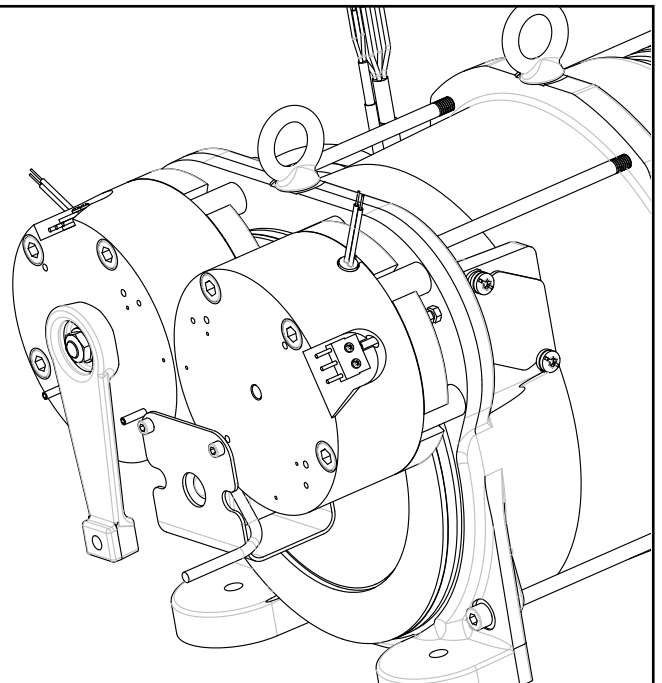




This manual is to be given
to the end user



MICRO GEARLESS XAPI-CE

**Permanent magnet synchronous motor for
commercial lifts**

Installation and maintenance

MICRO GEARLESS XAP1-CE

Permanent magnet synchronous motor for commercial lifts

NOTE

LEROY-SOMER reserves the right to modify the characteristics of its products at any time in order to incorporate the latest technological developments. The information contained in this document may therefore be changed without notice.



CAUTION

For the user's own safety, this XAP1 motor must be connected to an approved earth (\perp).

For the user's own safety, this XAP1 motor must be connected to an approved earth (terminal). If accidentally starting the installation is likely to cause a risk to personnel or the machines being driven, it is essential to supply the equipment via a circuit-breaking device (power contactor) which can be controlled via an external safety system (emergency stop, detection of errors on the installation).

The motor which is the subject of this manual is designed to be integrated in an installation or an electrical machine, and can under no circumstances be considered to be a safety device. It is therefore the responsibility of the machine manufacturer, the designer of the installation or the user to take all necessary precautions to ensure that the system complies with current standards, and to provide any devices required to ensure the safety of equipment and personnel.

LEROY-SOMER declines any responsibility in the event of the above recommendations not being observed.

SAFETY AND OPERATING INSTRUCTIONS FOR LIFT MOTORS



Throughout the manual, this symbol warns of consequences which may arise from inappropriate use of the motor, since electrical risks may lead to material or physical damage as well as constituting a fire hazard.

1 - GENERAL

Depending on their degree of protection, motors may contain moving parts, as well as hot surfaces, during operation.

Unjustified removal of protection devices, incorrect use, faulty installation or inappropriate operation could represent a serious risk to personnel and equipment.

For further information, consult the manual.

All work relating to transportation, installation, commissioning and maintenance must be performed by experienced, qualified personnel (see national specifications for installation and accident prevention).

In these basic safety instructions, qualified personnel means persons competent to install, mount, commission and operate the product and possessing the relevant qualifications.

2 - USE

XAP1 motors are components designed for integration in installations or electrical machines.

When integrated in a machine, commissioning must not take place until it has been verified that the machine conforms to the Machinery Directive.

Commissioning can take place only if the requirements of the Electromagnetic Compatibility Directive are met.

The motors meet the requirements of the Low Voltage Directive.

The technical characteristics and instructions concerning the connection conditions specified on the nameplate and in the documentation provided must be observed without fail.

3 - TRANSPORTATION, STORAGE

All instructions concerning transportation, storage and correct handling must be observed.

The climatic conditions specified in the technical manual must be observed.

