Geared motor
Multibloc 3901 - TSA 50

Manual
Commissioning, maintenance

Mb 3901 - TSA 50

"CNIM"

Leroy-Somer thanks you for having chosen their product. In order to ensure your complete satisfaction, this document will provide you with the necessary information for the commissioning of gearboxes and geared motors.
Our products are systematically inspected prior to dispatch. However we would ask you to make sure that no damage has occurred during transportation. Should this be the case, please notify the carrier immediately.

FOREWORD

This manual concerns the Multibloc 39 gearbox and the TSA 50 motor, used in accordance with CNIM specifications n° E8 S 38 S 03.005 (power ratings, charging cycle, ambient temperature etc).

Operation in conditions not conforming to these specifications may affect the following recommendations.

Réf. 2215 - 4.33 / c - 10.96

GEARED MOTOR Mb 3901

1 - **STORAGE and INSTALLATION**

1 - 1 **Storage:**

The geared motor must be stored under cover, protected against inclement weather and possible pollutants. It should be kept in a humidity lower than 98% and at a temperature between -10°C and +50°C.

If requested at the time of ordering (internal parts), geared motors supplied without oil are protected against corrosion by pulverisation with anti-corrosion oil, carried out in the factory. Protection lasts for a maximum period of 6 months.

In the case of geared motors supplied with oil up to the level, it is advisable to operate the motor for 10 minutes every 2 months. If this is not possible, the machine should be completely filled with oil which should be taken down to the level on installation.

1 - 2 **Assembling transmission devices :**

Motor coupling : put the V seal 103 . 10mm before the output shaft shoulder and perpendiculary to the axis. Insert Epexelf MO2 grease (or equivalent) into the worm bore and the bearing 87. The quantity of grease must be adequate to make a reserve in the bore back.

It is advisable to assemble the transmission devices before installing the gearbox in its final environment.

Before assembling the transmission devices, remove the protections on the shaft end(s) and flanges. If a solvent is used, ensure that it does not come into contact with the seals.

For assembly, use the tapped hole in the shaft end. According to DIN 332, the transmission devices should preferably be heated to a temperature of around 80°C. **In no circumstances should a hammer be used**, as shocks and blows to the shaft end will damage the bearings. Transmission devices should be assembled as near as possible to the shoulder of the shaft. For chain transmissions, check that the shafts are parallel and always follow the manufacturer's recommendations.

1 - 3 **Installing - Fixing :**

The gearbox itself (without the motor) must always be handled using 2 x 290 lifting rings.

The geared motor must be handled as follows :

- position B (horizontal motor) : lifting ring 290 situated at the front of the gearbox (opposite the motor) + 2 motor shackles.

- position V (vertical motor) : 2 hooks in the 2 holes in the feet behind the motor (motor side) + 2 motor shackles.

Installation of a Leroy-Somer geared motor or gearbox must be carried out so that ventilation air can circulate freely. Equipment should be installed on a **flat, rigid baseplate capable of withstanding mechanical vibrations** and resistant to the effects of torsion or flexion. The output shaft must be carefully aligned, and the foot mounting should not cause any mechanical tension on the gearbox. The foot housing must be flanged on its support by 4 x M24 screws (class 10-9 minimum) of sufficient length. The tightening torque must ensure that the screws are tightened to a tension of 70% to 75% of the elasticity of the screw material. It is strongly recommended that the screws are locked using an adhesive or appropriate mechanical solution. It is also advisable to fit M24 NFE 25-513 plain washers under the screw heads.

1 - 4 **Electrical connection of geared motor :**

Check that the motor supply voltage conforms to the mains supply voltage. Wiring diagrams can be found on the inside of the motor terminal box cover.

Cross sections, conductor type and protective devices conform to specifications and current standards.

Electrical connections must be carried out by qualified personnel adhering to the current safety regulations.

1 - 5 **Commissioning**

Replace the 255 plug, situated on the top, with the 257 gauge delivered with the gearbox. Check the conformity of the gauge depending on the operating position of the gearbox. The marking under the gauge head must be : position B = 155 to 165 mm, position V = 120 to 130 mm.
Check the oil level. Fill as required, (see lubrication).

2 - **RUNNING-IN**

2 - 1 **First start-up**

In order to increase the life of the gearbox, it is advisable to run it in at 50% of the rated power for around 48 to 96 hrs, then to switch gradually to the rated load for a few hundred hours. The oil, still hot, should be drained after this period.

2 - 2 **After 50 hours of operation**

Check the state of the seals. **Check the oil level,** the tightness of the gearbox fixing screws and the transmission rung according to the manufacturer's recommendations.

2 - 3 **Maintenance**

The Leroy-Somer gearbox or geared motor only requires limited maintenance. However, it is recommended that the oil level be regularly checked.

3 - **SECTIONAL VIEW and PARTS LIST**

The parts list on page 4 corresponds to diagram 502638 on page 5.

4 - **LUBRICATION**

4 - 1 **Type of lubricant:**

Leroy-Somer Motors recommends the use of Shell Tivela WB oil, a polyalkylene glycol synthetic lubricant with ISO VG 220 viscosity, which has been approved by its Technical Department. This lubricant can only be substituted by the following lubricants with the same class of viscosity (ISO VG 220) and of the same type (synthetic polyalkylene glycol). These lubricants have not been approved by LSM, and the user or recommending retailer is responsible for their use.

SUPPLIER	REFERENCE
BP	ENERGOL SG-XP
CASTROL	ALPHA PG
ICI TRIBOL	TRIBOL 800
ICI TRIBOL	TRIBOL 1310
KLUBER	SYNTHESO HT
LUBRILOG	LUBRILOG LY PG
MOBIL	GLYGOYLE 30
TEXACO	SYNLUBE CLP
TOTAL	CORTUSA SY

CAUTION:

These specifications, instructions and descriptions concern standard operation. They do not take account of non-standard versions or special adaptations. If these recommendations are not adhered to, the gearbox or geared motor may suffer premature deterioration and the guarantee may be invalidated.

