



Cb, Ot, Mub, Mb, FFB Electromechanical Manual

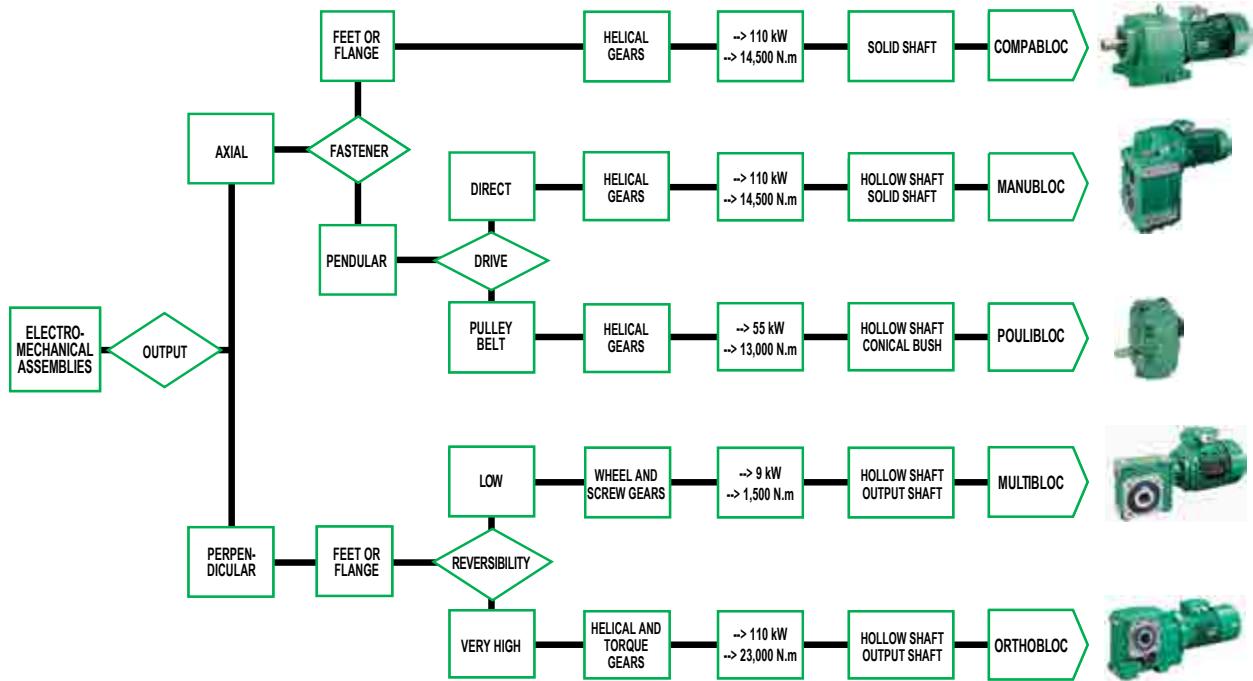


Offer, Ranges, Determinations
Variable speed and fixed speed
Efficiencies: Non IE, IE2, IE3
0.06 to 110 kW

LEROY-SOMER™

Nidec
All for dreams

Offer

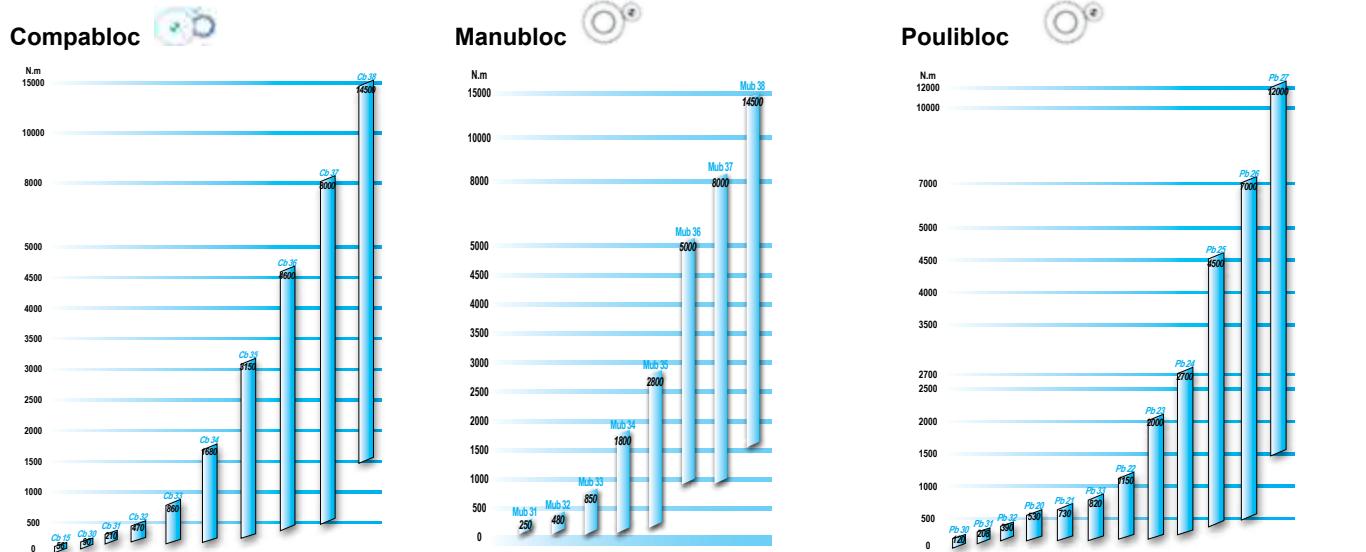


Ranges of associated drives

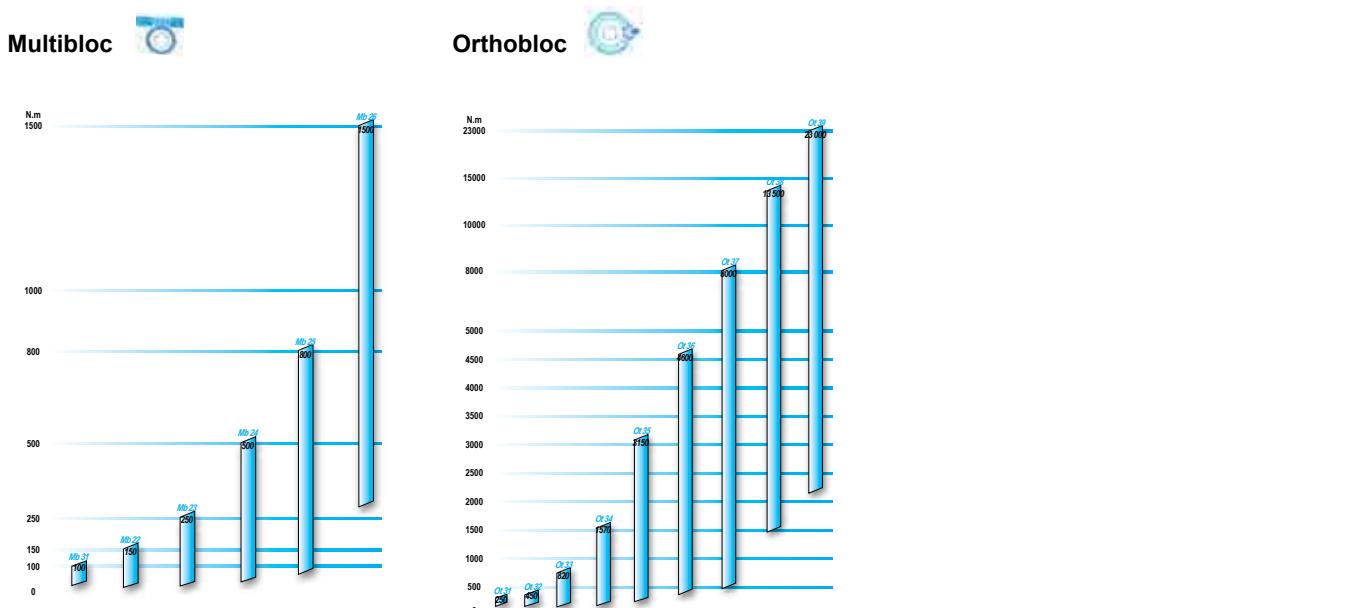
	Starter	Drive cabinet variable speed	Built-in variable speed	
Variable speed	DIGISTART 110 kW 75 kW --> 45 kW --> --> 22 kW --> 11 kW 7.5 kW 2.2 kW --> 1.1 kW 0.37 kW 0.25 kW	UNIDRIVE M M400 M300 M100 M200	POWERDRIVE MD2M FX F300	VMATL VMAT 7.5 kW 2.2 kW --> 1.5 kW 0.37 kW --> 0.25 kW -->



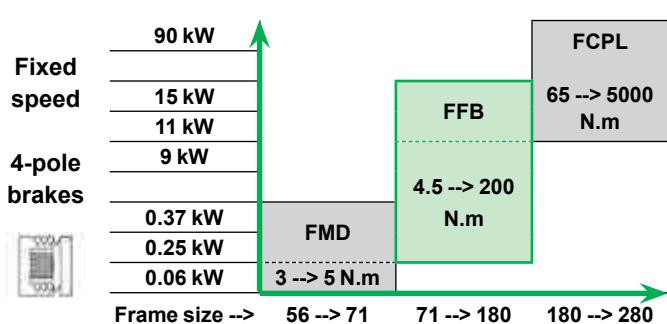
Ranges of axial output gearbox



Ranges of perpendicular output gearbox



Ranges of brakes



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Electromechanical Manual
General information
Quality commitment

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

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

process re-engineering, plus Lean Manufacturing and Lean Office.

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

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

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



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

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

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



ISO 9001 : 2008



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 (January 2014)

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

Motors concerned

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

Sphere of application:

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

Motors not concerned

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

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

It concerns asynchronous induction motors:

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

Notes:

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

Example of a 22 kW 4P LSES motor:

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

DIRECTIVE 2009/125/CE (21 October 2009)

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

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

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

Classes of efficiency	Level of efficiency
IE1	Standard
IE2	High
IE3	Premium
IE4	Super Premium

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

European Directive ErP

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

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

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

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

* or IE2 motor + drive

Motors not concerned:

- Motors designed to operate when fully submerged in liquid
- Motors which are fully integrated in another product (rotor/stator)
- Motors with duty other than continuous duty
- Motors designed to operate in the following conditions:
 - altitude > 4000 m
 - ambient air temperature > 60°C
 - maximum operating temperature > 400°C
 - ambient air temperature < -30°C or < 0°C for water-cooled motors
 - safety motors conforming to directive ATEX 94/9/EC
 - brake motors
 - on-board 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 6072-1		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

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General information

Standards and approvals

HOMOLOGATIONS

Certain countries demand or advise approvals to be sought from national bodies.
Approved products must bear the acknowledged mark on the nameplate.

Approvals for LEROY-SOMER motors and geared motors (versions derived from standard construction):

Country	Initials	Body	Certification No.	Application
CANADA	CSA	Canadian Standards Association	LR 57 008	Standard adapted range (see section "Supply voltage")
USA	UL or FU	Underwriters Laboratories	E 68554 SA 6704 E 206450	Impregnation systems Stator/rotor assemblies for sealed units Complete motors up to 160 size
SAUDIARABIA	SASO	SASO		Standard range
FRANCE	LCIE INERIS	LCIE INERIS	Various n°s	Sealing, shocks, safety

For approved special products, see the relevant documents.

International and national standard equivalents

International reference standards		National standards				
IEC	Title (summary)	FRANCE	GERMANY	U.K.	ITALY	SWITZERLAND
60034-1	Ratings and operating characteristics	NFEN 60034-1 NFC 51-120 NFC 51-200	DIN/VDE 0530	BS 4999	IEC 2.3.VI.	SEVASE 3009
60034-5	Classification of degrees of protection	NFEN 60034-5	DIN/EN 60034-5	BS EN 60034-5	UNELB 1781	
60034-6	Cooling methods	NFEN 60034-6	DIN/EN 60034-6	BS EN 60034-6		
60034-7	Mounting arrangements and assembly layouts	NFEN 60034-7	DIN/EN 60034-7	BS EN 60034-7		
60034-8	Terminal markings and direction of rotation	NFC 51 118	DIN/VDE 0530 Teil 8	BS 4999-108		
60034-9	Noise limits	NFEN 60034-9	DIN/EN 60034-9	BS EN 60034-9		
60034-12	Motor starting characteristics at a speed supplied under voltage \leq 660 V	NFEN 60034-12	DIN/EN 60034-12	BS EN 60034-12		SEVASE 3009-12
60034-14	Mechanical vibrations of machines with a frame size \geq 56 mm	NFEN 60034-14	DIN/EN 60034-14	BS EN 60034-14		
60072-1	Dimensions and output powers for machines of between 56 and 400 frame size and flanges of between 55 and 1080.	NFC 51 104 NFC 51 105	DIN 748 (~) DIN 42672 DIN 42673 DIN 42631 DIN 42676 DIN 42677	BS 4999		
60085	Evaluation and thermal classification of electrical insulation	NFC 26206	DIN/EN 60085	BS 2757		SEVASE 3584

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

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)

1 st digit: Ingress of solid objects			2 nd digit: Ingress of liquids			3 rd digit: Protection against mechanical impacts		
IP	Tests	Definition	IP	Tests	Definition	IK	Tests	Definition
0		No protection	0		No protection	00		No protection
1		Protected against solid objects over 50mm (e.g. unintentional hand contact)	1		Protected against vertically falling drops of water (condensation)	01		Impact energy: 0.15 J
2		Protected against solid objects over 12mm (e.g. finger)	2		Protected against falling drops of water, if the case is disposed up to 15° from vertical	02		Impact energy: 0.20 J
3		Protected against solid objects over 2.5mm (e.g. tools, wire)	3		Protected against sprays of water from any direction, even if the case is disposed up to 60° from vertical	03		Impact energy: 0.37 J
4		Protected against solid objects over 1.0mm (e.g. fine tools, small wires)	4		Protected against splash water from any direction	04		Impact energy: 0.50 J
5		Protection against dust ingress (no harmful deposit)	5		Protected against low pressure water jets from any direction	05		Impact energy: 0.70 J
6		Totally protected against dust ingress	6		Protected against high pressure water jets from any direction	06		Impact energy: 1 J
			7		Protected against short periods of immersion in water	07		Impact energy: 2 J
			8		Protected against long, durable periods of immersion in water	08		Impact energy: 5 J
			9			09		Impact energy: 10 J
			10			10		Impact energy: 20 J

Example:

Example of an IP 55 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.

RELATIVE AND ABSOLUTE HUMIDITY

Measuring the humidity:

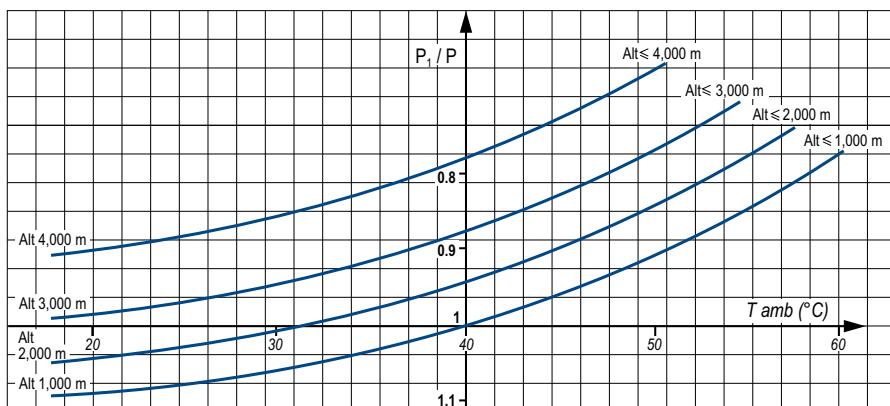
Humidity is usually measured by the "wet and dry bulb thermometer" method. Absolute humidity, calculated from the readings taken on the two thermometers, can be determined using the chart on the right. The chart also provides relative humidity figures.

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

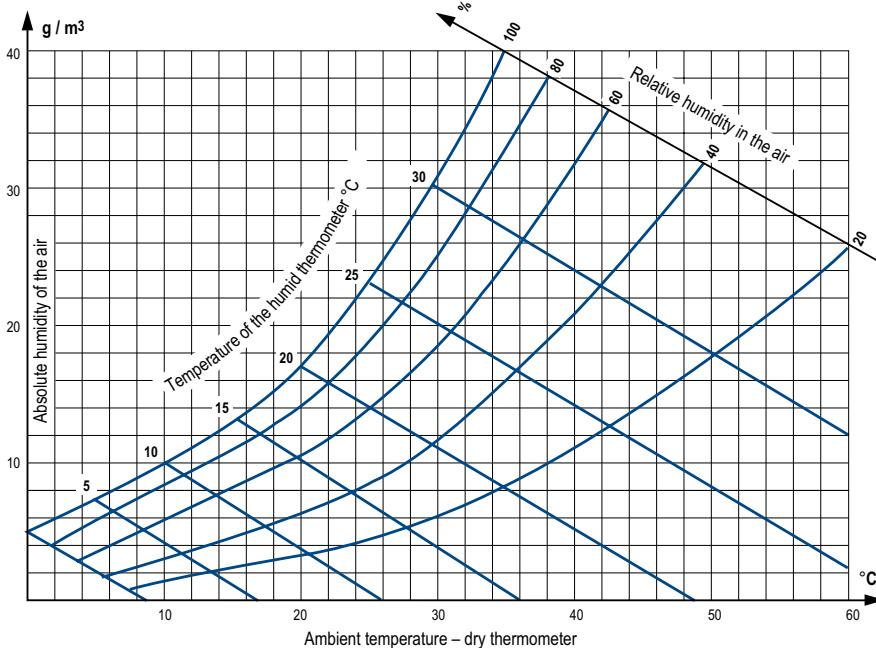
During the construction of aluminium motors, the materials of the various components which are in contact with one another are selected so as to minimise deterioration by galvanic effect. The voltages in the metal combinations used (cast iron-steel; cast iron-aluminium; steel-aluminium; steel-tin) are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

Correction coefficient table

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



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



DRAIN HOLES

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%*	Influence on construction
θ < - 40 °C	ask for estimate (quotation)	ask for estimate (quotation)	
- 20°C to + 40°C	T Standard or T0	TC Standard or TC0	
- 40°C to + 40°C	T1	TC1	
- 16 to + 65°C	T2	TC2	
+ 65 to + 90 °C	ask for estimate (quotation)	ask for estimate (quotation)	
θ > + 90 °C	ask for estimate (quotation)	ask for estimate (quotation)	
Plate mark	T	TC	
Influence on construction	Increased protection of windings		

* Atmosphere without high levels of condensation

** -16°C to +40°C for LSES Alu motors frame size 80 to 112

 Standard construction

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 (5×10^{-4} T). However, electromagnetic emissions may be noticeably reduced by a special construction of aluminium alloy end shields and a stainless steel shaft.

Immunity

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

POWER SUPPLY INTERFERENCE

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

The IEC 61000 standard, currently in preparation, will define permissible rejection and immunity rates: only then will machines for general distribution (especially single-phase motors and commutator motors) have to be fitted with suppression systems. Three-phase squirrel cage machines do not in themselves produce interference of this type. Mains connection equipment (contactors) may, however, need interference protection.

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

a - for motors only

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

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

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

APPLICATION OF LOW VOLTAGE DIRECTIVE 2006/95/CE

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

APPLICATION OF MACHINERY DIRECTIVE 2006/42/EC

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

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.

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Electromechanical Manual

Environment

External finish

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

LS gearboxes and geared motors comply with the System Ia prescription

Preparation of surfaces

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

Definition of ambiances

An ambiance is said to be aggressive when the components are attacked by bases, acids or salts. It is said to be corrosive when the attack is made by oxygen.

Painting - The systems

SERIES	AMBIENCE	SYSTEM	APPLICATIONS	CATEGORY * OF CORROSION AS PER ISO 12944-2
Standard finish (geared motor and motor with aluminium casing)	Low and non-aggressive (interior, rural, industrial)	Ia Standard LS	1 coat of polyurethane finish 20/30 µm	C3L
Optional finish ¹ (gearbox and motor with cast iron casing; Corrobloc finish)	Medium corrosive: humid, and outdoor (temperate climate)	IIa Standard FLS	1 coat of Epoxy primer 30/40 µm 1 coat of polyurethane finish 20/30 µm	C3M
	Chemical aggression (accidental projection): suited to food-grade and heavy industry	IIb	1 coat of Epoxy primer 30/40 µm 1 coat of Epoxy finish 25/35 µm	C3H
	Corrosive: seaside, very humid (tropical climate)	IIIa Standard Corrobloc	1 coat of Epoxy primer 30/40 µm 1 coat of Epoxy intermediate 30/40 µm 1 coat of polyurethane finish 20/30 µm	C4M
	Severe chemical aggression: frequent contact with bases, acids, alkalines. Special environment: neutral ambiance (without chlorine or sulphur based products)	IIIb**	1 coat of Epoxy primer 30 to 40 µm as well as inside the shrouds 1 coat of Epoxy intermediate 30 to 40 µm 1 coat of Epoxy finish 25/35 µm	C4H
	Particular ambience. Very aggressive, presence of chlorine or sulphur based products	Industrial Ve** Marine	1 coat of Epoxy primer 20 to 30 µm as well as inside the shrouds 2 coats of Epoxy intermediate 35 to 40 µm each 1 coat of polyurethane finish 35/40 µm 1 coat of primer 50 µm 2 coats of Epoxy intermediates 80/40 µm 1 coat of Epoxy finish 50 µm	C5I-M C5M-H

1. Other finish: please call.

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

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

The Ia system applies to the group of moderate climates and the IIa system to the group of general climates, as defined in standard IEC 60721.2.1.

Choosing a special motor because of a corrosive or aggressive atmosphere requires a level II system minimum. The gearbox associated to it will have the equivalent protection rating. **This optional finish must be specified clearly in the order.**

Example: system IIIb will be applied to a gearbox associated with an FLSC (category C4H).

Leroy-Somer standard paint colour reference in

CURRENT ENVIRONMENT

Standard Leroy-Somer (green)

RAL 6000

SPECIAL ENVIRONMENT

LSMV Dynabloc (black)

RAL 9005

Dust Atex II2D (yellow)

RAL 1007

LSRPM (burgundy winered)

RAL 3005

Atex Gas II 3G, 3GD, 2G, 2GD (orange)

RAL 2004

Construction

GEARBOXES, GEARED MOTORS

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

To meet this need, LEROY-SOMER has developed a comprehensive range of products over the last fifty years. It is the fruit of LEROY-SOMER design offices and factories. The close integration of manufacturing 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 LEROY-SOMER range is based on three gearbox principles.

1- Helical gears allow our notorious **Compabloc** range to take on the difficult market of high efficiency line gearboxes. Over the last forty years, LEROY-SOMER has designed, manufactured

and marketed new ranges of Compabloc, the latest of which benefit from progress in mathematical modelization of the components. This progress is made possible by very close integration, extending from the foundry to complete control of gear cutting (size, thermal treatment, rectification) encompassing machining of the housings (machining centre and three-dimensional checking).



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.

MOTORS

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 VARMECA).
- FCPL brake, IP54, from 18.5 to 110 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,
- VARMECA IP65, built into the motor.

Centralized variable speed

Whatever the motorisation, by alternating current or auto-synchronous, 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.