4 - INSTALLATION

The installation and cooling of equipment must comply with the specifications in the manual supplied with the product.

The motors must be protected against excessive stress. In particular, there must be no damage to parts and/or modification

of the clearance between components during transportation and handling.

The motors contain parts which are sensitive to electrostatic stress and may be easily damaged if handled incorrectly (encoder).

5 - ELECTRICAL CONNECTION

When work is performed on the motors which are powered up, the national accident prevention specifications must be respected.

The electrical installation must comply with the relevant specifications (for example conductor cross-sections, protection via fused circuit-breaker, connection of protective conductor). More detailed information is given in the manual. Instructions for an installation which meets the requirements for electromagnetic compatibility, such as screening, earthing, and correct insertion of cables and conductors, are given in the documentation supplied with the motor. These instructions must be followed under all circumstances, even if the motor carries the CE mark.

Adherence to the limits given in the EMC legislation is the responsibility of the manufacturer of the installation or the machine.

6 - OPERATION

Installations incorporating speed controllers must be fitted with additional protection and monitoring devices as laid down in the current relevant safety regulations: law on technical equipment, accident prevention regulations, etc.

The modification of the speed controller by using the control software is permitted.

Active parts of the device and live power connections must not be touched immediately after the speed controller is powered down, as the capacitors may still be charged.

During operation, all protective covers must remain closed.

7 - SERVICING AND MAINTENANCE

Refer to the manufacturer's documentation.

This manual must be forwarded to the end-user !

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In order to obtain full satisfaction from the LEROY-SOMER motor you have just acquired, it is indispensable to respect the following instructions:



IMPORTANT !

Contact with rotating or electrically live parts may cause injuries. Do not touch the frame of a running motor, as its temperature can reach high levels.



REMINDER

The installation, servicing and maintenance must only be carried out by qualified staff. The non respect or misapplication of the information given in this manual absolves the manufacturer of his responsibility. The product is under guarantee provided that it has not been partially or totally dismantled without assistance from LEROY-SOMER (or its approved representative) during the guarantee period.



CAUTION

Make sure the cabin is secured before intervening on motor or brakes.

1 - RECEPTION

CONTROLS TO BE DONE

- Assure conformity between the name-plate and contractual specifications, upon receipt of the machine.

- Proceed with inspection on delivery. In case of damage during transport, make the usual restrictions with the transporter.

Maximum load authorized on sheave

Type

Motor serial number

MOTOR		<i>Weight of motor</i>	
Type	XAP1-CE	Weight	110 Kg
Max Sheave Load	1400 Kg		
MOTOR			
Voltage	380 V	Current	8,6 A
Frequency	21,3 Hz	Duty	S5- 50%
Speed	160 rpm	Starts/h	180
Insul.Class	F	Amb Temp	40°C
Phases	3	Rated Power	3 kW
Enclosure	IP 20		
BRAKE			
Torque:	2X250 Nm	Current	0,43 A
Voltage :	103 VDC		
<i>Rated braking torque</i>		<i>Rated brake voltage</i>	
		<i>Rated brake current</i>	

E68554-S
GP200393
GQ113200 /C

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2 - STORAGE

2.1 - Warehouse

This area must be dry, protected from weather, from cold (temperature lower than -15°C), from frequent temperature changes (to avoid condensation), from vibrations, from dust and corrosive gases.

In case of vibrations in the warehouse, it is recommended that the drive shaft is turned at least twice a month (release the brakes by the manual system or energise the brakes in order to turn the sheave).

The sheave grooves are, under certain transport conditions, protected by a special varnish which must be left in place during storage.

2.2 - Extended storage (> 3 month)

Enclose the machine in a sealed waterproof envelope with a dehydrator bag inside corresponding to the volume to protect and the degree of humidity.

3 - ENVIRONMENT

The nominal characteristics are established for operation in a normalized environment (cf. IEC 600034-5):

- Altitude less than or equal to 1000 m
- Maximum humidity rate: 95%,
- Temperature between 0 and 40°C.

De-rating may be required if particular conditions are indicated when ordering of the material.

