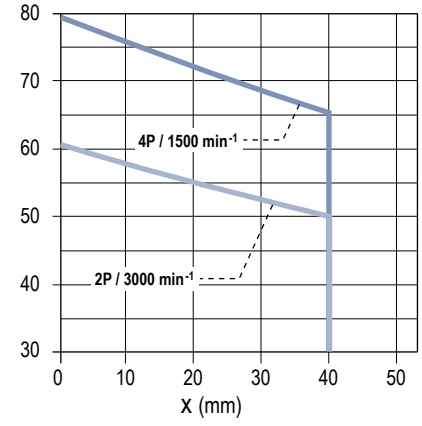
STANDARD FITTING ARRANGEMENT

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

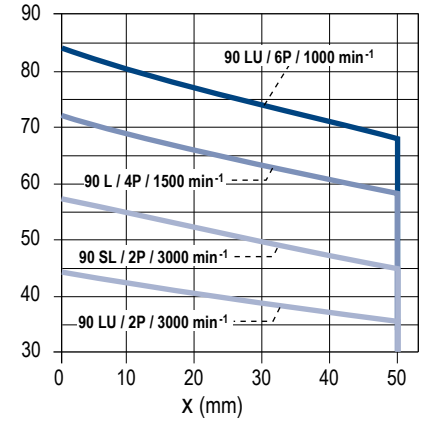
FLSES 80 L



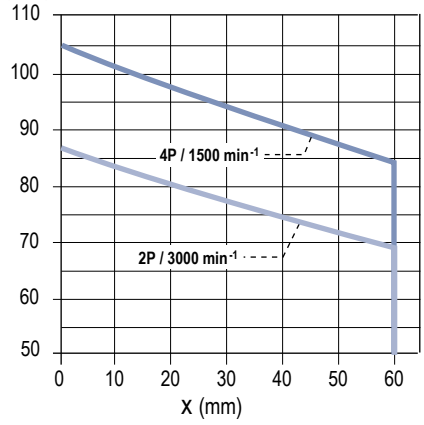
FLSES 80 LG



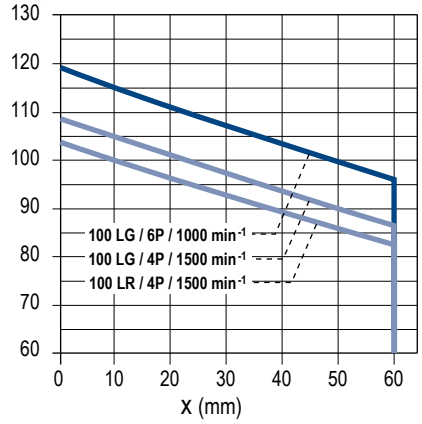
FLSES 90 SL/L/LU



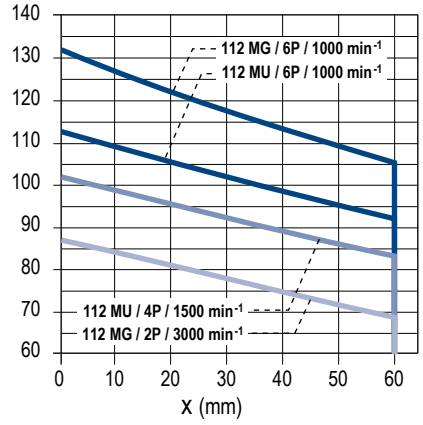
FLSES 100 L



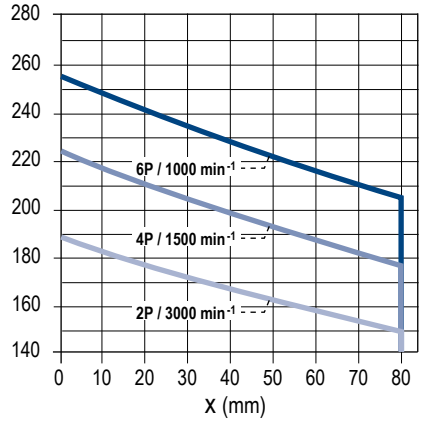
FLSES 100 LR/LG



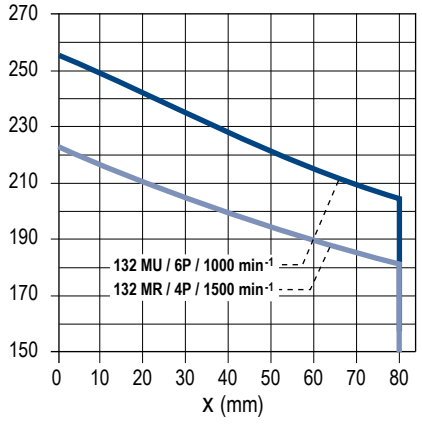
FLSES 112 MG/MU



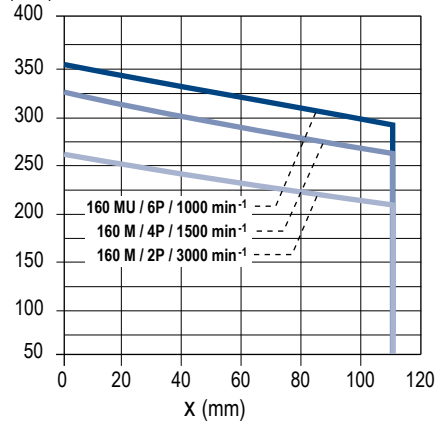
FLSES 132 SM/M



FLSES 132 MU/MR



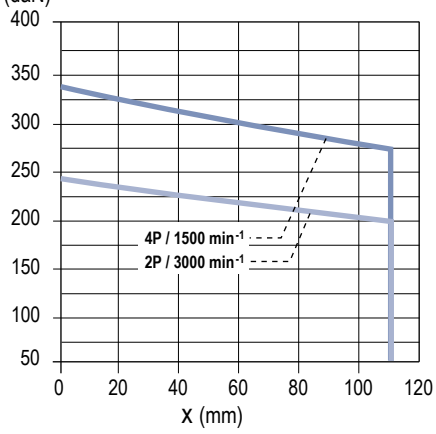
FLSES 160 M/MU



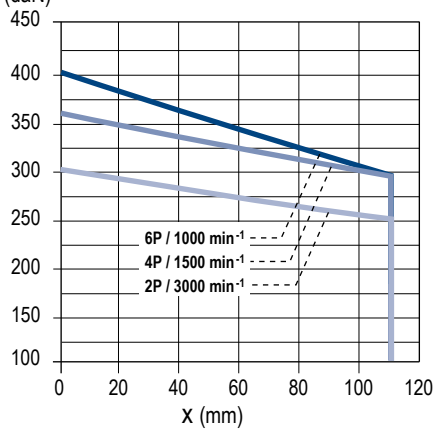
STANDARD FITTING ARRANGEMENT

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

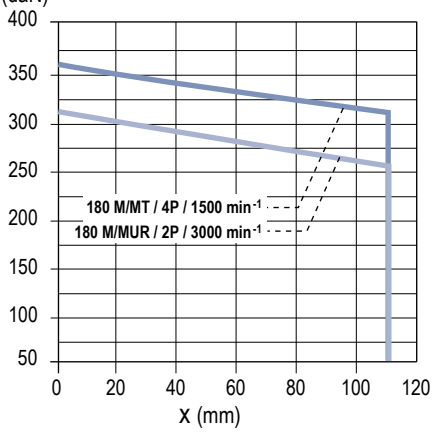
FLSES 160 L



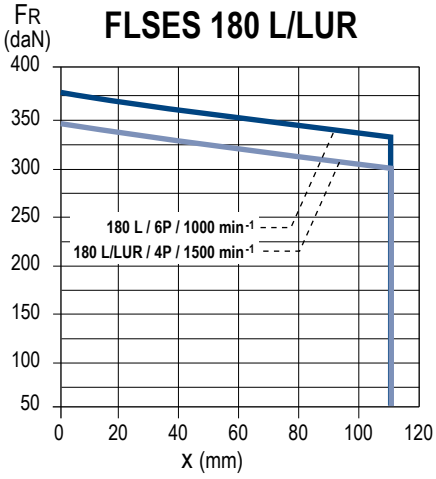
FLSES 160 LUR



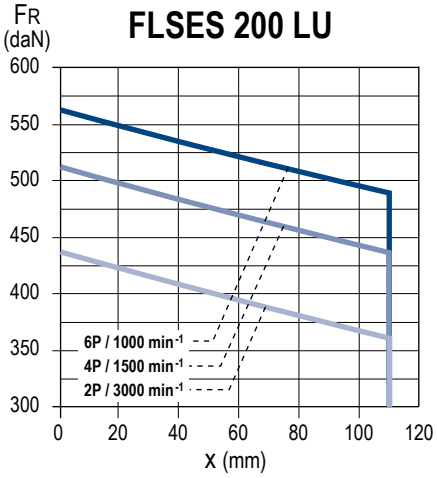
FLSES 180 M/MT/MUR



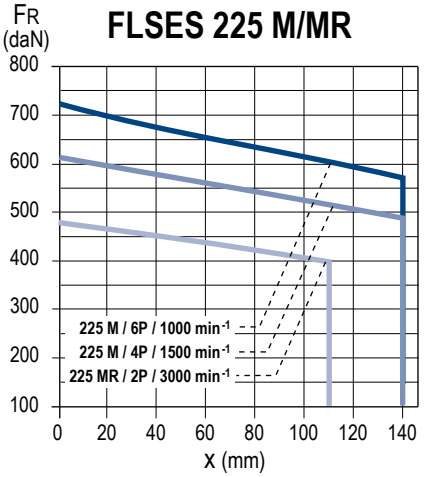
FLSES 180 L/LUR



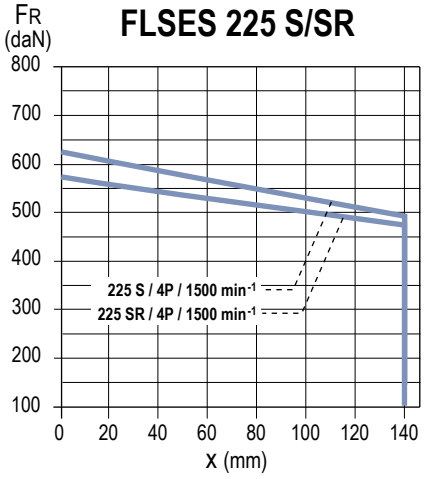
FLSES 200 LU



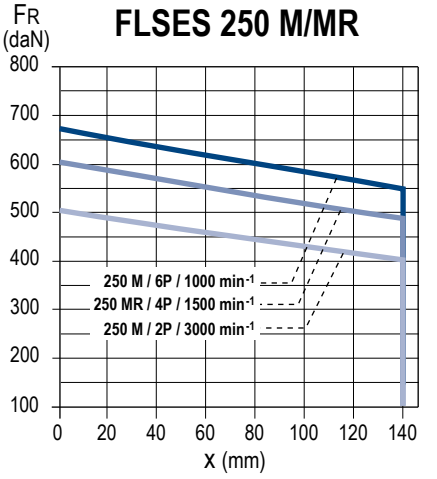
FLSES 225 M/MR



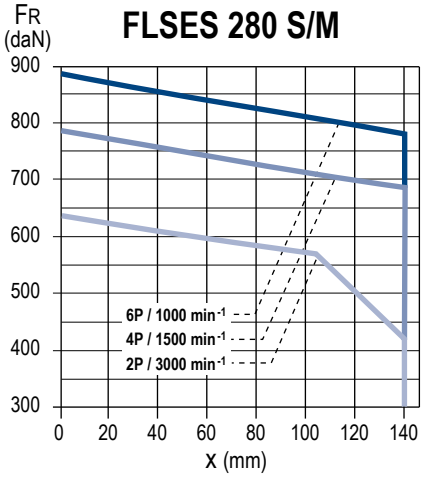
FLSES 225 S/SR



FLSES 250 M/MR



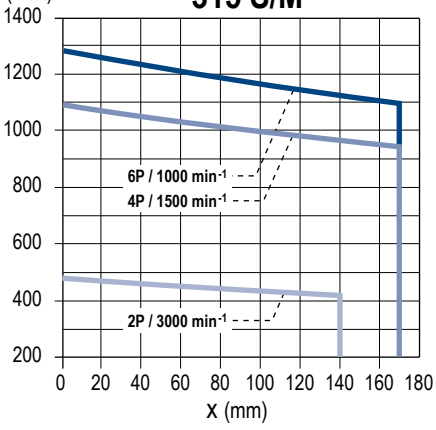
FLSES 280 S/M



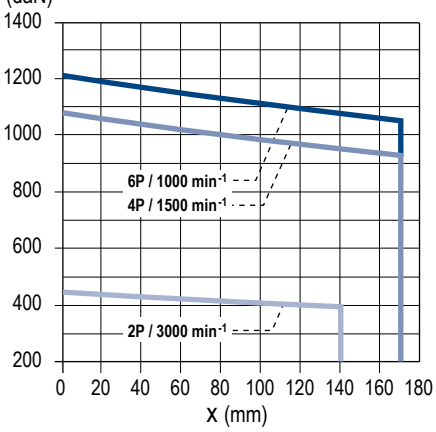
STANDARD FITTING ARRANGEMENT

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

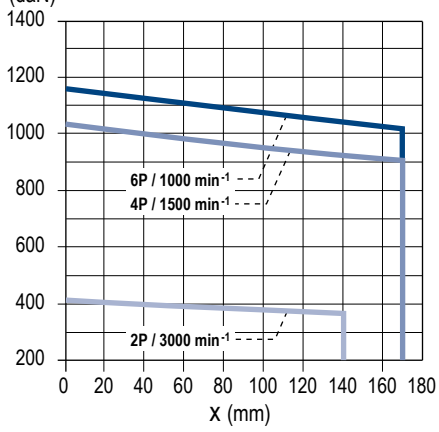
FLSES 280 MKA/MKB 315 S/M



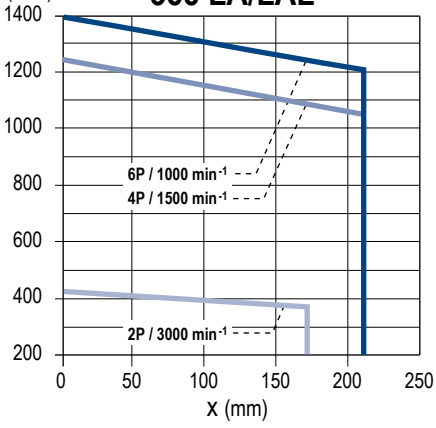
FLSES 315 LA



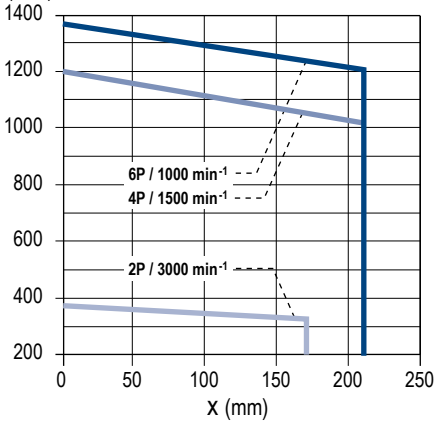
FLSES 315 LB



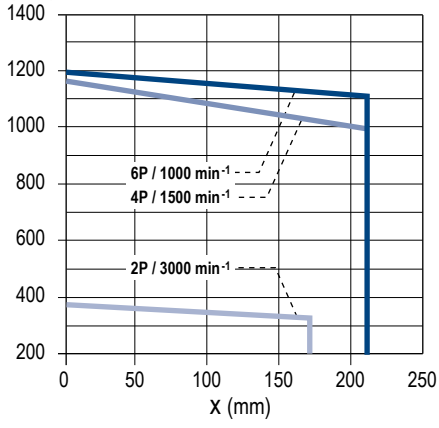
FLSES 315 LKA/LKB 355 LA/LAL



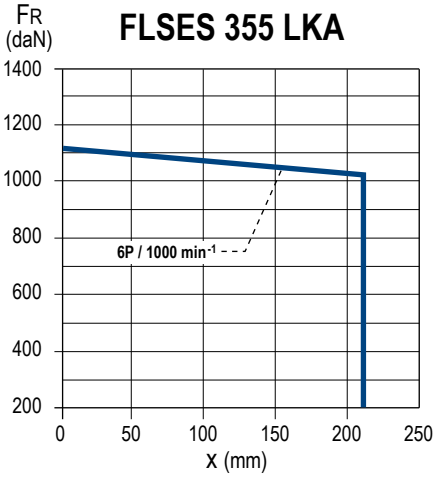
FLSES 355 LB



FLSES 355 LC/LD



FLSES 355 LKA



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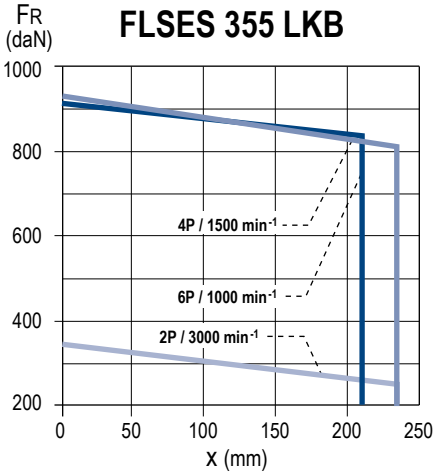
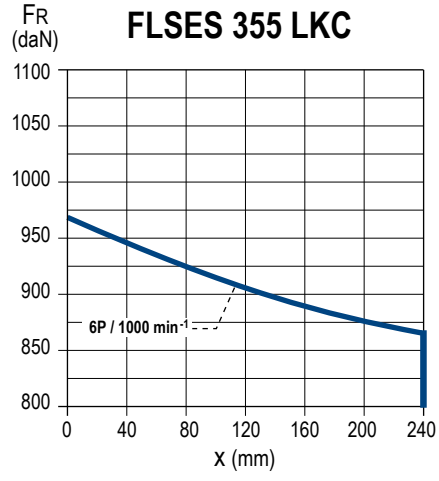