4 - 2 **Draining:**

In order to reduce pollution which might harm the bearings and seals, it is important to first drain the oil after a maximum of 1000 hrs of operation (see "comissioning and running-in"). The drainage interval depends on the service conditions. If Shell Tivela WB oil is used, we recommend the following intervals between oil changes :

Output power (kW)	22	18,5	15	11	9	7
Drainage interval (hrs)	7 300	7 300	8 000	9 000	10 000	10 000

Drainage can be carried out by use of gravity, removing the 255 plug situated at the lowest point and/or by inserting a pump into the port on top of the gearbox. The lubricant should still be warm (for better drainage of particles in suspension).

4 - 3 **Quantity of lubricant:**

The oil level should be checked regularly using a 257 gauge. This check must be carried out when the gearbox is cold (# 20°C) and at least after every oil fill or top-up (wait a few minutes until the oil runs smoothly into the housing).

operating position	Q (approximate) (litres)
B (horizontal motor)	35
V (vertical motor)	33

5 - **1ST MAINTENANCE PARTS**

Despite all precautions taken in the manufacture and the checking of equipment, Leroy-Somer cannot guarantee against leakage of lubricant. If the occurrence of minor leaks could risk the safety of equipment or personnel, it is the responsibility of the installer and the user to take all necessary avoiding action.
See also "dismantling and reassembly"

Drainage interval	**Part**	**Ref.**	**Observations** (Ps : output power of gearbox)
35000 hrs	oilseals	91-93	or if leakage (see previous text)
70000 hrs	bearings	61-62-63-64	if Ps > 15 kW
140000 hrs	bearings	61-62-63-64	if Ps ≤ 15 kW

6 - **DISMANTLING**

6 - 1 **Bearing change:**

In order to change one or more bearings, dismantling should be carried out as described below.

1. Drain the gearbox.
2. Uncouple the motor:

Use the extraction holes and the motor lifting rings.

3. Remove cap 16

Use the extraction holes

4. Take out worm screw 41

Push the screw towards bearing 64 until the end passes input seal 93. Remove the latter. Completely remove the worm screw, paying attention to bearing 64, without inverting the rings if it is to be refitted. In this case, carefully preserve shim 140.

5. Remove cap 9

Use the extraction holes. If bearings 61 and 62 are not being changed, take care not to invert the external rings or pole shims 123 and 124.

6. Remove end shield 5

Use the extraction holes

7. Remove wheel 51 and output shaft 32

Use a lifting ring screwed into the shaft end. Be careful not to knock the wheel teeth or the bearing rollers.

8. Bearings 61 and 62

Remove the internal rings with rollers using a bearing remover without damaging the running surface of output shaft 32.

9. Bearing 64

Heat lock nut 128 to around 150°C to destroy the film of glue. Unscrew lock nut 128, taking advantage of its notched bore to stop screw 41 from turning. Dismantle the internal rings of bearings 64 using a bearing remover.

10. Bearing 63

Dismantle retaining ring 135 and remove the external ring and its rollers. Remove the internal ring of the worm screw using an appropriate extractor.

Important note:

Wheel 41 is shrunk and hot-glued onto shaft 32. Any dismantling or assembly not carried out directly by Leroy-Somer could jeopardise the safety of the transmission. Wheel 41 and shaft 32 are considered as a single piece.

All dismantled parts must be cleaned before being reassembled.

All dismantled sealing devices must be replaced by new ones.

If the gearbox is totally dismantled, it is advisable to clean the inside of the housing using a product compatible with the lubricating oil.

6 - 2 **Changing the seal:**

1. Seal 93

This may be dismantled using a screwdriver or other tool which is able to pierce the steel armature (be careful not to damage the precision ground running surface of screw 41).

2. Seal 91

Dismantled after removal of cap 9 (see section 5)

===> The new seals must be greased before assembly (polyglycol grease is imperative) and set absolutely straight so that they are perpendicular to the shaft axis.

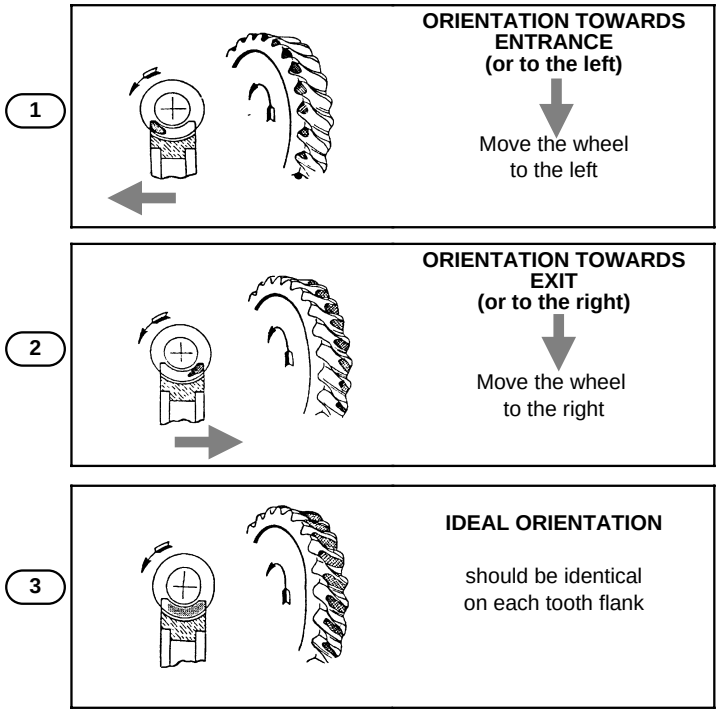
7 - **REASSEMBLY:**

This should be carried out by reversing the dismantling procedure, using the latest techniques, especially with regard to the tapered roller bearings.

