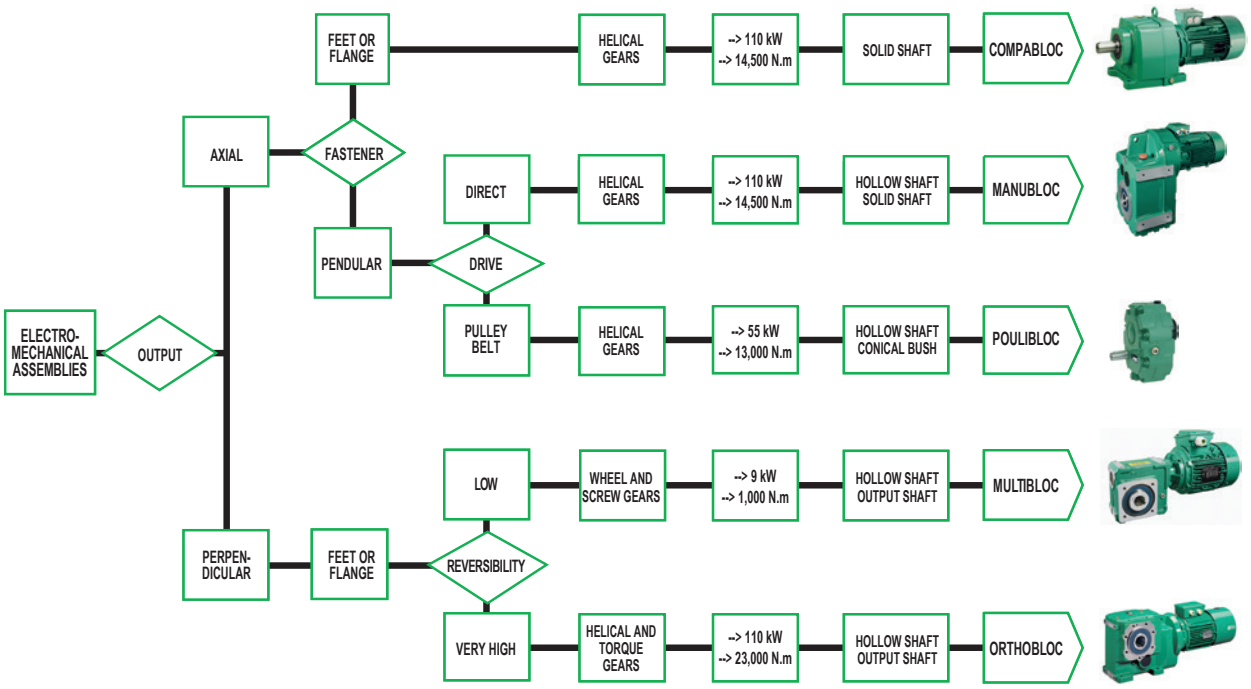
Electromechanical Manual

Offer, Ranges, Determinations
Variable speed and fixed speed
Efficiencies: Non IE, IE2, IE3
0.06 to 110 kW

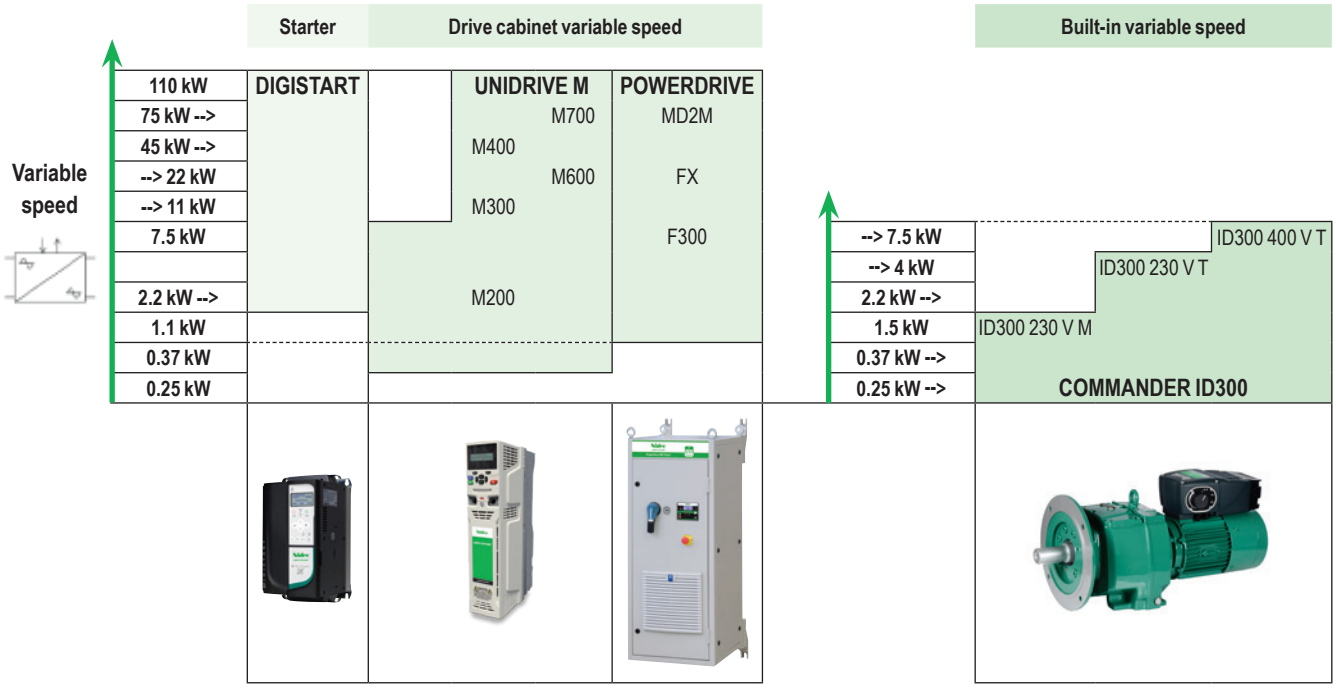
LEROY-SOMER™

Nidec
All for dreams

Offer

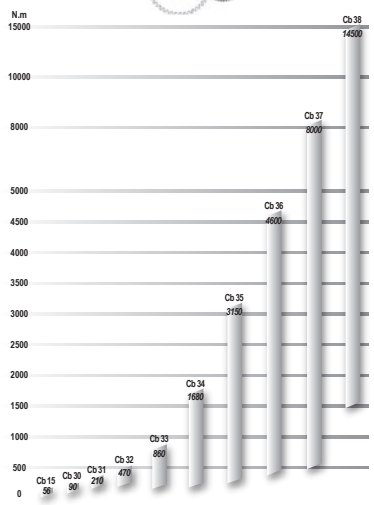


Ranges of associated drives

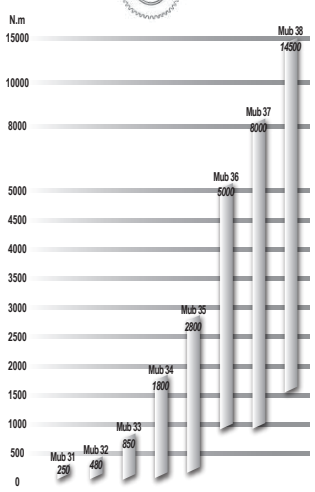


Ranges of axial output gearbox

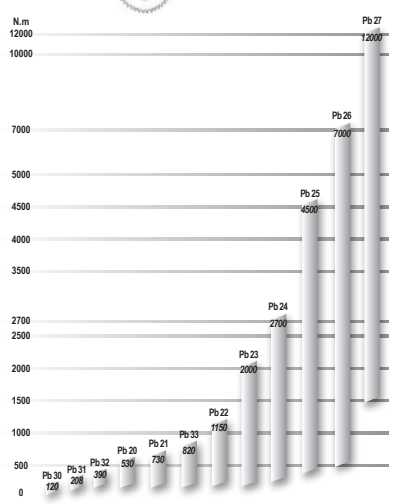
Compabloc



Manubloc

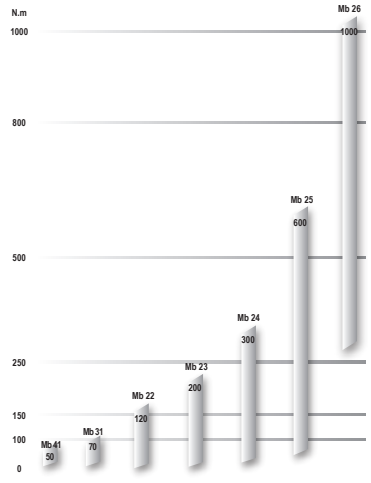


Poulibloc

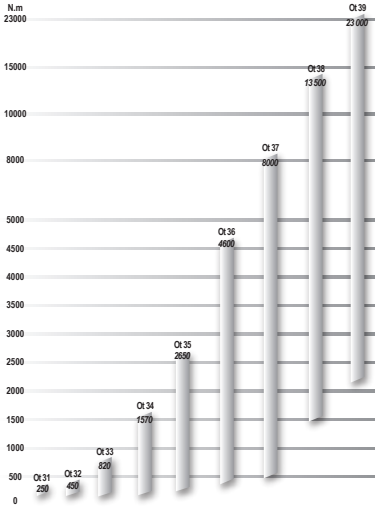


Ranges of perpendicular output gearbox

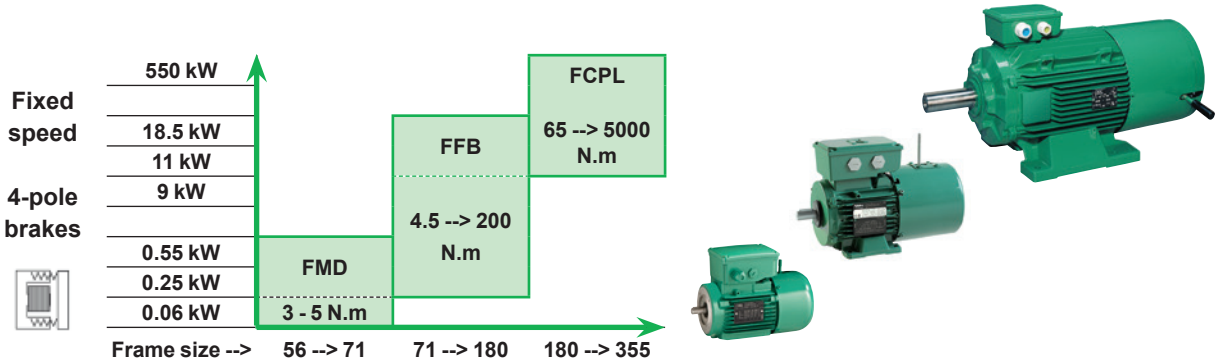
Multibloc



Orthobloc



Ranges of brakes



Contents

Index

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 "Environmental Profile".

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.

ISO 9001 : 2015

CERTIFICATION DE SYSTEME ENVIRONNEMENTAL ISO 14001 : 2015 DNV

CE

DNV DET NORSKE VERITAS

efectis

LCIE

UL

EAC

INERIS

BUREAU VERITAS 1828

BUREAU VERITAS

Directives 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) EC/640/2009 + AMENDMENT EU/4/2014

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 0.75 to 375 kW with 2, 4 and 6 poles.
Obligation to place High efficiency or Premium efficiency motors on the market:

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

** or IE2 motor + drive*

Motors not concerned:

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

Standards and approvals

LIST OF STANDARDS QUOTED IN THE TECHNICAL CATALOGUES

The motors and geared motors comply with the standards listed in this catalogue

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 output powers for electrical rotating machines: between 56 and 400 frame size and flanges of 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.
ISO 6743-6		Industrial lubricants, oils (for industrial gears)
ISO R773		Keying by square or rectangular parallel key (mm)
ISO R775		Cylindrical shaft extensions

Standards and approvals

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.
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 UR 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.

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

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: Ingress of solid objects			2nd digit: Ingress of liquids			3rd digit: Protection against mechanical impacts		
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 over 50mm (e.g. unintentional hand contact)	1		Protected against vertically falling drops of water (condensation)	01	150 g, 10 cm	Impact energy: 0.15 J
2	Ø 12 mm	Protected against solid objects over 12mm (e.g. finger)	2	15°	Protected against falling drops of water, if the case is disposed up to 15° from vertical	02	200 g, 10 cm	Impact energy: 0.20 J
3	Ø 2.5 mm	Protected against solid objects over 2.5mm (e.g. tools, wire)	3	60°	Protected against sprays of water from any direction, even if the case is disposed up to 60° from vertical	03	250 g, 15 cm	Impact energy: 0.37 J
4	Ø 1 mm	Protected against solid objects over 1.0mm (e.g. fine tools, small wires)	4		Protected against splash water from any direction	04	250 g, 20 cm	Impact energy: 0.50 J
5		Protection against dust ingress (no harmful deposit)	5		Protected against low pressure water jets from any direction	05	350 g, 20 cm	Impact energy: 0.70 J
6		Totally protected against dust ingress	6		Protected against high pressure water jets from any direction	06	250 g, 40 cm	Impact energy: 1 J
			7	0,15m, 1m	Protected against short periods of immersion in water	07	0,5 kg, 40 cm	Impact energy: 2 J
			8 . . m	..m	Protected against long, durable periods of immersion in water	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 IP55 machine

IP : Degree 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 projections of water in all directions from a nozzle with a flow of 12.5 l/min under 0.3 bar at a distance of 3 m from the machine.
The test will last for 3 minutes.
Test result: no damage from water projected onto the machine.

Environmental limitations

NORMAL OPERATING CONDITIONS

According to IEC 60034-1, geared motors can run in the following normal conditions:

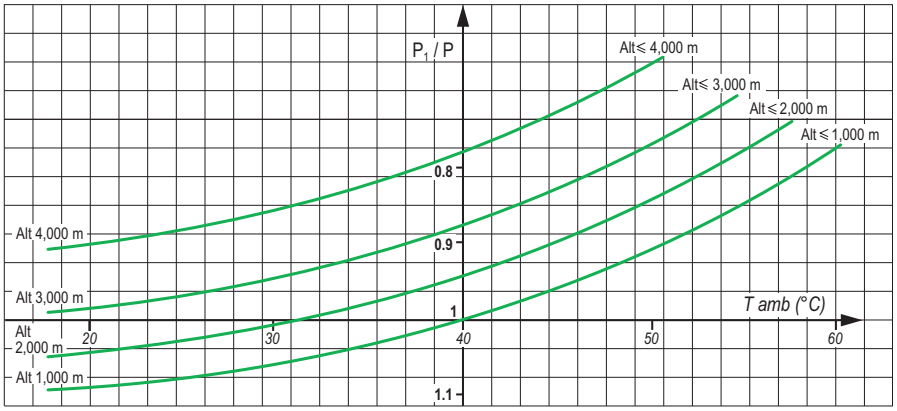
- ambient temperature within the range -10°C to 40 °C
- altitude less than 1000 m
- atmospheric pressure: 1050 hPa (mbar) = (750 mm Hg)

Power correction factor:

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

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.



FFB brakes comply with the following environmental conditions EN 60721-3-4 4K2 / 4Z1 / 4Z5 / 4Z7 / 4B1 / 4C2 / 4S2 / 4M3

RELATIVE AND ABSOLUTE HUMIDITY

Measuring the humidity:

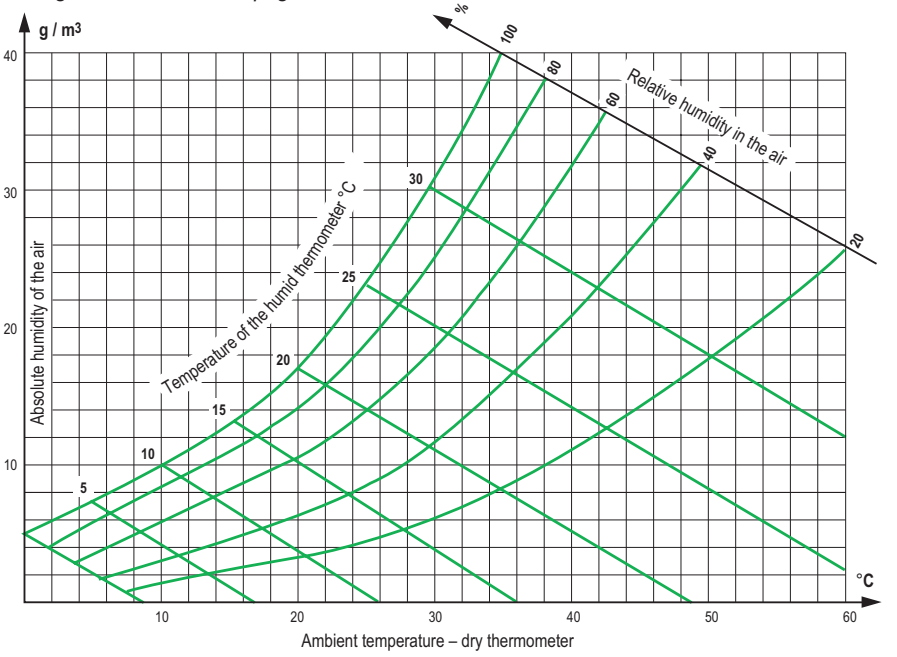
Humidity is usually measured by the "wet and dry bulb thermometer" method.

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; steel-tin) 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

Drain 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.

Impregnation and enhanced protection

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".

For high humidity environments, we recommend that the windings are pre-heated.

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.

Ambient temperature \ Relative humidity	RH ≤ 95%	RH > 95 % [1]	Influence on construction
θ < - 40 °C	ask for estimate (quotation)	ask for estimate (quotation)	
- 16 °C to + 50 °C	T Standard	TC Standard	
- 40 °C to+ 50 °C [2]	T1	TC1	
- 16 °C to+ 65 °C [2]	T2	TC2	
+ 65 °C to+ 90 °C [2]	T3	TC3	
θ > + 90 °C	ask for estimate (quotation)	ask for estimate (quotation)	
Plate mark	**T**	**TC**	
Influence on construction			

Increasing derating

Increased protection of windings

1. Atmosphere without high levels of condensation
2. For motors with a frame size ≥ 280 mm and IP23 motors with frame size ≥ 315 mm: upon offer

Standard impregnation

Interference suppression and protection of people

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 x 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)isolatesexternalelectromagnetic 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.

PRODUCT CE 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.

Environment

External finish

LS gearboxes and geared motors comply with the System la prescription

Leroy-Somer geared motors and motors are protected with a range of surface finishes. The surfaces receive appropriate special treatments, as shown below.

Preparation of surfaces

SURFACE	PARTS	SURFACE TREATMENT
Cast iron	End shields - Housings	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	-	-	-	-

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

** for indoor only*

Standard paint colour reference Nidec Leroy-Somer
(paint brightness standard: Satin)

Current environment

Nidec Leroy-Somer Standard (F)LSES
RAL 6000

Dyneo+ - LSMV - Dynabloc
RAL 9005

ID300-302
RAL 7016

Atex regulated environment

Dust II2D
RAL 1007

Gas II 3G, 3GD,2G, 2GD
RAL 2004

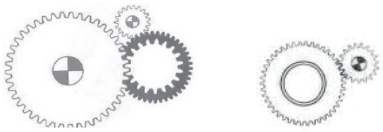
Construction

GEARBOXES, GEARED MOTORS

Driving loads at high speed safely requires absolute control of power transmission components.

To meet this need, Nidec Leroy-Somer motors has developed a comprehensive range of products over the last fifty years. It is the fruit of Nidec Leroy-Somer motors design offices and factories. The close integration of manufacturing from the foundry to complete control of gear cutting encompassing machining of the housings ensures continuity of the products proposed, cost reduction and perfect quality control.
Adapting the speed and torque of electric motors to the machines driven is the role assigned to the gearboxes. The Nidec Leroy-Somer motors range is based on three gearbox principles.

1 - Helical gears[1] allow our notorious **Compabloc** range to take on the difficult market of high efficiency line gearboxes.



These same helical gears are used in pendular gearboxes and hollow output shaft, **Manubloc** and **Poulibloc**.
For the first, the shrink disk option offers a mechanical coupling system of a smooth hollow shaft on a solid shaft while maintaining initial clearance throughout the lifetime and avoiding any risk of "fretting corrosion". The last are fitted with taper bush simplifying considerably the connection to the assembly to be driven.

2 - The worm and wheel make up the core of our **Multibloc** series.
This principle is the oldest and most proven to transmit high torque in intermittent duty.

3 - Helical and bevel gears make up the **Orthobloc** range allowing for perpendicular output while maintaining the benefits of the Compabloc: high efficiency, wide range of reduction, integrated motor.

[1] helical gears according to ISO 6336 (coefficient to be agreed)

MOTORS

Nidec Leroy-Somer motors are built around basic technical criteria to provide the user with the optimum product in each case:
- standardization (conformity with European Directives and international standards)
- sealing (reinforced, increasing the limits of use in particular environments)
- thermal reserve (20°C at rated voltage, it contributes to broadening the scope of application
- overloads, ambient temperature up to +55°C and extended lifetime of the windings).

MOTORS AND BRAKES

The brake motor combines a motor and a brake in a single electromechanical assembly. The brake allows stopping the motor and the machine driven, immobilizing them and this in several spheres of use:
- Paced movements: a reduced and precise stop time is possible thanks to the brake motor.
- Emergency stop: the brake motor allows virtually instant immobilisation, hence ensuring operator safety on all "hazardous" machines.
- Holding a device under load: the brake can be used to hold the motor in standstill position, even if torque is still applied. During hoisting, the brake stops the load, and then holds it.

The products offered are all brake motors with idle control: the brake remains locked once voltage disappears.
- FMD brake, IP55, from 0.06 to 0.25 kW;
- FFB brake, IP55, from 0.25 to 18.5 kW: new range for a modular brake; it adapts to three phase motors of the IMfinity® platform, allowing safe operation at variable speed (centralized with drive or decentralized with ID300).
- FCPL brake, IP54, from 18.5 to 550 kW and more: adapted to high braking power and torque, with an adjustable and tamper-proof braking torque.

DRIVES

Decentralized variable speed
Decentralizing speed drive at the core of the machines is a strong trend observed in the industry. The drive must operate in more difficult environments and be autonomous to avoid using an auxiliary unit whenever possible.
We offer autonomous and efficient products, installed close to the operator, in difficult environments:
- Proxidrive IP66,
- ID300-302 IP55 (IP65 optional), built into the motor.

Centralized variable speed
Whatever the motorisation, by alternating current or auto-synchronous, Nidec Leroy-Somer offers a broad pallet of solutions: a comprehensive system on specifications sheet (integrating the drive, the control chain and automations). This family of products is able to motorise all applications:
- UNIDRIVE: flexibility, high performance, cost reduction in addition to simplicity.

Electronic starter
To start, manage the transient phases of the induction motor, the electronic controller combines simplicity and user-friendliness.
- DIGISTART: effective, communicating and energy saving electronic controller.

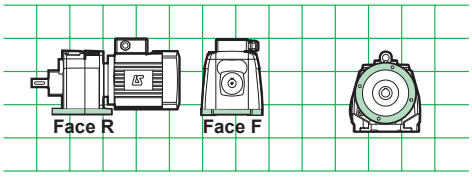
Mounting arrangements - Dimensions

COMPABLOC

Dimensions in millimetres

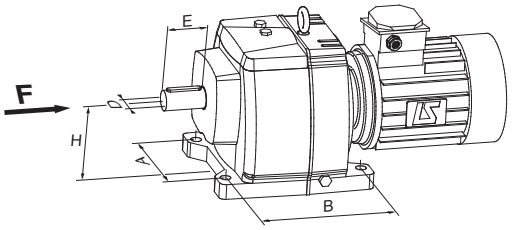
Standard position: gearbox seen from side F, motor to the rear, side D facing the ground.

Definition of the mounting arrangements: S, SBS, SBDn



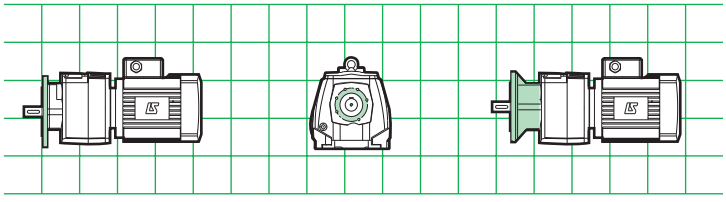
S
Housing with feet

SBS, SBDn
Housing with feet and flange



Compabloc	1 stage gearbox ØD	E	A	B	H	kg
Cb 3531	45k6	90	260	160	160	41
Cb 3431	40k6	80	216	125	132	25
Cb 3331	35k6	70	190	100	112	15.5
Cb 3231	25j6	50	140	80	90	8.3
Cb 3131	20j6	40	120	75	80	6.9
Cb 3031	16j6	40	125	70	75	2.3

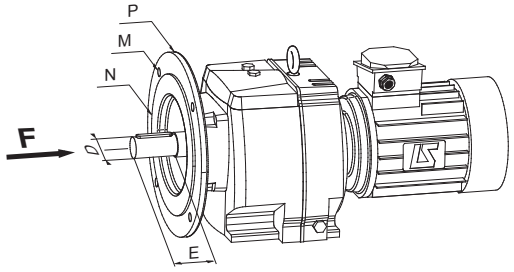
Compabloc	Multistage gearbox ØD	E	A	B	H	kg
Cb 3833	110m6	210	510	480	355	290
Cb 3733	90m6	170	420	390	315	192
Cb 3633	70m6	140	355	355	250	162
Cb 3533	60m6	120	280	280	225	90
Cb 3433	50k6	100	230	235	180	50
Cb 3333	40k6	80	170	240	140	30
Cb 3233	30j6	60	135	192	115	18.5
Cb 3133	25j6	50	110	165	90	13
Cb 3033	20j6	40	125	125	75	4.9
Cb 3032	20j6	40	125	105	75	4.8
Cb 15--	16j6	40	100	105	90	3.2



BS, BDn...
Housing with smooth hole flange

BT
Housing with tapped hole flange

BR
Housing with reinforced flange



Definition of the mounting forms: BS, BDn..., BT, BR

BS, BD1, BD2, BD3, BR form

Compabloc	1 stage gearbox ØD	E	BS ØM	ØN	ØP	kg	BD1 ØM	ØN	ØP	kg	BD2 ØM	ØN	ØP	kg	BD3 ØM	ØN	ØP	kg
Cb 3531	45k6	90	300	250	350	48	265	230	300	46	-	-	-	-	-	-	-	-
Cb 3431	40k6	80	265	230	300	31	215	180	250	30	-	-	-	-	-	-	-	-
Cb 3331	35k6	70	215	180	250	19	165	130	200	18	-	-	-	-	-	-	-	-
Cb 3231	25j6	50	165	130	200	10	130	110	160	9.5	-	-	-	-	-	-	-	-
Cb 3131	20j6	40	130	110	160	8.1	115	95	140	7.9	100	80	120	-	-	-	-	-
Cb 3031	16j6	40	115	95	140	2.5	100	80	120	2.5	130	110	160	2.5	165	130	200	2.4

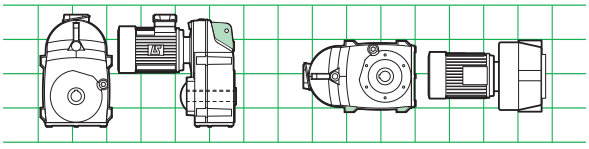
Compabloc	Multistage gearbox ØD	E	BS ØM	ØN	ØP	kg	BD1 ØM	ØN	ØP	kg	BD2 ØM	ØN	ØP	kg	BD3 ØM	ØN	ØP	kg	BR ØD	E	ØM	ØN	ØP	kg
Cb 3833	110m6	210	600	550	660	352	500	450	550	328	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cb 3733	90m6	170	500	450	550	228	400	350	450	222	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cb 3633	70m6	140	500	450	550	196	400	350	450	190	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cb 3533	60m6	120	350	300	400	97	300	250	350	96	265	230	300	90	-	-	-	-	65m6	130	300	250	350	130
Cb 3433	50k6	100	300	250	350	56	265	230	300	55	215	180	250	54	-	-	-	-	55k6	110	265	230	300	72
Cb 3333	40k6	80	265	230	300	34	215	180	250	33	165	130	200	32.5	-	-	-	-	45k6	90	215	180	250	44
Cb 3233	30j6	60	215	180	250	18.8	165	130	200	18.7	130	110	160	18.6	-	-	-	-	-	-	-	-	-	-
Cb 3133	25j6	50	165	130	200	13.4	130	110	160	13.3	115	95	140	13.2	100	80	120	13.1	-	-	-	-	-	-
Cb 3033	20j6	40	115	95	140	4.9	100	80	120	4.5	130	110	160	4.9	165	130	200	5	-	-	-	-	-	-
Cb 3032	20j6	40	115	95	140	4.9	100	80	120	4.5	130	110	160	4.9	165	130	200	5	-	-	-	-	-	-
Cb 15--	16j6	40	100	80	120	2.9	85	70	105	2.8	115	95	140	3	-	-	-	-	-	-	-	-	-	-

Mounting arrangements - Dimensions

MANUBLOC

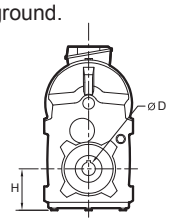
Dimensions in millimetres

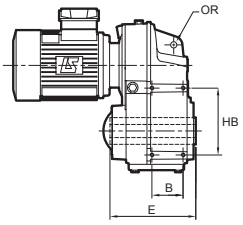
Standard position: gearbox seen from side F, motor to the rear, side D facing the ground.



R
Pendular

NUL
Left lateral face (L left , R right) with tapped holes



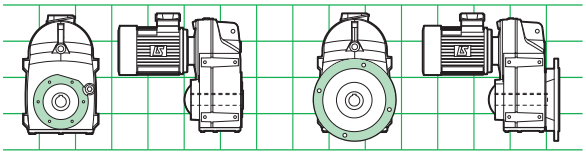


- R form

Manubloc	H hollow shaft ØD	H	OR	kg	S solid shaft OR	ØD	E	kg
Mub 38--	100H7	263	33	335	33	110m6	210	352
Mub 37--	90H7	214	26	283	33	90m6	170	297
Mub 36--	70H7	194	33	197	33	70m6	140	207
Mub 35--	60H7	151	24	116	-	-	-	-
Mub 34--	50H7	126	22	70	-	-	-	-
Mub 33--	40H7	127	14	43	-	-	-	-
Mub 32--	30H7	94.5	14	26	-	-	-	-
Mub 3132	30H7	95	14	15.5	-	-	-	-

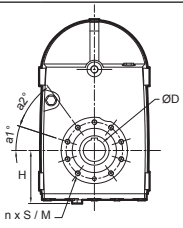
- NU form - L (left), R (right), LR (left and right)

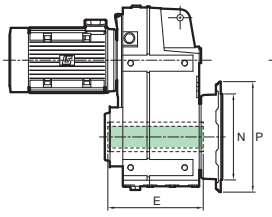
Manubloc	H hollow shaft ØD	H	B	HB	kg	S solid shaft ØD	E	kg
Mub 38--	100H7	263	270	450	332	110m6	210	348
Mub 37--	90H7	214	220	425	280	90m6	170	294
Mub 36--	70H7	194	165	315	195	70m6	140	205
Mub 35--	60H7	151	165	300	115	-	-	-
Mub 34--	50H7	126	100	240	69	-	-	-
Mub 33--	40H7	127	110	200	43	-	-	-
Mub 32--	30H7	94.5	70	150	26	-	-	-



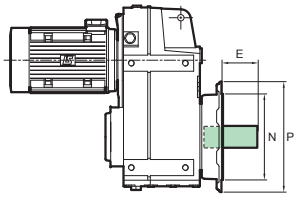
BT
Face mounting with tapped hole flange

BS, BD
Smooth hole flange





H: hollow shaft



S: output shaft (Mub 36 to 38)

- BT form

Manubloc	H hollow shaft ØD	H	a1°	a2°	a3°	a4°	a5°	a6°	a7°	a8°	a9°	a10°	a11°	nxS	ØM	kg
Mub 38--	100H7	263	30	30	30	60	30	30	30	30	30	30	30	11xM20x40	300	332
Mub 37--	90H7	214	18	36	36	36	36	36	36	72	36	-	-	9xM20x35	230	280
Mub 36--	70H7	194	15	40	70	40	35	70	70	-	-	-	-	6xM16x27	230	195
Mub 35--	60H7	151	60	-	-	-	-	-	-	-	-	-	-	6xM12x20	215	115
Mub 34--	50H7	126	60	-	-	-	-	-	-	-	-	-	-	6xM12x22	180	69
Mub 33--	40H7	127	60	-	-	-	-	-	-	-	-	-	-	6xM10x18	165	43
Mub 32--	30H7	94.5	45	-	-	-	-	-	-	-	-	-	-	4xM8x12	130	26
Mub 3132	30H7	95	45	-	-	-	-	-	-	-	-	-	-	4xM8x12	115	15.5

Manubloc	S solid shaft ØD	E	a1°	a2°	a3°	a4°	a5°	a6°	a7°	a8°	a9°	a10°	a11°	nxS	ØM	kg
Mub 38--	110m6	210	30	30	30	30	30	30	30	30	30	30	30	11xM20x40	300	348
Mub 37--	90m6	170	18	36	36	36	36	36	36	72	-	-	-	9xM20x35	230	294
Mub 36--	70m6	140	15	40	70	40	35	70	70	-	-	-	-	6xM16x27	230	205

- BS flange form

Manubloc	H hollow shaft ØD	E	nxS	ØM	a1°	a2°	ØNj6	ØP	kg
Mub 38--	100H7	428	8x17.5	600	22.5	45	550	660	390
Mub 37--	90H7	376	8x18	500	22.5	45	450	550	316
Mub 36--	70H7	326	8x18	500	22.5	45	450	550	229
Mub 35--	60H7	292	4x18	300	45	90	250	350	130
Mub 34--	50H7	260	4x14	265	45	90	230	300	79
Mub 33--	40H7	191.5	4x14	265	45	90	230	300	51
Mub 32--	30H7	190.5	4x14	215	45	90	180	250	31

S solid shaft ØD	E	a1°	a2°	kg
110m6	210	22.5	45	410
90m6	170	22.5	45	330
70m6	140	22.5	45	239

- BD flange form

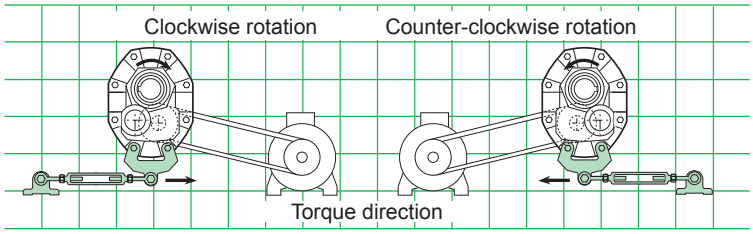
Manubloc	H hollow shaft ØD	E	nxS	ØM	a1°	a2°	ØNj6	ØP	kg
Mub 38--	100H7	428	8x17.5	500	22.5	45	450	550	367
Mub 37--	90H7	376	8x18	400	22.5	45	350	450	310
Mub 36--	70H7	326	8x18	400	22.5	45	350	450	223
Mub 35--	-	-	-	-	-	-	-	-	-
Mub 34--	50H7	260	4x14	215	45	90	180j6	250	78
Mub 33--	40H7	191.5	4x14	215	45	90	180j6	250	50
Mub 32--	30H7	190.5	4x12	165	45	90	130j6	200	30

S solid shaft ØD	E	a1°	a2°	kg
110m6	210	22.5	45	384
90m6	170	22.5	45	324
70m6	140	22.5	45	233

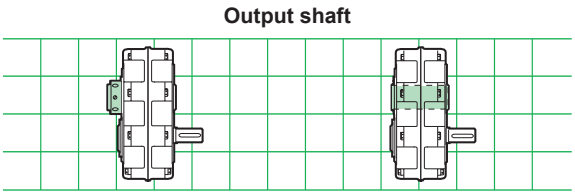
Mounting arrangements - Dimensions

POULIBLOC 2000: Pb 2000

Dimensions in millimetres



RK
Torque arm kit

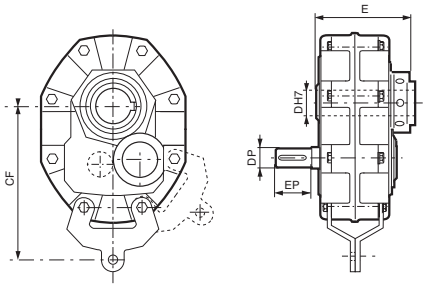


WTB
(with taper bush)

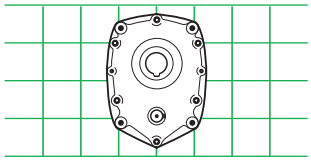
FTB
(for taper bush)

Poulibloc 2000: RK form with WTB taper bush

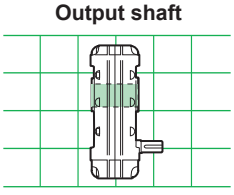
Poulibloc	Gearboxes					
	Output shaft and taper bush			Input shaft		
	DH7	E	CF	DP	EP	kg
Pb 27	100-110-120	312.5	521.5	65m6	130	295
Pb 2612-2615-2620-2625	75-80-85-90-95-100	300.5	440	55j6	120	158
Pb 2605	75-80-85-90-95-100	300.5	440	48j6	120	158
Pb 2512-2515-2520-2525	60-65-70-75-80-85	259	377	50j6	110	106
Pb 2505	60-65-70-75-80-85	259	377	38j6	80	106
Pb 24	45-50-55-60-65-70-75	207	332	50j6	110	68
Pb 23	35-40-45-50-55-60	184	290	35j6	80	52
Pb 22	30-35-40-45-50-55	171	260	32j6	80	32
Pb 21	25-30-35-40-45-50	158	227	28j6	60	24
Pb 20	20-25-30-35-40	138	210	24j6	60	19



POULIBLOC 3000: Pb 3000, Pbh 3000



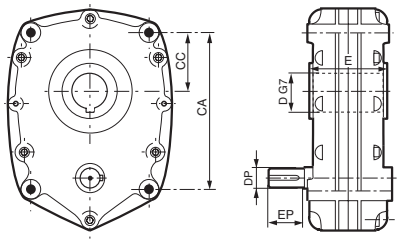
NU
Flexible mounting



H
Keyed hollow shaft

Poulibloc 3000: NU form, hollow shaft H

Poulibloc	Gearboxes						
	Hollow output shaft				Input shaft		
	DG7	E	CA	CC	DP	EP	kg
Pbh 33	50-55-60	166.5	291	123.4	30j6	68	40
Pbh 3208	40-45-50	144	255	110	28j6	65	32
Pbh 3205	40-45-50	144	255	110	32j6	65	32
Pbh 3108	30-35-40	126	200	85	24j6	50	20
Pbh 3105	30-25-40	126	200	85	28j6	60	20
Pb 3208	40-45-50	117	255	110	28j6	65	32
Pb 3205	40-45-50	117	255	110	32j6	65	32
Pb 3108	30-35-40	99	200	85	24j6	50	20
Pb 3105	30-35-40	99	200	85	28j6	60	20
Pb 30	25-30-35	74	160	65	24j6	50	12

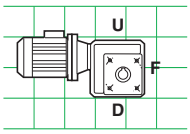


Mounting arrangements - Dimensions

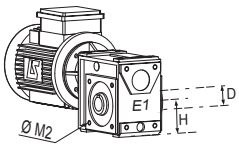
MULTIBLOC

Dimensions in millimetres

Standard position: gearbox seen from side F, motor to the rear, side D facing the ground.