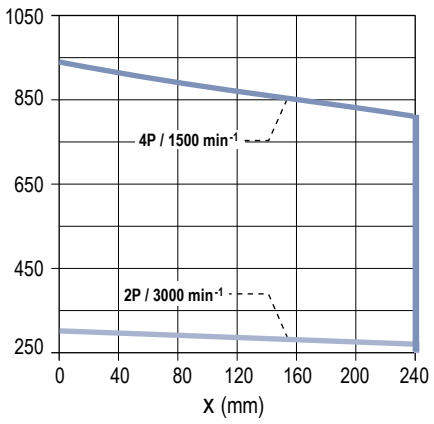
FLSES 355 LKC



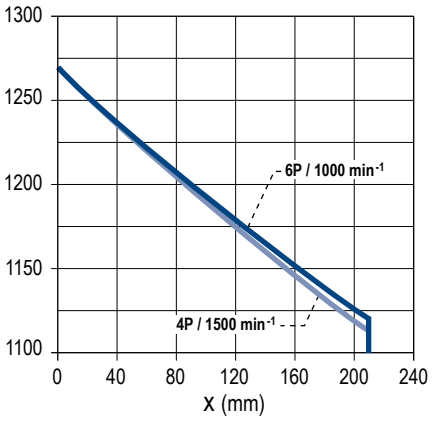
STANDARD FITTING ARRANGEMENT

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

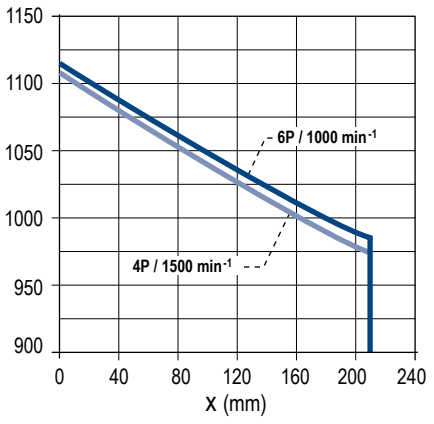
FLSES 400 LB



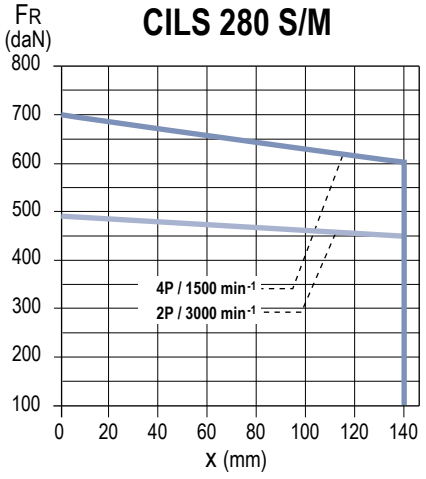
FLSES 450 LA



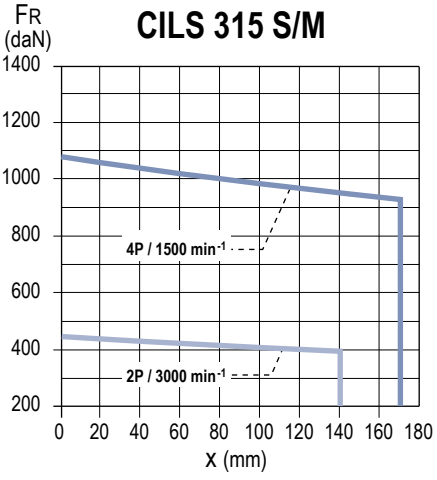
FLSES 450 LB/LC



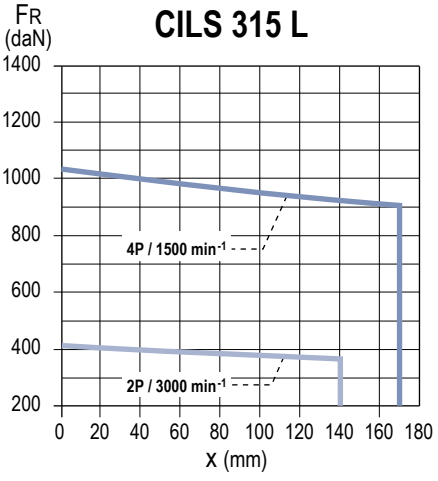
CILS 280 S/M



CILS 315 S/M



CILS 315 L

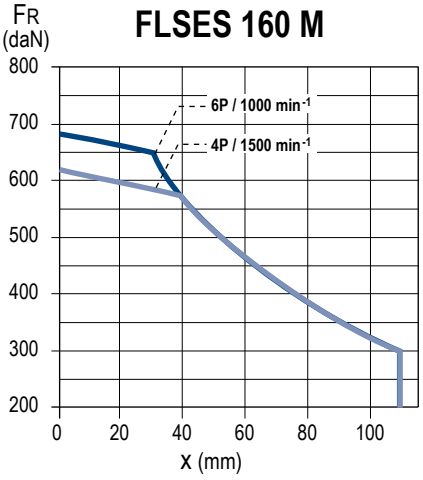


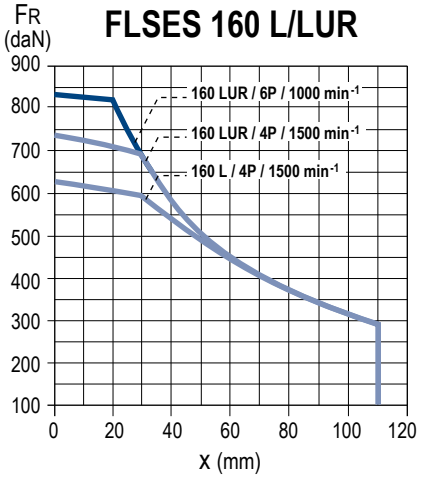
SPECIAL FITTING ARRANGEMENT

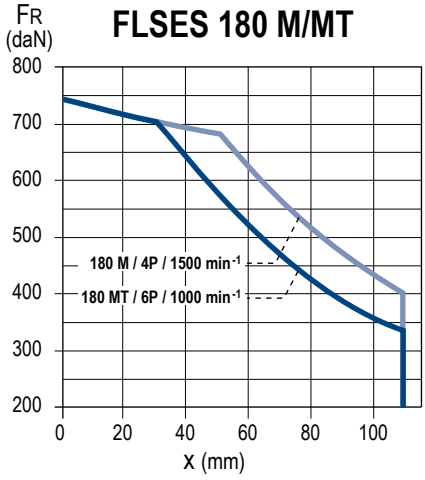
Type of drive end roller bearings

Series	Type	No. of poles	Non drive end bearing (N.D.E.)	Drive end bearing (D.E.)
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	6312 C3	NU 310
	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
	280 MKA/MKB	4	6316 C3	NU 320
	315 S/M/LA/LB	4 ; 6	6316 C3	NU 320
	315 LKA/LKB	4	6316 C3	NU 322
	355 L/LAL	4 ; 6	6316 C3	NU 322
	355 LKA	6	6324 C3	NU 324
	355 LKB	4 ; 6	6324 C3	NU 324
	355 LKC	6		
	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		
CILS	Consult Nidec Leroy-Somer			

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

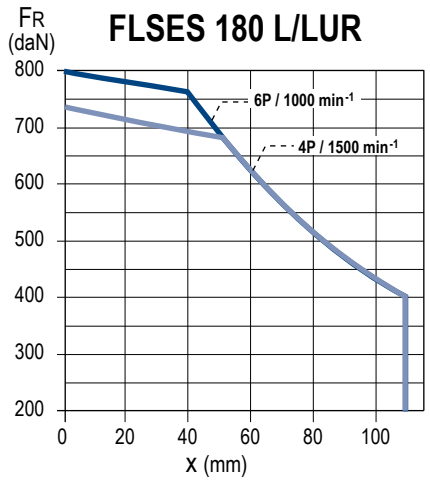


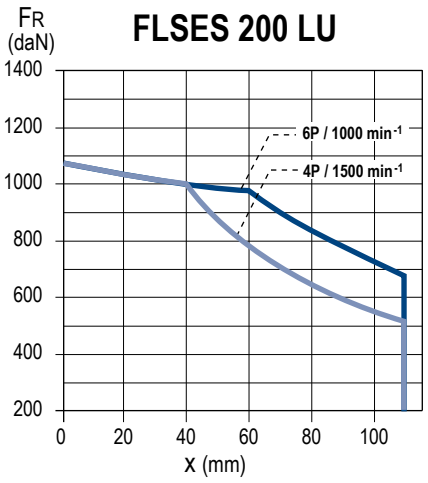


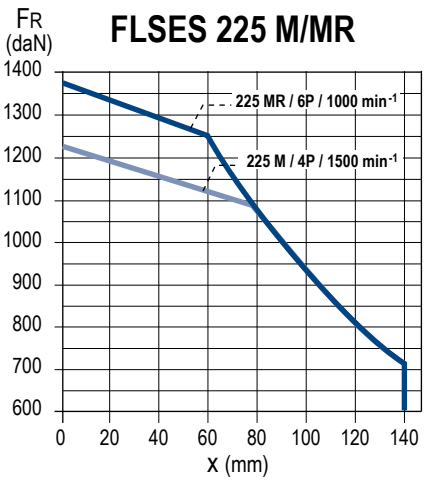


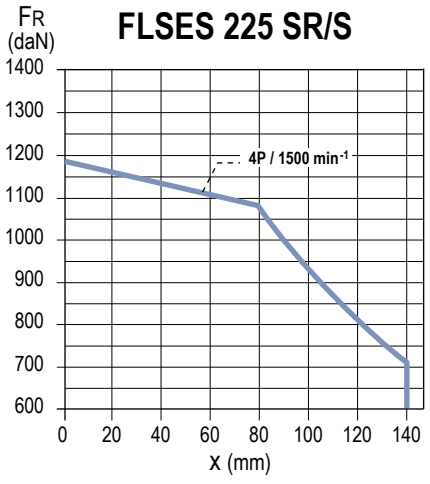
SPECIAL FITTING ARRANGEMENT

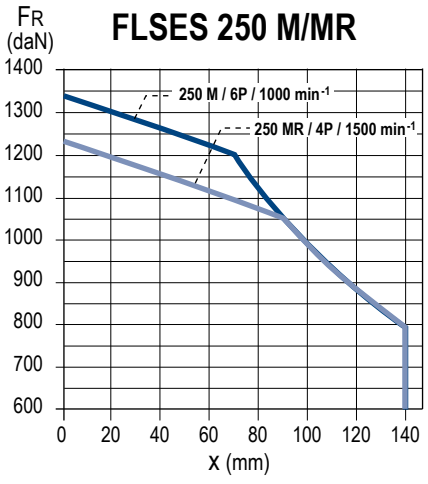
Permissible radial load on main shaft extension with a bearing life L_{10h} of 25,000 hours.
FR : Radial Force
X: Distance with respect to the shaft shoulder

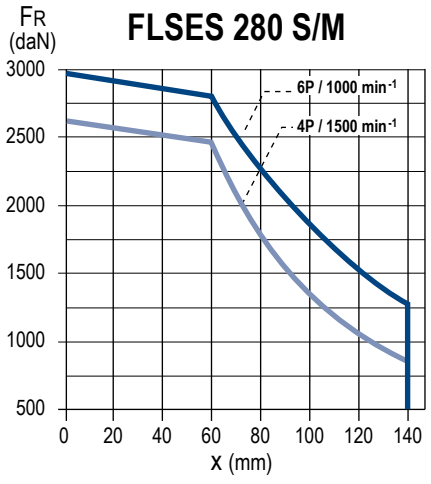


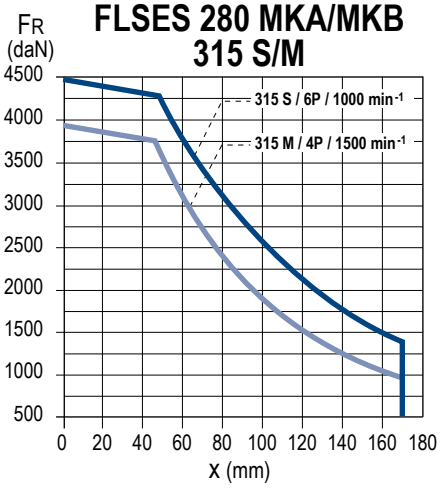


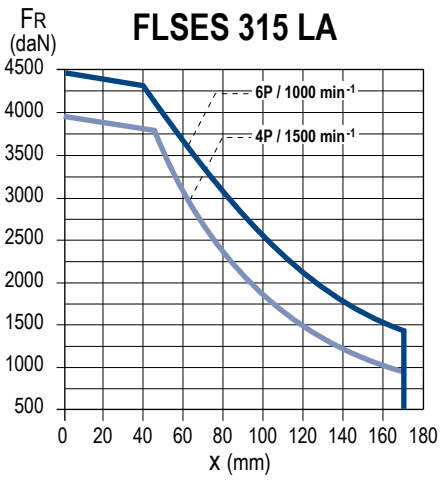


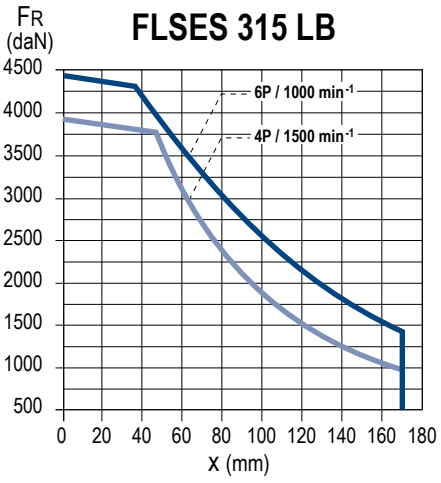






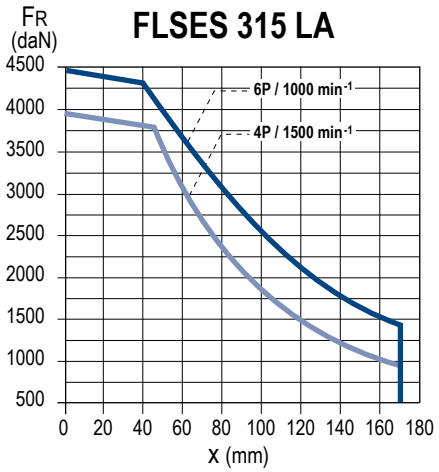


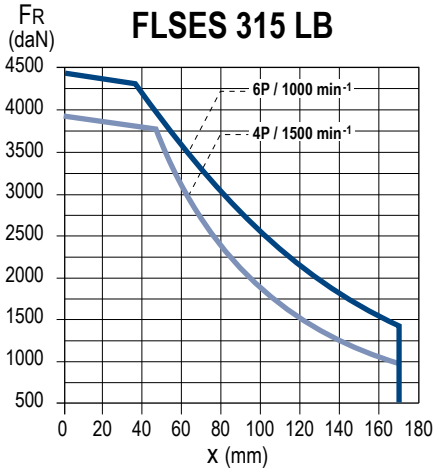


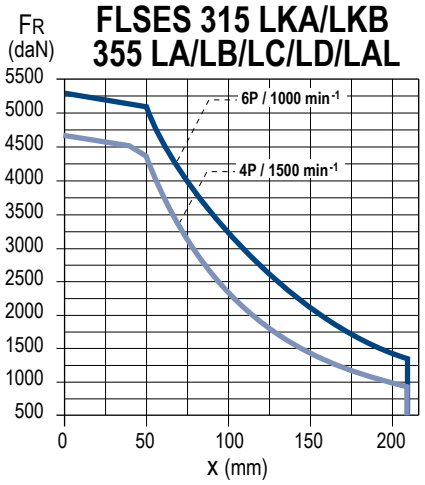


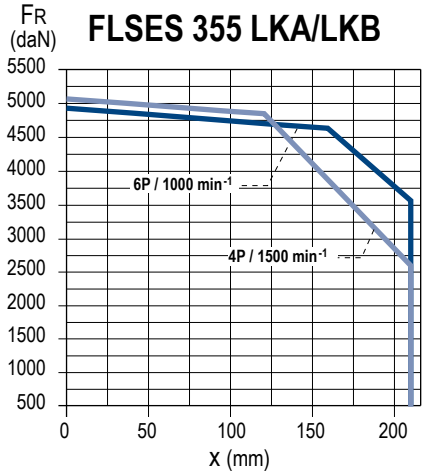
SPECIAL FITTING ARRANGEMENT

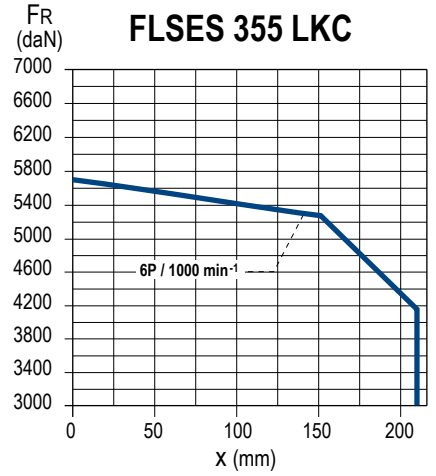
Permissible radial load on main shaft extension with a bearing life L_{10h} of 25,000 hours.
FR : Radial Force
X: Distance with respect to the shaft shoulder

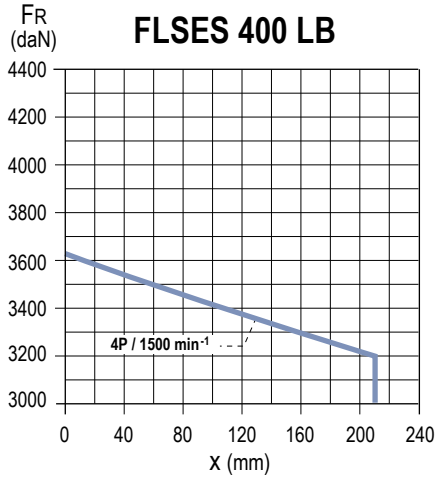


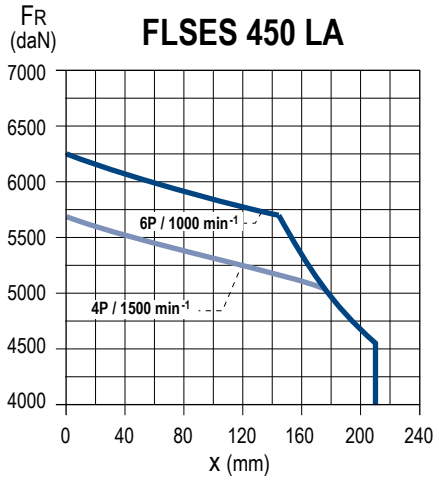


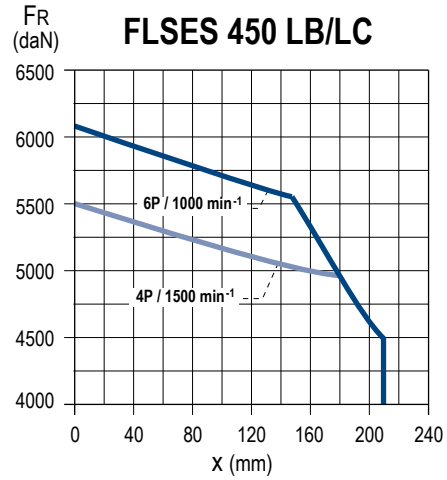












Optional features
Non-standard flanges

Optionally, Nidec 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.

