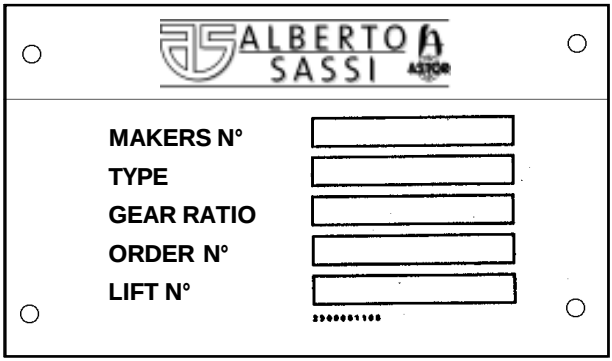
WARNING



The manufacturer must be notified of the following when ordering parts:

1) Gearbox type

2) Machine serial number indicated in the order confirmation, or in the gearbox data plate, or engraved on the gearbox body (Pag. 34).

These data enable SASSI S.p.A. to provide spare parts together with detailed instructions for their use.

PAY CAREFUL ATTENTION TO THE PERFORMANCE DATA CONTAINED IN THE SASSI S.p.A. GENERAL CATALOGUE FOR CONDITIONS AND LIMITS REGARDING USE.

ALL OPERATIONS INDICATED IN THIS HANDBOOK MUST BE CARRIED OUT BY AUTHORIZED PERSONNEL.

THE GUARANTEE IS NO LONGER CONSIDERED EFFECTIVE IF ANY PARTS ARE REMOVED FROM THE GEARBOX.

GENERAL TECHNICAL INFORMATION

ENGLISH

COMPLETE GEARBOX WITH MOTOR

- European reference norm:

EN 81-1 : 2005

- Vibrations:

IEC 34 -14 CEI 2 - 23 Noise: IEC 34 - 9 CEI EN 60034 - 9

THREE-PHASE ASYNCHRONOUS MOTOR - 1 OR 2 POLARITIES

- Constructive norms:

IEC 34 - 1 IEC 34 - 2 IEC 34 - 5
CEI 2 - 3 CEI 2-8 CEI 44-5 EN 60204-1 CEI 2 - 16 EN 60034 -5

- EMC norms:

EN 12015 - EN 12016 EN 50081 : 1991
EN 55011 : 1991 EN 55014 : 1991

ELECTROMAGNETIC BRAKE

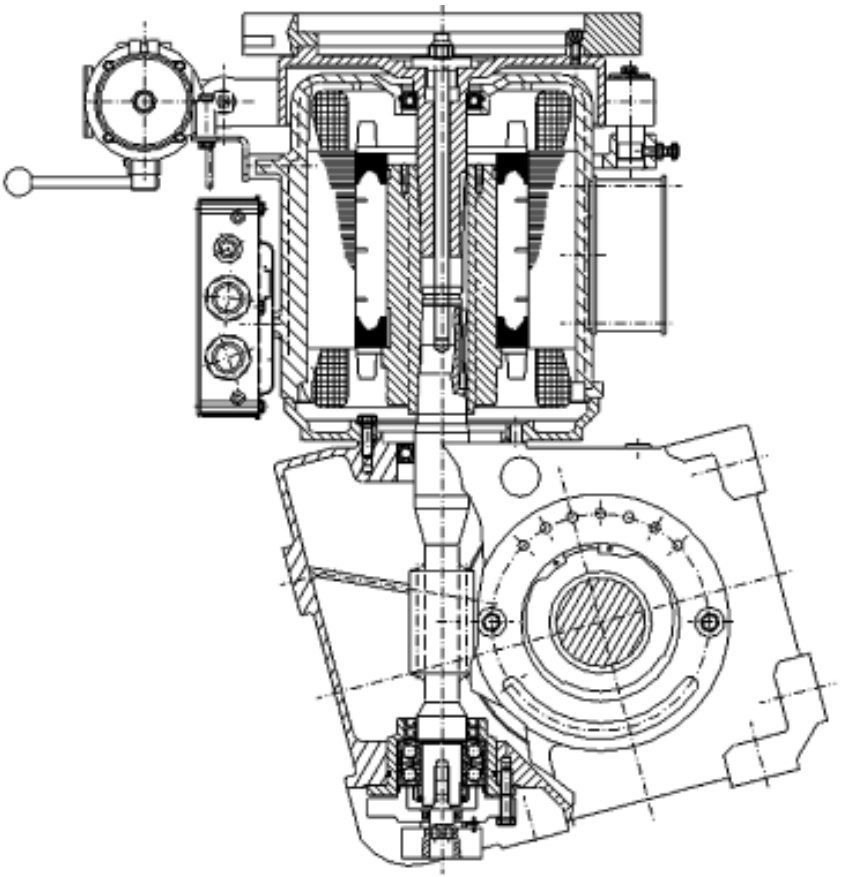
- European reference norm:

EN 81-1: 2005

- EMC norms:

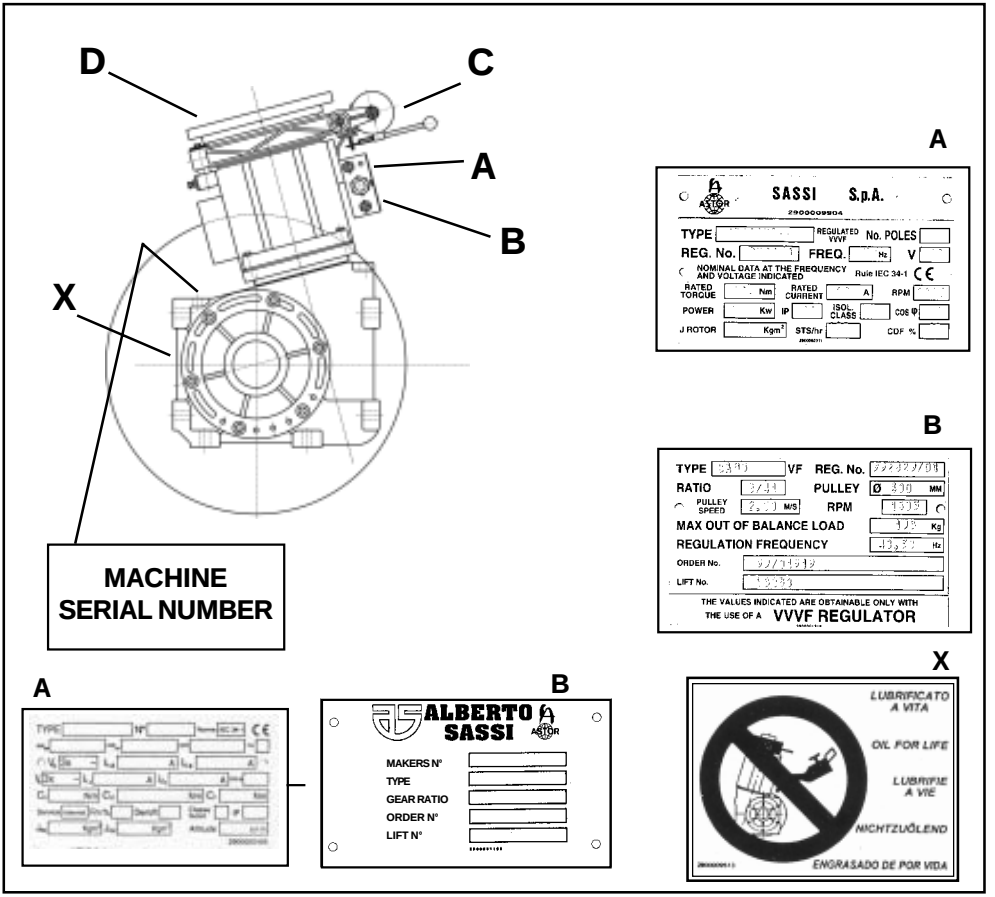
EN 12015 - EN 12016 EN 50081 : 1991
EN 55011 : 1991 EN 55014 : 1991