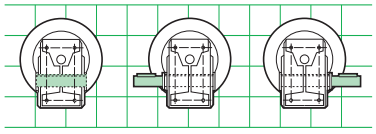
NU (S : Mb 41)

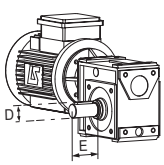


NU H

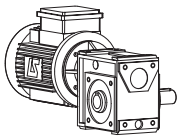

RK
Torque arm kit

Output shaft


H H L H R



NU HL


NU HR

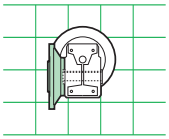
- NU form, hollow shaft H

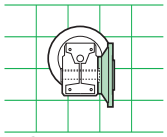
Multibloc	Ø D	E1	H	M2	kg
Mb 26	50H7	188	100	-[1]	37
Mb 25	45H7	168	90	180	31
Mb 24	35H7	138	75	130	17.5
Mb 23	30H7	118	63	115	10.5
Mb 22	25H7	108	56	105	8
Mb 31	20H8	90	50	85	5
Mb 41	20H8	78	50	85	2,5

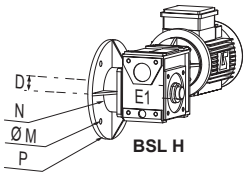
1. Mb 26 BT form: M = 165 (40 kg)

- NU form, left output shaft HL, right output shaft HR

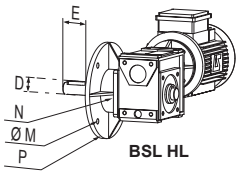
Multibloc	Ø Dh6	E	H	M2	kg
Mb 26	50	100	100	-	41.9
Mb 25	45	90	90	180	34.5
Mb 24	35	70	75	130	19.3
Mb 23	30	60	63	115	11.7
Mb 22	25	50	56	105	8.5
Mb 31	20	40	50	85	5.5
Mb 41	20j6	45	50	85	2.7


BSL, BDL, BNL

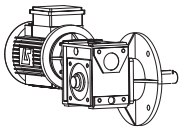

BSR, BDR, BNR



BSL H



BSL HL


BSR HR

- Flange form on left*, H hollow shaft

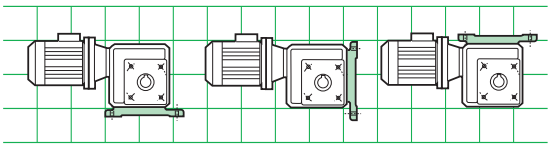
Multibloc	Ø D	E1	BSL* flange Ø M	Ø Nj6	Ø P	kg	BDL* flange Ø M	Ø Nj6	Ø P	kg	BNL* flange Ø M	Ø Nj6	Ø P	kg
Mb 26	50H7	188	300	250	350	48	265	230	300	50	-	-	-	-
Mb 25	45H7	168	265	230	300	38	215	180	250	38	265	-	300	38
Mb 24	35H7	138	215	180	250	23	165	130	200	23	215	-	250	23
Mb 23	30H7	118	165	130	200	14	130	110	160	14	165	-	200	14
Mb 22	25H7	108	165	130	200	11	130	110	160	11	165	-	200	11
Mb 31	20H7	90	-	-	-	-	-	-	-	-	100	-	120	6
Mb 31	20H7	90	-	-	-	-	-	-	-	-	85	-	105	6
Mb 31	20H7	90	-	-	-	-	-	-	-	-	115	-	140	6.2
Mb 41	20H8	78	100	80	120	2.5	85	70	105	2.2	-	-	-	-
Mb 41	20H8	78	-	-	-	-	115	95	140	2.5	-	-	-	-

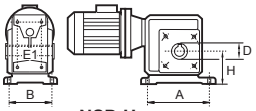
** Right option: BSR, BDR, BNR flange - H hollow shaft*

- Flange form on left*, HL* output shaft on left

Multibloc	Ø D	E	Bride BSL* Ø M	Ø Nj6	Ø P	kg	Bride BDL* Ø M	Ø Nj6	Ø P	kg	Bride BNL* Ø M	Ø P	kg
Mb 26	50h6	100	300	250	350	52.9	265	230	300	54	-	-	-
Mb 25	45h6	90	265	230	300	41.7	215	180	250	38	265	300	41.7
Mb 24	35h6	70	215	180	250	24.9	165	130	200	23	215	250	24.9
Mb 23	30h6	60	165	130	200	15	130	110	160	14	165	200	14
Mb 22	25h6	50	165	130	200	12	130	110	160	11	165	200	15
Mb 31	20h6	40	-	-	-	-	-	-	-	-	100	120	6.5
Mb 31	20h6	40	-	-	-	-	-	-	-	-	85	105	6
Mb 31	20h6	40	-	-	-	-	-	-	-	-	115	140	6.5
Mb 41	20j6	45	100	80	120	3	85	70	105	2.7	-	-	-
Mb 41	20j6	45	-	-	-	-	115	95	140	3	-	-	-

** Right option: BSR, BDR, BNR flange - HR output shaft*


NSD NSF NSU



NSD H

- NSD* feet form, hollow shaft H

Multibloc	A	B	H	Ø DH7	E1	kg
Mb 26	250	180	125	50	188	40.7
Mb 25	220	156	112	45	168	34
Mb 24	202	156	90	35	138	18
Mb 23	154	128	80	30	118	11
Mb 22	134	125	71	25	108	8
Mb 31, 41	-	-	-	-	-	-

** Option: NSF feet on face F; NSU feet on face U*

- NSD* feet form, left-output shaft HL*

Multibloc	A	B	Ø Dh6	E	H	kg
Mb 26	250	180	50	100	125	45.6
Mb 25	220	156	45	90	112	37.5
Mb 24	202	156	35	70	90	19.8
Mb 23	154	128	30	60	80	12.5
Mb 22	134	125	25	50	71	9
Mb 31, 41	-	-	-	-	-	-

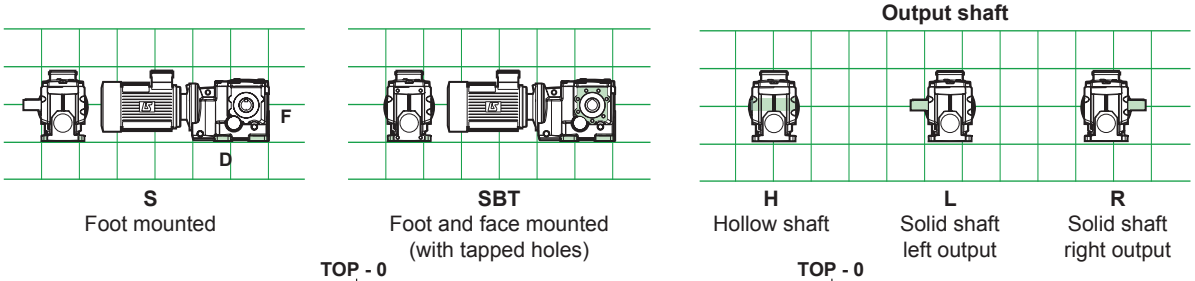
** Option: right output shaft HR*

Mounting arrangements - Dimensions

ORTHOBLOC

Dimensions in millimetres

Standard position: gearbox seen from side F, motor to the rear, side D facing the ground.



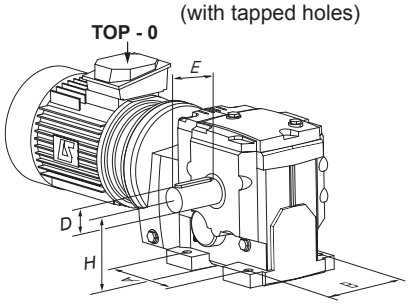
S Foot mounted

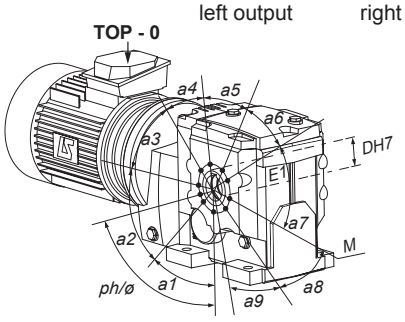
SBT Foot and face mounted (with tapped holes)

H Hollow shaft

L Solid shaft left output

R Solid shaft right output





- Feet form S, left solid shaft L, right solid shaft R, hollow shaft H

	S L					S R					S H					
Orthobloc	A	B	H	ØD	E	A	B	H	ØD	E	A	B	H	ØDH7	E1	kg
Ot 3933 S	380	370	450	120m6	210	380	370	450	120m6	210	380	370	450	120	450	648
Ot 3833 S	350	270	375	110m6	210	350	270	375	110m6	210	350	270	375	100	350	378
Ot 3733 S	420	270	250	90m6	170	420	270	250	90m6	170	420	270	250	90	340	306
Ot 3633 S	355	240	225	70m6	140	355	240	225	70m6	140	355	240	225	70	304	198
Ot 3533 S	180/230	180	212	60m6	120	180/230	180	212	60m6	120	180/230	180	212	60	244	83
Ot 3433 S	150/190	165	180	50k6	100	150/190	165	180	50k6	100	150/190	165	180	50	226	60
Ot 3333 S	120/150	140	140	40k6	80	120/150	140	140	40k6	80	120/150	140	140	40	173	38
Ot 3233 S	130/150	120	112	30j6	60	130/150	120	112	30j6	60	130/150	120	112	35	151	21
Ot 3232 S	130/150	120	112	30j6	60	130/150	120	112	30j6	60	130/150	120	112	35	151	22
Ot 3132 S	100	100	80	25j6	50	100	100	80	25j6	50	100	100	80	30	130	14.5

- Left faceplate form SBT, left solid shaft L, right solid shaft R, hollow shaft H

	Face L															H				
Orthobloc	A	B	H	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	n	ph/ø	øM	øDH7	E1	kg
Ot 3933 SBT[1]	380	370	450	20°	34°	36°	36°	36°	36°	36°	36°	36°	34°	-	10	0°-180°/325	340	120	450	565
Ot 3833 SBT[1]	350	270	375	30°	30°	30°	30°	30°	30°	30°	30°	30°	30°	30°	11	75°-255°/300	300	100	350	347
Ot 3733 SBT	420	270	250	36°	36°	36°	36°	36°	36°	36°	36°	36°	-	-	9	0°/230	230	90	340	289
Ot 3633 SBT	355	240	225	70°	35°	40°	70°	40°	35°	-	-	-	-	-	6	0°/220	230	70	310	186
Ot 3533 SBT	180/230	180	212	59°	52°	44°	50°	44°	81°	-	-	-	-	-	6	300°/190	190	60	244	80
Ot 3433 SBT	150/190	165	180	65°	46°	44°	50°	44°	81°	-	-	-	-	-	6	300°/152	152	50	226	58
Ot 3333 SBT	120/150	140	140	65°	48°	44°	46°	45°	67°	-	-	-	-	-	6	65°/123	123	40	173	36
Ot 3233 SBT	130/150	120	112	0°	65°	48°	44°	46°	50°	-	-	-	-	-	6	295°/102	100	35	151	20
Ot 3232 SBT	130/150	120	112	0°	65°	48°	44°	46°	50°	-	-	-	-	-	6	295°/102	100	35	151	21.8
Ot 3132 SBT	100	100	80	0°	90°	90°	90°	-	-	-	-	-	-	-	4	340°/95	95	30	130	14

1. Ot 38, Ot 39 SBT, solid shaft: not made

- Right faceplate form SBT, left solid shaft L, right solid shaft R, hollow shaft H

	Face R															H				
Orthobloc	A	B	H	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	n	ph/ø	øM	øDH7	E1	kg
Ot 3933 SBT[1]	380	370	450	20°	34°	36°	36°	36°	36°	36°	36°	36°	34°	-	10	0°-180°/325	340	120	450	565
Ot 3833 SBT[1]	350	270	375	30°	30°	30°	30°	30°	30°	30°	30°	30°	30°	30°	11	75°-255°/300	300	100	350	347
Ot 3733 SBT	420	270	250	36°	36°	36°	36°	36°	36°	36°	36°	36°	-	-	9	0°/230	230	90	340	289
Ot 3633 SBT	355	240	225	70°	35°	40°	70°	40°	35°	-	-	-	-	-	6	0°/220	230	70	310	186
Ot 3533 SBT	180/230	180	212	0°	59°	52°	44°	50°	44°	-	-	-	-	-	6	300°/190	190	60	244	80
Ot 3433 SBT	150/190	165	180	10°	55°	46°	44°	50°	44°	-	-	-	-	-	6	300°/152	152	50	226	58
Ot 3333 SBT	120/150	140	140	0°	45°	68°	44°	46°	44°	-	-	-	-	-	6	65°/123	123	40	173	36
Ot 3233 SBT	130/150	120	112	0°	65°	48°	44°	46°	50°	-	-	-	-	-	6	295°/102	100	35	151	20
Ot 3232 SBT	130/150	120	112	0°	65°	48°	44°	46°	50°	-	-	-	-	-	6	295°/102	100	35	151	21.8
Ot 3132 SBT	100	100	80	0°	90°	90°	90°	-	-	-	-	-	-	-	4	340°/95	95	30	130	14

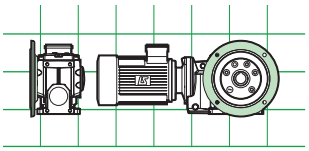
1. Ot 38, Ot 39 SBT, solid shaft: not made

Mounting arrangements - Dimensions

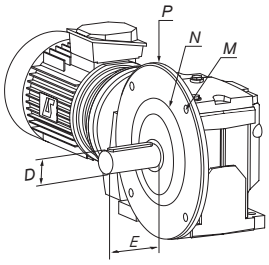
ORTHOBLOC

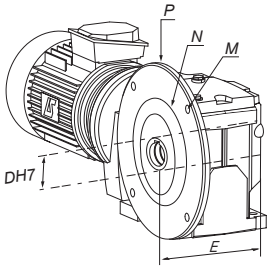
Dimensions in millimetres

Standard position: gearbox seen from side F, motor to the rear, side D facing the ground.



BSL, BDL
Smooth hole flange
on left



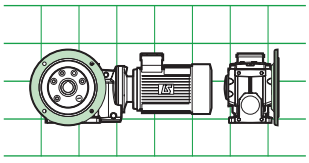


- BSL, BDL flange form, left solid shaft L

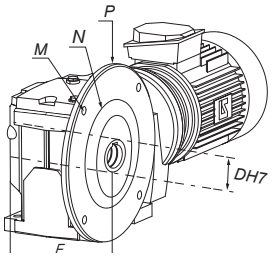
	BSL L						BDL L					
Orthobloc	ØM	ØNj6	ØP	ØD	E	kg	ØM	ØNj6	ØP	ØD	E	kg
Ot 3933	600	550	660	120m6	210	726	-	-	-	-	-	-
Ot 3833	600	550	660	110m6	210	440	500	450	550	110m6	210	402
Ot 3733	500	450	550	90m6	170	342	400	350	450	90m6	170	336
Ot 3633	500	450	550	70m6	140	232	400	350	450	70m6	140	226
Ot 3533	350	300	400	60m6	120	94	300	250	350	60m6	120	93
Ot 3433	300	250	350	50k6	100	68	265	230	300	50k6	100	67
Ot 3333	265	230	300	40k6	80	42	215	180	250	40k6	80	42
Ot 3233	215	180	250	30j6	60	22	165	130	200	30j6	60	21.7
Ot 3232	215	180	250	30j6	60	23.3	165	130	200	30j6	60	23
Ot 3132	130	110	165	25j6	50	14.8	-	-	-	-	-	-

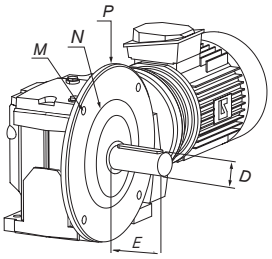
- BSL, BDL flange form hollow shaft H

	BSL H						BDL H					
Orthobloc	ØM	ØNj6	ØP	ØDH7	E	kg	ØM	ØNj6	ØP	ØDH7	E	kg
Ot 3933	600	550	660	120	450	648	-	-	-	-	-	-
Ot 3833	600	550	660	100	350	408	500	450	550	100	350	374
Ot 3733	500	450	550	90	340	328	400	350	450	90	340	322
Ot 3633	500	450	550	70	310	222	400	350	450	70	310	216
Ot 3533	350	300	400	60	244	91	300	250	350	60	244	89
Ot 3433	300	250	350	50	226	66	265	230	300	50	226	65
Ot 3333	265	230	300	40	173	40	215	180	250	40	173	40
Ot 3233	215	180	250	35	151	21	165	130	200	35	151	21.7
Ot 3232	215	180	250	35	151	23.3	165	130	200	30	151	23
Ot 3132	130	110	165	30	130	14.8	-	-	-	-	-	-



BSR, BDR
Flange mounted on right





- BS, BD, BR flange form, right solid shaft R

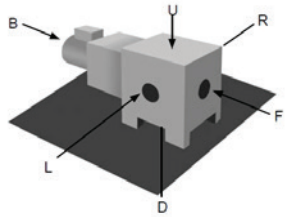
	BSR R						BDR R						BRR R only					
Orthobloc	ØM	ØNj6	ØP	ØD	E	kg	ØM	ØNj6	ØP	ØD	E	kg	ØM	ØNj6	ØP	ØD	E	kg
Ot 3933	600	550	660	120m6	210	726	-	-	-	-	-	-	-	-	-	-	-	-
Ot 3833	600	550	660	110m6	210	440	500	450	550	110m6	210	402	-	-	-	-	-	-
Ot 3733	500	450	550	90m6	170	342	400	350	450	90m6	170	336	-	-	-	-	-	-
Ot 3633	500	450	550	70m6	140	232	400	350	450	70m6	140	226	-	-	-	-	-	-
Ot 3533	350	300	400	60m6	120	94	300	250	350	60m6	120	93	300	250	350	65m6	130	120
Ot 3433	300	250	350	50k6	100	68	265	230	300	50k6	100	67	265	230	300	55k6	110	72
Ot 3333	265	230	300	40k6	80	42	215	180	250	40k6	80	42	215	180	250	45k6	90	51
Ot 3233	215	180	250	30j6	60	22	165	130	200	30j6	60	21.7	-	-	-	-	-	-
Ot 3232	215	180	250	30j6	60	23.3	165	130	200	30j6	60	23	-	-	-	-	-	-
Ot 3132	130	110	165	25j6	50	14.8	-	-	-	-	-	-	-	-	-	-	-	-

- BSR, BDR flange form hollow shaft H

	BSR H						BDR H					
Orthobloc	ØM	ØNj6	ØP	ØDH7	E	kg	ØM	ØNj6	ØP	ØDH7	E	kg
Ot 3933	600	550	660	120	450	648	-	-	-	-	-	-
Ot 3833	600	550	660	100	350	408	500	450	550	100	350	374
Ot 3733	500	450	550	90	340	328	400	350	450	90	340	322
Ot 3633	500	450	550	70	310	222	400	350	450	70	310	216
Ot 3533	350	300	400	60	244	91	300	250	350	60	244	89
Ot 3433	300	250	350	50	226	66	265	230	300	50	226	65
Ot 3333	265	230	300	40	173	40	215	180	250	40	173	40
Ot 3233	215	180	250	35	151	21	165	130	200	35	151	21.7
Ot 3232	215	180	250	35	151	23.3	165	130	200	30	151	23
Ot 3132	130	110	165	30	130	14.8	-	-	-	-	-	-

Operating position

The reference is the view from side F, motor to the back (B), side D facing the ground.



(L: left, R: right, F: front, B: back, D: down, U: up)

Fastening on casing, on feet, feet and flange, torque arm: B3, B6, B7, B8, V5, V6.
Fastening on flange: B5, B52, B53, B54, V1, V3.


Compabloc*1*, page 23


Manubloc*1*, page 24
Poulibloc, page 25


Multibloc*1*, pages 26-27


Orthobloc*1*, pages 28-29


Brake motors, page 30

1. **Compabloc, Manubloc, Multibloc, Orthobloc:**
The characteristics in our technical catalogues concern the standard operating position **B3-B5**.
The Cb, Mub, Mb, Ot gearboxes are supplied lubricated, ready for use (§ Lubrication - Maintenance), according to the operating position indicated in the order.

PARTICULAR CASES

• Gear gearboxes
Certain operating positions combined with high input speeds may occur churning losses. Therefore, we recommend limiting the input speed to reduce this phenomenon.

rpm	Gearbox	Sizes	Operating position
2500	Cb	30 --> 35	V5-V6
	Mub	31 --> 35	V1-V3
	Ot	31 --> 35	B6-B52 B7-B54
1500	Cb	> 35	V5-V6
	Mub	> 35	V1-V3
	Ot	> 35	B6-B52 B7-B54

• Worm and wheel gearboxes
For use in **continuous duty** and for an input speed **above 1500 rpm**, please consult.

rpm	Gearbox	Sizes	Operating position
1500	Mb	31, 22 --> 26	all

For very low speed applications and those where the output shaft does not turn a complete revolution, please consult to define the most appropriate operating position or the quantity of oil necessary.

COMBINED GEARBOXES

In the case of combined gearboxes, the (small) input gearbox follows the position of the output gearbox. Only the motor is orientable.

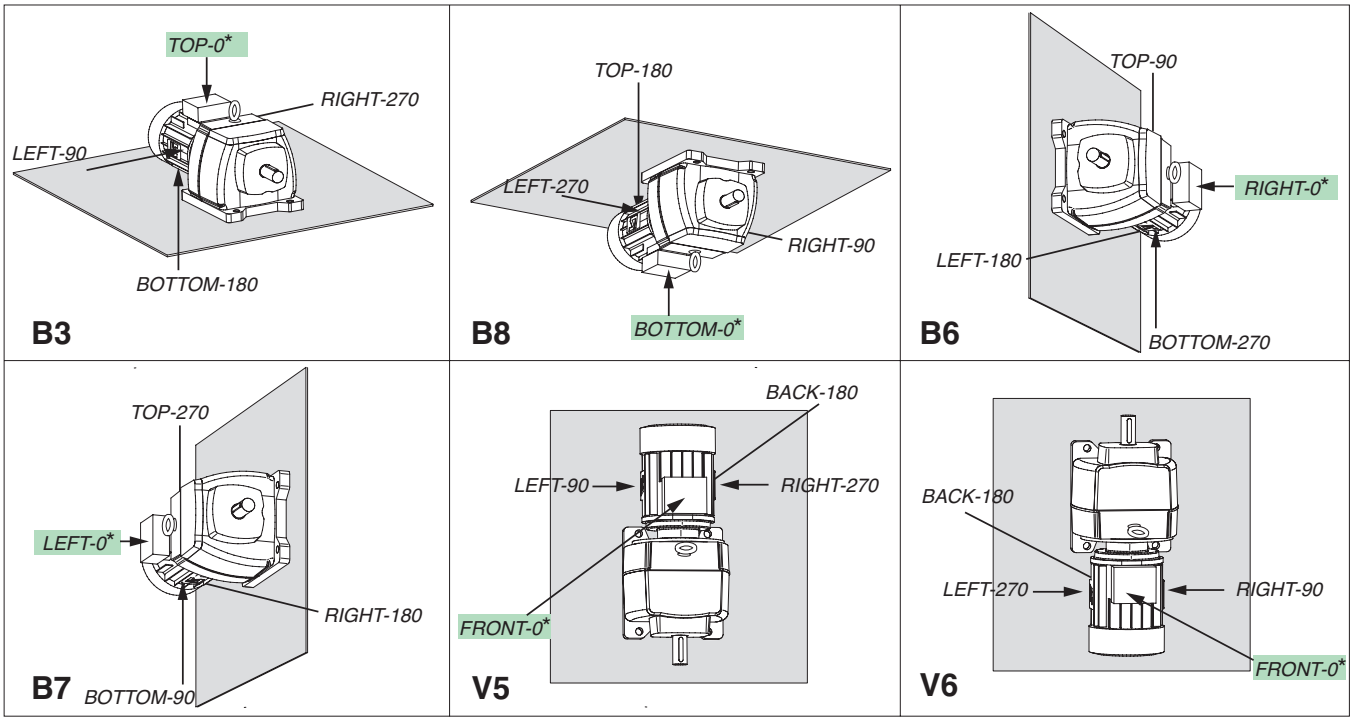
MOTOR CONNECTION

The absolute orientation of the connection (Terminal box: Up, Down, Right, Left, Front, Back) is related to the chosen operating position.
The relative orientation (0-90-180-270, in the trigonometric direction), a consequence of the absolute position, is related to the base of the gearbox (real or imaginary) for an observer, facing the gearbox.

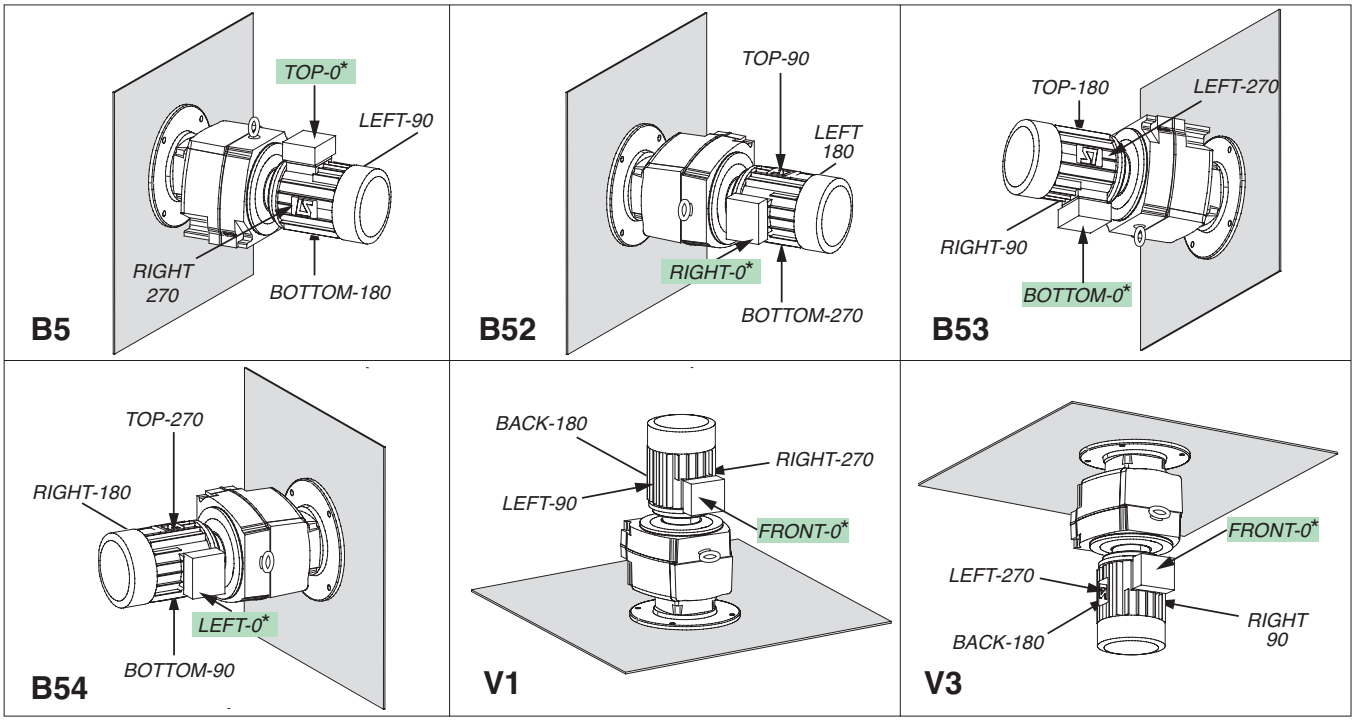
Do not install the geared motor in a position different from what was stated with the order.

Operating positions: Compabloc

- Feet form S, SBS, SBD...



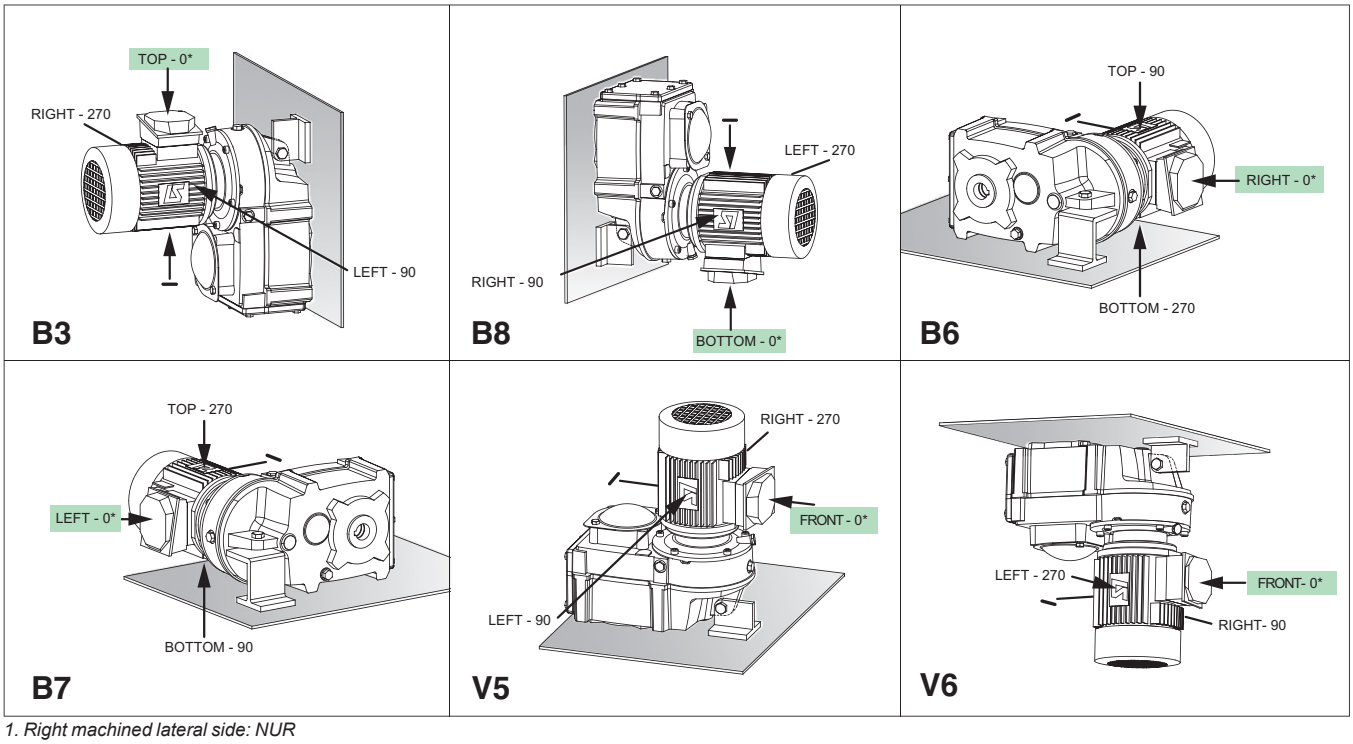
- Flange form BS, BD, BT, BR



** Std terminal box*

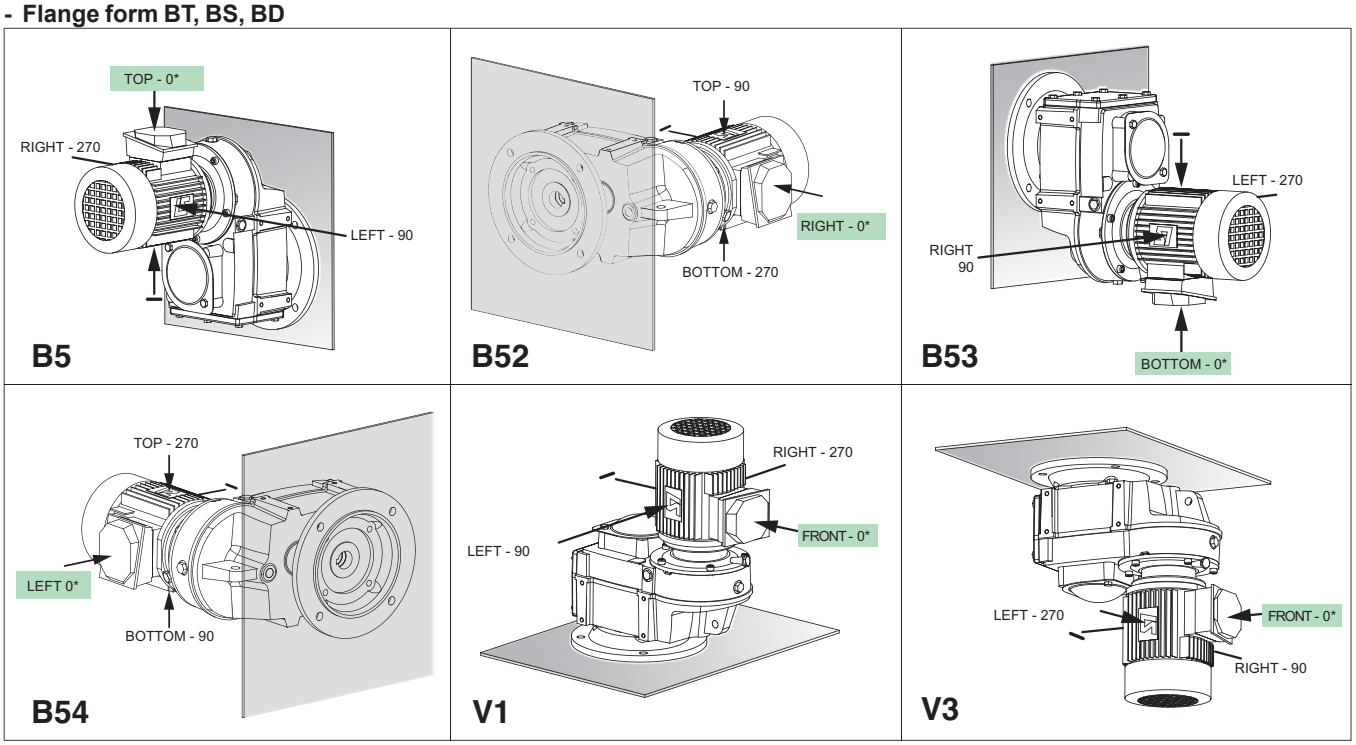
Operating positions: Manubloc

- Torque arm form R, left machined lateral side NUL[1]



1. Right machined lateral side: NUR

- Flange form BT, BS, BD



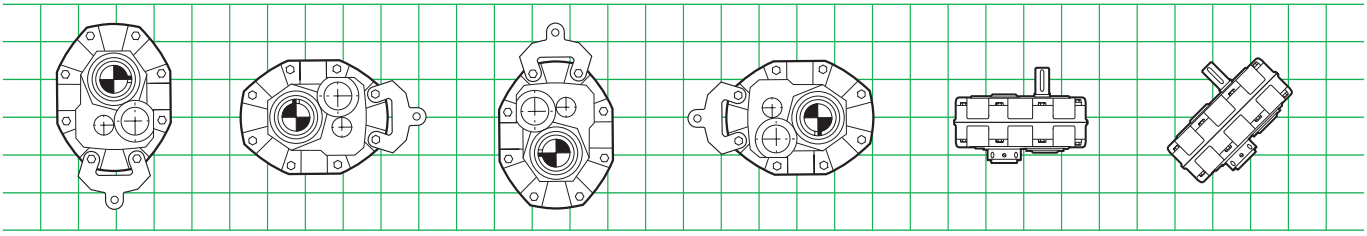
Std terminal box

Hollow shaft H, Output shaft S.

Operating positions: Poulibloc

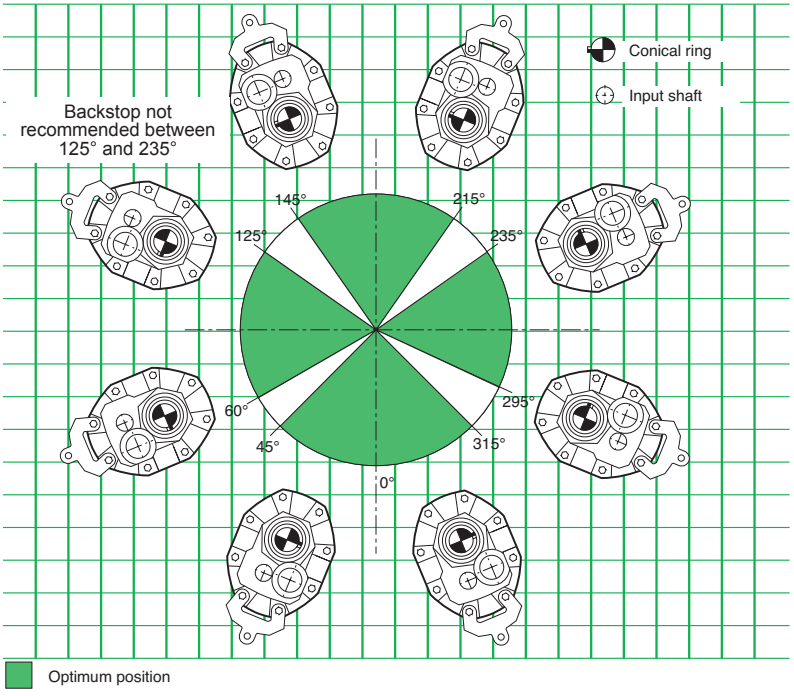
Fill up the oil corresponding to the operating position.