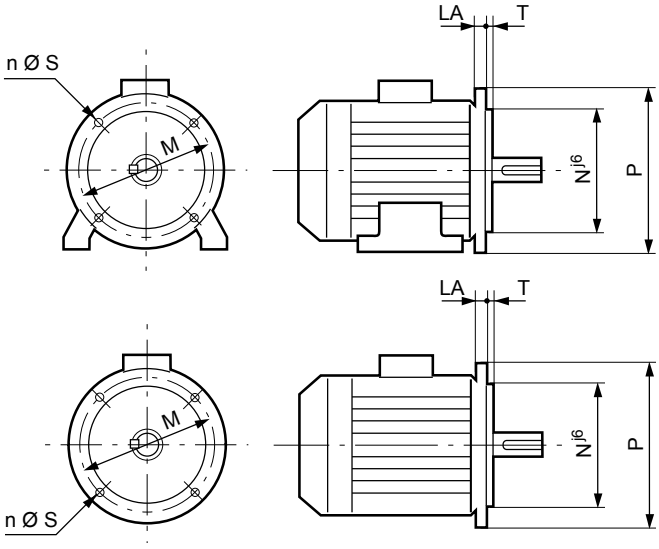
Dimensions in millimetres

(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

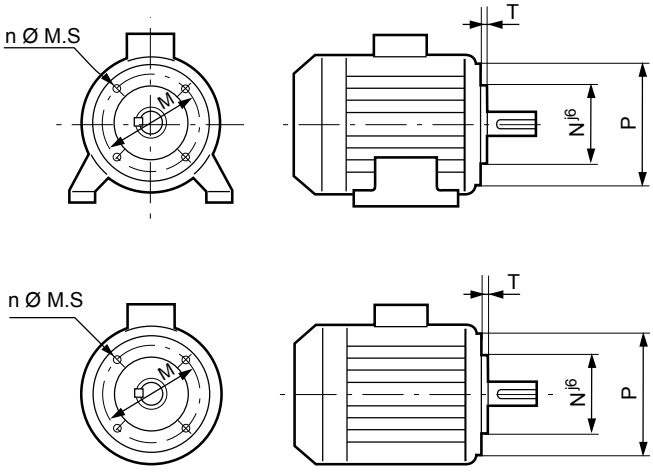
** Tolerance N js6*

*** 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

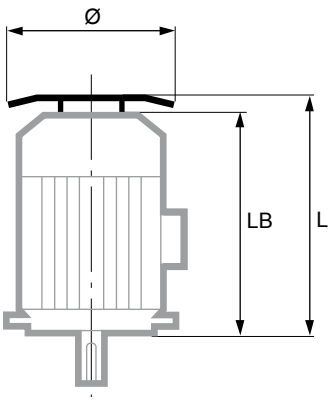
Series	Frame size and type	Mounting form \ Flange type	(FF) Flange mounted												(FT) Face mounted								
			FF 115	FF 130	FF 165	FF 215	FF 265	FF 300	FF 350	FF 400	FF 500	FF 600	FF 740	FF 940	FT 65	FT 75	FT 85	FT 100	FT 115	FT 130	FT 165	FT 215	FT 265
FLSES	80 L/LG	all	■	■	●	◆											◆	●	◆	◆	◆		
	90 S/L/LU	B5/B35 (1)	◆	◆	●	◆																	
	90 S/L/LU	B3/B14/B34	■	■	■	■												◆	●	◆	■		
	100 L/LK	all	■	■	■	●													◆	●	◆	◆	
	112 M	all	■	■	■	●													◆	●	◆	◆	
	112 MU	all		■	■	●	◆												◆	●	◆	◆	
	132 S/M/MR/MU	all			■	◆	●														●	◆	◆
	160 M/L/LU	all				◆	◆	●	◆														
	180 M/MR/L/ LUR	all					◆	●	◆														
	200 LU	all							●	◆													
	225 SR/M/MR	all							◆	●	◆												
	250 MR	all								◆	●												
	280 S/M	all								❍	●												
	280 MK	all									●												
	315 S	all									❍	●											
	315 M/ML/LK	all										●											
	355 L	all										❍	●										
	355 LK	all											●	◆									
	400 LA/LB	all												●									
CILS	280	all									●												
	315	all										●											

● Standard ■ Modified bearing location ◆ Adaptable without modification ❍ Please consult Nidec 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 280 MK	LB + 80	520
FLSES 315	LB + 118	620
FLSES 315 LK	LB + 80	520
FLSES 355 L	LB + 112	710
FLSES 355 LK	LB + 160	650
FLSES 400/450	LB + 160	650



BRAKE MOTORS, FORCED VENTILATION

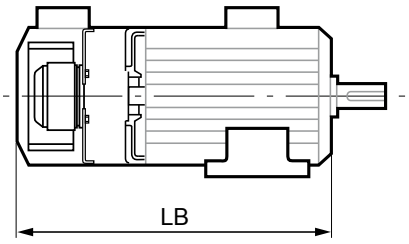
The integration of high-efficiency motors within a process often requires accessories to make operation easier:

- 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		
132 S	458	
132 MR		
132 M		
132 MU		
160 M	641	
160 L		
160 LU	702	
180 MR	641	
180 M	689	
180 L		
180 LUR		
200 LU	819	
225 SR	825,5	
225 MR		
225 M	917	
250 M		
280 S	1167	
280 M	1167	
315 S	1477	
315 M		
315 LA/LB		
355 LA/LB/LC/LD/LAL	1668	
355 LKA/LKB	1995	
400	Consult Nidec Leroy-Somer	
450		



MOTORS WITH SPACE HEATERS

Type	Power (W)
FLSES 80 L à 132	25
FLSES 80 LG à 132	25
FLSES 160 à 225 MR/SR	50
FLSES 225 M/S à 250	90
FLSES 280 à 315	100*
FLSES 355 à 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.

Installation and maintenance
Position of the lifting rings

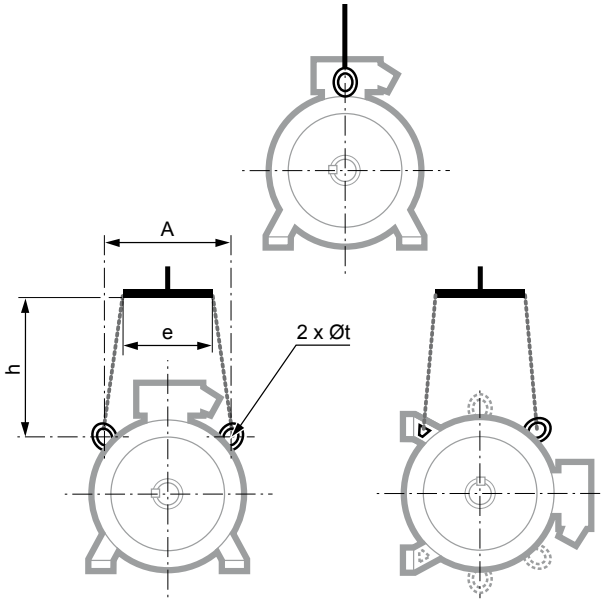
LIFTING THE MOTOR ONLY
(not coupled to the machine)

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.

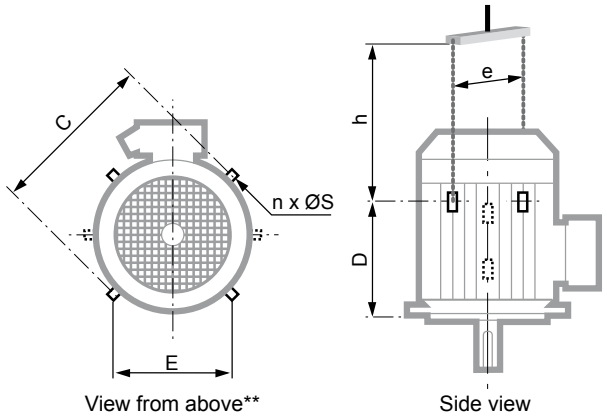
To prevent any damage to the motor during handling (for example: switching the motor from horizontal to vertical), it is essential to follow these instructions.

HORIZONTAL POSITION



Type	Horizontal position			
	A	e min	h min	Øt
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/CILS 280	360	380	500	30
FLSES 280 MK/315/CILS 315	440	400	500	60
FLSES 315LK/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



View from above** Side view

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

General information
Designation

4P 1500 min^{-1}	PLSES	225	MG	55 kW	IFT/IE3	IM 1001 IM B3	230 / 400 V	50 Hz
No. of poles speed(s)	Series designation	Frame size IEC 60072	Housing designation and manufacturer code	Rated power	Range/ Efficiency class	Mounting arrangement IEC 60034-7	Mains voltage	Mains frequency

Commercial product designation definition

General information

Description

In the standard version, the motors are wound 400 V 50 Hz with connection Δ

Component	Materials	Remarks
Housing	Steel	- gravity or low pressure die casting, frame size ≤ 250 - lifting rings
Stator	Insulated low-carbon magnetic steel laminations Electroplated copper	- low carbon content guarantees long-term lamination pack stability - welded laminations - semi-enclosed slots - class F insulation
Rotor	Insulated low-carbon magnetic steel laminations Aluminium or copper	- inclined cage bars - rotor cage pressure die-cast in aluminium - rotor cage shrink-fitted to shaft - rotor balanced dynamically, class A, 1/2 key
Shaft	Steel	
End shields	Cast iron or steel	
Bearings and lubrication		**Standard mounting:** - ball bearings C3 play - permanently greased bearings for frame size ≤ 200 - regreasable bearings from frame size 225 upwards - bearings preloaded at non drive end
Labyrinth seal **Lipseals**	Plastic or steel Synthetic rubber	- lipseal at drive end for all motors
Fan	Composite Aluminium or steel alloy	- bidirectional fan in motors with 2 poles (P ≤ 250 kW), 4 poles for frame size 180 to 315 except 315 MGU and LG - unidirectional fan (direction of rotation to be specified at time of ordering) in motors with 2 poles, for frame size 315 MGU and LG
Fan cover	Pressed steel	- fitted, on request, with a drip cover for operation in vertical position, shaft end facing up
Terminal box	Composite Aluminium alloy or steel	- can be turned in 4 directions, opposite the feet - fitted as standard with a terminal block with 6 steel terminals - terminal box comes fitted with threaded plugs for frame size ≤ 280 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 - 1 earth terminal in each terminal box

In the standard version, the motors are wound 400 V 50 Hz with connection Δ

Electrical and mechanical characteristics
IE3 - 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 2014			Power factor		
	P_n kW	M_n N.m	M_d/M_n	M_m/M_n	I_d/I_n	J kg.m²	IM B3 kg	LP db(A)	N_n min⁻¹	I_n A	η 4/4	η 3/4	η 2/4	Cos φ 4/4	Cos φ 3/4	Cos φ 2/4
2 poles																
PLSES 315L	250	803	2.15	2.9	6.95	1.26	790	85	2974	437	96.0	96.3	96.0	0.86	0.83	0.75
PLSES 315LD	280	898	2.2	2.85	6.75	1.37	920	86	2976	489	96.1	96.1	95.4	0.86	0.83	0.76
PLSES 315MGU	315	1012	1.5	2.2	5.8	2.47	1082	84	2971	533	95.8	96.3	95.8	0.89	0.89	0.86
PLSES 315LG	355	1139	1.8	2.7	6.8	2.76	1160	84	2977	605	96.3	96.7	96.5	0.88	0.87	0.83
PLSES 315LG	400	1282	1.8	2.8	7.1	3.1	1250	84	2979	673	96.4	96.7	96.8	0.89	0.88	0.85
PLSES 315VLG	450	1442	2.1	3.0	7.8	3.5	1340	84	2981	757	96.4	96.6	96.5	0.89	0.88	0.87
PLSES 315VLGU	500	1605	1.7	2.5	6.4	3.5	1385	84	2974	851	96.4	96.7	96.8	0.88	0.87	0.82
PLSES 355MA	500	1607	1.4	1.9	5.3	4.5	1948	80	2972	853	96.1	96.2	95.6	0.88	0.89	0.86
PLSES 355MB	560	1802	1.3	1.7	4.7	4.5	1948	89	2968	958	95.9	96.3	96.2	0.88	0.89	0.88
PLSES 355MC	630	2026	0.8	2.1	5.0	4.5	1948	89	2969	1038	96.3	96.6	96.4	0.91	0.92	0.90
PLSES 355LA	710	2274	2.1	2.5	7.3	5.74	2434	89	2982	1173	97.1	97.1	96.8	0.90	0.90	0.87
PLSES 355LB	800	2568	1.8	2.2	6.5	5.74	2434	89	2975	1327	96.7	97.1	96.7	0.90	0.90	0.87
4 poles																
PLSES 225MG	55	354	2.2	2.7	6.55	0.7806	420	69	1484	110	94.6	95.0	94.8	0.83	0.80	0.71
PLSES 315LUS	250	1610	3	2.95	7.42	3.5966	960	83	1486	452	96.2	96.4	96.0	0.83	0.79	0.70
PLSES 315LG	280	1798	2.4	3.0	8.1	5.84	1170	83	1487	488	96.3	96.5	96.3	0.86	0.83	0.74
PLSES 315LG	315	2024	2.2	2.6	7.3	5.84	1170	83	1486	543	96.2	96.4	96.3	0.87	0.84	0.76
PLSES 315LG	355	2280	2.2	2.8	7.0	5.84	1170	83	1487	650	96.2	96.3	96.0	0.82	0.77	0.66
PLSES 315VLG	400	2567	2.5	2.7	7.4	6.48	1327	83	1488	714	96.3	96.5	96.3	0.84	0.80	0.69
PLSES 315VLGU	450	2890	2.6	2.1	7.6	7.3	1400	83	1487	821	96.5	96.7	96.3	0.82	0.78	0.67
PLSES 355MA	500	3213	1.2	2.8	7.0	9.9	2041	87	1486	862	96.2	96.4	96.2	0.87	0.86	0.72
PLSES 355MB	560	3601	1.1	2.5	6.3	9.9	2041	87	1485	956	96.1	96.5	96.6	0.88	0.87	0.84
PLSES 355LA	630	4040	1.5	2.5	6.9	11.3	2295	87	1489	1086	96.2	96.3	95.9	0.87	0.85	0.79
PLSES 355LB	710	4557	1.4	3.0	7.6	12.4	2454	87	1488	1206	96.6	96.8	96.6	0.88	0.85	0.79
PLSES 355LC	750	4816	1.3	2.8	7.2	12.4	2454	87	1487	1275	96.5	96.8	96.6	0.88	0.86	0.80
PLSES 400LB	800	5117	2.7	2.2	8.1	25	3050	98	1493	1431	97.2	97.3	97.1	0.83	0.84	0.76
PLSES 400LB	900	5764	2.4	2.1	7.8	25	3050	101	1491	1522	97.0	97.3	97.1	0.88	0.85	0.77
6 poles																
PLSES 355LA	400	3851	1.7	2.5	6.7	14.5	2210	78	992	714	96.3	96.3	95.8	0.84	0.80	0.71
PLSES 355LB	450	4332	1.7	2.5	6.6	15.4	2245	78	992	817	94.6	96.4	96.0	0.84	0.80	0.72
PLSES 355LC	500	4813	2.0	2.6	6.6	16.3	2320	78	992	899	96.7	96.8	96.3	0.83	0.79	0.70
PLSES 355LD	560	5391	1.7	2.5	6.6	18.0	2450	78	992	1032	96.7	96.9	96.8	0.81	0.76	0.66
PLSES 400LB	630	6059	2.0	2.3	6.3	38.0	3100	84	993	1113	96.1	96.2	96.1	0.85	0.84	0.79
PLSES 400LD	710	6821	2.4	2.6	7.4	50.0	3300	84	994	1332	96.2	96.3	96.2	0.80	0.79	0.74

