LEROY SOMER

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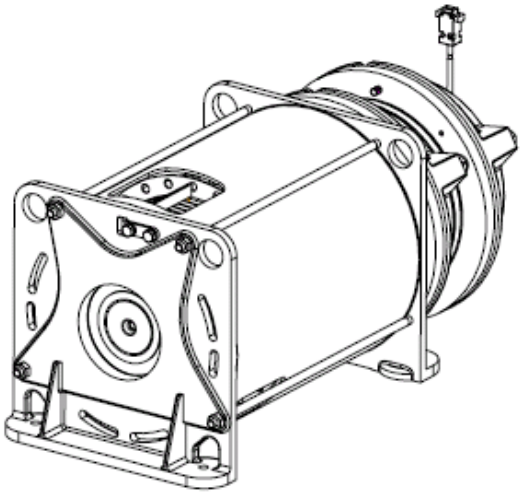


This notice must be given to the end user

GEARLESS XA2

A.C. Drive for lifts

Installation and maintenance

GEARLESS XA2
A.C. Drive for lifts
SUMMARY

GEARLESS XA2
A.C. Drive for lifts

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

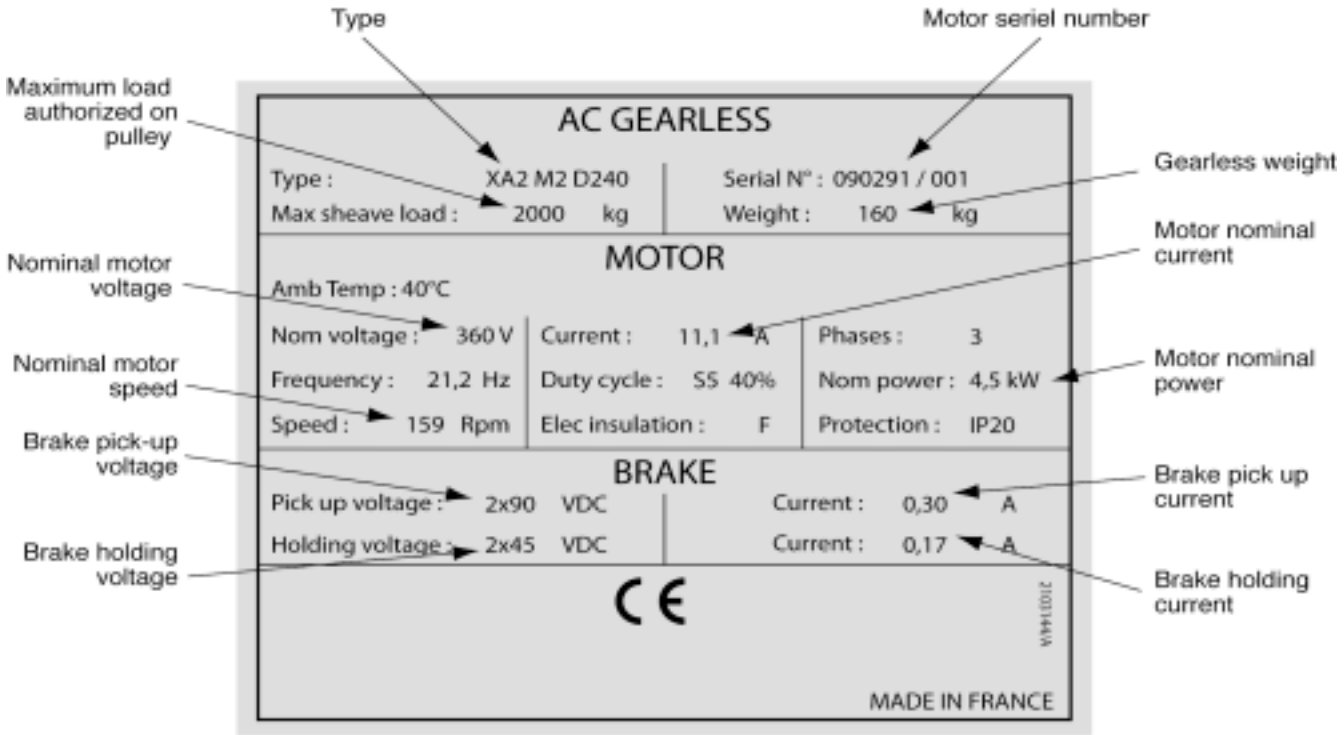
⚠ **IMPORTANT : Contact with rotating or electrically live parts may cause injuries. Do not touch the frame of a running motor, it's temperature can reach high levels.**

REMINDER: The installation, servicing and maintenance must only be carried out by qualified staff. The non respect or missapplication of information in the given manual absolves the manufacturer of his responsability. 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 not moving before intervening on motor or brakes.**

1 - RECEPTION

Controls:
- assure conformity between the name-plate and contractual specifications, upon receipt of the machine.
- proceed with inspection on delivery. In cases of damage through transport, make the usual reservations with the transporter.



2 - STORAGE

2.1 - Storage Facility

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 pulley is turned at least twice a month (free the brakes by the manual unblocking system or energise the brakes in order to turn the pulley).

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

2.2 - Extended storage (> 3 months)

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):
- altidude less than or equal to 1000 m,
- maximum humidity rate: 95%,
- temperatures between 0 and 40°C.