1 - Bearings 64 : the internal and external rings must not be inverted (paired bearings). The thread at the end of 41 must be degreased with Loctite 7063 or an equivalent. Lock nut 128 must be tightened to 400 N.m and locked by Omnifit 200M or an equivalent.

2 - Bearings 61 - 62 : the bearings must be adjusted before positioning the wheel with operational play as indicated in diagram 502638.

3 - Bearing 41: its position in relation to the worm screw is adjusted by shims 123 and 124. This can only be checked by orientating it so that blue is visible in the holes in the housing situated on the wheel axis. The position is correct when the orientation in figure 3 is achieved. Be careful, changing shims 123 and 124 in order to correct the orientation of the wheel must not modify the play of bearings 61 and 62 previously adjusted.



4 - Tightening the screws: tightening torques for both the fixing screws and the braking by adhesive should be as indicated in drawings 502638.

5 - Before coupling the motor, clean the output shaft ; the key and the worm bore. Replace the V seal 103. If the bearing 87 is too much worn (bore > ø 36,040 mm) it must be replace as follow. Insert a ball (35 mm < ø < 20 mm) into the bore back. Screw the bearing with an electrical Nb 29 hand tap up to the ball. Continue to screw and the bearing will translate on the tap.

8 - **HIGH PRESSURE CLEANING:**
Oil gauge 257 must be replaced with a stop plug 255.
The oilseals must be protected so that there is no pressure on the lip.
Drain plug 259 must be removed (during washing, water must not be able to enter through the hole).

9 - **ORDERING PARTS**
When placing an order, please give the following details :
- type of gearbox;
- assembly position,
- precise reduction ratio,
- **manufacturing number,** indicated on the nameplate
- number, part description, LS code
- type, number of poles, motor rating
(see motor nameplates).

10 - **PARTS LIST (sectional diagram 505013, exploded view 502638)**

Rep.	Description	LS code	Quantity	Dimensions	Standard
1	Carter/Housing	PUS654CF001	1		
5	Palier/Bearing housing	PUS450DF010	1		
9/10	Chapeau/Cap	PUS050DF016	1/1		
16	Chapeau/Cap	PUS185DG001	1		
32	Arbre/Output shaft	ABE120RM001	1		
41	Vis sans fin/Worm	ENG062VF055	1		
51	Roue/Wheel	ENG385RV001	1		
61/62	Roulement/Bearing	RLT100RC002	1/1	30220	ISO 355-1981
63	Roulement/Bearing	RLT060RO024	1	NU 212 E	ISO 15-1977
64	Roulement/Bearing	RLT055RC850	1	31311A.A80.120.N11CA	ISO 355-1981
81	Clavette/Key	ARR028RH360	1	A 28x16x125 - R≥1400MPa	NF E 22-177
82	Clavette/Key	ARR025RG341	1	A 25x14x90 - R≥1800MPa	NF E 22-177
87	Coussinet/Bearing	RLT036CB002	1	36/42 X 45	
91	Joint à lèvre/Oilseal	JOI100BB100	1	AS 100x120x12 FP	DIN 3760
93	Joint à lèvre/Oilseal	JOI060BD003	2	AS 60x110x13 NB	DIN 3760
95	Joint torique/O ring seal	JOI380TB001	1	380x4 NB 70shores A	
97/98	Joint torique/O ring seal	JOI172TB0000	1/1	172x3 NB 70shores A	
100	Joint torique/O ring seal	JOI122TB000	1	122x2,5 NB 70shores A	
103	Joint V/V seal	RLT045JV003	1	V 45 S	
123/124	Rondelle d'ajustage/Shim	RLT155RA101	*	155X180X0,1	DIN 988 sp.
123/124	Rondelle d'ajustage/Shim	RLT155RA102	*	155X180X0,15	DIN 988 sp.
123/124	Rondelle d'ajustage/Shim	RLT155RA103	*	155X180X0,5	DIN 988 sp.
128	Écrou/Lock nut	RLT055ER001	1	KM11	ISO 2982
134	Entretoise/Strut	PDC005EN019	1	55x67x5	DIN 988 sp.
135	Circlips/Retaining ring	ARR110CI001	1	Ø110	DIN 472
140	Rondelle d'ajustage/Shim	RLT105RA000	*	105x130x0,1	DIN 988
140	Rondelle d'ajustage/Shim	RLT105RA005	*	105x130x0,15	DIN 988
140	Rondelle d'ajustage/Shim	RLT105RA003	*	105x130x0,5	DIN 988
171	Vis/Screw	VIS012HF108	12	M12x40 - 8.8	ISO 4014
173	Rondelle Grower/Washer	VIS012WZ002	12	W12	NF E 25-515
179/180	Vis/Screw	VIS012HF207	8/8	M12x35 - 8.8	ISO 4014
181/182	Rondelle Grower/Washer	VIS012WZ002	8/8	W12	NF E 25-515
192	Vis/Screw	VIS012HF206	6	M12x30 - 8.8	ISO 4014
201	Vis/Screw	VIS012HF210	1	M24x50 - 8.8	ISO 4014
203	Rondelle/Washer	PUS110TX006	1	25x110x7	NF E 25-513 sp.
209	Vis/Screw	VIS008CH306	8	Chc M8x30 - 10-9	NF E 25-125
210	Rondelle Grower/Washer	VIS008WZ002	8	W8	NF E 25-515
252	Bouchon cuvette/Plug	QUI120BD101	1	120x12	
255	Jauge + joint/Gauge	QUI026BP009	1	3/4 Gaz	
257	Bouchon + joint/Oil plug	QUI026BM014	5	3/4 Gaz	DIN 908
259	Bouchon purge/Draining plug	QUI006BP001	1	Ø5,8	
290	Anneau de levage/lifting ring	LEV016AN002	2	M16x25	DIN 580
300	Pignon/Gear	**	1	20B - 24B -28B : Z= ?	NF E 26-102
301	Entretoise/Strut	PUS110TX008	1 ou 0 *	90x110x17	por 24B
301	Entretoise/Strut	PUS110TX007	1 ou 0 *	90x110x37	por 20B
302	Bouchon/Plug	QUI013BM002	1	1/4 gaz	DIN 906
303	Tuyau de lubrification	CUI008TU101	1	Ø8/10x335	
*	as required				
**	specify the type of chain, the pitch p and the number of teeth Z - specify whether dynamo driven or not				
sp.	non-standard dimensions				
Screw tightening torques and adhesives used should be as indicated in drawings 502638 page 5					