4 - PUTTING INTO SERVICE

BEFORE INSTALLATION

If storage has lasted several months, it is essential to check:

- Interior cleanliness and absence of condensation
- Disc brake cleanness (no rust or grease particles)
- Good insulation between the motor phase and earth (minimum 100MΩ under a continuous voltage of 500V during 60s), after having disconnected all electronic circuits.

WARNING ! do not apply the megohmmeter to the thermistor terminals to avoid damage.

If the level is not reached, dry with an external or internal heater

DRYING WITH EXTERNAL HEAT SOURCE

Place the motor in an oven at 70°C for at least 24 hours until the correct insulation is obtained. (100MΩ)

- Make sure the temperature is raised gradually in order to remove condensation
- After drying at ambient temperature, during the cooling phase

make regular checks of the insulation level, which will tend to drop, then to rise.

DRYING WITH AN INTERNAL HEAT SOURCE

- Test to be made with brakes open.
- Connect the motor windings V1 and W1 in parallel to U1.
- Note the resistance U and V/W.
- Supply a low-voltage direct current (in order to obtain 10% of the nominal current calculated using winding resistances), increase the voltage until the current reaches 50% of the nominal current
- Maintain supply for 4 hours, the motor temperature will gradually rise.



CAUTION !

When putting under voltage the pulley will move slightly (angular displacement of the rotor in relation to the stator).

Refer to paragraph 4.2- Cabling

4.1 - Installation

The installation must be in conformity with the motor characteristics indicated on the data plate (see § 1).

It must integrate the electrical safeties.

Verify that the equipments for handling (slings, eyebolts...) are adapted for the weight of the machine.

Use the attachment points provided on the machine, 2 metric threads ISO M10x1.5, usable length 20mm.

Check that the cables are correctly positioned in order to avoid deterioration.

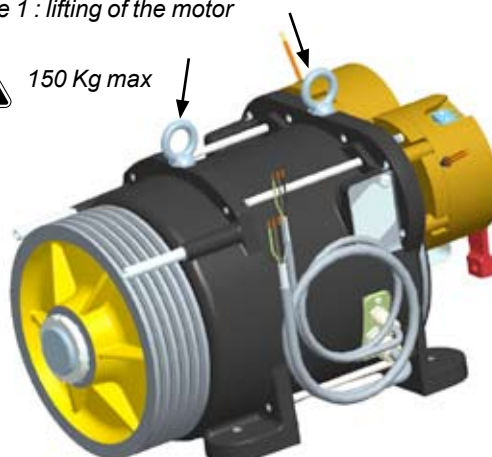
Ensure that necessary mechanical protections are in place, to avoid persons working on the machine to be caught or squeezed by the pulley or the cables.

The motor should be installed in sufficient space, to allow cooling air (not too humid, free of dust, vapours and corrosive gases) to circulate without obstruction.

Figure 1 : lifting of the motor



150 Kg max



Non contractual lifting diagram

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4.1.1 - Cleaning

- Release the brakes with the manual system or energise the brake if there is no manual device.
- Remove the protection varnish from the pulley grooves (if the case).



CAUTION !

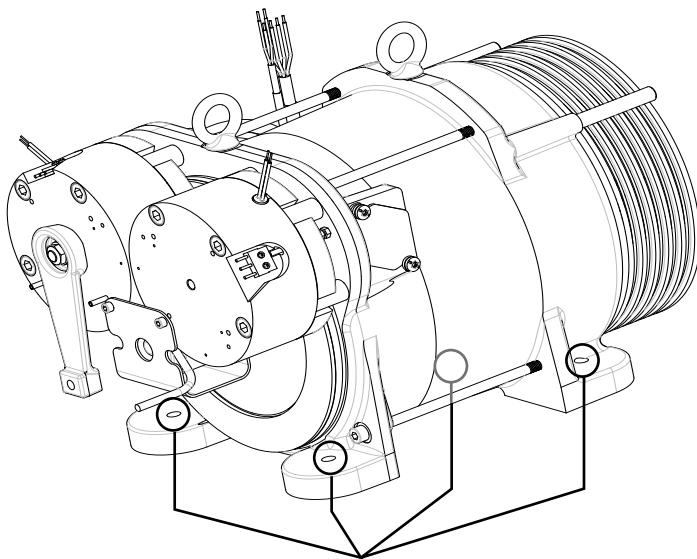
Do not use abrasive materials, only an alcohol soaked cloth. Be careful not to put alcohol or any grease on the brake disc.