Electrical and mechanical characteristics
IE3 - Powered by the mains

Type	Rated power at 50Hz	380V / 50Hz				415V / 50Hz				460V / 60Hz				
		Rated speed	Rated current	Efficiency	Power factor	Rated speed	Rated current	Efficiency	Power factor	Rated speed	Rated power at 60Hz	Rated current	Efficiency	Power factor
	P_n kW	N_n min^{-1}	I_n A	η 4/4	Cos φ 4/4	N_n min^{-1}	I_n A	η 4/4	Cos φ 4/4	N_n min^{-1}	M_n N_n	I_n A	η 4/4	Cos φ 4/4
2 poles														
PLSES 315L	250	2970	455	95.9	0.87	2976	431	96.0	0.84	3578	667	378	96.40	0.86
PLSES 315LD	280	2972	504	96.0	0.88	2978	483	96.0	0.84	3580	747	419	96.30	0.87
PLSES 315MGU	315	2965	561	95.8	0.89	2974	511	96.3	0.89	3578	841	459	95.8	0.90
PLSES 315LG	355	2972	631	96.0	0.89	2980	582	96.5	0.88	3585	948	517	95.8	0.90
PLSES 315LG	400	2973	711	96.0	0.89	2981	655	96.5	0.88	3586	1067	589	95.8	0.89
PLSES 315VLG	450	2976	790	96.2	0.90	2982	737	96.5	0.88	3582	1200	655	95.8	0.90
PLSES 315VLGU	500	2971	886	96.3	0.89	2979	829	96.5	0.87	3581	1336	744	95.8	0.88
PLSES 355MA	500	2966	901	95.8	0.88	2975	812	96.2	0.89	3576	1336	744	95.8	0.88
PLSES 355MB	560	2962	1021	95.8	0.87	2972	921	96.1	0.88	3571	1497	834	95.8	0.88
PLSES 355MC	630	2962	1096	96.0	0.91	2972	997	96.6	0.91	3571	1684	907	95.8	0.91
PLSES 355LA	710	2978	1225	96.8	0.91	2985	1129	97.2	0.90	3591	1892	1034	95.8	0.90
PLSES 355LB	800	2973	1398	96.6	0.90	2982	1275	97.0	0.90	3587	2133	1165	95.8	0.90
4 poles														
PLSES225MG	55	1480	104	94.6	0.85	1486	98	94.8	0.82	1786	294	87	95.4	0.84
PLSES315LUS	250	1484	465	96.0	0.85	1488	446	96.2	0.81	1790	1334	397	96.4	0.82
PLSES315LG	280	1488	509	96.1	0.87	1489	487	96.4	0.83	1790	1495	428	96.6	0.85
PLSES315LG	315	1485	567	96.0	0.88	1488	530	96.2	0.86	1788	1683	476	96.5	0.86
PLSES315LG	355	1486	660	96.1	0.85	1489	651	96.0	0.79	1787	1896	551	96.2	0.84
PLSES315VLG	400	1485	744	96.1	0.85	1489	713	96.4	0.81	1788	2139	614	96.2	0.85
PLSES315VLGU	450	1486	834	96.4	0.85	1489	812	96.4	0.80	1787	2405	707	96.2	0.83
PLSES355MA	500	1484	888	96.1	0.89	1488	832	96.1	0.87	1788	2666	759	96.2	0.86
PLSES355MB	560	1483	996	96.0	0.89	1487	921	96.1	0.88	1787	2987	840	96.2	0.87
PLSES355LA	630	1487	1133	96.0	0.88	1490	1058	96.3	0.86	1789	3361	956	96.2	0.86
PLSES355LB	710	1487	1257	96.4	0.89	1490	1188	96.7	0.86	1790	3790	1065	96.2	0.87
PLSES355LC	750	1486	1330	96.3	0.89	1490	1253	96.8	0.86	1789	3997	1112	96.2	0.88
PLSES400LB	800	1492	1474	97.0	0.85	1493	1398	97.1	0.82	1793	4258	1200	96.2	0.87
PLSES400LB	900	1490	1587	96.8	0.89	1492	1482	97.1	0.87	1792	4793	1334	96.2	0.88
6 poles														
PLSES 355LA	400	991	735	96.1	0.86	993	704	96.4	0.82	1193	3202	619	96.6	0.84
PLSES 355LB	450	991	826	96.2	0.86	993	791	96.5	0.82	1193	3602	696	96.6	0.84
PLSES 355LC	500	991	926	96.5	0.85	993	889	96.6	0.81	1193	4002	783	96.6	0.83
PLSES 355LD	560	991	1063	96.4	0.83	993	1020	96.7	0.79	1192	4482	887	96.6	0.82
PLSES 400LB	630	992	1159	96.0	0.86	994	1099	96.1	0.83	1193	5043	988	96.4	0.83
PLSES 400LD	710	993	1386	96.1	0.81	996	1300	96.2	0.79	1195	5865	1127	96.4	0.82

Electrical and mechanical characteristics
IE3 - Powered by the drive

Type	400V / 50Hz				Rated torque M_n at S1 continuous duty					400V / 87Hz Δ				Maximum mechanical speed[1]
	Rated power	Rated speed	Rated current	Power factor	10Hz	17Hz	25Hz	50Hz	87Hz	Rated power	Rated speed	Rated current	Power factor	
	P_n kW	N_n min^{-1}	I_n A	Cos φ 4/4	N.m	N.m	N.m	N.m	N.m	P_n kW	N_n min^{-1}	I_n A	Cos φ 4/4	
2 poles														
PLSES 315 L	250	2974	446	0.87	485	554	608	770	-	-	-	-	-	3600
PLSES 315 LD	280	2978	472	0.88	581	663	704	819	-	-	-	-	-	3600
PLSES 315 MGU	315	2963	582	0.89	708	850	992	1015	-	-	-	-	-	3600
PLSES 315 LG	355	2971	645	0.90	797	911	1070	1141	-	-	-	-	-	3600
PLSES 315 LG	400	2973	726	0.90	820	1011	1203	1285	-	-	-	-	-	3600
PLSES 315 VLG	450	2974	817	0.90	869	1050	1231	1445	-	-	-	-	-	3600
PLSES 315 VLGU	475	2969	857	0.90	1130	1325	1528	1528	-	-	-	-	-	3600
PLSES 355 MA	500	2960	936	0.88	1125	1365	1613	1613	-	-	-	-	-	3600
PLSES 355 MB	560	2960	1050	0.88	1261	1525	1790	1806	-	-	-	-	-	3600
PLSES 355 MC	630	2962	1128	0.91	1418	1625	1833	2031	-	-	-	-	-	3600
PLSES 355 LA	710	2977	1260	0.91	1700	1873	2050	2277	-	-	-	-	-	3600
PLSES 355 LB	800	2973	1431	0.90	1884	2080	2274	2570	-	-	-	-	-	3600
4 poles														
PLSES 225 MG	55	1480	109	0.85	230	283	319	354	202	-	-	-	-	3240
PLSES 315 LUS	250	1484	478	0.85	1127	1288	1449	1610	918	-	-	-	-	3420
PLSES 315 LG	280	1484	523	0.87	1440	1620	1801	1801	1024	-	-	-	-	2610
PLSES 315 LG	315	1481	582	0.88	1395	1530	2031	2031	1153	-	-	-	-	2610
PLSES 315 LG	355	1485	672	0.86	1470	1774	2077	2283	1299	-	-	-	-	2610
PLSES 315 VLG	400	1484	762	0.86	1673	1995	2316	2574	1646	-	-	-	-	2610
PLSES 315 VLGU	450	1484	831	0.88	1775	2087	2400	2896	1646	-	-	-	-	2610
PLSES 355 MA	500	1485	918	0.89	2317	2766	3215	3215	1646	-	-	-	-	2610
PLSES 355 MB	560	1483	1020	0.90	2484	3045	3606	3606	2048	-	-	-	-	2610
PLSES 355 LA	630	1485	1160	0.89	2524	3112	3700	4051	2305	-	-	-	-	2610
PLSES 355 LB	710	1486	1291	0.89	3111	3631	4150	4563	2305	-	-	-	-	2610
PLSES 355 LC	750	1485	1367	0.89	3135	3737	4340	4823	2744	-	-	-	-	2610
PLSES 400LB	800	1491	1437	0.90	3843	4356	4868	5124	2927	-	-	-	-	2610
PLSES 400LB	900	1489	1601	0.91	3925	4560	5195	5772	3293	-	-	-	-	2610
6 poles														
PLSES 355 LA	400	992	754	0.86	2311	2792	3273	3851	1464	-	-	-	-	1740
PLSES 355 LB	450	992	849	0.86	2599	3141	3682	4332	1646	-	-	-	-	1740
PLSES 355 LC	500	992	954	0.85	2888	3489	4091	4813	1829	-	-	-	-	1740
PLSES 355 LD	560	992	1107	0.82	3235	3902	4570	5391	2049	-	-	-	-	1740
PLSES 400LB	630	992	1197	0.86	3639	4397	5155	6065	2305	-	-	-	-	1200
PLSES 400LD	710	993	1432	0.81	4097	4950	5804	6828	2598	-	-	-	-	1200

⚠ **Values given with a voltage drop of 30V at the drive output**

Electrical and mechanical characteristics
IE4 - 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 2014			Power factor		
	P_n kW	M_n N.m	M_d/M_n	M_m/M_n	I_d/I_n	J kg.m²	IM B3 kg	LP db(A)	N_n min⁻¹	I_n A	η 4/4	η 3/4	η 2/4	Cos φ 4/4	Cos φ 3/4	Cos φ 2/4
2 poles																
PLSES 225 MG	75	241	2.00	3.25	6.80	0.34	365	95	2976	135	95.6	95.3	94.3	0.84	0.79	0.69
PLSES 250 SF	90	289	2.65	4.05	8.50	0.41	430	95	2978	159	96.2	96.0	95.0	0.85	0.79	0.68
PLSES 250 MF	110	353	2.30	3.60	7.90	0.48	465	95	2978	190	96.2	96.1	95.3	0.87	0.82	0.73
PLSES 280 MD	132	423	2.50	3.90	8.55	0.57	500	96	2980	229	96.6	96.4	95.6	0.86	0.81	0.71
PLSES 315 SU	160	513	2.15	3.00	7.50	1.05	700	95	2980	282	96.3	96.4	96.2	0.85	0.81	0.73
PLSES 315 MU	200	641	2.70	3.45	7.30	1.12	720	95	2980	360	96.5	96.3	95.6	0.83	0.77	0.66
PLSES 315 LD	250	801	2.75	3.35	7.35	1.26	790	96	2980	450	96.7	96.6	95.9	0.83	0.79	0.68
PLSES 315 LUS	280	897	2.75	3.30	7.55	1.37	920	95	2980	492	96.7	96.6	96.0	0.85	0.81	0.72
PLSES 315 MGU	315	1012	1.50	2.20	6.14	2.25	1082	84	2971	530	96.5	97.0	96.5	0.89	0.89	0.86
PLSES 315 LG	355	1139	1.60	2.11	6.37	2.50	1195	82	2976	615	96.6	96.9	96.8	0.86	0.85	0.79
PLSES 315 LG	400	1284	1.78	2.18	6.64	2.65	1240	82	2975	685	96.6	96.9	96.9	0.87	0.86	0.81
PLSES 315 VLG	450	1442	2.10	3.00	7.80	2.97	1340	84	2981	754	96.8	97.1	97.0	0.89	0.87	0.84
PLSES 315 VLGU	500	1605	1.70	2.50	6.40	3.10	1395	86	2974	848	96.7	97.0	97.0	0.88	0.87	0.82
PLSES 355 MA	500	1607	1.40	1.90	5.30	4.20	1948	80	2972	853	96.5	96.6	96.0	0.87	0.88	0.85
PLSES 355 MB	560	1802	1.30	1.70	4.70	4.20	1948	89	2968	958	96.5	96.9	96.8	0.87	0.88	0.87
PLSES 355 MC	630	2026	0.80	2.10	5.00	4.20	1948	89	2969	1047	96.5	96.8	96.6	0.90	0.91	0.89
PLSES 355 LA	710	2274	2.10	2.50	7.30	5.18	2435	89	2982	1173	97.1	97.1	96.8	0.90	0.90	0.87
PLSES 355 LB	800	2568	1.80	2.20	6.50	5.18	2435	89	2975	1327	96.7	97.1	96.7	0.90	0.90	0.87
PLSES 400 LA	900	2882	1.47	3.21	9.45	10.88	3366	93	2983	1480	96.5	96.7	96.3	0.90	0.90	0.87
PLSES 400 LA	1100	3527	1.20	2.62	7.73	10.88	3366	93	2983	1808	96.5	96.7	96.3	0.91	0.90	0.87
PLSES 400 LA	1200	3847	1.10	2.40	7.10	10.88	3300	93	2978	1990	96.7	96.7	96.3	0.91	0.90	0.87
4 poles																
PLSES 280 SG	75	481	3.05	3.65	8.75	0.96	480	94	1490	139	96.0	95.5	94.2	0.81	0.75	0.63
PLSES 280 SGJ	90	577	2.95	3.45	8.50	1.08	510	95	1490	163	96.2	95.9	94.8	0.83	0.77	0.66
PLSES 280 SGJ	110	706	2.85	3.30	8.25	2.08	680	95	1488	196	96.4	96.2	95.3	0.84	0.79	0.68
PLSES 280 MGU	132	845	3.40	3.85	9.40	2.29	715	95	1492	250	96.4	96.1	95.0	0.79	0.73	0.62
PLSES 315 MUR	160	1030	2.75	2.70	6.95	2.86	820	95	1490	302	96.8	96.7	96.1	0.79	0.73	0.60
PLSES 315 LUS	200	1280	3.40	3.60	9.35	3.34	910	95	1490	364	96.8	96.6	95.9	0.82	0.77	0.65

Electrical and mechanical characteristics
IE4 - Powered by the drive

Type	400V / 50Hz				Rated torque M_n at S1 continuous duty					400V / 87Hz Δ				Maximum mechanical speed[1]
	Rated power	Rated speed	Rated current	Power factor	10Hz	17Hz	25Hz	50Hz	87Hz	Rated power	Rated speed	Rated current	Power factor	
	P_n kW	N_n min^{-1}	I_n A	Cos φ 4/4	N.m	N.m	N.m	N.m	N.m	P_n kW	N_n min^{-1}	I_n A	Cos φ 4/4	
2 poles														
PLSES 225 MG	75	2972	137	0.88	210	241	241	241	-	-	-	-	-	3600
PLSES 250 SF	90	2976	163	0.88	248	289	289	289	-	-	-	-	-	3600
PLSES 250 MF	110	2974	196	0.89	243	299	353	353	-	-	-	-	-	3600
PLSES 280 MD	132	2976	236	0.89	311	359	407	423	-	-	-	-	-	3600
PLSES 315 SU	160	2974	293	0.87	359	436	487	513	-	-	-	-	-	3600
PLSES 315 MU	200	2978	367	0.86	417	481	545	641	-	-	-	-	-	3600
PLSES 315 LD	250	2978	451	0.87	521	561	641	801	-	-	-	-	-	3600
PLSES 315 LUS	280	2978	499	0.88	628	718	762	897	-	-	-	-	-	3600
PLSES 315 MGU	315	2963	582	0.89	708	850	992	1012	-	-	-	-	-	3600
PLSES 315 LG	355	2967	658	0.88	812	900	985	1139	-	-	-	-	-	3600
PLSES 315 LG	400	2967	740	0.89	876	1060	1244	1284	-	-	-	-	-	3600
PLSES 315 VLG	450	2974	817	0.9	869	1050	1231	1442	-	-	-	-	-	3600
PLSES 315 VLGU	500	2969	857	0.9	1130	1325	1528	1605	-	-	-	-	-	3600
PLSES 355 MA	500	2960	936	0.88	1125	1365	1613	1607	-	-	-	-	-	3600
PLSES 355 MB	560	2960	1050	0.88	1261	1525	1790	1802	-	-	-	-	-	3600
PLSES 355 MC	630	2962	1128	0.91	1418	1625	1833	2026	-	-	-	-	-	3600
PLSES 355 LA	710	2977	1260	0.91	1700	1873	2050	2274	-	-	-	-	-	3600
PLSES 355 LB	800	2973	1431	0.91	1884	2080	2274	2568	-	-	-	-	-	3600
PLSES 400 LA	900	2983	1590	0.91	2020	2222	2453	2655	-	-	-	-	-	3600
PLSES 400 LA	1100	2978	1942	0.91	2474	2722	3005	3252	-	-	-	-	-	3600
PLSES 400 LA	1200	2979	2150	0.91	2476	2740	3006	3847	-	-	-	-	-	3600
4 poles														
PLSES 280 SG	75	1490	142	0.84	481	481	481	481	-	-	-	-	-	2700
PLSES 280 SGJ	90	1488	168	0.85	577	577	577	577	-	-	-	-	-	2700
PLSES 280 SGJ	110	1488	202	0.86	706	706	706	706	-	-	-	-	-	2700
PLSES 280 MGU	132	1492	251	0.83	845	845	845	845	-	-	-	-	-	2700
PLSES 315 MUR	160	1490	307	0.82	1012	1030	1030	1030	-	-	-	-	-	2700
PLSES 315 LUS	200	1490	368	0.86	1126	1266	1280	1280	-	-	-	-	-	2700

⚠ **Values given with a voltage drop of 30 V at the drive output**

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 400	2; 4		0	Removable undrilled mounting plate (see details page 145)

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.

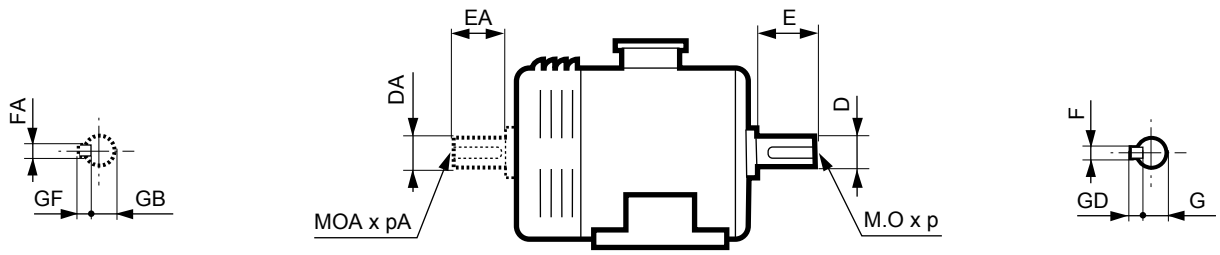
Tightening torque for the nuts on the terminal blocks.