Cb, Ot, Mub, Mb, FFB
Electromechanical Manual
General on gearboxes

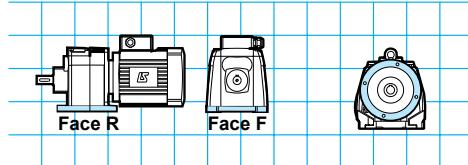
Mounting arrangements - Dimensions

COMPABLOC

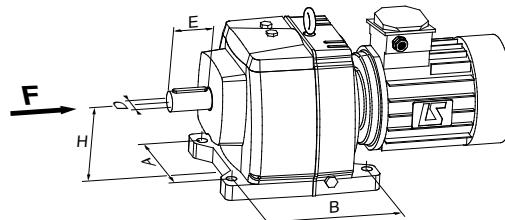
Dimensions in millimetres

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

Definition of the mounting arrangements: S, SBS, SBDn

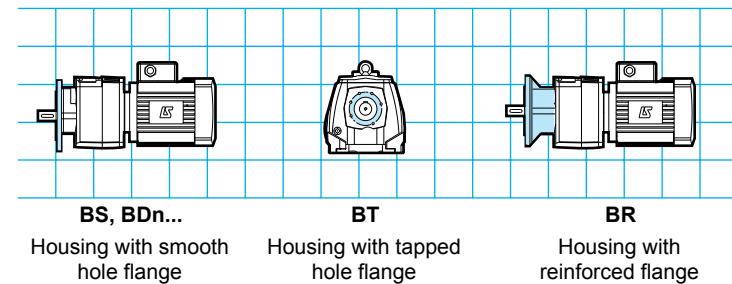


S
Housing with feet **SBS, SBDn**
Housing with feet and flange

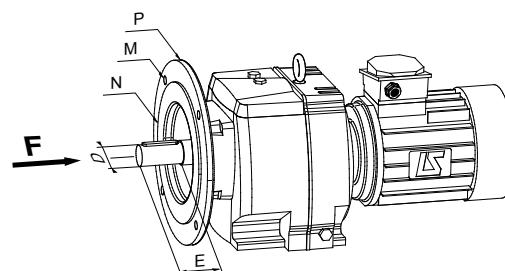


1 stage gearbox					
Compabloc	ØD	E	A	B	H
Cb 3531	45k6	90	260	160	160
Cb 3431	40k6	80	216	125	132
Cb 3331	35k6	70	190	100	112
Cb 3231	25j6	50	140	80	90
Cb 3131	20j6	40	120	75	80
Cb 3031	16j6	40	125	70	75
					2.3

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



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



BS, BD1, BD2, BD3, BR form

1 stage gearbox																								
BS						BD1						BD2						BD3						
Compabloc	ØD	E	ØM	ØN	ØP	kg	ØD	E	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	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cb 3031	16j6	40	115	95	140	2.5	100	80	120	2.5	130	110	160	2.5	165	130	200	2.4	-	-	-	-	-	

Multistage gearbox																								
BS						BD1						BD2						BD3						
Compabloc	ØD	E	ØM	ØN	ØP	kg	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	-	-	-	-	-	-	-	-	-	

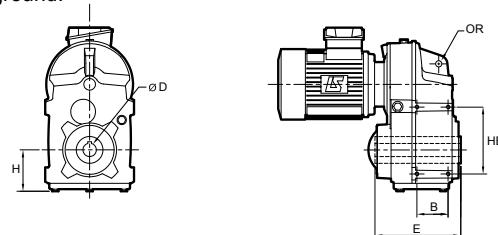
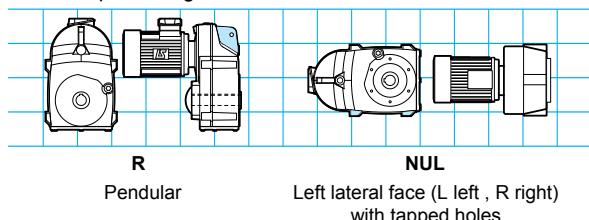
Cb, Ot, Mub, Mb, FFB
Electromechanical Manual
General on gearboxes

Mounting arrangements - Dimensions

MANUBLOC

Dimensions in millimetres

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

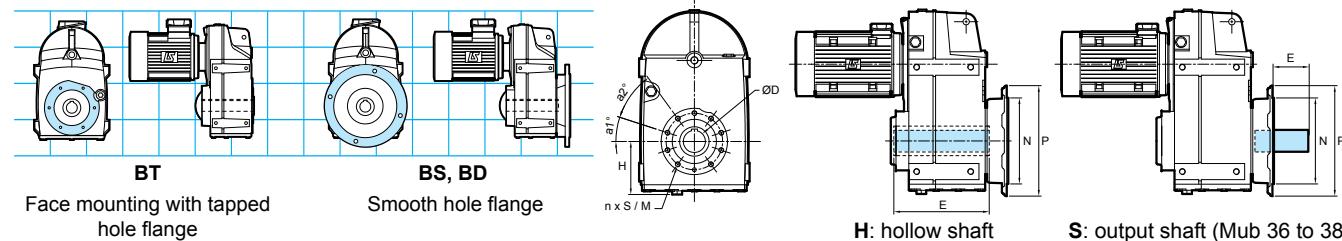


- R form

Manubloc	H hollow shaft			kg	S solid shaft			kg
	ØD	H	OR		OR	ØD	E	
Mub 38--	100H7	263	33	335	33	110m6	210	352
Mub 37--	90H7	214	33	283	33	90m6	170	297
Mub 36--	70H7	194	33	197	33	70m6	140	207
Mub 35--	60H7	171	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				kg	S solid shaft			kg
	ØD	H	B	HB		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	171	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 form

Manubloc	ØD	H	H hollow shaft												ØM	kg
			a1°	a2°	a3°	a4°	a5°	a6°	a7°	a8°	a9°	a10°	a11°	nxs		
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	36	36	-	-	9xM20x35	230	280
Mub 36--	70H7	194	15	40	70	40	35	70	70	-	-	-	-	6xM16x27	230	195
Mub 35--	60H7	171	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	ØD	E	S solid shaft												ØM	kg
			a1°	a2°	a3°	a4°	a5°	a6°	a7°	a8°	a9°	a10°	a11°	nxs		
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	36	36	-	-	9xM20x35	230	294
Mub 36--	70m6	140	15	40	70	40	35	70	70	-	-	-	-	6xM16x27	230	205

- BS flange form

Manubloc	ØD	E	H hollow shaft												ØM	kg
			a1°	a2°	a3°	a4°	a5°	a6°	a7°	a8°	a9°	a10°	a11°	nxs		
Mub 38--	428	8x17.5	600	22.5	45	550	660	390							410	
Mub 37--	376	8x18	500	22.5	45	450	550	316							330	
Mub 36--	326	8x18	500	22.5	45	450	550	229							239	
Mub 35--	292	4x18	300	45	90	250	350	130								
Mub 34--	260	4x14	265	45	90	230	300	79								
Mub 33--	191.5	4x14	265	45	90	230	300	51								
Mub 32--	190.5	4x14	215	45	90	180	250	31								

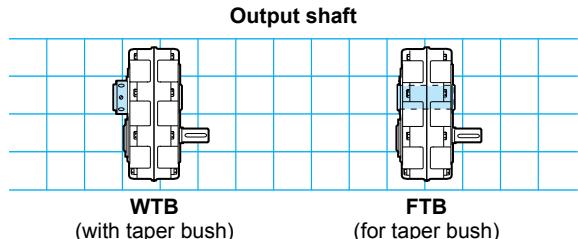
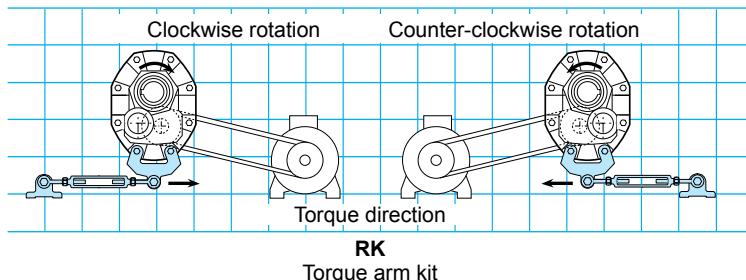
- BD flange form

Manubloc	ØD	E	S solid shaft												ØM	kg
			a1°	a2°	a3°	a4°	a5°	a6°	a7°	a8°	a9°	a10°	a11°	nxs		
Mub 38--	428	8x17.5	500	22.5	45	450	550	367							384	
Mub 37--	376	8x18	400	22.5	45	350	450	310							324	
Mub 36--	326	8x18	400	22.5	45	350	450	223							233	
Mub 35--	260	4x14	215	45	90	180	250	78								
Mub 33--	191.5	4x14	215	45	90	180	250	50								
Mub 32--	190.5	4x12	165	45	90	130	200	30								

Mounting arrangements - Dimensions

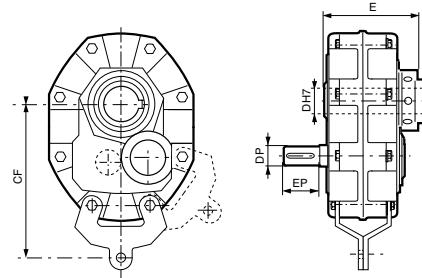
POULIBLOC 2000: Pb 2000

Dimensions in millimetres



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	65j6	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

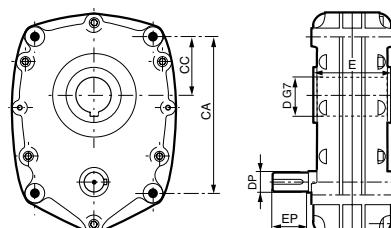


POULIBLOC 3000: Pb 3000, Pbh 3000



Poulibloc 3000: NU form, hollow shaft H

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



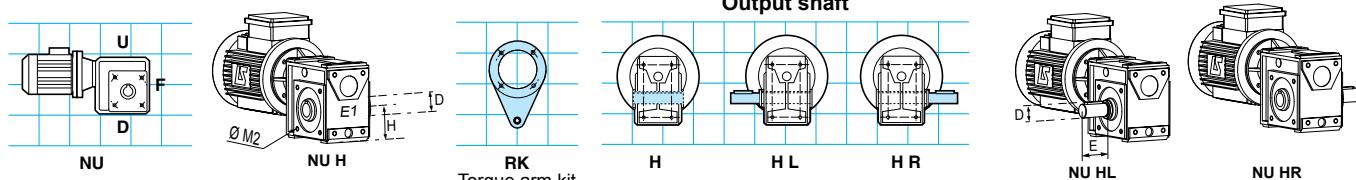
Cb, Ot, Mub, Mb, FFB Electromechanical Manual General on gearboxes

Mounting arrangements - Dimensions

MULTIBLOC

Dimensions in millimetres

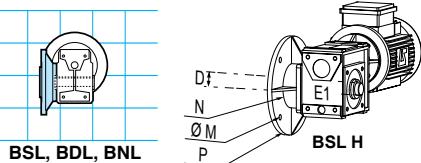
Standard position: gearbox seen from side F, motor to the rear, side D facing the ground.



- NU form, hollow shaft H

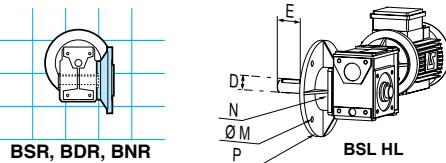
Multibloc	\emptyset DH7	E1	H	M2	kg
Mb 26	50	188	100	-	37
Mb 25	45	168	90	180	31
Mb 24	35	138	75	130	17.5
Mb 23	30	118	63	115	10.5
Mb 22	25	108	56	105	8
Mb 31	20	90	50	85	5

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



- BSL flange form on left, H hollow shaft

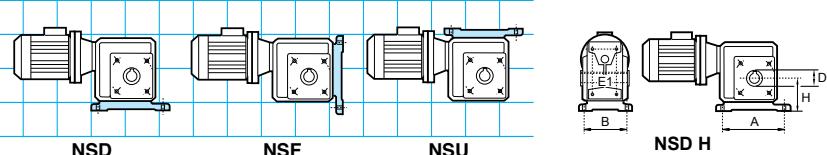
Multibloc	\emptyset DH7	E1	\emptyset M	\emptyset Nj6	\emptyset P	kg
Mb 26	50	188	300	250	350	48
Mb 25	45	168	265	230	300	38
Mb 24	35	138	215	180	250	23
Mb 23	30	118	165	130	200	14
Mb 22	25	108	165	130	200	11
Mb 31	-	-	-	-	-	-



- BSL* flange form on left, HL* output shaft on left

Multibloc	\emptyset Dh6	E	\emptyset M	\emptyset Nj6	\emptyset P	kg
Mb 26	50	100	300	250	350	52.9
Mb 25	45	90	265	230	300	41.7
Mb 24	35	70	215	180	250	24.9
Mb 23	30	60	165	130	200	15
Mb 22	25	50	165	130	200	12
Mb 31	-	-	-	-	-	-

* Right option: BSR flange, output shaft HR



- NSD* feet form, hollow shaft H

Multibloc	A	B	H	\emptyset 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	-	-	-	-	-	-

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

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

Multibloc	A	B	\emptyset 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	-	-	-	-	-	-

* Option: right output shaft HR

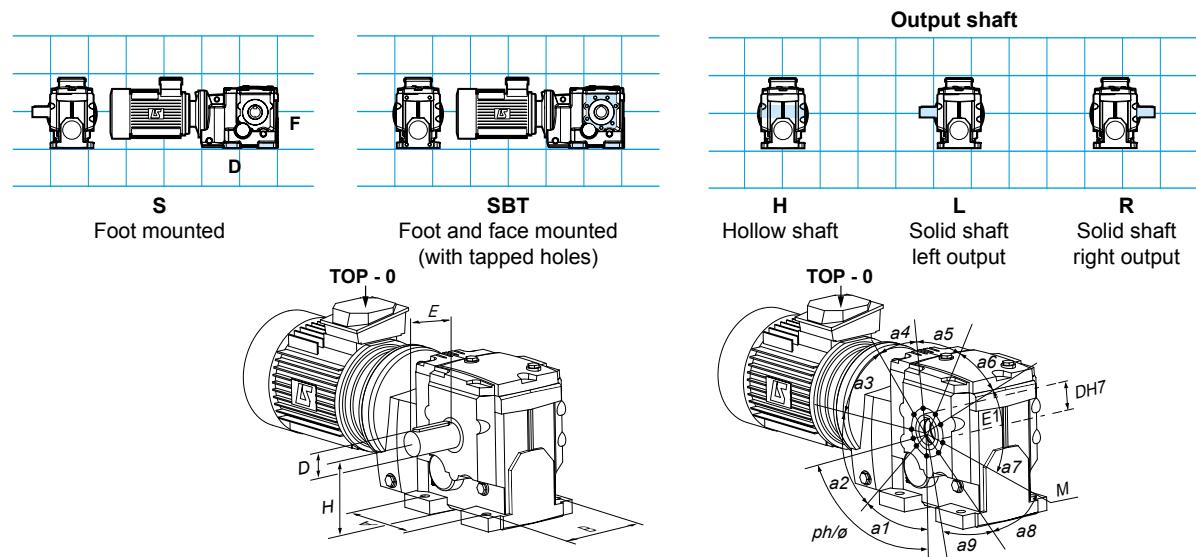
Cb, Ot, Mub, Mb, FFB
Electromechanical Manual
General on gearboxes

Mounting arrangements - Dimensions

ORTHOBLOC

Dimensions in millimetres

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



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

Orthobloc	SL					SR					SH					kg
	A	B	H	ØD	E	A	B	H	ØD	E	A	B	H	ØDH7	E1	
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	230	180	212	60m6	120	230	180	212	60m6	120	230	180	212	60	244	83
Ot 3433 S	190	165	180	50k6	100	190	165	180	50k6	100	190	165	180	50	226	60
Ot 3333 S	150	140	140	40k6	80	150	140	140	40k6	80	150	140	140	40	173	38
Ot 3233 S	150	120	112	30j6	60	150	120	112	30j6	60	150	120	112	35	151	21
Ot 3232 S	150	120	112	30j6	60	150	120	112	30j6	60	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

Orthobloc	Face L													H				kg		
	A	B	H	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	n	ph/ø	øM	øDH7	E1	
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	230	180	212	59°	52°	44°	50°	44°	81°	-	-	-	-	-	6	300°/190	190	60	244	80
Ot 3433 SBT	190	165	180	65°	46°	44°	50°	44°	81°	-	-	-	-	-	6	300°/152	152	50	226	58
Ot 3333 SBT	150	140	140	65°	48°	44°	46°	45°	67°	-	-	-	-	-	6	65°/123	123	40	173	36
Ot 3233 SBT	150	120	112	0°	65°	48°	44°	46°	50°	-	-	-	-	-	6	295°/102	100	35	151	20
Ot 3232 SBT	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

Orthobloc	Face R													H				kg		
	A	B	H	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	n	ph/ø	øM	øDH7	E1	
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	230	180	212	0°	59°	52°	44°	50°	44°	-	-	-	-	-	6	300°/190	190	60	244	80
Ot 3433 SBT	190	165	180	10°	55°	46°	44°	50°	44°	-	-	-	-	-	6	300°/152	152	50	226	58
Ot 3333 SBT	150	140	140	0°	45°	68°	44°	46°	44°	-	-	-	-	-	6	65°/123	123	40	173	36
Ot 3233 SBT	150	120	112	0°	65°	48°	44°	46°	50°	-	-	-	-	-	6	295°/102	100	35	151	20
Ot 3232 SBT	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

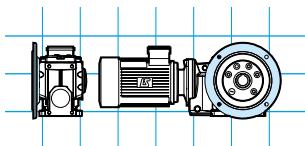
Cb, Ot, Mub, Mb, FFB
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Mounting arrangements - Dimensions

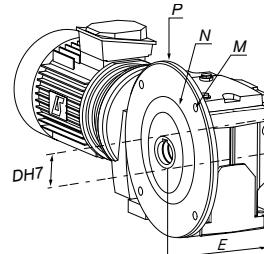
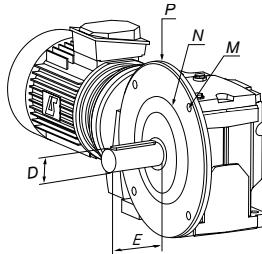
ORTHOBLOC

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

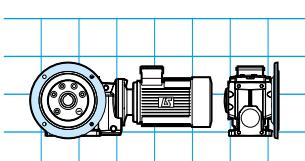


- BSL, BDL flange form, left solid shaft L

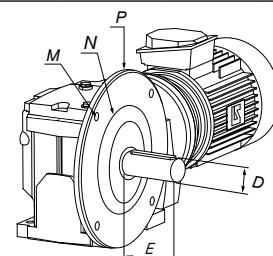
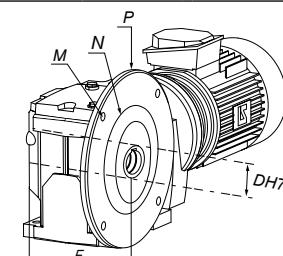
Orthobloc	BSL L					BDL L					kg
	ØM	ØNj6	ØP	ØD	E	ØM	ØNj6	ØP	ØD	E	
Ot 3933	600	550	660	120m6	210	726	-	-	-	-	-
Ot 3833	600	550	660	110m6	210	440	500	450	550	110m6	210
Ot 3733	500	450	550	90m6	170	342	400	350	450	90m6	170
Ot 3633	500	450	550	70m6	140	232	400	350	450	70m6	140
Ot 3533	350	300	400	60m6	120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

- BSL, BDL flange form hollow shaft H

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



BSR, BDR
Flange mounted on right



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

Orthobloc	BSR R					BDR R					BRR R only					kg
	ØM	ØNj6	ØP	ØD	E	ØM	ØNj6	ØP	ØD	E	ØM	ØNj6	ØP	ØD	E	
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
Ot 3433	300	250	350	50k6	100	68	265	230	300	50k6	100	67	265	230	300	55k6
Ot 3333	265	230	300	40k6	80	42	215	180	250	40k6	80	42	215	180	250	45k6
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	-	-	-	-	-	-	-	-	-	-

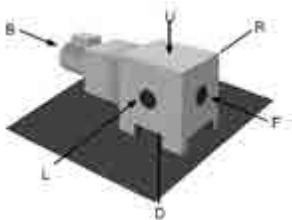
- BSR, BDR flange form hollow shaft H

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

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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.



Compabloc¹, page 23



Manubloc¹, page 24
Poulibloc, page 25



Multibloc¹, pages 26-27



Orthobloc¹, 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.

	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 min⁻¹**, please consult.

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

For very low speed applications (the slow 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

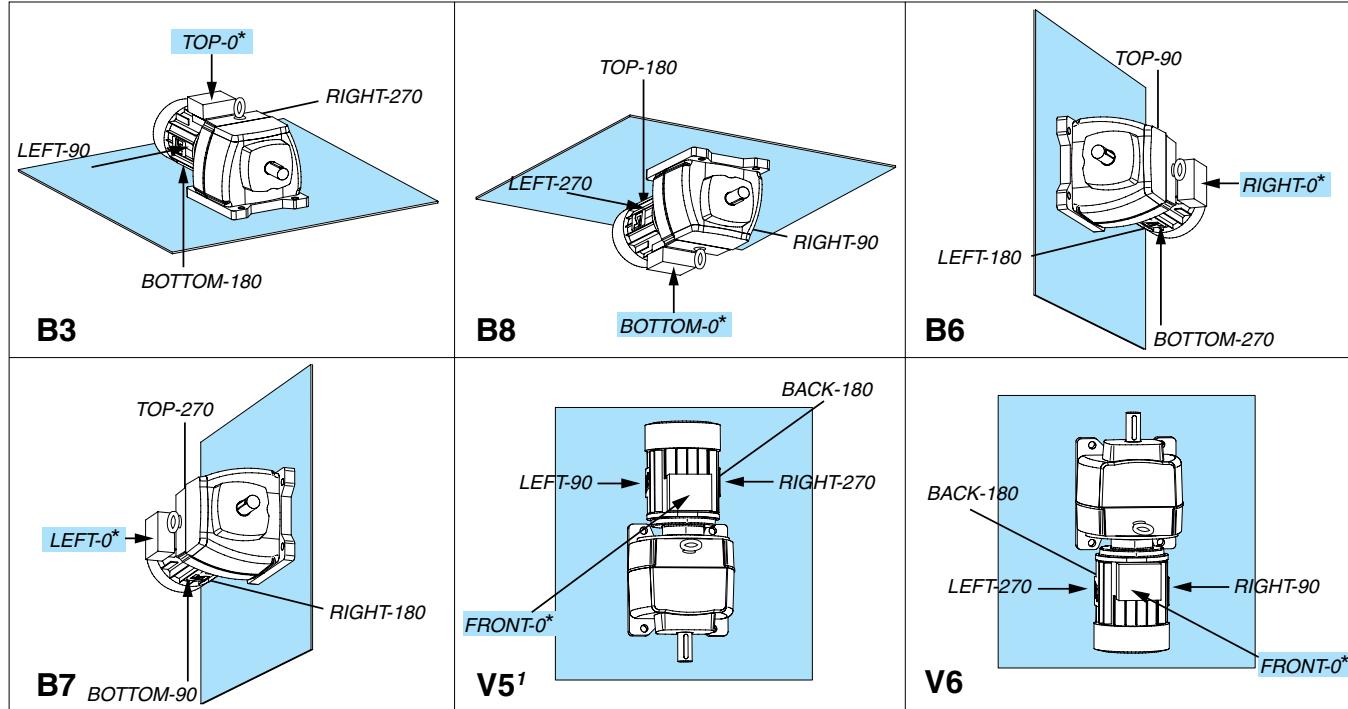
The absolute orientation of the connection (Terminal box: Up, Down, Right, Left, Front, Back) is related to the chosen operating position.

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.**

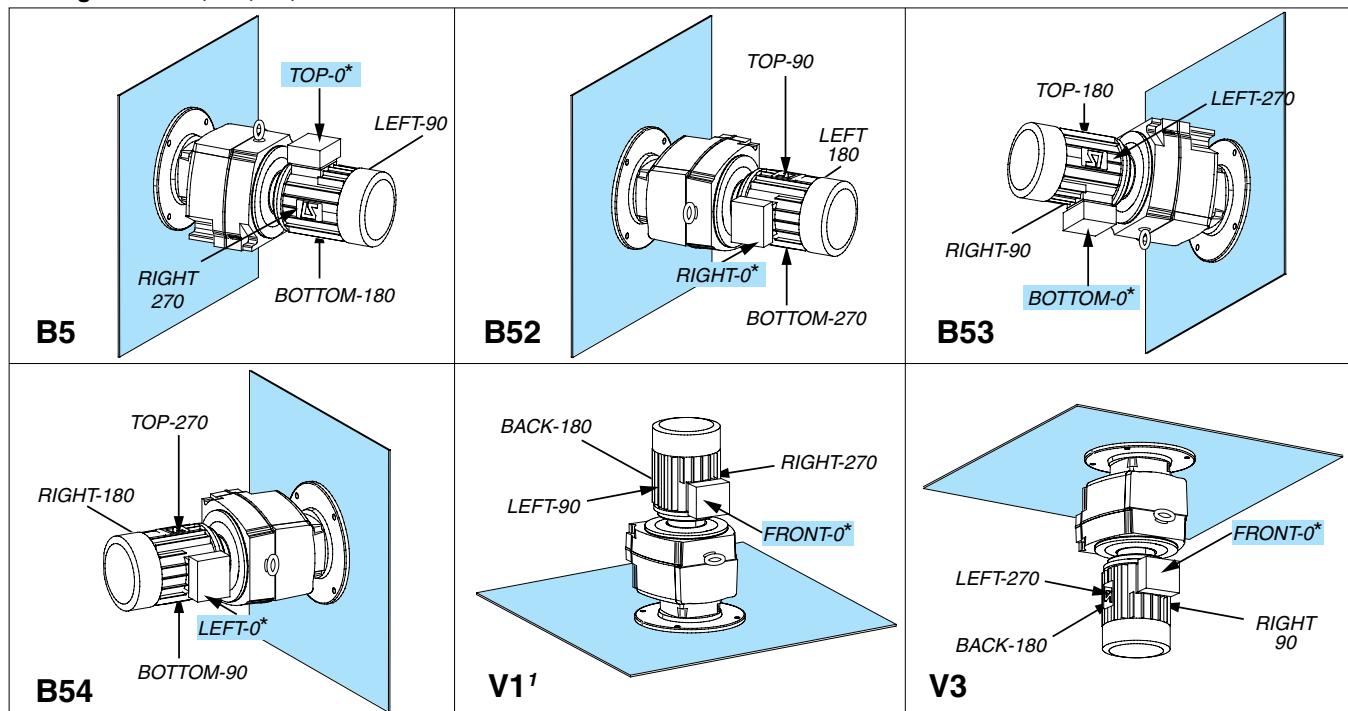
Operating positions: Compabloc

- Feet form S, SBS, SBD...