WARNING

Only use alcohol in a well ventilated area.

4.1.2 - Mechanical installation

- The GEARLESS machine must be installed on a vibration free frame and must be secured with 4 bolts M12 class 8.8 and washers, tightened to 81Nm ±10%. Nuts are only to be tightened when the cables, the cabin, the counterweights, and the traction sheave are perfectly aligned. Before installing the cables, check that the traction sheave can turn freely by hand, when the brakes are released.



4 bolts for Mounting of motor
XAP1 CE450

- Check that the cables are suitable for the traction sheave.



WARNING !

Danger of squeezing between cables and traction sheave.

4.2 - Connection

4.2.1 - Motor connection

4.2.1.1 - Shielded motor cable

Earth terminal	U	V	W	Running Direction
Green/ Yellow	Blue or Grey	Brown	Black	Clockwise viewing drive shaft
Green/ Yellow	1	2	3	

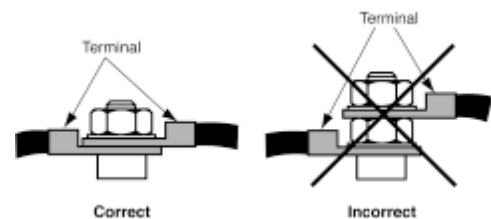
- Connect the motor using the adequate cable section (cables and terminals are dimensioned according to the current: see chart below). Check carefully that the terminal screws are tightened correctly. (Insufficient tightening may destroy the connections due to overheating: see picture below).

Rated current I(A) per phase	≤ 9,5	12	16
Minimum cable section (mm ²)	1,5	1,5	2,5



CAUTION !

It is the user's responsibility to make the connections in accordance with the legislation and regulations of the country where it shall be used. This is particularly important for, cable size, fuse size and type, earth or mass connections, turning off the power supply, the correction of faulty insulation and the protection against overcurrents. This chart is for information only and under no circumstances substitutes to the standards in effect. The recommended sections are determined for single wire cable with a maximum length of 10m, beyond which voltage drops due to the length need to be taken into account.



4.2.1.2 - Connection of the shielded PTC thermistor

- Connect the 2 wires of the thermistor to the controller
- Connect the the green/yellow wire to the earth connection
- Connect the shield

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4.2.2 - Encoder connection

Never touch the connection pins at the encoder cable. The encoder may be destroyed by electrostatic discharge.

Pins of the connector

Pin	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Signal	A	\bar{A}	B	\bar{B}			U	\bar{U}	V	\bar{V}	W	\bar{W}	+5Vcc	0V	

- Connect the power cables to the terminals U1, V1, W1, in conformity with IEC 600034-1 (see § 4.2).
- Connect the PTC thermistor to the controller (Option).
- Connect the ground terminal to earth (see § 4.2).
- Connect the brakes and the micro-switches
- Connect the encoder.



Carefully verify that no screw, washer, or any other foreign part may have entered the motor and may be in contact with the winding.

4.3 - Start up

Check that the electrical drives are connected to earth before doing the first operation.

Start up the machine and check the following points:

- All electrical fixations and connections are correctly tightened.
- After start up, check:
- Noise
 - Vibrations
 - Action of switches/buttons
 - Also check the current and the voltage on the machine while operating at rated load.

5 - MAINTENANCE / SERVICE

5.1 - After 1 month of running

- Check the tightness of bolts or electrical connections.
- Check the vibrations. Check on abnormal connections.
- Remove grease traces (if any) from the brake discs.
- Make sure that the brake noise level is below 60dBA. If a higher noise level is reported, inform LEROY-SOMER
- If a brake wear check is necessary: check that the brake airgap measures between 0,25 mm and 0,3 mm according to the control procedure described in § 6.

Note: this measurement will be used as reference.