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	4 ; 6	M14	M14

Dimensions
Shaft extensions

Dimensions in millimetres

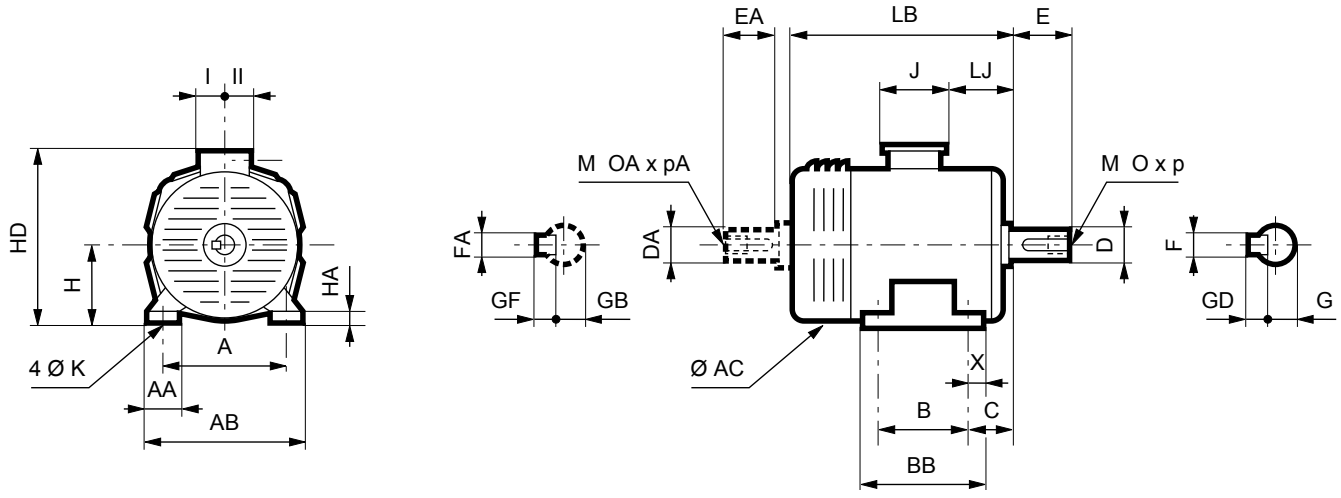


Type	Main shaft extensions																		
	4 and 6 poles									2 poles									
	F	GD	D	G	E	O	p	L	LO	F	GD	D	G	E	O	p	L	LO
PLSES 225 MG	18	11	65m6	58	140	20x2.5	42	125	15	18	11	60m6	53	140	20x2.5	42	125	15
PLSES 250 MF/SF	20	12	75m6	67.5	140	20x2.5	42	125	15	18	11	65m6	58	140	20x2.5	42	125	15
PLSES 280 MD	22	14	80m6	71	170	20x2.5	42	140	30	18	11	65m6	58	140	20x2.5	42	125	15
PLSES 280 MG/SGJ	22	14	80m6	71	170	20x2.5	42	140	30	-	-	-	-	-	-	-	-	-
PLSES 280 MGU	22	14	80m6	71	170	20x2.5	42	140	30	-	-	-	-	-	-	-	-	-
PLSES 280 SG	22	14	80m6	71	170	20x2.5	42	140	30	-	-	-	-	-	-	-	-	-
PLSES 315 L/M/MU/SU	25	14	90m6	81	170	24x3	50	155	30	20	12	70m6	62.5	140	20x2.5	42	140	30
PLSES 315 LD/LG/MGU/VLG/VLGU	28	16	100m6	90	210	24x3	50	180	30	22	14	80m6	71	170	20x2.5	42	140	30
PLSES 315 LU	28	16	100m6	90	210	24x3	50	180	30	20	12	70m6	62.5	140	20x2.5	42	140	30
PLSES 315 LUS	-	-	-	-	-	-	-	-	-	22	14	90m6	81	170	20x2.5	42	140	30
PLSES 315 MUR/SUR	25	14	90m6	81	170	24x3	50	140	30	-	-	-	-	-	-	-	-	-
PLSES 355 LA/LB/MA/MB	28	16	110m6	100	210	24x3	50	180	30	22	14	80m6	71	170	20x2.5	42	140	30
PLSES355 LC/LD	28	16	110m6	100	210	24x3	50	180	30	-	-	-	-	-	-	-	-	-
PLSES355 MC	-	-	-	-	-	-	-	-	-	22	14	80m6	71	170	20x2.5	42	140	30
PLSES 400 LA/LB/LD	32	18	120m6	109	210	24x3	50			-	-	-	-	-	-	-		

The dimensions given above for secondary shaft extensions are intended as a guide for motor offers. These are only available on request.

Dimensions
Foot mounted IM 1001 (IM B3)

Dimensions in millimetres

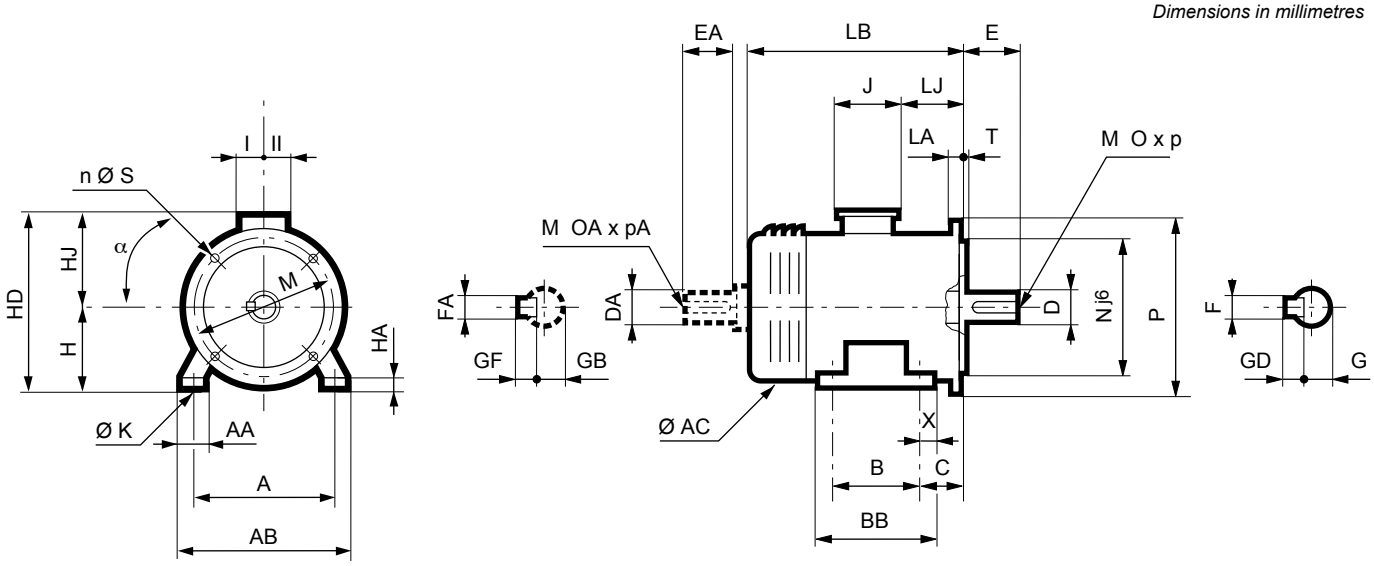


Type	Main dimensions																
	A	AB	B	BB	C	X	AA	K	HA	H	AC*	HD	LB	LJ	J	I	II
PLSES 225 MG	356	416	311	351	149	20	60	19	26	225	443	629	824	209	292	151	181
PLSES 250 MF/SF	406	466	349	397	168	24	60	24	26	250	443	654	904	209	292	151	181
PLSES 280 MD	457	517	419	467	190	24	60	24	26	280	443	684	904	209	292	151	181
PLSES 280 MG/SGJ	457	537	419	499	190	40	80	24	27	280	548	830	940	241.5	420	180	233
PLSES 280 MGU	457	537	368/419	499	190	40	80	24	27	280	548	-	1023	241	420	180	235
PLSES 280 SG	457	537	368	448	190	40	80	24	27	280	548	-	878	241	420	180	235
PLSES 315 L	508	608	508	588	216	40	100	28	26	315	548	865	1026	241.5	420	180	233
PLSES 315 LD	508	608	508	588	216	40	100	28	26	315	548	865	1085	241.5	420	180	233
PLSES 315 LU	508	608	508	588	216	40	100	28	26	315	548	865	1106	241.5	420	180	233
PLSES 315 LUS	508	608	508	588	216	40	100	28	26	315	548	-	1104	241	420	180	235
PLSES 315 M	508	608	457	537	216	40	100	28	26	315	600	865	940	241.5	420	180	233
PLSES 315 MU	508	608	457	537	216	40	100	28	26	315	600	865	1025	241.5	420	180	233
PLSES 315 MUR	508	608	457	537	216	40	100	28	26	315	600	865	1104	241.5	420	180	233
PLSES 315 SU	508	608	406	486	216	40	100	28	26	315	600	865	940	241.5	420	180	233
PLSES 315 SUR	508	608	406	486	216	40	100	28	26	315	600	865	1025	241.5	420	180	233
PLSES 315 MGU	508	608	457	588	216	40	100	27	26	315	624	880	1261	247	428	206	206
PLSES 315 LG	508	608	508	588	216	40	100	27	26	315	624	880	1261	247	428	206	206
PLSES 315 VLG	508	608	560	640	216	40	100	27	26	315	624	880	1321	248	428	206	206
PLSES 315 VLGU	508	608	560	640	216	40	100	27	26	315	624	880	1391	248	428	206	206
PLSES 355 LA/LB/LC/LD	610	710	800	880	254	45	100	28	26	355	681	1094	1710	96	700	224	396
PLSES355 MA/MB/MC	610	710	630	710	254	45	100	28	26	355	681	1094	1480	96	700	224	396
PLSES 400 LA																	
PLSES 400 LB/LD	686	806	710	800	280	45	120	35	26	400	795	1173	1755	177	700	224	396

** AC: housing diameter without lifting rings*

Dimensions
Foot and flange mounted IM 2001 (IM B35)

Dimensions in millimetres



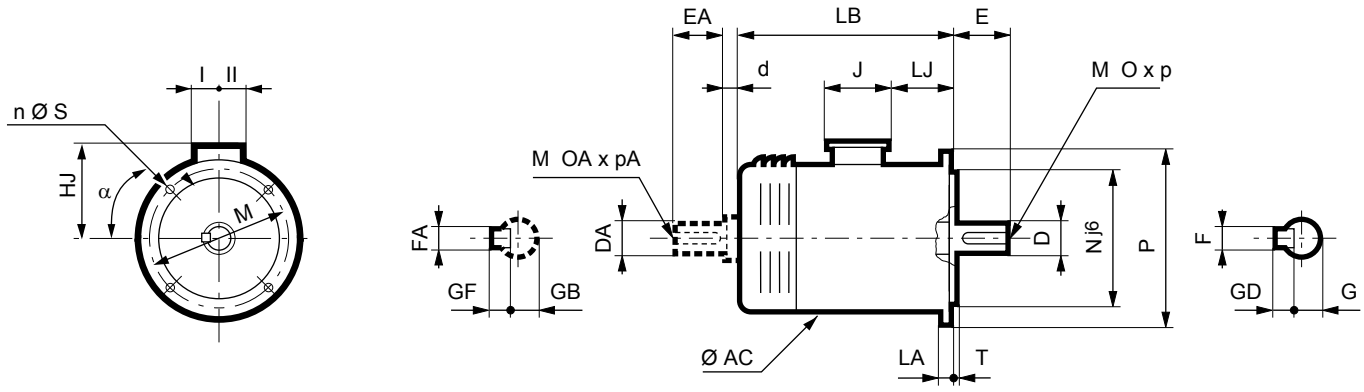
Type	Main dimensions																	
	A	AB	B	BB	C	X	AA	K	HA	H	AC*	HD	LB	LJ	J	I	II	Symb
PLSES 225 MG	356	416	311	351	149	20	60	19	26	225	443	629	824	209	292	151	181	FF500
PLSES 250 MF/SF	406	466	349	397	168	24	60	24	26	250	443	654	904	209	292	151	181	FF600
PLSES 280 MD	457	517	419	467	190	24	60	24	26	280	443	684	904	209	292	151	181	FF600
PLSES 280 MG/SGJ	457	537	419	499	190	40	80	24	27	280	548	830	940	241.5	420	180	233	FF600
PLSES 280 MGU	457	537	368/419	499	190	40	80	24	27	280	548	-	1023	241	420	180	235	FF600
PLSES 280 SG	457	537	368	448	190	40	80	24	27	280	548	-	878	241	420	180	235	FF600
PLSES 315 L	508	608	508	588	216	40	100	28	26	315	548	865	1026	241.5	420	180	233	FF740
PLSES 315 LD	508	608	508	588	216	40	100	28	26	315	548	865	1085	241.5	420	180	233	FF740
PLSES 315 LU	508	608	508	588	216	40	100	28	26	315	548	865	1106	241.5	420	180	233	FF740
PLSES 315 LUS	508	608	508	588	216	40	100	28	26	315	548	-	1104	241	420	180	235	FF740
PLSES 315 M	508	608	457	537	216	40	100	28	26	315	600	865	940	241.5	420	180	233	FF740
PLSES 315 MU	508	608	457	537	216	40	100	28	26	315	600	865	1025	241.5	420	180	233	FF740
PLSES 315 MUR	508	608	457	537	216	40	100	28	26	315	600	865	1104	241.5	420	180	233	FF740
PLSES 315 SU	508	608	406	486	216	40	100	28	26	315	600	865	940	241.5	420	180	233	FF740
PLSES 315 SUR	508	608	406	486	216	40	100	28	26	315	600	865	1025	241.5	420	180	233	FF740
PLSES 315 LG	508	608	508	588	216	40	100	27	26	315	624	880	1261	247	428	206	206	FF740
PLSES 315 MGU	508	608	457	588	216	40	100	27	26	315	624	880	1261	247	428	206	206	FF740
PLSES 315 VLG	508	608	560	640	216	40	100	27	26	315	624	880	1321	248	428	206	206	FF740
PLSES 315 VLGU	508	608	560	640	216	40	100	27	26	315	624	880	1391	248	428	206	206	FF740
PLSES 355 LA/LB/LC/LD	610	710	800	880	254	45	100	28	26	355	681	1094	1710	96	700	224	396	FF940
PLSES355 MA/MB/MC	610	710	630	710	254	45	100	28	26	355	681	1094	1480	96	700	224	396	FF940
PLSES 400 LA	686	806	710	1030	205	60	128	35	40	400	795	1174	1912	92	700	224	396	FF 940
PLSES 400 LB/LD	686	806	710	800	280	45	120	35	26	400	795	1173	1755	177	700	224	396	FF 940

Note: For frame size ≥ 250 mm used as IM B5 (IM 3001). please consult Nidec Leroy-Somer. ** AC: housing diameter without lifting rings*

IEC symbol	Flange dimensions							
	M	N	P	T	n	α°	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

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

Dimensions in millimetres



Type	Main dimensions							
	AC*	HJ	LB	LJ	J	I	II	Symb
PLSES 225 MG	443	404	824	209	292	151	181	FF500
PLSES 250 MF/SF	443	404	904	209	292	151	181	FF600
PLSES 280 MD	443	404	904	209	292	151	181	FF600
PLSES 280 MG/SGJ	548	550	964	265.5	420	180	233	FF600
PLSES 280MGU	548	550	1023	241	420	180	235	FF600
PLSES 280SG	548	550	878	241	420	180	235	FF600
PLSES 315 L	548	550	1026	241.5	420	180	233	FF740
PLSES 315 LD	600	550	1085	241.5	420	180	233	FF740
PLSES 315 LG	660	565	1261	248	428	206	206	FF740
PLSES 315 LU	548	550	1106	241.5	420	180	233	FF740
PLSES 315 LUS	548	550	1104	241	420	180	235	FF740
PLSES 315 M	600	550	940	241.5	420	180	233	FF740
PLSES 315 MGU	660	565	1261	248	428	206	206	FF740
PLSES 315 MU	600	550	1025	241.5	420	180	233	FF740
PLSES 315 MUR	600	550	1104	241.5	420	180	233	FF740
PLSES 315 SU	600	550	940	241.5	420	180	233	FF740
PLSES 315 SUR	600	550	1025	241.5	420	180	233	FF740
PLSES 315 VLG	660	565	1321	248	428	206	206	FF740
PLSES 315 VLGU	660	565	1391	248	428	206	206	FF740
PLSES 355 LA/LB/LC/LD	681	739	1710	406	700	224	396	FF940
PLSES355 MA/MB/MC	681	739	1480	406	700	224	396	FF940
PLSES 400 LA	795	773	1755	177	700	224	396	FF 940
PLSES 400 LB/LD	795	773	1755	177	700	224	396	FF 940

Note: For frame size ≥ 250 mm used as IM B5 (IM 3001). please consult Nidec Leroy-Somer. ** AC: housing diameter without lifting rings*

IEC symbol	Flange dimensions							
	M	N	P	T	n	α°	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

BEARING WITH GREASE NIPPLES

The chart opposite shows the greasing intervals, depending on the type of motor, for standard bearing assemblies of frame size ≥ 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 ≥ 160 mm have bearings with grease nipples.

Instructions for bearing maintenance are given on the nameplates on these machines.

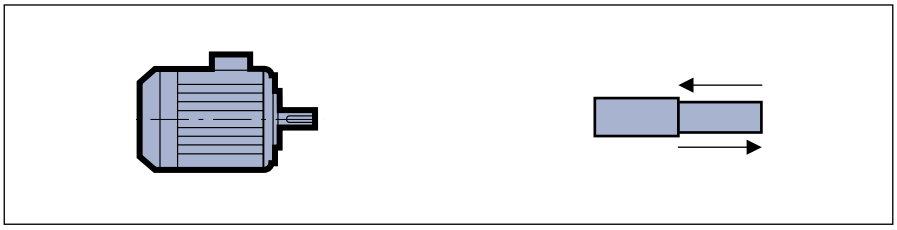
Series	Type	No. of poles	Type of bearing for bearings with grease nipples		Quantity of grease (NDE/DE)	Greasing intervals in hours								
						2P : 3000 min^{-1}			4P : 1500 min^{-1}			6P : 1000 min^{-1}		
			N.D.E.	D.E.	g	25°C	40°C	55°C	25°C	40°C	55°C	25°C	40°C	55°C
PLSES	225 MG	2 ; 4	6314 C3	6317 C3	40	8 000	4 000	2 000	19 600	9 800	4 900	-	-	-
	250 SF	2 ; 4			40									
	250 MF	2 ; 4			40									
	280 MD	2			40				-	-	-	-	-	-
	280 SGJ	4	6316 C3	6320 C3	50	-	-	-	15 800	7 900	3 950	-	-	-
	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	9 000	4 500	2 250	-	-	-	-	-	-
	315 MU	2			50									
	315 L	2			35									
	315 LU	4		6224 C3	45	-	-	-	9 000	4 500	2 250	-	-	-
	315 LD	2		6219 C3	35	8 000	4 000	2 000	-	-	-	-	-	-
	315 LG/MGU	2	6317 C3	6317 C3	35	6 500	6 500	4 095	-	-	-	-	-	-
		4	6317 C3	6322 C3	55	-	-	-	13 200	13 200	8 316	-	-	-
	315 VLG/VLGU	2	6317 C3	6317 C3	35	65 00	6 500	4 095	-	-	-	-	-	-
		4	6317 C3	6322 C3	55	-	-	-	13 200	13 200	8 316	-	-	-
	355 L	2	6317 C3	6317 C3	37 / 37	1 700	1 700	1 700	-	-	-	-	-	-
		4	6324 C3	6324 C3	72 / 72	-	-	-	8 000	8 000	8 000	-	-	-
	355 LA	2	6317 C4	6317 C4	37 / 37	6 200	6 200	6 200	-	-	-	-	-	-
	355 LA	6	6324 C3	6324 C3	72 / 72	-	-	-	-	-	-	8 000	8 000	8 000
	355 LB	2	6317 C4	6317 C4	37 / 37	6 200	6 200	6 200	-	-	-	-	-	-
	355 LB	4	6324 C3	6324 C3	72 / 72	-	-	-	2 300	2 300	2 300	-	-	-
	355 LB	6			72 / 72	-	-	-	-	-	-	8 000	8 000	8 000
	355 LC	2	6317 C4	6317 C4	37 / 37	1 700	1 700	1 700	-	-	-	-	-	-
	400 LA	2	6317 C3	6219 C3	37 / 28	4 800	4 800	4 800	-	-	-	-	-	-
	400 LB	4	6328 C3	6328 C3	93 / 93	-	-	-	2 300	2 300	2 300	-	-	-
	400 LB/ LD	6			93 / 93	-	-	-	-	-	-	6 000	6 000	6 000