De-rating may be required if particular conditions are indicated at time of order 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 cleanliness (no rust or grease particules);
- good insulation between the motor phase and earth (minimum 100MΩ under a continuous voltage of 500 V for 60 seconds) after disconnecting all of the electronic circuits if needed.

⚠ **WARNING:** do not apply the megohmeter to the heat detector 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 on the insulation level, which will tend to drop then raise.

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 restistance 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 put under voltage the pulley will move slightly (angular displacement of the rotor in relation to the stator).**
Connection chart (refer to figures 1 and 2 of paragraph 4.2 Cabling)

Motor*	Brake
U1 + V1 / W1	1 - 3

*Green/yellow connected to the stator

4.1 - INSTALLATION

The installation must be in conformity to the motor characteristics indicated on the rating plate (see § 1).
It must intergrate the electrical safety.
Verify that the moving equipment (slings...) are adapted to the weight of the machine.
Use the attachment points provided on the machine.
Check that the cables are well positioned in order to avoid deterioration.
Ensure that necessary mechanical protection is in place to avoid persons working on the machine being caught or trapped by the pulley or cables.
The motor should be installed to allow cooling air (not too humid, free of dust, vapours and corrosive gasses) to circulate without clogging.

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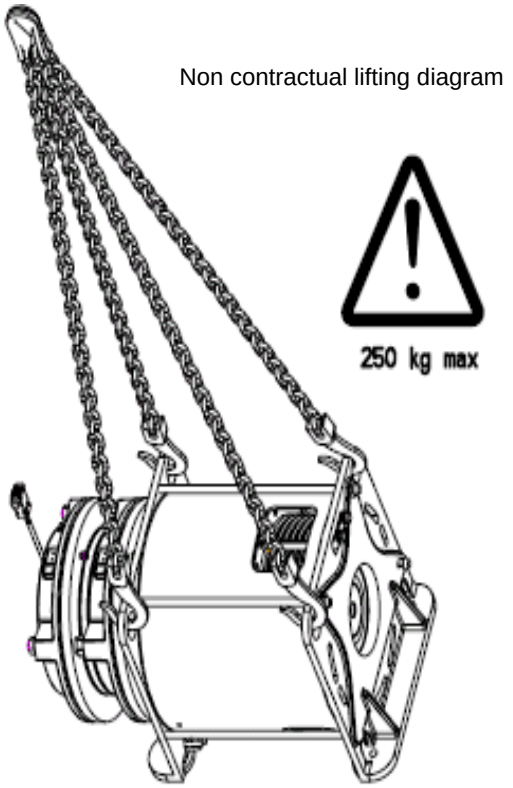


Fig. 1: Motor lifting

4.1.1 - Cleaning

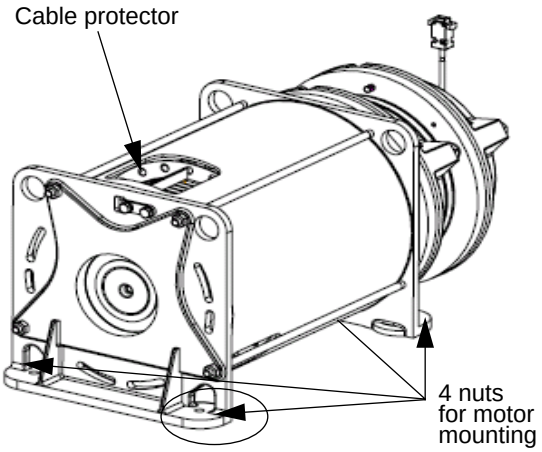
- Release the brakes with the manual unblocking system or energise the brake if there is no manual unblocking.
- Remove the protection varnish from the pulley grooves (if present).

⚠ **CAUTION: Do not use abrasive materials, only an alcohol soaked cloth. Be careful not to put alcohol or 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 the M16 nuts and washers. Nuts are only to be tightened when the cables, the cabin, the counterweights, and the drive pulley are perfectly aligned. Before installing the cables, check that the drive pulley can turn freely by hand when the brakes are open.



- Check that the cables are well adapted to the pulley.
- When the cables are installed, adjust the variation between the cables and the protection then block the protectors.

⚠ **CAUTION: There is a high risk of jamming between the cables and the pully.**

4.2 - Cabling

- Shielding of the cables connected to earth and cable outputs by the cable gland.