5.2 - Every year

- Make sure that the brake noise level is inferior to 60dBA. If higher, adjust according to § 6.
- If a brake wear check is necessary, check that the airgap is less than 0,3 mm. If higher: check that the motor doesn't start with the brake closed, otherwise contact LEROY-SOMER

6 - ADJUSTMENT PROCEDURE FOR BRAKES, ENCODER AND MICROSWITCHES

6.1 - Control of the airgap of the brake

- The brake must not be energized.
 - Measure the airgap with a set of feeler gauges.
 - The brake is designed for static application. Dynamic braking must be limited to emergencies and tests only.
- At normal use the wear of the brake will be insignificant. If the airgap will be bigger than 0,6 mm, the brake disc must be changed, see § 7.2.
- Energize the brakes
 - Check the value of the airgap
 - Check the noise level of each brake (no slapping) and that the sheave turns freely when the brakes are released.

6.2 - Encoder adjustment

- Avoid removing the encoder from the motor.
- In case of replacement, it is imperative to remove the cables from the sheave, in order not to have any resistant torque during the encoder setting.
- Connect the power supply of the encoder to the controller.
- Proceed to the setting of the new encoder according to the technical instructions given by the manufacturer of the controller.

6.3 - Control and adjustment of the micro-switches

6.3.1 - Control

- Each brake unit is equipped with a micro-switch.
- The micro-switches are closed when the brakes are closed (active).
- The micro-switches are wired in series.
- Control the micro-switches using an ohmmeter.
- Control successively each micro-switch after having short circuited the other. The control is done by operating the brake several times (opening/closing), to be carried out without failure on at least 3 equidistant points during a full rotation of the brake disc.

6.3.2 - Adjustment

6.3.2.1 - Tools needed

- 2 flat spanners for hex nuts (8 mm)
- A pilot lamp for adjusting the micro-switches.
- Suitable connections on the pilot lamp in order to be able to plug to the connector of the micro-switch.

6.3.2.2 - Adjustment of the micro-switches



Secure the load before any action on the brakes.

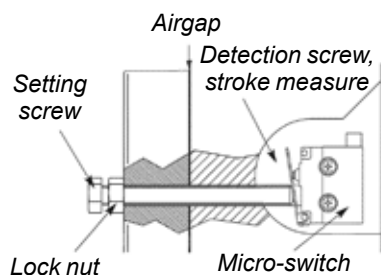
- Connect the pilot lamp to the two wires of the micro-switch.
- Insert a calibre gauge of 0,1mm close to the adjustment screw, in the corresponding airgap. Then energize the machine, tighten the adjustment screw H M5 (8/plat) to contact with the micro-switch until commutation is achieved (see fig.2).

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- Check the correct function by operating several succeeding releases and stops.
- Adjust the second micro-switch in the same way.
- Connect the micro-contacts and the supply of the brakes.

Figure 2

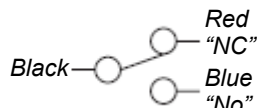


RATED CURRENT

10 mA to 100 mA at 24 VDC.

The maximum lifetime of the micro-switch is only guaranteed when switching under resistive load.

Connection of the micro-switch




7 - REPLACEMENT OF ENCODER, BRAKE AND MICRO-SWITCH

TOOLS NEEDED

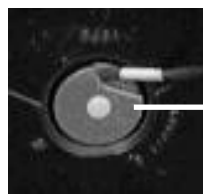
- Male hexagon angular offset spanner (2,5 mm) : DIN 911 (extended version : L=90)
- Kit of feeler gauges : 0,1 mm, 0,3 mm et 0,6 mm
- Male hexagon angular offset spanner (8 mm) : DIN 911 (non extended)
- Male hexagon angular offset spanner (4 mm) : DIN 911 (non extended)
- Torque spanner for hexagon screw M10 (8 mm) : 30-60 Nm range
- Grease
- Thread glue Loctite 242 or equivalent.

7.1 - Procedure for encoder replacement

-  Secure the load before any operation on the motor. Make sure that no torque applies to the rotor!

7.1.1 - Encoder dismantling procedure

- Disconnect the encoder (17)
- Unscrew the 2 socket hex screws CHc M5 (15) from the base of the encoder (16).
- Remove the base (16) by unscrewing the 2 socket hex screws CHc M5 (15) and the 2 socket hex screws CHc M3 (14) from the flexible coupling of the encoder.