STANDARD BEARING FITTING ARRANGEMENTS

PLSES series		Horizontal shaft	Vertical shaft	
			Shaft facing down	Shaft facing up
Foot mounted motors	Mounting arrangement	B3	V5	V6
	standard mounting	DE bearing locked	DE bearing locked	DE bearing locked
Flange mounted motors (or foot and flange)	Mounting arrangement	B5 / B35	V1 / V15	V3 / V36
	standard mounting	DE bearing locked	DE bearing locked	DE bearing locked

HORIZONTAL MOTOR

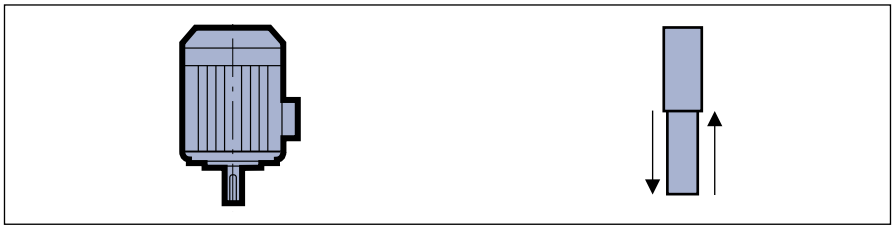
For a bearing life L_{10h} of 25,000 hours and 40,000 hours



Series	Type	No. of poles	Permissible axial load (in daN) on main shaft extension for standard bearing assembly IM B3 / B6 IM B7 / B8 IM B5 / B35 2P : 3000 min-1 →		2P : 3000 min-1 ←		4P : 1500 min-1 →		4P : 1500 min-1 ←		6P : 1000 min-1 →		6P : 1000 min-1 ←	
			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 LA	2	320	240	320	240	-	-	-	-	-	-	-	-
	400 LB	4	-	-	-	-	552	-	906	-	-	-	-	-
	400 LB/LD	6	-	-	-	-	-	-	-	-	650	-	1020	-

VERTICAL MOTOR SHAFT FACING DOWN

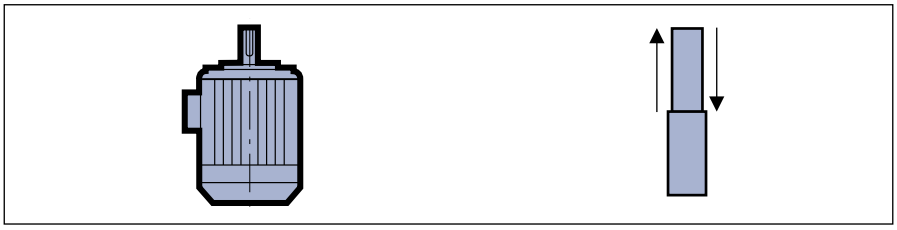
For a bearing life L_{10h} of 25,000 hours and 40,000 hours



Series	Type	No. of poles	Permissible axial load (in daN) on main shaft extension for standard bearing assembly IM V5 IM V1 / V15											
			2P : 3000 min-1				4P : 1500 min-1				6P : 1000 min-1			
			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 LA	2	NA	NA	NA	NA	-	-	-	-	-	-	-	-
	400 LB	4	-	-	-	-	568	-	1309	-	-	-	-	-
	400 LB/LD	6	-	-	-	-	-	-	-	-	650	-	1020	-

VERTICAL MOTOR SHAFT FACING UP

For a bearing life L_{10h} of 25,000 hours and 40,000 hours

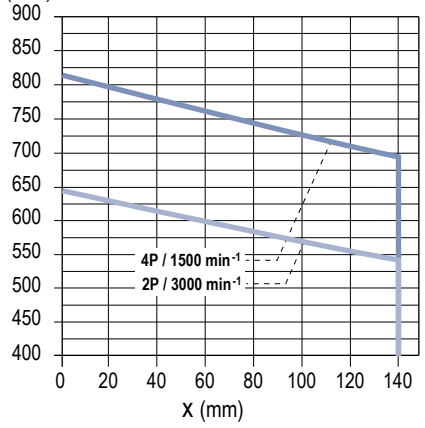


Series	Type	No. of poles	Permissible axial load (in daN) on main shaft extension for standard bearing assembly IM V6 IM V3 / V36							
			2P : 3000 min^{-1}				4P : 1500 min^{-1}			
			25 000 hours ↓	40 000 hours	25 000 hours ↑	40 000 hours	25 000 hours ↓	40 000 hours	25 000 hours ↑	40 000 hours
PLSES	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 LA	2	NA	NA	NA	NA	-	-	-	-
	400 LB	4	-	-	-	-	632	-	2570	-

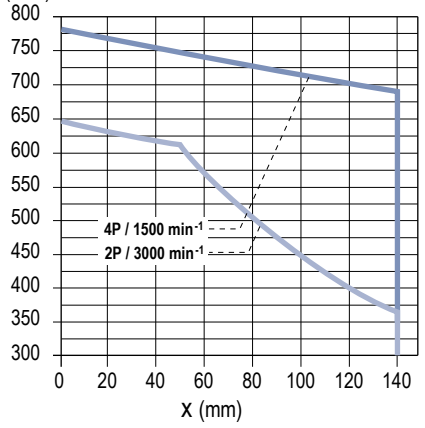
STANDARD FITTING ARRANGEMENT

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

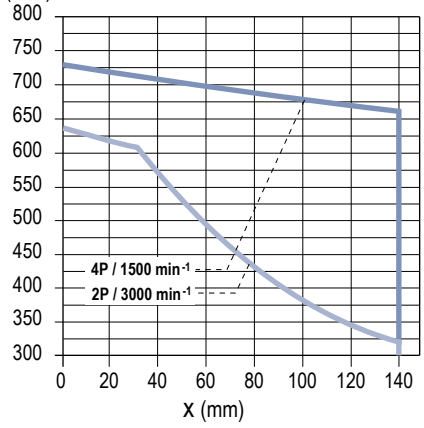
PLSES 225 MG



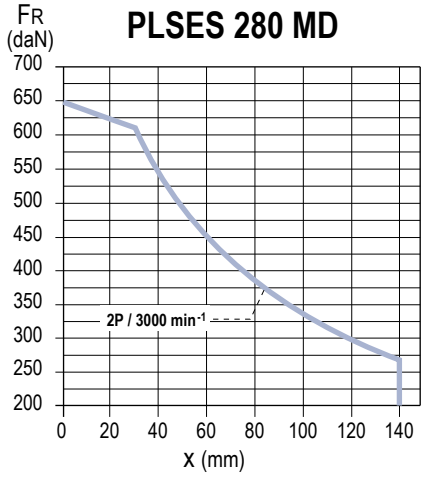
PLSES 250 SF



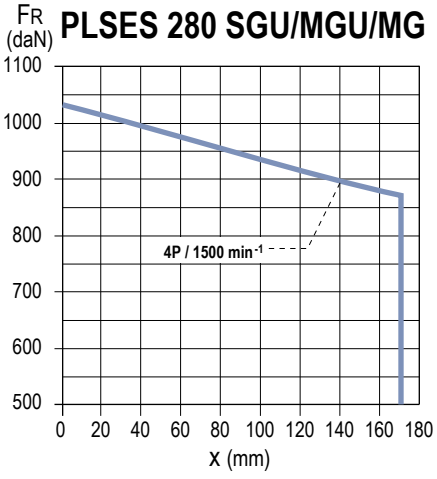
PLSES 250 MF



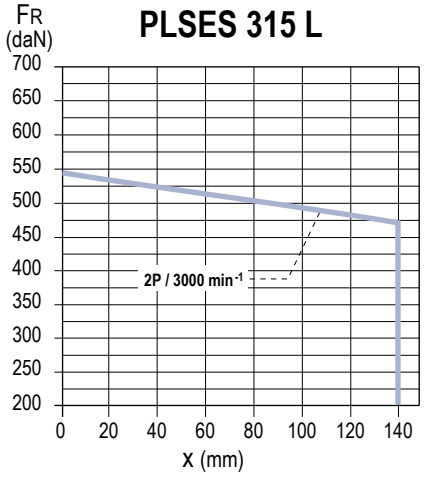
PLSES 280 MD



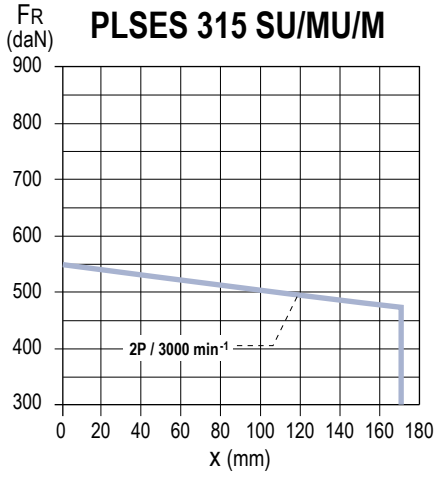
PLSES 280 SGU/MGU/MG



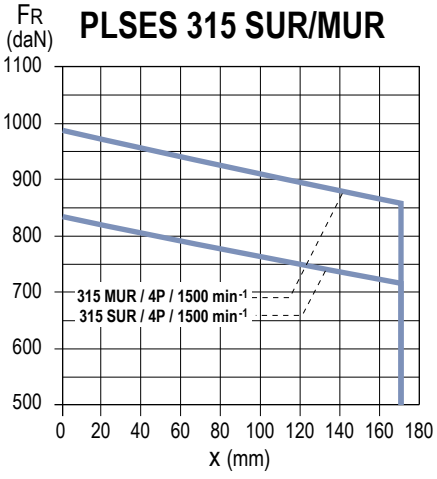
PLSES 315 L



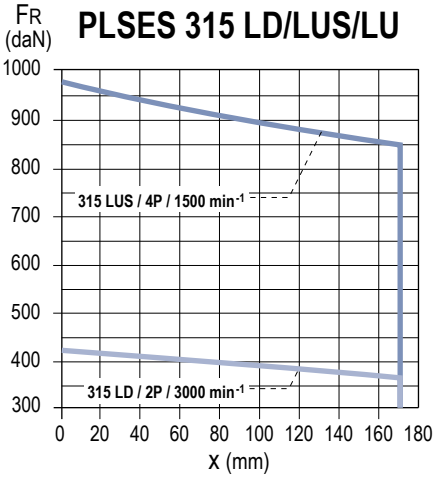
PLSES 315 SU/MU/M



PLSES 315 SUR/MUR

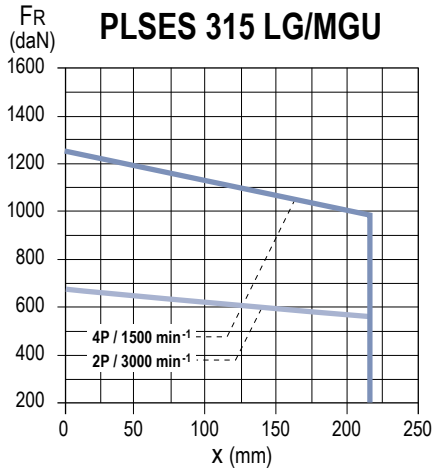


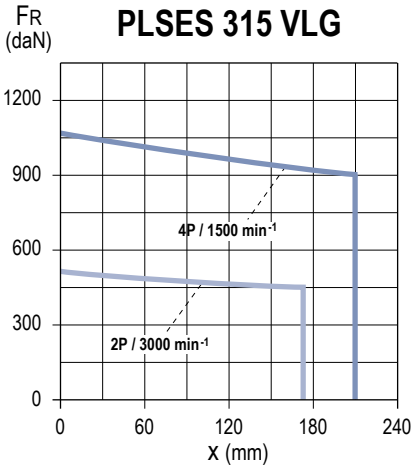
PLSES 315 LD/LUS/LU

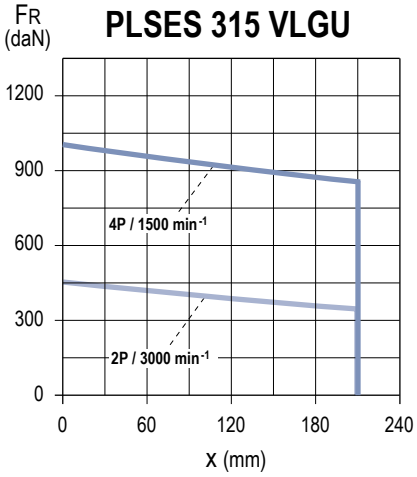


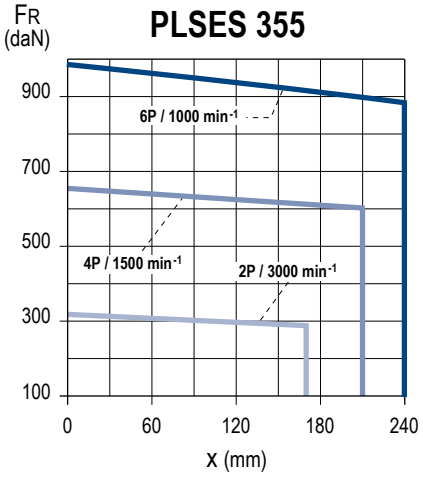
STANDARD FITTING ARRANGEMENT

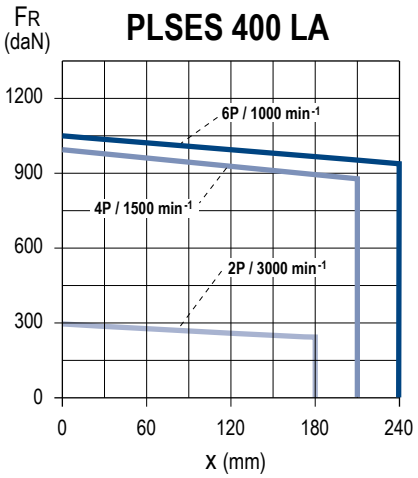
Permissible radial load on main shaft extension with a bearing life L_{10h} of 25,000 hours.
FR: Radial Force
X: Distance with respect to the shaft shoulder











SPECIAL FITTING ARRANGEMENT

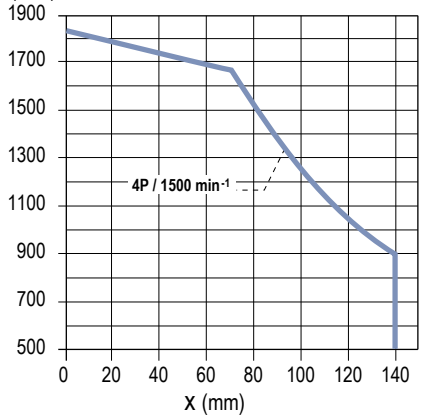
Type of drive end roller bearings

Series	Type	No. of poles	Non drive end bearing (N.D.E.)	Drive end bearing (D.E.)
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		