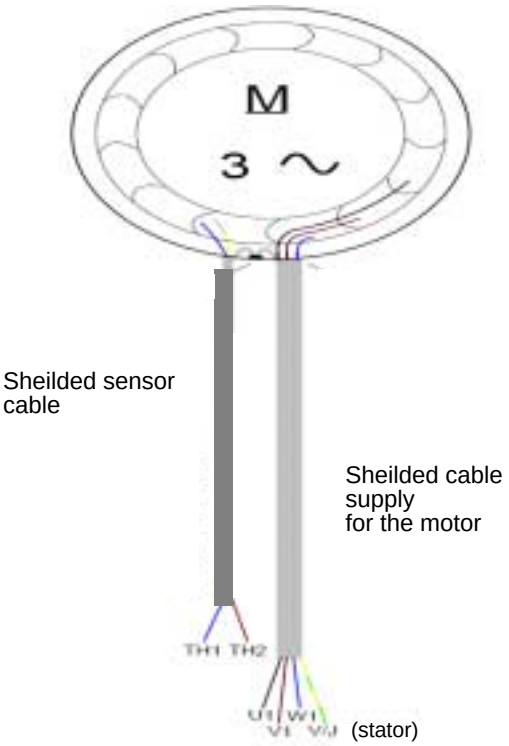


Fig. 1 - Motor

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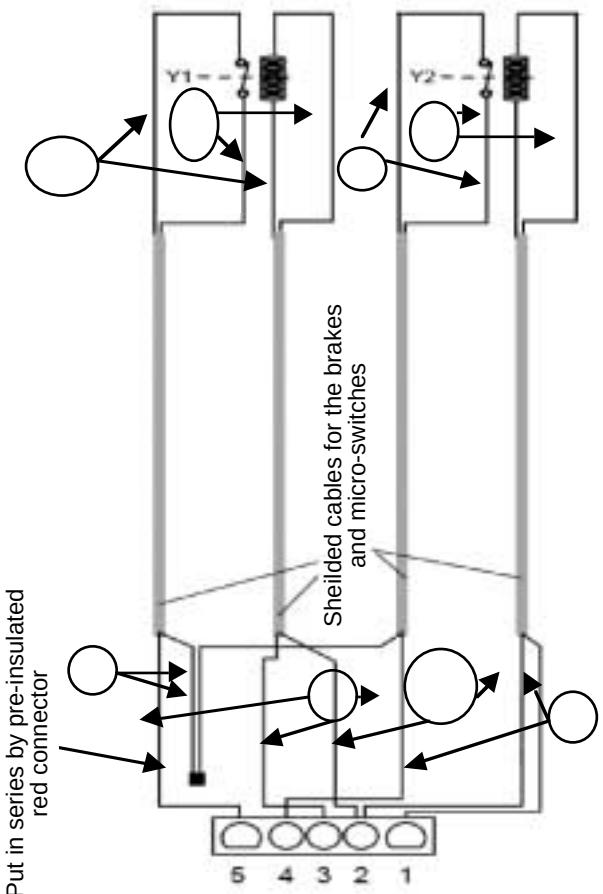
The brakes micro-switches must be «NF» standard



Connector type MAT-N-LOCK male ref 350809-1 (AMP)

Fig. 2 - Micro-switch (brake)

Key: 1: Brown - 2: Red

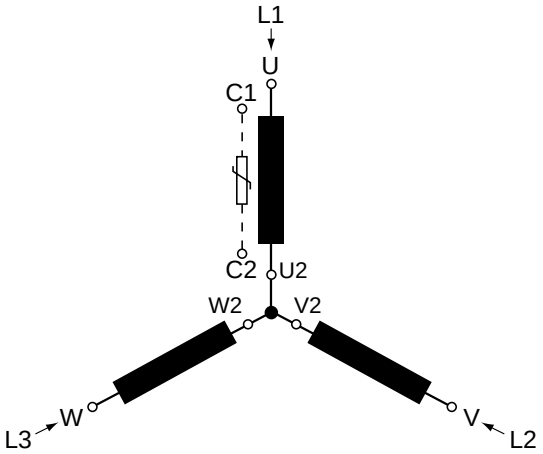


Fig. 3 - Internal motor connection

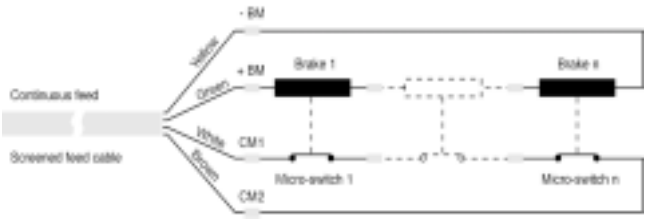


Fig. 4 - Brake and internal micro-switch connection

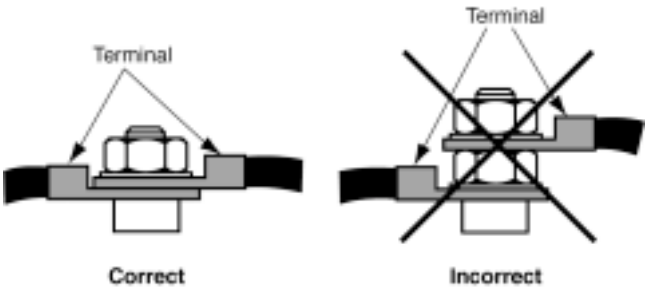
- Connect the motor using the adequate section cables (cables and terminals are dimensioned according to the current: see chart below). Thoroughly check the nut tightness on the terminals. (Bad tightening may cause destruction to the connections through heat: see later picture).

Nominal I (A) per phase	9,5	12	16	25	34	40	46	60	70	96
Min. cable section (mm^2)	1,5	1,5	2,5	4	6	10	10	16	16	25

⚠ CAUTION: It is the users responsability 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 for the standards in effect.

The recommended sections are determined using single-wire cable with a maximum length of 10m, beyond which line drops need to be taken into account due to its length.