Standard position: supplied without oil, it is multiposition: M

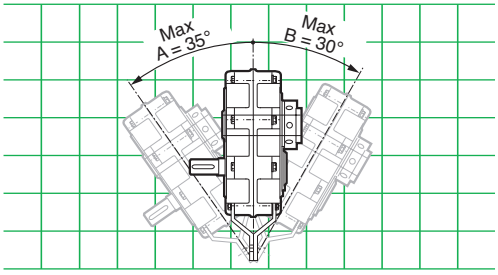


B3 B7 B8 B6 V5 Other positions: see below

Other positions

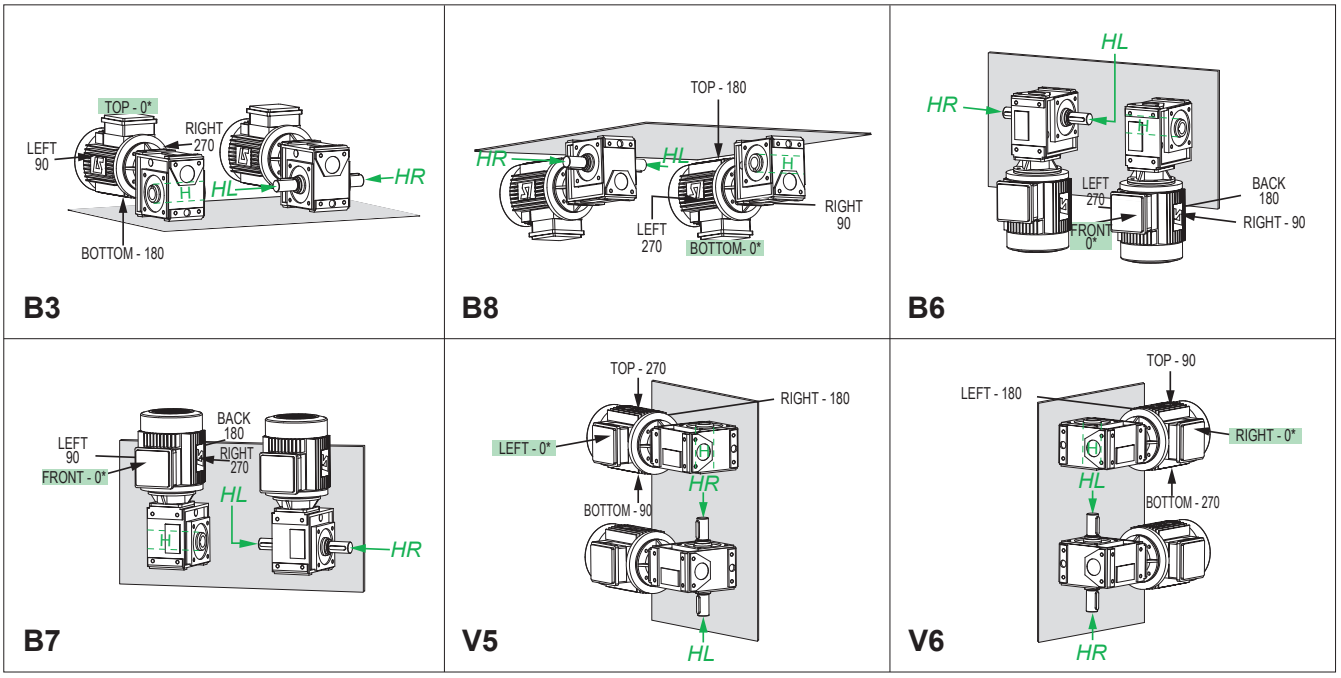


Limit operating positions

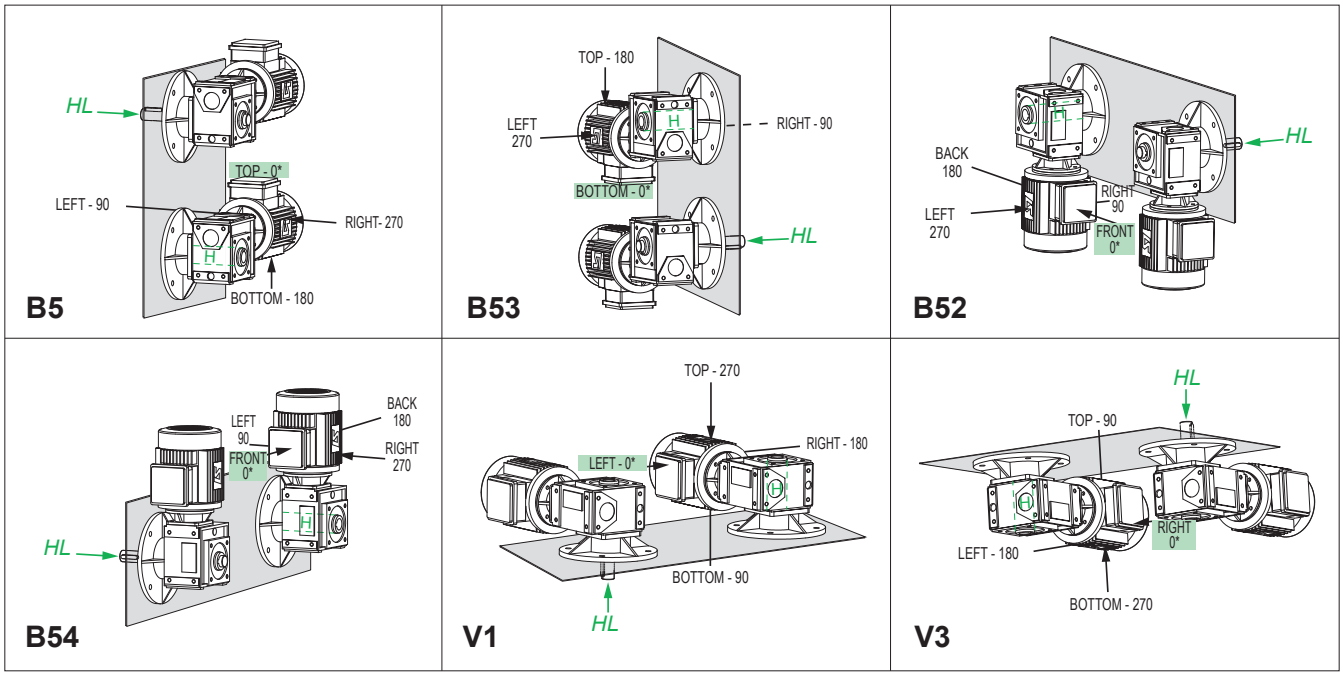


Operating positions: Multibloc

- Machined form NU, with feet NS, with torque arm R



- Flange form on left BSL, BDL, BNL

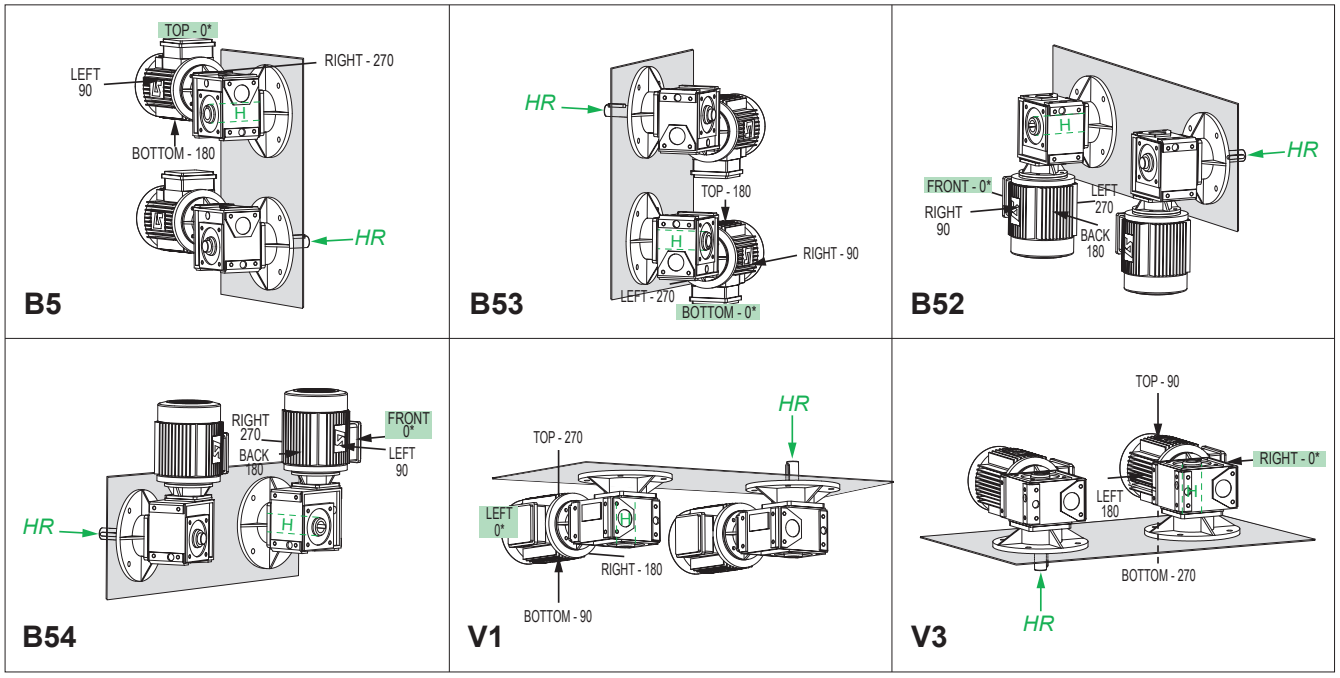


Std terminal box

Output shaft on left HL, right HR, hollow H.

Operating positions: Multibloc

- Flange form on right BSR, BDR, BNR

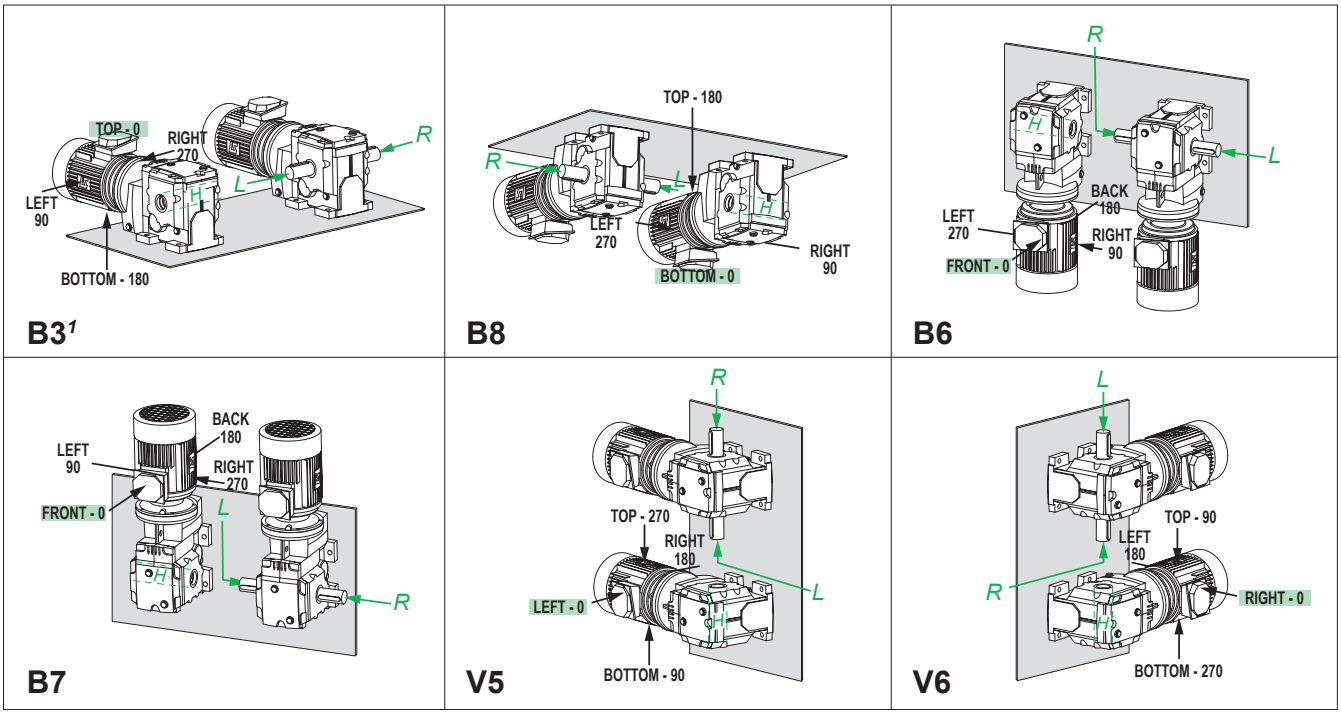


Std terminal box

Output shaft on left HL, right HR, hollow H.

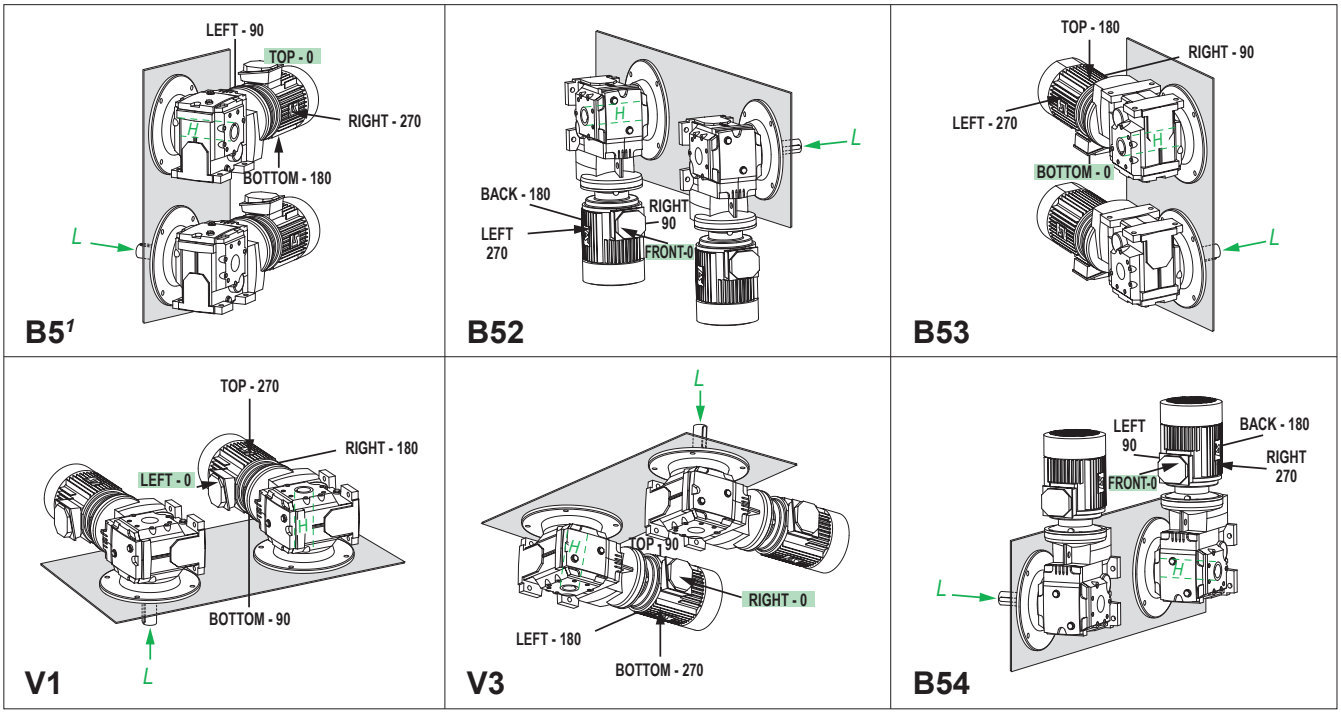
Operating positions: Orthobloc

- Feet form S, with machined feet and lateral sides SBT



1. Position recommended for Ot 39; other positions please consult.

- Flange form on left BSL, BDL



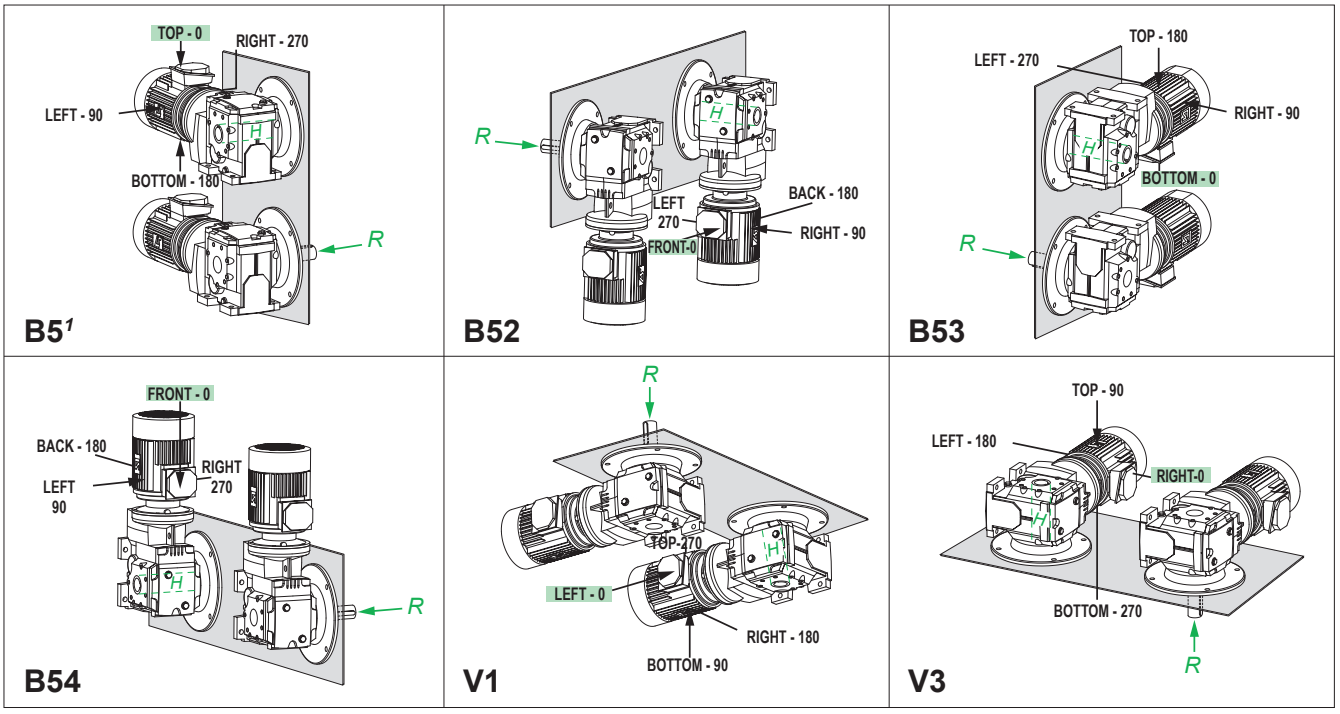
1. Position recommended for Ot 39; other positions please consult.

**** Std terminal box***

Output shaft on left HL, right HR, hollow H.

Operating positions: Orthobloc

- Flange form on right BSR, BDR, BRR



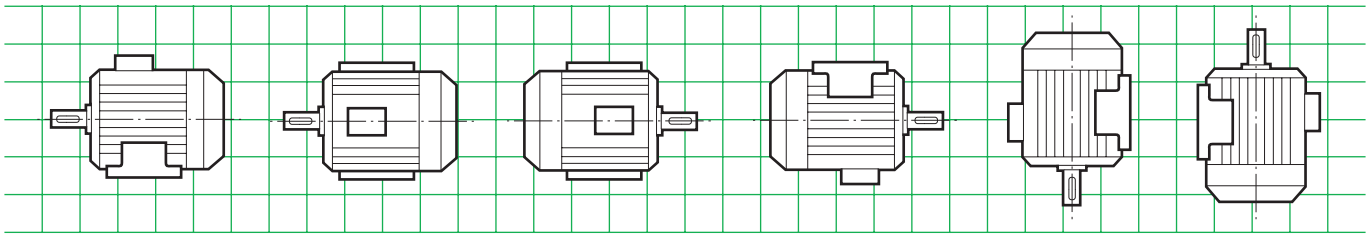
1. Position recommended for Ot 39; other positions please consult.

Std terminal box

Output shaft on right, hollow H.

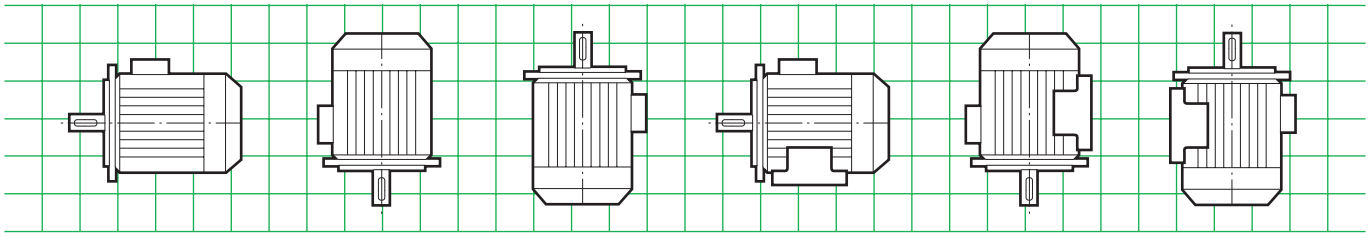
Operating positions: motors, brake motors

Feet form



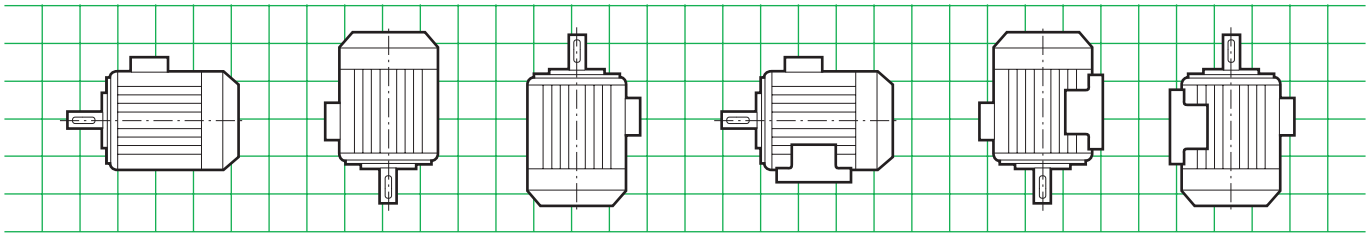
IM 1001 (IM B3) | **IM 1051** (IM B6) | **IM 1061** (IM B7) | **IM 1071** (IM B8) | **IM 1011** (IM V5) | **IM 1031** (IM V6)

Flange mounted form (FF with smooth holes)



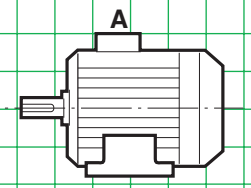
IM 3001 (IM B5) | **IM 3011** (IM V1) | **IM 3031** (IM V3) | **IM 2001** (IM B35) | **IM 2011** (IM V15) | **IM 2031** (IM V36)

Face mounted form (FT with tapped holes)



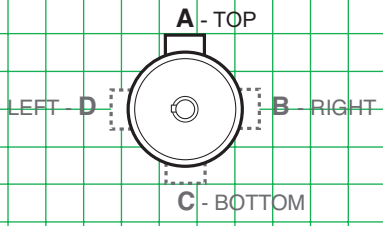
IM 3601 (IM B14) | **IM 3611** (IM V18) | **IM 3631** (IM V19) | **IM 2101** (IM B34) | **IM 2111** (IM V58) | **IM 2131** (IM V69)

Terminal box positions

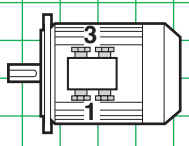


Motor with fixing feet

Cable gland positions



Motor with fixing flange
A - Top: standard
B - Right
C - Bottom
D - Left



All tapped holes
closed by plugs
1 - Right
3 - Left

Name

Designation Compabloc Cb

Cb	3233	30.3	S	S	B7	MI

Gearbox series

Cb: Compabloc standard

10 sizes

15--, 30-- to 38--

Manufacturer index

--31: 1 stage
--33: 2, 3 stages
--35: combined

Exact reduction rounded to 3 digits

(rounding 0.005)

1.16 ---> 252 (1 to 3 stages)
224 ---> 40490 (combined)

Fixing form

S
with feet

BS, BD
with flange

BR
with reinforced flange

BT
with face mounted form

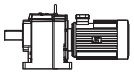
Output shaft definition

S: solid cylindrical keyed

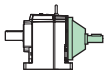
Operating positions

with feet S, SBS, SBD:
B3, B6, **B7**, B8, V5, V6
with flange BS, BD, BR:
B5, B52, B53, B54, V1, V3

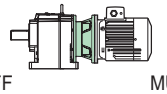
Input type



MI: integral mounting with adapted motor



AP



MUFF
(B5 IEC motor)

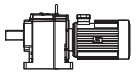
MUFC
(NEMA motor)

Option

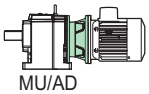
SBS, SBD

Option

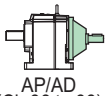
with backstop :



MI/AD



MU/AD



AP/AD
(Cb 36 to 38)

specify clockwise
or counter-clockwise

Name

Designation Manubloc Mub

Mub	3433	61.1	BT	H	B5	MI

Gearbox series

Mub: Manubloc standard

8 sizes

3132, 32--, 33--, **34--**, 35--; 36--, 37--, 38--

Manufacturer index

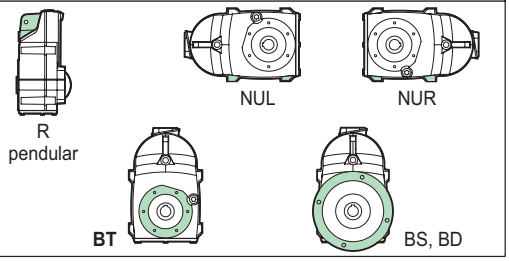
--32: 2 stages
--33: 3 stages
--35, --36: combined

Exact reduction rounded to 3 digits

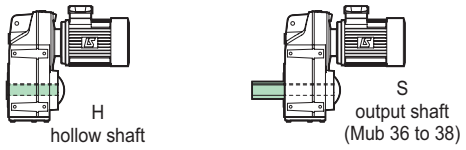
(rounding 0.005)

3.92 ---> 318
240 ---> 21100 (combined)

Fixing form



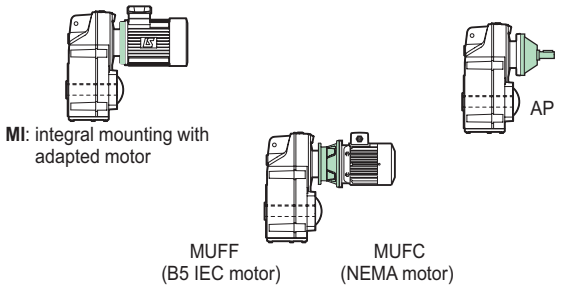
Output shaft definition



Operating positions

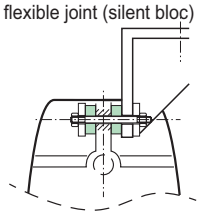
Pendular R, machined lateral face NU:
B3, B6, B7, B8, V5, V6
with flange:
B5, B52, B53, B54, V1, V3

Input type



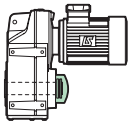
Option

FM: flexible joint (silent bloc)



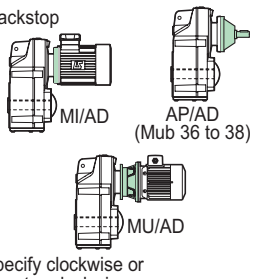
Option

SDB: shrink disc



Option

Backstop



specify clockwise or counter-clockwise

Name

Designation Poulibloc Pb

Pb	2020	20.6	RK	WTB	40H7	M	AP

Gearbox series

Pb: Poulibloc
Pb 2000
Pb, Pbh 3000

Gearboxes size

Pb 2000: 8 sizes
20-- to 27--
Pb 3000: 3 sizes
30-- to 32--

Manufacturer index

Pb 2000: --05, --12, --15, --**20**, --25 (iaR)
Pb 3000: --05, --08 (iaR)

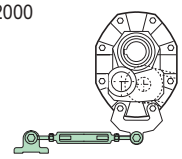
Exact reduction rounded to 3 digits

(rounding 0.005)

Pb 2000: 5.69 ---> 26.1
Pb, Pbh 3000: 5 and 8

Fixing form

Pb 2000



RK
(torque arm kit)

Pb, Pbh 3000

NU

Output shaft

Pb 2000

WTB
with taper bush

FTB
(for taper bush)

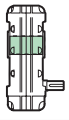
Pb, Pbh 3000

H
(keyed hollow)

Dimension (bush, shaft)

Pb 2000:
taper bush: Ø 20 to 120 mm

Pb, Pbh 3000:
saft: Ø 25 to 50 mm G7



Operating positions

M = multiposition

Input type

AP = mounting with input shaft

Option

Pb 2000 with AD backstop: specify clockwise or counter-clockwise

Name

Designation Multibloc Mb

Mb | 2401 | 40 | BS | L | H | V1 | MUT

Gearbox series
Mb: Multibloc

7 sizes
4101, 3101, 22--, 23--, **24**--, 25--, 26--

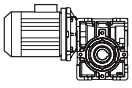
Manufacturer index
--**01**
--32, --33, --34 (combined)

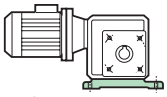
Exact reduction
(rounding 0.005)

5 ---> 100 (1 stage)
63.3 ---> 1420 (combined)

Fixing form


NU (BT Mb26)


S (Mb41)


NSD (Mb22 to 26)

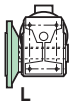
with flange:

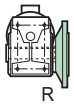

BS, BD (Mb41, 22 to 26)

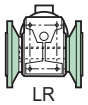

BN (Mb31, Mb22 to 25)

Fixing position (or orientation)

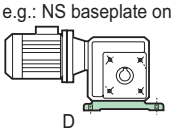
e.g.: Flange BS, BD, BN

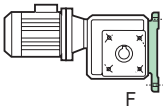

L

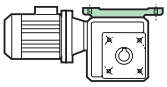

R


LR

e.g.: NS baseplate on face


D


F

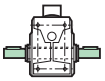

U

Output shaft


H


HL

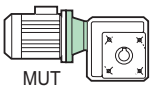

HR

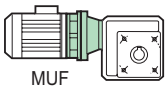

HLR

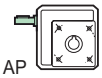
Operating positions

NU, with feet:
B3, B6, B7, B8, V5, V6 (Mb41: multipositions)
BS, BD, BN, **with flange:**
B5, B52, B53, B54, **V1**, V3 (Mb41: multipositions)

Input type


MUT
(Mb4101, 3101, Mb22 to 26)

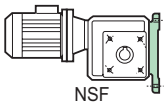

MUF
(Mb22 to 26)

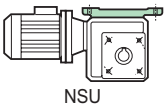

AP
(Mb22 to 26)

Option

Feet kit:

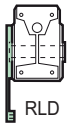

NSK

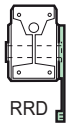

NSF


NSU

Torque arm kit:


RK


RLD


RRD

(Mb 41, 31, 22 to 25)

Name

Designation Multibloc Ot

Ot	3733	17.6	SBT	LR	H	B3	MI

Gearbox series
Ot: Orthobloc

9 sizes
31-- to 39--

Manufacturer index
--**33**: multistages
--35, --36: combined

Exact reduction
(rounding 0.005)

6.03 ---> 160
180 ---> 20000 (combined)

Fixing form


S
Feet


SBT
Face mounted form


BS, BD
with flange
(smooth hole)

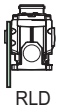

RK
Torque arm delivered in kit

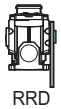
Option


SBS, SBD


BRR
(sizes 33 to 35)

Torque arm:


RLD


RRD

Fixing position (or orientation)


L


R


LR

Output shaft


H


L


R

Option


LR

Shrink disc (std mounting):

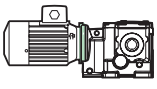

SDR

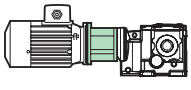

SDL

Operating positions

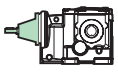
with feet:
B3, B6, B7, B8, V5, V6
with flange:
B5, B52, B53, B54, V1, V3

Input type


MI
Integral mounting with
adapted motor

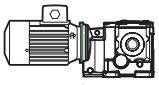

MUFF
(B5 IEC universal mounting motor)

MUFC
(NEMA motor)

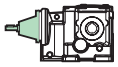

AP

Option

Backstop : specify clockwise
or counter clockwise

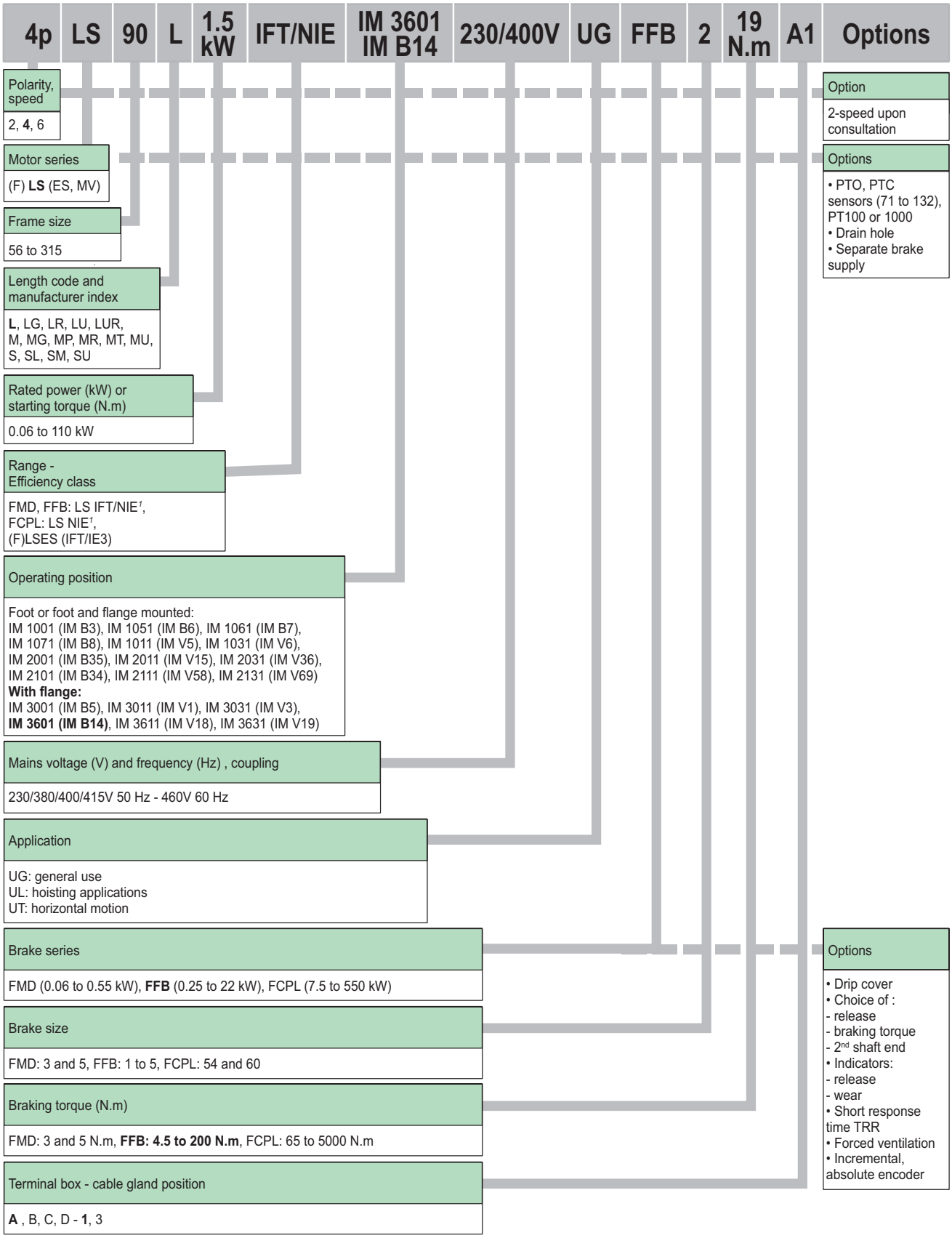

MI/AD


MU/AD


AP/AD (Ot 36 to 39)

Name

Designation Motor and brake

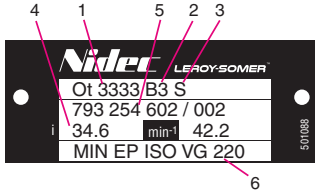


1. NIE: not in any efficiency class

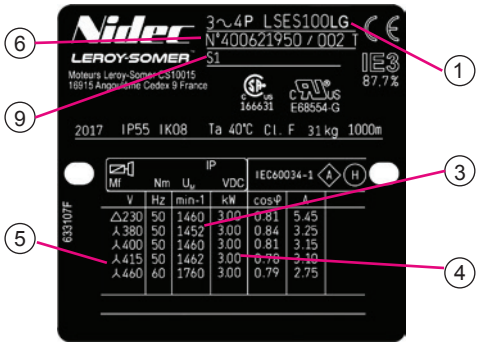
Nameplates

Check that the equipment conforms to the order: mounting arrangement, information on the Nidec Leroy-Somer nameplates.
Informations should be reminded whenever ordering spare parts.
Other logos can optionally be provided: agreement prior to ordering is essential.

Gearbox nameplate



Motor nameplate (for brake motor)



Brake nameplate (and drive informations)

Inverter supply plate:

Inverter settings: parameter setting the frequency inverter

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

min. Fsw (kHz): minimum cut-off frequency acceptable for the motor

Nmax (min^{-1}): maximum mechanical speed acceptable for the motor

Informations should be reminded whenever ordering spare parts

①	**Definition of gearbox**
②	Operating position
③	Fixing form (S: feet ; BS, BDn: flange), possible options
④	Exact reduction
⑤	N: manufacturing number
⑥	Lubricant

①	**3 ~ 4P LSES... : 3-phase motor, alternative, polarity, motor series, frame size**
②	FFB3: FFB brake type
③	min^{-1}: Speed of rotation
④	kW 3.00 : Rated power
⑤	V : Motor voltage
⑥	Motor and brake manufacturing number (2017: production year)
⑦	Mf 52 Nm: Braking torque (N.m)
⑧	U: Brake coil voltage (VDC)
⑨	S1: Duty - Operating factor
⑩	I : Coil current (mA)
⑪	Special marking (ATEX)
⑫	Nmax 4500 min^{-1}: Maximum speed use

Definition of symbols

T: Impregnation class
IE3, 87.7%: Efficiency class, Efficiency at 4/4 load
IP55, IK08: Ingress protection*
Cl.F: Insulation class
Ta 40°C: Ambient operating temperature
Cos P ou φ: Power factor
A: Rated current
Δ: Delta connection
人: Star connection
Hz: Supply frequency
*IK: Shock resistance
The motor can withstand a weak mechanical shock (IK 08 according to EN 50102). **The user must provide additional protection if there is a risk of significant mechanical shock.**

Bearings

DE: Drive End or Drive End bearing (side F)
NDE: Non Drive End or Non Drive End bearing (side B)
g: Amount of grease at each regreasing (in g)
h: regreasing interval (in h)
Polyrex EM 103: grease type
Ⓐ: Vibration level
Ⓗ: Balancing mode

		Nameplate			
		(F)LS(ES) motor	FFB brake	FMD brake	FCPL brake
CE	Legal mark of compliance of equipments with the requirements of European Directives	Frame size 56 to 315	Frame size 71 to 180	Frame size 56 to 71	Frame size 180 to 315
cULus	Legal mark of compliance of equipments with the USA and Canada markets	Frame size 56* to 315	-	-	-
UL	Legal mark of compliance of components of end-product with the requirements of USA and Canada markets	Optional Fr.size 56 to 71	-	-	-
CSA 166031	Legal mark of brake's compliance with the USA and Canada requirements	Frame size 80 to 315	Frame size 71 to 180	-	-
CSA	Legal mark of compliance of equipments with the USA and Canada requirements	*or optional Frame size 56 to 71	-	-	-

Storage - Installation recommendations

STORAGE

Store the equipment in a clean, dry location, protected from shocks, vibrations, variations in temperature (between -16°C and +50°C) and in an atmosphere with hygrometry below 80 %.