1. V5: For Cb 36 to Cb 38, backstop forbidden.

- Flange form BS, BD, BT, BR

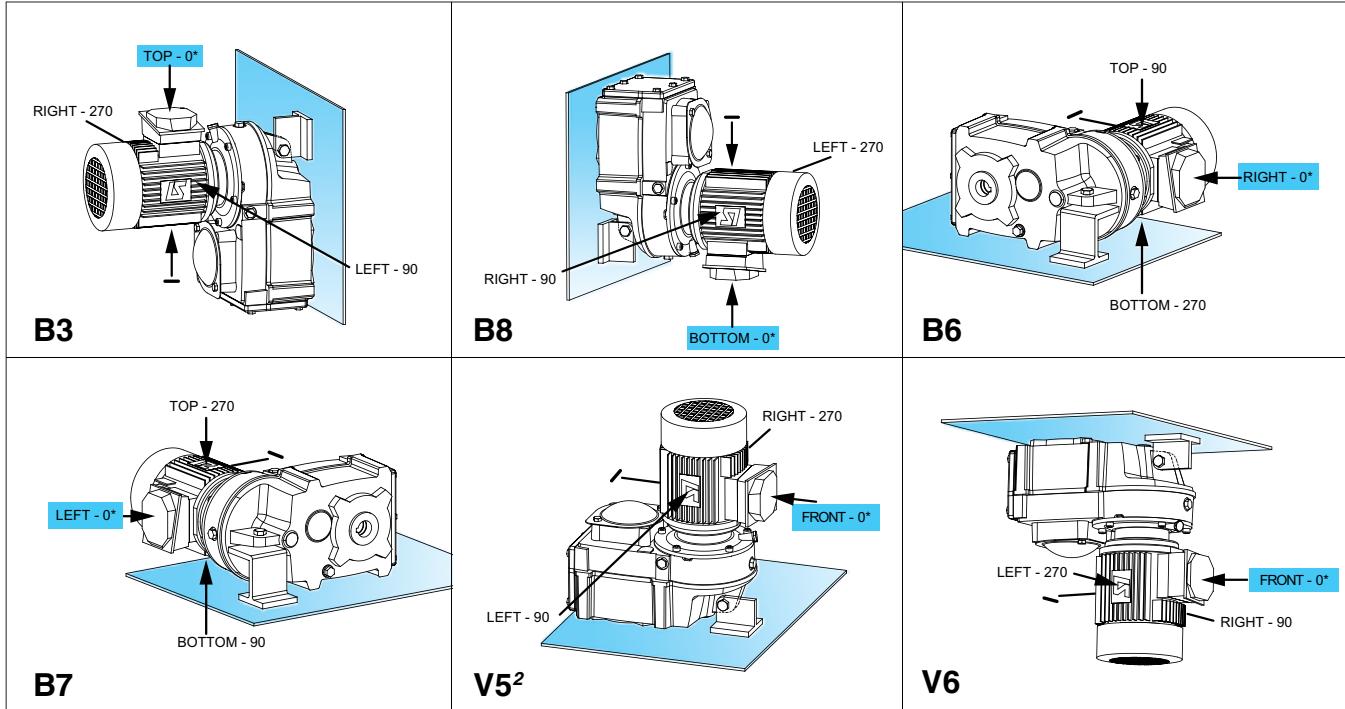


1. V1: For Cb 36 to Cb 38, backstop forbidden.

* Std terminal box

Operating positions: Manubloc

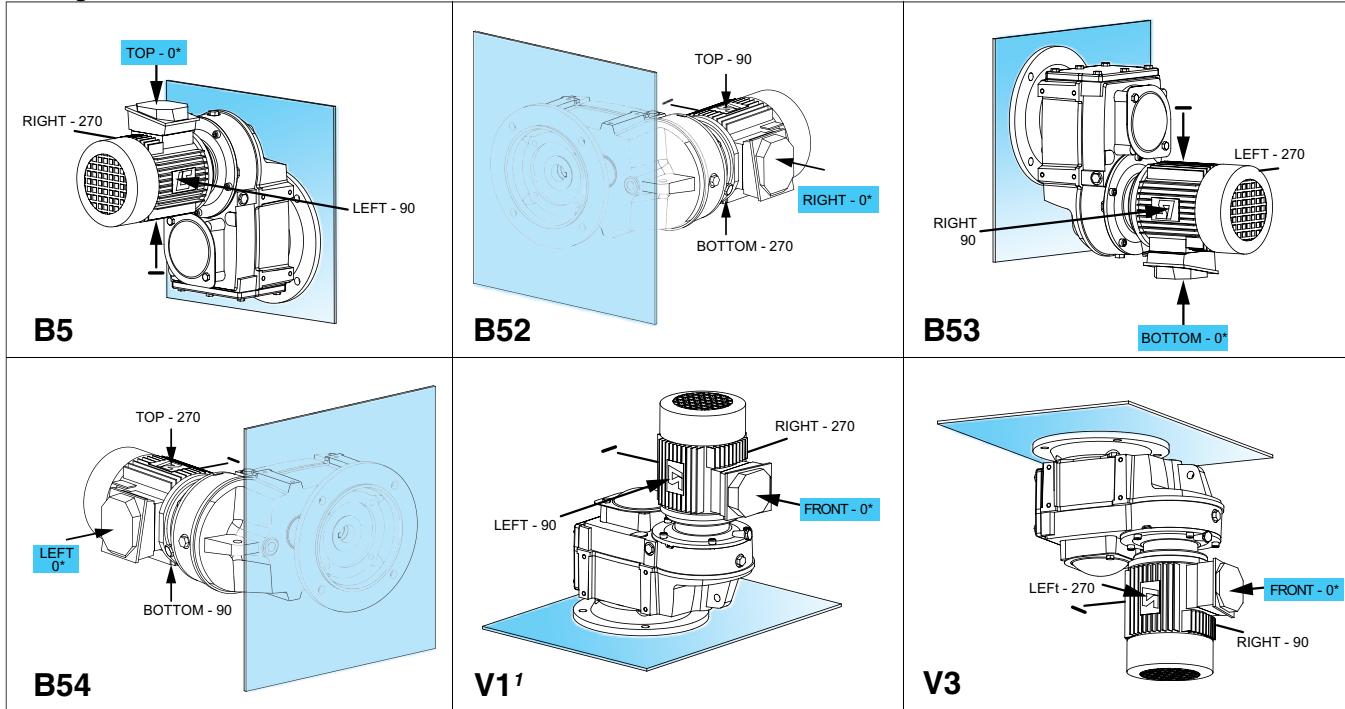
- Torque arm form R, left machined lateral side NUL¹



1. Right machined lateral side: NUR

2. V5: For Mub 36 to Mub 38, backstop forbidden.

- Flange form BT, BS, BD



1. V1: For Mub 36 to Mub 38, backstop forbidden.

* Std terminal box

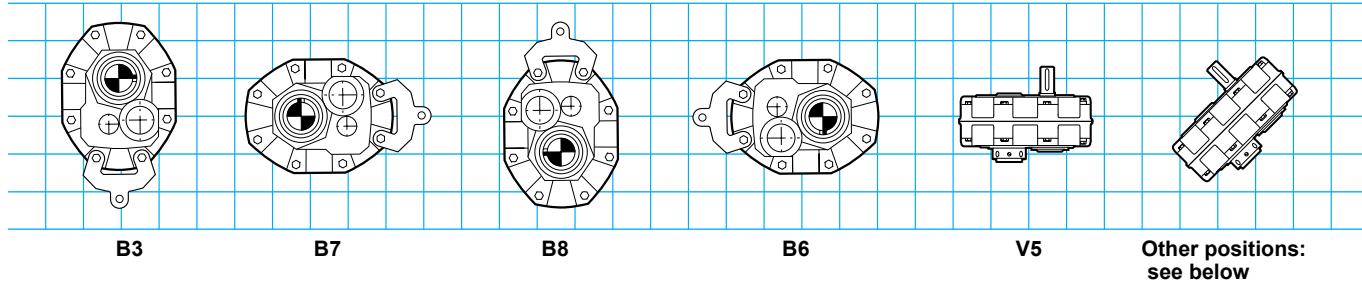
Hollow shaft H, Output shaft S.

Operating positions: Poulibloc

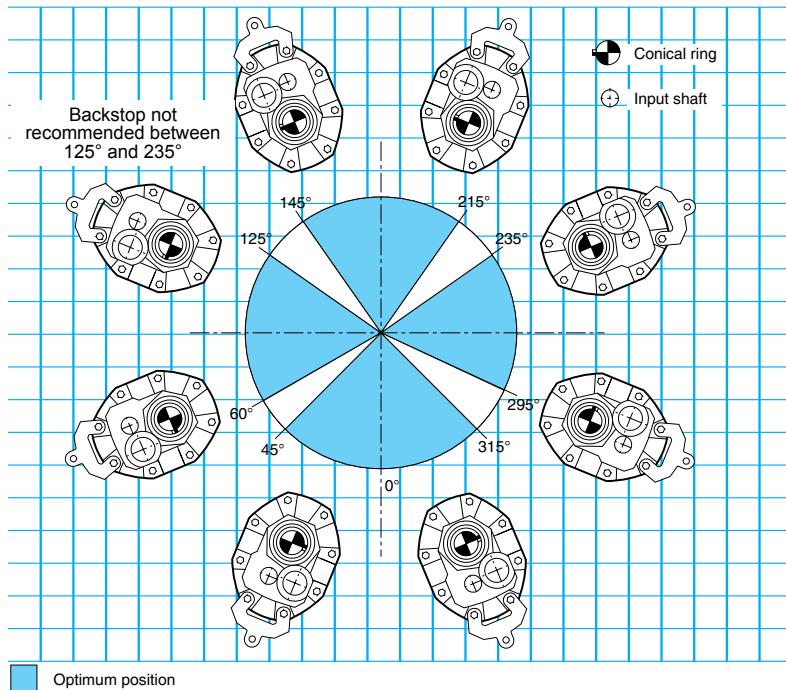


Fill up the oil corresponding to the operating position.

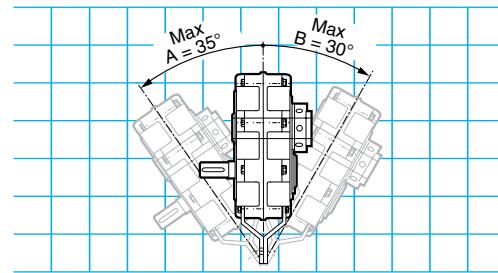
Standard position: supplied without oil, it is multiposition: M



Other positions

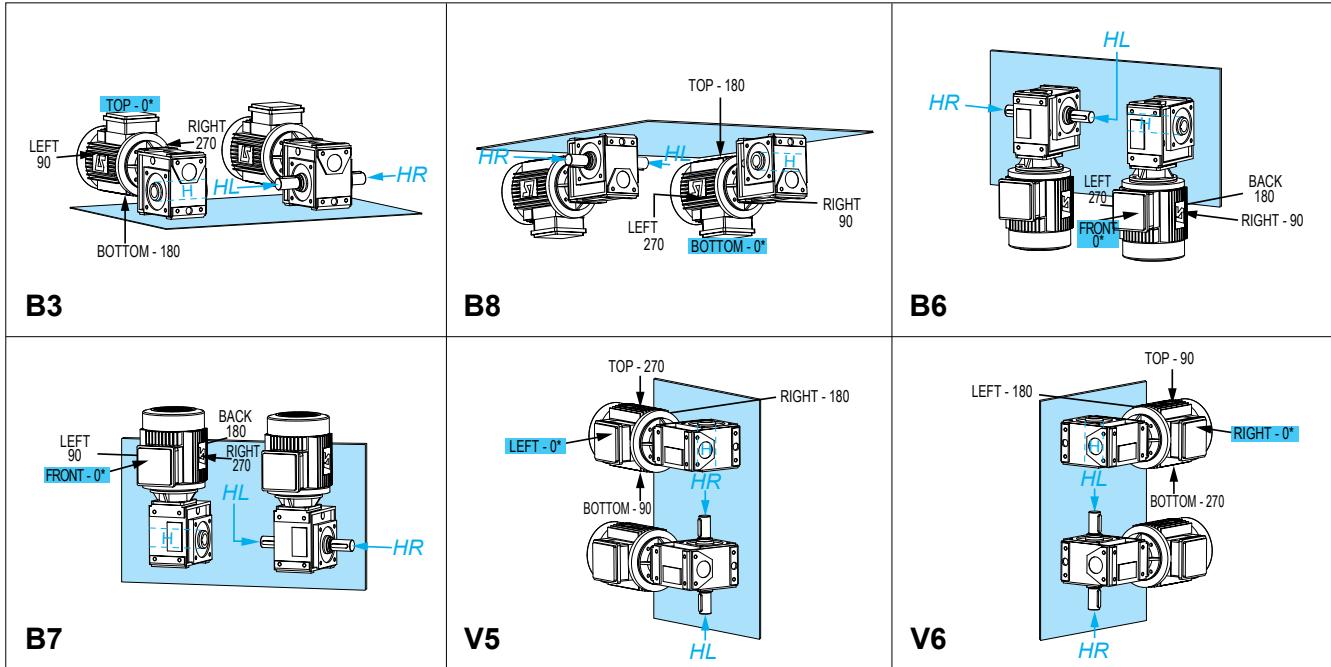


Limit operating positions

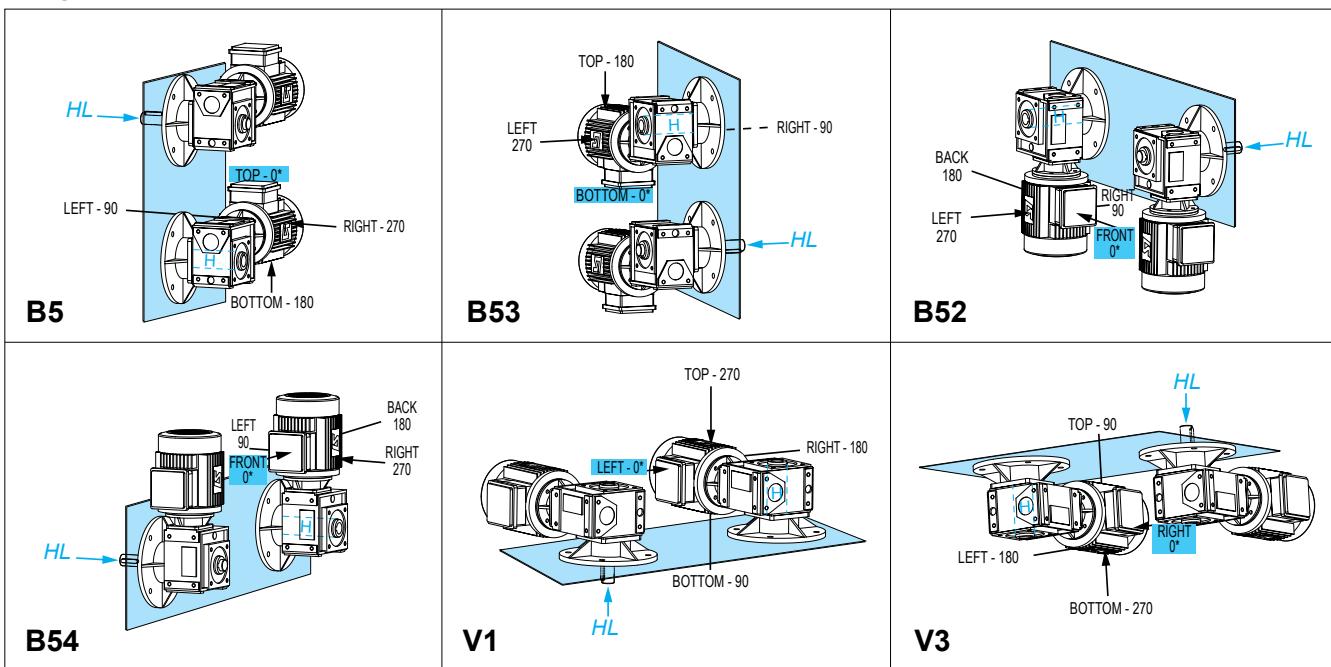


Operating positions: Multibloc

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



- Flange form on left BSL, BDL, BNL

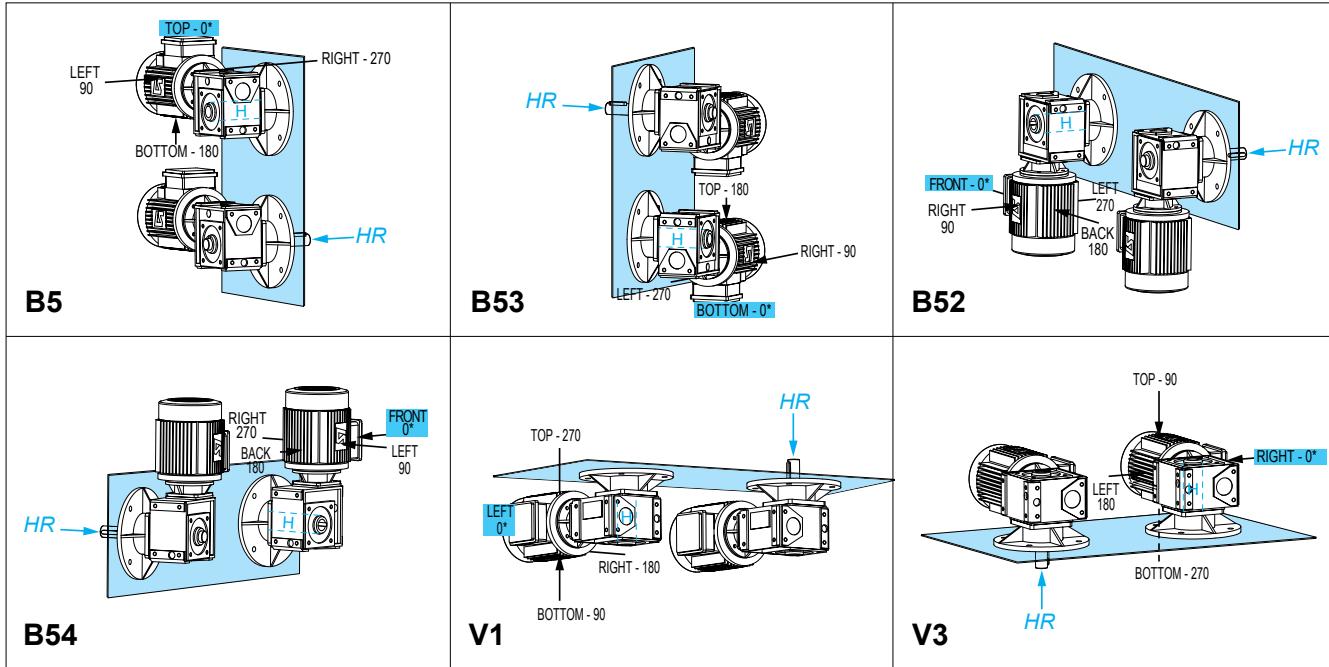


* Std terminal box

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

Operating positions: Multibloc

- Flange form on right BSR, BDR, BNR

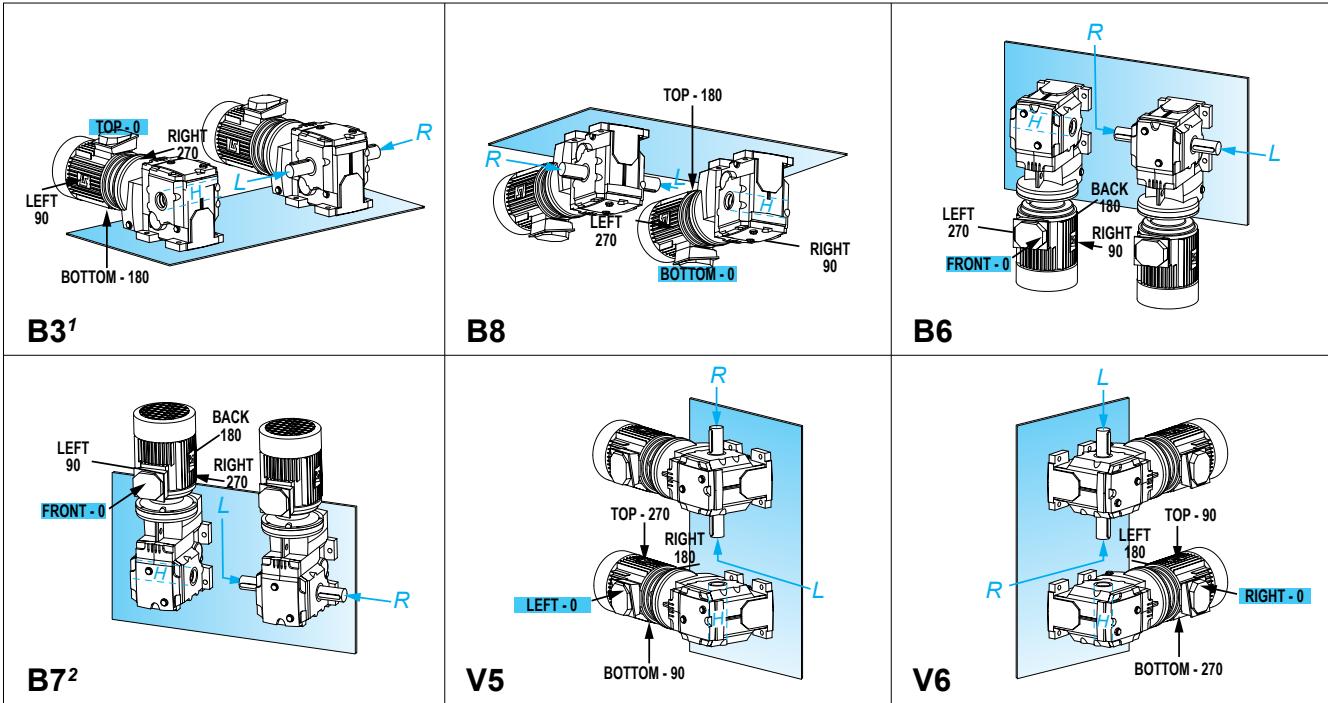


* Std terminal box

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

Operating positions: Orthobloc

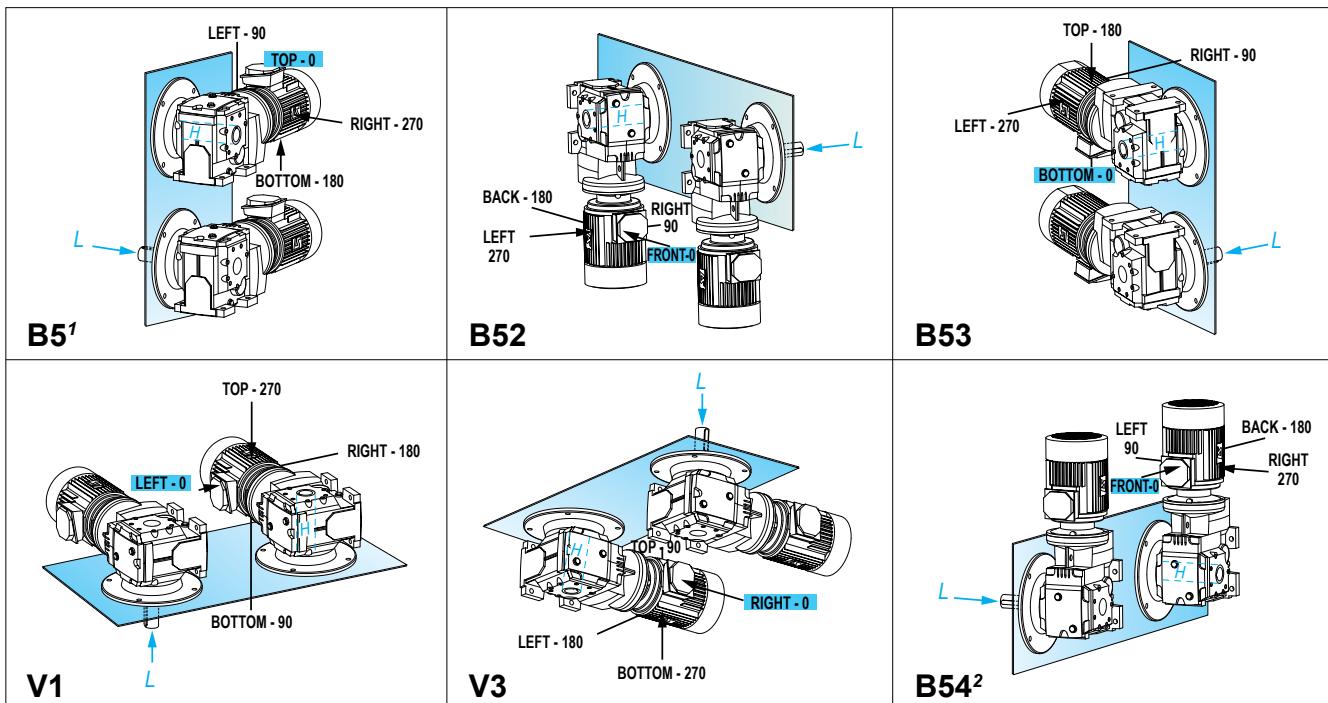
- Feet form S, with machined feet and lateral sides SBT



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

2. B7: For Ot 36 to Ot 39, backstop forbidden.

- Flange form on left BSL, BDL



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

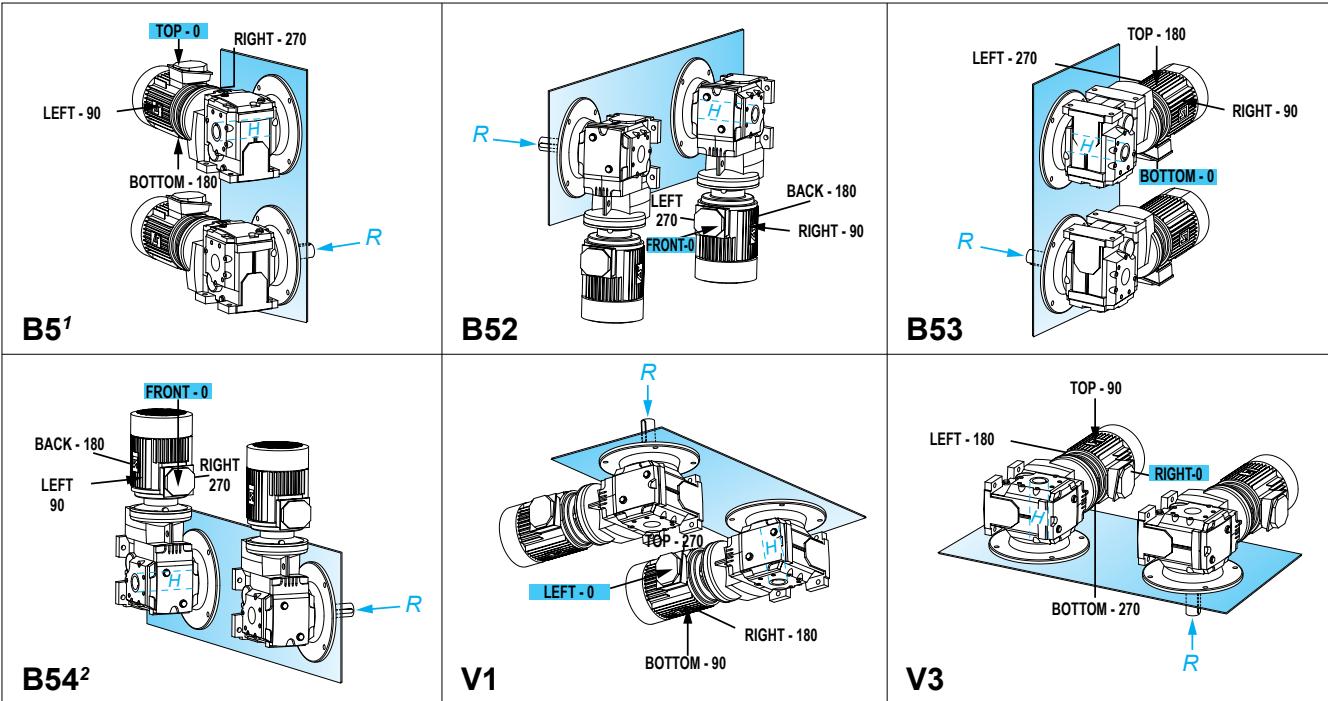
2. B54: For Ot 36 to Ot 39, backstop forbidden.

* 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.

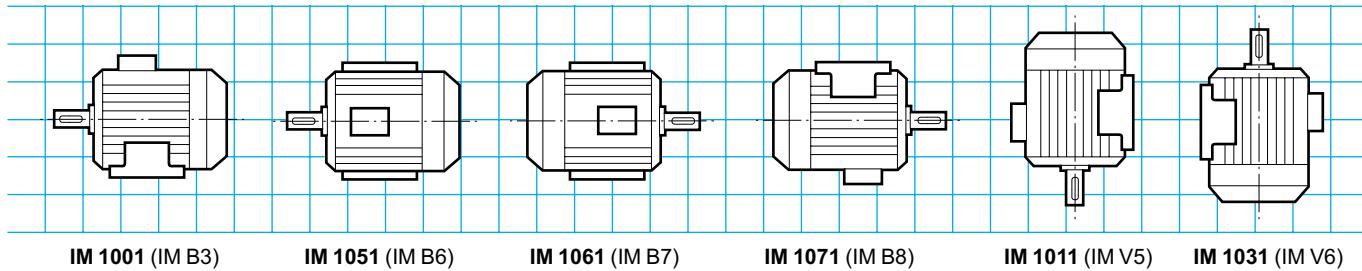
2. B54: For Ot 36 to Ot 39, backstop forbidden.