- Connect the power cables to the terminals U1, V1, W1, in conformity with IEC 600034-1 (see § 4.2).
- Connect the temperature sensor to the variator.
- Connect the motors stator to earth (see § 4.2).
- Connect the brakes to the micro-switches.
- Connect the encoder.

4.3 - Start up

Check that the electrical drives are well 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:
- noice,
- vibrations,
- action of switches/buttons,
- also check the current and the voltage on the machine while operating at rated load.

5 - MAINTENANCE/SERVICING

5.1 - After 1 month of operating

- Check the tightness of bolts or electrical connections.
- Check the vibrations. Check for abnormal connections.
- Remove grease traces (if any) from the brake discs.
- Make sure that the brake noise level is less than 60dBA. If a higher noise level is reported, please 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 paragraph 6.

Note/ this measure will be used as reference.

5.2 - Once a year

- Make sure that the brake noise level is inferior to 6dBA. If higher, adjust according to paragraph 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, ENCODERS AND MICRO-SWITCHES

6.1 - Adjustment of airgap clearance (non-supplied brakes)

6.1.1 - Brake clearance control

- Measure the airgap with a set of feeler gauges at the two indicated places (between the framework and the brake box) see fig. 4 from § 6.1.2.3.
- The brake is correctly adjusted, if the airgap is between 0,25 and 0,3 mm (factory setting).

6.1.2 - Brake airgap adjustment

6.1.2.1 - Tools needed

- A set of feeler gauges: 0,3 mm, 0,25 mm and 0,06 mm.
- Male hexagon offset spanner (2 mm): DIN 911 (extended version: L=90).
- Small flat screwdriver.
- Crosshead screwdriver for M3 screw.
- Flat spanner for hexnuts (24 mm).
- Flat or offset spanner for hex nuts (18 mm).
- Torque spanner for hex nuts (18 mm) : 30-60 N.m available.
- Pocket torch.

6.1.2.2 - View of Brake

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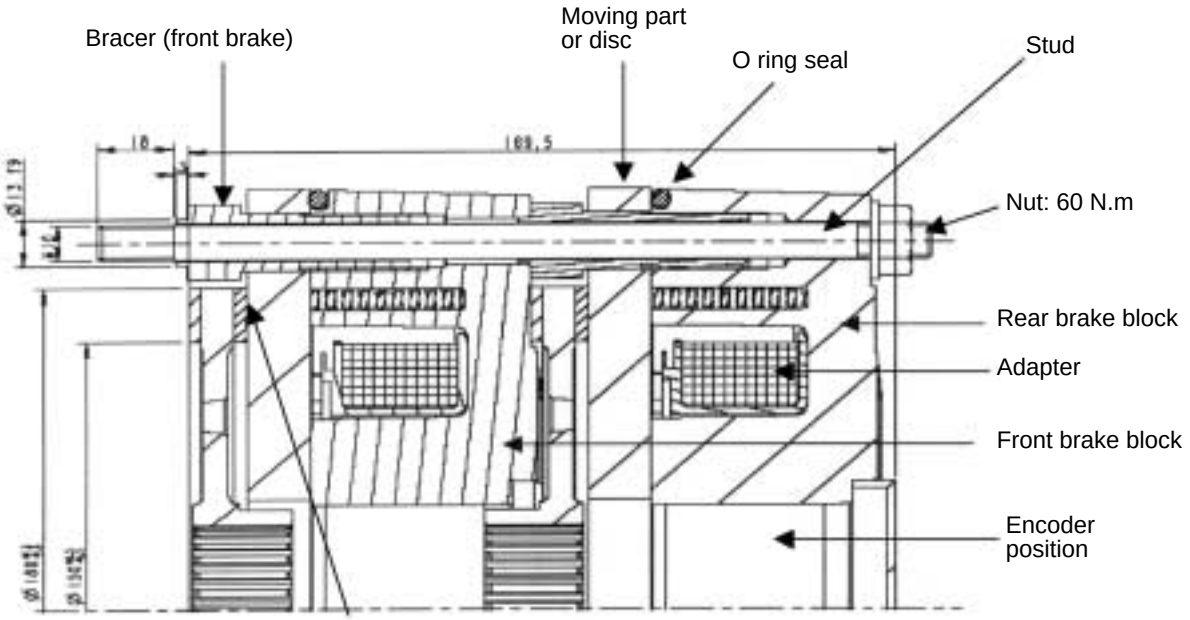
⚠ The dimensions on the picture are not validated. The encoder is not represented.



Airgap: 0,3 mm (when the windings are energised)

Cross-sectional view of the two brakes

- Turn the spanner anti-clockwise to the encoder in order to reduce the airgap.

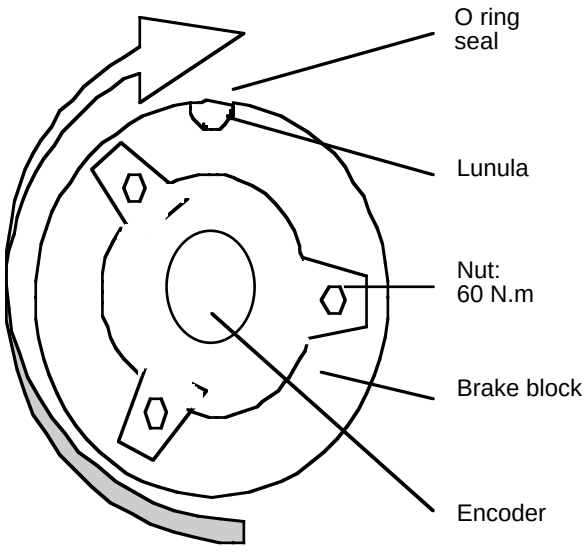


Fig. 3 - Lunula

Check if you have a lunula on the brake block to remove the O ring seal. If so, use only § 6.1.2.3. if there isn't a lunula, use only § 6.1.2.4.