Geared motor
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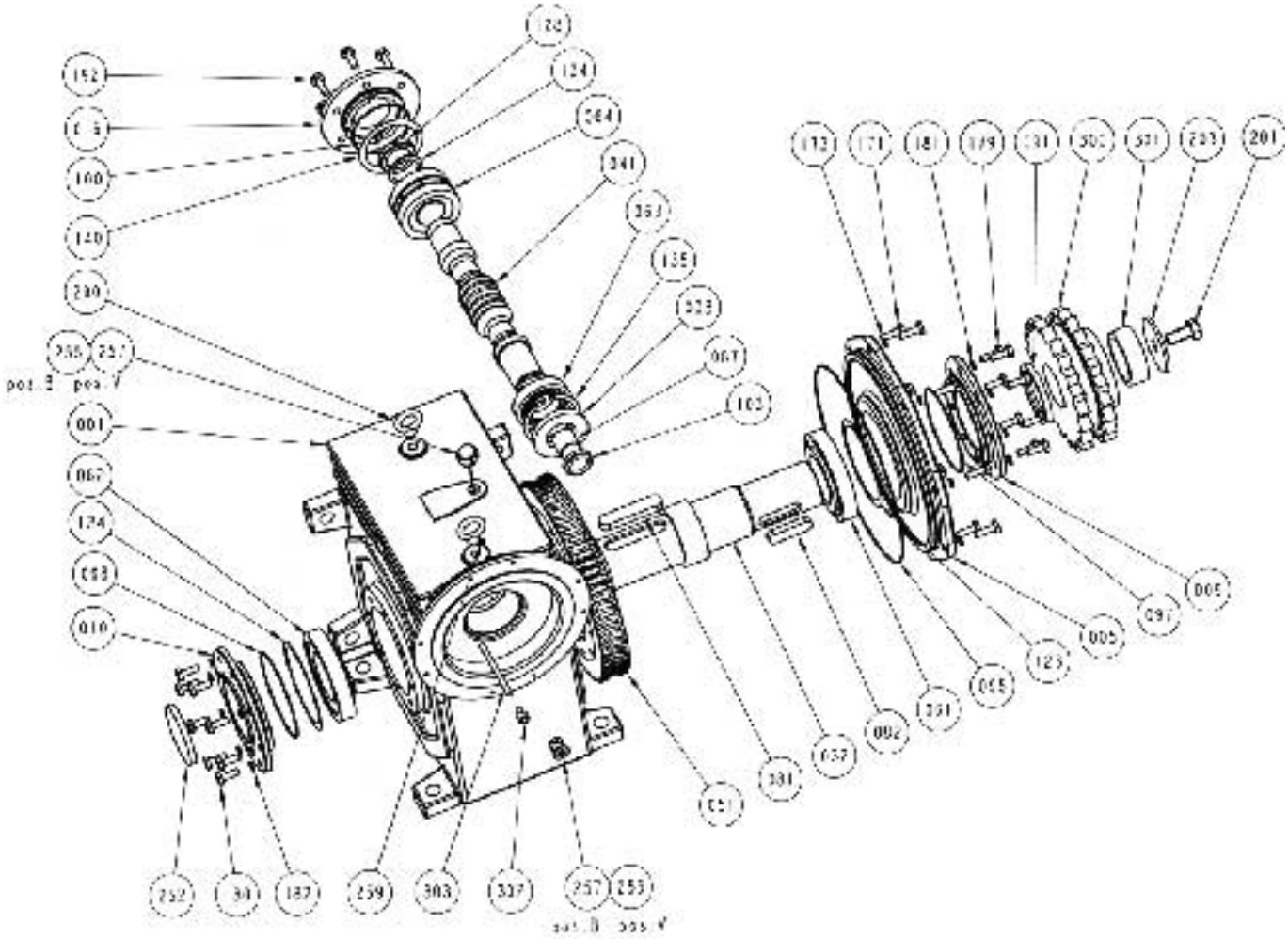

According to diagram ref. 502638 C

Positioning of wheel 51 in relation to screw 41 according to diagram p3
Axial play on shaft 32: 0 (0, + 0.05) at 20°C
Play between housing I and cap 16: 0 (+ 0.01, + 0.1) at 20°C, tightened by 3 x 192 screws (at 120°C) to 10 Nm
Tightening torque for screws 171, 179 and 180 : 70 Nm ± 5 ; locking with OMNIFIT 100 M
Tightening torque for screw 192 : 50 Nm ± 5 ; locking with OMNIFIT 100 M
Tightening torque for lock nut 128 : 400 Nm ± 20 ; locking OMNIFIT 200 M