Encoder Heidenhain

TO REMOVE THE ENCODER

- Unscrew the plastic screw on the top of the encoder.
- Unscrew the socket hex crew CHc M5 inside the encoder with a male angular hexagon offset spanner (4 mm).
- Fit the M6 screw instead of the M5 screw which has just been removed.
- Remove the encoder and the screw M6 inside of it.
- Unscrew the 2 socket hex crews CHc M3 (14) from the flexible coupling of the encoder, in order to remove the encoder base plate.

7.1.2 - Reassembly of the encoder


- Assemble the encoder base plate to the encoder with the 2 socket hex screws (14) on the flexible coupling.
- Place the M5 screw inside the encoder (without putting the encoder in place).
- Put a drop of Loctite on the thread of the M5 screw.
- Screw the encoder onto the rotor.
- Screw the plastic screw on the top of the encoder.
- Fix the encoder base plate, at the back of the 2 brakes, with the 2 socket hex screws M5 (15).

7.1.3 - Adjusting the encoder (see § 6.2)

7.2 - Brake replacement procedure


7.2.1 - Removing the encoder (see § 7.1.1)

7.2.2 - Removing the old brake and the brake disc.

-  Secure the load before any operation on the motor. Make sure that no torque applies to the rotor!

- Disconnect the brake

7.2.3 - Fitting the new brake

-  **CAUTION !** Do not touch or put any grease or oil on the brake lining! Use gloves or wash hands if necessary.

- Put a little grease on the rotor splines
- Put the brake disc with its O-rings on the splines, the shoulder showing forward.
- Push the brake disc to the friction face of the non-drive endschild of the motor.
- Mount the first brake coil unit.
- Place the 3 spacers on the 3 fixing screws of the brake coil unit.
- Position the brake coil unit in the right position in relation to the non-drive endschild of the motor.
- Turn the 3 fixing screws until contact.
- Tighten the 3 fixing screws with torque 44Nm \pm 10% in the following order: screw on the top (1), screw on the bottom (2) and screw in the middle (3), see fig.3.

Note : Secure the fixing screws (safety washer or thermoplastic liquid such as Loctite)

- Remove the transport screw, see fig.3.
- Proceed to all electrical connections.
- Carry out a few successive draws and releases.
- Check the airgap (see §6.1).

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- Mount the additional brake coil units by following the same procedure and by respecting the brake composition set up in the packaging.

Note : Before any dynamic braking, make run the motor at low speed (< 5 rpm), with the brake engaged over few turns to place properly the disc.

Reminder : These brakes are intended for static application only as safety brakes. Any dynamic braking is restricted to emergency and test braking. Normal use will not lead to any noticeable wear on the linings.

If the airgap exceeds the maximum value given in §6.1, it will be necessary to change the friction disc, see §7.2