6.1.2.3 - Adjusting with a lunula

- Remove the joint ring with a flat screwdriver. Do not remove completely as indicated in the picture.
- Screw and unscrew the bracer until a 0,3 mm gauge can be inserted, but not two gauges together (0,31). Insert the gauges between the moving part of the brake and the brake block adjacent to the bracer (see fig 3 lunula).
- Adjust in the same way the two other bracers of the same brake. Then adjust the second brake.
- Reposition the O ring seal by pressing with the fingers.

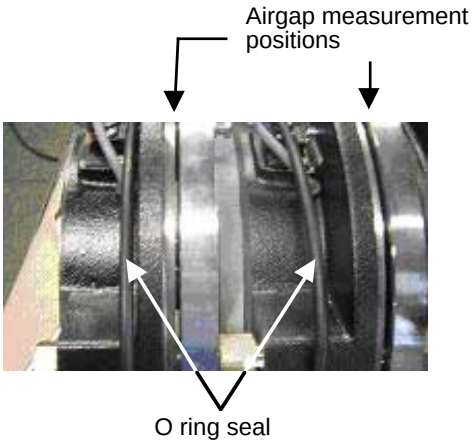


Fig. 4

6.1.2.4 - Adjusting without a lunula

- Unscrew (but not fully) the rear brake nuts until the O ring seal can be removed.
- Remove the O ring seal with the aid of a flat screwdriver. Do not remove completely as indicated on fig 4.
- Initially tighten the 3 nuts on the rear brake to a torque of 30Nm.
- Then tighten the 3 nuts on the rear brake to a torque of 60Nm.
- Screw and unscrew the bracer until a 0,3 mm gauge can be inserted 0,3 mm, but not the two other gauges together (0,31 mm). Insert the gauges between the moving part of the brake and the brake block ajacent to the bracer.

See fig 3 and 4.

- Adjust in the same way the two other bracers of the same brake. Then adjust the second brake in the same way
- Reposition by pressing the O ring seal with fingers.
- Tighten the bolts on the rear brake to a torque of 60 N.m

6.1.2.5 - Control of brake airgap (supplied brakes)

- Energise the brakes.
- Check the noise level of each brake (no slapping) and that the pulley turns freely with the brakes open.
- If there is too much noice, readjust the brakes with a 0,20 mm gauge.
- After this action, check without fail the micro-switches adjustement.

6.2 - Adjusting the encoder

- Connect the brake supply and encoder connectors.
- Adjust the encoder to fit the new encoder.

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 if 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 others. The control is done by operating the brake several times (opening/closing) to be carried out without fail on at least 3 equidistant points during a full rotation of the brake disc.

6.3.2 - Adjustment

6.3.2.1 - Tools needed

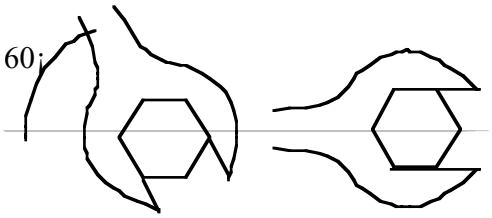
- 2 flat spanners for hex nuts (8 mm)
- A pilot lamp for adjusting the micro-switches.
- Adaptable points on the pilot lamp in order to be able to plug into the back of the connector. See fig 1.

Fig. 1

6.3.2.2 - Adjusting the first micro-switch

⚠ Secure the load before any action on the brakes;
Only adjust the second micro-switch if the first has been adjusted.

- Connect the pilot lamp to the two wires on the micro-switch. The lamp should light. (use fig 1). If it doesn't unscrew each adjustment screw until it does (see fig3).
- Unscrew with one turn, only one adjustment screw and its lock nut (see fig2).
- Slowly screw the adjustment screw until the light goes out. Unscrew to 60° once the light has gone out.
- Hold the adjustment screw in position with a flat spanner while tightening the lock nut.
- Only if the first micro-switch has been ajusted, adjust the second in the same way.
- Connect the brake feed connector.



Make sure that the bolt head has the same orientation before and after tightening.