* Std terminal box

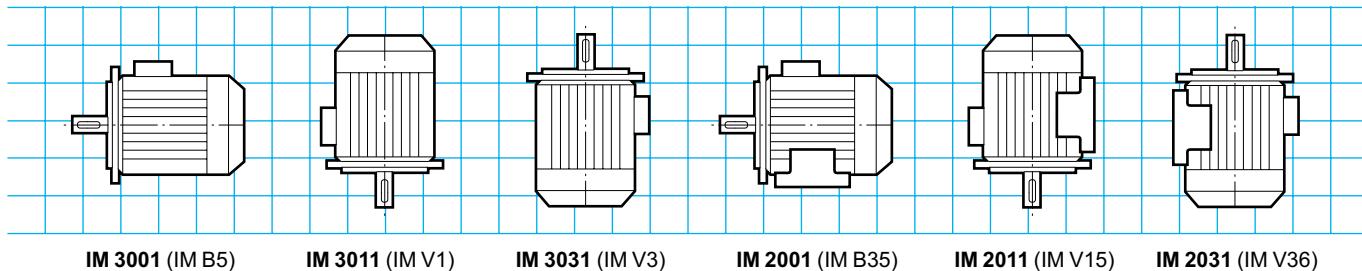
Output shaft on right, hollow H.

Operating positions: motors, brake motors

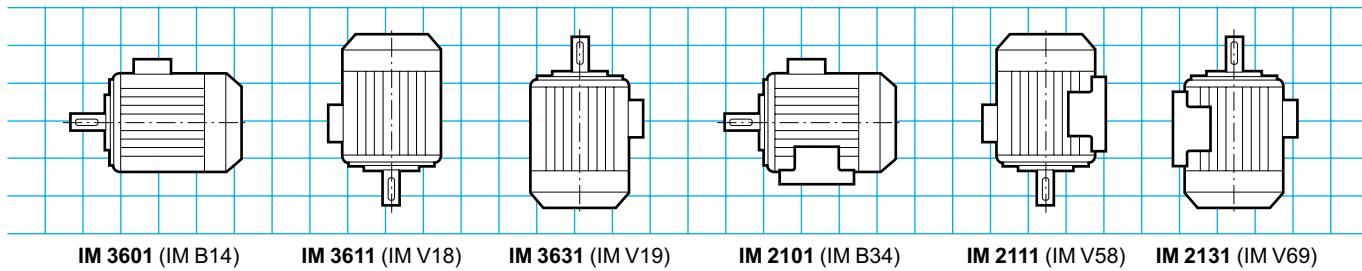
Feet form



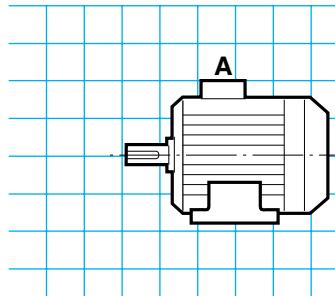
Flange mounted form (FF with smooth holes)



Face mounted form (FT with tapped holes)

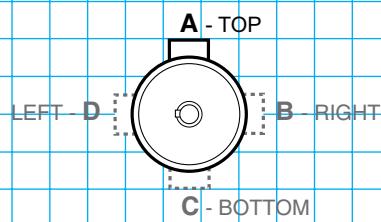


Terminal box positions



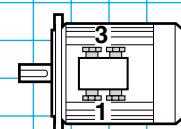
Motor with fixing feet

Cable gland positions



Motor with fixing flange

A - Top: standard
 B - Right
 C - Bottom
 D - Left



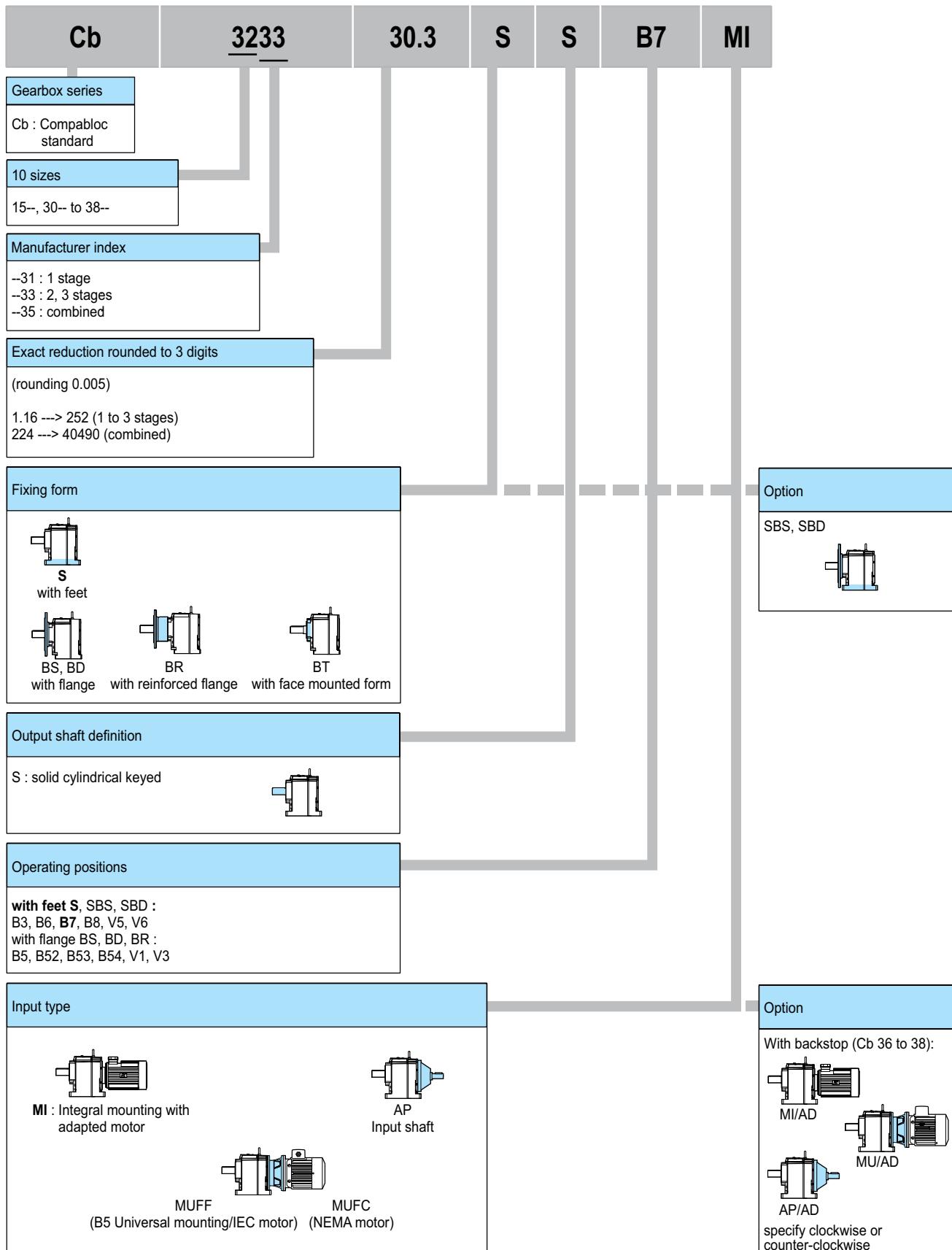
All tapped holes closed by plugs

1 - Right
 3 - Left

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Name

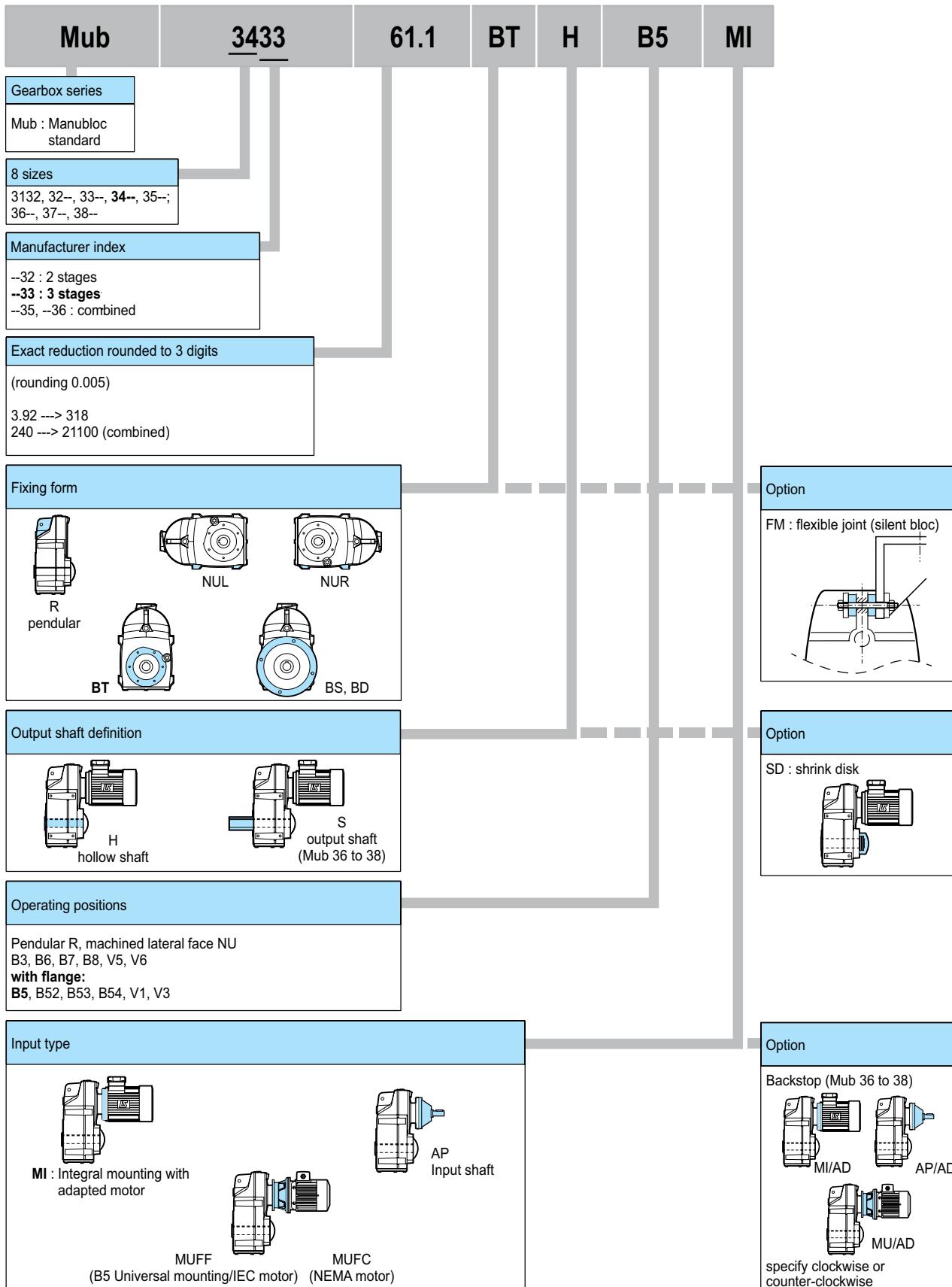
Designation Compabloc Cb



Cb, Ot, Mub, Mb, FFB
 Electromechanical Manual
 General on gearboxes

Name

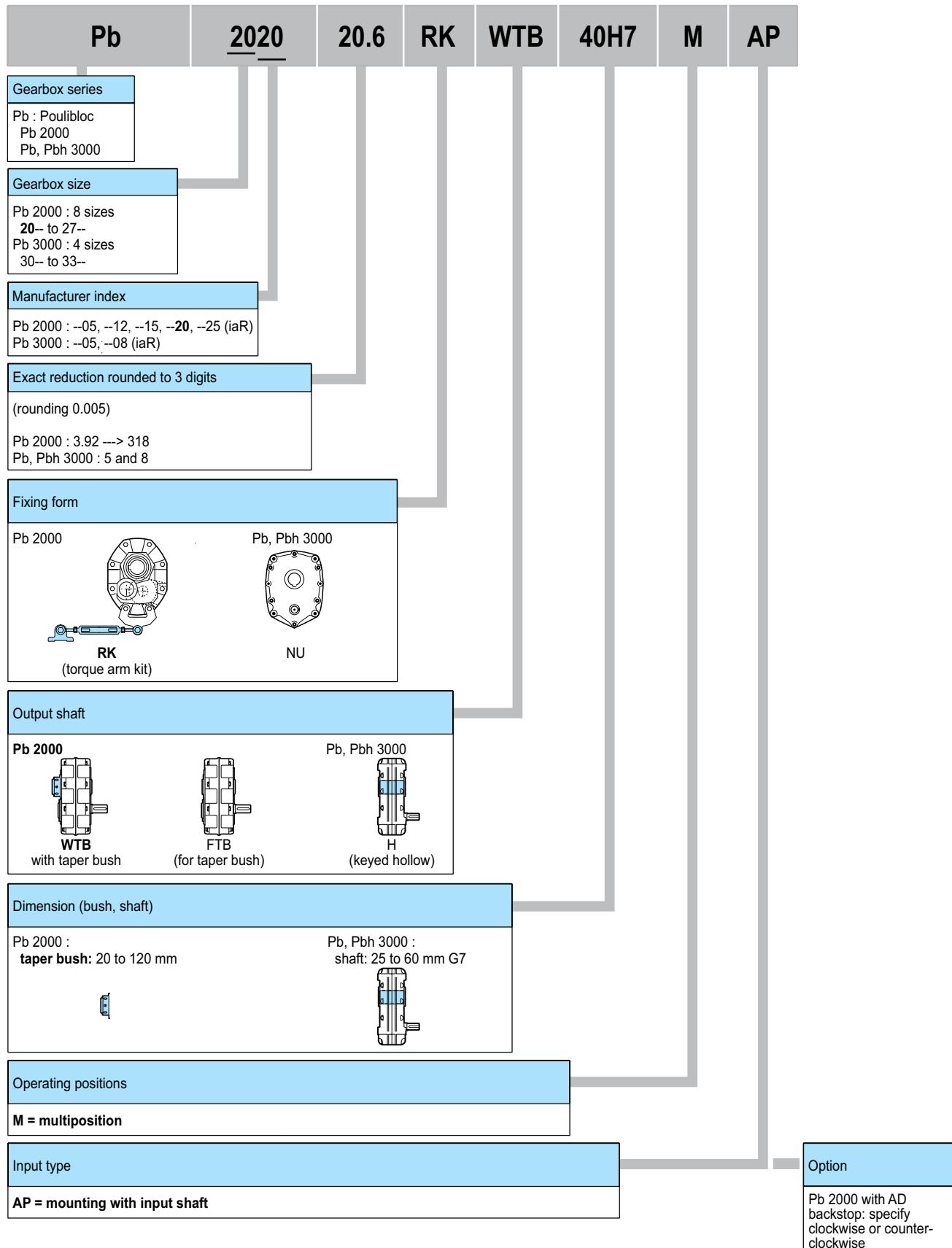
Designation Manubloc Mub



Cb, Ot, Mub, Mb, FFB
 Electromechanical Manual
 General on gearboxes

Name

Designation Poulibloc Pb



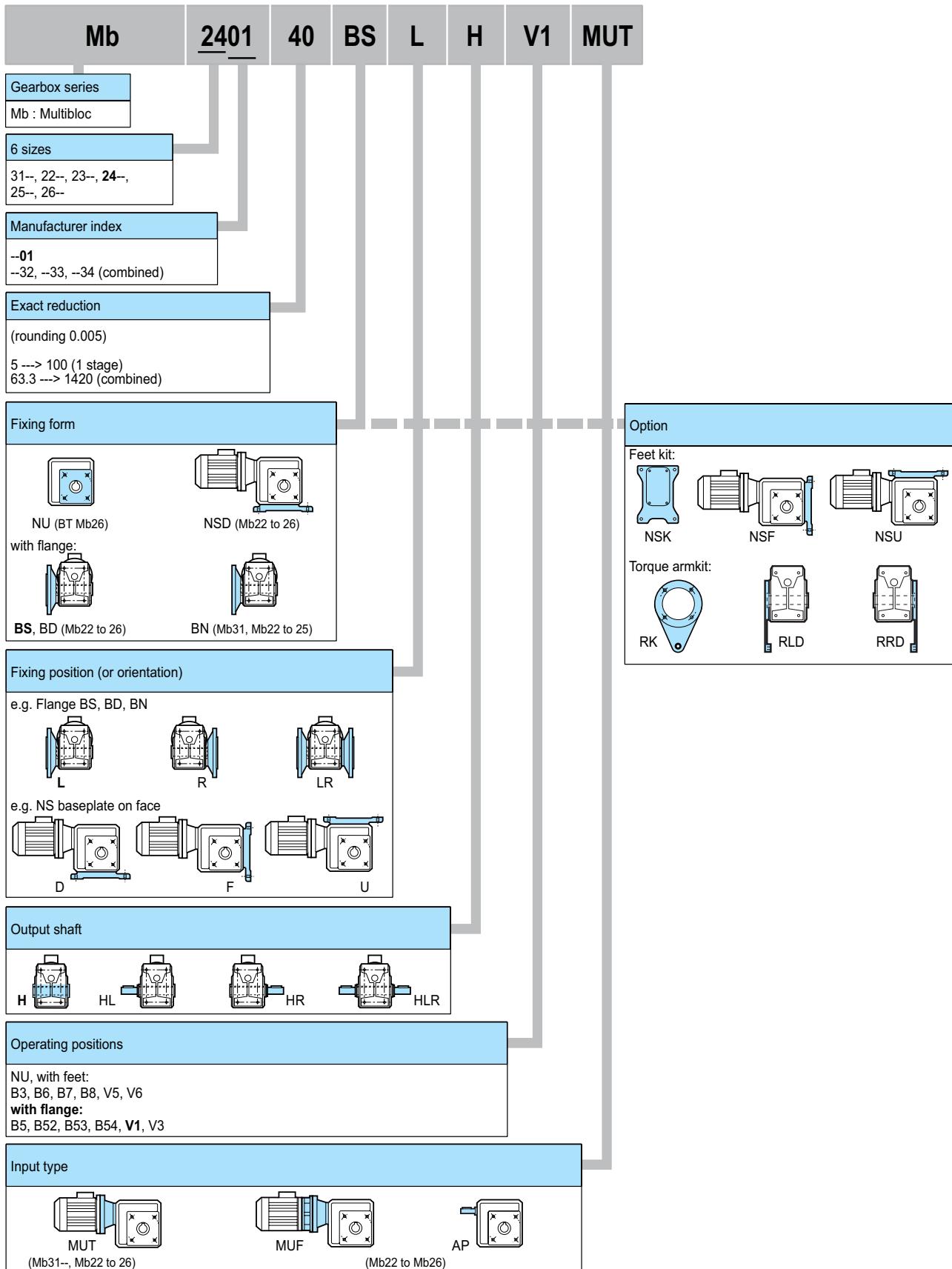
Cb, Ot, Mub, Mb, FFB

Electromechanical Manual

General on gearboxes

Name

Designation Multibloc Mb



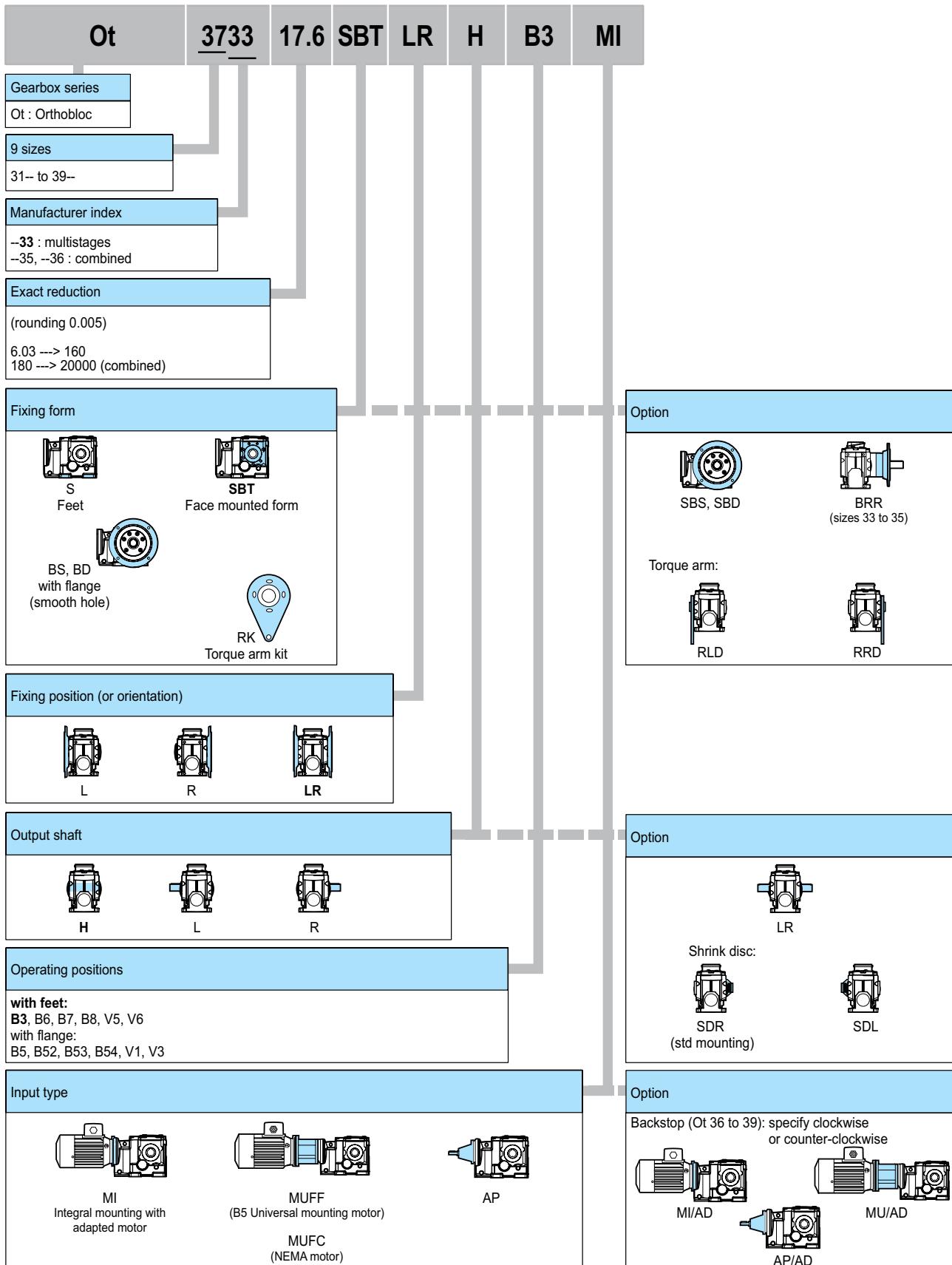
Cb, Ot, Mub, Mb, FFB

Electromechanical Manual

General on gearboxes

Name

Designation Multibloc Ot



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 General on gearboxes

Name

Designation Motor and brake

4p	LS	90	L	1.5 kW	IFT/NIE	IM 3601	230/400V	UG	FFB	2	19 N.m	A1	OPTIONS
Polarity, speed 2, 4, 6													Option 2 speed upon consultation
Motor series (F) LS (ES, MV)													Options • PTO, CTP sensors (71 to 132), KTY and PT100 • Drain hole • Separate brake supply
Frame size 56 to 315													
Length code and manufacturer index L, LG, LR, LU, LUR, M, MG, MP, MR, MT, MU, S, SL, SM, SU													
Rated power (kW) or starting torque (N.m) 0.06 to 110 kW													
Range, efficiency class FMD/FCPL: LS IFT/NIE ¹ , FFB: LS IFT/NIE ¹ , LSES (IFT/IE3)													
Operating position Foot or fot and flange mounted: IM 1001 (IM B3), IM 1051 (IM B6), IM 1061 (IM B7), IM 1071 (IM B8), IM 1011 (IM V5), IM 1031 (IM V6), IM 2001 (IM B35), IM 2011 (IM V15), IM 2031 (IM V36), IM 2101 (IM B34), IM 2111 (IM V58), IM 2131 (IM V69) With flange: IM 3001 (IM B5), IM 3011 (IM V1), IM 3031 (IM V3), IM 3601 (IM B14) , IM 3611 (IM V18), IM 3631 (IM V19)													
Mains voltage (V) and frequency (Hz), coupling 230/380/400/415V 50 Hz - 460V 60 Hz													
Application UG : general use UL : hoisting applications UT : horizontal motion													
Brake series FMD, FFB , FCPL													Options • Drip cover • Choice of: - DLRA, DLM, DMD release - braking torque • Indicators: - release - wear • Short response time TRR • Forced ventilation • Incremental, absolute encoder
Brake size FFB: 1 to 5													
Braking torque (N.m) FMD : 3 to 5 N.m - FFB : 4.5 to 200 N.m - FCPL : 65 to 5000 N.m													
Terminal box – cable gland position A, B, C, D - 1, 3													

1. NIE: not in any efficiency class

Cb, Ot, Mub, Mb, FFB

Electromechanical Manual

General on gearboxes

Nameplates

Check that the equipment conforms to the order (mounting arrangement, information on the Leroy-Somer nameplates).

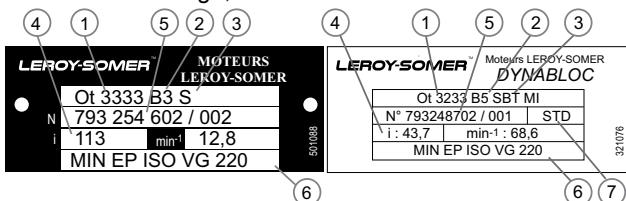
Informations 1 to 11 should be quoted

Please quote when ordering spare parts.

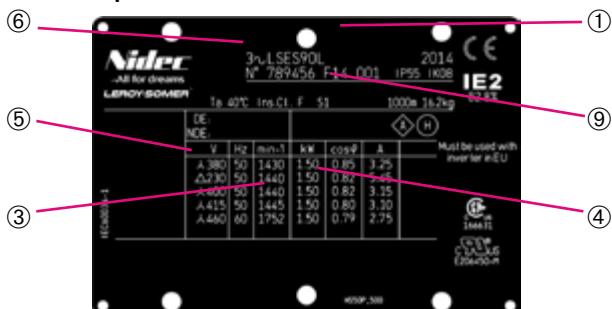
Other logos can optionally be provided: agreement prior to ordering is essential.