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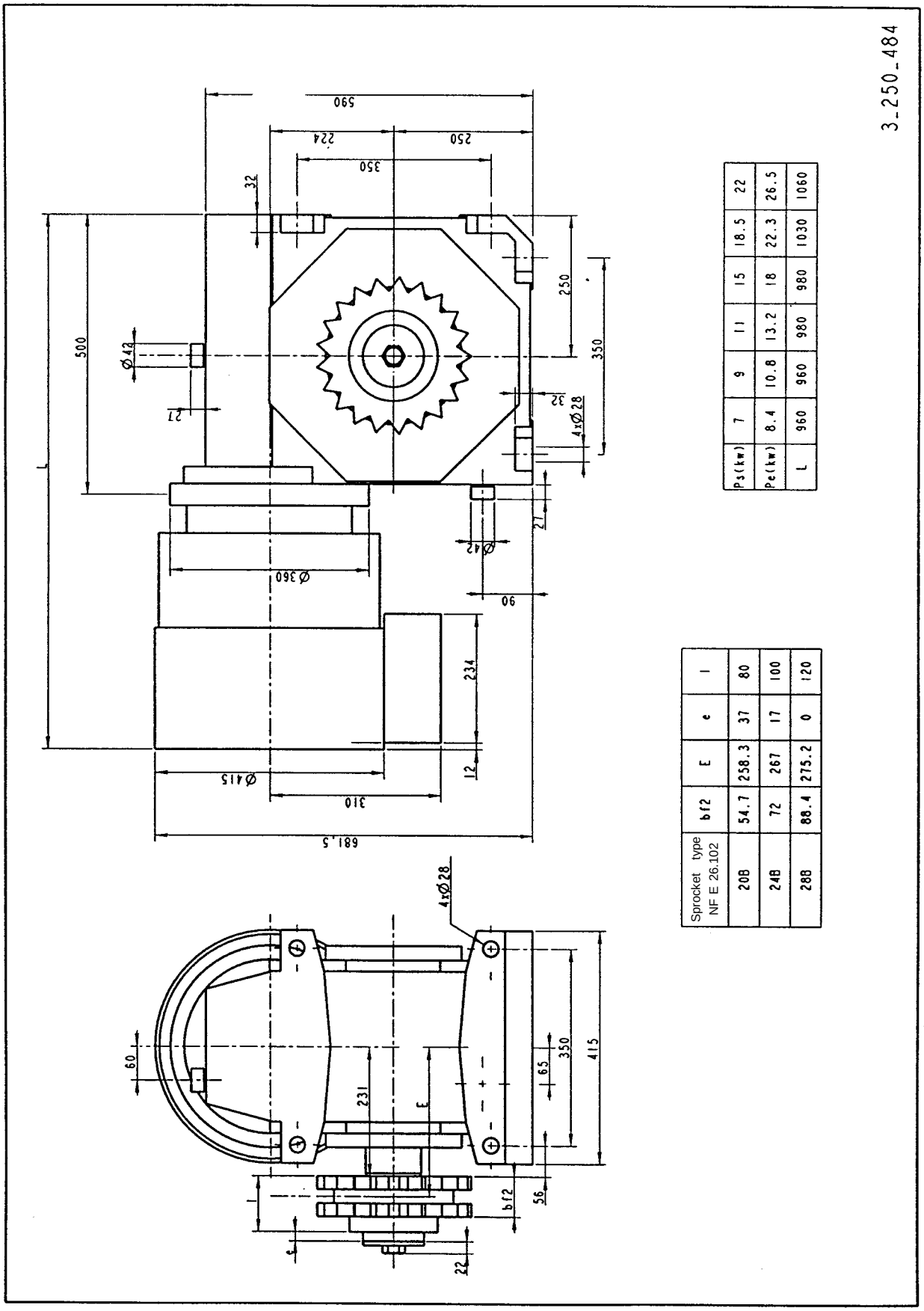


Ps(kw)	7	9	11	15	18.5	22
Pe(kw)	8.4	10.8	13.2	18	22.3	26.5
L	960	960	980	980	1030	1060

Sprocket type NF E 26.102	bf2	E	e	l
20B	54.7	258.3	37	80
24B	72	267	17	100
28B	88.4	275.2	0	120

MOTOR TSA 50

Reception:
Check the state of the motor. In the event of damage to the motor or even to its packaging, contact the carrier.
Check that the motor conforms with the order (mounting arrangements, nameplate information).

Storage
Whilst waiting to be installed, the motor must be stored safe from knocks and vibration, and preferably in a clean and dry environment.
If the latter is not possible the motor must at least be placed in its operating position under cover, however crude (tarpaulin or corrugated iron) in the state in which it was sent, in other words cable gland or cable entry closed, terminal box and plugs for the drain holes tightly closed. In this situation, the relative humidity must not exceed 98%.

Handling
The handling rings of the motor are the appropriate size for its own weight. They must not be used for lifting the unit on which the motor is assembled.

1) Commissioning

1.1) Checking before installation.
Ensure that :
- the brake works and can be correctly released.
- when the brake is released, the rotor can be turned by hand.
- the winding has not absorbed any humidity. To check this, measure the insulation resistance of the stator windings using a 500V D.C. megohmmeter.