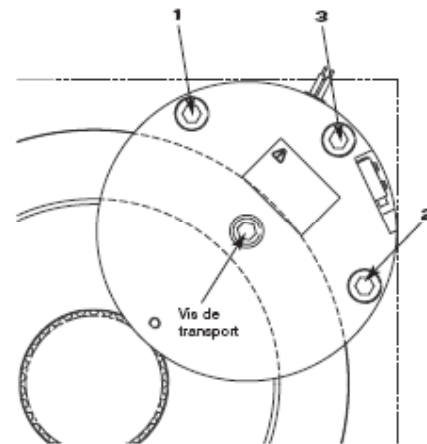


Fig. 3

8 - ORDERING OF SPARE PARTS

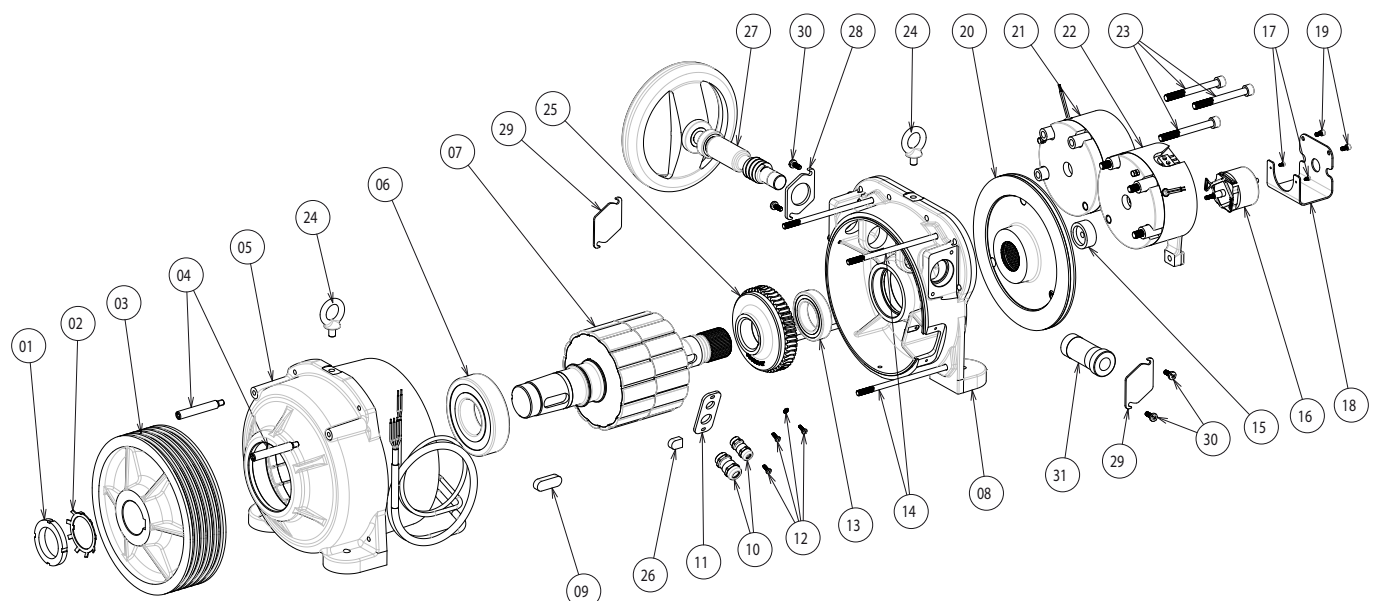
To obtain the most efficient after-sales service, always provide the following information when ordering: motor type and serial number, and for each part:

- part designation and (or) part number
- quantity to order

For immediate identification, please indicate the file reference used for the order (number of drawing or manual). The motor type and the serial number figure on the name plate of the motor.

Designation of parts :

1 & 2 – Safety screw and washer	13 – Rear Bearing	Lifting Kit
3 - Sheave	14 – Motor assembly bolts	24 – Lifting Eyebolt (Option)
4 – Rope protection bolts	15 – Encoder hub	
5 - Housing	16&17 – Encoder with assembly bolts	Option Manual Rescue Device
6 – Front bearing	18&19 – Encoder base plate with screws	25 – Worm wheel
7 - Rotor		26 – Key for worm wheel
8 – Rear endshield	Brake sub-assembly	27 – Worm sub-assembly
9 – Key for sheave	20 – Brake disc	28&30 – Thrust plate with screws
10 – Cable gland kit	21&23 – Brake without manual release	29&30 – Cover plate with screws
11&12 – Cable gland base kit	22&23 – Brake with manual release	31 – Worm shaft bushing



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9 - RESCUE PROCEDURE IN CASE OF POWER SUPPLY FAILURE

9.1 - Choice of side of manual rescue device

In the standard version, the motor is supplied for mounting of the manual device to the right side. In the case of mounting to the opposite side, follow the items 1) to 4):

- 1) When installing the motor (33), choose the side for the manual rescue device.
- 2) Fit the cover plate (29) and fasten with the 2 screws (30).
- 3) On the opposite side, insert the worm shaft bushing (31).
- 4) Fit the cover plate (29) and fasten with the 2 screws (30).