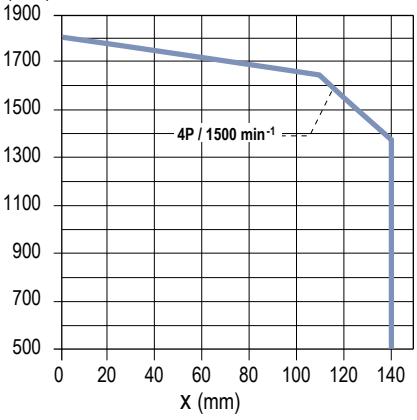
SPECIAL FITTING ARRANGEMENT

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

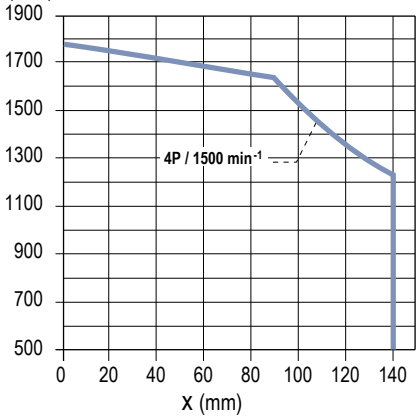
PLSES 225 MG



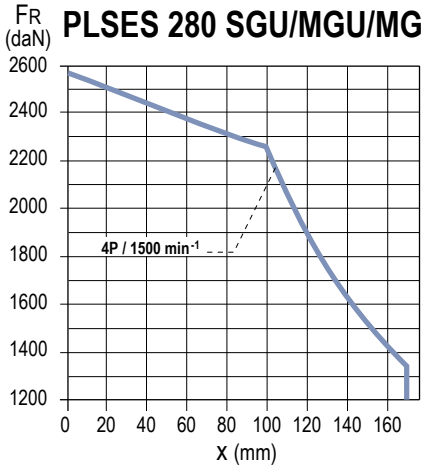
PLSES 250 SF



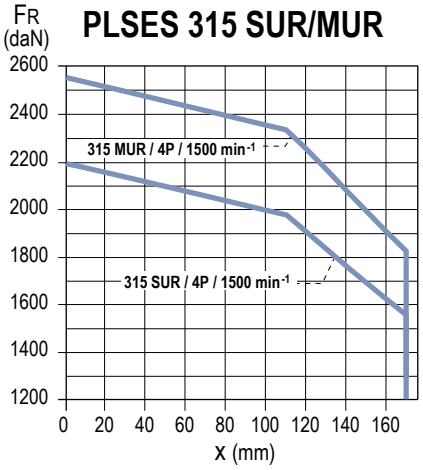
PLSES 250 MF



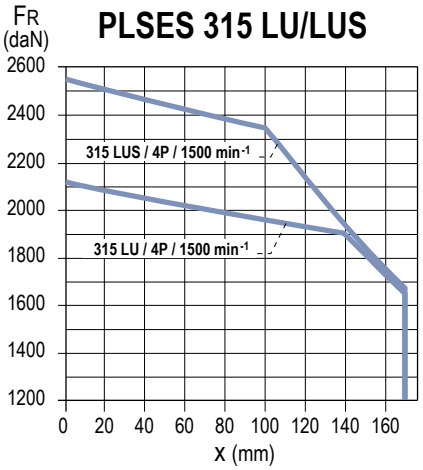
PLSES 280 SGU/MGU/MG



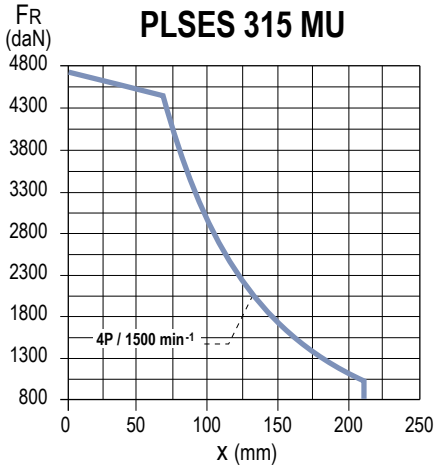
PLSES 315 SUR/MUR



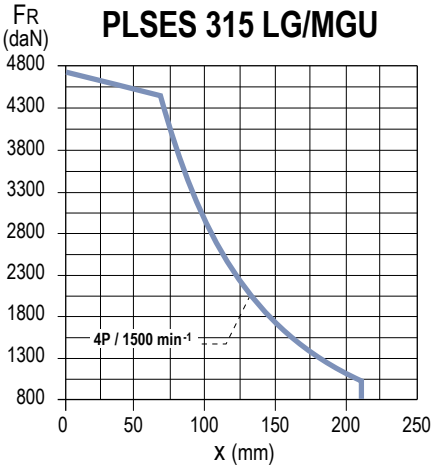
PLSES 315 LU/LUS



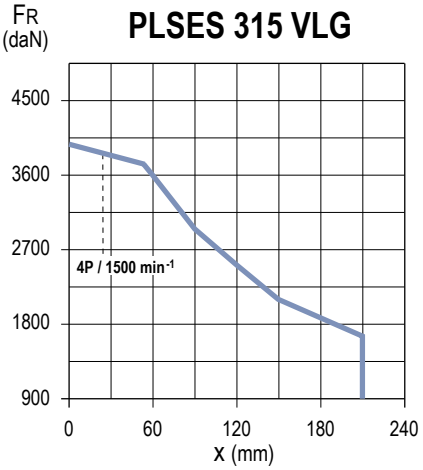
PLSES 315 MU



PLSES 315 LG/MGU

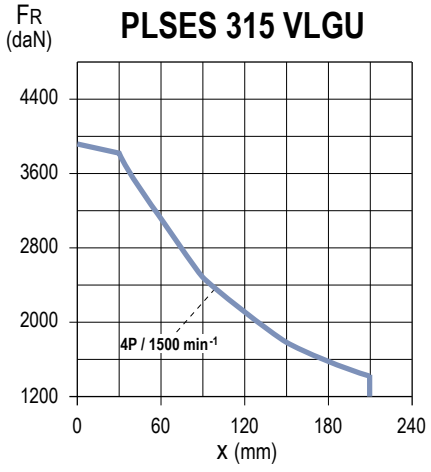


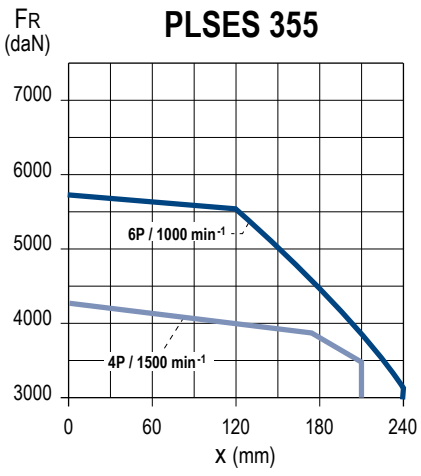
PLSES 315 VLG

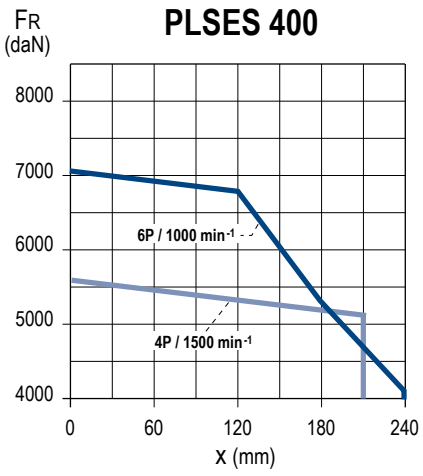


SPECIAL FITTING ARRANGEMENT

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							●	◆

● Standard ◆ Adaptable without shaft modification

Mechanical and electrical options

MOTORS WITH SPACE HEATERS

Type	Power (W)
PLSES 225 to 280MD	90
PLSES 280SG/MG to 315	100
PLSES 355 / 400	200

The space heaters use 200/240 V single phase, 50 or 60 Hz.

Installation and maintenance
Position of the lifting rings

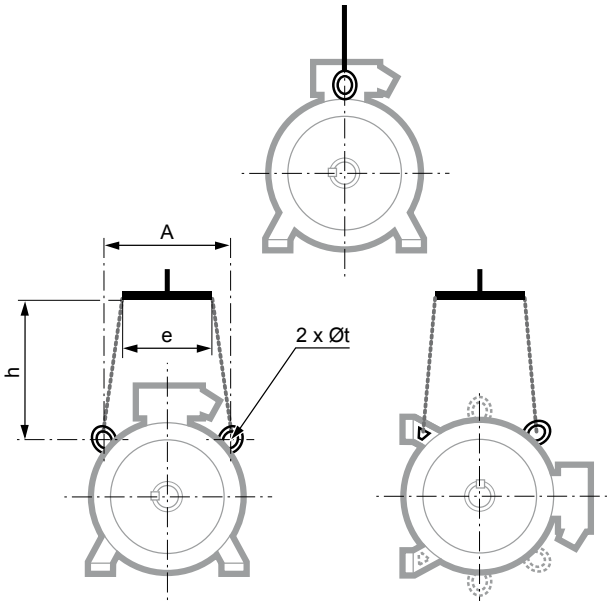
LIFTING THE MOTOR ONLY
(not coupled to the machine)

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.

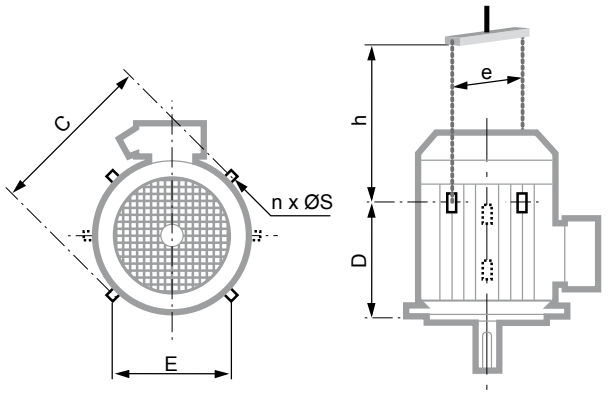
To prevent any damage to the motor during handling (for example: switching the motor from horizontal to vertical), it is essential to follow these instructions.

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

VERTICAL POSITION



View from above** Side view

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

** 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 axis of the terminal box.*

If n = 4, this angle becomes 45°.

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 L = 333

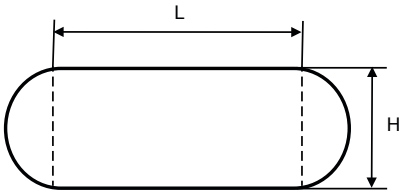


Diagram 1

IP55 cast iron motors

Motor type	Diagram	Without extension feed (standard)
FLSES 160	**3**	H = 54 L = 131
FLSES 180		
FLSES 200		
FLSES 225 SR/MR		
FLSES 225 S/M/SG	**3**	H = 80 L = 190
FLSES 250		
FLSES 280	**3**	H = 80 L = 190
FLSES 315	**1**	H = 115 L = 125
FLSES 355 L		
FLSES 355 LK	**2**	H = 170 L = 460
FLSES 400		
FLSES 450		

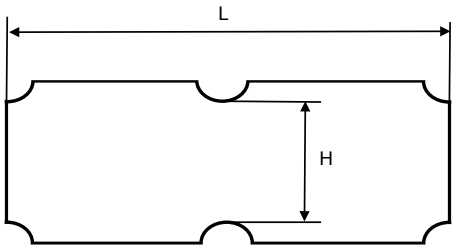


Diagram 2

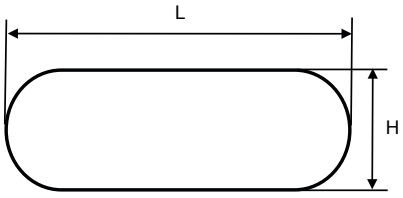


Diagram 3

IP23 drip-proof motors

Motor type	Diagram	Without extension feed (standard)
PLSES 280 MGU/SGU	**4**	H = 170 L = 333
PLSES 315 L/LD/LUS/M/MUR		
PLSES 315 MU/S/SU/SUR		
PLSES 315 LG/MGU/VLG/VLGU	**1**	H = 115 L = 125
PLSES 355		
PLSES 400	**2**	H = 170 L = 460

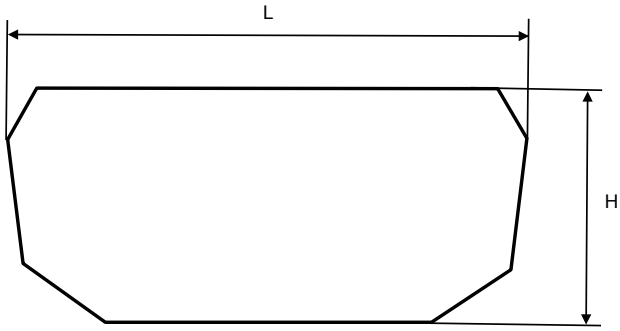


Diagram 4

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 Ω) and electrical (power absorbed Pabs) 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 Pjs and rotor Pjr), iron losses (Pf) and mechanical losses (Pm) which are relatively easy to measure. Miscellaneous losses which are more difficult to determine, called additional losses, are added to these losses.

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.

$$\eta = \frac{P_{abs} - P_{js} - P_{jr} - P_f - P_m - P_{\text{sup}}}{P_{abs}}$$

Those additional losses can be calculated in 2 ways define in the standard IEC 60034-2-1, June 2014:
1/ they can be calculated based on a fixed percentage of 0.5% of the power absorbed,
2/ they can be precisely measured.

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.

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 Période	Frequency	*f*		Hz (hertz)		
Courant électrique (intensité de)	Electric current	*I*		A (ampere)		
Potentiel électrique Tension Force électromotrice	Electric potential Voltage Electromotive force	*V* *U* *E*		V (volt)		
Déphasage	Phase angle	φ		rad	° degree	
Facteur de puissance	Power factor	cos φ				
Réactance Résistance Impédance	Reactance Resistance Impedance	*X* *R* *Z*		Ω (ohm)		*j* is defined as $j^2 = -1$ ω rotational frequency = $2\pi . f$
Inductance propre (self)	Self inductance	*L*		H (henry)		
Capacité	Capacitance	*C*		F (farad)		
Charge électrique, Quantité d'électricité	Quantity of electricity	*Q*		C (coulomb)	A.h 1 A.h = 3 600 C	
Résistivité	Resistivity	ρ		Ω.m		Ω/m
Conductance	Conductance	*G*		S (siemens)		1/ Ω = 1 S
Nombre de tours, (spires) de l'enroulement Nombre de phases Nombre de paires de poles	N° of turns (coil) N° of phases N° of pairs of poles	*N* *m* *p*				
Champ magnétique	Magnetic field	*H*		A/m		
Différence de potentiel magnétique Force magnétomotrice Solénation, courant totalisé	Magnetic potential difference Magnetomotive force	*Um* *F, Fm* *H*		A		The unit AT (ampere-turns) is incorrect because it treats "turn" as a physical unit
Induction magnétique, Densité de flux magnétique	Magnetic induction Magnetic flux density	*B*		T (tesla) = Wb/m^2		(gauss) 1 G = 10^{-4} T
Flux magnétique, Flux d'induction magnétique	Magnetic flux	Φ		Wb (weber)		(maxwell) 1 max = 10^{-8} Wb
Potentiel vecteur magnétique	Magnetic vector potential	*A*		Wb/m		
Perméabilité d'un milieu Perméabilité du vide	Permeability Permeability of vacuum	$\mu = \mu_o \mu_r$ μ_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 $T = t + 273{,}15$	°C: Degree Celsius t_C : Temp. in °C t_F : Temp. in °F f temperature Fahrenheit °F
Écart de température	Temperature rise	ΔT		K	°C	1 °C = 1 K
Densité de flux thermique	Heat flux density	q, φ		W/m²		
Conductivité thermique	Thermal conductivity	λ		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	$L_W = 10 \lg(P/P_O)$ $(P_O = 10^{-12}\ W)$	dB (decibel)		lg logarithm to base 10 lg10 = 1
Niveau de pression acoustique	Sound pressure level	L_P	$L_P = 20 \lg(P/P_O)$ $(P_O = 2x10^{-5}\ Pa)$	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)	α, β, T, φ		rad	degree: ° minute: ' second: "	180° = π rad = 3.14 rad
Longueur Largeur Hauteur Rayon Longueur curviligne	Length Breadth Height Radius	l b h r s		m (metre)	micrometre	cm, dm, dam, hm 1 inch = 1" = 25.4 mm 1 foot = 1" = 304.8 mm µm micron µ angström: A = 0.10 nm
Aire, superficie	Area	A, S		m²		1 square inch = 6.45 10^{-4} m²
Volume	Volume	V		m³	litre: l liter: L	UK gallon = 4.546 10^{-3} m³ US gallon = 3.785 10^{-3} m³

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 Period (periodic time)	Temps Intervalle de temps, durée Période (durée d'un cycle)	t T		s (second)	minute: min hour: h day: d	Symbols ' and " are reserved for angles minute not written as mn
Angular velocity Circular frequency	Vitesse angulaire Pulsation	ω	$\omega = \frac{d\varphi}{dt}$	rad/s		
Angular acceleration	Accélération angulaire	α	$\alpha = \frac{d\omega}{dt}$	rad/s^2		
Speed Velocity	Vitesse Célérité	$u, v, w,$ c	$v = \frac{ds}{dt}$	m/s	1 km/h = 0.277 778 m/s 1 m/min = 0.016 6 m/s	
Acceleration Acceleration of free fall	Accélération Accélération de la pesanteur	a $g = 9.81 m/s^2$	$a = \frac{dv}{dt}$ *in Paris*	m/s^2		
Revolution per minute	Vitesse de rotation	N		s^{-1}	min^{-1}	tr/mn, RPM, TM...
Mass	Masse	m		kg (kilogramme)	tonne: t 1 t = 1 000 kg	kilo, kgs, KG... 1 pound: 1 lb = 0.453 6 kg
Mass density	Masse volumique	ρ	$\frac{dm}{dV}$	kg/m^3		
Linear density	Masse linéique	ρ_e	$\frac{dm}{dL}$	kg/m		
Surface mass	Masse surfacique	ρ_A	$\frac{dm}{dS}$	kg/m^2		
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^2		$J = \frac{MD^2}{4}$ kg.m^2 pound per square feet = 1 lb.ft^2 = 42.1 x 10^{-3} kg.m^2
Force Weight	Force Poids	F G	$G = m.g$	N (newton)		kgf = kgp = 9.81 N pound force = lbF = 4.448 N
Moment of force, Torque	Moment d'une force	M T	$M = F.r$	N.m		mdaN, mkg, m.N 1 mkg = 9.81 N.m 1 ft.lbF = 1.356 N.m 1 in.lbF = 0.113 N.m
Pressure	Pression	p	$p = \frac{F}{S} = \frac{F}{A}$	Pa (pascal)	bar 1 bar = 10^5 Pa	1 kgf/cm^2 = 0.981 bar 1 psi = 6 894 N/m^2 = 6 894 Pa 1 psi = 0.068 94 bar 1 atm = 1.013 x 10^5 Pa
Normal stress Shear stress	Contrainte normale Contrainte tangentielle, Cission	σ τ		Pa we use MPa = 10^6 Pa		kg/mm^2, 1 daN/mm^2 = 10 MPa psi = pound per square inch 1 psi = 6 894 Pa
Friction coefficient	Facteur de frottement	μ				incorrectly = coefficient friction f
Work Energy Potential energy Kinetic energy Quantity of heat	Travail Énergie Énergie potentielle Énergie cinétique Quantité de chaleur	W E Ep Ek Q	$W = F.l$	J (joule)	Wh = 3 600 J (watthour)	1 N.m = 1 W.s = 1 J 1 kgm = 9.81 J (calorie) 1 cal = 4.18 J 1 kgm = 1.055 J (British thermal unit)
Power	Puissance	P	$P = \frac{W}{t}$	W (watt)		1 ch = 736 W 1 HP = 746 W
Volumetric flow	Débit volumique	q_v	$q_v = \frac{dV}{dt}$	m^3/s		
Efficiency	Rendement	η		< 1		%
Dynamic viscosity	Viscosité dynamique	η, μ		Pa.s		poise, 1 P = 0.1 Pa.s
Kinematic viscosity	Viscosité cinématique	ν	$\nu = \frac{\eta}{\rho}$	m^2/s		stokes, 1 St = 10^{-4} m^2/s

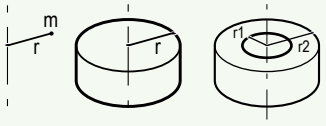
Unit conversions

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.m² = 23.73 lb.ft²	1 lb.ft² = 0.042 14 kg.m²
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 / m² = 6.452 10⁴ line / in²	1 line / in² = 1.550 10⁻⁵ Wb / m²
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^{18} or 1 000 000 000 000 000 000	exa	E
10^{15} or 1 000 000 000 000 000	peta	P
10^{12} or 1 000 000 000 000	tera	T
10^{9} or 1 000 000 000	giga	G
10^{6} or 1 000 000	mega	M
10^{3} or 1 000	kilo	k
10^{2} or 100	hecto	h
10^{1} or 10	deca	da
10^{-1} or 0.1	deci	d
10^{-2} or 0.01	centi	c
10^{-3} or 0.001	milli	m
10^{-6} or 0.000 001	micro	µ
10^{-9} or 0.000 000,001	nano	n
10^{-12} or 0.000 000,000,001	pico	p
10^{-15} or 0.000 000,000,000,001	femto	f
10^{-18} or 0.000 000,000,000,000,001	atto	a