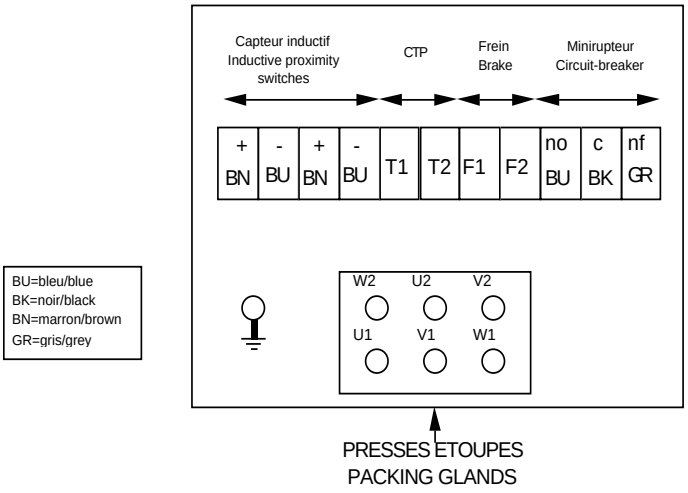
We estimate that if the value is lower than 10 MΩ in cold state, the winding must be dried.

1.2) Installation.
Ensure sufficient aeration for the motor.
The ventilation intake and discharge holes should be opened wide to enable the cooling air to circulate freely. Make sure that the air is not recycled.
Provide easy access to terminals, grease nipple and draining plugs.
On delivery of the motors these drain holes are blanked with plugs (73). They should be situated as low as possible on the motor.

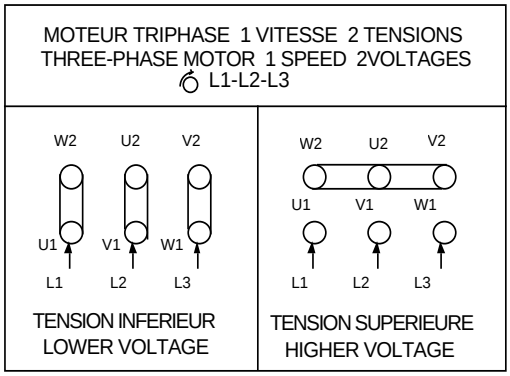
1.3) Motor connection :
The links required for coupling the motor should be placed on the terminals.
Connect the motor as shown in the connection diagram.
In certain cases, a connection error (Y connection instead of Δ with a small load) may lead to a significant rotor temperature rise without tripping the protection device, causing damage to the rotor cage, windings, or bearings.
For connection use cables of sufficient cross-section (5 Amperes per mm^2) to reduce voltage drops, and cables with an external diameter corresponding to the dimensions of the cable glands.
Earth the motor. A screw situated inside the terminal box and another on the flange, can be used to connect the motor to the earth.
NEVER TOUCH THE INTERNAL MOTOR CONNECTIONS
For all connections, make sure the connectors are arranged correctly and the lock nuts and counternuts are tightened properly before power-up.
The auxiliary circuits (probes, detectors, brake supply etc) are connected back to the terminal box (see diagram).

To reverse the motor direction of rotation, simply swap over 2 of the line conductors.

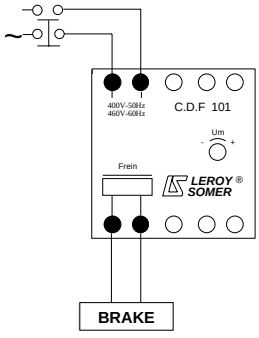
CONNECTION DIAGRAM



POWER CONNECTION DIAGRAM



1.4) Connection of CDF 101 card.
This unit enables the brake to be supplied directly from a 400V supply. It applies an overvoltage of several milliseconds before stabilising at its steady value.
Adjustment is carried out by placing a needle type voltmeter on the output terminals of the unit and using a small screwdriver to alter the potentiometer situated on the front panel.
The holding voltage must be adjusted to around 90V to 100V.
A protection fuse is mounted on the card inside the unit.



2) Service checks and periodical maintenance.
Keep the motor clean so as not to interfere with its cooling operation. Ensure in particular that the ventilation circuit passages are not obstructed.
Open and close the drain holes for the condensation water from time to time (at least once a year). It is advisable to leave drain holes open regardless of the protection index in cases where the motor is operating in a very humid atmosphere or when it is subject to extreme temperature variations.

2.1) Greasing.
The bearing must be greased regularly.
Lubrication should be carried out every 6200 hours; the quantity of new grease to be added is $15cm^3$.
Do not forget that an excess of grease can lead to a considerable temperature rise in the bearing. The period between greasings must not exceed one year even if, due to operating conditions, the normal interval does not apply.
Similarly we recommend that after a motor stop of six months or longer, the motor is greased before restarting.
It is recommended that the above greasing operations are carried out with the motor running.
Note : Non reversible greasing circuit.

2.2) Quality of grease
The bearings are covered in high quality SKF LGM T2 grease in the factory. This grease is recommended for subsequent greasing. Avoid mixing greases.
Should similar grease of a different brand or composition be used, the bearing must be changed and the housing, pipes and internal cover cleaned with petrol to remove the old grease.
Regrease the bearing using the specially designed grease nipple.

2.3) Inspection of bearings.
Regularly check that the bearing is operating correctly.
A temperature rise in the bearing housing or abnormal noise during rotation are warning signs of a worn bearing. In the event of this happening, **THE BEARING IS DEFUNCT AND MUST BE REPLACED AS SOON AS POSSIBLE.** If not, the bearing is likely to seize, possibly damaging the motor and connected equipment.
In order to dismantle a bearing properly for replacement it is important to label the different parts to facilitate reassembly and avoid any error or inversion.
Bearings can be removed using extractors.
After desmantling and reassembly, grease the whole unit.
After desmantling and reassembly, proceed with a complete greasing and make sure that the grease used is emptied by the waste grease pipe.

2.4) Spare parts
When placing an order, please quote the details given on the motor nameplate.

3) Storage for longer than 6 months

In some cases, rotating electrical machines can be stored for quite a long time before being commissioned. Even when the machines are stored in the correct conditions, certain electrical as well as mechanical checks must be carried out.