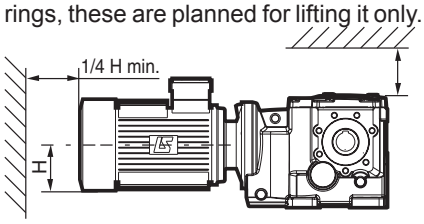
long-term storage (> 1 year)

Fill the gearbox fully with oil (upon start up, change the oil and top up as indicated in the manual of the gearbox concerned) except if the equipment is lubricated for life. Coat the external seal(s) with grease.

- Enclose the unit in a sealed plastic bag (e.g. thermogluing) with desiccant product inside.
- For brake geared motors with manual release, unlock the brake to avoid sticking.

Handling

- When the equipment is fitted with lifting rings, these are planned for lifting it only.



RECOMMENDATIONS OF INSTALLATION

Installation must be performed by qualified personnel.

- Mount the gearboxes onto rigid and flat supports free of vibration. Use screws of sufficient length and quality class (class 8.8 min) and tighten them at 70 % their elastic limit.
- Implement a sufficient distance around the geared motor to ensure accessibility to the plugs (or tank/exchanger § Lubrication - Servicing), as well as brake maintenance:
  - 200 mm: std G1/4' plug (Cb, Mub, Ot: 30 to 35), G1/4' (Pb 20 to 24), G1/8' (Mb 22 to 25);
  - 500 mm: G3/4' plug + dipstick (Cb, Mub, Ot: 36 to 39), G3/8' (Mb 26, Pb 25 to 27).
- Remove the protections from the shaft(s) and flange(s): plastic end pieces, oil or varnish (if necessary, use a solvent while avoiding any contact with the seals).
- For hollow shaft gearboxes in pendular mounting, do not forget to mount a torque arm (see appropriate catalogues).
- Mount the couplings, pinions, pulleys, etc. onto the shaft(s) as close as possible to the shoulder with the greatest care, preferably after heating.
- Check the radial load (§ Radial load; refer to selection catalogues).

a) For direct sleeve couplings, check the alignment of the axes, as per supplier recommendations.

b) For belt or chain transmissions, check the parallelism of the shafts; apply the recommendations of the manufacturers for belt tightening (do not tighten the chains).

- Protect all rotating parts to avoid bodily damage during use (as per legislation enforced in the country).

Do not install the geared motor in a position other than that planned in the order.

Lubrication - Maintenance

LUBRICATION

The Compabloc, Manubloc, Orthobloc 3000 reducer is shipped, as standard, with mineral Extreme Pressure oil: MIN EP ISO VG 220.

The Multibloc gearbox is supplied in standard lubricated with synthetic oil (see page 39).

The Pb 3000 gearbox is lubricated with grease for 10,000 hours operation.

The Pb 2000 and Pbh 3000 gearboxes must be lubricated after installation.

You MUST use an oil of the recommended type (next page).

Polyglycols lubricants cannot be mixed with mineral or synthetic lubricants of a different type.

Oil capacities

The oil capacities shown in table (see reference of the respective manuals of § Associated documents) are approximate: values should be used only as reference in determining how much oil to provide.

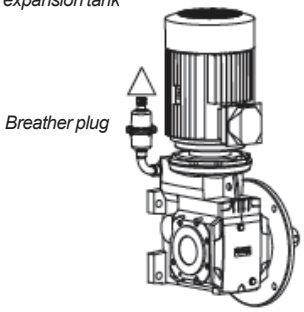
For the precise quantity, fill the gearbox up to its level plug (except for gearboxes lubricated for life).

Particular cases

• Lubrication kit:

for Cb, Mub and Ot gearboxes, installing a lubrication kit (manual reference 5088) is recommended in certain operating positions or depending on input speeds.

Example: Ot with flange, B54 operating position, with expansion tank



• Thermal exchanger:

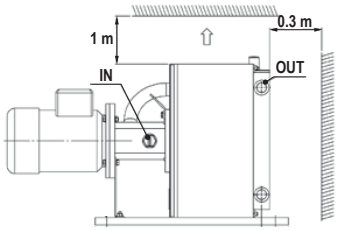
Cb, Mub and Ot gearboxes size 36 to 39 above the thermal limit may require an external cooling unit to maintain geared motor performance (manual reference 5217).

The thermal limit of the gearbox can be reached, according to the input speed, quantity of oil, operating position, reduction ratio; i.e. the maximum power ensuring the gearbox oil does not exceed 90°C in continuous duty.

Lubrication - Maintenance

Nidec Leroy-Somer offers an optional thermal exchanger, supplied separately with:
- maximum dissipation of 10 kW,
- maximum pump duty pressure: 40 l/min for 40 cSt -4bar
- maximum oil temperature
- 4-pole motor, IP 55, class F.

In this case, plan a sufficient distance around the geared motor (about 1m).



GEARBOXES LUBRICANT

Type gear	Gearbox range	Ambient temperature (°C) -40	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	Lubricant* Nature	Cl. ISO	VI ISO	AGIP	KLUBER	MOBIL	MOTUL	SHELL	TOTAL
helical	Cb 15--Cb 3000 Ot 3000 Mub 3000 Pb 2000 Pbh 3000												MIN	ISO	VG 220			**Mobilgear 600 XP 220** (-24°C)	**SUPRACO** MPL220 (-12°C)	**Omala S2 GX220** ex Omala 220-G200 (-24°C)	**Carter EP220** (-24°C)
			1										PAO	ISO	VG 150			**SHC CIBUS 150** ex SHC 629 (-45°C)	**SAFCOGEAR SY150**	**Omala S4 GXV150** ex Omala HD/GX150 (-48°C)	
		1											PAO	ISO	VG 32			**SHC 624** (-54°C)			
													PAO	ISO	VG 460			**SHC CIBUS 460** ex SHC 634 (-42°C)	**SAFCOGEAR SY460**	**Omala S4 GXV460** ex Omala HD/GX460 (-42°C)	
			1										PAO Food.H1	ISO	VG 150		**Klüberoil 4UH1 150** (-30°C)				**Nevastane SL 150**
worm and wheel	Mb 22 to 26										2	2	PAO	ISO	VG 460			**SHC CIBUS 460** ex SHC 634 (-42°C)	**SAFCOGEAR SY460**	**Omala S4 GXV460** ex Omala HD/GX460 (-42°C)	
			1										PAO	ISO	VG 150			**SHC CIBUS 150** ex SHC 629 (-45°C)	**SAFCOGEAR SY150**	**Omala S4 GXV150** ex Omala HD/GX150 (-48°C)	
		1											PAO	ISO	VG 32			**SHC 624** (-54°C)			
											2	2	PAO Food.H1	ISO	460		**Klüberoil 4UH1 460** (-30°C)	**SHC CIBUS 460** ex SHC 634 (-42°C)			
	Mb 31										2	2	PG	ISO	VG 220					**Omala S4 WE220** ex Tivéla WB (-27°C)	
	Mb 41												PG	ISO	VG 320	**Télium VSF**					

** Lubricants: MIN = MINERAL; PAO = POLYALPHAOLEFINE; PG = POLY-GLYCOLS*
1. Caution! Critical behaviour during cold starts (power reserve and fragile seals)
2. Caution! Machine derated at high temperature
(-xx°C): Pour point

Standard Leroy-Somer lubricant

MAINTENANCE

Control after commissioning (50 hours of operation).

Check tightening of fastening screws and belt tensioning if applicable.

Preventive maintenance visit:
- Check regularly that the recommendations concerning mechanical and electrical installation are still complied with.
- If the gearbox is fitted with a breather plug, make sure that the vent hole of the plug is not obstructed.
- Inspect the seals.
- Clean the ventilation louvres of the motor.
- Lubricate the bearings of the motors fitted with grease nipples.
- Control the air gap of brake motors.

Cb, Mub, Ot

Oil, bearings, seals, AD.

6 months	Adjust oil level. Inspect the seals.
3 years (or 5,000 h)	Drain and refill mineral oil. Change the seals. Change the grease of regreasable bearings.
5 years (or 25,000 h)	Drain and refill synthetic oil. Change the seals. Change the grease of regreasable bearings.

Mb

Always check the condition of the seal item 093 on the worm, on the motor input side. Change if necessary (Prevent drying the lip seal).

Greaser on AP Cb 34-35, Mub 34- 35, Ot 35.

- Replace the grease ISO VG 100, NLGI 2, after 12,000 h (25°C; 1500 rpm)

Storage period	< 1 year	AP can be commissioned without regreasing.
	>1 and <2 years	Regrease before commissioning.
	2 to 5 years	Dismantle AP. Clean it. Replace the grease completely.

Despite all the care taken in the manufacture and checking of this equipment, Nidec Leroy-Somer cannot guarantee that lubricant will not escape during the product's lifetime. If these leaks could have serious consequences for the safety of people and property, the installer should take all necessary precautions to avoid such consequences.

Definition of the duty factor: fixed speed

Gearboxes must be selected according to criteria of equal importance:
- motor power or output torque,
- output speed and input speed (or reduction ratio),
- application (or duty factor).

Some of these applications are listed in the "AGMA" (American Gear Manufacturers Association).
The table below summarises the relationship between the "AGMA" class and the gearbox duty factor Kp.

"AGMA" class	Gearbox duty factor K_p
I	1
II	1.4
III	2

A - Your application is listed
Follow the indicative load classification table according to "AGMA", page 42.

B - Your application is not listed
The "AGMA" selection class is defined by the daily operating time and the type of operation of the application, according to the opposite table.

Type of application	Daily operating time	"AGMA" class
Shock-free, few starts	10 hours/day	I
Damped shocks	10 hours/day	II
Shock-free, few starts	24 hours/day	
Violent shocks, many starts	10 hours/day	III
Damped shocks	24 hours/day	

The duty factor for gearbox depends on:
1) the daily running time expressed in hours per day (**h/d**);
2) the starting frequency ***Z*** (**s/h**).
For 2-speed motor drives, each gear shift is considered to be similar to 1 start.
When used with a starter or a frequency inverter, the starting torque limitation allows omitting starting when determining the **K** factor necessary.

3) the inertia factor ***FJ***:

$$FJ = \frac{J_{C/M}}{J_M}$$

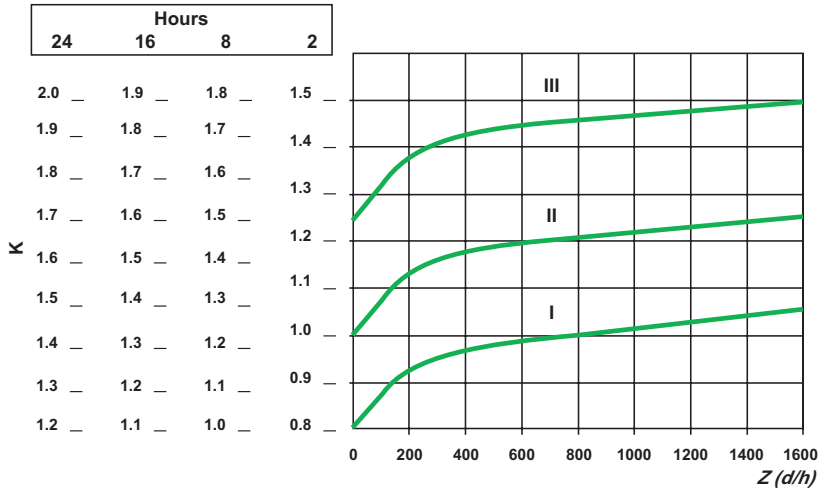
- $J_{C/M}$: moment of inertia of the load at the motor shaft;
- J_M: moment of inertia of the motor.

Ratio between the load inertia and the motor inertia: curves I, II, III.

Class of application	I	II	III
FJ	≤ 0.25	≤ 3	≤ 10
Type of operation	Even (smooth)	Damped shocks	Violent shocks

For applications with a *FJ* factor > 10, consult the Leroy-Somer technical services.

Duty factor **K**
(electric motor drive)



Definition of the duty factor: fixed speed

Worm and wheel gearboxes must be selected according to:
- K1 duty factor depending on the inertia factor, operating time and starting frequency;
- K2 duty factor depending on the operating factor.

The global duty factor **K** for drive by induction motor is the product K1 x K2.
We recommend determining precisely the duty factor **K** necessary for gearbox selection, in the best possible conditions of reliability, safety and saving.
The duty factor **K1** depends on:
- the daily running time expressed in hours per day (**h/d**),
- the starting frequency **Z (d/h)**.

For 2-speed motor drives, each change in speed is considered to be similar to 1 start. When used with a starter, the starting torque limitation allows omitting starting when determining the K factor necessary.
- Inertia factor ***FJ***:

$$FJ = \frac{J_{C/M}}{J_M}$$

- $J_{C/M}$: moment of inertia of the load at the motor shaft;
- J_M: moment of inertia of the motor.

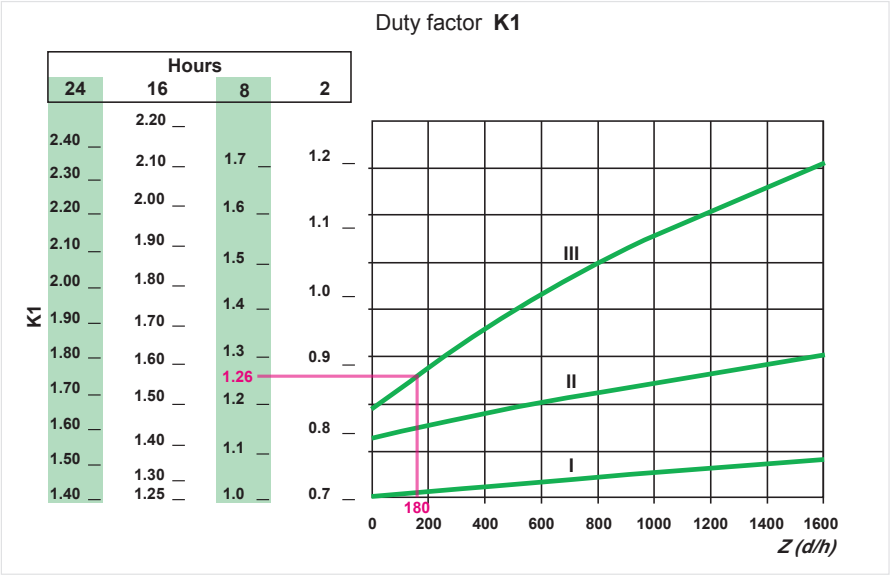
The value of ***FJ*** indicates the application class and type of overload.
If ***FJ*** has not been calculated, consider the type of overload required to the application according to the following table:

Type of overload	None	Average	Heavy
FJ	≤ 0.2	≤ 3	≤ 10*
Class of application	I	II	III

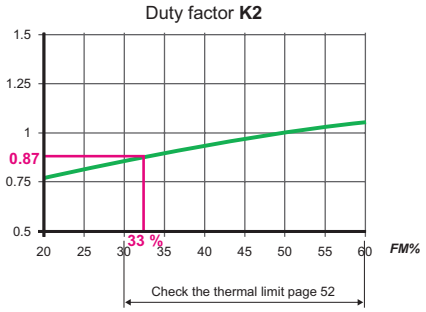
** For FJ > 10, please consult Leroy-Somer.*

The duty factor K2:
In the sizing of wheel and screw gearboxes, the operating factor ***FM***, expressed in %., must be considered

$$FM = \frac{\text{Operating time during cycle}}{\text{Total cycle time}}$$



The following graph defines the **K2** factor according to the operating factor expressed as a %.



The global duty factor required for the application is:

K = K1 x K2

The selections are given for gearbox duty factors above 0.8. If the applications seems to require a duty factor < 0.8, refer to our technical services for a choice adapted to the gearbox.

Example of calculation of the global service factor:
- daily operating time 8h/d;
- starting frequency of the application, Z = 180 s/h;
- moment of inertia of the application: 0.0064 kgm^2;
- motor moment of inertia: 0.0016 kgm^2.

CALCULATING *FJ*
Determination of the inertia factor ***FJ*** for the application.

$$FJ = \frac{J_{C/M}}{J_M} = \frac{0.0064}{0.0016} = 4$$

The application class is III for an operation with heavy overloads. The graph of the duty factor K1 indicates the following for 8 h/d and 180 s/h: K1 = 1.26
Knowing that the application operates 20 min/h under load,

$$FM\ \% = \frac{20}{60} \times 100 = 33\ \%$$

the graph of determination according to the operating factor gives a value of: K2 = 0.87
The global duty factor is:

1.26 x 0.87 = 1.10

Directory of applications according to AGMA

Directory of applications according to AGMA

OPERATION in hours/day	3 h/day	10 h/day	24 h/day
COOLING TOWERS	-	-	-
AGITATORS			
liquids with variable density	II	II	II
liquids and solids	II	II	II
pure liquids	I	I	II
semi-liquids, variable density	II	II	II*
FOOD AND BEVERAGE INDUSTRY			
cereal cookers	I	I	II
beet choppers	II	II	II
meat choppers	II	II	II
dough mixers	I	II	II
extruding machines	I	II	III
FEEDING (attachment)			
reciprocating	III	III	III*
disks	I	I	II
lattice	I	II	II
belt	I	II	II
screw	I	II	II
TRANSMISSION SHAFT			
loads with moderate shocks	I	II	II
loads with severe shocks	III	III	III*
constant loads	I	I	II
CLAY (industry)			
brick machines	III	III	III*
processing machines	II	II	II
mixers	II	II	II
brick presses	III	III	III*
TIPPERS	III	III	
TIMBER (industry)			
supplying:			
saws in series	III	III	III*
shape-cutting machines	II	II	III
planers	II	II	III
cutting	II	II	III
chains	II	II	III
turntable control	I	II	III
main conveyors	I	II	III
ball conveyors	III	III	III*
circular feed conveyors	I	II	III
burner conveyors	I	II	III
waste conveyors	I	II	II
plank conveyors	III	III	III*
transfer conveyors	I	II	III
devices:			
for planer inclination	I	II	III
for ball turning	III	III	III*
barking machine, feeder	II	II	III
main drive system barking machine	III	III	III*
roller drive system	III	III	III*
haulage of balls:			
inclined	III	III	III*
well	III	III	III*
cross-cut saws:			
chain	II	II	III
reciprocating	II	II	III
sorting tables	I	II	III
ball support plates	III	III	III*
barking drums	III	III	III*
peeling tower	-	-	-
transfer:			
on bogies	I	II	III
chain	I	II	III
BREWERIES, DISTILLERIES			
boilers, continuous duty			II
cookers, continuous duty			II
brewing vats, continuous duty			II
bottling machines	I	I	II
scaling hoppers:			
frequent starts	II	II	III
GRINDERS			
minerals	III	III	III*
stones	III	III	III*
HAMMER MILLS	III	III	III*
ROTARY GRINDERS			
rod mills	III	III	III*
ball mills	III	III	III*
pebble mills	III	III	III*
RUBBER (industry)			
air chamber extruder	II	II	II

OPERATION in hours/day	3 h/day	10 h/day	24 h/day
grinders (2 or more)	II	II	II*
calenders	II	II	II*
extruding machines	II	II	III
sheet forming machines	I	II	II*
mixers	III	III	III*
CLARIFIERS	I	I	II
SORTERS, GRADERS	I	II	II
COMPRESSORS			
lobe	I	II	II
centrifugal	I	II	II
CONVEYORS (loaded or fed uniformly)			
belt	I	I	II
chain	I	I	II
apron	I	I	II
bucket	I	I	II
scraper	I	I	II
screw	I	I	II
assembly	I	I	II
furnace	I	I	II
CONVEYORS (loaded or fed non-uniformly)			
heavy duty:			
belt	II	II	II
chain	II	II	II
apron	II	II	II
bucket	II	II	II
scraper	II	II	II
roller	I	I	II
screw	II	II	II
reciprocating	III	III	III*
assembly	II	II	II
furnace	II	II	II
vibratory	III	III	III*
removal	I	I	-
CANE KNIVES	II	II	III
SIEVES			
rotary	I	II	III
stone washer with water circulation	I	I	II
DREDGERS			
shaker control	III	III	III*
cutting head control	III	III	III*
sieve control	III	III	III*
conveyors	I	II	II
pumps	I	II	II
cable winding drums	I	II	-
handling winches	II	II	-
service winches	II	II	-
CONTROL (vehicle)	II	II	II
ELEVATORS			
centrifugal unloading	I	I	II
gravity unloading	I	I	II
escalators	I	II	III
buckets:			
continuous load	I	I	II
heavy load	II	II	II
uniform load	I	I	II
material hoist	III	III	-
WINDING MACHINES	–	–	–
FILTERS	I	II	III
FURNACES			
dryers, coolers	I	II	II
tumbling barrels	III	III	III*
CRANES AND LIFTING			
moving truck	-	-	-
moving bridge	-	-	-
bucket winches	-	-	-
hoisting gear	-	-	-
WINDLASSES, CAPSTANS	II	II	II*
PRINTING (presses)	I	I	II
PACKAGING MACHINES			
stackers	II	III	III
wrapping machines	I	I	II
WASHING MACHINES			
drum	II	II	II
reversible	II	II	II
MACHINE TOOLS			
main drive system	I	II	II
auxiliary drive system	I	I	II
punching machines (geared)	III	III	III*
flat planers	III	III	III*

OPERATION in hours/day	3 h/day	10 h/day	24 h/day
bending rollers	II	II	II
nut tappers	II	III	III*
shears	III	III	III
MIXERS			
constant density	I	I	II
variable density	I	II	II
cement, continuous duty	I	II	II
cement, intermittent duty	I	I	-
METALLURGY (industry)			
drawing frames, carriage	III	III	III*
drawing frames, main control	III	III	III*
table conveyor:			
single direction of operation	I	II	III
reverse operation	III	III	III
wire winders	I	II	II
sheet metal winders	I	II	II
spreading roller drive	III	III	III*
splitting lines	II	II	III
wire drawing mills, flatteners	II	II	III
shape-cutting machines	III	III	III*
separating rollers	-	-	-
drying rollers	-	-	-
PAPER (industry)			
aerators	-	-	-
agitators, mixers	I	II	II
wind up turrets	I	I	II
calenders	I	II	II*
conveyors	I	II	II
ball conveyors	III*	III*	III*
cutters, plating machines	I	II	II
bleaching vats	I	II	II
cylinders	I	II	II
felt stitching machines	III*	III*	III*
washers, thickeners	I	II	II*
barking machines (mechanical)	III	III	III
pulp machines, uncoilers	I	II	II
pulp hammers	II	II	II*
presses	I	II*	II*
suction rollers	I	II	II*
dryers	I	II	II*
wood pulp storing machines	I	II	II
barking drums	III	III	III*
felt tension devices	I	II	II
PUMPS			
reciprocating:			
multi-cylinder single-acting	I	II	II
centrifugal	I	I	II
dosing	I	II	II*
rotary:			
geared	I	I	II
lobed, vaned	I	I	II
SEWAGE PLANTS			
surface aerators	III	III	III
duck type aerators	III	III	III
bar screens	I	I	II
screw pumps	I	II	III
TEXTILES			
reelers (except drum)	I	II	II
calenders	I	II	II
padding calenders	I	II	II
carding machines, spinners	I	II	II*
alignment controls	-	-	-
glueing machines	I	II	II
drying machines, mangles	II	II	II
napping mills	I	II	II
washing machines	I	II	II
soap milling machines	I	II	II
dyeing machines	I	II	II
knitting machines	-	-	-
cloth finishing machines:			
washers, spreading machines	I	II	II
dryers, calenders	I	II	II
thread preparation machines:			
weaving looms	II	III	III
spinning machines	I	I	II
dryers	I	II	II
loading hoppers	II	II	II
VENTILATION	-	-	-

** : These classes assume minimum and normal conditions. To take account of variations which may affect the load conditions, it is recommended that applications are carefully researched before making a selection.*

-: Call Leroy-Somer

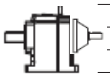
Radial load

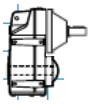
RADIAL FORCE ON THE INPUT SHAFT

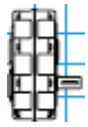
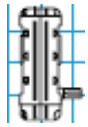
The input shaft of gearboxes driven by a motor other than by semi-elastic coupling is subject to a radial load.

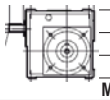
The following tables indicate the minimum diameter of the pulley to install (according to the type of transmission) at the centre of the gearbox input shaft at EP/2.

Drive diameter in millimetres

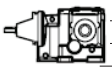
Gearbox	Size	Chain sprocket	Toothed pulley	Gear pinion	V-belt pulley	Flat pulley	Variable pulley
Compabloc	**Cb 38**	167	250	208	250	417	583
	**Cb 37**	133	200	167	200	333	467
	Cb 36	133	200	167	200	333	467
	Cb 35	100	150	125	150	250	350
	Cb 34	83	125	104	125	208	292
	Cb 33	67	100	83	100	167	233
	Cb 32	40	60	50	60	100	140
	Cb 31	33	50	42	50	83	117
	Cb 30	27	40	33	40	67	93
	Cb 15	27	40	33	40	67	93

Gearbox	Size	Chain sprocket	Toothed pulley	Gear pinion	V-belt pulley	Flat pulley	Variable pulley
Manubloc	**Mub 38**	167	250	208	250	417	583
	**Mub 37**	167	250	208	250	417	583
	Mub 36	133	200	167	200	333	467
	Mub 35	100	150	125	150	250	350
	Mub 34	83	125	104	125	208	292
	Mub 33	67	100	83	100	167	233
	Mub 32	40	60	50	60	100	140
	Mub 3132	33	50	42	50	83	117

Gearbox	Size	Chain sprocket	Toothed pulley	Gear pinion	V-belt pulley	Flat pulley	Variable pulley
Poulibloc	**Pb 27xx**	133	200	167	200	333	467
	**Pb 26xx**	100	150	125	150	250	350
	Pb 2605	83	125	104	125	208	292
	Pb 25xx	100	150	125	150	250	350
	Pb 2505	83	125	104	125	208	292
	Pb 24xx	100	150	125	150	250	350
	Pb 2405	83	25	104	125	208	292
	Pb 23xx	100	150	125	150	250	350
	Pb 2305	71	106	88	106	177	247
	Pb 22xx	83	125	104	125	208	292
	Pb 2205	63	95	79	95	158	222
	Pb 21xx	83	125	104	125	208	292
	Pb 2105	60	90	75	90	150	210
	**Pb 20xx**	83	125	104	125	208	292
	Pb 2005	60	90	75	90	150	210
	Pb 3308	200	300	250	300	500	700
	Pb 32xx	167	250	83	250	167	583
	Pb 31xx	133	67	167	200	333	467
	Pb 3005	133	67	167	200	333	467

Gearbox	Size	Chain sprocket	Toothed pulley	Gear pinion	V-belt pulley	Flat pulley	Variable pulley
Multibloc	**Mb 26**	111	167	139	167	278	390
	**Mb 25**	100	150	125	150	250	350
	Mb 24	83	125	104	125	208	292
	Mb 23	67	100	83	100	167	233
	Mb 22	40	60	50	60	100	140
	Mb 41, 31[1]	-	-	-	-	-	-

1. Mb 4101, 3101: the input flange MUT F85 integral with the casing does not allow for a drive other than a motor.

Gearbox	Size	Chain sprocket	Toothed pulley	Gear pinion	V-belt pulley	Flat pulley	Variable pulley
Orthobloc	**Ot 39**	167	250	208	250	417	583
	Ot 38	167	250	208	250	417	583
	Ot 37	133	200	167	200	333	467
	**Ot 36**	133	200	167	200	333	467
	Ot 35	83	125	104	125	208	292
	Ot 34	67	100	83	100	167	233
	Ot 33	40	60	50	60	100	140
	Ot 3232-33	33	50	42	50	83	117
	Ot 3132	33	50	42	50	83	117

Radial load

RADIAL FORCE ON THE OUTPUT SHAFT

All gearboxes and geared motors, connected to the load by a means other than a hollow shaft or a semi-elastic sleeve, are subject to a radial load F_r approximately equal to:

$$F_r = (M_{uS} / rp) \times \delta$$

where F_r is expressed in N, M_{uS} the (working) torque requested by the application in N.m and ***rp*** the primitive radius of the pulley or pinion in m.

The coefficient δ (see table below) depends on the type of transmission.

Values of δ

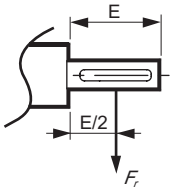
Drive type	δ
Chain sprocket	1
Toothed pulley	1.5
Gear pinion	1.25
V-belt pulley	1.5
Flat pulley	2.5
Variable pulley	3.5

The radial load F_r acceptable by a gearbox always depends on:
- bearing life,
- mechanical strength of the shaft and the other elements,
- configuration of the output shaft (with or without flange),
- distance between the shaft shoulder and point of application of this load,
- shaft rotation speed,
- shaft rotation direction,
- output torque, direction of this load.

The selection tables in technical catalogues indicate the radial load acceptable at E/2 for the following mechanical executions:
- Std shaft for Cb, foot mounting form,
- Std shaft to the left for Mb NU or foot mounting form,
- Std shaft to the left or right for Ot with foot mounting form.

For the Manubloc (Mub) range, the gearbox is designed to operate in pendular mounting; the values listed are for the user machine's shaft fitted in Mub's hollow shaft H.
For the version Mub 36 to 38 with solid output shaft, our gearboxes can support more important loads. In case of doubt or for real values, consult Nidec Leroy-Somer.

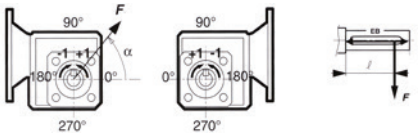
For hazardous applications (hoisting, transport of persons, etc.), the user or recommender shall be liable for checking the level of safety with regards to the application and/or the standards. Within this framework, please consult for advice based on a precise specifications.



Worm and wheel gearboxes (Mb)

The tables in pages 46, 47 indicate the radial load F_r acceptable at the centre of the output shaft, in the least favourable HL, HR or HLR configurations.
Therefore, many of our gearboxes can withstand much higher loads. For optimized values in worm and wheel gearboxes, indicate the actual values of the parameters mentioned in the § Radial load on output shaft (opposite) and using the following diagrams as reference.

Rotation and direction of the radial load *F*



For a standard shaft (without flange on shaft side) HL or HR, use the following values in the calculations:

Type	K_{rr}	K_{ra}
Mb 31--	$\frac{90}{70+\ell}$	$\frac{25}{5+\ell}$
Mb 22--	$\frac{107}{80+\ell}$	$\frac{30}{5+\ell}$
Mb 23--	$\frac{120}{90+\ell}$	$\frac{35}{5+\ell}$
Mb 24--	$\frac{140}{105+\ell}$	$\frac{40}{5+\ell}$
Mb 25--	$\frac{174}{129+\ell}$	$\frac{50}{5+\ell}$
Mb 26--	$\frac{176}{126+\ell}$	$\frac{55}{5+\ell}$

Radial load

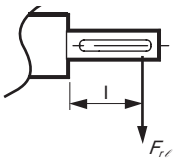
RADIAL FORCE ON THE OUTPUT SHAFT

Helical gearboxes (Cb, Ot)
Correction to be made for a different point of application:
radial load: $F_{r\ell} = F_r \times \Psi$

In this case, check that the actual radial load required by the application does not exceed the force acceptable by the gearbox.

The bearings are designed for a radial load with a direction fixed with respect to the housing. Otherwise specify when ordering.

Comment: Reinforced bearings can be mounted optionally, allowing for higher radial forces on the output shaft. If required, refer to your usual Nidec Leroy-Somer contact.



Radial load acceptable at a distance ℓ from the shoulder

ℓ	Size of Compabloc multistage gearbox									
mm	38	37	36	35	34	33	32	31	30	15
5	1.260	1.261	1.235	1.264	1.253	1.197	1.167	1.160	1.254	1.178
10	1.245	1.241	1.214	1.235	1.219	1.164	1.129	1.115	1.156	1.112
15	1.229	1.222	1.193	1.206	1.186	1.133	1.094	1.074	1.073	1.053
20	1.214	1.203	1.172	1.179	1.155	1.104	1.061	1.036	**1**	**1**
25	1.199	1.184	1.153	1.154	1.126	1.076	1.029	**1**	0.800	0.800
30	1.184	1.166	1.134	1.129	1.099	1.049	**1**	0.833	0.667	0.667
35	1.170	1.149	1.115	1.105	1.072	1.024	0.857	0.714	0.571	0.571
40	1.156	1.132	1.097	1.082	1.047	**1**	0.750	0.625		
45	1.142	1.116	1.079	1.061	1.023	0.889	0.667	0.556		
50	1.129	1.100	1.063	1.040	**1**	0.800	0.600			
55	1.116	1.084	1.046	1.019	0.909	0.727	0.546			
60	1.103	1.069	1.030	**1**	0.833	0.667				
65	1.090	1.054	1.015	0.923	0.769	0.615				
70	1.078	1.040	**1**	0.857	0.714	0.571				
75	1.066	1.026	0.936	0.800	0.667	0.533				
80	1.055	1.013	0.875	0.750	0.625					
85	1.043	**1**	0.830	0.706	0.588					
90	1.032	0.944	0.778	0.667	0.556					
95	1.021	0.900	0.739	0.632	0.526					
100	1.011	0.856	0.699	0.600						
105	**1**	0.815	0.663	0.571						
110	0.955	0.773	0.636	0.546						
115	0.913	0.742	0.604	0.522						
120	0.875	0.708	0.583							
130	0.750	0.654	0.539							
140	0.700	0.607								
150	0.656	0.567								
160	0.618	0.531								
170	0.583									
180	0.553									
190	0.525									
200	0.505									

ℓ	Size of Compabloc single stage gearbox					
mm	35	34	33	32	31	30
5	1.513	1.407	1.405	1.339	1.268	1.306
10	1.422	1.330	1.317	1.234	1.164	1.185
15	1.341	1.260	1.238	1.145	1.076	1.085
20	1.269	1.198	1.169	1.068	**1**	**1**
25	1.204	1.142	1.106	**1**	0.800	0.800
30	1.146	1.090	1.051	0.833	0.667	0.667
35	1.093	1.043	**1**	0.714	0.571	0.571
40	1.044	**1**	0.875	0.625		
45	**1**	0.889	0.778	0.556		
50	0.900	0.800	0.700			
55	0.818	0.727	0.636			
60	0.750	0.667	0.583			
65	0.692	0.615	0.539			
70	0.643	0.571				
75	0.600	0.533				
80	0.563	0.625				
85	0.529	0.588				

ℓ	Orthobloc gearbox size								
mm	39	38	37	36	35	34	33	32	31
5	1.279	1.260	1.261	1.235	1.264	1.253	1.197	1.167	1.167
10	1.263	1.245	1.241	1.214	1.235	1.219	1.164	1.129	1.129
15	1.248	1.229	1.222	1.193	1.206	1.186	1.133	1.094	1.094
20	1.232	1.214	1.203	1.172	1.179	1.155	1.104	1.061	1.061
25	1.217	1.199	1.184	1.153	1.154	1.126	1.076	1.029	1.029
30	1.202	1.184	1.167	1.134	1.129	1.099	1.049	**1**	**1**
35	1.188	1.170	1.149	1.115	1.105	1.072	1.024	0.857	0.857
40	1.173	1.156	1.132	1.097	1.082	1.047	**1**	0.750	0.750
45	1.160	1.142	1.116	1.079	1.061	1.023	0.889	0.667	0.667
50	1.146	1.129	1.100	1.062	1.040	**1**	0.800	0.600	
55	1.133	1.116	1.084	1.046	1.019	0.909	0.727	0.546	
60	1.120	1.103	1.069	1.030	**1**	0.833	0.667		
65	1.107	1.090	1.054	1.015	0.923	0.769	0.615		
70	1.094	1.078	1.040	**1**	0.857	0.714	0.571		
75	1.082	1.066	1.026	0.936	0.800	0.667	0.533		
80	1.070	1.054	1.013	0.875	0.750	0.625			
85	1.059	1.043	**1**	0.830	0.706	0.588			
90	1.047	1.032	0.944	0.778	0.667	0.556			
95	1.037	1.021	0.900	0.739	0.632	0.526			
100	1.026	1.011	0.856	0.699	0.600				
105	**1**	**1**	0.815	0.663	0.571				
110	0.993	0.955	0.773	0.636	0.546				
115	0.947	0.911	0.742	0.604	0.522				
120	0.910	0.875	0.708	0.583					
130	0.780	0.750	0.654	0.539					
140	0.728	0.700	0.607						
150	0.682	0.656	0.567						
160	0.643	0.618	0.531						
170	0.606	0.583							
180	0.575	0.553							
190	0.546	0.525							
200	0.520	0.500							

Helical gears Manubloc (Mub) :
The table bellow gives correction values for the user machine's shaft fitted in Mub's hollow shaft H. For solid outpud shaft, our gearboxes can support more important loads. For optimised values with output shaft S on Mub 36 up to 38, consult Nidec Leroy-Somer.

ℓ	Manubloc gearbox size							
mm	38	37	36	35	34	33	32	31
5	1,688	1,835	1,872	1,262	1,244	1,279	1,250	1,246
10	1,667	1,809	1,841	1,237	1,217	1,240	1,212	1,197
15	1,646	1,784	1,809	1,213	1,192	1,204	1,176	1,152
20	1,626	1,759	1,685	1,190	1,167	1,170	1,143	1,109
25	1,606	1,714	1,577	1,168	1,143	1,138	1,111	1,070
30	1,587	1,610	1,482	1,146	1,120	1,107	1,081	1,034
35	1,568	1,517	1,398	1,126	1,098	1,078	1,053	**1**
40	1,524	1,435	1,323	1,106	1,077	1,051	1,026	0,908
45	1,448	1,361	1,255	1,087	1,057	1,025	**1**	0,826
50	1,379	1,294	1,194	1,068	1,037	**1**	0,943	0,747
55	1,317	1,234	1,139	1,050	1,018	0,926	0,887	0,674
60	1,260	1,179	1,088	1,033	**1**	0,862	0,826	0,619
65	1,208	1,128	1,042	1,016	0,933	0,805	0,759	0,598
70	1,159	1,082	**1**	**1**	0,875	0,753	0,691	
75	1,115	1,039	0,940	0,932	0,823	0,705	0,628	
80	1,074	**1**	0,885	0,872	0,775	0,661	0,586	
85	1,036	0,946	0,838	0,820	0,731	0,623	0,581	
90	**1**	0,894	0,797	0,774	0,689	0,592		
95	0,946	0,847	0,761	0,734	0,650	0,573		
100	0,895	0,805	0,729	0,699	0,615			
105	0,851	0,767	0,700	0,667	0,586			
110	0,812	0,732	0,673	0,638	0,564			
115	0,778	0,701	0,647	0,612	0,554			
120	0,748	0,673	0,622	0,586				
130	0,698	0,622	0,568	0,537				
140	0,657	0,578						
150	0,618	0,536						
160	0,577							
170	0,528							
180								
190								
200								

Worm and wheel gearboxes (Mb)
Radial load acceptable at a distance ℓ (mm), different from E/2 of the shoulder: $F_{r\ell}$

We calculate according to:

F_r : radial load acceptable at E/2

K_r : correction factor linked to output torque and speed (tables in next pages)

K_{rr} : correction factor linked to bearing lifetime

K_{ra} : correction factor linked to shaft resistance

When $K_r \geq 1$ two acceptable forces are calculated:

$F_{r\ell r} = K_{rr} \times K_r \times F_r$ (bearing)

$F_{r\ell a} = K_{ra} \times F_r$ (shaft)

The radial load acceptable is the smallest of the two values.