Gearbox nameplate:

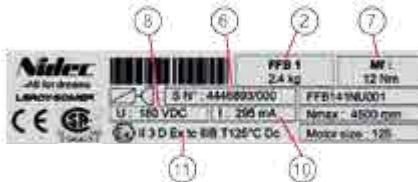
- ① Gearbox definition;
- ② Operating position;
- ③ Fixing form (S: feet; BS, BDn: flange); possible options;
- ④ Exact unit reduction;
- ⑤ N: manufacturing number;
- ⑥ Lubricant;
- ⑦ DYNABLOC range, backlash: standard.



Motor nameplate:



Brake nameplate:



Essential information included on the nameplates:

1	Motor series, frame size
2	FFB brake type <input checked="" type="checkbox"/>
3	Speed of rotation (min^{-1})
4	Rated power (kW)
5	Motor voltage (V)
6	Motor and brake manufacturing no.
7	Mf: Braking torque (N.m)
8	U: Brake coil voltage (VDC)
9	Duty - Duty (operating) factor
10	I: Coil current (mA)
11	Special marking (ATEX) <input checked="" type="checkbox"/>

Please quote when ordering spare parts

Definition of symbols

T: Impegnation class

IE2: Efficiency class

IP-- IK--: Ingress protection*

Cl.F: Insulation class

(Ta) 40°C: Ambient operating temperature

cos P or φ: power factor

A : Rated intensity

Δ : Delta connection

λ : Star connection

A : Vibration level

H : Balancing mode

Bearings

DE: Drive end bearing

NDE: Non drive end bearing

Marking

Definition of symbols used on nameplates:

CE: Legal mark of conformity of product to the requirements of European Directives

CSA: Product certified CSA, conforming to UL

*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.**

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 %.

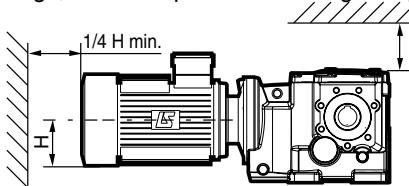
long-term storage (> 1 year)

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

For operation in ambient temperature between -10°C and +40°C, 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 of the type:

- P.A.G. (Poly-Alkylene-Glycol) ISO VG 220 for Mb 3101,
- P.A.O. (Poly-Alpha-Olefine) ISO VG 460 for Mb 2201 to 2601.

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.

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.

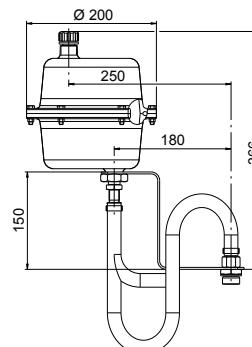
For the precise quantity, fill the gearbox up to its level plug (except for gearboxes lubricated for life).

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 of large expansion tank with maximum dimensions in mm.



• Thermal exchanger:

Cb, Mub and Ot gearboxes size 36 to 39 above the thermal limit 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.



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

Cb, Ot, Mub, Mb, FFB

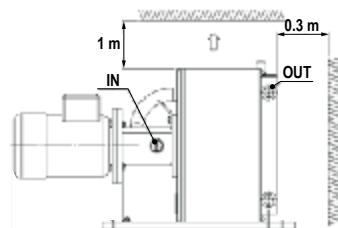
Electromechanical Manual

General on gearboxes

Lubrication - Maintenance

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: 90°C
 - 4-pole motor, 1.1 kW, IP 55, class F.

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



GEARBOX LUBRICANTS

Type gear	Gearbox range	Ambient temperature (°C)										Lubricant*			KLUBER	MOBIL	MOTUL	SHELL	TOTAL
		-40	-30	-20	-10	0	+10	+20	+30	+40	+50								
helical	 Cb 3000 Ot 3000 Mub 3000 Pb 2000 Pbh 3000											MIN	ISO	VG 220		Mobilgear 600 XP 220 (-24°C)		Omala S2 G220 ex Omala 220 (-24°C)	Carter EP220 (-24°C)
		1										PAO	ISO	VG 150		SHC CIBUS 150 ex SHC 629 (-45°C)	SAFCOGEAR SY150	Omala S4 GX150 ex Omala HD150 (-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 GX460 ex Omala HD460 (-42°C)	
		1										PAO agro.H1	ISO	VG 150				Cassida Fluid GL 150 (-54°C)	
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 GX460 ex Omala HD460 (-42°C)	
		1										PAO	ISO	VG 150		SHC CIBUS 150 ex SHC 629 (-45°C)	SAFCOGEAR SY150	Omala S4 GX150 ex Omala HD150 (-48°C)	
		1										PAO	ISO	VG 32		SHC 624 (-54°C)			
	Mb 31								2	2		PAG	ISO	VG 220				Omala S4 WE220 ex Tivéla WB (-27°C)	

* Lubricants: MIN = MINERAL; PAO = POLYALPHAOLEFINE; PAG = POLY-ALKYLENE-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.

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 min⁻¹)

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, 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 K_p.

"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	
Shock-free, few starts	24 hours/day	II
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**:

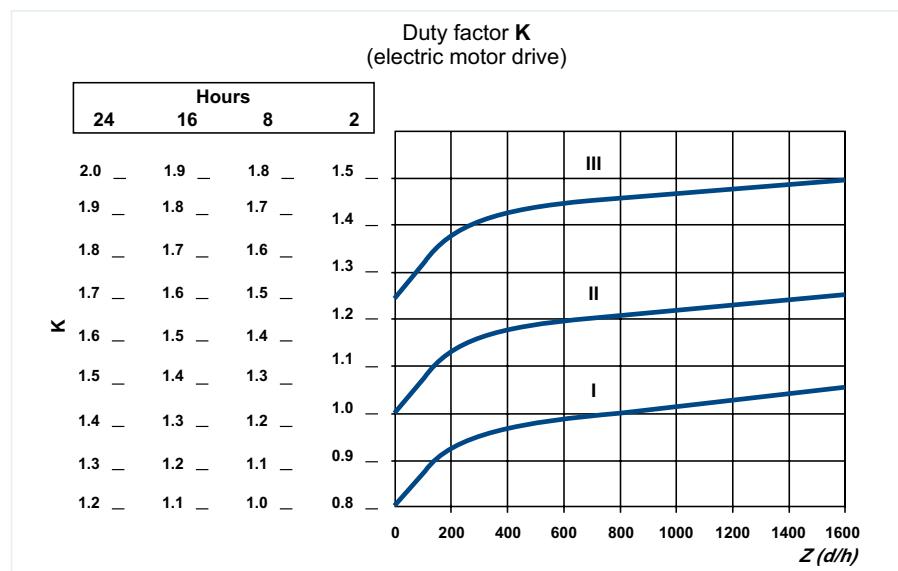
$$FJ = \frac{J_{C/M}}{J_M}$$

- $J_{C/M}$: 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.



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 (s/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	$\leq 10^*$
Class of application	I	II	III

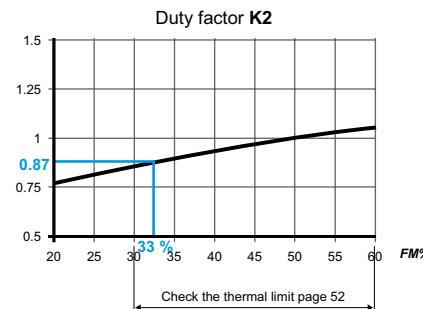
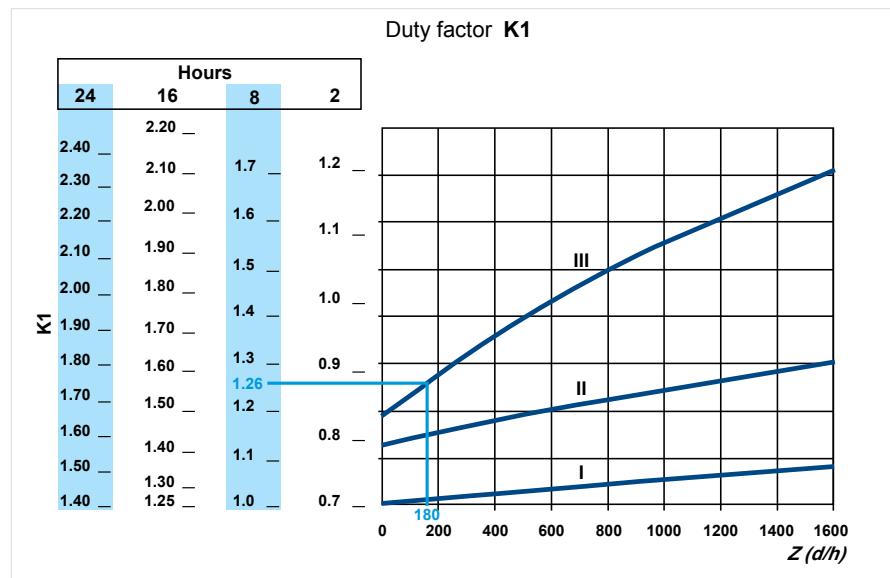
* For **FJ > 10**, please consult Leroy-Somer.

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:

$$K = K1 \times K2$$

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 kgm²;
- motor moment of inertia: 0.0016 kgm².

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:

$$1.26 \times 0.87 = 1.10$$

Directory of applications according to AGMA

Directory of applications according to AGMA

OPERATION in hours/day				OPERATION in hours/day				OPERATION in hours/day			
	3 h/day	10 h/day	24 h/day		3 h/day	10 h/day	24 h/day		3 h/day	10 h/day	24 h/day
COOLING TOWERS	-	-	-	grinders (2 or more)	II	II	II*	bending rollers	II	II	II
AGITATORS				calenders	II	II	III	nut tappers	II	III	II*
liquids with variable density	II	II	II	extruding machines	II	II	III	shears	III	III	III
liquids and solids	II	II	II	sheet forming	I	II	II*	MIXERS			
pure liquids	I	I	II	machines	III	III	III*	constant density	I	I	II
semi-liquids, variable density	II	II	II*	mixers	III	III	III*	variable density			
FOOD AND BEVERAGE INDUSTRY				CLARIFIERS	I	I	II	cement, continuous duty			
cereal cookers	I	I	II	SORTERS, GRADERS	I	II	II	cement, intermittent duty			
beet choppers	II	II	II	COMPRESSORS	I	II	II	METALLURGY (industry)			
meat choppers	II	II	II	lobe	I	II	II	drawing frames, carriage	III	III	II*
dough mixers	I	II	II	centrifugal	I	II	II	drawing frames, main control	III	III	II*
extruding machines	I	II	III	CONVEYORS (loaded or fed uniformly)				table conveyor:			
FEEDING (attachment)				belt				single direction of operation	I	II	III
reciprocating	III	III	III*	chain				reverse operation	III	III	III
disks	I	I	II	apron				wire winders			
lattice	I	II	II	bucket				sheet metal winders	I	II	II
belt				scraper				spreading	III	III	II*
screw	I	II	II	screw				roller drive			
TRANSMISSION SHAFT				assembly				splitting lines	II	II	III
loads with moderate shocks				furnace				wire drawing mills, flatteners	II	II	II
loads with severe shocks	III	III	III*	CONVEYORS (loaded or fed non-uniformly)				shape-cutting machines	III	III	II*
constant loads	I	I	II	heavy duty:				separating rollers	-	-	-
CLAY (industry)				belt	II	II		drying rollers	-	-	-
brick machines	III	III	III*	chain	II	II		PAPER (industry)			
processing machines	II	II	II	apron	II	II		aerators	-	-	-
mixers	II	II	II	bucket	II	II		agitators, mixers	-	II	II
brick presses	III	III	III*	scraper	II	II		wind up turrets			
TIPPERS	III	III		roller	I	II		calenders			
TIMBER (industry)				screw	II	II		conveyors			
supplying:				reciprocating	III	III		ball conveyors	III*	III*	III*
saws in series	III	III	III*	assembly	II	II		cutters, plating machines			
shape-cutting machines	II	II	III	furnace	II	II		bleaching vats			
planers	II	II	III	vibratory	III	III		cylinders	I	II	II
cutting				removal	I	I		felt stitching machines	III*	III*	III*
chains				CANE KNIVES	II	II		washers, thickeners			
turntable control				rotary	I	II		barking machines (mechanical)	III	III	III
main conveyors				stone washer with water circulation	I	I		pulp machines, uncolers			
ball conveyors	III	III	III*	DREDGERS	III	III		pulp hammers			
circular feed conveyors	I	II	III	shaker control	III	III		presses			
burner conveyors				cutting head control	III	III		suction rollers			
waste conveyors				sieve control	III	III		dryers			
plank conveyors	III	III	III*	conveyors	II	II		wood pulp storing machines			
transfer conveyors	I	II	III	pumps	II	II		barking drums	III	III	II*
devices:				cable winding drums	I	II		felt tension devices	I	II	II
for planer inclination	I	II	III	handling winches	II	II		PUMPS			
for ball turning	III	III	III*	service winches	II	II		reciprocating:			
barking machine, feeder	II	II	III	CONTROL (vehicle)	II	II		multi-cylinder single-acting	I	II	II
main drive system barking	III	III	III*	ELEVATORS				centrifugal			
machine				centrifugal unloading	I	I		dosing			
roller drive system	III	III	III*	gravity unloading	I	I		rotary:			
haulage of balls:				escalators	I	II		geared	I	I	II
inclined	III	III	III*	buckets:				lobed, vaned	I	I	II
well	III	III	III*	continuous load	I	I		SEWAGE PLANTS			
cross-cut saws:				heavy load	II	II		surface aerators	III	III	III
chain	II	II	III	uniform load	II	II		duck type aerators	III	III	III
reciprocating	II	II	III	material hoist	III	III		bar screens	I	I	III
sorting tables	I	II	III	WINDING MACHINES	-	-		screw pumps	I	I	III
ball support plates	III	III	III*	FILTERS	I	II		TEXTILES			
barking drums	III	III	III*	FURNACES	I	II		reelers (except drum)	I	I	II
peeling tower				dryers, coolers	I	II		calenders			
transfer:				tumbling barrels	III	III		padding calenders			
on bogies	I	II	III	CRANES AND LIFTING				carding machines, spinners			
chain	I	II	III	moving truck	-	-		alignment controls	-	-	
BREWERIES, DISTILLERIES				moving bridge	-	-		glueing machines			
boilers, continuous duty				bucket winches	-	-		drying machines, mangles	II	II	II
cookers, continuous duty				hoisting gear	-	-		napping mills			
brewing vats, continuous duty				WINDLASSES, CAPSTANS	II	II		washing machines			
bottling machines	I	I	II		I	I		soap milling machines			
scaling hoppers:				PRINTING (presses)				dyeing machines			
frequent starts	II	II	III	PACKAGING MACHINES				knitting machines			
GRINDERS				stackers	II	III		cloth finishing machines:			
minerals	III	III	III*	wrapping machines	I	I		washers, spreading machines			
stones	III	III	III*	WASHING MACHINES				dryers, calenders			
HAMMER MILLS	III	III	III*	drum	II	II		thread preparation machines:			
ROTARY GRINDERS				reversible	II	II		weaving looms	II	III	III
rod mills	III	III	III*	MACHINE TOOLS				spinning machines			
ball mills	III	III	III*	main drive system	I	II		dryers			
pebble mills	III	III	III*	auxiliary drive system	I	I		loading hoppers	II	II	II
RUBBER (industry)				punching machines (geared)	III	III		VENTILATION	-	-	-
air chamber extruder	II	II	II	flat planers	III	III					

* : 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

Cb, Ot, Mub, Mb, FFB

Electromechanical Manual

Selection methods

Radial load

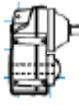
RADIAL FORCE ON THE INPUT SHAFT

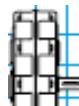
The input shaft of gearboxes driven by a motor other than by semi-elastic coupling is subject to a radial load.

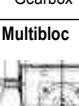
The following tables indicate the minimum diameter of the pulley to install (according to the type of transmission) at the centre of the gearbox input shaft at EP/2.

Drive diameter in millimetres

Gearbox	Size	Chain sprocket	Toothed pulley	Gear pinion	V-belt pulley	Flat pulley	Variable pulley
	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
	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
	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
	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 31¹	-	-	-	-	-	-

1. Mb 31: the input flange B14 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
	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:

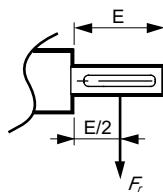
- bearing life,
- mechanical strength of the shaft and the other elements,
- configuration of the output shaft (with or without flange),
- distance between the shaft shoulder and point of application of this load,
- shaft rotation speed,
- shaft rotation direction,
- output torque, direction of this 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 and foot mounting form.

For the Manubloc range, the gearbox is designed to operate in pendular mounting; the output shaft is planned to withstand the weight of the geared motor assembly. For operation with radial load applied to the output shaft, please consult.

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.

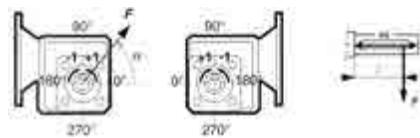


Worm and wheel gearboxes (Mb)

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--	$\frac{176}{126 + \ell}$	$\frac{55}{5 + \ell}$

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RADIAL FORCE ON THE OUTPUT SHAFT



Helical gearboxes (Cb, Ot)

Correction to be made for a different point of application:

$$\text{radial load: } F_r = F_{r'} \times \Psi$$

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

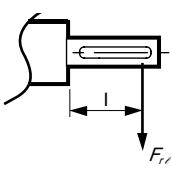
The bearings are designed for a radial load with a direction fixed with respect to the housing. Otherwise specify when ordering.

Radial load acceptable at a distance ℓ from the shoulder

ℓ mm	Size of Compabloc multistage gearbox									
	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 mm	Orthobloc gearbox size									
	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								

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



Worm and wheel gearboxes (Mb)

Radial load acceptable at a distance ℓ (mm), different from EB/2 of the shoulder: F_r

We calculate according to:

$$F_{rr} : \text{radial load acceptable at EB/2}$$

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:

$$F_{rrr} = K_{rr} \times K_r \times F_r (\text{bearing})$$

$$F_{rra} = K_{ra} \times F_r (\text{shaft})$$

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

When $K_r < 1$ we also have:

$$F_{rrr} = K_{rr} \times K_r \times F_r (\text{bearing})$$

$$F_{rra} = K_{ra} \times F_r / K_r (\text{shaft})$$

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 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--	$\frac{226}{180 + \ell}$	$\frac{109}{59 + \ell}$

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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.m	n_s (min^{-1})																									
	$n_s < 20$		$n_s < 30$		$n_s < 40$		$n_s < 50$		$n_s < 70$		$n_s < 100$		$n_s < 150$		$n_s < 200$		$n_s < 250$		$n_s < 300$							
	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						
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											
Mb 25	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															
	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							
Mb 26	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															
Mb 26	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																	
	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											
Mb 26	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 EB/2 (N)

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

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

n_s : output speed (min^{-1})

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

M_{uS} N.m	n_S (min^{-1})												
	$n_S < 20$		$n_S < 30$		$n_S < 40$		$n_S < 50$		$n_S < 70$		$n_S < 100$		
	F_R	K_R	F_R	K_R	F_R	K_R	F_R	K_R	F_R	K_R	F_R	K_R	
Mb 31	15	1900	1	1900	1	1900	1	1786	0.94	1583	0.83	1393	0.73
	30	1850	1	1850	1	1813	0.98	1666	0.90	1464	0.79	1274	0.69
	50	1750	1	1750	1	1653	0.94	1506	0.86	1305	0.75	1116	0.64
	70	1650	1	1650	1	1492	0.90	1346	0.82	1146	0.69	958	0.58
	85	1600	1	1578	0.99	1372	0.86	1226	0.77	1026	0.64	839	0.52
	100	1550	1	1458	0.94	1252	0.81	1106	0.71	907	0.58	720	0.46
Mb 22	30	1860	2.14	1860	1.86	1860	1.68	1860	1.55	1860	1.38	1860	1.21
	50	1790	2.15	1790	1.86	1790	1.67	1790	1.54	1790	1.36	1790	1.19
	70	1690	2.21	1690	1.90	1690	1.70	1690	1.56	1690	1.37	1690	1.19
	100	1450	2.45	1450	2.09	1450	1.86	1450	1.69	1450	1.47	1450	1.26
	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		
Mb 23	50	2930	1.69	2930	1.47	2930	1.33	2930	1.23	2930	1.09	2790	0.96
	70	2870	1.69	2870	1.46	2870	1.31	2870	1.21	2870	1.07	2690	0.94
	100	2760	1.70	2760	1.46	2760	1.31	2760	1.20	2760	1.06	2530	0.92
	150	2460	1.80	2460	1.53	2460	1.36	2460	1.24	2460	1.08	2270	0.92
	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		
Mb 24	70	4280	1.49	4280	1.29	4280	1.16	4280	1.08	4090	0.95	3600	0.84
	100	4230	1.47	4230	1.27	4230	1.15	4230	1.06	3950	0.93	3460	0.82
	150	4100	1.46	4100	1.26	4100	1.13	4100	1.03	3720	0.91	3230	0.79
	200	3900	1.47	3900	1.26	3900	1.12	3900	1.03	3490	0.89	3000	0.77
	250	3640	1.52	3460	1.29	3640	1.14	3640	1.04	3250	0.89	2770	0.76
	300	3290	1.61	3290	1.35	3290	1.19	3290	1.08	3020	0.92	2530	0.77
Mb 25	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
	200	8460	1.04	7600	0.90	6830	0.81	6280	0.74	5530	0.65	4820	0.57
	250	8330	1.03	7380	0.89	6610	0.79	6070	0.73	5310	0.64	4600	0.55
Mb 26	300	8160	1.03	7170	0.88	6400	0.78	5850	0.72	5100	0.62	4390	0.54
	350	7960	1.03	6950	0.87	6180	0.78	5630	0.71	4880	0.61	4170	0.52
	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		
Mb 26	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
	400	9620	0.92	8190	0.78	7300	0.70	6660	0.63	5780	0.55	4960	0.47
	500	9220	0.90	7790	0.76	6900	0.67	6260	0.61	5390	0.53	4570	0.45
	600	8810	0.89	7390	0.75	6500	0.66	5860	0.59	4990	0.51	4180	0.42
	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 EB/2 (N)

K_R : correction factor of the radial load acceptable for a distance different from EB/2

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

n_S : output speed (min^{-1})

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Axial load



GEAR GEARBOXES (Cb, Mub, Ot)

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

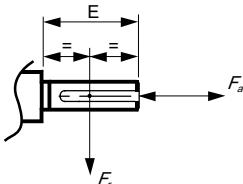
In the absence of radial load on the output shaft, the axial load acceptable at the output of the geared motor represents 50 % the radial load value given in the selection tables of the technical catalogues.

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.

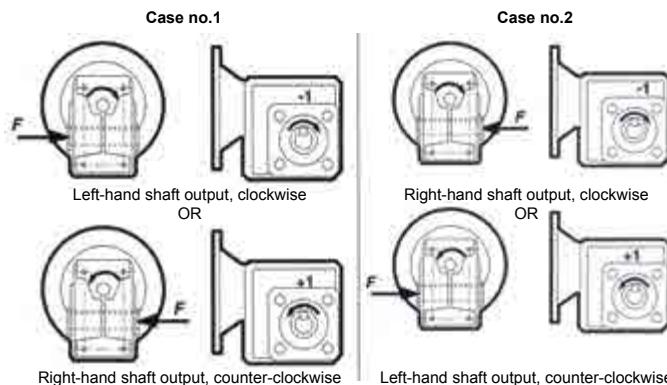
The rated load applicable along the axis of the output shaft is given in the following tables.

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.

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



CASE no.1

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 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 (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 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				

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CASE no.1

M_{bS} 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 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_{bS} 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 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_{bS} 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 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_{bS} 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 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_{bS} 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 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_{bS} 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 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					

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CASE no.1

M_{bS} 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 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_{bS} 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 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_{bS} 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 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_{bS} 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 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									

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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	31	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	-	-
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 $\eta \approx 3\%$ (reductions 5 to 10),
- 48 h for a gain of $\eta \approx 3$ to 7% (reductions 15 to 25),
- 48 h for a gain of $\eta \approx 10$ 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	
Orthobloc	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	
	Cb 3835	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	
Manubloc	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	
Poulibloc	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
Poulibloc	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 η_s** (or start-up efficiency): the values of η_s 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 $k = 1$.

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

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

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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 $n_{inv} < 0$), 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 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 is 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



- Helical gears:

The rated thermal power P_t is indicated for an ambient temperature of 20°C. It changes according to the input power, the gearbox size*, speed, operating position, etc.

*Particular case of Ot 39 in operating position other than on B3-B5: upon consultation.

The selections proposed by the configurator indicate if necessary for sizes 36 to 39 whether a 10kW exchanger is supplied optionally (§ Lubrication). See example of selection opposite.

The screenshot shows a software interface for selecting thermal power. The main window title is 'Lubrification / Thermique réducteur - V8.149'. The configuration parameters listed are:

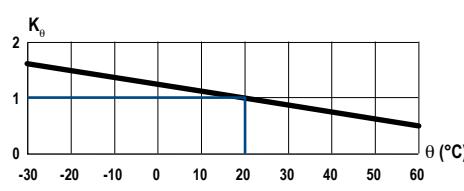
- Type moteur: IP13E5250ME 50kW 3800/4000/4150/480V-4800S
- Type réducteur: CB-BT11-i=45 - Montage universel
- Type de lubrifiant: Huile Minérale EP ISO VG 220
- Anti-dérapage A&I
- Sens de rotation arbre lent
- Système de refroidissement: Refroidissement externe nécessaire
- Exchangers 10kW fournis - Non fournis

 Below the configuration area are several navigation buttons: a left arrow, a right arrow, a circular arrow, and a double right arrow.



- 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 .



Rated thermal powers (P_t in kW at $\theta = 20^\circ\text{C}$)

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.56

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)	K _p	Cb / MI-MU	i	M (Nm)	F _R E/2 (N)	Dim. MI ↔ page	N _S (min ⁻¹)	K _p
1.5 kW - 50 Hz								
41.0	1.5	3633	34.5	330	30,310	141	2.61 kW - 87 Hz*	
47.2	1.55	3232	30.3	202	6,244	132	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, an output current limitation is indicated.