Fig. 2

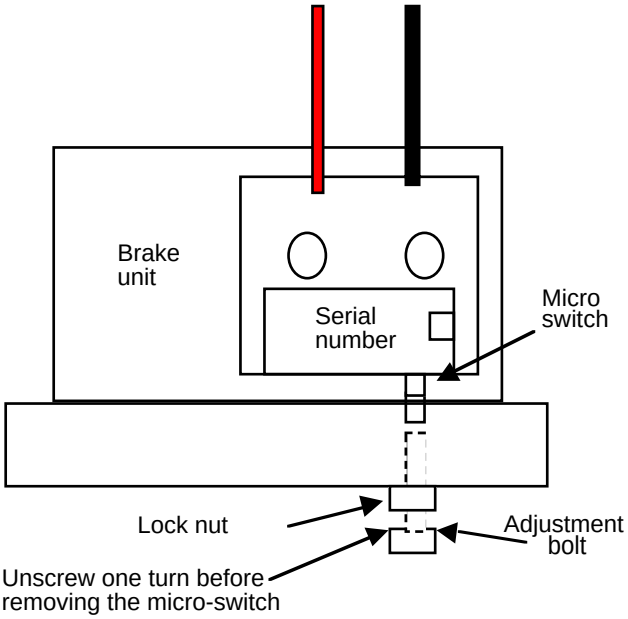


Fig. 3

7 - REPLACING ENCODERS BRAKES AND MICRO-SWITCHES

Tools needed
- Male hexagon offset spanner (2 mm): DIN 911 (extended version: L=90).
- Male hexagon offset spanner (4, 5 and 6 mm) : DIN 911 (unextended).
- Crosshead screwdriver for M3 screw.
- Flat head screwdriver for M6 screw.
- Flat or offset spanner for hex nuts (18 mm).
- Torque spanner for hex nuts (18 mm) : 30-60 N.m.
- Loctite 8150 grease or equivalent.
- Pocket lamp.
- Brake thread Omnifit 100M or equivalent.
- Kit to be acquired through retailer.

7.1 - Encoder change procedure

⚠ **Secure the load before any operation on the motor. Make sure that no torque is applied to the rotor**
- Unplug the encoder.
- Unplug the brake connector(s).
- Check to see if you have a DANAHER encoder (fixed to the brake with a metal plate) or a HEIDENHAIN encoder (screwed into the brake hole).

7.1.1 - If HEIDENHAIN encoder dismantling procedure as below

- Unscrew (3 turns) the CHC (M2) screw inside the brake hole (between the brake and the encoder). Use the lamp to find.

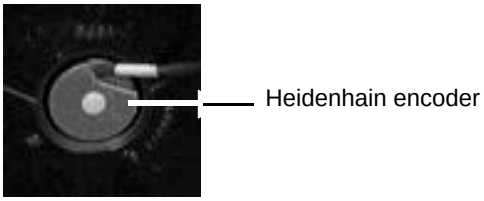


Fig. 1

Removing the HEIDENHAIN encoder:
- Unscrew (2 turns) the CHC (M2) screw inside the brake hole (between the brake and the encoder). Use lamp to find.
- Unscrew the plastic screw on the top of the encoder. Then unscrew the bolt inside using a male hexagon offset spanner (4 mm).
- Place the M6 screw instead of the M5 screw which has just been removed.
- Remove the encoder and the M6 screw inside.

7.1.2 - If DANAHER encoder dismantling procedures below

- Unscrew the 2 crosshead screws on the top of the encoder (keep them).

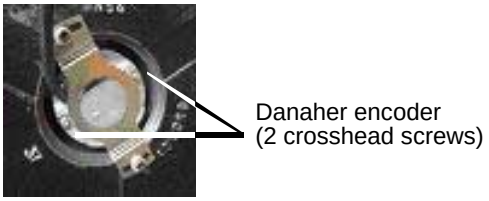


Fig. 2

Removing the DANAHER encoder:
- Unscrew the steel plate fixing the encoder to the brake.
- Unscrew the 3 crosshead screws on the top of the encoder (keep them).
- Remove the encoder hood (keep it).
- Loosen the bolt inside the encoder (male offset spanner 4 mm).
- In place of the M5 screw which has just been removed, place the M6 screw.

Remove the encoder and unscrew the M6 screw inside
- Unscrew the 3 hex nuts on the rear brake.
- Remove the rear brake.
- Remove the front brake disc.
- Remove the front brake.
- Remove the front brake disc.

7.1.3 - Reassembling the HEIDENHAIN encoder

- Place the M5 screw inside the encoder (without putting the encoder in place).
- Put a drop of Omnifit on the M5 screw thread.
- Screw the encoder to the rotor.
- Screw the plastic screw on the top of the encoder.
- Screw the M2 screw inside the brake hole (between the encoder and the brake). Use the pocket lamp to find.

7.1.4 - Reassembling the DANAHER encoder

- Place the M5 screw inside the encoder.
- Put a drop of Omnifit on the M5 screw thread.
- Screw the encoder to the rotor.
- Fix encoder hood.
- Screw the fixation plate to the encoder.
- Screw the fixation plate with the brake.
- Plug the brake and encoder connectors.
- Auto calibrate the new position of the encoder on the speed variator.

7.1.5 - Adjusting the encoder (see § 6.2)

7.2 - Brake changing procedure

7.2.1 - To remove the encoder (see § 7.1)

7.2.2 - Removing the old brakes

⚠ **Secure the load before any operation on the motor. Make sure that no torque is applied to the rotor!**
- Unplug the encoders connector.
- Unplug the brakes connector(s).
- Check if you have a DANAHER encoder (fixed to the brake with a metal plate) or a HEIDENHAIN encoder (screwed into the brake hole).