When $K_r < 1$ we also have:

$F_{r\ell r} = K_{rr} \times F_r$ (bearing)

$F_{r\ell a} = K_{ra} \times F_r / K_r$ (shaft)

The radial load acceptable is the smallest of the two values.

For an output shaft HL or HR for flange, use the following values in the calculations:

Type	K_{rr}	K_{ra}
Mb 41	-	$\frac{120}{97,5+\ell}$
Mb 31--	$\frac{116}{96+\ell}$	$\frac{51}{31+\ell}$
Mb 22--	$\frac{148}{123+\ell}$	$\frac{71}{46+\ell}$
Mb 23--	$\frac{162}{132+\ell}$	$\frac{77}{47+\ell}$
Mb 24--	$\frac{192}{157+\ell}$	$\frac{92}{57+\ell}$
Mb 25--	$\frac{211}{166+\ell}$	$\frac{87}{42+\ell}$
Mb 26--	$\frac{226}{180+\ell}$	$\frac{109}{59+\ell}$

Radial load

WORM AND WHEEL GEARBOX

Radial load on standard output shaft HL (left) **or HR** (right)

In two shaft ends configuration HLR, the force must be divided between the two shafts.

	M_{uS}	N_S (min^{-1})																	
	N.m	N_S < 20		N_S < 30		N_S < 40		N_S < 50		N_S < 70		N_S < 100		N_S < 150		N_S < 200		N_S < 250		N_S < 300	
		F_r	K_r	F_r	K_r	F_r	K_r	F_r	K_r	F_r	K_r	F_r	K_r	F_r	K_r	F_r	K_r	F_r	K_r	F_r	K_r
	22*																			890	-
	33*	2750	-													985	-				
	39			2215	-					1545	-										
Mb41	40											1345	-	1090	-						
	41					2040	-														
	45							1780	-												
Mb 31	15	3181	0.89	2759	0.77	2492	0.70	2302	0.64	2041	0.57	1795	0.50	1550	0.43	1395	0.39	1286	0.36	1203	0.34
	30	3026	0.87	2603	0.75	2337	0.68	2147	0.62	1887	0.55	1642	0.47	1398	0.40	1246	0.36	1138	0.33	1056	0.31
	50	2818	0.89	2396	0.76	2130	0.67	1941	0.61	1682	0.53	1438	0.45	1196	0.38	1046	0.33	940	0.30	861	0.27
	70	2611	0.97	2189	0.82	1924	0.72	1735	0.65	1476	0.55	1234	0.46	995	0.37	846	0.32	742	0.28	665	0.25
	85	2094	1.17	2034	0.97	1769	0.84	1580	0.75	1322	0.63	1081	0.52	843	0.40						
	100	1028	2.24	1028	1.83	1028	1.57	1028	1.39	1028	1.14	928	0.90								
Mb 22	30	5360	1.03	4780	0.89	4320	0.81	3990	0.74	3540	0.66	3120	0.58	2690	0.50	2420	0.45	2230	0.42	2090	0.39
	50	5230	1.02	4600	0.88	4150	0.79	3820	0.73	3370	0.64	2950	0.56	2520	0.48	2250	0.43	2060	0.40	1920	0.37
	70	5030	1.03	4430	0.88	3970	0.79	3640	0.72	3200	0.64	2780	0.55	2350	0.47	2090	0.41				
	100	4600	1.07	4180	0.91	3720	0.81	3400	0.74	2950	0.64	2530	0.55	2100	0.46						
	125	4050	1.16	3960	0.98	3500	0.86	3180	0.78	2730	0.67	2310	0.57								
	150	3270	1.37	3270	1.15	3270	1.01	2960	0.91	2510	0.77										
Mb 23	50	6690	0.85	5800	0.74	5240	0.67	4850	0.62	4290	0.55	3770	0.48	3260	0.41	2930	0.37	2700	0.34	2525	0.32
	70	6540	0.84	5660	0.73	5100	0.66	4700	0.60	4150	0.53	3630	0.47	3120	0.40	2790	0.36	2560	0.33	2390	0.31
	100	6330	0.84	5440	0.72	4880	0.65	4490	0.59	3935	0.52	3420	0.45	2900	0.38	2580	0.34				
	150	5970	0.85	5080	0.72	4520	0.64	4120	0.59	3580	0.51	3060	0.43	2550	0.36						
	200	5600	0.90	4720	0.76	4160	0.67	3770	0.60	3220	0.52	2700	0.43								
	250	5010	1.05	4359	0.87	3800	0.76	3400	0.68	2860	0.57										
Mb 24	70	8730	0.73	7580	0.63	6850	0.57	6320	0.53	5610	0.47	4930	0.41	4260	0.36	3840	0.32	3540	0.29	3310	0.28
	100	8540	0.72	7380	0.62	6650	0.56	6130	0.52	5420	0.46	4750	0.40	4070	0.34	3650	0.31	3350	0.28	3120	0.26
	150	8220	0.71	7060	0.61	6330	0.54	5810	0.50	5100	0.44	4430	0.38	3760	0.32	3340	0.29	3040	0.26	2820	0.24
	200	7900	0.70	6740	0.60	6010	0.53	5500	0.49	4780	0.42	4110	0.36	3450	0.31	3030	0.27	2730	0.24		
	250	7580	0.70	6420	0.59	5690	0.53	5180	0.48	4460	0.41	3800	0.35	3130	0.29	2720	0.25				
	300	7250	0.71	6100	0.60	5370	0.53	4850	0.48	4140	0.41	3480	0.34	2820	0.28						
	350	6930	0.74	5780	0.61	5050	0.54	4530	0.48	3820	0.41	3160	0.34								
	400	6610	0.78	5460	0.65	4730	0.56	4210	0.50	3500	0.42	2840	0.34								
	450	6290	0.88	5130	0.72	4410	0.62	3890	0.54	3180	0.45										
Mb 25	150	10950	0.55	9470	0.48	8540	0.43	7880	0.40	6970	0.35	6100	0.31	5240	0.26	4700	0.24	4300	0.22	4010	0.20
	200	10680	0.54	9210	0.47	8280	0.42	7620	0.38	6700	0.34	5840	0.29	4980	0.25	4430	0.22	4040	0.20	3740	0.19
	250	10420	0.53	8950	0.46	8020	0.41	7350	0.37	6440	0.33	5580	0.28	4710	0.24	4170	0.21	3780	0.19		
	300	10140	0.52	8690	0.45	7760	0.40	7090	0.37	6180	0.32	5320	0.27	4450	0.23	3910	0.20				
	350	9900	0.52	8420	0.44	7490	0.39	6830	0.36	5920	0.31	5060	0.26	4190	0.22						
	400	9630	0.51	8160	0.43	7230	0.38	6560	0.35	5660	0.30	4790	0.25								
	450	9360	0.51	7900	0.43	6970	0.38	6310	0.34	5390	0.29	4530	0.24								
	500	9110	0.50	7630	0.42	6710	0.37	6040	0.33	5130	0.28										
	600	8580	0.50	7110	0.41	6180	0.36	5510	0.32	4600	0.27										
	700	8060	0.50	6580	0.41	5650	0.35	4990	0.31												
	800	7530	0.52	6060	0.42	5130	0.35	4470	0.31												
Mb 26	300	12600	0.41	10810	0.36	9680	0.32	8880	0.29	7780	0.26	6740	0.22	5710	0.19	5070	0.17	4620	0.15	4280	0.14
	400	12100	0.40	10310	0.34	9180	0.30	8370	0.28	7280	0.24	6240	0.21	5220	0.17	4590	0.15	4140	0.14	3810	0.13
	500	11590	0.39	9800	0.33	8670	0.29	7870	0.26	6780	0.23	5750	0.19	4730	0.16	4110	0.14				
	600	11090	0.38	9300	0.32	8170	0.28	7370	0.25	6280	0.21	5250	0.18	4250	0.15						
	700	10580	0.37	8800	0.31	7670	0.27	6870	0.24	5780	0.20	4760	0.17								
	800	10080	0.36	8290	0.30	7170	0.26	6370	0.23	5280	0.19	4270	0.15								
	1000	9070	0.34	7290	0.28	6160	0.23	5370	0.20												
	1200	8060	0.33	6280	0.26	5160	0.21														
	1400	7050	0.33																		
	1600	6040	0.34																		

F_r: radial load acceptable at E/2 (N)

K_r: correction factor of the radial load acceptable for a distance different from E/2

M_{uS}: useful output torque required for the application (N.m)

N_S: output speed (rpm)

**Torque limitation for a maximum power of 750 W*

Radial load

WORM AND WHEEL GEARBOX
Radial load on standard output shaft HL (left) **or HR** (right) **with flange**

	M_{uS}	N_S (min^{-1})																	
	N.m	N_S < 20		N_S < 30		N_S < 40		N_S < 50		N_S < 70		N_S < 100		N_S < 150		N_S < 200		N_S < 250		N_S < 300	
		F_r	K_r	F_r	K_r	F_r	K_r	F_r	K_r	F_r	K_r	F_r	K_r	F_r	K_r	F_r	K_r	F_r	K_r	F_r	K_r
	22*																			690	-
	33*	2150	-													765	-				
Mb41	39			1910	-					1200	-										
	40											1050	-	850	-						
	41					1600	-														
	45							1390	-												
	15	1900	1	1900	1	1900	1	1786	0.94	1583	0.83	1393	0.73	1202	0.63	1083	0.57	998	0.53	933	0.49
	30	1850	1	1850	1	1813	0.98	1666	0.90	1464	0.79	1274	0.69	1085	0.59	966	0.52	883	0.48	819	0.44
Mb 31	50	1750	1	1750	1	1653	0.94	1506	0.86	1305	0.75	1116	0.64	928	0.53	811	0.46	729	0.42	668	0.38
	70	1650	1	1650	1	1492	0.90	1346	0.82	1146	0.69	958	0.58	772	0.47	656	0.40	576	0.35	516	0.31
	85	1600	1	1578	0.99	1372	0.86	1226	0.77	1026	0.64	839	0.52	654	0.41						
	100	1550	1	1458	0.94	1252	0.81	1106	0.71	907	0.58	720	0.46								
	30	1860	2.14	1860	1.86	1860	1.68	1860	1.55	1860	1.38	1860	1.21	1860	1.05	1750	0.94	1610	0.87	1510	0.81
	50	1790	2.15	1790	1.86	1790	1.67	1790	1.54	1790	1.36	1790	1.19	1790	1.02	1630	0.91	1490	0.83	1390	0.78
Mb 22	70	1690	2.21	1690	1.90	1690	1.70	1690	1.56	1690	1.37	1690	1.19	1690	1.01	1510	0.89				
	100	1450	2.45	1450	2.09	1450	1.86	1450	1.69	1450	1.47	1450	1.26	1450	1.05						
	125	1120	3.02	1120	2.55	1120	2.26	1120	2.05	1120	1.76	1120	1.49								
	150	490	6.66	490	5.58	490	4.89	490	4.41	490	3.74										
	50	2930	1.69	2930	1.47	2930	1.33	2930	1.23	2930	1.09	2790	0.96	2410	0.82	2170	0.74	2000	0.68	1870	0.64
	70	2870	1.69	2870	1.46	2870	1.31	2870	1.21	2870	1.07	2690	0.94	2310	0.80	2070	0.72	1900	0.66	1770	0.62
Mb 23	100	2760	1.70	2760	1.46	2760	1.31	2760	1.20	2760	1.06	2530	0.92	2150	0.78	1910	0.69				
	150	2460	1.80	2460	1.53	2460	1.36	2460	1.24	2460	1.08	2270	0.92	1890	0.77						
	200	1960	2.12	1960	1.79	1960	1.58	1960	1.43	1960	1.22	1960	1.03								
	250	990	3.93	990	3.26	990	2.85	990	2.55	990	2.14										
	70	4280	1.49	4280	1.29	4280	1.16	4280	1.08	4090	0.95	3600	0.84	3100	0.73	2800	0.65	2580	0.60	2410	0.56
	100	4230	1.47	4230	1.27	4230	1.15	4230	1.06	3950	0.93	3460	0.82	2970	0.70	2660	0.63	2440	0.57	2280	0.54
	150	4100	1.46	4100	1.26	4100	1.13	4100	1.03	3720	0.91	3230	0.79	2740	0.67	2430	0.59	2220	0.54	2050	0.50
	200	3900	1.47	3900	1.26	3900	1.12	3900	1.03	3490	0.89	3000	0.77	2510	0.64	2210	0.57	1990	0.51		
Mb 24	250	3640	1.52	3460	1.29	3640	1.14	3640	1.04	3250	0.89	2770	0.76	2280	0.63	1980	0.54				
	300	3290	1.61	3290	1.35	3290	1.19	3290	1.08	3020	0.92	2530	0.77	2050	0.62						
	350	2820	1.79	2820	1.50	2820	1.31	2820	1.17	2790	0.99	2300	0.82								
	400	2150	2.24	2150	1.85	2150	1.61	2150	1.43	2150	1.19	2070	0.96								
	450	920	4.98	920	4.07	920	3.49	920	3.08	920	2.52										
	150	8260	1.06	7820	0.96	7050	0.82	6500	0.76	5750	0.67	5040	0.59	4320	0.50	3870	0.45	3550	0.41	3310	0.39
	200	8460	1.04	7600	0.90	6830	0.81	6280	0.74	5530	0.65	4820	0.57	4110	0.49	3660	0.43	3330	0.39	3090	0.37
	250	8330	1.03	7380	0.89	6610	0.79	6070	0.73	5310	0.64	4600	0.55	3890	0.47	3440	0.41	3120	0.37		
	300	8160	1.03	7170	0.88	6400	0.78	5850	0.72	5100	0.62	4390	0.54	3670	0.45	3220	0.39				
	350	7960	1.03	6950	0.87	6180	0.78	5630	0.71	4880	0.61	4170	0.52	3460	0.43						
Mb 25	400	7730	1.03	6730	0.87	5960	0.77	5420	0.70	4670	0.60	3950	0.51								
	450	7450	1.04	6520	0.87	5750	0.77	5200	0.70	4450	0.60	3740	0.50								
	500	7130	1.05	6300	0.88	5530	0.78	4990	0.70	4230	0.59										
	600	6310	1.12	5870	0.93	5100	0.81	4550	0.72	3800	0.60										
	700	5200	1.28	5200	1.05	4670	0.90	4120	0.79												
	800	3480	1.78	3480	1.44	3480	1.22	3480	1.06												
	300	10020	0.94	8590	0.80	7700	0.72	7060	0.66	6180	0.58	5360	0.50	4540	0.42	4030	0.38	3670	0.34	3400	0.32
	400	9620	0.92	8190	0.78	7300	0.70	6660	0.63	5780	0.55	4960	0.47	4150	0.40	3650	0.35	3290	0.31	3030	0.29
	500	9220	0.90	7790	0.76	6900	0.67	6260	0.61	5390	0.53	4570	0.45	3760	0.37	3260	0.32				
Mb 26	600	8810	0.89	7390	0.75	6500	0.66	5860	0.59	4990	0.51	4180	0.42	3380	0.34						
	700	8410	0.89	6990	0.74	6100	0.65	5460	0.58	4600	0.49	3780	0.40								
	800	8010	0.90	6590	0.74	5700	0.64	5060	0.57	4200	0.47	3390	0.38								
	1000	7210	0.95	5790	0.77	4900	0.65	4270	0.56												
	1200	5420	1.18	4990	0.92	4100	0.76														

F_r: radial load acceptable at E/2 (N)

K_r: correction factor of the radial load acceptable for a distance different from E/2

M_{uS}: useful output torque required fot the application (N.m)

N_S: output speed (rpm)

**Torque limitation for a maximum power of 750 W*

Axial load

GEAR GEARBOXES (Cb, Mub, Ot)

The forces acceptable on the output shaft depend on the rotation speed and torque transmitted.

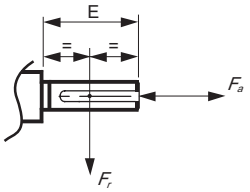
In the absence of radial load on the output shaft, the axial load acceptable at the output of the geared motor represents 50 % the radial load value given in the selection tables of the technical catalogues.

Direction of forces

F_a **+** = axial load by PULLING on the shaft end: TRACTION

F_a **-** = axial load by PUSHING on the shaft end: PRESSURE

F_r = radial load on the shaft end at E/2 from the shoulder.



For special constructions with reinforced flange (chosen for Agitation/Mixing application), in case of doubt or for applications with both radial and axial forces, consult your usual Leroy-Somer contact.

WORM AND WHEEL GEARBOXES

The axial load acceptable on the gearbox output shaft depends on the following parameters:
- speed of rotation,
- output torque,
- direction of rotation,
- reduction ratio,
- direction of the force.

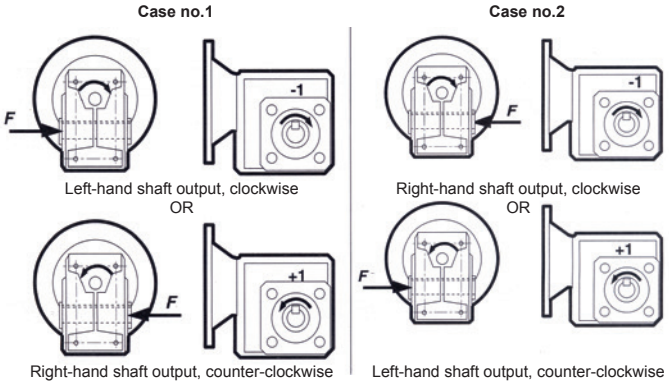
The rated load applicable along the axis of the output shaft is given in the following tables.

It can be applied with a radial load defined beforehand.

It has been determined for the values of parameters giving the least favourable results.

Therefore, in many cases, our gearboxes are able to withstand higher axial forces.

Nidec Leroy-Somer Technical Departments may determine their optimized value according to your application, provided the actual values of the parameters.



CASE no.1

	M_{uS} N.m	N_S (rpm)									
		N_S < 20	N_S < 30	N_S < 40	N_S < 50	N_S < 70	N_S < 100	N_S < 150	N_S < 200	N_S < 250	N_S < 300
Mb 31	15	2990	2994	2740	2497	2172	1881	1626	1469	1363	1306
	30	3031	3037	2790	2553	2233	1953	1733	1597	1508	1486
	50	3085	3095	2858	2627	2315	2049	1875	1768	1702	1726
	70	3139	3154	2926	2701	2396	2145	2018	1939	1895	1966
	85	3179	3197	2976	2757	2457	2216	2125	2067	2040	2147
	100	3220	3241	3027	2813	2518	2288	2232	2195	2186	2327

CASE no.2

	M_{uS} N.m	N_S (rpm)									
		N_S < 20	N_S < 30	N_S < 40	N_S < 50	N_S < 70	N_S < 100	N_S < 150	N_S < 200	N_S < 250	N_S < 300
Mb 31	15	2679	2684	2426	2181	1854	1556	1269	1094	972	881
	30	2409	2417	2162	1920	1596	1302	1019	846	727	637
	50	2048	2062	1811	1572	1253	963	685	516	399	312
	70	1687	1707	1460	1224	910	625	352	186	72	
	85	1417	1441	1197	963	652	371	102			
	100	1146	1175	934	702	395	117				

CASE n°1 or 2

	M_{uS} N.m	N_S (min^{-1})									
		N_S < 20	N_S < 30	N_S < 40	N_S < 50	N_S < 70	N_S < 100	N_S < 150	N_S < 200	N_S < 250	N_S < 300
Mb 41	22*								280		160
	33*	2000									
	39		1800			990					
	40						770	430			
	41			1500							
	45				1300						

** Torque limitation for a maximum power of 750 W*

Axial load

CASE no.1

	M_{uS} N.m	N_S (rpm)									
		$N_S < 20$	$N_S < 30$	$N_S < 40$	$N_S < 50$	$N_S < 70$	$N_S < 100$	$N_S < 150$	$N_S < 200$	$N_S < 250$	$N_S < 300$
Mb 22	30	4853	4314	3815	3471	3031	2641	2321	2104	2026	1897
	50	4922	4379	3877	3531	3103	2730	2467	2268	2253	2122
	70	4991	4444	3939	3591	3175	2820	2612	2433	2480	2347
	100	5095	4542	4031	3681	3283	2955	2831	2680	2820	2685
	125	5185	4624	4108	3756	3374	3067	3013	2886	3104	2967
	150	5267	4705	4185	3831	3464	3179	3195	3091	3387	3248

CASE no.2

	M_{uS} N.m	N_S (rpm)									
		$N_S < 20$	$N_S < 30$	$N_S < 40$	$N_S < 50$	$N_S < 70$	$N_S < 100$	$N_S < 150$	$N_S < 200$	$N_S < 250$	$N_S < 300$
Mb 22	30	4368	3841	3352	3014	2561	2151	1754	1515	1346	1221
	50	4113	3590	3105	2769	2320	1914	1521	1287	1119	996
	70	3858	3340	2858	2525	2079	1677	1288	1059	892	771
	100	3476	2965	2487	2158	1718	1321	939	716	552	433
	125	3157	2652	2179	1852	1417	1025	648	431	268	151
	150	2839	2339	1870	1546	1115	729	357	146		

CASE no.1

	M_{uS} N.m	N_S (rpm)									
		$N_S < 20$	$N_S < 30$	$N_S < 40$	$N_S < 50$	$N_S < 70$	$N_S < 100$	$N_S < 150$	$N_S < 200$	$N_S < 250$	$N_S < 300$
Mb 23	50	5924	5229	4627	4210	3700	3204	2824	2554	2495	2336
	70	5974	5275	4672	4253	3762	3270	2934	2674	2675	2515
	100	6049	5344	4738	4318	3854	3369	3098	2854	2945	2783
	150	6173	5459	4849	4427	4009	3533	3371	3155	3395	3229
	200	6297	5574	4960	4536	4163	3698	3645	3455	3845	3675
	250	6421	5689	5071	4645	4317	3863	3918	3756	4294	4121

CASE no.2

	M_{uS} N.m	N_S (rpm)									
		$N_S < 20$	$N_S < 30$	$N_S < 40$	$N_S < 50$	$N_S < 70$	$N_S < 100$	$N_S < 150$	$N_S < 200$	$N_S < 250$	$N_S < 300$
Mb 23	50	5295	4618	4027	3617	3069	2570	2093	1800	1595	1444
	70	5093	4420	3831	3423	2878	2383	1910	1619	1415	1265
	100	4790	4123	3537	3132	2592	2101	1635	1347	1145	997
	150	4284	3627	3048	2648	2116	1633	1178	894	695	551
	200	3779	3132	2559	2163	1639	1164	720	441	245	105
	250	3274	2636	2069	1679	1162	695	262			

CASE no.1

	M_{uS} N.m	N_S (rpm)									
		$N_S < 20$	$N_S < 30$	$N_S < 40$	$N_S < 50$	$N_S < 70$	$N_S < 100$	$N_S < 150$	$N_S < 200$	$N_S < 250$	$N_S < 300$
Mb 24	70	7710	6486	5741	5224	4581	3985	3508	3191	3104	2908
	100	7780	6551	5805	5286	4663	4080	3658	3363	3349	3151
	150	7898	6661	5911	5391	4799	4239	3908	3650	3757	3556
	200	8016	6771	6018	5495	4935	4397	4158	3938	4165	3961
	250	8134	6880	6124	5599	5071	456	4408	4225	4573	4367
	300	8251	3990	6230	5703	5207	4714	4658	4512	4980	4772
	350	8369	7100	6337	5808	5343	4873	4908	4799	5388	5177
	400	8487	7209	6443	5912	5479	5031	5159	5086	5796	5582
	450	8605	7319	6550	6016	5614	5190	5409	5373	6204	5987

CASE no.2

	M_{uS} N.m	N_S (rpm)									
		$N_S < 20$	$N_S < 30$	$N_S < 40$	$N_S < 50$	$N_S < 70$	$N_S < 100$	$N_S < 150$	$N_S < 200$	$N_S < 250$	$N_S < 300$
Mb 24	70	6908	5706	4974	4466	3787	3170	2573	2214	1962	1774
	100	6634	5437	4708	4203	3529	2915	2322	1968	1717	1531
	150	6179	4990	4267	3766	3098	2491	1904	1557	1309	1126
	200	5724	4543	3825	3328	2667	2067	1486	1146	901	721
	250	5268	4095	3383	2891	2236	1643	1068	735	493	315
	300	4813	3648	2941	2453	1805	1220	650	325	86	
	350	4358	3201	2500	2016	1373	796	232			
	400	3903	2754	2058	1579	942	372				
	450	3447	2306	1616	1141	511					

Axial load

CASE no.1

	M_{uS} N.m	N_S (rpm)									
		$N_S < 20$	$N_S < 30$	$N_S < 40$	$N_S < 50$	$N_S < 70$	$N_S < 100$	$N_S < 150$	$N_S < 200$	$N_S < 250$	$N_S < 300$
Mb 25	150	8988	7573	6712	6114	5382	4710	4212	3869	3931	3704
	200	9084	7664	6800	6201	5488	4833	4403	4087	4269	4038
	250	9181	7754	6889	6288	5595	4957	4593	4305	4606	4373
	300	9277	7845	6977	6374	5702	5081	4784	4522	4943	4708
	350	9374	7935	7065	6461	5808	5204	4974	4740	5280	5043
	400	9470	8026	7154	6548	5915	5328	5165	4958	5617	5378
	450	9566	8117	7242	6635	6021	5451	5355	5175	5954	5713
	500	9663	8207	7330	6721	6128	5575	5546	5393	6291	6047
	600	9855	8389	7507	6895	6341	5822	5927	5828	6966	6717
	700	10048	8570	7684	7068	6554	6069	6308	6264	7640	7387
	800	10241	8751	7860	7242	6768	6316	6689	6699	8314	8057

CASE no.2

	M_{uS} N.m	N_S (rpm)									
		$N_S < 20$	$N_S < 30$	$N_S < 40$	$N_S < 50$	$N_S < 70$	$N_S < 100$	$N_S < 150$	$N_S < 200$	$N_S < 250$	$N_S < 300$
Mb 25	150	7587	6209	5368	4785	4009	3288	2613	2198	1909	1692
	200	7217	5844	5008	4429	3657	2938	2271	1858	1572	1357
	250	6846	5480	4648	4073	3306	2588	1928	1519	1235	1021
	300	6476	5116	4289	3717	2955	2237	1586	1180	898	686
	350	6105	4752	3929	3360	2604	1887	1243	840	560	350
	400	5734	4388	3569	3004	2253	1537	901	501	223	15
	450	5364	4024	3210	2648	1902	1186	558	161		
	500	4993	3659	2850	2292	1551	836	215			
	600	4252	2931	2130	1579	848	135				
	700	3511	2203	1411	867	146					
	800	2770	1475	692	154						

CASE no.1

	M_{uS} N.m	N_S (rpm)									
		$N_S < 20$	$N_S < 30$	$N_S < 40$	$N_S < 50$	$N_S < 70$	$N_S < 100$	$N_S < 150$	$N_S < 200$	$N_S < 250$	$N_S < 300$
Mb 26	300	9204	7775	6906	6305	5603	5082	4606	4316	4523	4301
	400	9361	7924	7052	6449	5777	5324	4924	4679	5054	4832
	500	9519	8073	7197	6592	5952	5567	5241	5042	5584	5362
	600	9677	8222	7343	6736	6126	5809	5559	5404	6115	5893
	700	9835	8371	7488	6879	6301	6052	5876	5767	6646	
	800	9993	8521	7633	7022	6475	6294	6194	6130		
	900	10151	8670	7779	7166	6649	6537	6511			
	1000	10308	8819	7924	7309	6824	6779	6829			
	1100	10466	8968	8070	7453	6998	7022				
	1200	10624	9117	8215	7596	7172	7265				
	1300	10782	9262	8361	7739						
	1400	10940	9416	8506	7883						
	1500	11098	9565								

CASE no.2

	M_{uS} N.m	N_S (rpm)									
		$N_S < 20$	$N_S < 30$	$N_S < 40$	$N_S < 50$	$N_S < 70$	$N_S < 100$	$N_S < 150$	$N_S < 200$	$N_S < 250$	$N_S < 300$
Mb 26	300	6964	5592	4756	4179	3408	2715	2034	1620	1332	1115
	400	6376	5013	4184	3614	2851	2169	1494	1084	799	584
	500	5787	4435	3613	3049	2294	1623	954	548	267	
	600	5199	3856	3041	2483	1737	1076	414			
	700	4610	3278	2470	1918	1179	530				
	800	4022	2699	1899	1353	622					
	900	3433	2121	1327	788						
	1000	2844	1543	756	222						
	1100	2256	964	184							
	1200	1667	386								
	1300	1079									
	1400	490									

Backlash on output shaft

The standard backlash play measured on the output shaft (locked worm) is given for information, in angle minutes (’), in the opposite table:

Type gearbox	Gearbox size											
	39	38	37	36/26	35/25	34/24	33/23	32/22	3101/3131	4101	30	15
Cb - 2/3 stages	-	< 10	< 10	< 10	< 10	< 13	< 17	< 17	< 22	-	< 25	< 25
Cb - 1 stage	-	-	-	-	< 12	< 13	< 17	< 20	< 24	-	< 30	-
Mub	-	< 10	< 10	< 10	< 10	< 10	< 10	< 14	< 16	-	-	-
Mb	-	-	-	< 11.5	< 13.5	< 21.5	< 23	< 27	< 28	< 25	-	-
Ot	< 10	< 10	< 10	< 10	< 12	< 14	< 16	< 17	< 18	-	-	-

Running-in

RUNNING-IN THE GEARBOX

- Helical gears
The efficiencies in the catalogue are achieved when the assembly is running at the rated load, with a gearbox lubricated according to our recommendations (§ Lubrication - Maintenance) and having reached its working temperature.

- Worm and wheel
Particular case of the Multibloc worm and wheel gearbox: to extend the gearbox lifetime, we recommend running in the machine (to obtain a perfect conjugation of the teeth profiles).

This running-in must be performed at a torque equal to 0.5 times the gearbox torque over about one year:
- 24 h for a gain in η ≈ 3% (reductions 5 to 10),
- 48 h for a gain of η ≈ 3 to 7% (reductions 15 to 25),
- 48 h for a gain of η ≈ 10 to 15% (reductions 30 to 100).

Efficiency

EFFICIENCY OF THE GEARBOX

- Helical gears
The dynamic and static efficiencies have an identical value.

Type gearbox	Size gearbox	i	η
Compabloc 	Cb 3031 to Cb 3531		0.98
	Cb 1502, Cb 1503		0.96
	Cb 3032 to Cb 3833		0.96
	Cb 3235 to Cb 3535	220 > i < 8000	0.94
	Cb 3235 to Cb 3835	i > 8001	0.91
	Cb 3635	i < 4000	0.94
	Cb 3635	i > 4000	0.91
	Cb 3735	i < 4600	0.94
	Cb 3735	i > 4600	0.91
	Cb 3835	i < 4000	0.94
	Cb 3835	i > 4001	0.91

Type gearbox	Size gearbox	i	η
Orthobloc 	Ot 3232 to Ot 3533		0.96
	Ot 3633 to Ot 3933		0.94
	Ot 3235 to Ot 3835	i < 5500	0.94
	Ot 3235 to Ot 3835	i > 5500	0.93
	Ot 3935	i > 5501	0.93

Gearbox type	Gearbox size	i	η
Manubloc 	Mub 3132 to Mub 3832		0.97
	Mub 3233 to Mub 3833		0.96
	Mub 3235 to Mub 3735	i < 6500	0.94
	Mub 3835	i < 4000	0.94
	Mub 3235 to Mub 3735	i > 6500	0.91
	Mub 3835	i > 4000	0.91

Gearbox type	Gearbox size	i	η
Poulibloc 	Pb 2005 to Pb 2705	5	0.97
	Pb 2012 to Pb 2720	12 - 15 - 20	0.94
	Pb 2025 to Pb 2625	25	0.94
	Pb 3005 to Pb 3208	5 - 8	0.95
	Pbh 3105 to Pbh 3308	5 - 8	0.98

- Worm and wheel:
The **dynamic efficiency** ***η*** of the Multibloc gearbox is indicated in the selection tables.

The **static efficiency** ***ηs*** (or start-up efficiency): the values of *ηs* below are given for rated operating conditions, i.e.
- perfectly run-in device,
- appropriate approved lubricant (§ Lubrication - Maintenance),
- stabilised operating temperature,
- load close to the rated torque for k = 1.

	Multibloc					
i_{aR}	Mb 26--	Mb 25--	Mb 24--	Mb 23--	Mb 22--	Mb 31--
5.2				0.72		
7.3			0.69	0.63	0.68	0.90
10	0.66	0.66	0.65	0.64	0.65	0.87
11.5				0.61	0.63	0.85
15	0.60	0.58	0.58	0.56	0.59	0.83
20	0.57	0.56	0.56	0.55	0.57	0.80
25	0.55	0.53	0.52	0.51	0.51	0.78
30	0.51	0.44	0.43	0.41	0.44	0.72
40	0.42	0.41	0.41	0.40	0.37	0.68
50	0.40	0.37	0.36	0.35	0.34	0.64
60	0.35	0.35	0.33	0.30	0.33	0.61
80	0.31	0.30	0.29	0.28	0.30	0.55
100	0.26	0.26	0.26	0.25	0.26	0.50

The **reverse dynamic efficiency** η_{inv}
Knowing its value is particularly interesting, even approximate, when the wheel becomes a driving wheel: this is usually the case when braking on the input shaft.
It is calculated approximately by the following formula:

$$\eta_{inv} = 2 - 1 / \eta$$

Hence, the reverse static efficiency is worth :

$$\eta_{s.inv} = 2 - 1 / \eta_s$$

Reversibility

GEARBOX REVERSIBILITY

• Helical gears:

Mechanically speaking, helical gearboxes are fully reversible and can be used as multipliers, provided a minimum sizing of 2 is used for rated power. For any application as a multiplier operation, consult the technical departments.

For hoisting or transport of persons, always consult Leroy-Somer with the specifications sheet and/or technical specifications.

• Worm and wheel:

When $\eta_{s.inv} < 0$ (or $\eta_{inv} < 0$), the gearbox is said to be statically (or dynamically) irreversible.

Generally, the notion of reversibility remains purely theoretical, as this phenomenon depends too much on parameters which are never perfectly known:

- running-in condition of the gearbox (the more the gearbox is run in, the better the reversibility),
- lubrication (nature and operating temperature),
- inertia of the shaft lines,
- amplitude and frequency of vibrations the gearbox is subject to.

For any case of application where reversibility (or irreversibility) is necessary or detrimental, call the Nidec Leroy-Somer Technical Departments.
For a simplified approach to this phenomenon, we can consider the following three cases:

- a) static reversibility: reductions 5 to 15 when applying a torque to the output shaft (of a device whether run on or not), the input shaft starts rotating instantly: this is called "backdriving".

- b) random static reversibility: reduction of 20, 25, 30, 40 according to the parameters cited beforehand, the gearbox will be reversible or not, it is highly probable that it will become reversible, with a mediocre reverse efficiency, after a few hundred hours running under rated load.

- c) static irreversibility: reductions 50 to 100. Whatever the running-in status of the device, there a risk of "backdriving" (from a static position) only if the gearbox is subject to shocks or vibrations. In this case, once the input shaft rotates, the gearbox becomes dynamically reversible with a very mediocre reverse efficiency.

Thermal power rating

• Helical gears:

The thermal capacity Pt of our gearboxes is calculated based on type, size, integration, input speed, ratio and type of duty (ISO-TR 13593 - Appendix C: December 2000).
The selection* (catalogs and Configurator) is given with our following 'standards':

- Maximum ambient temperature: + 40°C
- Altitude below or equal to 1000 m
- Air speed between 0,5 m/s and 1,4 m/s (average inner space)
- Maximum allowable oil temperature: 95°C
- Operating time 100% (continuous duty)

The following tables give the correction coefficients (to be applied on thermal capacity) for verification: Pthm = Bref * BV * BA * BT * BD * Pt The following tables give the correction coefficients (to be applied on the thermal capacity) for verification: Pthm = Bref * BV * BA * BT * BD * Pt.
Exceeding the thermal capacity over a long period of time can cause heating and damage.

** For more details on values or for specific applications: consult the technical department with the specifications.*

Correction coefficient depending on ambient temperature

The nominal thermal power is given with ambient temperature of 40°C. A lower ambient temperature allows an increase in thermal capacity. Below is the correction table for different ambient temperature.

Ambient temperature in °Celsius	B_{ref}
10	1.17
15	1.12
20	1.06
25	1.00
30	0.94
35	0.88
40	0.81
45	0.74
50	0.66

Correction coefficient depending on altitude

At high altitudes, the decrease in air density affects the B_A factor. Below is the correction table.

Altitude in metres	B_A
0 - Sea level	1.00
750	0.95
1000	0.93
1500	0.90
2250	0.85
3000	0.81
3750	0.76
4500	0.72
5250	0.68

Thermal power

Correction coefficient depending on integration

Air circulation in confined space or outside has an influence on heat transfer. Outside. Protect the equipment from solar radiation and in any case reduce the maintenance period and proceed with the removal of dust from the whole machine. Below is the correction table (apart from the standard value $B_V = 1$).

Ambient air speed: Vref in m/s	B_V
Vref ≤ 0.5 (tight and confined space)	0.75
0.5 < Vref ≤ 1.4 (average inner space)	1.00
1.4 < Vref < 3.7 (spacious inner space)	1.40
Vref ≥ 3.7 (outside)	1.90

Correction coefficient depending on the oil temperature in the housing

The standard maximum allowable oil bath temperature is 95°C. Below is the correction table for the capacity control.

Temperature oil bath in °Celsius	B_T
65	0.60
85	0.81
95	1.00
105	1.13

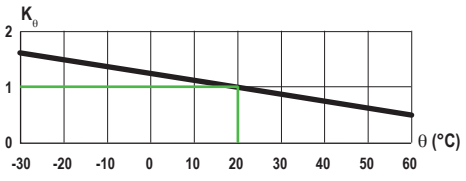
Correction coefficient depending on operating time

A different operating than 'continuous' with zero-speed periods allows cooling and thus an increase in thermal capacity. Below is the correction table for non-continuous duty.