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

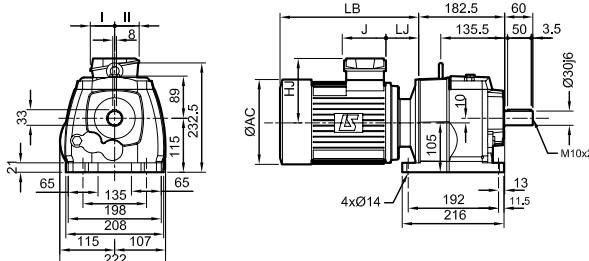
Or 39 in operating position other than on B3-B5: please consult.

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 ¹								kg
		AC	HJ	J	LB	LJ	I	II		
LS 71 L	FFB 1	140	130	160	299.5	25.5	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 L	-	-	-	-	-	-	-	-	-	
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 M	FFB 3	200	156	160	482.5	60	55	55	29.6	
LSES 112 MU	FFB 3	235	165	160	483.5	59	55	55	43.6	
LS 132 S	FFB 3	227	168	160	509	60.5	55	55	44.6	
LSES 132 SU	-	-	-	-	-	-	-	-	-	
LSES 132 SM	FFB 4	272	186	160	663	70	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).

¹except motor, brake motor in italics: not concerned by the IE

Cb, Ot, Mub, Mb, FFB

Electromechanical Manual

Current applications

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):

$$m = \frac{Q \times l}{3.6 \times V} = \dots \text{kg}$$

Calculation of the conveyor tilt angle:

$$\alpha = \sin^{-1} x \frac{h}{l} = \dots ^\circ$$

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 ($Mrd_{c/m}$):

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

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

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):

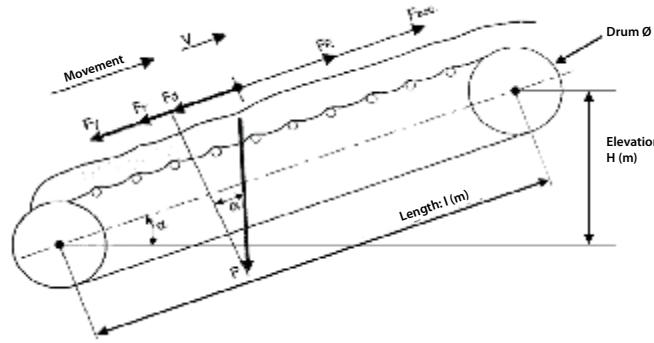
$$m = \frac{510 \times 55}{3.6 \times 1.65} = 4722 \text{ kg}$$

Calculation of the conveyor tilt angle:

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

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

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



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

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

Torque necessary to the motor:

$$Mn > Mr_{c/m} + Md_{c/m}$$

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

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

$$Mf > 1.2 \times Mdéc. > Mrd_{c/m} - Mr_{c/m}$$

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

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

2) Gearbox choice:

Gearbox output speed (rpm):

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

Determination of the duty factor:

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

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



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

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

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

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

Torque necessary to the motor:

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

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

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

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

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

$$J_{motor} = 0.2897 \text{ kg.m}^3 \quad Mn = 239 \text{ N.m} \quad Md = 777 \text{ N.m}$$

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

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

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

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

2) Gearbox choice:

Gearbox output speed (rpm):

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

Determination of the duty factor:

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

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

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 RKRDB3 MI-4PLSES 225 SR

37 kW IFT/IE3 + quarry finish

Catalogue duty factor: 2.73

Cb, Ot, Mub, Mb, FFB

Electromechanical Manual

Current applications

Hoisting

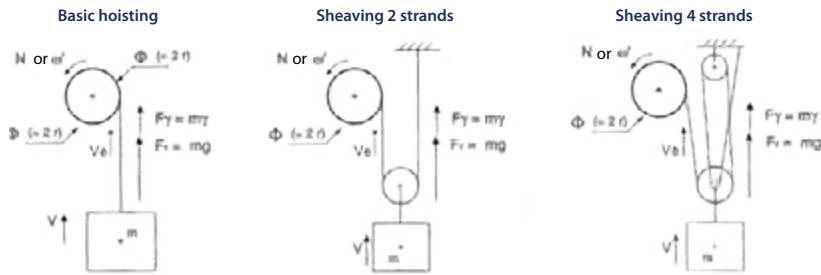
Whatever the number of strands, power and torque at the motor are identical. Only the rotation speed at the drum changes.

The drive speed (V_e) is:

$$V_e = V \times \text{number of strands}$$

i.e. $V_e = V \times 2$ for 2 strands and $V_e = V \times 4$ 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 ($M_{r_{c/m}}$):

$$M_{r_{c/m}} = \frac{Fr \times V}{\omega} \times \frac{1}{\eta} = \frac{m \times g \times V}{\omega \times \eta}$$

Resistive torque due to acceleration ($M_{y_{c/m}}$):

$$M_{y_{c/m}} = \frac{F_y \times V}{\omega} \times \frac{1}{\eta} \quad \text{i.e. } M_{y_{c/m}} = \frac{m \times \gamma \times V}{\omega \times \eta}$$

Deceleration torque in descent ($M_{dec.}$):

$$Mdéc. > M_{y_{motor}} + (M_{y_{c/m}} - M_{r_{c/m}}) \times \eta \times \eta_{inv}$$

Torque necessary to the motor:

$$Mn > M_{r_{c/m}}$$

$$Macc. > M_{y_{c/m}} + M_{y_{motor}} + M_{r_{c/m}}$$

$$Mdéc. > M_{y_{motor}} + (M_{y_{c/m}} - M_{r_{c/m}}) \times \eta \times \eta_{inv}$$

$$Mf > 1.2 \times Mdéc. > 1.6 \times Mn$$

Motor inertia acceleration torque ($M_{y_{motor}}$):

$$M_{y_{motor}} = J_{motor} \times \frac{\omega}{t\gamma} = \dots \text{N.m}$$

2) Gearbox choice:

Drum rotation speed:

$$N = \frac{60 \times V_e}{\pi \times \phi} = \dots \text{tr/min}$$

$$\omega' = \frac{V_e}{r} = \frac{2 \times V_e}{\phi} \dots \text{rad/s}$$



Determination of the duty factor:

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

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

Application example:

Operation: 16 h/d

Weight: 2000 kg loaded, 1000 kg at no load

Linear speed: 30 m/min

Drum: $\phi 200 \text{ mm}$

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 ($M_{r_{c/m}}$):

$$M_{r_{c/m}} = 2000 \times 9.81 \times \frac{0.5}{150} \times \frac{1}{0.9} = 72.66 \text{ N.m}$$

Resistive torque due to acceleration ($M_{y_{c/m}}$):

$$M_{y_{c/m}} = \frac{2000 \times 0.5 \times 0.5}{150 \times 0.9} = 3.70 \text{ N.m}$$

Deceleration torque in descent:

$$Mdéc. = M_{y_{motor}} + (3.70 + 72.66) \times 0.9 \times 0.9$$

$$Mdéc. = M_{y_{motor}} + 61.86 \text{ N.m}$$

Torque necessary to the motor:

$$Mn > 72.66 \text{ N.m}$$

$$Mdéc. > 61.86 \text{ N.m} + M_{y_{motor}}$$

$$Macc. > 76.36 \text{ N.m} + M_{y_{motor}} \quad Mf > 1.6 \times 72.66 > 116.26 \text{ N.m}$$

Motor choice (cat. ref.5329 or § Elec. char.):

4P LS 160 MP 11 kW FFB5, Mf 140 N.m

$$J_{motor} = 0.03336 \text{ kg.m}^2 \quad Mn = 72.3 \text{ N.m} \quad Md = 209.67 \text{ N.m}$$

Acceleration torque for the motor inertia ($M_{y_{motor}}$):

$$M_{y_{motor}} = 0.03336 \times \frac{150}{1} = 5 \text{ N.m}$$

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

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

Operating factor calculation:

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

Calculation of number of starts/h:

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

Starting frequency check:

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

$$J_m = 0.03336 \text{ kg.m}^2$$

$$Z_0 = Z \times \frac{J_{c/m} + J_m}{J_m} = 88 \times \frac{0.022 + 0.057}{0.03336} = 158 \text{ d/h}$$

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

2) Gearbox choice:

Gearbox output speed (rpm):

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

Determination of the duty factor:

$$J_{c/m} = 0.022 \text{ kg.m}^2 \quad J_m = 0.03336 \text{ kg.m}^2$$

$$FJ = \frac{J_{c/m}}{J_m} = \frac{0.022}{0.03336} = 0.66$$

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 140 N.m

Catalogue duty factor: 2.29

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

⚠ The load is driving in descent.

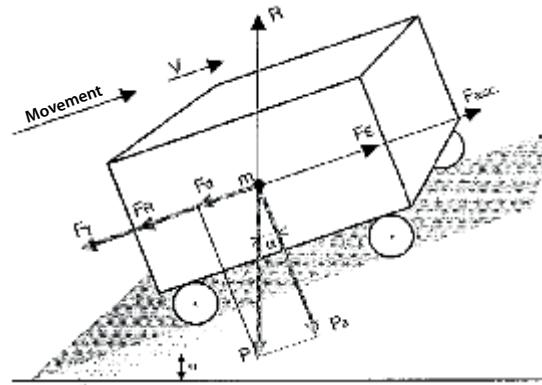
Displacement of a truck in a slope

The k_r 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:

$$\alpha = \sin^{-1} x \frac{h}{l} = \dots^\circ$$

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

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

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

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

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

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

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 ($M_{r_{c/m}}$):

$$M_{r_{c/m}} = \frac{1000 \times 9.81 \times 0.01 \times \cos 10^\circ \times 0.5}{150 \times 0.9} = 0.36 \text{ N.m}$$

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

$$M_{rd_{c/m}} = \frac{1000 \times 9.81 \times \sin 10^\circ \times 0.5}{150 \times 0.9} = 6.31 \text{ N.m}$$

Resistive torque due to acceleration ($M_{y_{c/m}}$):

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

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

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

Resistive torque due to acceleration ($M_{y_{c/m}}$):

$$M_{y_{c/m}} = \frac{F_y \times V}{\omega} \times \frac{1}{\eta} \text{ i.e. } M_{y_{c/m}} = \frac{m \times \gamma \times V}{\omega \times \eta}$$

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

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

Torque necessary to the motor:

$$M_n > M_{r_{c/m}} + M_{rd_{c/m}}$$

$$M_{acc.} > M_{y_{c/m}} + M_{\mu_{motor}} + M_{r_{c/m}} + M_{rd_{c/m}}$$

$$M_{dec.} > M_{\mu_{motor}} + (M_{y_{c/m}} - M_{r_{c/m}} - M_{rd_{c/m}}) \times \eta \times \eta_{inv}$$

$$M_f > 1.2 \times M_{dec.}$$

$$M_p > M_n + M_{acc.}$$

Acceleration torque for the motor inertia ($M_{y_{motor}}$):

$$M_{y_{motor}} = J_{motor} \times \frac{\omega}{t\gamma} = \dots \text{ N.m}$$

2) Gearbox choice:

Gearbox output speed (rpm):

$$N_s = \frac{V}{\pi \times D} \times 60 = \dots \text{ tr/min}$$

Determination of the duty factor:

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

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



Torque necessary to the motor:

$$M_n > 6.67 \text{ N.m}$$

$$M_{acc.} > 7.6 \text{ N.m} + M_{\mu_{motor}}$$

$$M_{dec.} > 5.58 \text{ N.m} + M_{\mu_{motor}}$$

$$M_f > 6.69 \text{ N.m}$$

⚠ 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:

$$M_n > 6.67 / 0.9 = 7.41 \text{ N.m}$$

$$M_{acc.} > 7.6 / 0.9 \text{ N.m} + M_{\mu_{motor}} = 8.44 \text{ N.m} + M_{\mu_{motor}}$$

$$M_{dec.} > 5.58 / 0.9 \text{ N.m} + M_{\mu_{motor}} = 6.2 \text{ N.m} + M_{\mu_{motor}}$$

$$M_f > 1.2 \times (7.41 + M_{\mu_{motor}})$$

Motor choice (cat. ref. 5329 or § Elec. char.):

4P LS 90 1.5 kW FFB, Mf 19 N.m

$$J_{motor} = 0.00421 \text{ kg.m}^2 \quad M_n = 10 \text{ N.m} \quad M_f = 19 \text{ N.m}$$

Motor inertia acceleration torque ($M_{y_{motor}}$):

$$M_{y_{motor}} = 0.00421 \times \frac{150}{2} = 0.32 \text{ N.m}$$

$$M_n = 10 \text{ N.m} > 7.41 \text{ N.m}$$

$$M_{acc.} = 19 \text{ N.m} > 8.44 \text{ N.m} + 0.32 \text{ N.m}$$

Starting frequency check:

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

$$J_m = 0.00421 \text{ kg.m}^2$$

$$Z_o = Z \times \frac{J_{c/m} + J_m}{J_m} = 200 \times \frac{0.01 + 0.00421}{0.00421} = 476 \text{ d/h}$$

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

2) Gearbox choice:

Gearbox output speed (rpm):

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

Determination of the duty factor:

$$J_{c/m} = 0.01 \text{ kg.m}^2 \quad J_m = 0.00421 \text{ kg.m}^2$$

$$FJ = \frac{J_{c/m}}{J_m} = \frac{0.01}{0.00421} = 2.38$$

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 B7 MI - 4P LS 90 L 1.5 kW

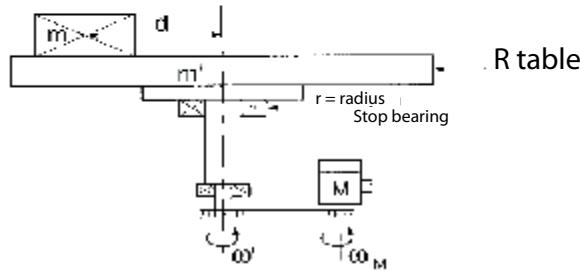
IFT/NIE FFB 19 N.m.

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 ($M\gamma_{c/m}$):

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

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

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

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

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:

$$Mn > Mr_{c/m}$$

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

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

$$Mf > 1.2 \times Mdéc.$$

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

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

2) Gearbox choice:

Gearbox output speed (rpm):

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

Determination of the duty factor:

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

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



Torque necessary to the motor:

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

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

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

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

Motor choice (cat. ref. 5329 or § Elec. char.):

4P LS 71 0.25 kW FFB, Mf 4.5 N.m

$$J_{motor} = 0.00094 \text{ kg.m}^2 \quad Mn = 1.68 \text{ N.m} \quad Md = 4.6 \text{ N.m}$$

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

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

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

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

Starting frequency check:

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

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

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

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:

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

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

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 4.5 N.m.

Catalogue duty factor: 2.28

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	$\cos \phi$				
Réactance Résistance	Reactance Resistance	X R		Ω (ohm)		j is defined as $j^2 = -1$ ω pulse = $2 \pi \cdot f$
Impédance	Impedance	Z				
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		$\Omega \cdot m$		Ω/m
Conductance	Conductance	G		S (siemens)		$1/\Omega = 1 S$
Nombre de tours, (spires) de l'enroulement	N° of turns (coil)	N				
Nombre de phases	N° of phases	m				
Nombre de paires de pôles	N° of pairs of poles	p				
Champ magnétique	Magnetic field	H		A/m		
Différence de potentiel magnétique Force magnétomotrice Solenation, courant totalisé	Magnetic potential difference Magnetomotive force	Um F, F_m 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	$\mu = \mu_0 \mu_r$ μ_0		H/m		
Permittivité	Permittivity	$\epsilon = \epsilon_0 \epsilon_r$		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 , $^{\circ}\text{C}$ $T = t + 273.15$	$^{\circ}\text{C}$: Degree Celsius t_{C} : temp. in $^{\circ}\text{C}$ t_{F} : temp. in $^{\circ}\text{F}$ f temperature Fahrenheit $^{\circ}\text{F}$
Écart de température	Temperature rise	ΔT		K	$^{\circ}\text{C}$	$1^{\circ}\text{C} = 1 \text{ K}$
Densité de flux thermique	Heat flux density	q, φ		W/m^2		
Conductivité thermique	Thermal conductivity	λ		$\text{W}/\text{m.K}$		
Coefficient de transmission thermique global	Total heat transmission coefficient	K		$\text{W}/\text{m}^2.\text{K}$		
Capacité thermique	Heat capacity	C		J/K		
Capacité thermique massique	Specific heat capacity	c		$\text{J}/\text{kg.K}$		
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	$L_w = 10 \lg(P/P_o)$ ($P_o = 10^{-12} \text{ W}$)	dB (décibel)		\lg logarithme à base 10 $\lg 10 = 1$
Niveau de pression acoustique	Sound pressure level	L_p	$L_p = 20 \lg(P/P_o)$ ($P_o = 2 \times 10^{-5} \text{ Pa}$)	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)	$\alpha, \beta, \gamma, \varphi$		rad	degré : $^{\circ}$ minute : ' seconde : ''	$180^{\circ} = \pi \text{ rad}$ $= 3,14 \text{ rad}$
Longueur Largeur Hauteur Rayon Longueur curviligne	Length Breadth Height Radius Curved length	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		m^2		1 square inch = 6.45 10^{-4} m^2
Volume	Volume	V		m^3	litre : l liter: L	UK gallon = 4.546 10^{-3} m^3 US gallon = 3.785 10^{-3} m^3

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	Speed	$u, v, w,$	$v = \frac{ds}{dt}$	m/s	1 km/h = 0.277 778 m/s	
Célérité	Velocity	c			1 m/min = 0.016 6 m/s	
Accélération	Acceleration	a	$a = \frac{dv}{dt}$	m/s ²		
Accélération de la pesanteur	Acceleration of free fall	$g = 9.81m/s^2$	in Paris			
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		$J = \frac{MD^2}{4}$ 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 = coefficient 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	$W = F.l$		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	qv	$qv = \frac{dV}{dt}$	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

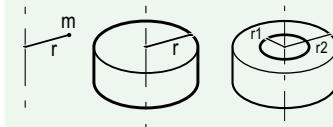
Units of measurement and standard formulae

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

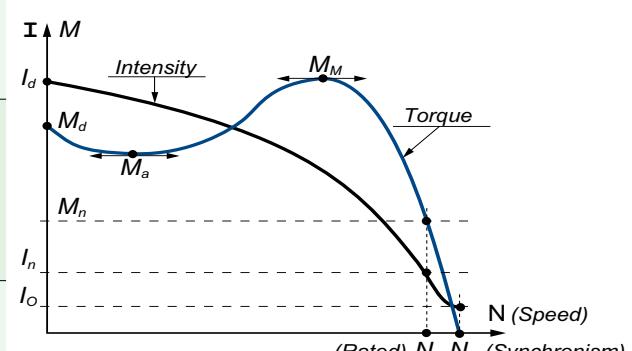
Mechanical formulae

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 $g = 9.81 \text{ m/s}^2$	
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		$J = m \cdot r^2$		
Cylinder solid around its axis		$J = m \cdot \frac{r^2}{2}$	J in kg.m^2 m in kg r in m	
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.

Units of measurement and standard formulae

Electrical formulae

Titles	Formulae	Units	Definitions / Notes
Accelerating torque	$M_{acc} = \frac{M_d + 2M_a + 2M_M + M_n}{6} - M_r$ <p>General formula:</p> $M_{acc} = \frac{1}{N_n} \int_0^{N_n} (M_{mot} - M_r) dN$	Nm	<p>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)</p> <p>N = instantaneous speed</p> <p>N_n = rated speed</p>
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)	$P = \sqrt{3} \cdot U \cdot I \cdot \cos j \cdot \eta$		η expresses motor efficiency at the point of operation under consideration.
Slip	$g = \frac{N_S - N}{N_S}$		Slip is the difference between the actual motor speed N and the synchronous speed N_S
Synchronous speed	$N_S = \frac{120 \cdot f}{p}$	N_S in min^{-1} 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	min^{-1}	

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

Units of measurement and standard formulae

Tolerances of electromechanical characteristics

IEC 60034-1 specifies standard tolerances for electromechanical characteristics.

Parameters	Tolerances
Efficiency { machines P ≤ 150 kW machines P > 150 kW	- 15 % of $(1 - \eta)$ - 10 % of $(1 - \eta)$
Cos φ	- 1/6 $(1 - \cos \varphi)$ (min 0.02 - max 0.07)
Slip { machines P < 1 kW machines P ≥ 1 kW	±30 % ±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

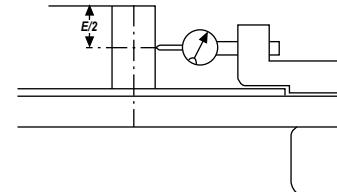
Note: IEC 60034-1 - does not specify tolerances for current

- the tolerance is ± 10% in NEMA-MG1

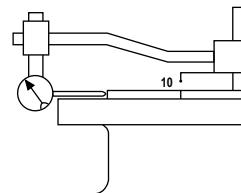
Tolerances and adjustments

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.

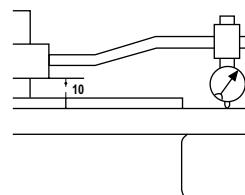
Characteristics	Tolerances
Frame size H ≤ 250 ≥ 280	0, — 0.5 mm 0, — 1 mm
Diameter Ø of the shaft extension: - 11 to 28 mm - 32 to 48 mm - 55 mm and over	j6 k6 m6
Diameter N of flange spigots	j6 up to FF 500, js6 for FF 600 and more
Key width	h9
Width of drive shaft keyway (normal keying)	N9
Key depth: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

Units of measurement and standard formulae

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

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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			
	P _n kW	M _n N.m	M _d /M _n	M _m /M _n	I _d /I _n	J kg.m ²	IM B3 kg	LP db(A)	N _n min ⁻¹	I _n A	Efficiency IEC 60034-2-1 2007	Power factor
4 poles												
LSES 80 LG	0.75	5	1.9	2.8	5.9	0.00265	11.6	47	1445	1.7	80.9	81.5
LSES 80 LG	0.9	6	1.9	2.5	6.3	0.00316	14.1	47	1435	1.95	80.5	81.5
LSES 90 SL	1.1	7.3	1.9	2.7	6.1	0.00336	13.9	47	1440	2.35	82.1	83.8
LSES 90 L	1.5	10	2.3	2.9	6.3	0.00418	16.2	47	1440	3.15	83.5	85.1
LSES 90 LU	1.8	11.9	2.6	2.3	6.6	0.0045	20.4	47	1440	3.8	83.9	84.4
LSES 100 L	2.2	14.6	2.5	3.1	6.8	0.00567	22.6	49	1440	4.5	85.0	86.3
LSES 100 LR	3	19.9	2.8	3.2	6.7	0.00677	25.8	54	1440	6.25	85.8	87.1
LSES 112 MU	4	26.4	2.2	3.0	6.2	0.01312	34.4	55	1445	7.9	87.2	88.9
LSES 132 SU	5.5	36.1	2.7	3.1	7.1	0.01611	42.1	55	1454	11.2	88.5	89.5
LSES 132 M	7.5	49.3	2.6	3.4	7.5	0.02286	52.1	60	1452	14.4	89.4	90.5
LSES 132 M	9	58.9	2.8	3.6	8.0	0.02722	59.1	63	1458	17.1	90.0	91.0
LSES 160 MR	11	71.9	3.1	3.7	8.4	0.03574	78	61	1460	20.9	90.6	91.5
LSES 160 L	15	97.8	2.5	3.1	8.1	0.0712	90	60	1464	28.2	91.2	92.1
LSES 180 MT	18.5	121	2.1	3.2	8.2	0.0844	100	58	1464	35.2	91.4	92.3
LSES 180 LR	22	143	2.6	3.4	8.6	0.0956	108	60	1466	41	91.9	92.7
LSES 200 LR	30	196	2.0	2.6	7.8	0.1563	166	64	1464	56.3	92.4	93.3
LSES 225 ST	37	240	2.7	2.7	6.3	0.2294	205	64	1472	70.2	92.9	93.7
LSES 225 MR	45	292	2.3	2.4	6.9	0.2885	230	70	1472	83.8	93.4	94.1
LSES 250 ME	55	354	2.3	2.7	7.3	0.7793	350	69	1484	101	94.7	95.1
LSES 280 SD	75	482	2.5	3.2	8.2	0.9595	428	69	1486	138	94.5	94.7
LSES 280 MD	90	579	2.6	3.5	8.3	1.0799	470	68	1484	169	94.7	94.9
LSES 315 SP	110	706	3.1	2.9	7.6	2.4322	690	76	1488	200	94.8	94.8

LSES IMfinity® IFT/IE2 - Powered by drive - 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 min ⁻¹	I _n A	Cos φ 4/4						P _n kW	N _n min ⁻¹	I _n A	Cos φ 4/4	
4 poles														
LSES 80 LG	0.75	1425	1.75	0.78	90 %	100 %	100 %	100 %	57 %	1.31	2535	3.05	0.78	3000
LSES 80 LG	0.9	1400	1.95	0.82	90 %	100 %	100 %	100 %	57 %	1.57	2510	3.64	0.82	3000
LSES 90 SL	1.1	1415	2.5	0.82	90 %	100 %	100 %	100 %	57 %	1.91	2525	4.32	0.82	3000
LSES 90 L	1.5	1415	3.3	0.82	90 %	100 %	100 %	100 %	57 %	2.61	2525	5.76	0.82	3000
LSES 90 LU	1.8	1435	3.8	0.81	90 %	100 %	100 %	100 %	57 %	3.13	2545	6.86	0.81	3000
LSES 100 L	2.2	1420	4.8	0.83	90 %	100 %	100 %	100 %	57 %	3.83	2530	8.3	0.83	3000
LSES 100 LR	3	1415	6.5	0.81	90 %	100 %	100 %	100 %	57 %	5.22	2525	11.34	0.81	3000
LSES 112 MU	4	1420	8.5	0.84	90 %	100 %	100 %	100 %	57 %	6.96	2530	14.81	0.84	3000
LSES 132 SU	5.5	1435	11.5	0.80	90 %	90 %	100 %	100 %	57 %	9.57	2545	19.98	0.80	3000
LSES 132 M	7.5	1435	15.1	0.84	90 %	90 %	100 %	100 %	57 %	13.05	2545	26.24	0.84	3000
LSES 132 M	9	1440	17.8	0.84	90 %	90 %	100 %	100 %	57 %	15.66	2550	30.98	0.84	3000
LSES 160 MR	11	1445	21.9	0.84	85 %	95 %	100 %	100 %	57 %	19.14	2555	38.09	0.84	3000
LSES 160 L	15	1452	29.9	0.84	85 %	95 %	100 %	100 %	57 %	26.1	2562	51.97	0.84	3000
LSES 180 MT	18	1452	36.4	0.83	80 %	90 %	100 %	100 %	57 %	32.19	2562	63.32	0.83	3000
LSES 180 LR	22	1454	42.4	0.84	80 %	90 %	100 %	100 %	57 %	38.28	2564	73.81	0.84	3000
LSES 200 LR	28	1450	55.7	0.83	80 %	89 %	94 %	94 %	54 %	48.96	2560	97.03	0.83	3000
LSES 225 ST	37	1460	73.5	0.82	85 %	95 %	100 %	100 %	57 %	64.38	2570	127.99	0.82	3000
LSES 225 MR	45	1460	88.8	0.83	85 %	95 %	100 %	100 %	57 %	78.3	2570	154.57	0.83	3000
LSES 250 ME	55	1480	108	0.83	85 %	95 %	100 %	100 %	57 %	95.7	2590	187.92	0.83	3000
LSES 280 SD	75	1480	146	0.83	85 %	95 %	100 %	100 %	57 %	130.5	2590	253.95	0.83	3000
LSES 280 MD	90	1480	176	0.81	85 %	95 %	100 %	100 %	57 %	156.6	2590	306.43	0.81	3000
LSES 315 SP	110	1482	211	0.84	80 %	90 %	100 %	100 %	57 %	191.4	2592	367.38	0.84	2700

(1) speed limitation in drive system with gearbox.