3.1) Storage conditions

The machine must be stored in a sheltered environment, protected against humidity (warehouse for example). In humidity levels higher than 90%, the machine insulation drops very quickly and is practically zero at humidity in the region of 100%.

3.2) Electrical checks

Before starting the machine running, it is advisble to check the insulation between phase and earth and between phases. This check is carried out using a 500 V D.C. megohmmeter. Insulation should be at least 10 megohms when warm (100°C) or 100 megohms when cold.

In the event that this value is not reached, and always, if the machine has been subjected to water splashing, spray, a prolonged period in an environment with high humidity, or if it is covered in condensation, we recommend that the stator be dried for 24 hrs in an oven at a temperature of around 100 to 110°C.

If the stator cannot be dried in an oven, you should:

- supply the stator with a 3-phase alternating voltage (via an induction regulator or a step-down transformer with adjustable taps) at around 10% of the nominal voltage for 12 hrs, with the rotor locked.

- supply the stator with direct current, with all three phases in series (via a D.C. generator with separate field excitation or batteries for motors of less than 30 h.p.): direct voltage of 1 to 2% of the rated voltage.

The alternating or direct current must not exceed 60% of the rated current.

The current can be controlled using a clamp ammeter (A.C.), or a shunt ammeter (D.C.) and by placing a thermometer on the motor housing: if the temperature exceeds 70° C, reduce the voltage or current indicated above by 5% of the original value for a 10° C temperature rise.

3.3) Mechanical checks

If the motor has not been operated for 6 months, lubricate before restarting.

3.4) Prolonged standstill

Conditions similar to those for prolonged storage may apply if the machine has been stopped for a long period whilst remaining in its operating position.

The whole motor should be checked before restarting.

4) Adjustment

4.1) Adjusting the braking torque

a/ remove the 6 fixing screws (37), taking turns to gradually unscrew them.
b/ take off the washer (36) and clean the contact surfaces.
c) remove or add springs (32) and washers (33) in order to modify the braking torque. (See table below)
d/ put back the washer (36), after applying a silicon thread round the edges.
e/ tighten the 6 screws (37).
Note: Try and balance the position of the springs and washers as well as possible.

Torque Nm	Number of springs	Number of washers
40	2	0
50	2	2
60	3	0
70	3	2
80	4	0
90	4	2
100	4	4
110	5	2
120	6	0
130	6	2
140	6	4
150	6	6
160	8	0
170	8	2
180	8	4
190	8	6
200	8	8
225	8*	4
250	8*	8

* Green springs

4.2) Manual brake release.

a/ take out the central plug (38).
b/ screw (for around 10 mm) the 2 rods of the release lever (63) into the corresponding tapped holes (on 17).
c/ insert the six hexagonal keys of the control wheel (64) into the shaft end.
d/ to turn the motor, simply exert force on the operating lever (63) and simultaneously exert torque on the wheel (64).

4.3) Adjustment of braking process.

a/ remove the terminal box cover (58) by taking out the screws (59).
b/ take out the compression washer plug (39).
c/ connect an ohmmeter between "bk" and "bu" on the microswitch terminal block (49) (see the connection diagram).
d/ tighten the screw (34) until zero resistance is displayed on the ohmmeter.
e/ loosen the screw (34) until the plunger swings and an infinite resistance is displayed on the ohmmeter.
f/ lock the lock nut (35) after adjustment.
g/ check that the microswitch works correctly by manually releasing the brake (see section 4.2).
h/ disconnect the ohmmeter, replace the terminal box cover (58).
i/ replace the plug (39).

4.4) Adjustment of the air-gap.

a/ remove the terminal box cover (58) by taking out the screws (59).
b/ take out the compression washer plug (39).
c/ connect an ohmmeter between "bk" and "bu" on the microswitch terminal block (49) (see the connection diagram).
d/ tighten the screw (34) until 0 resistance is displayed on the ohmmeter.
e/ loosen the screw (34) until the plunger swings and an infinite resistance is displayed on the ohmmeter.
f/ turn the screw another 3 turns.
g/ lock the lock nut (35) after adjustment.
h/ disconnect the ohmmeter, replace the terminal box cover (58).
i/ replace the plug (39).

4.5) Adjustment of inductive sensor.

a/ remove the terminal box cover (58) by taking out the screws (59).
b/ manually release the brake (see section 4.2).
c/ using the control wheel, position one of the washers located on the inertia wheel (13) facing the inductive sensor.
d/ screw in the sensor (65) so that it comes into contact with a washer and then unscrew it by half a turn. Lock the nut after positioning the sensor.
e/ manually rotate to ensure that nothing is touching.
f/ replace the terminal box cover (58).

4.6) Changing the electric magnet.

The table below indicates, depending on the type of motor, the number of braking operations which can be performed by the brake.

Type	Power kW	Number of braking operations
TSA50S	8,4	1000000
TSA50M	10,8	1000000
TSA50L	13,2	1000000
TSA50LL	18	850000
TSA50VL	22,3	650000
TSA50VMM	26,5	550000
TSA50XL	33,3	420000

Above these values the brake linings will need to be changed. To do this :
a/ remove the terminal box cover (58) by taking out the screws (59).
b/ disconnect (labelling the wires):
- the auxiliary circuits from inside the motor (connector 49).
- the motor supply (on 47).

c/ remove the 2 fixing screws (48) on the terminal plate.
d/ remove the 3 screws (46) and take off the terminal box support (45).
e/ remove the inductive sensor(s) (65).
f/ take off the compression washer (36) (see section I). Remove the preloaded wavy washers (33) and springs (32). Label their positions.
g/ remove the 6 fixing screws (30) of the brake housing (24) and take off the whole unit.
h/ change the electric magnet (17). Take out the microswitch (21) with its support (18) and fix the whole thing onto the new electric magnet. Adjustment should be carried out once the brake has been fitted.
i/ reassemble the whole unit. Put back the springs and preloaded wavy washers in their original positions as well as the columns (31). Fix the washer (36) using screws (37).
j/ adjust the microswitch setting (see section 4.3 and 4.4).
k/ refit the inductive sensors and adjust as necessary (see section 4.5).
l/ refit the terminal box (screw 46). Connect the wires of the auxiliary circuit and the motor supply.
m/ replace the cover (58).