Operation per hour in %	B_D
100	1.00
80	0.95
60	0.93
40	0.90
20	0.85

• Worm and wheel:

The rated thermal power P_t is indicated for an ambient temperature of 20°C.
It changes according to the input power heating the gearbox up to the maximum temperature acceptable by the seals (100°C) in the oil bath. If the ambient temperature θ is different from 20°C, the thermal power at 20°C is multiplied by ratio K_t.



For more details on specific applications: consult the technical department with the specifications.

Rated thermal powers (P_t in kW at θ = 20°C)

I_{aR}	N_E	Mb 31	Mb 22	Mb 23	Mb 24	Mb 25	Mb 26
5	2850			2.75			
	1430			1.98			
	950			1.63			
7.3	2850	2.23	1.86	2.43	3.64	6.41	10.45
	1430	1.46	1.33	1.74	2.67	4.85	8.07
	950	1.15	1.08	1.42	2.22	4.1	6.91
10	2850	1.99	1.67	2.15	3.2	5.62	9.24
	1430	1.22	1.19	1.53	2.33	4.21	7.06
	950	0.98	0.97	1.24	1.93	3.55	6.02
11.5	2850	1.63	1.56	1.95			
	1430	1.05	1.11	1.38			
	950	0.80	0.9	1.12			
15	2850	1.39	1.39	1.72	2.64	4.52	7.63
	1430	0.92	0.99	1.21	1.91	3.35	5.76
	950	0.75	0.8	0.98	1.57	2.81	4.89
20	2850	1.21	1.27	1.59	2.39	4.11	6.94
	1430	0.82	0.9	1.12	1.73	3.05	5.23
	950	0.64	0.73	0.91	1.43	2.56	4.44
25	2850	1.07	1.07	1.41	2.1	3.73	6.39
	1430	0.70	0.76	1	1.52	2.76	4.81
	950	0.56	0.62	0.81	1.26	2.31	4.09

I_{aR}	N_E	Mb 31	Mb 22	Mb 23	Mb 24	Mb 25	Mb 26
30	2850	0.83	0.92	1.12	1.74	3.1	5.77
	1430	0.57	0.65	0.79	1.25	2.29	4.34
	950	0.44	0.53	0.64	1.03	1.92	3.68
40	2850	0.70	0.77	1.05	1.55	2.72	4.62
	1430	0.48	0.55	0.74	1.12	2.02	3.47
	950	0.39	0.45	0.6	0.93	1.7	2.94
50	2850	0.63	0.71	0.93	1.38	2.45	4.22
	1430	0.44	0.51	0.66	1.01	1.82	3.18
	950	0.38	0.42	0.54	0.84	1.54	2.71
60	2850	0.57	0.66	0.8	1.25	2.28	3.84
	1430	0.40	0.47	0.57	0.92	1.7	2.9
	950	0.35	0.39	0.47	0.76	1.44	2.47
80	2850	0.49	0.59	0.73	1.08	1.92	3.25
	1430	0.35	0.43	0.53	0.8	1.44	2.47
	950	0.28	0.36	0.44	0.67	1.23	2.12
100	2850	0.43	0.53	0.66	0.98	1.72	2.84
	1430	0.32	0.39	0.48	0.73	1.31	2.18
	950	0.26	0.32	0.4	0.62	1.12	1.88

Example of selections and dimensions

SELECTION TABLES

According to the example of the application "Displacement of a truck on a slope" p.57

IMfinity® Range 3000 geared motors
Compabloc

Selection tables
Compabloc: Cb / LS, LSES / 4-pole motors

LS, LSES 1500 min^{-1} - 50 Hz		Cb - Gearbox					LS, LSES 2600 min^{-1} - 87 Hz	
N_S (min^{-1})	Kp	Cb / MI-MU	i	M (Nm)	F_R E/2 (N)	Dim. MI ⟷ page	N_S (min^{-1})	Kp
1.5 kW - 50 Hz		*LSES 90 L IFT/IE2 - LSES 90 LU IFT/IE3 LS 90 L FFB2 IFT/NIE - LSES 90 LU FFB2 IFT/IE3*					**2.61 kW - 87 Hz***	
41.5	13	3633	34.5	330	36 313	141		
47.2	**1.55**	**3233**	30.3	292	6 214	133	83.2	1.52
47.3	**2.77**	**3333**	30.2	291	11 573	135	83.3	2.82
44.8	**5**	**3433**	31.9	306	18 001	137	79.0	5
47.5	**10**	**3533**	30.1	289	26 044	139	83.6	10
53.1	**1.74**	**3233**	26.9	259	6 855	133	93.6	1.66

The characteristics indicated in our catalogues are given, in a current environment, for:
- a gearbox with standard fixing form, i.e. Compabloc **Cb: S**, Manubloc **Mub: R**, Poulibloc **Pb: RK WTB**, Multibloc **Mb: NU H**, Orthobloc **Ot: S L** (§ Construction)
- a **horizontal** operating position: **B3** (§ Operating positions);
- a standard lubricant approved by our technical department (§ Lubrication).

The motor power (in kW) is used only as input of the selection. The drive system is chosen based on the criteria according to the selection method (§ Duty factor definition).

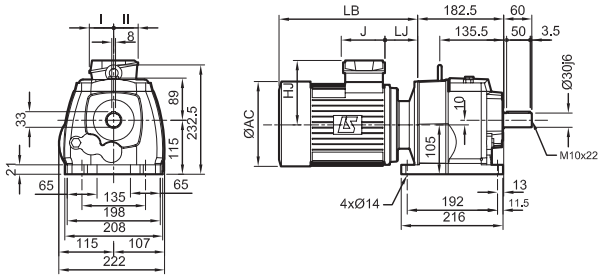
The output speed (N_S) is for information and is calculated from the rated motor speed (§ Electrical characteristics) according to its load as well as the supply conditions.
In the electrical characteristic tables about the brakes (§ Electrical characteristics), the braking torque values are indicated for information only: in case of normative restriction, please consult.
Similarly, in case of operation with a brake motor, the braking torque will be limited to 2.5 times the M_n. Locking the gearbox output shaft must be avoided to preserve the gearbox.
For the low speed selections offered in combined gearboxes, the output torque is used as selection. The application must not exceed the maximum torque indicated. The drive system must be protected from any overloads.
When using in variable speed with separate drive, maximum mechanical input speed is 3600 min^{-1} (Mb: 1500 min^{-1}) and an output current limitation is indicated.

Operating positions must be avoided (e.g. slow shaft upwards).

DIMENSIONS

- Feet S

Cb: 18.5 kg + Mot



Dimensions in millimetres

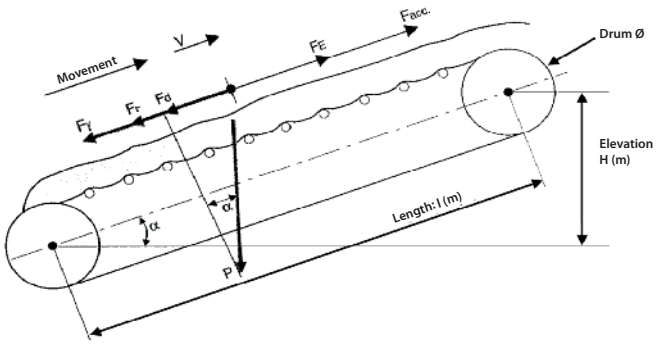
Cb 32

Motor type	Brake type	IMfinity® three-phase 4-pole motors and brake AC	HJ	J	LB	LJ	I	II	kg
LS 71 M	FFB 1	140	130	160	295,5	21,5	55	55	10,3
LS 71 L	FFB 1	140	130	160	295,5	21,5	55	55	11,3
LS 80 L	FFB 1	170	141	160	347	49,5	55	55	13,9
LSES 80 LG	FFB 1	190	151	160	430	55,5	55	55	17,1
LS 90 SL	FFB 2	190	151	160	434,5	59	55	55	18,2
LSES 90 SL	FFB 2	190	151	160	434,5	59	55	55	22,4
LS 90 L	FFB 2	190	151	160	434,5	59	55	55	21
LSES 90 LU	FFB 2	190	151	160	434,5	59	55	55	26,6
LS 100 L	FFB 2	200	156	160	482,5	60	55	55	29,1
LSES 100 L	FFB 2	200	156	160	482,5	60	55	55	29,6
LSES 100 LR	FFB 2	200	156	160	482,5	60	55	55	32
LSES 100 LG	FFB 3	235	165	160	458,5	59	55	55	37,6
LS 112 MG	FFB 3	235	165	160	486	61,5	55	55	37,6
LSES 112 MU	FFB 3	235	165	160	483,5	59	55	55	40,9
LS 132 S	FFB 3	227	168	160	509	60,5	55	55	44,6
LSES 132 SM	FFB 4	272	186	160	648	77,5	55	55	66,5

The weights indicated in the 'Dimensions' pages must be added. Example for weight of Cb 3233 feet gearbox: 18.5 kg (lubricated for B3 operation) + weight of LS 90 L FFB2 brake motor: 21 kg (weight of brake motor alone). They are given for information and must be corrected by considering the options and operating position requiring more lubrication and equipment (e.g. lubrication kit).

Belt conveyor

The drive of each roller generates resistive torque; the longer the belt, the higher the resistive torque.
The *kr* chosen is linked to the nature of the belt contact on rollers. If side panels or guides are located on the sides, friction also absorbs energy in proportion to the contact length.
The tilt angle has a direct impact on the backdriving force, expressed in %, degrees or elevation.
As the load has no rigidity, the belt dips between two rollers, which increases the *kr*.
Therefore this value is extremely variable and only the manufacturer is authorized to set it. In case of doubt, the calculation hypothesis must be specified.



1) Determination of the motor:
Calculation of the weight (*m*) according to the flow rate (*Q*):

$$m = \frac{Q \text{ x } l}{3.6 \text{ x } V} = \ldots \text{ kg}$$

Calculation of the conveyor tilt angle:

$$\alpha = \sin^{-1} \text{ x } \frac{h}{l} = \ldots °$$

Resistive torque due to the bearing ($Mr_{c/m}$):

$$Mr_{c/m} = \frac{Fr \text{ x } V}{\omega} \text{ x } \frac{1}{\eta}$$

$$\text{i.e. } Mr_{c/m} = \frac{m \text{ x } g \text{ x } kr \text{ x } \cos\alpha \text{ x } V}{\omega \text{ x } \eta}$$

Resistive torque due to backdriving ($Mrd_{c/m}$):

$$Mrd_{c/m} = \frac{Fdev \text{ x } V}{\omega} \text{ x } \frac{1}{\eta}$$

$$\text{i.e. } Mrd_{c/m} = \frac{m \text{ x } g \text{ x } \sin\alpha \text{ x } V}{\omega \text{ x } \eta}$$

Resistive torque due to acceleration ($M\gamma_{c/m}$):

$$M\gamma_{c/m} = \frac{F\gamma \text{ x } V}{\omega} \text{ x } \frac{1}{\eta} \quad \text{i.e. } M\gamma_{c/m} = \frac{m \text{ x } \gamma \text{ x } V}{\omega \text{ x } \eta}$$

Torque necessary to the motor:

$$Mn \succ Mr_{c/m} + Md_{c/m}$$

$$Macc. \succ M\gamma_{c/m} + M\gamma_{motor} + Mr_{c/m} + Mrd_{c/m}$$

$$Mdéc. \succ M\gamma_{motor} + (M\gamma_{c/m} - Mr_{c/m} - Mrd_{c/m}) \text{ x } \eta \text{ x } \eta_{inv}$$

$$Mf \succ 1.2 \text{ x } Mdéc. \succ Mrd_{c/m} - Mr_{c/m}$$

Motor inertia acceleration torque ($M\gamma_{motor}$):

$$M\gamma_{motor} = J_{motor} \text{ x } \frac{\omega}{t\gamma} = \ldots N.m$$

2) Gearbox choice:
Gearbox output speed (rpm):

$$Ns = \frac{V}{\pi \text{ x } D} \text{ x } 60 = \ldots \text{ tr/min}$$

Determination of the duty factor:

$$J_{c/m} = m \text{ x } \left(\frac{V}{\omega}\right)^2 = \ldots \text{ kg.m}^2 \qquad J_m = \ldots \text{ kg.m}^2$$

$$FJ = \frac{J_{c/m}}{J_m}$$

Application example:
Operation: 24 h/d - 10 s/h
Flow rate: 510 t/h
Length: 55 m
Linear speed: 1.65 m/s
Drum (D): Ø 400 mm
Elevation: 5 m
Minimum acceleration time: 2 s
Rolling resistance coefficient: 0.3
Overall efficiency: 0.9
Bevel gearbox, floating mount

1) Determination of the motor:
Calculation of the weight (*m*) according to the flow rate (*Q*):

$$m = \frac{510 \text{ x } 55}{3.6 \text{ x } 1.65} = 4722 \text{ kg}$$

Calculation of the conveyor tilt angle:

$$\alpha = \sin^{-1} \text{ x } \frac{5}{55} = 5.21 °$$

Rolling resistive torque ($Mr_{c/m}$):

$$Mr_{c/m} = \frac{4722 \text{ x } 9.81 \text{ x } 0.3 \text{ x } \cos 5.21° \text{ x } 1.65}{150 \text{ x } 0.9} = 169.15 \text{ N.m}$$

Resistie torque due to backdriving ($Mrd_{c/m}$):

$$Mrd_{c/m} = \frac{4722 \text{ x } 9.81 \text{ x } \sin 5.21° \text{ x } 1.65}{150 \text{ x } 0.9} = 51.4 \text{ N.m}$$

Resistive torque due to acceleration ($M\gamma_{c/m}$):

$$M\gamma_{c/m} = \frac{4722 \text{ x } 0.825 \text{ x } 1.65}{150 \text{ x } 0.9} = 47.6 \text{ N.m}$$

Torque necessary to the motor:

$$Mn \succ 220.55 \text{ N.m} \quad (169.15 + 51.4)$$

$$Macc. \succ 268.15 \text{ N.m} + M\gamma_{motor}$$

$$Mdéc. \succ 140.09 \text{ N.m} + M\gamma_{motor}$$

$$Mf \succ -168.11 \text{ N.m} \succ -117.75 \text{ N.m}$$

As the braking torque required is < 0, this application does not need a brake.

Motor choice (cat. ref.5147 or § Elec. char.) :
4P LSES 225 SR 37 kW IFT/IE3
J_{motor} = 0.2897 kg.m^2 *Mn* = 239 N.m *Md* = 777 N.m

Motor inertia acceleration torque ($M\gamma_{motor}$):

$$M\gamma_{motor} = 0.2897 \text{ x } \frac{150}{2} = 21.73 \text{ N.m}$$

$$Mn = 239 \text{ N.m} \succ 220.55 \text{ N.m}$$

$$Macc. = 777 \text{ N.m} \succ 268.15 \text{ N.m} + 21.73 \text{ N.m}$$

2) Gearbox choice:
Gearbox output speed (rpm):

$$Ns = \frac{V \text{ x } 60}{\pi \text{ x } D} = \frac{1.65 \text{ x } 60}{\pi \text{ x } 1.4} = 78.82 \text{ tr/min}$$

Determination of the duty factor:

$$J_{c/m} = 4722 \text{ x } \left(\frac{1.65}{150}\right)^2 = 0.57 \text{ kg.m}^2 \qquad J_m = 0.2897 \text{ kg.m}^2$$

$$FJ = \frac{J_{c/m}}{J_m} = \frac{0.57}{0.2897} = 1.91$$

According to § 'Definition of the duty factor' for 10 s/h, operation 24 h/d and inertia factor 1.91 factor k must be > 1.4 for D.O.L. starting.

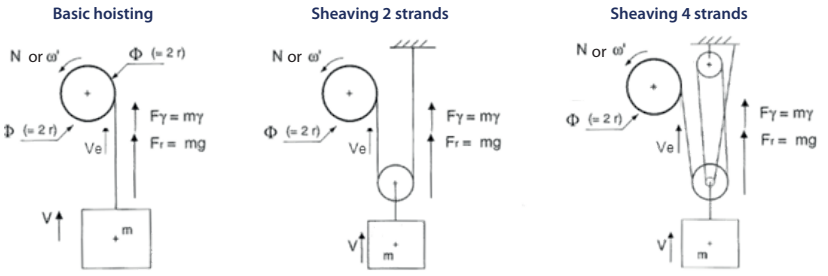
Gearbox chosen:
Ot 3833 i: 17.8 RK RD H B3 MI - 4P LSES 225 SR 37 kW IFT/IE3 + quarry finish
Catalogue duty factor: 2.73

Hoisting

Whatever the number of strands, power and torque at the motor are identical. Only the rotation speed at the drum changes.
The drive speed (*Ve*) is:

$$Ve = V \text{ x number of strands}$$

i.e. Ve = V x 2 for 2 strands and Ve = V x 4 for 4 strands.
The loss linked to reeving rarely exceeds 10 %. In the descent direction, the load is driving. The overload coefficients imposed by regulations must sometimes be considered.



1) Determination of the motor:
Resistant torque at hoisting ($Mr_{c/m}$):

$$Mr_{c/m} = \frac{Fr \text{ x } V}{\omega} \text{ x } \frac{1}{\eta} = \frac{m \text{ x } g \text{ x } V}{\omega \text{ x } \eta}$$

Resistive torque due to acceleration ($M\gamma_{c/m}$):

$$M\gamma_{c/m} = \frac{F\gamma \text{ x } V}{\omega} \text{ x } \frac{1}{\eta} \quad \text{i.e.} \quad M\gamma_{c/m} = \frac{m \text{ x } \gamma \text{ x } V}{\omega \text{ x } \eta}$$

Deceleration torque in descent (*Mdec.*) :

$$Mdéc. \succ M\gamma_{motor} + (M\gamma_{c/m} - Mr_{c/m}) \text{ x } \eta \text{ x } \eta_{inv}$$

Torque necessary to the motor:

$$Mn \succ Mr_{c/m}$$

$$Macc. \succ M\gamma_{c/m} + M\gamma_{motor} + Mr_{c/m}$$

$$Mdéc. \succ M\gamma_{motor} + (M\gamma_{c/m} - Mr_{c/m}) \text{ x } \eta \text{ x } \eta_{inv}$$

$$Mf \succ 1.2 \text{ x } Mdéc. \succ 1.6 \text{ x } Mn$$

Motor inertia acceleration torque ($M\gamma_{motor}$):

$$M\gamma_{motor} = J_{motor} \text{ x } \frac{\omega}{t\gamma} = \ldots N.m$$

2) Gearbox choice:
Drum rotation speed:

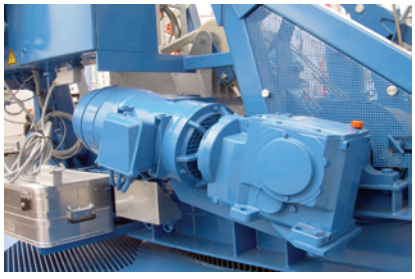
$$N = \frac{60 \text{ x } V_e}{\pi \text{ x } Ø} = \ldots tr/min$$

$$\omega' = \frac{V_e}{r} = \frac{2 \text{ x } V_e}{Ø} \quad \ldots rad/s$$

Determination of the duty factor:

$$J_{c/m} = m \text{ x } \left(\frac{V}{\omega}\right)^2 = \ldots \text{ kg.m}^2 \qquad J_m = \ldots \text{ kg.m}^2$$

$$FJ = \frac{J_{c/m}}{J_m}$$



Application example:
Operation: 16 h/d
Weight: 2000 kg loaded, 1000 kg at no load
Linear speed: 30 m/min
Drum: Ø 200 mm
Acceleration/deceleration time: 1 s
Maximum braking time: 1 s
Overall efficiency: 0.9
Bevel gearbox, foot mounting
Cycle: on load raising 9 s, stop 30 s; no load lowering 9 s, stop 30 s
No risk to humans

1) Determination of the motor:
Resistive torque due to the bearing ($Mr_{c/m}$):

$$Mr_{c/m} = 2000 \text{ x } 9.81 \text{ x } \frac{0.5}{150} \text{ x } \frac{1}{0.9} = 72.66 \text{ N.m}$$

Resistive torque due to acceleration ($M\gamma_{c/m}$):

$$M\gamma_{c/m} = \frac{2000 \text{ x } 0.5 \text{ x } 0.5}{150 \text{ x } 0.9} = 3.70 \text{ N.m}$$

Deceleration torque in descent:

$$Mdéc. = M\gamma_{motor} + (3.70 + 72.66) \text{ x } 0.9 \text{ x } 0.9$$

$$Mdéc. = M\gamma_{motor} + 61.86 \text{ N.m}$$

Torque necessary to the motor:

$Mn \succ 72.66$ N.m $Mdéc. \succ 61.86$ N.m + $M\gamma_{motor}$

$Macc. \succ 76.36$ N.m + $M\gamma_{motor}$ $Mf \succ 1.6 \text{ x } 72.66 \succ 116.26$ N.m

Motor choice (cat. ref.5329 or § Elec. char.) :
4P LS 160 MP 11 kW FFB5, Mf 140 N.m
$J_{motor} = 0.0338$ kg.m^2 $Mn = 72.3$ N.m $Md = 209.67$ N.m

Acceleration torque for the motor inertia ($M\gamma_{motor}$):

$$M\gamma_{motor} = 0.0338 \text{ x } \frac{150}{1} = 5 \text{ N.m}$$

$$Mn = 72.3 \text{ N.m} \approx 72.66 \text{ N.m}$$

$$Macc. = 209.67 \text{ N.m} \succ 76.36 \text{ N.m} + 5 \text{ N.m}$$

Operating factor calculation:

$$FM = \frac{\text{Operating time}}{\text{Total cycle time}} = \frac{1 + 9 + 1}{30 + 1 + 9 + 1} = 26.8 \text{ \%}$$

Calculation of number of starts/h:

$$Z = \frac{\text{Number of starts per cycle}}{\text{Cycle time}} \text{ x } 3600 = \frac{1}{30 + 1 + 9 + 1} \text{ x } 3600 = 87.8 \text{ d/h}$$

Starting frequency check:

$$J_{c/m} = m \text{ x } \left(\frac{V}{\omega}\right)^2 = 2000 \text{ x } \left(\frac{0.5}{150}\right)^2 = 0.022 \text{ kg.m}^2$$

$$J_m = 0.0338 \text{ kg.m}^2$$

$$Z_o = Z \text{ x } \frac{J_{c/m} + J_m}{J_m} = 88 \text{ x } \frac{0.022 + 0.057}{0.0338} = 206 \text{ d/h}$$

According to the brake motor catalogue, the Z_0 is 300 s/h, for FM = 25 %.

⚠ **The load is driving in descent.**

2) Gearbox choice:
Gearbox output speed (rpm):

$$Ns = \frac{V_e \text{ x } 60}{\pi \text{ x } D} = \frac{1 \text{ x } 60}{\pi \text{ x } 0.2} = 95.49 \text{ tr/min}$$

Determination of the duty factor:

$$J_{c/m} = 0.022 \text{ kg.m}^2 \qquad J_m = 0.0338 \text{ kg.m}^2$$

$$FJ = \frac{J_{c/m}}{J_m} = \frac{0.022}{0.0338} = 0.65$$

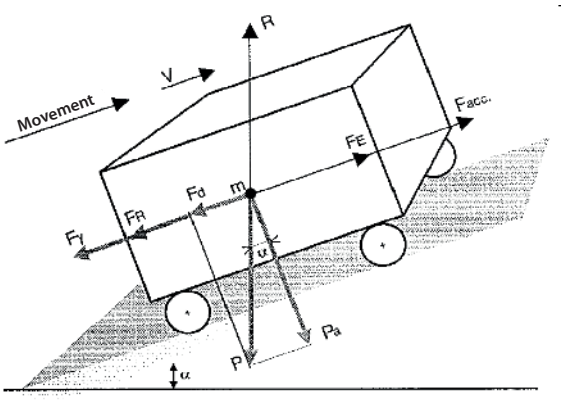
According to § 'Definition of the duty factor' for 87 s/h, operation 16 h/d and inertia factor 0.39 factor k must be > 1.3 for D.O.L. starting.

Geared motor chosen (according to Orthobloc catalogue ref.3981):
Ot 3533 i: 14.9 SBT LR H B3 MI - 4P LS 160 MP 11 kW FFB 5 - 140 N.m
Catalogue duty factor: 2.29

The gearbox mounting form is an alternative for delivery in Express Availability.

Displacement of a truck in a slope

The *kr* is linked to the nature of the wheel contact on the ground.
Check the grip (risk of slip at acceleration, braking or in case of excess slope).
To reduce the risk of slipping, either increase the number of driven wheels, or modify the grip coefficient, or use a solution with positive drive.
The tilt angle has a direct impact on the backdriving force, expressed in %, degrees or elevation.



1) Determination of the motor:
Calculation of the conveyor tilt angle:

$$\alpha = \sin^{-1} \times \frac{h}{l} = \ldots °$$

Resistive torque due to the bearing ($Mr_{c/m}$):

$$Mr_{c/m} = \frac{Fr \times V}{\omega} \times \frac{1}{\eta}$$

$$\text{i.e. } Mr_{c/m} = \frac{m \times g \times kr \times \cos\alpha \times V}{\omega \times \eta}$$

Resistive torque due to backdriving ($Mrd_{c/m}$):

$$Mrd_{c/m} = \frac{Fd \times V}{\omega} \times \frac{1}{\eta}$$

$$\text{i.e. } Mrd_{c/m} = \frac{m \times g \times \sin\alpha \times V}{\omega \times \eta}$$

Resistive torque due to acceleration ($M\gamma_{c/m}$):

$$M\gamma_{c/m} = \frac{F\gamma \times V}{\omega} \times \frac{1}{\eta} \quad \text{i.e. } M\gamma_{c/m} = \frac{m \times \gamma \times V}{\omega \times \eta}$$

Slip torque ($M\mu_{c/m}$):

$$M\mu_{c/m} = \frac{F\mu \times V}{\omega} \times \frac{1}{\eta} \times a \quad \text{i.e. } M\mu_{c/m} = \frac{m \times \mu \times V}{\omega \times \eta} \times a$$

Torque necessary to the motor:

$Mn \succ Mr_{c/m} + Mrd_{c/m}$

$Macc. \succ M\gamma_{c/m} + M\gamma_{motor} + Mr_{c/m} + Mrd_{c/m}$

$Mdéc. \succ M\gamma_{motor} + (M\gamma_{c/m} - Mr_{c/m} - Mrd_{c/m}) \times \eta \times \eta_{inv}$

$Mf \succ 1.2 \times Mdéc.$

$Mp \succ Mn + Macc.$

Acceleration torque for the motor inertia ($M\gamma_{motor}$):

$$M\gamma_{motor} = J_{motor} \times \frac{\omega}{t\gamma} = \ldots N.m$$

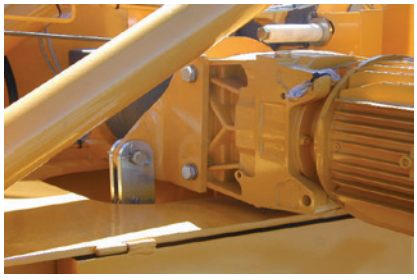
2) Gearbox choice:
Gearbox output speed (rpm):

$$Ns = \frac{V}{\pi \times D} \times 60 = \ldots tr/min$$

Determination of the duty factor:

$$J_{c/m} = m \times \left(\frac{V}{\omega}\right)^2 = \ldots kg.m^2 \qquad J_m = \ldots kg.m^2$$

$$FJ = \frac{J_{c/m}}{J_m}$$



Application example:
Operation: 16 h/d - 200 s/h
Weight: 1000 kg
Linear speed: 0.5 m/s
Wheels: Ø 200 mm
Slope: 10°
Minimum acceleration time: 2 s
Rolling resistance coefficient: 0.01
Grip coefficient: 0.1
Overall efficiency: 0.9
Coaxial gearbox with feet

1) Determination of the motor:
Rolling resistive torque ($Mr_{c/m}$):

$$Mr_{c/m} = \frac{1000 \times 9.81 \times 0.01 \times \cos 10° \times 0.5}{150 \times 0.9} = 0.36 \text{ N.m}$$

Resistive torque due to backdriving ($Mrd_{c/m}$):

$$Mrd_{c/m} = \frac{1000 \times 9.81 \times \sin 10° \times 0.5}{150 \times 0.9} = 6.31 \text{ N.m}$$

Resistive torque due to acceleration ($M\gamma_{c/m}$):

$$M\gamma_{c/m} = \frac{1000 \times 0.25 \times 0.5}{150 \times 0.9} = 0.93 \text{ N.m}$$

Slip torque ($M\mu_{c/m}$):

$$M\mu_{c/m} = \frac{1000 \times 9.81 \times 0.1 \times 0.5}{150 \times 0.9} = 3.63 \text{ N.m}$$

Torque necessary to the motor:

$Mn \succ 6.67$ N.m

$Macc. \succ 7.6$ N.m + $M\gamma_{motor}$

$Mdéc. \succ 5.58$ N.m + $M\gamma_{motor}$

$Mf \succ 6.69$ N.m

⚠ **The slip torque is below the rated torque, requiring the grip coefficient to be modified or switching to positive drive. The client chooses a sprocket/chain drive ratio: 1.1, efficiency: 0.9.** Actual calculations below.
Torque necessary to the motor corrected:

$Mn \succ 6.67 / 0.9 = 7.41$ N.m

$Macc. \succ 7.6 / 0.9$ N.m + $M\gamma_{motor} = 8.44$ N.m + $M\gamma_{motor}$

$Mdéc. \succ 5.58 / 0.9$ N.m + $M\gamma_{motor} = 6.2$ N.m + $M\gamma_{motor}$

$Mf \succ 1.2 \times (7.41 + M\gamma_{motor})$

Motor choice (cat. ref.5329 or § Elec. char.) :
4P LS 90 L 1.5 kW FFB 2, Mf 19 N.m
$J_{motor} = 0.00425$ kg.m² $Mn = 10$ N.m $Md = 19$ N.m

Motor inertia acceleration torque ($M\gamma_{motor}$):

$$M\gamma_{motor} = 0.00425 \times \frac{150}{2} = 0.32 \text{ N.m}$$

$Mn = 10$ N.m $\succ 7.41$ N.m

$Macc. = 19$ N.m $\succ 8.44$ N.m + 0.32 N.m

Starting frequency check:

$$J_{c/m} = m \times \left(\frac{V}{\omega}\right) = 1000 \times \left(\frac{0.5}{150}\right) = 0.01 \text{ kg.m}^2$$

$J_m = 0.00425$ kg.m²

$$Z_o = Z \times \frac{J_{c/m} + J_m}{J_m} = 200 \times \frac{0.01 + 0.00425}{0.00425} = 673 \text{ d/h}$$

According to the brake motor catalogue, the Z_0 is 1000 s/h, for FM = 60 %.

2) Gearbox choice:
Gearbox output speed (rpm):

$$Ns = \frac{V \times 60}{\pi \times D} = \frac{0.5 \times 60}{\pi \times 0.2} = 47.75 \text{ tr/min}$$

Determination of the duty factor:

$J_{c/m} = 0.01$ kg.m² $\quad J_m = 0.00425$ kg.m²

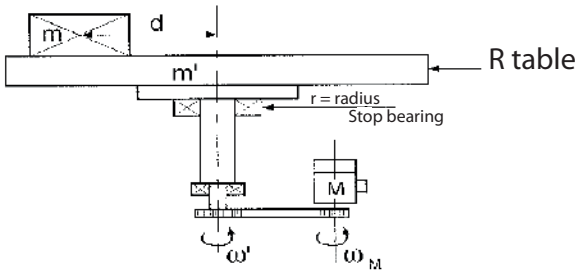
$$FJ = \frac{J_{c/m}}{J_m} = \frac{0.01}{0.00425} = 2.35$$

According to § 'Definition of the duty factor' for 200 s/h, operation 16 h/d and inertia factor 2.38 factor k must be > 1.5 for D.O.L. starting.

Geared motor chosen (according to Compabloc cat. ref 3521):
Cb 3233 i: 30.3 S S B7 MI - 4P LS 90 L 1.5 kW IFT/NIE FFB 2 - 19 N.m.
Catalogue duty factor: 1.55

Rotation of a table with an off-center load

The acceleration time has a strong impact on the sizing of the motorisation.
Inertial movement: ensure proper separation of the inertia calculation of each rotating part.
The inertia calculation depends on the part shape and its position with respect to the rotation axis.



1) Determination of the motor:
Resistant torque due to the bearing ($Mr_{c/m}$):

$$Mr_{c/m} = \frac{Fr \times r \times \omega'}{\omega} \times \frac{1}{\eta}$$

$$\text{i.e. } Mr_{c/m} = \frac{(m + m') \times g \times kr \times r \times \omega'}{\omega \times \eta}$$

Resistive torque due to acceleration ($M\gamma_{c/m}$):

$$M\gamma_{c/m} = \sum J \times \frac{\omega'^2}{\omega^2} \times \frac{\omega}{t\gamma} \times \frac{1}{\eta}$$

$$\sum J = Jm' + Jm$$

$$Jm' = \frac{1}{2} \times m' \times R^2 \quad \textbf{(Load centered on axis)}$$

$$Jm \approx md^2 \quad \textbf{(Off-centered load on axis)}$$

Torque necessary to the motor:

$$Mn \succ Mr_{c/m}$$

$$Macc. \succ M\gamma_{c/m} + M\gamma_{motor} + Mr_{c/m}$$

$$Mdéc. \succ M\gamma_{motor} + (M\gamma_{c/m} - Mr_{c/m}) \times \eta \times \eta_{inv}$$

$$Mf \succ 1.2 \times Mdéc.$$

Acceleration torque of the motor inertia ($M\gamma_{motor}$):

$$M\gamma_{motor} = J_{motor} \times \frac{\omega}{t\gamma} = \ldots N.m$$

2) Gearbox choice:
Gearbox output speed (rpm):

$$Ns = \frac{V}{\pi \times D} \times 60 = \ldots tr/min$$

Determination of the duty factor:

$$J_{c/m} = \sum J \times \frac{\omega'^2}{\omega^2} = \ldots kg.m^2 \qquad J_m = \ldots kg.m^2$$

$$FJ = \frac{J_{c/m}}{J_m}$$

Application example:
Operation: 16 h/d - 500 s/h
Weight: 100 kg
m': 200 kg
d: 0.75 m
r: 50 mm
R: 1 m
ω: 2 rad/s
Acceleration time: 2 s
Thrust bearing coefficient: 0.0015
Thrust bearing Ø: 0.75 m
Transmission ratio: 1/3
Overall efficiency: 0.9
Coaxial gearbox with feet

1) Determination of the motor:
Rolling resistive torque ($Mr_{c/m}$):

$$Mr_{c/m} = \frac{(100 + 200) \times 9.81 \times 0.0015 \times 0.05 \times 2}{150 \times 0.9} = 0.00327 \text{ N.m}$$

Resistive torque due to acceleration ($M\gamma_{c/m}$):

$$Jm' = \frac{1}{2} \times 200 \times 1^2 = 100 \text{ kg.m}^2$$

$$Jm \approx 100 \times 0.75^2 \approx 56.25 \text{ kg.m}^2$$

$$\sum J = 100 + 56.25 = 156.25 \text{ kg.m}^2$$

$$M\gamma_{c/m} = 156.25 \times \frac{2^2}{150^2} \times \frac{150}{2} \times \frac{1}{0.9} = 2.32 \text{ N.m}$$

Torque necessary to the motor:

$$Mn \succ 0.003 \text{ N.m}$$

$$Macc. \succ 2.32 \text{ N.m} + M\gamma_{motor}$$

$$Mdéc. \succ 1.88 \text{ N.m} + M\gamma_{motor}$$

$$Mf \succ 1.2 \times (1.88 + M\gamma_{motor})$$

Motor choice (cat. ref.5329 or § Elec. char.) :
4P LS 71 0.25 kW FFB 1, Mf 4.5 N.m
J_{motor} = 0.00094 kg.m² Mn = 1.68 N.m Md = 4.6 N.m

Motor inertia acceleration torque ($M\gamma_{motor}$):

$$M\gamma_{motor} = 0.00094 \times \frac{150}{2} = 0.07 \text{ N.m}$$

$$Mn = 1.68 \text{ N.m} \succ 0.003 \text{ N.m}$$

$$Macc. = 4.6 \text{ N.m} \succ 2.32 \text{ N.m} + 0.07 \text{ N.m}$$

Starting frequency check:

$$J_{c/m} = \sum J \times \left(\frac{\omega'}{\omega}\right)^2 = 156.25 \times \left(\frac{2}{150}\right) = 0.028 \text{ kg.m}^2$$

$$J_m = 0.00094 \text{ kg.m}^2$$

$$Z_o = Z \times \frac{J_{c/m} + J_m}{J_m} = 500 \times \frac{0.028 + 0.00094}{0.00094} = 15393 \text{ d/h}$$

According to the brake motor catalogue, the Z_0 is 3000 s/h, for FM = 60 %.

⚠ **The motor's temperature rise in D.O.L. starting is too high. Steer choice of drive mechanism towards control by a drive.**

2) Gearbox choice:
Gearbox output speed (rpm):

$$Ns = \frac{\omega'}{2 \times \pi} \times i = \frac{2 \times 60}{2 \times \pi} \times 3 = 57.29 \text{ tr/min}$$

Determination of the duty factor:

$$J_{c/m} = 0.028 \text{ kg.m}^2 \qquad J_m = 0.00094 \text{ kg.m}^2$$

$$FJ = \frac{J_{c/m}}{J_m} = \frac{0.028}{0.00094} = 29.78$$

According to § 'Definition of the duty factor' for 500 s/h, operation 16 h/d and inertia factor > 10 factor k must be > 1.8 for D.O.L. starting.