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Fixed speed

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

Type	Rated power	380V 50Hz				415V 50Hz				460V 60Hz			
		Rated speed N_n min $^{-1}$	Rated current I_n A	Efficiency η 4/4	Power factor $\cos \varphi$ 4/4	Rated speed N_n min $^{-1}$	Rated current I_n A	Efficiency η 4/4	Power factor $\cos \varphi$ 4/4	Rated speed N_n min $^{-1}$	Rated current I_n A	Efficiency η 4/4	Power factor $\cos \varphi$ 4/4
4 poles													
LSES 80 LG	0.75	1435	1.75	79.7	0.82	1450	1.7	80.77	0.76	1754	1.5	82.9	0.75
LSES 80 LG	0.9	1430	2.05	80.3	0.84	1440	1.95	80.70	0.80	1750	1.75	82.5	0.79
LSES 90 SL	1.1	1430	2.45	81.4	0.84	1445	2.35	82.53	0.80	1750	2.05	84.9	0.79
LSES 90 L	1.5	1430	3.25	82.8	0.85	1445	3.1	84.09	0.80	1752	2.75	86.2	0.79
LSES 90 LU	1.8	1435	3.95	82.8	0.84	1445	3.75	84.10	0.79	1756	3.3	86.8	0.79
LSES 100 L	2.2	1435	4.65	84.3	0.85	1450	4.45	85.56	0.81	1754	3.95	87.5	0.80
LSES 100 LR	3	1430	6.35	85.5	0.84	1445	6.2	86.07	0.78	1752	5.45	87.9	0.78
LSES 112 MU	4	1435	8.3	86.6	0.85	1450	7.75	87.74	0.82	1756	6.8	89.7	0.82
LSES 132 SU	5.5	1445	11.4	87.9	0.83	1458	11.2	88.62	0.77	1762	9.75	90.5	0.78
LSES 132 M	7.5	1445	14.8	88.7	0.86	1458	14.3	89.66	0.81	1762	12.6	91.1	0.82
LSES 132 M	9	1450	17.7	89.4	0.87	1460	16.9	90.30	0.82	1764	15	91.6	0.83
LSES 160 MR	11	1452	21.5	89.9	0.87	1462	20.6	90.82	0.82	1766	18.3	91.7	0.83
LSES 160 L	15	1460	29.1	90.6	0.86	1468	27.8	91.50	0.82	1772	24.6	92.8	0.83
LSES 180 MT	18.5	1460	36	91.2	0.86	1468	34.9	91.59	0.81	1770	30.5	93.0	0.82
LSES 180 LR	22	1460	42	91.6	0.87	1468	40.8	91.92	0.81	1772	35.6	93.2	0.83
LSES 200 LR	30	1458	57.9	92.3	0.85	1468	55.6	92.72	0.81	1772	48.9	93.7	0.82
LSES 225 ST	37	1472	72.2	92.7	0.84	1478	65.3	93.00	0.80	1782	60.8	94.1	0.81
LSES 225 MR	45	1466	86.2	93.1	0.85	1474	78.4	93.57	0.81	1776	72.5	94.4	0.82
LSES 250 ME	55	1482	105	94.3	0.84	1486	98.5	94.93	0.82	1786	88	95.2	0.82
LSES 280 SD	75	1484	143	94.1	0.85	1486	135	94.64	0.81	1786	121	94.9	0.82
LSES 280 MD	90	1482	174	94.5	0.83	1488	167	94.70	0.79	1788	149	95.1	0.80
LSES 315 SP	110	1486	207	94.6	0.85	1488	194	95.03	0.82	1790	177	94.5	0.83

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

Summaries of recommended protections

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

RIS: Reinforced Insulation System.

The filter is recommended above frame size 315.

Standard insulation = 1500 V peak and 3500 V/ μ s.

Protection solutions exist (insulation for winding and bearings).

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



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

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

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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			
	P _n kW	M _n N.m	M _d /M _n	M _m /M _n	I _d /I _n	J kg.m ²	IM B3 kg	LP db(A)	N _n min ⁻¹	I _n A	Efficiency IEC 60034-2-1 2007	Power factor
4 poles												
LSES 80 LG	0.75	4.95	2.2	2.9	6.2	0.00335	13.6	48	1450	1.65	83.2	83.9
LSES 80 LG	0.9	5.9	2.6	3.1	6.4	0.00381	14.1	48	1450	1.9	83.5	84.2
LSES 90 SL	1.1	7.25	2.4	3.2	6.9	0.00418	16.2	45	1450	2.3	84.8	85.7
LSES 90 LU	1.5	9.85	2.9	3.7	7.7	0.00524	20.4	51	1452	3.2	85.6	86.2
LSES 100 L	1.8	11.8	2.4	2.7	6.6	0.00561	22.6	48	1452	3.7	86.0	86.5
LSES 100 LR	2.2	14.4	3.2	3.8	8.1	0.00676	25.8	47	1454	4.6	87.1	87.7
LSES 100 LG	3	19.6	2.5	3.3	7.2	0.01152	31	55	1460	6.05	88.3	89.1
LSES 112 MU	4	26.2	2.7	3.1	7.1	0.01429	37	53	1458	8.1	88.8	89.6
LSES 132 SM	5.5	35.9	2.8	3.6	8.6	0.02286	52	59	1462	10.3	90.3	91.1
LSES 132 MU	7.5	49.1	3.0	3.4	8.0	0.02965	62.6	61	1458	14	90.6	91.7
LSES 160 MR	9	58.7	3.1	3.7	8.9	0.03574	77.8	62	1464	16.7	91.2	92.0
LSES 160 M	11	71.7	2.3	3.1	7.3	0.0712	93	59	1466	20.5	91.6	92.6
LSES 160 LUR	15	97.6	2.6	3.5	8.4	0.0954	100	58	1468	27.7	92.3	93.1
LSES 180 M	18.5	120	3.0	2.9	7.8	0.2075	130	68	1468	33.7	92.9	93.7
LSES 180 LUR	22	143	3.3	3.2	8.2	0.1555	155	68	1470	40.9	93.2	93.7
LSES 200 LU	30	194	3.0	2.8	7.3	0.2704	225	63	1476	55.1	93.8	94.3
LSES 225 SR	37	239	3.3	3.2	8.0	0.2897	236	63	1480	69.8	94.2	94.5
LSES 225 MG	45	290	2.3	2.9	7.3	0.6573	318	70	1484	83	94.6	94.9
LSES 250 ME	55	354	2.3	2.7	7.3	0.7793	350	69	1484	101	94.9	95.3
LSES 280 SD	75	482	2.5	3.2	8.2	0.9595	428	69	1486	137	95.2	95.4
LSES 280 MD	90	579	2.6	3.5	8.5	1.0799	470	68	1484	166	95.5	95.7
LSES 315 SP	110	706	3.1	2.9	7.7	2.4322	690	76	1488	198	95.6	95.6

LSES IMfinity® IFT/IE3 - Powered by drive - 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 min ⁻¹	I _n A	Cos φ 4/4						P _n kW	N _n min ⁻¹	I _n A	Cos φ 4/4	
4 poles														
LSES 80 LG	0.75	1430	1.7	0.80	90 %	100 %	100 %	100 %	57 %	1.31	2540	2.96	0.80	3000
LSES 80 LG	0.9	1440	2.45	0.80	90 %	100 %	100 %	100 %	57 %	1.55	2550	3.47	0.80	3000
LSES 90 SL	1.1	1430	2.3	0.81	90 %	100 %	100 %	100 %	57 %	1.91	2540	4.23	0.81	3000
LSES 90 LU	1.5	1440	3.3	0.79	90 %	100 %	100 %	100 %	57 %	2.61	2550	5.76	0.79	3000
LSES 100 L	1.8	1440	3.9	0.82	90 %	100 %	100 %	100 %	57 %	3.13	2550	6.77	0.82	3000
LSES 100 LR	2.2	1435	4.8	0.79	90 %	100 %	100 %	100 %	57 %	3.83	2545	8.3	0.79	3000
LSES 100 LG	3	1445	6.4	0.81	90 %	100 %	100 %	100 %	57 %	5.22	2555	11.09	0.81	3000
LSES 112 MU	4	1440	8.4	0.80	90 %	100 %	100 %	100 %	57 %	6.96	2550	14.56	0.80	3000
LSES 132 SM	5.5	1450	11	0.85	90 %	90 %	100 %	100 %	57 %	9.57	2560	19.13	0.85	3000
LSES 132 MU	7.5	1440	14.9	0.86	90 %	90 %	100 %	100 %	57 %	13.05	2550	25.9	0.86	3000
LSES 160 MR	9	1452	17.8	0.85	90 %	90 %	100 %	100 %	57 %	15.66	2562	30.98	0.85	3000
LSES 160 M	11	1454	21.6	0.85	85 %	95 %	100 %	100 %	57 %	19.14	2564	37.58	0.85	3000
LSES 160 LUR	15	1456	29.2	0.85	85 %	95 %	100 %	100 %	57 %	26.1	2566	50.79	0.85	3000
LSES 180 M	18.5	1460	36.3	0.85	80 %	90 %	100 %	100 %	57 %	32.19	2570	63.15	0.85	3000
LSES 180 LUR	22	1458	43.6	0.83	80 %	90 %	100 %	100 %	57 %	38.28	2568	75.85	0.83	3000
LSES 200 LU	30	1468	59.2	0.84	85 %	95 %	100 %	100 %	57 %	52.2	2578	102.93	0.84	3000
LSES 225 SR	37	1474	73	0.81	85 %	95 %	100 %	100 %	57 %	64.38	2584	126.97	0.81	3000
LSES 225 MG	45	1478	87.8	0.83	85 %	95 %	100 %	100 %	57 %	78.3	2588	152.88	0.83	3000
LSES 250 ME	55	1480	108	0.83	85 %	95 %	100 %	100 %	57 %	95.7	2590	187.92	0.83	3000
LSES 280 SD	75	1480	146	0.83	85 %	95 %	100 %	100 %	57 %	130.5	2590	253.95	0.83	3000
LSES 280 MD	90	1480	176	0.82	85 %	95 %	100 %	100 %	57 %	156.6	2590	306.43	0.82	3000
LSES 315 SP	110	1482	211	0.84	80 %	90 %	100 %	100 %	57 %	191.4	2592	367.38	0.84	2700

(1) speed limitation in drive system with gearbox.

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

Type	Rated power	380V 50Hz				415V 50Hz				460V 60Hz			
		Rated speed N_n min $^{-1}$	Rated current I_n A	Efficiency η 4/4	Power factor $\cos \varphi$ 4/4	Rated speed N_n min $^{-1}$	Rated current I_n A	Efficiency η 4/4	Power factor $\cos \varphi$ 4/4	Rated speed N_n min $^{-1}$	Rated current I_n A	Efficiency η 4/4	Power factor $\cos \varphi$ 4/4
4 poles													
LSES 80 LG	0.75	1440	1.65	82.6	0.82	1452	1.6	83.29	0.78	1758	1.45	85.1	0.76
LSES 80 LG	0.9	1440	2	83.0	0.82	1452	1.8	83.60	0.78	1758	1.7	85.6	0.76
LSES 90 SL	1.1	1445	2.35	84.1	0.83	1454	2.3	85.42	0.79	1760	2.05	86.6	0.78
LSES 90 LU	1.5	1445	3.25	85.3	0.82	1456	3.2	85.75	0.77	1760	2.8	87.3	0.76
LSES 100 L	1.8	1445	3.9	85.4	0.83	1454	3.9	86.20	0.79	1760	3.3	87.0	0.78
LSES 100 LR	2.2	1445	4.7	86.7	0.82	1456	4.6	87.27	0.77	1760	4.15	88.4	0.76
LSES 100 LG	3	1452	6.2	87.7	0.84	1462	6.05	88.36	0.78	1766	5.35	90.0	0.79
LSES 112 MU	4	1450	8.3	88.6	0.83	1462	8.05	88.88	0.78	1764	7.1	90.2	0.79
LSES 132 SM	5.5	1456	10.7	89.6	0.87	1466	10.2	90.43	0.83	1768	9.05	91.7	0.83
LSES 132 MU	7.5	1450	14.5	90.4	0.87	1462	13.6	90.90	0.85	1766	12.1	92.0	0.84
LSES 160 MR	9	1458	17.4	90.9	0.86	1466	16.5	91.50	0.83	1768	14.7	92.4	0.83
LSES 160 M	11	1462	21.1	91.4	0.86	1470	19.8	91.91	0.84	1774	17.8	92.7	0.84
LSES 160 LUR	15	1464	28.7	92.1	0.86	1472	26.8	92.55	0.84	1774	24.2	93.3	0.83
LSES 180 M	18.5	1466	35.3	92.6	0.86	1474	33.1	93.16	0.84	1774	29.5	93.8	0.84
LSES 180 LUR	22	1466	42.4	93.0	0.85	1474	40.3	93.41	0.81	1770	36.4	93.8	0.81
LSES 200 LU	30	1472	56.8	93.6	0.85	1478	53.9	94.10	0.82	1778	48.1	94.5	0.83
LSES 225 SR	37	1476	71.7	93.9	0.83	1482	69.5	94.30	0.79	1782	61.2	94.5	0.80
LSES 225 MG	45	1480	86.2	94.3	0.85	1486	80.7	94.94	0.82	1786	72.3	95.0	0.82
LSES 250 ME	55	1482	105	94.6	0.84	1486	98.3	95.13	0.82	1786	87.9	95.4	0.82
LSES 280 SD	75,	1484	142	95.0	0.85	1486	134	95.34	0.81	1786	120	95.6	0.82
LSES 280 MD	90	1482	170	95.3	0.84	1488	164	95.50	0.80	1788	148	95.7	0.80
LSES 315 SP	110	1486	206	95.4	0.85	1488	193	95.83	0.82	1790	176	95.8	0.82

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

Summaries of recommended protections

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

RIS: Reinforced Insulation System.

The filter is recommended above frame size 315.

Standard insulation = 1500 V peak and 3500 V/ μ s.

Protection solutions exist (insulation for winding and bearings).

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



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

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

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LS IMfinity® IFT/NIE brake FFB

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 - 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 kg
		P _n kW	M _n N.m	M _d /M _n	M _m /M _n	I _d /I _n	J kg.m ²	M _a N.m	M _f N.m	N _n min ⁻¹	Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor
<i>LS 71 M</i>	FFB1	0.25	1.68	2.73	2.93	4.63	0.00094	4.60	4.5	1425	0.80	67.0	0.65	9.4
<i>LS 71 M</i>	FFB1	0.37	2.49	2.41	2.81	4.91	0.00111	6.00	4.5	1420	1.06	70.0	0.70	10.3
<i>LS 71 L</i>	FFB1	0.55	3.75	2.32	2.53	4.81	0.00136	8.75	6	1400	1.62	68.0	0.70	11.3
<i>LS 80 L</i>	FFB1	0.55	3.75	2.15	2.30	3.90	0.00154	7.88	12	1405	1.70	66.9	0.71	11.5
<i>LS 80 L</i>	FFB1	0.75	5.1	1.80	2.15	4.25	0.00190	7.40	12	1400	2.05	69.3	0.77	13.5
<i>LS 80 L</i>	FFB1	0.9	6.05	3.10	3.10	5.55	0.00266	17	12	1425	2.45	73.0	0.73	13.9
<i>LS 90 SL</i>	FFB2	1.1	7.35	1.50	2.15	4.50	0.00349	11	19	1425	2.50	76.1	0.84	18.2
<i>LS 90 L</i>	FFB2	1.5	10	1.90	2.40	5.25	0.00421	19	19	1430	3.30	79.2	0.83	20.0
<i>LS 90 L</i>	FFB2	1.8	12	2.00	2.55	5.60	0.00464	24	26	1435	3.95	79.9	0.82	21.0
<i>LS 100 L</i>	FFB2	2.2	14.6	2.30	2.70	5.70	0.00514	29	26	1435	4.80	80.2	0.82	24.9
<i>LS 100 L</i>	FFB3	3	20	2.60	3.10	6.65	0.00654	50	52	1435	6.35	82.2	0.83	29.1
<i>LS 112 MG</i>	FFB3	4	26.7	2.65	3.05	5.85	0.00704	69	52	1430	8.95	81.4	0.79	29.6
<i>LS 132 S</i>	FFB3	5.5	36.1	2.55	3.20	6.95	0.01534	85	67	1456	11.5	85.4	0.81	44.6
<i>LS 132 M</i>	FFB4	7.5	49.4	2.30	3.00	5.90	0.02508	114	110	1450	15.6	86.8	0.80	62.5
<i>LS 132 M</i>	FFB4	9	59.3	2.40	2.95	6.60	0.02868	128	110	1450	17.8	87.5	0.83	67.4
<i>LS 160 MP</i>	FFB5	11	72.3	2.90	3.30	6.85	0.03366	177	140	1452	22.1	88.8	0.81	82.9
<i>LS 160 LR</i>	FFB5	15	98.5	2.85	3.35	7.45	0.04153	227	180	1454	30.0	89.1	0.81	96.1

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

2. These values are given for information only.

LS IMfinity® IFT/NIE brake FFB

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 - IP55 - Built-in power supply - Factory-set braking torque

Motor type	Brake type	380V - 50Hz				415V - 50Hz				Rated power	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 speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor
P _n kW	N _n min ⁻¹	I _n A	η% 4/4	Cos φ 4/4	N _n min ⁻¹	I _n A	η% 4/4	Cos φ 4/4	P _n kW	N _n min ⁻¹	I _n A	η% 4/4	Cos φ 4/4	
<i>LS 71 M</i>	FFB1	0.25	-	-	-	-	-	-	-	-	-	-	-	-
<i>LS 71 M</i>	FFB1	0.37	-	-	-	-	-	-	-	-	-	-	-	-
<i>LS 71 L</i>	FFB1	0.55	-	-	-	-	-	-	-	-	-	-	-	-
<i>LS 80 L</i>	FFB1	0.55	1390	1.65	67.5	0.75	1415	1.75	65.5	0.67	0.63	1710	1.40	71.6
<i>LS 80 L</i>	FFB1	0.75	1380	2.05	68.3	0.81	1410	2.05	69.0	0.73	0.86	1705	1.95	73.3
<i>LS 80 L</i>	FFB1	0.9	1415	2.45	73.0	0.77	1435	2.50	72.0	0.70	1.04	1715	2.20	75.5
<i>LS 90 SL</i>	FFB2	1.1	1420	3.40	77.8	0.87	1440	3.25	79.5	0.80	1.27	1730	2.40	78.8
<i>LS 90 L</i>	FFB2	1.5	1425	4.10	78.8	0.86	1445	4.00	80.3	0.78	1.73	1735	3.20	81.2
<i>LS 90 L</i>	FFB2	1.8	1410	2.60	74.3	0.85	1435	2.45	77.0	0.82	2.07	1735	3.90	81.8
<i>LS 100 L</i>	FFB2	2.2	1425	4.90	79.3	0.86	1445	4.90	80.6	0.78	2.53	1735	4.70	82.4
<i>LS 100 L</i>	FFB3	3	1425	6.50	81.3	0.86	1440	6.30	82.7	0.80	3.45	1735	6.15	83.8
<i>LS 112 MG</i>	FFB3	4	1420	8.90	80.9	0.84	1440	9.10	81.4	0.75	4.60	1735	8.70	83.4
<i>LS 132 S</i>	FFB3	5.5	1440	11.5	84.5	0.86	1456	11.2	85.5	0.81	6.33	1756	11.1	86.7
<i>LS 132 M</i>	FFB4	7.5	1445	15.9	86.5	0.83	1415	14.3	65.5	0.67	8.63	1740	14.8	87.9
<i>LS 132 M</i>	FFB4	9	1440	18.4	86.5	0.86	1410	16.9	69.0	0.73	10.35	1745	17.2	88.7
<i>LS 160 MP</i>	FFB5	11	1450	22.8	88.5	0.83	1435	20.6	72.0	0.70	12.65	1745	20.8	89.7
<i>LS 160 LR</i>	FFB5	15	1450	31.0	88.7	0.83	1440	27.8	79.5	0.80	17.25	1745	28.4	89.8

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LS IMfinity® IFT/NIE brake FFB

4 poles - 1500 rpm⁻¹ - IFT/NIE - 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 - 50Hz			% Rated torque				
			Rated speed	Rated current	Power factor	M _n at				
		P _n kW	N _n min ⁻¹	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 IMfinity® IFT/NIE brake FFB

4 poles - 1500 rpm⁻¹ - IFT/NIE - 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
			Rated speed	Rated current	Power factor	
		P _n kW	N _n min ⁻¹	I _n A	Cos φ 4/4	
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

1. Data only applicable to motors: 400V 50Hz Y.

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LSES IMfinity® IFT/IE3 brake FFB

4 poles - 1500 rpm⁻¹ - 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 kg
		P _n kW	M _n N.m	M _d /M _n	M _m /M _n	I _d /I _n	J kg.m ²	M _a N.m	M _f N.m	N _n min ⁻¹	I _n A	η% 4/4	Cos φ 4/4	
LSES 80 LG	FFB1	0.75	4.95	2.20	2.9	6.20	0.0036	10.9	12	1450	1.65	83.2	0.80	16.6
LSES 80 LG	FFB1	0.9	5.90	2.58	3.1	6.42	0.0041	13.2	12	1450	1.90	83.5	0.80	17.1
LSES 90 SL	FFB2	1.1	7.25	2.45	3.2	6.90	0.0050	16.3	19	1450	2.30	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	3.20	85.6	0.79	26.6
LSES 100 L	FFB2	1.8	11.8	2.40	2.7	6.59	0.0065	26.8	26	1452	3.70	86.0	0.82	28.8
LSES 100 LR	FFB2	2.2	14.4	3.20	3.8	8.05	0.0076	46.1	26	1454	4.60	87.1	0.79	32.0
LSES 100 LG	FFB3	3	19.6	2.45	3.3	7.15	0.0124	46.1	52	1460	6.05	88.3	0.81	37.6
LSES 112 MU	FFB3	4	26.2	2.70	3.1	7.05	0.0140	56.3	52	1458	8.10	88.8	0.80	43.6
LSES 132 SM	FFB4	5.5	35.9	2.80	3.6	8.55	0.0287	96.9	67	1462	10.3	90.3	0.85	66.5
LSES 132 MU	FFB4	7.5	49.1	2.95	3.4	8.00	0.0355	133	110	1458	14.0	90.6	0.86	77.1
LSES 160 MR	FFB4	9	58.7	3.10	3.7	8.85	0.0416	158	110	1464	16.7	91.2	0.85	92.3
LSES 160 M	FFB5	11	71.7	2.25	3.1	7.25	0.0770	133	140	1466	20.5	91.6	0.85	110
LSES 160 LUR	FFB5	15	97.6	2.55	3.5	8.35	0.1012	185	180	1468	27.7	92.3	0.85	117

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

2. These values are given for information only.

LSES IMfinity® IFT/IE3 brake FFB

4 poles - 1500 rpm⁻¹ - 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		P _n kW	N _n min ⁻¹	I _n A	η% 4/4
LSES 80 LG	FFB1	0.75	1440	1.65	82.6	0.82	1452	1.60	83.3	0.78	0.75	1758	1.45	85.1	0.76
LSES 80 LG	FFB1	0.9	1440	2.00	83.0	0.82	1452	1.80	83.6	0.78	0.9	1758	1.70	85.6	0.76
LSES 90 SL	FFB2	1.1	1445	2.35	84.1	0.83	1454	2.30	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	3.20	85.8	0.77	1.5	1760	2.80	87.3	0.76
LSES 100 L	FFB2	1.8	1445	3.90	85.4	0.83	1454	3.90	86.2	0.79	1.8	1760	3.30	87.0	0.78
LSES 100 LR	FFB2	2.2	1445	4.70	86.7	0.82	1456	4.60	87.3	0.77	2.2	1760	4.15	88.4	0.76
LSES 100 LG	FFB3	3	1452	6.20	87.74	0.84	1462	6.05	88.4	0.78	3	1766	5.35	90.0	0.79
LSES 112 MU	FFB3	4	1450	8.30	88.6	0.83	1462	8.05	88.9	0.78	4	1764	7.10	90.2	0.79
LSES 132 SM	FFB4	5.5	1456	10.7	89.64	0.87	1466	10.2	90.4	0.83	5.5	1768	9.05	91.7	0.83
LSES 132 MU	FFB4	7.5	1450	14.5	90.4	0.87	1462	13.6	90.9	0.85	7.5	1766	12.1	92.0	0.84
LSES 160 MR	FFB4	9	1458	17.4	90.6	0.86	1466	16.5	91.5	0.83	9	1768	14.7	92.4	0.83
LSES 160 M	FFB5	11	1462	21.1	91.4	0.86	1470	19.8	91.9	0.84	11	1774	17.8	92.8	0.84
LSES 160 LUR	FFB5	15	1464	28.7	92.1	0.86	1472	26.8	92.5	0.84	15	1774	24.2	93.3	0.93

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LSES IMfinity® IFT/IE3 brake FFB

4 poles - 1500 rpm⁻¹ - 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 - 50Hz			% Rated torque				
			Rated speed	Rated current	Power factor	M _n at				
		P _n kW	N _n min ⁻¹	I _n A	Cos φ 4/4	10 Hz	17 Hz	25 Hz	50 Hz	87 Hz
LSES 80 LG	FFB1	0.75	1450	1.70	0.80	90%	100%	100%	100%	57%
LSES 90 SL	FFB2	1.1	1450	2.43	0.81	90%	100%	100%	100%	57%
LSES 90 LU	FFB2	1.5	1452	3.31	0.79	90%	100%	100%	100%	57%
LSES 100 LR	FFB2	2.2	1454	4.77	0.79	90%	100%	100%	100%	57%
LSES 100 LG	FFB3	3	1460	6.37	0.81	90%	100%	100%	100%	57%
LSES 112 MU	FFB3	4	1458	8.37	0.80	90%	100%	100%	100%	57%
LSES 132 SM	FFB4	5.5	1462	11.0	0.85	90%	90%	100%	100%	57%
LSES 132 MU	FFB4	7.5	1458	14.9	0.86	90%	90%	100%	100%	57%
LSES 160 MR	FFB4	9	1464	17.8	0.85	90%	90%	100%	100%	57%
LSES 160 M	FFB5	11	1466	21.6	0.85	85%	95%	100%	100%	57%
LSES 160 LUR	FFB5	15	1468	29.2	0.85	85%	95%	100%	100%	57%

LSES IMfinity® IFT/IE3 brake FFB

4 poles - 1500 rpm⁻¹ - 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
			Rated speed	Rated current	Power factor	
		P _n kW	N _n min ⁻¹	I _n A	Cos φ 4/4	
LSES 80 LG	FFB1	1.31	2511	2.96	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 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.