Gearbox TORO
Wormwheel section



IDENTIFICATION PLATES FOR GEARBOXES AND MOTORS

EXAMPLES OF DATA PLATES ON THE MACHINE WHICH MAY BE VARY IN QUANTITY AND POSITION IN ACCORDANCE WITH THE CONFIGURATION



A. PLATE FOR ELECTRICAL MOTOR
B. PLATE INDICATING THE MANUFACTURER'S DATA RELATIVE TO THE GEAR TYPE
C. PLATE OF THE BRAKE MANUFACTURER
D. PLATE FOR THE BRAKE DATA
E. ADHESIVE PLATE "UP/DOWN" (THESE PLATES ARE SUPPLIED SEPARATELY AND MUST BE PLACED BY THE CUSTOMER IN ACCORDANCE WITH THE CABIN MOVEMENTS)
X. ADHESIVE PLATE "OIL FOR LIFE"

IMPORTANT:

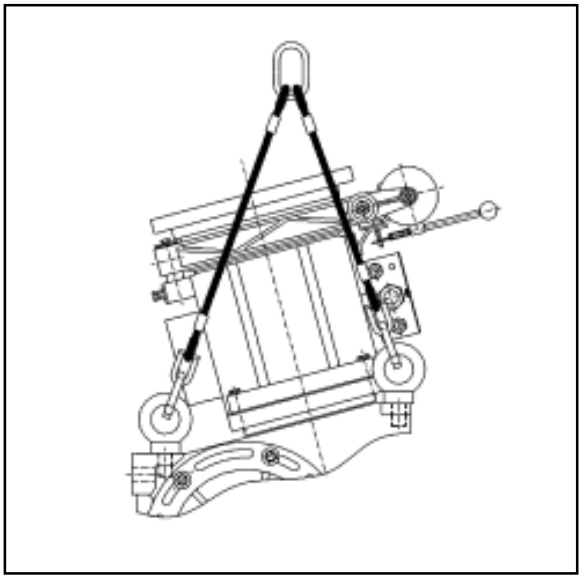
IN CASE OF MOTOR REPLACEMENT, THE COVER OF THE TERMINAL BOX WITH THE GEAR PLATE MUST BE REUSED

OPENING THE PLYWOOD BOXES

The nails must be removed to open the plywood boxes.
In order to prevent the wood from splintering use the tool shown in figures **A** and **B**.
This special tool is a right-angle tube. Its short end has a **V shaped groove** with a sharpened edge. Place the centre of the sharpened side on the nail and strike the tube with a hammer until the lip is inserted in the wood, then turn the tube using the tube elbow as leverage so that the nail head is lifted upwards.
Continue lifting so that the nail head fits into the **V** groove and is then removed.

UNPACKING AND HANDLING

The gear is equipped with threaded holes M24x3 for eyebolts (not supplied) to help the handling operations. During removal from packing take care to the moving parts (fly-wheel, brake drum), which, if damaged, could interfere with the machine balancing carried out in our works.
For the positioning on the frame see page 49.
For encoder fitting, when foreseen, (the encoder is supplied unfitted), position the machine on the frame and than remove the eye bolt following the instructions at page 36.



FITTING THE ENCODER
STANDARD CONFIGURATION

In case the gear is already installed, before fitting the encoder, switch off the mains switch in control panel.

1. The gear manufactured with the predisposition for the encoder coupling on thrustbearing side are equipped with the special cover 2 (see drawing). This predisposed cover protected by a yellow plastic plug (not indicated in drawing) which can be removed once the machine is 'cold' to avoid any grease leakage from thrustbearing.