Standard formulae used in electrical engineering

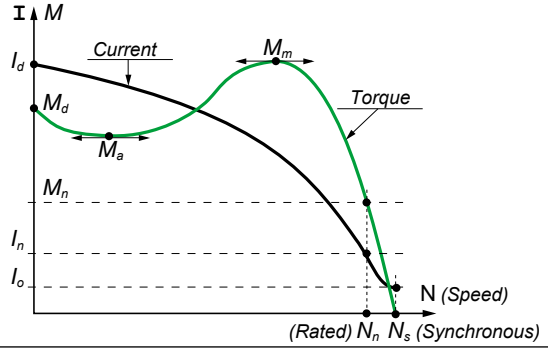
MECHANICAL FORMULAE

Title	Formula	Unit	Definitions / Notes
Force	$F = m \cdot \gamma$	F in N m in kg γ in m/s^2	A force F is the product of a mass m by an acceleration γ
Weight	$G = m \cdot g$	G in N m in kg g = 9.81 m/s^2	
Torque	$M = F \cdot r$	M in N.m F in N 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	$P = M \cdot \omega$	P in W M in N.m ω in rad/s	Power P is the quantity of work yielded per unit of time $\omega = 2\pi N/60$ where N is the speed of rotation in min^{-1}
- linear	$P = F \cdot V$	P in W F in N V in m/s	V = linear velocity
Acceleration time	$t = J \cdot \frac{\omega}{M_a}$	t in s J in kg.m^2 ω in rad/s M_a in Nm	J is the moment of inertia of the system M_a is the moment of acceleration Note: All the calculations refer to a single rotational speed ω. where the inertias at speed ω' are corrected to speed ω by the following calculation: $J_\omega = J_{\omega'} \cdot \left(\frac{\omega'}{\omega}\right)^2$
Moment of inertia Centre of gravity	$J = m \cdot r^2$	J in kg.m^2 m in kg r in m	
Solid cylinder around its axis	$J = m \cdot \frac{r^2}{2}$		
Hollow cylinder around its axis	$J = m \cdot \frac{r_1^2 + r_2^2}{2}$		
Inertia of a mass in linear motion	$J = m \cdot \left(\frac{v}{\omega}\right)^2$	J in kg.m^2 m in kg v in m/s ω 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	$M_a = \frac{M_d + 2M_a + 2M_m + M_n}{6} - M_r$ *General formula:* $M_a = \frac{1}{N_n}\int_0^{N_n}(M_{mot} - M_r)\,dN$	*Nm*	Moment of acceleration M_a is the difference between the motor torque M_{mot} (estimated), and the resistive torque M_r (M_d, M_a, M_m, M_n, see curve below) N = instantaneous speed N_n = rated speed
Power required by the machine	$P = \frac{M \,.\, \omega}{\eta_a}$	*P* in W *M* in N.m ω in rad/s η_A without unit	η_a expresses the efficiency of the driven machine. *M* is the torque required by the driven machine.
Power drawn by the 3-phase motor	$P = \sqrt{3} \,.\, U \,.\, I \,.\, \cos\varphi$	*P* in W *U* in V *I* in A	φ phase angle by which the current lags or leads the voltage. *U* armature voltage. *I* line current.
Reactive power drawn by the motor	$Q = \sqrt{3} \,.\, U \,.\, I \,.\, \sin\varphi$	Q in VAR	
Reactive power supplied by a bank of capacitors	$Q = \sqrt{3} \,.\, U^2 \,.\, C \,.\, \omega$	*U* in V *C* in μ F ω in rad/s	*U* = voltage at the capacitor terminals *C* = capacitor capacitance ω = rotational frequency of supply phases (ω = 2πf)
Apparent power	$S = \sqrt{3} \,.\, U \,.\, I$ $S = \sqrt{P^2 + Q^2}$	S in VA	
Power supplied by the 3-phase motor	$P = \sqrt{3} \,.\, U \,.\, I \,.\, \cos\varphi \,.\, \eta$		η 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	$N_S = \frac{120 \,.\, f}{p}$	N_S in min^{-1} *f* in Hz	*p* = number of poles *f* = frequency of the power supply

Parameters	Symbol	Unit	Torque and current curve as a function of speed
Starting current **Rated current** **No-load current**	I_d I_n I_o	A	
Starting torque* **Run up torque** **Breakdown torque** **Rated torque**	M_d M_a M_m M_n	Nm	
Rated speed **Synchronous speed**	N_n N_s	min^{-1}	

* *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.

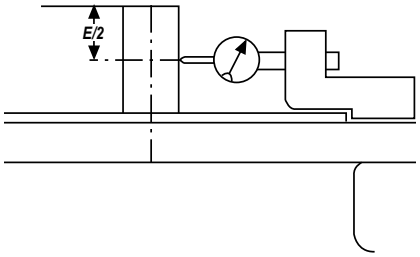
Parameters		Tolerances
Efficiency	machines P ≤ 150 kW	**– 15 % of (1 – η)**
	machines P > 150 kW	**– 10 % of (1 – η)**
Cos φ		**– 1/6 (1 – cos φ)** **(min 0.02 - max 0.07)**
Slip	machines P < 1 kW	**±30 %**
	machines P ≥ 1 kW	**±20 %**
Locked rotor torque		**– 15 %, + 25 % of rated torque**
Starting current		**+ 20 %**
Run-up torque		**– 15 % of rated torque**
Maximum torque		**– 10 % of rated torque** **> 1.5 M_N**
Moment of inertia		**±10 %**
Noise		**+ 3 dB (A)**
Vibration		**+ 10 % of the guaranteed class**

Note: IEC 60034-1 - does not specify tolerances for current
- the tolerance is ± 10% in NEMA-MG1

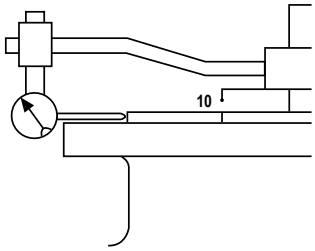
TOLERANCES AND ADJUSTMENTS

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.

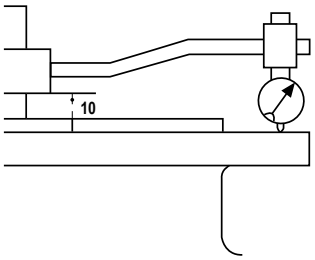
Characteristics	Tolerances
frame size H ≤ 250	**0, — 0.5 mm**
≥ 280	**0, — 1 mm**
Diameter ∅ of the shaft extension:	
- 11 to 28 mm	**j6**
- 32 to 48 mm	**k6**
- 55 mm and over	**m6**
Diameter N of flange spigots	**j6 up to FF 500, js6 for FF 600 and more**
Key width	**h9**
Width of drive shaft keyway (normal keying)	**N9**
Key depth:	
- square section	**h9**
- rectangular section	**h11**
① ***Eccentricity of shaft in flanged motors*** (standard class)	
- diameter > 10 up to 18 mm	**0.035 mm**
- diameter > 18 up to 30 mm	**0.040 mm**
- diameter > 30 up to 50 mm	**0.050 mm**
- diameter > 50 up to 80 mm	**0.060 mm**
- diameter > 80 up to 120 mm	**0.070 mm**
② ***Concentricity of spigot diameter*** and ③ ***perpendicularity of mating surface of flange in relation to shaft*** (standard class)	
Flange (FF) or Faceplate (FT):	
- F 55 to F 115	**0.08 mm**
- F 130 to F 265	**0.10 mm**
- F 300 to F 500	**0.125 mm**
- F 600 to F 740	**0.16 mm**
- F 940 to F 1080	**0.20 mm**



① ***Eccentricity of shaft in flanged motors***

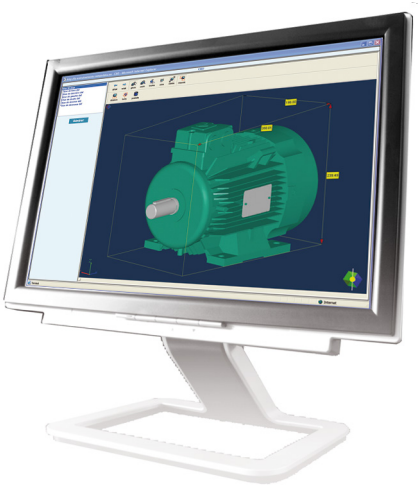


② ***Concentricity of spigot diameter***



③ ***Perpendicularity of mating surface of flange in relation to shaft***

Configurator

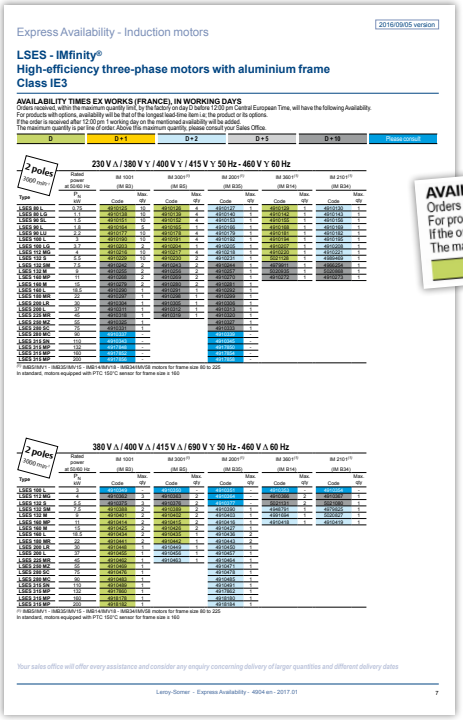


The Nidec Leroy-Somer configurator can be used to choose the most suitable motor and provides the technical specifications and corresponding drawings.

Register online at:
http://configurateurls.leroy-somer.com

- Help with product selection
- Print-outs of technical specifications
- Print-outs of 2D and 3D CAD files
- The equivalent of 300 catalogues in 15 languages

Product availability


Express Availability - Induction motors

2016/09/05 version

LSES - IMfinity®
High-efficiency three-phase motors with aluminium frame
Class IE3

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

230 V Δ / 380 V Y / 400 V Y / 415 V Y 50 Hz - 460 V Y 60 Hz

2 Poles 3000 min⁻¹

Type	Rated power at 50/60 Hz	IM 1001 (IM B3)		IM 3001 (1) (IM B5)		IM 2001 (1) (IM B35)		IM 3601 (1) (IM B14)		IM 2101 (1) (IM B34)	
	P_N kW	Code	Max. qty	Code	Max. qty	Code	Max. qty	Code	Max. qty	Code	Max. qty
LSES 80 L	0.75	4910125	10	4910126	4	4910127	1	4910128	1	4910129	1
LSES 90 LP	1.1	4910138	10	4910139	4	4910140	1	4910141	1	4910142	1
LSES 90 SL	1.5	4910151	10	4910152	4	4910153	1	4910154	1	4910155	1
LSES 90 L	1.8	4910164	6	4910165	4	4910166	1	4910167	1	4910168	1
LSES 90 LU	2.2	4910177	10	4910178	4	4910179	1	4910180	1	4910181	1
LSES 100 LP	3	4910190	10	4910191	4	4910192	1	4910193	1	4910194	1
LSES 100 LG	3.7	4910203	6	4910204	1	4910205	1	4910206	1	4910207	1
LSES 112 MP	4.4	4910216	6	4910217	2	4910218	1	4910219	1	4910220	1
LSES 132 SP	5.5	4910229	6	4910230	2	4910231	1	4910232	1	4910233	1
LSES 132 SM	7.5	4910242	2	4910243	2	4910244	1	4910245	1	4910246	1
LSES 132 M	9	4910255	2	4910256	2	4910257	1	4910258	1	4910259	1
LSES 160 MP	11	4910268	2	4910269	2	4910270	1	4910271	1	4910272	1
LSES 160 M	15	4910281	2	4910282	2	4910283	1	4910284	1		
LSES 160 L	18.5	4910294	1	4910295	1	4910296	1	4910297	1		
LSES 180 MP	22	4910307	1	4910308	1	4910309	1	4910310	1		
LSES 200 LR	30	4910320	1	4910321	1	4910322	1	4910323	1		
LSES 200 LG	37	4910333	1	4910334	1	4910335	1	4910336	1		
LSES 225 SMP	45	4910346	1	4910347	1	4910348	1	4910349	1		
LSES 225 MC	55	4910359	1	4910360	1	4910361	1	4910362	1		
LSES 250 MC	75	4910372	1	4910373	1	4910374	1	4910375	1		
LSES 280 MC	90	4910385	1	4910386	1	4910387	1	4910388	1		
LSES 315 SP	110	4910398	1	4910399	1	4910400	1	4910401	1		
LSES 315 MP	132	4910411	1	4910412	1	4910413	1	4910414	1		
LSES 315 MP	160	4910424	1	4910425	2	4910426	1	4910427	1		
LSES 315 MP	200	4910437	1	4910438	2	4910439	2	4910440	2		

(1) IM3001/M/V1 - IM3531/M/V15 - IM3614/M/V18 - IM3634/M/V58 motors for frame size 80 to 225
In standard, motors equipped with PTC 150°C sensor for frame size ≥ 160

380 V Δ / 400 V Δ / 415 V Δ / 690 V Y 50 Hz - 460 V Δ 60 Hz

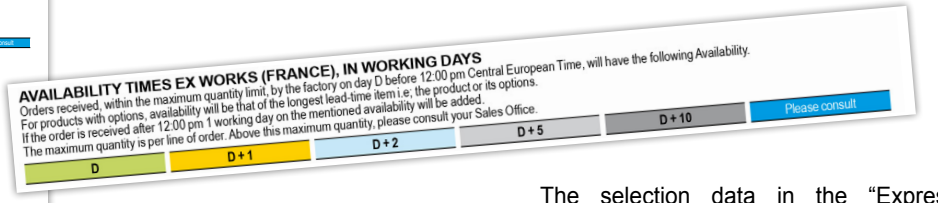
2 Poles 3000 min⁻¹

Type	Rated power at 50/60 Hz	IM 1001 (IM B3)		IM 3001 (1) (IM B5)		IM 2001 (1) (IM B35)		IM 3601 (1) (IM B14)		IM 2101 (1) (IM B34)	
	kW	Code	Max. qty	Code	Max. qty	Code	Max. qty	Code	Max. qty	Code	Max. qty
LSES 160 L	22	4910450	1	4910451	1	4910452	1	4910453	1	4910454	1
LSES 180 MP	30	4910463	1	4910464	1	4910465	1	4910466	1	4910467	1
LSES 180 MR	37	4910476	1	4910477	1	4910478	1	4910479	1	4910480	1
LSES 180 M	45	4910489	1	4910490	1	4910491	1	4910492	1	4910493	1
LSES 180 MP	55	4910502	1	4910503	1	4910504	1	4910505	1	4910506	1
LSES 200 L	75	4910515	1	4910516	1	4910517	1	4910518	1	4910519	1
LSES 225 MP	90	4910528	1	4910529	1	4910530	1	4910531	1	4910532	1
LSES 225 MR	110	4910541	1	4910542	1	4910543	1	4910544	1	4910545	1
LSES 250 MC	132	4910554	1	4910555	1	4910556	1	4910557	1	4910558	1
LSES 280 MC	160	4910567	1	4910568	1	4910569	1	4910570	1	4910571	1
LSES 315 SN	200	4910580	1	4910581	1	4910582	1	4910583	1	4910584	1

(1) IM3001/M/V1 - IM3531/M/V15 - IM3614/M/V18 - IM3634/M/V58 motors for frame size 80 to 225
In standard, motors equipped with PTC 150°C sensor for frame size ≥ 160

Your sales office will offer every assistance and consider any enquiry concerning delivery of larger quantities and different delivery dates

Leroy-Somer - Express Availability - 4904 en - 2017.01 7



Being able both to respond to urgent requests and adhere to promised customer lead times calls for a powerful logistics system.

The availability of motors is ensured by the network of approved partners and Nidec Leroy-Somer central services all working together.

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 Nidec Leroy-Somer.

Declaration of EC conformance

Nidec	PS6 : DOCUMENT MANAGEMENT				Classement/*File*: S4T007
	EU & UK DECLARATION OF CONFORMITY AND INCORPORATION				Révision: L Date: 2023/05/02 — Page : 2 / 2
TECHNICAL MANAGEMENT	*Doc type : S6T002 Rev D du/from 16/03/2017*	M☐	R☐	I☒	Cancels and replaces: S4T007 Révision K from 2022/10/21
		CIMD-E			

We, **MOTEURS LEROY SOMER,** boulevard Marcellin Leroy CS10015, 16915 ANGOULEME cedex 9, France, and we,

Constructions Electriques de Beaucourt (CEB) 14, Rue de Dampierre, 90500 BEAUCOURT, France (company of **Nidec Leroy-Somer Holding SA** , boulevard Marcellin Leroy, CS 10015, 16915 ANGOULEME cedex 9, France**).**

declare, under our own responsibility that the following products:

Moteurs Asynchrones des gammes : LS, FLS, PLS, LSES, FLSES, PLSES, LSP, LSPR, CILS.

comply with:

- European Directives & United Kingdom Statutory Instrument regulations:
  - Low Voltage Directive : **2014/35/EU & S.I. 2016:1101 ;**
  - ROHS 2 and 3 Directives : **2011/65/EU, 2015/863/EU & S.I. 2016:3032 ;**
  - Eco-design Erp Directive : **2009/125/EC and regulations (UE) 2019/1781 & S.I. 2010 :2617;**

- European standard : **EN 60034-1:2010, EN IEC 60034-7:2022, EN 60034-9:2005/A1:2007, EN IEC 60034-14 :2018 ; EN IEC 63000 :2018 ; EN 62262 :2002/A1 :2021.**

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(all parts) "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 & Regulations.

Installation of these materials shall be done by a professional who is responsible to comply with the regulations, decrees, laws, orders, directives, application circulars, standards, rules or any other document relating to the installation site. He will be also responsible for the respect of values stamped on motor rating plate(s), instruction manual, installation instructions, maintenance manuals and/or any other document supplied by the manufacturer. MOTEURS LEROY-SOMER and CEB accepts no liability in the event of failure to comply with these rules and regulations.

Signature of technical manager:
A. MARINO

Notes

Notes

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All for dreams

Moteurs Leroy-Somer SAS. Headquarters: Bd Marcellin Leroy, CS 10015, 16915 Angoulême Cedex 9, France. Share Capital: 32 239 235 €, RCS Angoulême 338 567 258.

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