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Rep	Qté	Désignation/Designation	Référence/Reference
1	*1*	Masse stator complète/Complete stator	*
2	*1*	Rotor/Rotor	*
3	*1*	Flasque côté bout d'arbre/End shaft flange	011F156050
4	*1*	Flasque côté frein/Brake bearing	011F604050
5	*1*	Roulement/Ball bearing	080W050110
6	*1*	Couvercle intérieur coté frein/Rods	026F001050
7	*4*	Vis de fix. couvercle intérieur/Clamping screw cap	42
8	*16*	Rondelle frein/Lock washer	921
9	*6*	Tige de fixation des flasques/Clamping rod flange**	*
10	*6*	Ecrou/Nut	706
11	*1*	Bouchon entrée de graisse/Trap introduction grease	068E002014
13	*1*	Volant d'inertie/Inertia wheel	*
14	*12*	Ailette de ventilation/Blade of a fan	*
15	*24*	Vis de fixation des ailettes/Clamping screw fin	045Q400005
16	*1*	Assembleur conique/Coned assembler	062E800050
17	*1*	Electromobile équipé/Armature of electric magnet	057F304050
18	*1*	Support minirupteur/Circuit breaker-support	066F404050
19	*2*	Vis de fixation support/Clamping screw support	215b
20	*2*	Joint torique/Ring seal	070U381054
21	*1*	Minirupteur/Circuit-breaker	069E800050
22	*2*	Vis fixat. minirupteur/Clamping screw circuit-breaker	045G450002
23	*4*	Ecrou/Nut	045C000002
24	*1*	Electrofixe/Flange brake	EC050275001
25	*2*	Grille de protection/Safety grid	048F001050
26	*4*	Passe fil/Bead wire	048F233000
27	*1*	Tôle de protection/Safety sheet	061F200050
28	*2*	Vis de fixation tôle/Clamping screw sheet	216b
29	*1*	Déflecteur d'air/Air baffle	065U500050
30	*6*	Vis de fixat. flasque frein/Clamping screw flange	045H402008
31	*2*	Colonne de guidage/Column	064F560050
32a	*	Ressort/Spring	058E121050
32b	*	Ressort vert/Green spring	058E122050
33	*	Plot de centrage/Washer	059F200050
34	*1*	Vis de règlage du minirupteur/Adjusting screw	045V400005
35	*1*	Ecrou de blocage/Locknut	704b
36	*1*	Couronne de compression/Spring washer	062F200050
37	*5*	Vis de fixation rondelle/Clamping screw washer	34
38	*1*	Bouchon central/Middle trap	068E003014
39	*2*	Bouchon rondelle compression/Washer trap compression	068E004014
40	*1*	Ceinture démontable/Changeable belt	051F800050
41	*2*	Crochet/Hook	044E800054
42	*1*	Vis de fixation crochet/Clamping screw hook	045H400006
43	*1*	Ecrou/Nut	705
44	*1*	Joint de support/Seal support	070U310050
45	*1*	Support de boîte à bornes/Terminal box support	066F405050
46	*3*	Vis de fixation support/Clamping screw support	045D403006
47	*1*	Plaque à bornes/Terminal strip	*
48	*2*	Vis fixat. de plaque à bornes/Clamping screw terminal strip	115
49	*11*	Bornier/Strap connection	*
50	*1*	Joint d'embase/Seal baseplate	070E312180
51	*1*	Couvre bornes/Terminal box	057F118180
52	*4*	Vis fixation couvre bornes/Clamping screw terminal box	21
53	*4*	Rondelle frein/Lock washer	920
54	*1*	Presse étoupe aliment. moteur/Packing gland motor	068E921213
55	*1*	Presse étoupe aliment. frein/Packing gland brake	068E913209
56	*1*	Presse étoupe minirupteur/Packing gland circuit breaker	068E913209
57	*1*	Joint de couvercle/Seal cover	070E311180
58	*1*	Couvercle de boîte à bornes/Terminal box cover	066B800180
59	*2*	Vis de fixation couvercle/Clamping screw cover	31
60	*1*	Clavette/key	042N090012
61	*1*	Vis de masse/Earth	045C400006
62	*1*	Rondelle/ Washer	904
63	*1*	Levier de déblocage/Brake release level	071A800050
64	*1*	Volant de manoeuvre/Control wheel	054F400050
65	*1*	Capteur inductif/Inductive proximity switches	065E600050
66	*1*	Bouchon fileté/Screw plug	068E001012
67	*1*	Presse-étoupe capteur/Packing gland	068E913209
68	*1*	Support bornes /Strap connection support	066U406050
69	*2*	Entretoise/Spacer	070U022050
70	*2*	Vis/Screw	29
71	*1*	Carte CDF 101/ Feeder CDF 101	069E808046
72	*1*	Joint/Seal	070U303070
73	*2*	Bouchon de purge/Drain plug	068E001006

* The references for these parts vary according to the motor rating. To order these parts, give the serial number of the machine and its power rating. (Data on the nameplate).
** Rods tightened at a 10 Nm torque.

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