Geared motor chosen (according to Compabloc cat. ref 3521):
CB 3032 i: 25.6 S S V5 MI - 4P LS 71 M 0.25 kW FFB 1 - 4.5 N.m.
Catalogue duty factor: 2.28

Units of measurement and standard formulae

Electricity and electromagnetism

Parameters				Units		Parameters and units of use non-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	° degré	
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 pulse = $2\pi . f$
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 pôles	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 AT unit (amper per turn) is inappropriate as it presumes the turn as being a 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

Thermal

Parameters				Units		Quantities and units of use non-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 Capacité thermique massique	Thermal power Specific heat capacity	Pt c		J/K J/kg.K		
Energie interne	Internal energy	U		J		

Noise and vibration

Parameters				Units		Parameters and units of use non-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 (décibel)		lg logarithme à 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				Units		Parameters and units of use non-recommended
French name	English name	Symbol	Definition	SI	Non-SI but accepted	Conversions
Angle (angle plan)	Angle (plane angle)	α, β, T, φ		rad	degré : ° minute : ’ seconde : ”	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 galon = 4.546 10^{-3} m³ US gallon = 3.785 10^{-3} m³

Mechanical and movement

Mechanical and movement

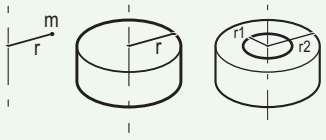
Parameters				Units		Parameters and units of use non-recommended
French name	English name	Symbol	Definition	SI	Non-SI but accepted	Conversions
Temps Intervalle de temps, durée Période (durée d'un cycle)	Time Period (periodic time)	t T		s (seconde)	minute: min hour: h day: d	The symbols ' and " are reserved to angles. minute is not written mn
Vitesse angulaire Pulsation	Angular velocity Circular frequency	ω	$\omega = \frac{d\varphi}{dt}$	rad/s		
Accélération angulaire	Angular acceleration	α	$\alpha = \frac{d\omega}{dt}$	rad/s^2		
Vitesse Célérité	Speed Velocity	$u, v, w,$ c	$v = \frac{ds}{dt}$	m/s	1 km/h = 0.277 778 m/s 1 m/min = 0.016 6 m/s	
Accélération Accélération de la pesanteur	Acceleration Acceleration of free fall	a $g = 9.81 m/s^2$	$a = \frac{dv}{dt}$ *in Paris*	m/s^2		
Vitesse de rotation	Revolution per minute	N		s^{-1}	min^{-1}	tr/mn, RPM, TM...
Masse	Mass	m		kg (kilogramme)	ton: t 1 t = 1,000 kg	kilo, kgs, KG... 1 pound: 1 lb = 0.453 6 kg
Masse volumique	Mass density	ρ	$\frac{dm}{dV}$	kg/m^3		
Masse linéique	Linear density	ρ_e	$\frac{dm}{dL}$	kg/m		
Masse surfacique	Surface mass	ρ_A	$\frac{dm}{dS}$	kg/m^2		
Quantité de mouvement	Momentum	P	$p = m.v$	kg. m/s		
Moment d'inertie	Moment of inertia	J, I	$I = \sum m.r^2$	kg.m^2		$J = \frac{MD^2}{4}$ kg.m^2 square pound foot = 1 lb.ft^2 = 42.1 x 10^{-3} kg.m^2
Force Poids	Force Weight	F G	$G = m.g$	N (newton)		kgf = kgp = 9.81 N pound force = lbF = 4.448 N
Moment d'une force	Moment of inertia Torque	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
Pression	Pressure	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
Constagete normale Constagete tangentielle, Cission	Normal stress Shear stress	σ τ		Pa use MPa = 10^6 Pa		kg/mm^2, 1 daN/mm^2 = 10 MPa psi = pound per square inch 1 psi = 6 894 Pa
Facteur de frottement	Friction coefficient	μ				improperly = cœfficient of friction f
Travail Énergie Énergie potentielle Énergie cinétique Quantité de chaleur	Work Energy Potential energy Kinetic energy Quantity of heat	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 Btu = 1 055 J (British thermal unit)
Puissance	Power	P	$P = \frac{W}{t}$	W (watt)		1 ch = 736 W 1 HP = 746 W
Débit volumique	Volumetric flow	q_v	$q_v = \frac{dV}{dt}$	m^3/s		
Rendement	Efficiency	η		< 1		%
Viscosité dynamique	Dynamic viscosity	η, μ		Pa.s		poise, 1 P = 0.1 Pa.s
Viscosité cinématique	Kinematic viscosity	ν	$\nu = \frac{\eta}{\rho}$	m^2/s		stokes, 1 St = 10^{-4} m^2/s

Unit conversions

Units	MKSA (International System IS)	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 d'inertie	1 kg.m^2 = 23.73 lb.ft^2	1 lb.ft^2 = 0.042 14 kg.m^2
Power	1 kW = 1.341 HP	1 HP = 0.746 kW
Pressure	1 kPa = 0.145 05 psi	1 psi = 6.894 kPa
Magnetic flux	1 T = 1 Wb / m^2 = 6.452 10^4 line / in^2	1 line / in^2 = 1,550 10^{-5} Wb / m^2
Magnetic losses	1 W / kg = 0.453 6 W / lb	1 W / lb = 2.204 W / kg

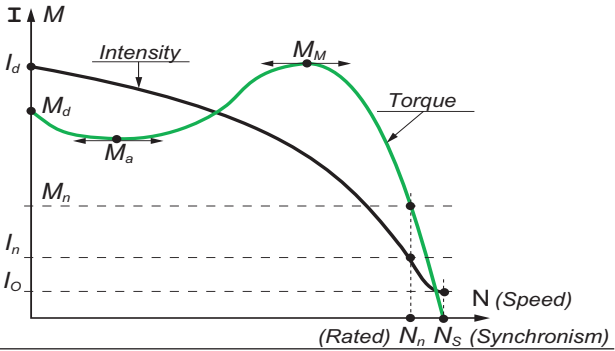
Multiples and sub-multiples		
Factor by which the unit is multiplied	Prefix to be placed before the unit name	Symbol to be placed before that of the unit
10^{18} or 1 000 000 000 000 000 000	exa	E
10^{15} or 1 000 000 000 000 000	peta	P
10^{12} or 1 000 000 000 000	tera	T
10^{9} or 1 000 000 000	giga	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

Mechanical formulae

Titles	Formulae	Units	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 $J_\omega = J_{\omega'} \cdot \left(\frac{\omega'}{\omega}\right)^2$
Moment of inertia Punctual mass	$J = m \cdot r^2$	J in kg.m^2 m in kg r in m	
Cylinder solid around its axis	$J = m \cdot \frac{r^2}{2}$		
Cylinder hollow around its axis	$J = m \cdot \frac{r_1^2 + r_2^2}{2}$		
Inertia of a weight 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.

Electrical formulae

Titles	Formulae	Units	Definitions / Notes
Accelerating torque	$M_{acc} = \frac{M_d + 2M_a + 2M_M + M_n}{6} - M_r$ *General formula:* $M_{acc} = \frac{1}{N_n}\int_0^{N_n} (M_{mot} - M_r)\, dN$	*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	$P = \frac{M \cdot \omega}{\eta_A}$	*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	$P = \sqrt{3} \cdot U \cdot I \cdot \cos j$	*P* in W *U* in V *I* in A	φ current / voltage phase angle. *U* armature voltage. *I* line current.
Reactive power absorbed by the motor	$Q = \sqrt{3} \cdot U \cdot I \cdot \sin j$	Q in VAR	
Reactive power supplied by a battery of capacitors	$Q = \sqrt{3} \cdot U^2 \cdot C \cdot \omega$	*U* in V *C* in µ F ω in rad/s	*U* = voltage at the terminals of the capacitor *C* = capacitor capacitance ω = rotational frequency of supply phases ($\omega = 2\pi f$)
Apparent power	$S = \sqrt{3} \cdot U \cdot I$ $S = \sqrt{P^2 + Q^2}$	S in VA	
Power supplied by the motor (three phase)	$P = \sqrt{3} \cdot U \cdot I \cdot \cos j \cdot h$		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	$N_S = \frac{120 \cdot f}{p}$	N_S in rpm *f* in Hz	*p* = number of poles *f* = frequency of the power supply

Parameters	Symbols	Units	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 **Pull-in torque** **Maximum torque or pull-out torque** **Rated torque**	M_d M_a M_M M_n	Nm	
Rated speed **Synchronous speed**	N_n N_S	rpm	

* Torque is the usual term for expressing the moment of a force.

Tolerances of electromechanical characteristics

IEC 60034-1 specifies standard tolerances for electromechanical characteristics.

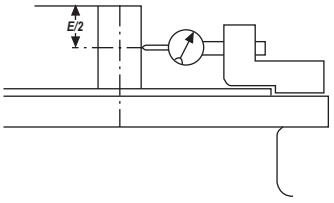
Parameters		Tolerances
Efficiency	machines P ≤ 150 kW	**– 15 % of (1 – η)**
	machines P > 150 kW	**– 10 % of (1 – η)**
Cos φ		**– 1/6 (1 – cos φ) (min 0.02 - max 0.07)**
Slip	machines P < 1 kW	**±30 %**
	machines P ≥ 1 kW	**±20 %**
Locked rotor torque		**– 15 % of rated torque**
Inrush started current		**+ 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

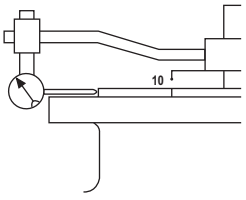
Tolerances and adjustments

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.

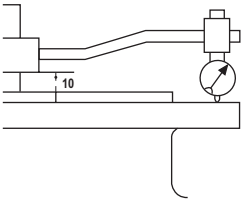
Characteristics	Tolerances
Frame size H ≤ 250	**0, — 0.5 mm**
≥ 280	**0, — 1 mm**
Diameter ∅ of the shaft extension:	
- 11 to 28 mm	**j6**
- 32 to 48 mm	**k6**
- 55 mm and over	**m6**
Diameter N of flange spigots	**j6 up to FF 500, js6 for FF 600 and more**
Key width	**h9**
Width of drive shaft keyway (normal keying)	**N9**
Key depth:	
- square section	**h9**
- rectangular section	**h11**
① ***Eccentricity of shaft in flanged motors*** (normal 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 in relation to shaft*** (normal class)	
Flange (FF) or Faceplate (FT):	
- F 55 to F 115	**0.08 mm**
- F 130 to F 265	**0.10 mm**
- FF 300 to FF 500	**0.125 mm**
- FF 600 to FF 740	**0.16 mm**
- FF 940 to FF 1080	**0.20 mm**



① ***Measurement of beating or out of round of the shaft extension of flanged motors***



② ***Concentricity of spigot diameter measurement***



③ ***Measurement of perpendicularity of mating surface of flange in relation to shaft***

Fixed speed

LSES IMfinity® IFT/IE2 - Powered by the mains - 4 poles

Type	Rated power	Rated torque	Starting torque/ Rated torque	Maximum torque/ Rated torque	Starting current/ Rated current	Moment of inertia	Weight	Noise	400V 50Hz							
									Rated speed	Rated current	Efficiency IEC 60034-2-1 2007			Power factor		
	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 rpm	I_n A	η 4/4	η 3/4	η 2/4	Cos φ 4/4	Cos φ 3/4	Cos φ 2/4
4 poles																
LSES 80 LG	0,75	4,95	1,95	2,8	5,85	0,00265	11,6	47	1445	1,7	81,30	81,90	80,50	0,78	0,70	0,57
LSES 80 LG	0,9	5,95	1,92	2,52	6,25	0,00316	12,5	47	1445	1,95	82,30	83,40	82,60	0,80	0,72	0,50
LSES 90 SL	1,1	7,3	1,9	2,65	6,05	0,00336	13,9	47	1440	2,35	82,40	84,00	83,80	0,82	0,74	0,61
LSES 90 L	1,5	9,95	2,25	2,85	6,25	0,00418	16,2	47	1440	3,15	83,60	85,10	84,70	0,82	0,75	0,61
LSES 90 LU	1,8	11,9	2,6	2,3	6,6	0,0045	18,6	47	1440	3,8	84,00	85,50	84,90	0,81	0,73	0,60
LSES 100 L	2,2	14,5	2,52	3,07	6,6	0,00567	22,5	49	1450	4,6	85,60	86,60	86,00	0,81	0,74	0,60
LSES 100 LR	3	19,9	2,75	3,15	6,7	0,00677	25,8	54	1440	6,25	85,50	86,80	86,60	0,81	0,73	0,60
LSES 112 MU	4	26,4	2,2	2,95	6,24	0,01312	34,9	55	1445	7,85	87,40	89,00	89,40	0,84	0,79	0,69
LSES 132 SU	5,5	36,1	2,65	3,05	7,1	0,01611	42,6	55	1456	11,2	88,50	89,50	89,20	0,80	0,73	0,60
LSES 132 M	7,5	49,3	2,55	3,35	7,5	0,02286	52,1	60	1452	14,4	89,40	90,50	90,50	0,84	0,78	0,66
LSES 132 M	9	58,9	2,8	3,55	7,95	0,02722	59,1	63	1458	17,2	90,00	91,00	91,00	0,84	0,78	0,67
LSES 160 MR	11	71,9	3,1	3,7	8,4	0,03574	78	61	1460	20,9	90,60	91,50	91,30	0,84	0,78	0,66
LSES 160 L	15	97,8	2,45	3,1	8,1	0,0712	90	60	1464	28,2	91,00	91,90	91,90	0,84	0,79	0,67
LSES 180 MT	18,5	121	2,1	3,15	8,15	0,0844	100	58	1464	35,2	91,40	92,30	92,20	0,83	0,77	0,66
LSES 180 LR	22	143	2,6	3,35	8,51	0,0956	108	60	1466	41,2	91,80	92,50	92,50	0,84	0,79	0,68
LSES 200 LR	30	195	1,96	2,56	7,58	0,1563	166	64	1470	57,6	92,80	93,40	93,20	0,81	0,75	0,63
LSES 225 ST	37	240	2,65	2,7	6,26	0,2294	205	64	1474	70,1	92,90	93,70	93,70	0,82	0,77	0,67
LSES 225 MR	45	292	2,25	2,35	6,79	0,2885	230	70	1472	85,1	93,40	94,05	93,97	0,83	0,78	0,68
LSES 250 ME	55	354	2,3	2,7	7,23	0,7793	350	69	1484	102	94,00	94,40	94,30	0,83	0,79	0,70
LSES 280 SD	75	482	2,45	3,2	8,03	0,9595	428	69	1486	140	94,40	94,70	94,30	0,82	0,78	0,69
LSES 280 MD	90	579	2,6	3,45	8,25	1,0799	470	68	1484	170	94,50	94,70	94,40	0,81	0,76	0,65
LSES 315 SP	110	707	3,1	2,85	7,56	2,4322	630	76	1486	201	95,00	95,00	94,30	0,84	0,78	0,69

LSES IMfinity® IFT/IE2 - Powered by drive[1] - 4 poles

Type	400V 50Hz				% Rated torque M_n at					400V 87Hz				Mechanical speed maximum[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 rpm	I_n A	Cos φ 4/4						P_n kW	N_n rpm	I_n A	Cos φ 4/4	
4 poles														
LSES 80 LG	0,75	1445	1,75	0,78	4,5	5	5	5	2,8	1,3	2503	3,1	0,78	11700
LSES 90 SL	1,1	1440	2,48	0,82	6,6	7,3	7,3	7,3	4,2	1,9	2494	4,3	0,82	11700
LSES 90 L	1,5	1440	3,31	0,82	9,0	10	10	10	5,7	2,6	2494	5,8	0,82	11700
LSES 100 L	2,2	1440	4,77	0,83	13,1	14,6	14,6	14,6	8,4	3,8	2494	8,3	0,83	9900
LSES 100 LR	3	1440	6,52	0,81	17,9	19,9	19,9	19,9	11,4	5,2	2494	11,3	0,81	9900
LSES 112 MU	4	1445	8,51	0,84	23,8	26,4	26,4	26,4	15,2	7	2503	14,8	0,84	9900
LSES 132 SU	5,5	1454	11,48	0,80	32,5	32,5	36,1	36,1	20,8	9,6	2515	20	0,80	7600
LSES 132 M	7,5	1452	15,08	0,84	44,4	44,4	49,3	49,3	28,3	13,1	2525	26,2	0,84	7600
LSES 132M	9	1458	17,81	0,84	53	53	58,9	58,9	33,9	15,7	2518	31	0,84	7600
LSES 160 MR	11	1460	21,89	0,84	61,1	68,3	71,9	71,9	41,3	19,1	2536	38,1	0,84	6000
LSES 160 L	15	1464	29,87	0,84	83,1	92,9	97,8	97,8	56,2	26,1	2529	52	0,84	7600
LSES 180 MT	18,5	1464	36,39	0,83	97	109	121	121	70	32,2	2539	63,3	0,83	4500
LSES 180 LR	22	1466	42,42	0,84	114	129	143	143	82	38,3	2536	73,8	0,84	5670
LSES 200 LR	30	1464	55,8	0,83	156	175	184	196	106	49	2536	97	0,83	4500
LSES 225 ST	37	1472	73,6	0,82	204	228	240	240	138	64,4	2550	128	0,82	4320
LSES 225 MR	45	1472	88,8	0,83	248	277	292	292	168	78,3	2550	155	0,83	4320
LSES 250 ME	55	1484	108	0,83	301	336	354	354	203	95,7	2570	188	0,83	4050
LSES 280 SD	75	1486	146	0,83	410	458	482	482	277	-	-	-	-	3420
LSES 280 MD	90	1484	176	0,81	492	550	579	579	333	-	-	-	-	3420
LSES 315 SP	110	1488	211	0,84	565	635	706	706	406	-	-	-	-	2700

[1] Values given with a voltage drop of 30 V at the drive output ; with gearbox, please see page 54

Fixed speed

LSES IMfinity® IFT/IE2 - Powered by the mains - 4 poles

Type	Rated power	380V 50Hz				415V 50Hz				460V 60Hz			
		Rated speed	Rated current	Efficiency	Power factor	Rated speed	Rated current	Efficiency	Power factor	Rated speed	Rated current	Efficiency	Power factor
	P_n kW	N_n rpm	I_n A	η 4/4	Cos φ 4/4	N_n rpm	I_n A	η 4/4	Cos φ 4/4	N_n rpm	I_n A	η 4/4	Cos φ 4/4
4 poles													
LSES 80 LG	0,75	1435	1,75	80,10	0,82	1450	1,7	81,20	0,76	1754	4,1	1,5	83,30	0,75
LSES 80 LG	0,9	1435	2	81,60	0,83	1450	1,95	82,60	0,78	1756	4,9	1,8	82,50	0,77
LSES 90 SL	1,1	1430	2,4	81,40	0,85	1445	2,3	82,80	0,80	1752	6	2,05	85,30	0,79
LSES 90 L	1,5	1430	3,25	82,80	0,85	1445	3,1	84,10	0,80	1754	8,17	2,75	86,00	0,79
LSES 90 LU	1,8	1435	3,9	83,50	0,84	1450	3,75	84,50	0,79	1752	9,8	3,45	84,00	0,78
LSES 100 L	2,2	1440	4,7	84,90	0,84	1454	4,5	86,00	0,79	1760	11,94	4,05	87,70	0,78
LSES 100 LR	3	1430	6,35	85,50	0,84	1445	6,2	86,00	0,78	1752	16,35	5,5	87,90	0,78
LSES 112 MU	4	1435	8,15	86,60	0,86	1450	7,65	88,20	0,83	1756	21,75	6,75	89,60	0,83
LSES 132 SU	5,5	1450	11,4	87,90	0,83	1460	11,3	88,60	0,77	1764	29,77	9,5	91,10	0,80
LSES 132 M	7,5	1445	14,8	88,70	0,87	1458	14,4	89,60	0,81	1762	40,65	12,6	91,10	0,82
LSES 132 M	9	1450	17,6	89,40	0,87	1460	16,9	90,40	0,82	1764	48,72	15,2	91,90	0,83
LSES 160 MR	11	1452	21,6	89,90	0,86	1462	20,8	91,00	0,81	1766	59,5	18,4	91,70	0,82
LSES 160 L	15	1460	29,1	90,60	0,86	1468	28	91,30	0,82	1772	80,8	24,5	92,60	0,83
LSES 180 MT	18,5	1460	36	91,20	0,86	1468	34,8	91,60	0,81	1770	99,8	30,4	93,00	0,82
LSES 180 LR	22	1460	41,9	91,60	0,87	1468	41,2	91,80	0,81	1772	119	35,7	93,10	0,83
LSES 200 LR	30	1466	58,6	92,40	0,84	1472	57,6	92,90	0,78	1776	161	50,1	93,90	0,80
LSES 225 ST	37	1468	72,2	92,70	0,84	1478	69	93,20	0,80	1782	198	60,9	94,40	0,81
LSES 225 MR	45	1466	86,2	93,10	0,85	1474	78,4	93,57	0,81	1776	242	72,5	94,39	0,82
LSES 250 ME	55	1482	106	93,60	0,84	1486	99,2	94,20	0,82	1786	294	88,2	95,20	0,82
LSES 280 SD	75	1484	144	94,00	0,84	1486	136	94,60	0,82	1788	401	121	94,70	0,82
LSES 280 MD	90	1482	175	94,30	0,83	1488	167	94,50	0,79	1788	481	149	94,90	0,80
LSES 315 SP	110	1486	208	94,80	0,85	1488	196	95,10	0,82	1788	587	175	95,40	0,83

Fixed speed

LSES IMfinity® IFT/IE3 - Powered by the mains - 4 poles

Type	Rated power	Rated torque	Starting torque/ Rated torque	Maximum torque/ Rated torque	Starting current/ Rated current	Moment of inertia	Weight	Noise	400V 50Hz							
									Rated speed	Rated current	Efficiency IEC 60034-2-1 2007			Power factor		
	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 rpm	I_n A	η 4/4	η 3/4	η 2/4	Cos φ 4/4	Cos φ 3/4	Cos φ 2/4
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	0,65
LSES 132 MU	7,5	49,1	2,95	3,35	8,12	0,02965	62,6	61	1458	13,8	90,40	91,50	91,90	0,87	0,82	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 LUR	15	97,6	2,55	3,45	8,47	0,0954	100	58	1468	27,3	92,10	92,90	93,00	0,86	0,82	0,72
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
LSES 280 SD	75	482	2,45	3,2	8,08	0,9595	428	69	1486	139	95,00	95,20	94,90	0,82	0,78	0,69
LSES 280 MD	90	579	2,6	3,45	8,35	1,0799	470	68	1484	168	95,50	95,70	95,40	0,81	0,76	0,65
LSES 315 SP	110	707	3,1	2,85	7,57	2,4322	630	76	1486	200	95,60	95,60	94,90	0,83	0,78	0,69

LSES IMfinity® IFT/IE3 - Powered by drive[1] - 4 poles

Type	400V 50Hz				% Rated torque M_n at					400V 87Hz Δ				Mechanical speed maximum[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 rpm	I_n A	Cos φ 4/4						P_n kW	N_n rpm	I_n A	Cos φ 4/4	
4 poles														
LSES 80 LG	0,75	1450	1,7	0,80	4,5	5	5	5	2,8	1,31	2511	3	0,8	11700
LSES 90 SL	1,1	1450	2,4	0,81	6,5	7,3	7,3	7,3	4,2	1,91	2511	4,2	0,81	11700
LSES 90 LU	1,5	1452	3,3	0,79	8,9	9,9	9,9	9,9	5,7	2,61	2515	5,8	0,79	11700
LSES 100 LR	2,2	1454	4,8	0,79	13,0	14,4	14,4	14,4	8,3	3,83	2518	8,3	0,79	9900
LSES 100 LG	3	1460	6,4	0,81	17,6	19,6	19,6	19,6	11,3	5,22	2529	11,1	0,81	9900
LSES 112 MU	4	1458	8,4	0,8	23,6	26,2	26,2	26,2	15,1	6,96	2525	14,6	0,8	9900
LSES 132 SM	5,5	1462	11	0,85	32,3	32,3	35,9	35,9	20,6	9,57	2532	19,1	0,85	6700
LSES 132 MU	7,5	1458	14,9	0,86	44,2	44,2	49,1	49,1	28,2	13,05	2525	25,9	0,86	6700
LSES 160 MR	9	1464	17,8	0,85	52,8	52,8	58,7	58,7	33,7	15,66	2536	31	0,85	6000
LSES 160 MR	11	1466	21,6	0,85	61,0	68,1	71,7	71,7	41,2	19,14	2539	37,6	0,85	6000
LSES 160 LUR	15	1468	29,2	0,85	83,0	92,7	97,6	97,6	56,1	26,1	2543	50,8	0,85	5670
LSES 180 M	18,5	1468	36,3	0,85	96	108	120	120	69	32,19	2543	63,2	0,85	5670
LSES 180 LUR	22	1470	43,6	0,83	114	129	143	143	82	38,28	2546	75,9	0,83	4500
LSES 200 LU	30	1476	59,2	0,84	165	184	194	194	111	52,2	2557	103	0,84	4500
LSES 225 SR	37	1480	73	0,81	203	227	239	239	137	64,38	2584	127	0,81	4320
LSES 225 MG	45	1484	87,9	0,83	247	276	290	290	167	78,3	2570	153	0,83	4050
LSES 250 ME	55	1484	108	0,83	301	336	354	354	203	95,7	2570	188	0,83	4050
LSES 280 SD	75	1486	146	0,83	410	458	482	482	277	-	-	-	-	3420
LSES 280 MD	90	1484	176	0,82	492	550	579	579	333	-	-	-	-	3420
LSES 315 SP	110	1488	211	0,84	565	635	706	706	406	-	-	-	-	2700

[1] *Values given with a voltage drop of 30 V at the drive output ; with gearbox, please see page 54*

Fixed speed

LSES IMfinity® IFT/IE3 - Powered by the mains - 4 poles

Type	Rated power	380V 50Hz				415V 50Hz				460V 60Hz			
		Rated speed	Rated current	Efficiency	Power factor	Rated speed	Rated current	Efficiency	Power factor	Rated speed	Rated current	Efficiency	Power factor
	P_n kW	N_n rpm	I_n A	η 4/4	Cos φ 4/4	N_n rpm	I_n A	η 4/4	Cos φ 4/4	N_n rpm	I_n A	η 4/4	Cos φ 4/4
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	0,86	1466	10,3	90,60	0,82	1770	29,67	9,20	91,70	0,82
LSES 132 MU	7,5	1450	14,3	90,40	0,88	1462	13,5	90,90	0,85	1766	40,55	12,10	91,80	0,85
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 LUR	15	1464	28,6	91,50	0,87	1472	26,6	92,40	0,85	1774	80,7	24,00	93,20	0,84
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
LSES 280 SD	75	1484	143	95,00	0,84	1486	135	95,10	0,81	1788	401	120,00	95,50	0,82
LSES 280 MD	90	1482	173	95,30	0,83	1488	165	95,50	0,79	1788	481	147,00	95,80	0,80
LSES 315 SP	110	1486	206	95,40	0,85	1488	195	95,70	0,82	1788	587	173,00	95,90	0,83

Fixed speed

LS FFB IFT/NIE

4 poles - 1500 rpm - IFT/NIE *(except motors in italics)* **- MAINS power supply**
LS FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ
50 / 60 Hz - IP55 - Built-in power supply - Factory-set braking torque

Motor type	Brake type	Rated power	Rated torque	Starting torque/ Rated torque	Maximum torque/ Rated torque	Starting current/ Rated current	Moment of inertia	Locking torque	Braking torque[1]	400V - 50Hz				Weight IM B3/B5[2]
										Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	
		P_n kW	M_n N.m	M_d/M_n	M_m/M_n	I_d/I_n	J kg.m²	M_a N.m	M_f N.m	N_n rpm	I_n A	η % 4/4	Cos φ 4/4	kg
LS 71 M	***FFB1***	*0,25*	*1,68*	*2,73*	*2,93*	*4,63*	*0,00094*	*4,60*	*4,5*	*1425*	*0,8*	*67,0*	*0,65*	*9,4*
LS 71 M	***FFB1***	*0,37*	*2,49*	*2,41*	*2,81*	*4,9*	*0,00111*	*6,00*	*4,5*	*1420*	*1,06*	*70,0*	*0,70*	*10,3*
LS 71 L	***FFB1***	*0,55*	*3,75*	*2,32*	*2,53*	*4,8*	*0,00136*	*8,75*	*6*	*1400*	*1,62*	*68,0*	*0,70*	*11,3*
LS 80 L	**FFB1**	0,55	3,75	2,15	2,3	3,9	0,00154	7,88	12	1405	1,7	66,9	0,71	11,5
LS 80 L	**FFB1**	0,75	5,1	1,8	2,15	4,25	0,00190	7,40	12	1400	2,05	69,3	0,77	12,2
LS 80 L	**FFB1**	0,9	6,05	3,1	3,1	5,33	0,00266	17	12	1420	2,55	73,0	0,73	14,8
LS 90 SL	**FFB2**	1,1	7,35	1,5	2,15	4,5	0,00353	11	19	1425	2,5	76,1	0,84	18,2
LS 90 L	**FFB2**	1,5	10	1,9	2,4	5,25	0,00425	19	19	1430	3,3	79,2	0,83	20,0
LS 90 L	**FFB2**	1,8	12	2	2,55	5,6	0,00469	24	26	1435	3,95	79,9	0,82	21,0
LS 100 L	**FFB2**	2,2	14,6	2,3	2,7	5,7	0,00518	29	26	1435	4,8	80,2	0,82	24,9
LS 100 L	**FFB3**	3	20	2,6	3,1	6,65	0,00655	50	52	1435	6,35	82,2	0,83	29,1
LS 112 MG	**FFB3**	4	26,2	3,20	3,19	6,74	0,01240	64	52	1455	8,70	86,9	0,77	29,4
LS 132 S	**FFB3**	5,5	36,1	2,41	3,06	6,33	0,01538	88	67	1456	11,5	85,4	0,81	44,9
LS 132 M	**FFB4**	7,5	49,6	2,29	2,99	5,9	0,02523	114	110	1445	15,6	86,8	0,80	62,4
LS 132 M	**FFB4**	9	59,5	2,4	2,95	6,64	0,0288	128	110	1445	17,7	87,5	0,83	66,3
LS 160 MP	**FFB5**	11	72,3	2,9	3,3	6,85	0,0338	177	140	1450	22,1	88,8	0,81	83,3
LS 160 LR	**FFB5**	15	98,4	2,85	3,35	7,45	0,0417	227	180	1456	30	89,1	0,81	96,3
LS 180 MT	**FFB5**	18,5	121	2,1	3,15	7,95	0,0904	218	200	1464	36	89,3	0,83	117

1. Values given for information only; for standards-related restrictions, please consult us.
2. These values are given for information only.

4 poles - 1500 rpm - IFT/NIE - DRIVE power supply
LS FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ
50 / 60 Hz - IP55 - Built-in power supply - Factory-set braking torque

Motor type	Brake type	Rated power	400V - 50Hz			% Rated torque				
			Rated speed	Rated current	Power factor	M_n à				
		P_n kW	N_n rpm	I_n A	Cos φ 4/4	10 Hz	17 Hz	25 Hz	50 Hz	87 Hz
LS 80 L	**FFB1**	0.75	1380	2.10	0.81	65%	80%	100%	100%	57%
LS 80 L	**FFB1**	0.9	1415	2.50	0.77	65%	80%	100%	100%	57%
LS 90 SL	**FFB2**	1.1	1410	2.68	0.87	75%	85%	90%	100%	57%
LS 90 L	**FFB2**	1.5	1420	3.52	0.86	75%	85%	90%	100%	57%
LS 90 L	**FFB2**	1.8	1425	4.23	0.85	75%	85%	90%	100%	57%
LS 100 L	**FFB2**	2.2	1425	5.11	0.86	75%	85%	90%	100%	57%
LS 100 L	**FFB3**	3	1425	6.78	0.86	60%	85%	90%	100%	57%
LS 112 MG	**FFB3**	4	1420	9.32	0.84	60%	85%	90%	100%	57%
LS 132 S	**FFB3**	5.5	1450	11.9	0.86	70%	85%	100%	100%	57%
LS 132 M	**FFB4**	7.5	1445	15.7	0.82	90%	100%	100%	100%	57%
LS 132 M	**FFB4**	9	1440	18.8	0.86	90%	100%	100%	100%	57%
LS 160 MP	**FFB5**	11	1450	22.3	0.83	90%	100%	100%	100%	57%
LS 160 LR	**FFB5**	15	1450	30.3	0.83	90%	100%	100%	100%	57%
LS 180 MT	**FFB5**	18.5	1464	36.0	0.83	80%	90%	100%	100%	57%

Fixed speed

LS FFB IFT/NIE

4 poles - 1500 rpm - IFT/NIE *(except motors in italics)* **- MAINS power supply**
LS FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ
50 / 60 Hz - IP55 - Built-in power supply - Factory-set braking torque

			380V - 50Hz				415V - 50Hz					460V - 60Hz			
		Rated power	Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	Rated power	Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor
Motor type	**Brake type**	P_n kW	N_n rpm	I_n A	η% 4/4	Cos φ 4/4	N_n rpm	I_n A	η% 4/4	Cos φ 4/4	P_n kW	N_n rpm	I_n A	η% 4/4	Cos φ 4/4
LS 71 M	***FFB1***	*0,25*	*1425*	*0,78*	*68,0*	*0,70*	*1430*	*0,84*	*67,0*	*0,60*	*0,30*	*1684*	*0,82*	*68,42*	*0,77*
LS 71 M	***FFB1***	*0,37*	*1410*	*1,10*	*71,0*	*0,70*	*1430*	*1,10*	*70,0*	*0,65*	*0,44*	*1713*	*1,05*	*73,00*	*0,73*
LS 71 L	***FFB1***	*0,55*	*1385*	*1,59*	*68,0*	*0,75*	*1410*	*1,56*	*68,0*	*0,70*	*0,66*	*1671*	*1,56*	*70,60*	*0,75*
LS 80 L	**FFB1**	0,55	1390	1,65	67,5	0,75	1415	1,75	65,5	0,67	0,63	1710	1,60	71,60	0,70
LS 80 L	**FFB1**	0,75	1380	2,05	68,3	0,81	1410	2,05	69,0	0,73	0,86	1710	1,95	73,30	0,76
LS 80 L	**FFB1**	0,9	1405	2,5	74,3	0,74	1430	2,65	73,6	0,64	1,04	1720	2,40	76,70	0,7
LS 90 SL	**FFB2**	1,1	1410	2,60	74,3	0,87	1435	2,45	76,9	0,82	1,26	1730	2,40	78,80	0,84
LS 90 L	**FFB2**	1,5	1420	3,40	77,1	0,86	1440	3,25	79,6	0,80	1,72	1735	3,20	81,20	0,83
LS 90 L	**FFB2**	1,8	1425	4,10	78,8	0,85	1445	4,00	80,7	0,78	2,07	1735	3,90	81,80	0,82
LS 100 L	**FFB2**	2,2	1425	4,90	79,3	0,86	1445	4,90	80,6	0,78	2,53	1735	4,70	82,40	0,82
LS 100 L	**FFB3**	3	1425	6,50	81,3	0,86	1440	6,30	82,7	0,80	3,45	1735	6,15	83,80	0,84
LS 112 MG	**FFB3**	4	1420	8,90	80,9	0,84	1440	9,10	81,4	0,75	4,60	1735	8,70	83,40	0,80
LS 132 S	**FFB3**	5,5	1450	11,4	85,9	0,86	1458	11,6	85,2	0,77	6,3	1756	11	86,70	0,83
LS 132 M	**FFB4**	7,5	1440	16,0	85,5	0,83	1450	16,5	86,7	0,73	8,6	1750	14,9	88,00	0,82
LS 132 M	**FFB4**	9	1435	18,2	87,2	0,86	1452	17,4	89,5	0,81	10,3	1745	17,1	89,40	0,85
LS 160 MP	**FFB5**	11	1440	22,1	88,0	0,86	1454	21,5	89,3	0,80	12,6	1750	20,9	90,20	0,84
LS 160 LR	**FFB5**	15	1450	31,0	88,7	0,83	1458	32,2	88,9	0,73	17,2	1756	29,6	90,40	0,81
LS 180 MT	**FFB5**	18,5	1460	36,9	88,8	0,86	1468	35,7	89,5	0,81	21,0	1762	34	92,10	0,84

4 poles - 1500 rpm - IFT/NIE - DRIVE power supply
LS FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ
50 / 60 Hz - IP55 - Separate brake power supply - Factory-set braking torque

			400V - 87Hz Δ[1]			Maximum mechanical speed[2]
Motor type	**Brake type**	Rated power	Rated speed	Rated current	Power factor	
		P_n	N_n	I_n	Cos φ	
LS 80 L	**FFB1**	1.31	2500	3.65	0.81	4500
LS 80 L	**FFB1**	1.57	2490	4.34	0.77	4500
LS 90 SL	**FFB2**	1.91	2525	4.66	0.87	4500
LS 90 L	**FFB2**	2.61	2520	6.13	0.86	4500
LS 90 L	**FFB2**	3.13	2530	7.36	0.85	4500
LS 100 L	**FFB2**	3.83	2535	8.90	0.86	4500
LS 100 L	**FFB3**	5.22	2535	11.8	0.86	4500
LS 112 MG	**FFB3**	6.96	2535	16.2	0.84	4500
LS 132 S	**FFB3**	9.57	2530	20.6	0.86	4500
LS 132 M	**FFB4**	13.1	2560	27.3	0.82	4500
LS 132 M	**FFB4**	15.7	2555	32.7	0.86	4500
LS 160 MP	**FFB5**	19.1	2550	38.7	0.83	4500
LS 160 LR	**FFB5**	26.1	2560	52.7	0.83	4500
LS 180 MT	**FFB5**	18.5	2560	52.7	0.83	4500

1. Data only applicable to motors: 400V 50Hz Y.
2. with encoder: 3000 rpm

Fixed speed

LSES FFB IFT/IE3

4 poles - 1500 rpm - IFT/IE3 - AC power supply
LSES FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ - IP55 - Built-in power supply - Factory-set braking torque

Motor type	Brake type	Rated power	Rated torque	Starting torque/ Rated torque	Maximum torque/ Rated torque	Starting current/ Rated current	Moment of inertia	Locking torque	Braking torque[1]	400V - 50Hz				Weight IM B3/B5[2]
										Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	
		P_n kW	M_n N.m	M_d/M_n	M_m/M_n	I_d/I_n	J kg.m²	M_a N.m	M_f N.m	N_n rpm	I_n A	η% 4/4	Cos φ 4/4	kg
LSES 80 LG	FFB1	0,75	4,95	2,20	3,0	6,39	0,0036	10,9	12	1450	1,6	83,6	0,81	16,6
LSES 80 LG	FFB1	0,9	5,9	2,58	3,1	6,26	0,0041	13,2	12	1450	1,95	83,8	0,79	16,7
LSES 90 SL	FFB2	1,1	7,25	2,45	3,2	6,90	0,0051	16,3	19	1450	2,3	84,8	0,81	22,4
LSES 90 LU	FFB2	1,5	9,85	2,90	3,7	7,65	0,0061	26,6	19	1452	3,2	85,6	0,79	26,6
LSES 100 L	FFB2	1,8	11,8	2,41	2,7	6,42	0,0065	26,8	26	1452	3,8	86,6	0,79	29,9
LSES 100 LR	FFB2	2,2	14,4	3,20	3,8	7,96	0,0076	46,1	26	1454	4,65	87,1	0,78	32,0
LSES 100 LG	FFB3	3	19,6	2,45	3,3	7,21	0,0124	46,1	52	1460	6	89,2	0,81	36,1
LSES 112 MU	FFB3	4	26,2	2,70	3,1	7,23	0,0140	56,3	52	1458	7,9	88,9	0,82	43,6
LSES 132 SM	FFB4	5,5	35,9	2,80	3,6	8,39	0,0289	96,9	69	1462	10,5	90,3	0,84	66,5
LSES 132 MU	FFB4	7,5	49,1	2,95	3,4	8,12	0,0356	133	110	1458	13,8	90,4	0,87	77,1
LSES 160 MR	FFB4	9	58,7	3,10	3,7	8,69	0,0418	158	110	1464	17	91	0,84	92,3
LSES 160 M	FFB5	11	71,7	2,25	3,1	7,36	0,0772	133	140	1466	20,2	91,4	0,86	110
LSES 160 LUR	FFB5	15	97,6	2,55	3,5	8,47	0,1014	185	180	1468	27,3	92,1	0,86	117