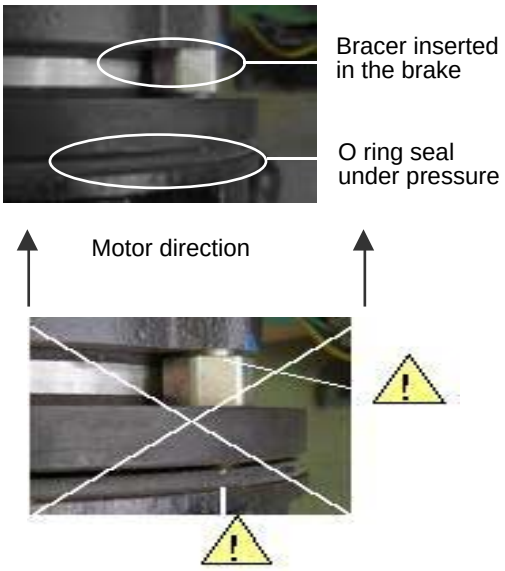
7.2.3 - Refitting new brakes

⚠ **CAUTION: Do not touch or put any grease or oil on the brake lining! Use gloves or wash hands if needed.**
Do not mix rear and front brakes and discs.
- Put a little grease on the rotor splines.
- Put the front brake disc on the splines making sure they are correctly positioned (see below).


- Put the back brake disc on the bracers making sure they are well positioned (see below).

- Put the back brake disc on the bracers making sure they are well positioned (see below).


- Insert the front brake on the studs respecting the direction (the 2 micro-switches must be alined and on the top).
- Put in place and tighten the nuts (18 mm): 30 N.m.
- Check that the bracers are well postioned (see below). If not, loosen the 3 nuts and repeat the above step. Counterbalance the weight of the brakes on the studs to improve bearer positionning.



- If the bracers are correctly positioned, tighten the 3 nuts (18 mm) to a torque of: 60 N.m .

7.3 - Replacing the micro-contacts

7.3.1 - Tools needed

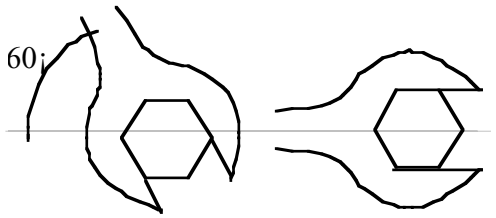
- Male hexagon offset spanner: DIN 911, 1,5 mm.
- A wire cutter to remove sleeving and free the wires.
- Brake thread Omnifit 100M or equivalent.
- 2 flat spanners for hex nuts (8 mm).
- A pilot lamp for adjusting the micro-switches.
- A crimper.
- 2 Colson rings or equivalent: 3,5*140 (for each micro-switch).
- 2 protection sleeves: 30 cm long; interior diameter between 8 and 10 mm.
- Kit to be acquired through LEROY-SOMER Motors.

7.3.2 - Remove the old micro-switches

⚠ **Do not remove two micro-switch at the same time! Secure the weight before any operation on the brakes.**
- Cut the micro-switch wires at 20 cm.
- Unscrew one turn the adjustment bolt on the micro-switch.
- Unscrew and remove the micro-switch.

7.3.3 - Putting into place the micro-switch

- Put a drop of Omnifit on both of the micro-switch fixing screw threads.
- Tighten the micro-switch bolts to a low torque (30 N.m).
- Connect the pilot lamp on both of the micro-switch wires.
- Slowly tighten the adjustment bolt until the light goes out. Unscrew to 60° after the light has gone out (see below).
- Hold the adjustment bolt in position with a flat spanner while tightening the lock nut.



Make sure that the bolt head has the same orientation before and after tightening.

Fig. 1

7.3.4 - Placing the new cables for the micro-switches

- Cut and free the wires coming from the connector as indicated on fig 2.
- Insert the sleeving around the wires coming from the connector.
- Cut and free the micro-switch wires (see fig 1).
- Connect the connector wires with those from the micro-switch using two cufs and a crimper.
- Fix the new sleeve around the cufs and wires using two Colson rings or equivalent.

BEFORE INTERVENING
NEVER CUT THE WINDING WIRES!