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Fixed speed

LS brake FMD

4 poles - 1500 rpm⁻¹ - 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 kg
		P _n kW	M _n N.m	M _d /M _n	M _m /M _n	I _d /I _n	J kg.m ²	M _f N.m	N _n min ⁻¹	I _n (400V) A	η% 4/4	Cos φ 4/4	
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⁻¹ - 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 kg
		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 min ⁻¹	I _n (400V) A	Cos φ 4/4	
LS 56 MP	FMD3	0.06	0.41	1.27	2.24	2.64	6	3	1420	0.72	0.90	4.7
LS 63 MP	FMD3	0.09	0.62	0.68	1.35	2.40	6	3	1380	0.75	0.95	5.2
LS 63 MP	FMD3	0.12	0.82	0.88	1.76	2.90	8	3	1400	1.00	0.95	5.7
LS 71 LP	FMD5	0.18	1.20	0.60	2.60	3.89	10	5	1430	1.80	0.75	7.9
LS 71 LP	FMD5	0.25	1.67	0.59	2.28	4.29	10	5	1430	2.10	0.80	8.4
LS 71 LP	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.

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Fixed speed

LS brake FCPL

4 poles - 1500 rpm⁻¹ - 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	400V - 50Hz				Weight IM B3/B5 ² kg
		P _n kW	M _n N.m	M _d /M _n	I _d /I _n	J kg.m ²	M _f ±20% N.m	N _n min ⁻¹	I _n (400V) A	η% 4/4	Cos φ 4/4	
LS 160 MP	FCPL 40 - H1D	11	72	2.9	7.7	0.050	80	1456	21.1	88.4	0.85	100
LS 160 LR	FCPL 40 - H1D	15	99	2.9	8.3	0.058	105	1456	28.8	89.4	0.84	105
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	3.2	7.4	0.117	150	1456	41.7	90.7	0.84	150
LS 200 LT	FCPL 54 - H1D ¹	30	196	2.7	6.6	0.187	220	1460	56.3	91.5	0.84	210
LS 225 ST	FCPL 54 - H1D ¹	37	239	2.6	6.5	0.306	260	1470	68.7	92.5	0.84	280
LS 225 MR	FCPL 54 - H1D ¹	45	292	2.8	6.5	0.365	300	1470	83.3	62.8	0.84	305
LS 250 ME	FCPL 60 - H2D	55	355	2.7	7	0.749	390	1478	101	93.6	0.84	400
LS 280 SC	FCPL 60 - H2D	75	485	2.8	7.2	1.084	520	1478	137	94.2	0.84	470
LS 280 MD	FCPL 60 - H2D ¹	90	581	3	7.6	1.274	590	1478	164	94.4	0.84	540
LS 315												

Please consult us

1. Requires using a CDF7 power supply board.

2. These values are given for information only.

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Variable speed

IMfinity® IFT/IE2¹ VMA T - 4 poles

THREE PHASE power supply VMA 31/32/33/34 of 400 V -10% at 480 V +10%, 50/60 Hz ±2%

Three phase motors 230/400 V ±10% Y connected

Motor type	Brake VMA	Rated torque at 1500 min ⁻¹	Measured torque (N.m)								Starting torque	Switching frequency	Weight		
			Speed (min ⁻¹)							M_d	F _d kHz				
			M_n	300	600	900	1200	1500	1800						
LS 71 L 0.25 kW	VMA 31T 025	1.6	1.6	1.4	1.4	1.4	1.5	2.1	1.4	1.1	3.4	4	10.6		
LS 71 L 0.37 kW	VMA 31T 037	2.4	2.4	2.1	2.1	2.1	2.2	2.8	2	1.6	4.2	4	11.5		
LS 71 L 0.55 kW	VMA 31T 055	3.6	3.6	2.8	2.8	2.8	3.2	3.8	2.9	2.4	5.8	4	12.5		
LSES 80 LG 0.75 kW	VMA 31T 075	4.8	4.8	3.4	4.2	4.6	4.6	4.9	4.1	3.2	10	4	15.9		
LSES 80 LG 0.9 kW	VMA 31T 090	5.7	5.7	4.6	5	5.8	6	6	5	4.2	11	4	16.7		
LSES 90 S 1.1 kW	VMA 31T 110	7	7	5.2	5.5	7	7	7	6	4.7	13	4	18.4		
LSES 90 L 1.5 kW	VMA 32T 150	9.5	9.5	7	8.5	9.5	9.5	9.5	8	6.5	18	4	18.8		
LSES 90 LU 1.8 kW	VMA 32T 180	11.5	11.5	7.7	10	11	12	12	10	8	24	4	23.2		
LSES 100 L 2.2 kW	VMA 32T 220	14	14	9.4	12	13	13	14.5	12	9.5	26	4	25.5		
LSES 100 LR 3 kW	VMA 32T 300	19.1	19.1	12.8	12	15	17	19.1	16	12.8	30	4	29.9		
LSES 112 MU 4 kW	VMA 32T 400	25.5	25.5	18	20	20	25	25	22	17	40	4	43.1		
LSES 132 SU 5.5 kW	VMA 33T 550	35	35	25	35	35	35	35	30	24	52	4	50.1		
LSES 132 M 7.5 kW	VMA 33T 750	47.8	47.8	31.9	40	47	48	48	40	32	72	4	65.1		

1. Except motors in italics

IMfinity® IFT/IE2¹ VMA TL - 4 poles

THREE PHASE power supply of 200 V -10% at 240 V +10%, 50/60 Hz ±2%

Three phase motors 230/400 V ±10% Δ connected

Motor type	Brake VMA	Rated torque at 1500 min ⁻¹	Measured torque (N.m)								Starting torque	Switching frequency	Weight		
			Speed (min ⁻¹)							M_d	F _d kHz				
			M_n	300	600	900	1200	1500	1800						
LS 71 L 0.25 kW	VMA 31TL 025	1.6	1.6	1.4	1.4	1.4	1.5	2.1	1.4	1.1	3.2	4	10.6		
LS 71 L 0.37 kW	VMA 31TL 037	2.4	2.4	1.6	1.8	1.9	2.2	2.4	2	1.6	4.8	4	11.5		
LS 71 L 0.55 kW	VMA 31TL 055	3.6	3.6	2.7	2.7	2.8	3.2	3.6	2.9	2.1	5.4	4	12.5		
LSES 80 LG 0.75 kW	VMA 31TL 075	4.8	4.8	3.4	4.2	4.6	4.6	4.9	4.1	3.2	10	4	15.9		
LSES 80 LG 0.9 kW	VMA 32TL 090	5.7	5.7	4.6	5	5.8	6	6	5	4.2	11	4	16.7		
LSES 90 S 1.1 kW	VMA 32TL 110	7	7	5.2	5.5	7	7	7	6	4.7	13	4	18.4		
LSES 90 L 1.5 kW	VMA 32TL 150	9.5	9.5	7	8.5	9.5	9.5	9.5	8	6.5	18	4	18.8		
LSES 90 LU 1.8 kW	VMA 32TL 180	11.5	11.5	7.7	10	11	12	12	10	8	24	4	23.2		
LSES 100 L 2.2 kW	VMA 32TL 220	14	14	9.4	12	13	13	14.5	12	9.5	26	4	25.5		
LSES 100 LR 3 kW	VMA 33TL 300	19.1	19.1	13	16	19	19	19	16	13	30	4	33.8		
LSES 112 MU 4 kW	VMA 33TL 400	25.5	25.5	18	20	20	25	25	22	17	38	4	43.1		
LSES 132 SU 5.5 kW	VMA 34TL 550 ²	35	35	35	35	35	35	35	29	24	52	4	50.1		
LSES 132 M 7.5 kW	VMA 34TL 750 ²	47.8	47.8	48	48	48	48	48	40	32	72	4	65.1		

1. Except motors in italics

2. Forced ventilation required

IMfinity® IFT/IE2¹ VMA M - 4 poles

SINGLE PHASE power supply of 200 V -10% at 240 V +10%, 50/60 Hz ±2%

Three phase motors 230/400 V ±10% Δ connected

Motor type	Brake VMA	Rated torque at 1500 min ⁻¹	Measured torque (N.m)								Starting torque	Switching frequency	Weight		
			Speed (min ⁻¹)							M_d	F _d kHz				
			M_n	300	600	900	1200	1500	1800						
LS 71 L 0.25 kW	VMA 31M 025	1.6	1.6	1.6	1.6	1.7	2.2	1.4	1.1	2.9	4	10.6			
LS 71 L 0.37 kW	VMA 31M 037	2.4	2.4	2.2	2.2	2.2	2.3	2.8	2	1.6	4	11.5			
LS 71 L 0.55 kW	VMA 31M 055	3.6	3.6	2.6	2.6	2.8	3.2	3.6	2.9	2	5.5	4	12.5		
LSES 80 LG 0.75 kW	VMA 31M 075	4.8	4.8	3	4	4.4	4.4	4.8	4	3	10	4	15.9		
LSES 80 LG 0.9 kW	VMA 32M 090	5.7	5.7	4	4.8	5.4	5.7	5.7	4.8	4	11	4	16.7		
LSES 90 S 1.1 kW	VMA 32M 110	7	7	4.7	5.3	6.7	7	7	5.8	4.4	13	4	18.4		
LSES 90 L 1.5 kW	VMA 32M 150	9.5	9.5	6.2	8.2	9.1	9.5	9.5	7.8	6.2	18	4	18.8		

1. Except motors in italics

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Variable speed

LS IMfinity® IFT/NIE (except motors in italics) VMA T brake FFB

4 pole - 1500 RPM⁻¹ - THREE PHASE power supply of 200 V -10% at 240 V +10%, 50/60 Hz ±2%

Three phase brake motors 230/400 V ±10% Y connected - IP55 - Built-in power supply - Factory-set braking torque

Motor type	VMA type	Brake type	Rated power	Rated torque	Starting torque/Rated torque	Inertia torque	Braking torque ¹	Rated current	Weight ²
			P _n kW	M _n N.m					
LS 71 L	VMA 31T 025 SD ¹	FFB1	0.25	1.06	1.68	2.73	0.00072	4.5	0.80
LS 71 L	VMA 31T 037 SD ¹	FFB1	0.37	1.57	2.49	2.41	0.00089	4.5	1.06
LS 71 L	VMA 31T 055 SD ¹	FFB1	0.55	2.34	3.75	2.32	0.00114	6	1.62
LS 80 L	VMA 31T 075 SD ¹	FFB1	0.75	3.20	5.1	1.80	0.00168	12	2.05
LS 80 L	VMA 31T 090 SD ¹	FFB1	0.9	3.84	6.05	3.10	0.00244	12	2.45
LS 90 SL	VMA 31T 110 SD ¹	FFB2	1.1	4.69	7.35	1.50	0.00269	19	2.50
LS 90 L	VMA 32T 150 SD ¹	FFB2	1.5	6.40	10	1.90	0.00341	19	3.30
LS 90 L	VMA 32T 180 SD ¹	FFB2	1.8	7.68	12	2.00	0.00384	26	3.95
LS 100 L	VMA 32T 220 SD ¹	FFB2	2.2	9.38	14.6	2.30	0.00434	26	4.80
LS 100 L	VMA 32T 300 SD ¹	FFB3	3	12.8	20	2.60	0.00574	52	6.35
LS 112 MG	VMA 32T 400 SD ¹	FFB3	4	17.1	26.7	2.65	0.00624	52	8.95
LS132 S	VMA 33T 550 SD ¹	FFB3	5.5	23.5	36.2	2.40	0.0145	67	11.2
LS 132 M	VMA 33T 750 SD ¹	FFB4	7.5	32.0	49.4	2.30	0.0195	110	15.6

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

2. These values are given for information only.

LS IMfinity® IFT/NIE (except motors in italics) VMA TL brake FFB

4 pole - 1500 RPM⁻¹ - THREE PHASE power supply of 200 V -10% at 240 V +10%, 50/60 Hz ±2%

Three phase brake motors 230/400 V ±10% Δ connected - IP55 - Built-in power supply - Factory-set braking torque

Brake type	Brake type	Brake type	Rated power	Inertia torque	Starting torque/Rated torque	Inertia torque	Braking torque ¹	Rated current	Weight ²
			P _n kW	M _n N.m					
LS 71 M	VMA 31TL 025 SD ¹	FFB1	0.25	1.06	1.68	2.73	0.00072	4.5	1.39
LS 71 M	VMA 31TL 037 SD ¹	FFB1	0.37	1.57	2.49	2.41	0.00089	4.5	1.84
LS 71 L	VMA 31TL 055 SD ¹	FFB1	0.55	2.34	3.75	2.32	0.00114	6	2.81
LS 80 L	VMA 31TL 075 SD ¹	FFB1	0.75	3.20	5.1	1.80	0.00168	12	3.55
LS 80 L	VMA 31TL 090 SD ¹	FFB1	0.9	3.84	6.05	3.10	0.00244	12	4.25
LS 90 SL	VMA 32TL 110 SD ¹	FFB2	1.1	4.69	7.35	1.50	0.00269	19	4.35
LS 90 L	VMA 32TL 150 SD ¹	FFB2	1.5	6.40	10	1.90	0.00341	19	5.70
LS 90 L	VMA 32TL 180 SD ¹	FFB2	1.8	7.68	12	2.00	0.00384	26	6.85
LS 100 L	VMA 32TL 220 SD ¹	FFB2	2.2	9.38	14.6	2.30	0.00434	26	8.30

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LSRPM - 2400 min⁻¹

IP55 - Class F - DT80K - S1 self-ventilated - Altitude 1000 m max - Ambient temperature 40°C max

Power supply upstream 400 V drive

Motor type	RANGE 2400 min ⁻¹									
	Rated power	Rated speed	Rated torque	Rated current ¹	Efficiency IEC 60034-2-1 2007	Maximum torque/Rated torque	Maximum current/Rated current ¹	Moment of inertia	Weight	
	P_n kW	N_n min ⁻¹	M_n N.m	I_n A	n 100 %	M_{max}/M_n	I_{max}/I_n	J kg.m ²	IM B3 kg	IM B14 kg
LSRPM 90 SL	4.8	2400	19	9.1	90.5	1.5	1.5	0.0032	-	14
LSRPM 100 L	7.2	2400	29	13.4	92	1.5	1.5	0.0066	-	19
LSRPM 100 L	9.5	2400	38	17.7	93	1.5	1.5	0.009	-	26
LSRPM 132 M	13.1	2400	52	25	92.5	1.5	1.5	0.0165	-	40
LSRPM 132 M	16.3	2400	65	31	93	1.5	1.5	0.0231	-	44
LSRPM 132 M	19.2	2400	76	37	93.5	1.5	1.5	0.0311	49	-
LSRPM 160 MP	25	2400	99	47	94	1.36	1.36	0.0418	60	-
LSRPM 160 MP						1.5	1.5			-
LSRPM 160 MP	31	2400	122	58	94.5	1.1	1.1	0.0514	69	-
LSRPM 160 MP						1.5	1.5			-
LSRPM 160 LR	36	2400	145	68	94.5	1.16	1.16	0.0626	79	-
LSRPM 160 LR						1.5	1.5			-
LSRPM 200 L	50	2400	199	110	95.4	1.01	1.08	0.17	150	-
LSRPM 200 L						1.33	1.43			-
LSRPM 200 L1	65	2400	259	137	95.9	1.07	1.15	0.20	168	-
LSRPM 200 L1			288	145		1.35	1.45			-
LSRPM 200 L1	80	2400	318	160	96.6	1.16	1.25	0.24	183	-
LSRPM 200 L1						1.35	1.45			-
LSRPM 225 MR1	100	2400	374	188	96.9	1.19	1.28	0.30	218	-
LSRPM 225 MR1			398	200		1.35	1.45			-

1. The drive setting must meet the rated current values to ensure thermal control, as well as the maximum intensity values to avoid risks of demagnetisation.

Other drive mechanism solutions



LSMV: induction motors 1500 min^{-1} from 0.25 to 110 kW

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



UNIMOTOR FM ad HD: servomotors 3000 min^{-1} from 0.7 to 136 N.m

High dynamics compact applications.

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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 _d	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
FMD	Brake for motor ≤ 0.55 kW	N _{S MAX}	Maximum output speed of gearbox
F _{R E/2}	Radial load acceptable at E/2	N _{S MIN}	Minimum output speed of gearbox
F _r	Rolling resistance force (N)	Ot	Orthobloc
F _γ	Acceleration resistance force (N)	P	Weight = m x g (N)
H	Hollow shaft	P _n	Rated power
HA	Frame size	P _u	Output power
HL	Shaft on left	Q	Rate (ton/hour)
HR	Shaft on right	R	Table radius (m)
R.H.	Relative humidity	r	Rolling radius (m)
i	Exact reduction of gearbox	A.T.	Ambient temperature
i _{aR}	Reduction index (approached)	t ₁	Release response time
I _D	Starting current	t ₂	Tightening response time
I _n	Rated 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	type	VARMECA
K2	Duty factor depending on the operating factor	Z (s/h)	Starting frequency of the application (s/h)
Kp	Maximum duty factor possible of the geared motor	α	Tilt angle (°)
kr	Bearing coefficient	γ	Acceleration (m/S ²)
KVA _N	Apparent rated power	η	Efficiency
kW	Kilo Watt	ω	Angular speed (in rad/s)

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

Cb, Ot, Mub, Mb, FFB
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Associated documents

Gearboxes and brake

Gearboxes	Environment								
	Current				Atex regulated		Options		
	Commissioning						Lubrication vase	Thermal exchanger	
Gearboxes	Brochure	Catalogue	Installation	Maintenance			Lubrication vase	Thermal exchanger	
	3969	3521	3520	5060	3711	3804	5088	5217	5060
	3969	5200 to be issued	4031	5066	3711	3804	5088	5217	5066
	3780	to be issued	3097	5069	3711	to be issued	-	-	4114
	3625	3733	2910	5062	3711	to be issued	-	-	-
	3969	3981	3996	4952	3711	3804	5088	5217	4952
FFB brake		5281	5329	5286	5287	Pending	to be issued	-	-

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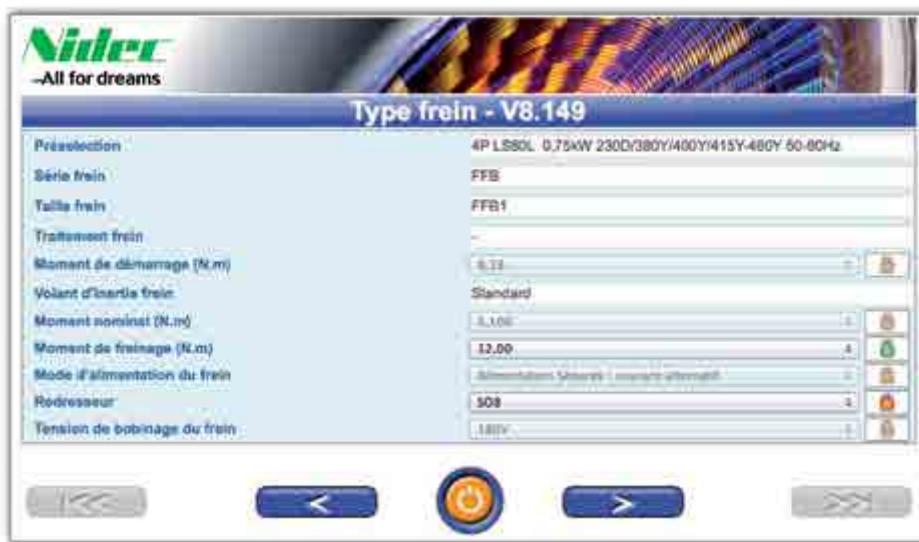
Configurator



The Leroy-Somer Configurator is used to select motors most suited to your applications, while also allowing their technical specifications and corresponding plans to be printed.

- Product selection support
- Print-outs of technical specifications
- Print-outs of 2D and 3D CAD files
- The equivalent of 300 catalogues in 11 languages.

Register online at:
[http://www.nidecautomation.com/
fr-FR/leroy-somer-motors-drives/
Products/Configurator/](http://www.nidecautomation.com/fr-FR/leroy-somer-motors-drives/Products/Configurator/)



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.

Cb, Ot, Mub, Mb, FFB

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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 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 Leroy-Somer.

The illustration of the delivery time below for the equipment selected page 19, i.e. D+5; D being the day the order is received by the factory before 12:00 am.

Geared motors IMfinity® IE2 class Helical gears COMPABLOC, MANUBLOC, ORTHOBLOC Standard environment - Fixed speed

Integral mounting	MI
Universal mounting	MU
Input shaft mounting	AP

AVAILABILITY TIMES EX WORKS (FRANCE), IN WORKING DAYS

Orders received, within the maximum quantity limit, by the factory on day D before 12:00pm 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 12:00pm 1 working day on the mentioned availability will be added.

The maximum quantity is per line of order. Above this maximum quantity, please consult your Sales Office.

D	D + 1	D + 2	D + 5	D + 10	Please consult
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IMfinity® IE2 class associated motors 4p
(except motors in *italics*, not concerned by the IE)

Type	IE	Mounting	Rated power <i>P_n</i> kW	230 V Δ / 380 V Y / 400 V Y / 415 V Y 50 Hz - 460 V Y 60 Hz									
				400 V	Cb 30- Ot 31- Mub 31-	Cb 31- Ot 31- Mub 32-	Cb 32- Ot 32-, 33- Mub 32-	Cb 33- Ot 34- Mub 33-	Cb 34- Ot 35- Mub 34-	Cb 35- Ot 36-* Mub 35-	Cb 36-* Ot 36-* Mub 36-*	Cb 37-* Ot 37-, 38-* Mub 37-*	Cb 38-* Ot 39- Mub 38-*
LS 71 L	NC	MI or MU	0.25	Y	5	5	5	5	5	5	5	5	5
LS 71 L	NC	MI or MU	0.37	Y	5	5	5	5	5	5	5	5	5
LS 71 L	NC	MI or MU	0.55	Y	5	5	5	5	5	5	5	5	5
LSES 80 LG	IE2	MI or MU	0.75	Y	5	5	5	5	5	5	5	5	5
LSES 80 LG	IE2	MI or MU	0.9	Y	5	5	5	5	5	5	5	5	5
LSES 90 SL	IE2	MI or MU	1.1	Y	5	5	5	5	5	5	5	5	2
LSES 90 L	IE2	MI or MU	1.5	Y	5	5	5	5	5	5	5	5	2
LSES 90 LU	IE2	MI or MU	1.8	Y	5	5	5	5	5	5	5	5	2
LSES 100 L	IE2	MI or MU	2.2	Y	5	5	5	5	5	5	5	5	2
LSES 100 LR	IE2	MI or MU	3	Y	5	5	5	5	5	5	5	5	2
LSES 112 MG	IE2	MI or MU	4	Y	5	5	5	5	5	5	5	5	2
LSES 132 SU	IE2	MI or MU	5.5	Y	5	5	5	5	5	5	5	5	2
LSES 132 M	IE2	MI or MU	7.5	Δ	5	5	5	5	5	5	5	5	2
LSES 132 M	IE2	MI or MU	9	Δ	5	5	5	5	5	5	5	5	2
LSES 160 MR	IE2	MI or MU	11	Δ	5	5	5	5	5	5	5	5	2
LSES 160 L	IE2	MI or MU	15	Δ	5	5	5	5	5	5	5	5	2
LSES 180 MT	IE2	MI or MU	18.5	Δ	5	5	5	5	5	5	5	5	2
LSES 180 LR	IE2	MI or MU	22	Δ	5	5	5	5	5	5	5	5	2
LSES 200 LR	IE2	MI or MU	30	Δ	5	5	5	5	5	5	5	5	1
LSES 225 ST	IE2	MU	37	Δ	5	5	5	5	5	5	5	5	1
LSES 225 MR ²	IE2	MU	45	Δ	5	5	5	5	5	5	5	5	1
LSES 250 ME ²	IE2	MU	55	Δ	5	5	5	5	5	5	5	5	1
LSES 280 SD ²	IE2	MU	75	Δ	5	5	5	5	5	5	5	5	1
LSES 280 MD ²	IE2	MU	90	Δ	5	5	5	5	5	5	5	5	1
LSES 315 SP ²	IE2	MU	110	Δ	5	5	5	5	5	5	5	5	1

1. motor B35 obligatory NC: not concerned by IE Standards

COMPABLOC - MECHANICAL OPTIONS CORRESPONDING TO THE FIXING FORM

Type	Feet S	Cb multistage MI shapes					Tapped holes			Backstop ¹		Multistage Cb mounting	
		BS	BD1	Smooth hole flanges BD2	BD3	BR	BT	AD/AP-MI-MU	MU	AP	Universal	Input shaft	
Cb 3032-3033													
Cb 3133													
Cb 3233													
Cb 3333													
Cb 3433													
Cb 3533													
Cb 3633													
Cb 3733													
Cb 3833													

1. Cb 36 to 38: AD (backstop) forbidden in operating positions V5, V1.

SAVING YOUR TIME

The delivery charter for products in Express Availability are accessible strictly through our web pages:
<http://lrsm.co/dispofr> (chapter 6: Gearboxes-Geared motors)

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



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All for dreams

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