1. Values given for information only; for standards-related restrictions, please consult us.

2. These values are given for information only.

4 poles - 1500 rpm - IFT/IE3 - AC power supply
LSES FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ - IP55 - Built-in power supply - Factory-set braking torque

Motor type	Brake type	Rated power	380V - 50Hz				415V - 50Hz				Rated power	460V - 60Hz			
			Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor		Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor
		P_n kW	N_n rpm	I_n A	η% 4/4	Cos φ 4/4	N_n rpm	I_n A	η% 4/4	Cos φ 4/4	P_n kW	N_n rpm	I_n A	η% 4/4	Cos φ 4/4
LSES 80 LG	FFB1	0.75	1450	1.70	0.80	90%	100%	100%	100%	57%	0.75	1758	1.45	85.1	0.76
LSES 80 LG	FFB1	0.9	1440	2.45	0.80	90%	100%	100%	100%	57%	0.9	1758	1.70	85.6	0.76
LSES 90 SL	FFB2	1.1	1450	2.43	0.81	90%	100%	100%	100%	57%	1.1	1760	2.05	86.6	0.78
LSES 90 LU	FFB2	1.5	1452	3.31	0.79	90%	100%	100%	100%	57%	1.5	1760	2.80	87.3	0.76
LSES 100 L	FFB2	1.8	1440	3.90	0.82	90%	100%	100%	100%	57%	1.8	1760	3.30	87.0	0.78
LSES 100 LR	FFB2	2.2	1454	4.77	0.79	90%	100%	100%	100%	57%	2.2	1760	4.15	88.4	0.76
LSES 100 LG	FFB3	3	1460	6.37	0.81	90%	100%	100%	100%	57%	3	1766	5.35	90.0	0.79
LSES 112 MU	FFB3	4	1458	8.37	0.80	90%	100%	100%	100%	57%	4	1764	7.10	90.2	0.79
LSES 132 SM	FFB4	5.5	1462	11.0	0.85	90%	90%	100%	100%	57%	5.5	1768	9.05	91.7	0.83
LSES 132 MU	FFB4	7.5	1458	14.9	0.86	90%	90%	100%	100%	57%	7.5	1766	12.1	92.0	0.84
LSES 160 MR	FFB4	9	1464	17.8	0.85	90%	90%	100%	100%	57%	9	1768	14.7	92.4	0.83
LSES 160 M	FFB5	11	1466	21.6	0.85	85%	95%	100%	100%	57%	11	1774	17.8	92.8	0.84
LSES 160 LUR	FFB5	15	1468	29.2	0.85	85%	95%	100%	100%	57%	15	1774	24.2	93.3	0.93

Fixed speed

LSES FFB IFT/IE3

4 poles - 1500 rpm - IFT/IE3 - AC power supply
LS FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ - IP55 - Built-in power supply - Factory-set braking torque

Motor type	Brake type	380V - 50Hz					415V - 50Hz					460V - 60Hz				
		Rated power	Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	Rated power	Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor
		P_n kW	N_n rpm	I_n A	η% 4/4	Cos φ 4/4	N_n rpm	I_n A	η% 4/4	Cos φ 4/4	P_n kW	N_n rpm	I_n A	η% 4/4	Cos φ 4/4
LSES 80 LG	FFB1	0,75	1440	1,65	82,6	0,82	1452	1,6	83,7	0,78	0,75	1758	1,45	85,1	0,77
LSES 80 LG	FFB1	0,9	1445	2	83,3	0,82	1456	1,95	84,1	0,79	0,9	1760	1,75	85,7	0,76
LSES 90 SL	FFB2	1,1	1445	2,35	84,1	0,83	1454	2,25	85,4	0,79	1,1	1760	2,05	86,6	0,78
LSES 90 LU	FFB2	1,5	1445	3,25	85,3	0,82	1456	3,2	85,7	0,76	1,5	1760	2,85	87,2	0,76
LSES 100 L	FFB2	1,8	1445	3,9	86	0,83	1454	3,75	86,8	0,79	1,8	1762	3,35	88,2	0,76
LSES 100 LR	FFB2	2,2	1445	4,75	86,7	0,82	1456	4,6	87,3	0,76	2,2	-	-	-	-
LSES 100 LG	FFB3	3	1456	6,2	88,7	0,84	1466	6	89,2	0,78	3	1770	5,25	90,5	0,79
LSES 112 MU	FFB3	4	1452	8,05	88,6	0,83	1460	7,8	89,0	0,8	4	1764	7,05	90,3	0,79
LSES 132 SM	FFB4	5,5	1456	10,8	89,7	0,87	1466	10,3	90,6	0,82	5,5	1770	9,2	91,7	0,82
LSES 132 MU	FFB4	7,5	1450	14,3	90,4	0,87	1462	13,5	90,9	0,85	7,5	1766	12,1	91,8	0,85
LSES 160 MR	FFB4	9	1458	17,5	90,9	0,86	1466	16,7	91,3	0,84	9	1768	14,9	92,2	0,82
LSES 160 M	FFB5	11	1462	20,8	91,4	0,86	1470	19,6	91,7	0,85	11	1774	17,6	92,5	0,85
LSES 160 LUR	FFB5	15	1464	28,6	91,5	0,86	1472	26,6	92,4	0,85	15	1774	24,0	93,2	0,84

4 poles - 1500 rpm - IFT/IE3 - DRIVE power supply
LS FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ - IP55 - Separate brake power supply - Factory-set braking torque

Motor type	Brake type	Rated power	400V - 87Hz Δ[1]			Maximum mechanical speed[2]
			Rated speed	Rated current	Power factor	
		P_n kW	N_n rpm	I_n A	Cos φ 4/4	rpm
LSES 80 LG	FFB1	1.31	2511	2.96	0.80	4500
LSES 80 LG	FFB1	1.55	2550	3.47	0.80	4500
LSES 90 SL	FFB2	1.91	2511	4.23	0.81	4500
LSES 90 LU	FFB2	2.61	2514	5.76	0.79	4500
LSES 100 L	FFB2	3.13	2550	6.77	0.82	4500
LSES 100 LR	FFB2	3.83	2518	8.30	0.79	4500
LSES 100 LG	FFB3	5.22	2528	11.1	0.81	4500
LSES 112 MU	FFB3	6.96	2525	14.6	0.80	4500
LSES 132 SM	FFB4	9.57	2532	19.1	0.85	4500
LSES 132 MU	FFB4	13.1	2525	25.9	0.86	4500
LSES 160 MR	FFB4	15.7	2535	31.0	0.85	4500
LSES 160 M	FFB5	19.1	2538	37.6	0.85	4500
LSES 160 LUR	FFB5	26.1	2542	50.8	0.85	4500

1. Data only applicable to motors: 400V 50Hz Y.
2. with encoder: 3000 rpm

Fixed speed

LS brake FMD

4 poles - 1500 rpm - Powered by the mains
LS FMD brake - 230Δ / 400 V - IP55 - Built-in power supply - Factory-set braking torque

Motor type	Brake type	Rated power	Rated torque	Starting torque/ Rated torque	Maximum torque/ Rated torque	Starting current/ Rated current	Moment of inertia	Braking torque[1]	400V - 50Hz				Weight IM B3/B5[2]
									Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	
		P_n kW	M_n N.m	M_d/M_n	M_m/M_n	I_d/I_n	J kg.m²	M_f N.m	N_n rpm	I_n (400V) A	η% 4/4	Cos φ 4/4	kg
LS 56 M	**FMD3**	0.06	0.44	2.41	2.50	2.79	0.00040	3	1380	0.29	40	0.76	5.2
LS 56 M	**FMD3**	0.09	0.61	2.75	2.75	3.08	0.00040	3	1400	0.39	53	0.60	5.2
LS 63 M	**FMD3**	0.12	0.83	2.41	2.31	3.20	0.00050	3	1380	0.44	54	0.70	6.0
LS 63 M	**FMD3**	0.18	1.24	2.61	2.61	3.70	0.00063	3	1390	0.64	60	0.65	6.2
LS 71 L	**FMD5**	0.25	1.68	2.73	2.93	4.63	0.00088	5	1425	0.80	67	0.65	8.3
LS 71 L	**FMD5**	0.37	2.49	2.41	2.81	4.91	0.00105	5	1420	1.06	70	0.70	9.2
LS 71 L	**FMD5**	0.55	3.75	2.41	2.81	4.81	0.00130	5	1400	1.62	68	0.70	10.2

1. Values given for information only; for standards-related restrictions, please consult Leroy-Somer.
2. These values are given for information only.

LS brake FMD

4 poles - 1500 rpm - Powered by the mains
LS FMD brake - 230V - IP55 - Built-in power supply - Factory-set braking torque

Motor type	Brake type	Rated power	Rated torque	Starting torque/ Rated torque	Maximum torque/ Rated torque	Starting current/ Rated current	CP 400V	Braking torque[1]	230V - 50Hz			Weight IM B3/B5[2]
									Rated speed	Rated current	Power factor	
		P_n kW	M_n N.m	M_d/M_n	M_m/M_n	I_d/I_n	MF	M_f N.m	N_n rpm	I_n (400V) A	Cos φ 4/4	kg
LS 56 M P	**FMD3**	0.06	0.41	1.27	2.24	2.64	6	3	1420	0.72	0.90	4.7
LS 63 M P	**FMD3**	0.09	0.62	0.68	1.35	2.40	6	3	1380	0.75	0.95	5.2
LS 63 M P	**FMD3**	0.12	0.82	0.88	1.76	2.90	8	3	1400	1.00	0.95	5.7
LS 71 L P	**FMD5**	0.18	1.20	0.60	2.60	3.89	10	5	1430	1.80	0.75	7.9
LS 71 L P	**FMD5**	0.25	1.67	0.59	2.28	4.29	10	5	1430	2.10	0.80	8.4
LS 71 L P	**FMD5**	0.37	2.51	0.50	1.89	4.00	12	5	1410	2.80	0.85	9.4

1. Values given for information only; for standards-related restrictions, please consult Leroy-Somer.
2. These values are given for information only.

Fixed speed

LS brake FCPL

4 poles - 1500 rpm - Powered by the mains

LS brake FCPL - 400V - IP44 - Class F - ΔT80K - Duty S1 - Separate power supply - Standard braking torque

Motor type	Brake type	Rated power	Rated torque	Starting torque/ Rated torque	Started current/ Rated current	Moment of inertia	Braking torque [1]	400V - 50Hz				Weight IM B3/B5[2]
								Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	
		P_n kW	M_n N.m	M_d/M_n	I_d/I_n	J kg.m²	M_f ±20% N.m	N_n rpm	I_n (400V) A	η% 4/4	Cos φ 4/4	kg
LS 180 MT	**FCPL 54 - H1D**	18.5	121	2.9	7.4	0.104	130	1456	35.4	90.3	0.84	140
LS 180 LR	**FCPL 54 - H1D**	22	144	3.0	7.89	0.111	150	1456	41.7	90.2	0.84	152
LS 200 LT	**FCPL 54 - H1D**[3]	30	196	2.9	6.61	0.166	220	1460	56.3	90.8	0.84	200
LS 225 ST	**FCPL 54 - H1D**[3]	37	241	2.7	6.28	0.255	260	1468	69	92	0.84	242
LS 225 MR	**FCPL 54 - H1D**[3]	45	293	2.7	6.25	0.305	330	1468	84	92.5	0.84	274
LS 250 ME	**FCPL 60 - H2D**	55	355	2.7	6.93	0.680	390	1478	102	93.1	0.84	405
LS 280 SC	**FCPL 60 - H2D**	75	485	2.8	7.15	0.880	520	1478	138	93.5	0.84	465
LS 280 MD	**FCPL 60 - H2D**[3]	90	581	3	7.55	1.080	590	1478	165	93.5	0.84	535
LS 315 SN	**FCPL 60 - H2D**[3]	110	711	3	7.6	1.090	740	1477	201	94.1	0.84	555
LS 315 MP	**FCPL60-H2D**[3]	132	849	2.9	7.6	2.840	870	1484	236	94.2	0.85	835
LS 315 MR	**FCPL60-H2D**[3]	160	1030	2.9	7.7	3.320	1150	1484	286	94.7	0.85	930
LS 315 MR	**FCPL60-H2D**[3]	200	1285	3.1	8.1	3.320	1300	1486	359	94.9	0.84	930

1. Values given for information only; for standards-related restrictions, please consult Leroy-Somer.

2. These values are given for information only.

3. Requires using a CDF7 power supply board.

Decentralised variable speed with Commander ID300 drive

IMfinity® IFT/IE2 - ID300-302 integrated
LSES - 4 poles - 230/400 V - IP55

Motor type	Commander type			Rated power	Torque available at speeds (rpm) 400V 3ph					Starting torque	Motor moment of inertia	Weight
	ID300 230V 1ph	ID300 230V 3ph	ID300-ID302 400V 3 ph	P_n	300 rpm	500 rpm	750 rpm	**1500 rpm**	2400 rpm	M_d	J	
				kW	Nm	Nm	Nm	Nm	Nm	Nm	kg.m2	kg(1)
LSES 80 LG	**12030**		**14021**	0,75	3,2	4,2	4,6	**5**	3,1	9	0,00265	15,1
LSES 80 LG	**22035**		**14025**	0,9	3,9	5,1	5,5	**6**	3,7	10,8	0,00316	17,6
LSES 90 SL	**22052**		**14030**	1,1	4,8	6,3	6,8	**7,4**	4,6	13,3	0,00336	17,4
LSES 90 L	**22057***		**14033**	1,5	6,5	8,4	9,2	**9,9**	6,2	17,8	0,00418	19,7
LSES 90 LU	**-**	**-**	**24042**	1,8	7,8	10,2	11,0	**12**	7,6	21,6	0,00450	28,3
LSES 100 L	**-**	**32087***	**24050**	2,2	9,5	12,4	13,4	**14,6**	9,0	26,3	0,00567	30,5
LSES 100 LR	**-**	**32120***	**24070***	3	15,9*	19,8*	19,8*	**19,8***	12,3*	35,8	0,00677	33,7
LSES 112 MU	**-**	**32155***	**24085***	4	20,9*	26,1*	26,2*	**26,1***	16,2*	47,7	0,01312	42,3
LSES 132 SU	**-**	**-**	**34119***	5,5	28,7*	35,9*	35,9*	**35,9***	22,2*	64,6	0,01611	50
LSES 132 M	**-**	**-**	**34155***	7,5	39,7*	49,4*	49,4*	**49,5***	30,7*	89,1	0,02286	60

** Drive fan included*

Torque available over the entire operating range when fitted to gearbox

(1) These values are given for information only

IMfinity® IFT/IE3 - ID300-302 integrated
LSES - 4 poles - 230/400 V - IP55

Motor type	Commander type			Rated power	Torque available at speeds (rpm) 400V 3ph					Starting torque	Motor moment of inertia	Weight
	ID300 230V 1ph	ID300 230V 3ph	ID300-ID302 400V 3 ph	P_n	300 rpm	500 rpm	750 rpm	**1500 rpm**	2400 rpm	M_d	J	
				kW	Nm	Nm	Nm	Nm	Nm	Nm	kg.m2	kg(1)
LSES 80 LG	**12030**		**14021**	0.75	3.3	4.3	4.6	**5.0**	3.1	9	0.00335	17.1
LSES 80 LG	**22035**		**14025**	0.9	3.9	5.1	5.5	**6.0**	3.7	10.8	0.00381	17.6
LSES 90 SL	**22052**		**14030**	1.1	4.7	6.2	6.7	**7.2**	4.5	13	0.00418	19.7
LSES 90 LU	**22057***		**14033**	1.5	6.4	8.3	9.1	**9.9**	6.1	17.8	0.00524	23.9
LSES 100 L	**-**	**32075***	**24042**	1.8	7.9	10	11	**12**	7.6	21.8	0.00561	30.5
LSES 100 LR	**-**	**32087***	**24050**	2.2	9.5	12.2	13.3	**14.5**	9	26.1	0.00676	33.7
LSES 100 LG	**-**	**32120***	**24070***	3	15.6	19.5	19.5	**19.5**	12.1	35.5	0.01152	38.9
LSES 112 MU	**-**	**32155***	**24085***	4	21.1	26.2	26.2	**26.2**	16.2	47.2	0.01312	44.9
LSES 132 SM	**-**	**-**	**34119***	5.5	28.7	35.8	35.8	**35.8**	22.2	64.4	0.02286	59.9
LSES 132 MU	**-**	**-**	**34155***	7.5	39	49	49	**49.2**	30.5	88.6	0.02965	70.5

** Drive fan included*

Torque available over the entire operating range when fitted to gearbox

(1) These values are given for information only

IMfinity® IFT/NIE - ID300-302 integrated
LS - 4 poles - 230/400 V - IP55

Motor type	Commander type			Rated power	Torque available at speeds (rpm) 400V 3ph					Starting torque	Motor moment of inertia	Weight
	ID300 230V 1ph	ID300 230V 3ph	ID300-ID302 400V 3 ph	P_n	300 rpm	500 rpm	750 rpm	**1500 rpm**	2400 rpm	M_d	J	
				kW	Nm	Nm	Nm	Nm	Nm	Nm	kg.m2	kg(1)
LS 71 M	**12017**		**14012**	0.25	0.9	1.4	1.6	**1.7**	1	3.1	0.00068	9.9
LS 71 M	**12024**		**14015**	0.37	1.4	2.1	2.3	**2.5**	1.5	4.5	0.00085	10.8
LS 71 L	**12030**		**14018**	0.55	2.1	3.2	3.5	**3.8**	2.3	6.8	0.00110	11.8

(1) These values are given for information only

Torque available over the entire operating range when fitted to gearbox

Decentralised variable speed with Commander ID300 drive

IMfinity® IFT/NIE - ID300-302 integrated - FFB brake
LS - 4 poles - 230/400 V - IP55

Motor type	Commander type		Rated power	Torque available at speeds (rpm) 400V 3ph					Starting torque	Motor moment of inertia	Braking torque	Weight
	ID300-ID302 400V 3 ph	Brake type	P_n	300 rpm	500 rpm	750 rpm	**1500 rpm**	2400 rpm	M_d	J	$Mf^{(1)}$	
			kW	Nm	Nm	Nm	Nm	Nm	Nm	kg.m2	Nm	$kg^{(1)}$
LS 71 M	**14012**	**FFB1**	0.25	0.9	1.4	1.6	**1.7**	0.9	3.1	0.00094	4.5	13.6
LS 71 M	**14015**	**FFB1**	0.37	1.4	2.1	2.3	**2.5**	1.4	4.5	0.00111	4.5	14.5
LS 71 L	**14018**	**FFB1**	0.55	2.1	3.2	3.5	**3.8**	2.1	6.8	0.00136	6	15.5
LS 80 L	**14021***	**FFB1**	0.75	4	4.5	4.8	**5.1**	3.2	9.2	0.00190	12	17.7
LS 80 L	**14025***	**FFB1**	0.9	5.1	5.4	5.8	**6.1**	3.8	11	0.00266	12	18.1
LS 90 SL	**14030***	**FFB2**	1.1	6.2	6.6	7	**7.4**	4.6	13.3	0.00353	19	22.4
LS 90 L	**14033***	**FFB2**	1.5	8.5	9.5	9.8	**10**	6.2	18	0.00425	19	24.2
LS 90 L	**24042***	**FFB2**	1.8	10.8	11.8	11.9	**12**	7.5	21.6	0.00469	26	25.2
LS 100 L	**24050***	**FFB2**	2.2	12.4	13.9	14.3	**14.6**	9.1	26.3	0.00518	26	29.1
LS 100 L	**24070***	**FFB3**	3	17	19	19.5	**20**	12.5	36	0.00655	52	33.3
LS 112 MG	**24085***	**FFB3**	4	24	27	26.7	**26.7**	16.7	48.1	0.0124	52	33.8
LS 132 S	**34119***	**FFB3**	5.5	32.4	35.9	36	**36**	22.5	64.8	0.0154	67	52.7
LS 132 M	**34155***	**FFB4**	7.5	34.0	37.8	39.9	**44.5**	30.8	80.1	0.0252	110	70.6

** Drive fan included*

Torque available over the entire operating range when fitted to gearbox

(1) Values given for information only; for standards-related restrictions, please consult Leroy-Somer

(2) These values are given for information only

IMfinity® IFT/IE3 - ID300-302 integrated - FFB brake
LSES - 4 poles - 230/400 V - IP55

Motor type	Commander type		Rated power	Torque available at speeds (rpm) 400V 3ph					Starting torque	Motor moment of inertia	Braking torque	Weight
	ID300-ID302 400V 3 ph	Brake type	P_n	300 rpm	500 rpm	750 rpm	**1500 rpm**	2400 rpm	M_d	J	$Mf^{(1)}$	
			kW	Nm	Nm	Nm	Nm	Nm	Nm	kg.m2	Nm	$kg^{(1)}$
LSES 80 LG	**14021**	**FFB1**	0.75	3.3	4.3	4.6	**5.0**	3.1	9	0,00361	12	20.8
LSES 80 LG	**14025**	**FFB1**	0.9	3.9	5.1	5.5	**6.0**	3.7	10.8	0,00407	12	22.2
LSES 90 SL	**14030**	**FFB2**	1.1	4.7	6.2	6.7	**7.2**	4.5	13	0,00506	19	26.6
LSES 90 LU	**14033**	**FFB2**	1.5	6.4	8.3	9.1	**9.9**	6.1	17.8	0,00612	19	30.8
LSES 100 L	**24042**	**FFB2**	1.8	7.9	10	11	**12**	7.6	21.8	0,00649	26	33
LSES 100 LR	**24050**	**FFB2**	2.2	9.5	12.2	13.3	**14.5**	9	26.1	0,00764	26	36.2
LSES 100 LG	**24070***	**FFB3**	3	15.6	19.5	19.5	**19.5**	12.1	35.5	0,01239	52	41.8
LSES 112 MU	**24085***	**FFB3**	4	21.1	26.2	26.2	**26.2**	16.2	47.2	0,01399	52	45.2
LSES 132 SM	**34119***	**FFB4**	5.5	28.7	35.8	35.8	**35.8**	22.2	64.4	0,02889	69	74.6
LSES 132 MU	**34155***	**FFB4**	7.5	39	49	49	**49.2**	30.5	88.6	0,03560	110	85.2

** Drive fan included*

Torque available over the entire operating range when fitted to gearbox

(1) Values given for information only; for standards-related restrictions, please consult Leroy-Somer

(2) These values are given for information only

Other drive mechanism solutions

LSMV: induction motors 1500 rpm from 0.25 to 110 kW

Applications for variable speed operation requiring constant torque over a wide speed range.
Associated documents: catalog ref. 4981; guides ref. 5626 (to best practices -motor-drive-systems-) and ref. 5664 (Speed and position feedback devices)

UNIMOTOR FM and HD: servomotors 3000 rpm from 0.7 to 136 N.m

High dynamics compact applications.
Associated document: ref.5409

Packaging Weights and Dimensions

Dimensions in millimetres

ROAD TRANSPORT (code 30) or AIR TRANSPORT (code 40)		
Cardboard boxes[1]		
Ref.	**Tare (kg)**	**Dimensions (mm) (L x W x H)** [2]
P0 000	0.25	245 x 190 x 150
P0 100	0.35	256 x 222 x 165
P0 200	0.4	330 x 288 x 172
R1	0.25	330 x 145 x 200
R2	0.5	420 x 200 x 240
R3	0.65	520 x 220 x 280
R4	1.05	550 x 320 x 360
R5	0.85	580 x 260 x 280
R6	1.3	780 x 300 x 430
R7	0.75	420 x 300 x 260
R8	0.9	500 x 330 x 290
R5 Marine	0.85	580 x 260 x 280
Open pallet box or open-slat crate		
Tare (kg)	**Outer dimensions (mm) (L x W x H)**	**Inner dimensions (mm) (L x W x H)**
10	720 x 420 x 550	650 x 350 x 400
26	830 x 520 x 660	760 x 450 x 500
30	990 x 570 x 620	920 x 500 x 550
47	920 x 870 x 700	850 x 800 x 550
48	990 x 870 x 880	920 x 800 x 720
45	1270 x 870 x 700	1200 x 800 x 550
47	1270 x 870 x 880	1200 x 800 x 720
61	1270 x 1070 x 730	1200 x 1000 x 550
62	1270 x 1070 x 900	1200 x 1000 x 720
64	1270 x 1070 x 1050	1200 x 1000 x 870

1. Maximum permissible weight 50 kg.
2. These approximate values are given for individual packages.
Packages grouped in open slat crates for quantity of machines supplied > 5, in the majority of cases.

PACKAGING FOR SEA TRANSPORT (code 10)		
Barred crates with plywood panels		
Tare (kg)	**Outer dimensions (mm) (L x W x H)**	**Inner dimensions (mm) (L x W x H)**
20	740 x 480 x 730	680 x 420 x 600
26	840 x 520 x 710	760 x 440 x 530
30	980 x 560 x 720	920 x 500 x 550
58	1120 x 750 x 850	1040 x 680 x 670
60	1100 x 950 x 680	1020 x 870 x 500
80	1100 x 950 x 1180	1020 x 870 x 1000

Electromechanical Manual

Glossary

Symbol	Definition	Symbol	Definition
a	Number of drive wheels / Number of carrier wheels	m	Weight of the load (kg)
BA	Shaft extension	m'	Weight of the table (kg)
Cb	Compabloc	M_a	Locking torque
Cos φ	Power factor	Mb	Multibloc
d	Distance from the load to the axis (m)	M_d	Starting torque
E	Slow shaft length	M_f	Braking torque
F_{acc}	Accelerator force (N)	M_m	Maximum permissible torque
FCPL	Brake for motor > 15 kW	M_n	Rated torque
F_d	Starting frequency	M_{rd}	Resistant torque due to backdriving
F_{dev}	Backdriving resistance force (N)	Mub	Manubloc
FE	Drive force	N	Rotation speed (drum, rollers, motors, etc.) in revs per minute
FFB	Brake for IMfinity® motor	N_n	Rated speed
FJ	Duty - Service factor	$N_{S\,MAX}$	Maximum output speed of gearbox
FMD	Brake for motor ≤ 0.55 kW	$N_{S\,MIN}$	Minimum output speed of gearbox
F_R E/2	Radial load acceptable at E/2	Ot	Orthobloc
F_r	Rolling resistance force (N)	P	Weight = m x g (N)
F_γ	Acceleration resistance force (N)	P_n	Rated power
H	Hollow shaft	P_u	Output power
HA	Frame size	Q	Rate (ton/hour)
HL	Shaft on left	R	Table radius (m)
HR	Shaft on right	r	Rolling radius (m)
R.H.	Relative humidity	A.T.	Ambient temperature
i	Exact reduction of gearbox	t_1	Release response time
i_{aR}	Reduction index (approached)	t_2	Tightening response time
I_D	Starting current	$t_{2\,DC}$	Application response time with DC switch-off
I_n	Rated current	U.G.	General use
IP, IK	Protection index	U.L.	Hoisting applications
Iu	Reduction available to the application	U.T.	Displacement Usage
J	Moment of inertia	V	Linear speed (m/s)
K	Global duty factor	Ve	Drive speed (m/s)
K1	Duty factor according to the inertia	Z (s/h)	Starting frequency of the application (s/h)
K2	Duty factor depending on the operating factor	α	Tilt angle (°)
Kp	Maximum duty factor possible of the geared motor	γ	Acceleration (m/S^2)
kr	Bearing coefficient	η ; η_{inv} ; $\eta_{s\,inv}$	Efficiency; inverse efficiency; inverse static efficiency
KVA_N	Apparent rated power	ω	Angular speed (in rad/s)
kW	Kilo Watt		

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

Electromechanical Manual

Associated documents

Gearboxes, drives and brakes

		Environment									
				Current			Atex regulated		Options		
				Commissioning					Kit		
		Brochure	Catalogue	General recommendations	Installation	Maintenance	II3D II2D	II3G II2G	Lubrication vase	Thermal exchanger	AD
Gearboxes											
	Cb 15	5679	3521	-	3005		To be issued	-	-	-	-
	Cb 3000	5679 - 3969		2557	3520	5060	3711	3804	5088	5217	5060
	Mub	5679 - 3969	5200	2557	4031	5066	3711	3804	5088	5217	5066
	Pb	5679 - 3780	5732	2557	3097	5069	3711	-	-	-	3097 4114
	Mb 4101	5679	3733	-	4125		-	-	-	-	-
	Mb3101 Mb 22 to 26	5679 - 3625		2557	2910	5062	3711	-	-	-	-
	Ot	5679 - 3969	3981	2557	3996	4952	3711	3804	5088	5217	4952
Integrated drive											
	Commander ID 300-302	5679 - 5547	5595	5634	5511		-	-	-	-	-
Motors											
	(F)LS(ES-E)	5473	5147	1889	4850		3385	(F)LSE: 3606 (F)LSN: 5735 (F)LSD-E: 3522	-	-	-
Brake motor											
	FFB	5846	5329	1889	5286	5287	II 3D	-	-	-	-
	FMD	5846	-	1889			-	-	-	-	-
	FCPL	5846	-	1889	FCPL 60: 5282		-	-	-	-	-

Electromechanical Manual

Configurator

Configurator is a powerful tool to assist you in the selection of motors or geared motors combined with variable speed drives.

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

- All standard products are 100%-characterised, with print-outs of technical specifications available in 11 languages
- Products dimensions supplied in 3D
- Real-time information on the eligibility of the product for the *Express* Availability offering

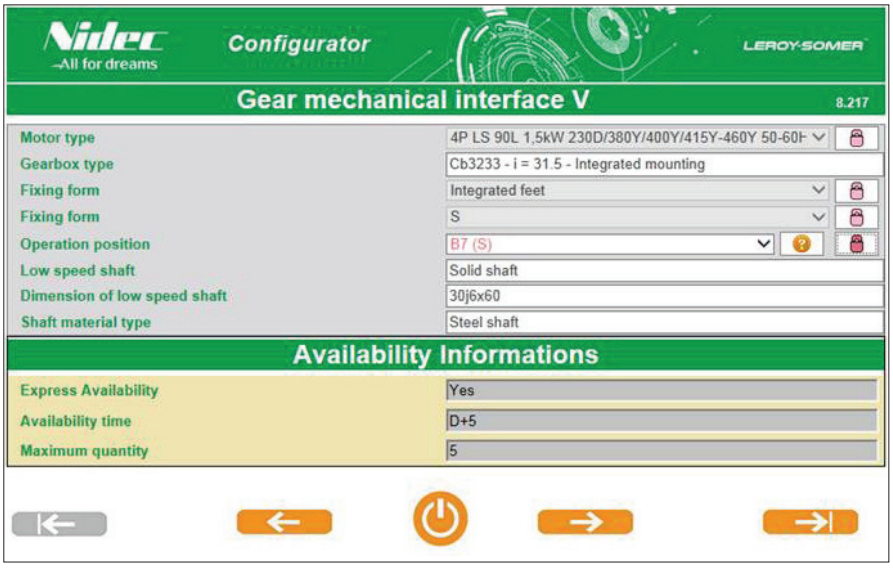


Illustration of application example page 57

Service for drive systems

Audit & Advice

- **Facilities audit**
- **Energy optimisation**
- **Modernisations**
- **Installed facilities management**

Installation & commissioning

- **Installation**
- **Commissioning**
- **Extended warranty**
- **Stageing**

Maintenance

- **Emergency services**
- **On-demand services**
- **Contracts**

MAINTENANCE

The scheduled maintenance of your facilities ensures continuity of your production flow and extends equipment lifetime, while ensuring a good return on investment.
In case of emergency, we offer services ensuring you have the solution allowing your facilities to be restarted in the shortest possible time.
We believe maintenance relies on experts close to your facilities, available 24/7, monitoring your equipment's operation, knowing how to define the level of intervention required according to the context, and able to intervene urgently.

MONITORING CONTRACTS

Maintaining drive systems in operating condition at all times is vital for proper operation of your equipment, whether on line production units or utilities.
Settings monitoring programs allow detecting any drift and anomalies, often causing malfunctions.

MAINTENANCE CONTRACTS

Observing checking intervals and changing first wear devices and parts are operations which are often complex and tedious due to the many pieces of equipment present in an industrial site.
To facilitate these operations, our solutions allow managing maintenance of the drives.

Electromechanical Manual

Express Availability

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

The availability of geared 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 use a colour code to specify the product delivery time for each family, and according to the quantities ordered.

Call Nidec Leroy-Somer.

The illustration of the delivery time below for the equipment selected page 57, i.e. D+5; D being the day the order is received by the factory before 12:00 am.

To verify if your country is covered by the Express Availability offer or by the 24 h *Express* transport, please consult your local contact.

2019/12/17 version

Express Availability - Geared brake motors

FMD - FFB - IFT/NIE geared brake motors (Not in any efficiency class)
Helical gears COMPABLOC, MANUBLOC, ORTHOBLOC
Standard environment

Integral mounting **MI**
Universal mounting **MU**

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 will be added to the stated lead time.
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

FMD or FFB - IMfinity® NIE brake associated motors 4p IP55 Class F *(motors in italics excepted NC: Not Covered by IE Standards)*

4 poles 1500 min⁻¹

Cb, Mub, Ot + 4p LS FMD - FFB brake motor - IFT/NIE - 230 V Δ / 380 V Y / 400 V Y / 415 V Y - 460 V Y or 400 V Δ
Brakes: 180V Brake power supply - Factory set braking torque

Motor type	Brake type	Brake moment Mf [1] N.m	Mounting	Rated power P_n kW	400 V	Cb 15-	Cb 30-	Cb 31- Ot 31- Mub 31-	Cb 32- Ot 32-, 33- Mub 32-	Cb 33- Ot 34- Mub 33-	Cb 34- Ot 35- Mub 34-	Cb 35- - Mub 35-	Cb 36-* Ot 36-* Mub 36-*	Cb 37-* Ot 37-, 38-* Mub 37-*	Cb 38-* - Mub 38-*	Ot 39-
LS 56 M	*FMD*	*3*	*MI or MU*	*0.06*	Y	2	2									
LS 56 M	*FMD*	*3*	*MI or MU*	*0.09*	Y	2	2									
LS 63 M	*FMD*	*3*	*MI or MU*	*0.12*	Y	2	2									
LS 63 M	*FMD*	*3*	*MI or MU*	*0.18*	Y	2	2									
LS 71 L	*FMD*	*5*	*MI or MU*	*0.25*	Y	2	2									
LS 71 L	*FMD*	*5*	*MI or MU*	*0.37*	Y	2	2									
LS 71 L	*FMD*	*5*	*MI or MU*	*0.55*	Y											
LS 71 M	*FFB1*	*4.5*	*MI or MU*	*0.25*	Y		5	5	5	5						
LS 71 M	*FFB1*	*4.5*	*MI or MU*	*0.37*	Y		5	5	5	5						
LS 71 L	*FFB1*	*6*	*MI or MU*	*0.55*	Y		5	5	5	5						
LS 80 L	FFB1	12	MI or MU	0.75	Y		5	5	5	5	5	5				
LS 80 L	FFB1	12	MI or MU	0.9	Y		5	5	5	5	5	5				
LS 90 SL	FFB2	19	MI or MU	1.1	Y			5	5	5	5	5	2	2		
LS 90 L	FFB2	19	MI or MU	1.5	Y			5	5	5	5	5	2	2		
LS 90 L	FFB2	26	MI or MU	1.8	Y			5	5	5	5	5	2	2		
LS 100 L	FFB2	26	MI or MU	2.2	Y			5	5	5	5	5	2	2		
LS 100 L	FFB3	52	MI or MU	3	Y			5	5	5	5	5	2	2		
LS 112 MG	FFB3	52	MI or MU	4	Y				5	5	5	5	2	2		
LS 132 S	FFB3	67	MI or MU	5.5	Y				5	5	5	5	2	2		
LS 132 M	FFB4	110	MI or MU	7.5	Δ					5	5	5	2	2	2	
LS 132 M	FFB4	110	MI or MU	9	Δ						5	5	2	2	2	
LS 160 MP	FFB5	140	MI or MU	11	Δ						2	2	2	2	2	
LS 160 LR	FFB5	180	MI or MU	15	Δ						2	2	2	2	2	
LS 180 MT	FFB5	200	MI or MU	18.5	Δ						1	1	1	1	1	

(1) values given for information only; in the event of normative restriction, please consult us

*** Exceptions**

	Size	* i feasible on consultation																	
Cb	Cb 36	3.21	3.64	3.88	4.34	4.91	5.56	6.15	6.86	7.71	9.03	10.2	11.1	13.0	14.1	15.8	17.6	19.9	21.8	24.5
	Cb 37	3.08	3.52	3.91	4.39	4.91	5.63	6.21	7.04	7.99	9.09	10.3	11.5	12.8	14.5	16.2	18.3	20.5	21.9	24.5
	Cb 38	2.88	3.18	3.49	4.08	4.40	5.01	5.55	6.27	6.88	7.73	8.73	9.81	11.0	12.3	13.8	15.5	17.3		
Ot	Ot 36	5.00	5.57	6.50	7.43	8.15	9.10	10.2	11.5	12.4	14.1	15.6	18.1	19.7	22.2	24.7	28.0	32.2	40.8	
	Ot 37	5.17	5.86	6.25	6.99	7.90	8.95	9.90	11.0	12.4	14.5	16.4	17.9	20.9	22.7	25.5	28.3	32.0	35.1	39.4
	Ot 38	4.90	5.59	6.21	6.98	7.80	8.94	9.86	11.2	12.7	14.4	16.3	18.3	20.4	23.0	25.8	29.1	32.5	34.8	38.9
	Mub 36	3.25	3.68	3.92	4.39	4.96	5.62	6.22	6.93	7.79	9.13	10.3	11.3	13.1	14.3	16.0	17.8	20.1	22.0	24.7
	Mub 37	3.08	3.52	3.91	4.39	4.91	5.63	6.21	7.04	7.99	9.09	10.3	11.5	12.8	14.5	16.2	18.3	20.5	21.9	24.5

SAVING YOUR TIME

The delivery charter for products in Express Availability are accessible strictly through our web pages:
http://lrsm.co/dispofr (chapter 5: Gearboxes-Geared motors)

You can also scan the QR code opposite for direct access:

24 h Express transport option

LEROY-SOMER™

www.leroy-somer.com

Connect with us at:

twitter.com/Leroy_Somer_en

facebook.com/leroysomer.nidec.en

youtube.com/user/LeroySomerOfficiel

linkedin.com/company/leroy-somer

Nidec

All for dreams

Moteurs Leroy-Somer SAS. Headquarters: Bd Marcellin Leroy, CS 10015, 16915 Angoulême Cedex 9, France. Share Capital: 65 800 512 €, RCS Angoulême 338 567 258.

5181 en - 2020.01 / e