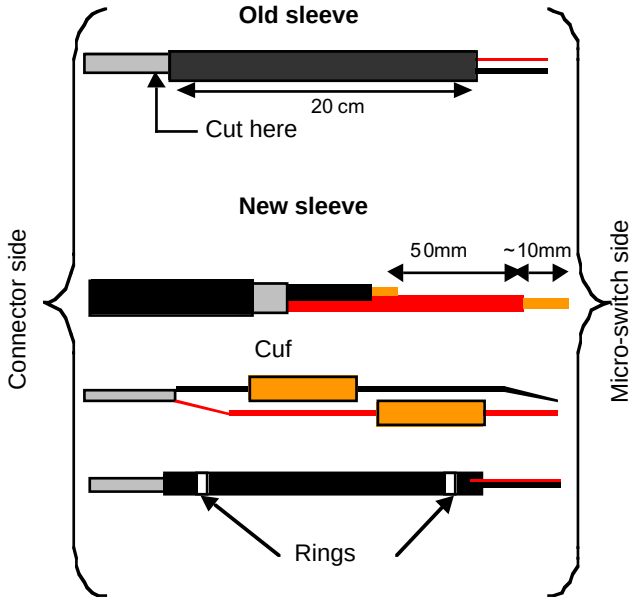


Fig. 1

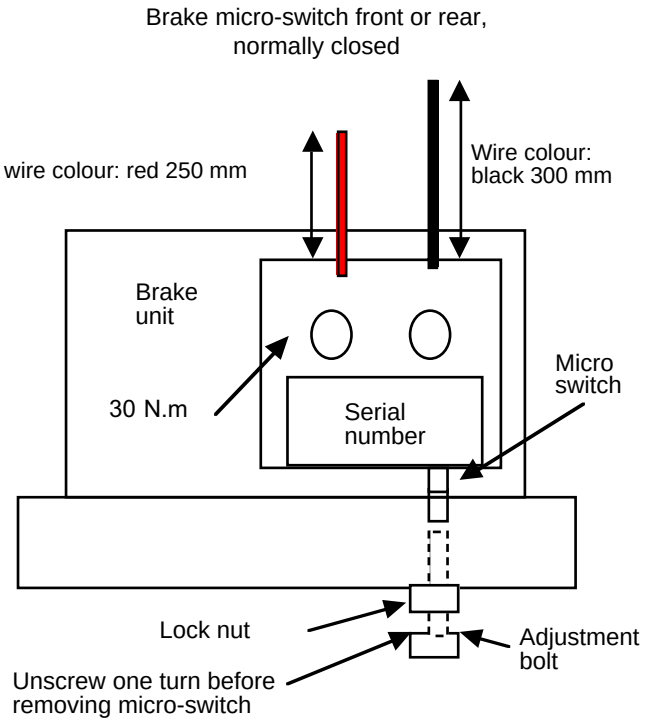


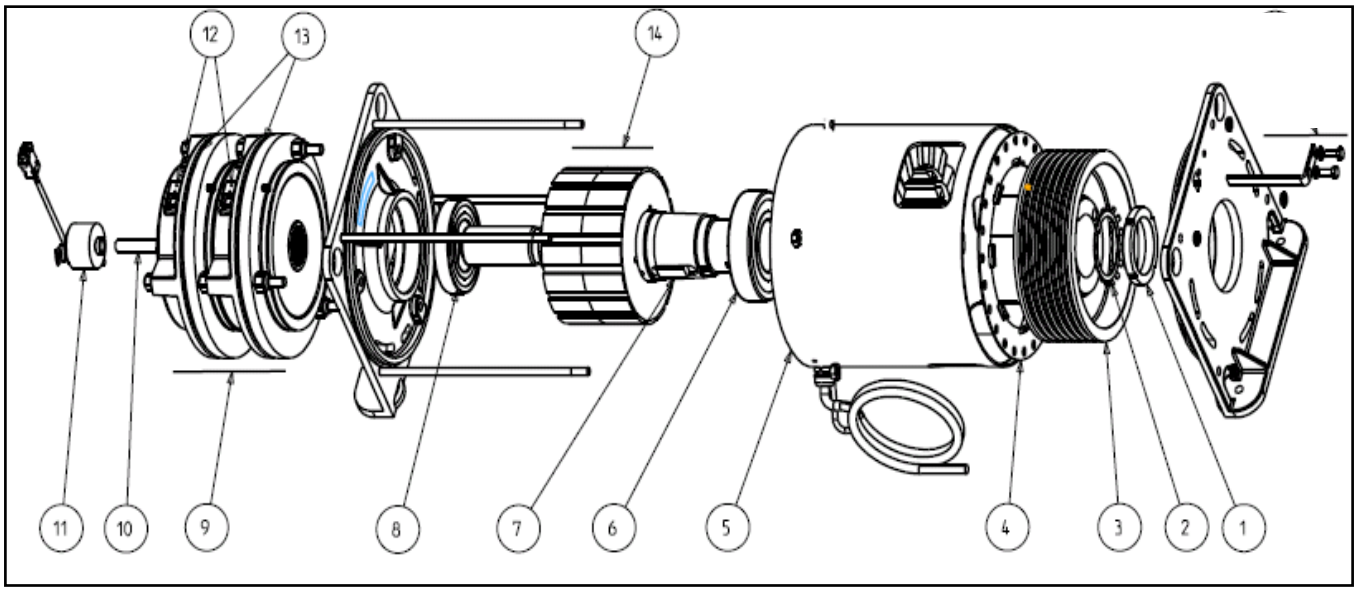
Fig. 2

8 - ORDERING OF REPLACEMENT PARTS

For the after-sales service, always provide the following elements with replacement parts orders:
- motor type and serial number,
and for each part:
- part designation and (or) parts number,
- quantity ordered.
For immediate identification, please indicate the file reference used at order (plan or manual number). Details of the type and serial number can be found on the motors rating plate.

Parts designation:

1 - 2 : Brake ring and nut	7 - Key	12 - Micro-switches
3 - Pulley	8 - Front bearings	13 - O ring seal
4 - Stator ring	9 - Brake	14 - Rotor
5 - Stator	10 - Axle encoder	15 - Motor bearing
6 - Front bearings	11 - Encoder (2 types possible)	16 - Brake bearing



GEARLESS XA2
A.C. Drive for lifts
NOTES

MOTEURS LEROY-SOMER 16015 ANGOULÊME CEDEX - FRANCE

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