9.2 - Procedure for the installation of the manual rescue device

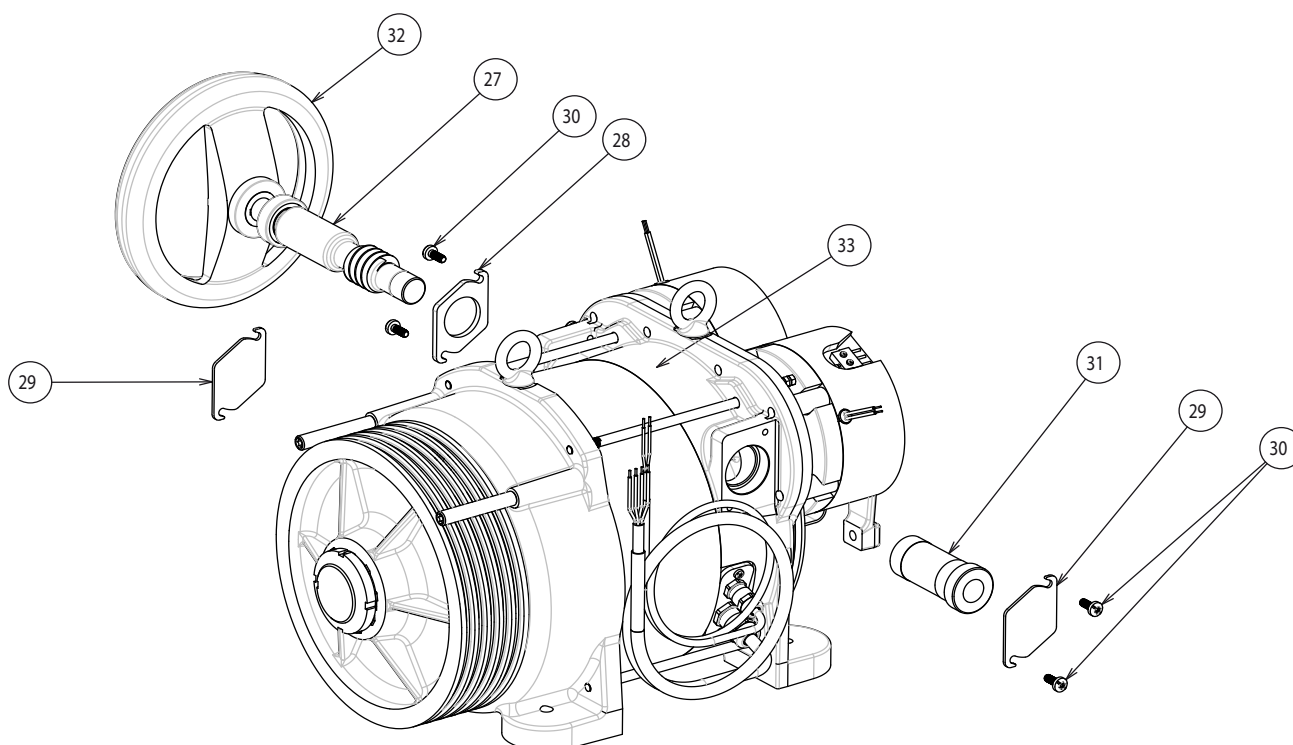
- 1) Disconnect the motor electrically from the controller.
- 2) Remove the 2 screws (30)
- 3) Remove the cover plate (29) by pivoting around the 2 screws
- 4) Push the manual rescue device sub-assembly (27) and (28) axially into the housing.
- 5) Finalize the insertion of the sub-assembly by turning the hand wheel (32).
- 6) Fit the thrust plate (28) under the screws (30).
- 7) Fasten the thrust plate by tightening the 2 screws (30).

9.3 - Handling of the cabin

- 1) To move the cabin, turn the hand wheel (32) in the selected direction.
- 2) As soon as the position of the cabin is even with the floor level, the doors can be opened.

WARNING !
 The manual device must imperatively be removed before restarting the motor !

27 - Manual rescue device (sub-assembly)	31 – Worm shaft bushing
28 – Thrust plate	32 – Hand wheel
29 – Cover plate	33 - Motor
30 – Assembly screw	
30 – Assembly scw	



MICRO GEARLESS XAPI-CE

Permanent magnet synchronous motor for commercial lifts



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<http://www.leroy-somer.com>