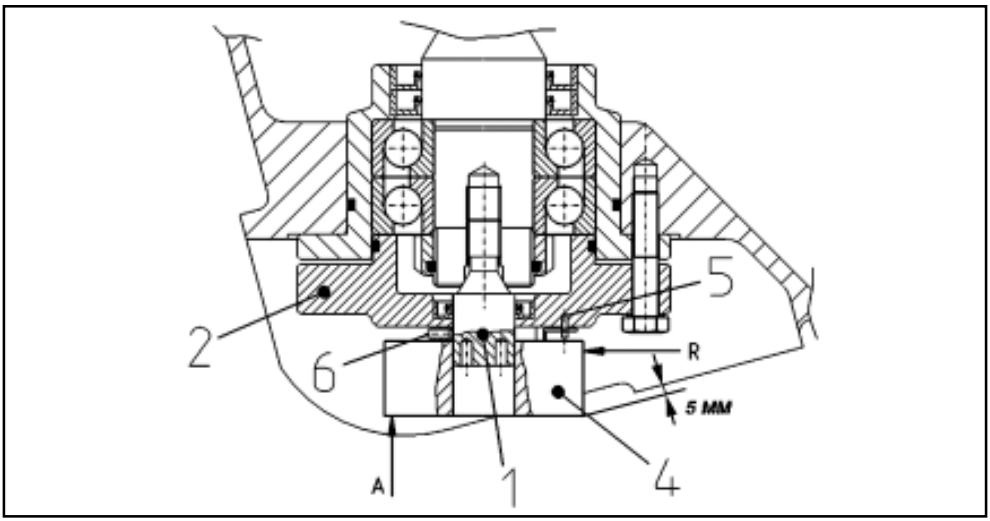
2. The standard bolt, which is already mounted on the ending part of the worm, has a diameter apt to the fitting of some type of encoder with hollow shaft with Ø 25mm .

3. To assemble the encoder 4, move it coaxially along bolt 1 till a distance of 0.5mm from cover 2 and centre the plug 5 in the special antirotation holder. The standard plug has a Ø of 3mm and is positioned at a distance of 32.5mm from rotation axis.

4. Sligthly move the three dowels M4 nr. 6 alternately towards the shaft 1 by means of Allen wrench in order to centre the encoder; then tighten them in the same way. Check that during the rotation of the motor axis the encoder does not move incorrectly causing a wrong centring. The maximum allowable values of the standard encoder are lower or equal to +/- 0.1mm in radial direction (R) and lower or equal to +/- 1mm in axial direction (A), and are measured by means of a dial gauge. Should not this occur, please repeat procedures at points 3 and 4.

5. Once assembled, the encoder is protruding from the supporting surface, if the gear is mounted in vertical position (~ 5 mm).

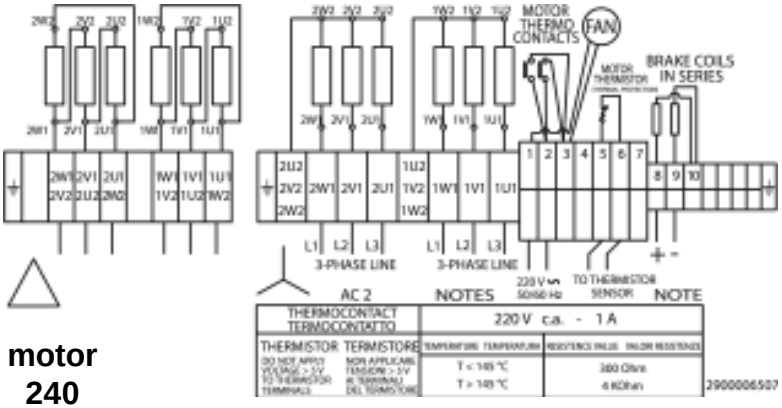
6. Should you intend to fit this encoder on a gear not predisposed, please contact Alberto Sassi Spa to receive the specific instructions.



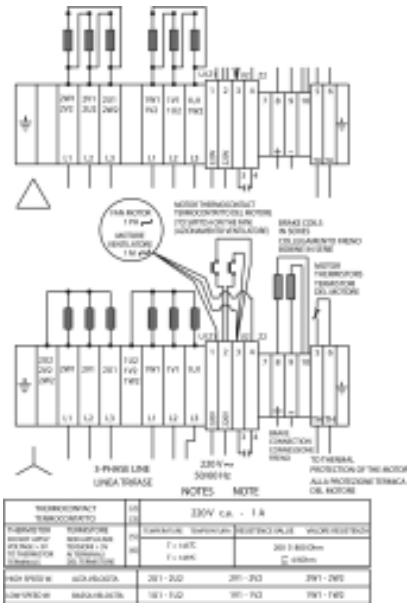
MACHINE START

Open the cover of the terminal box to take the wire clamps and the eletric plan.
Carry out the connections according the the following indications:

MOTORS AC2

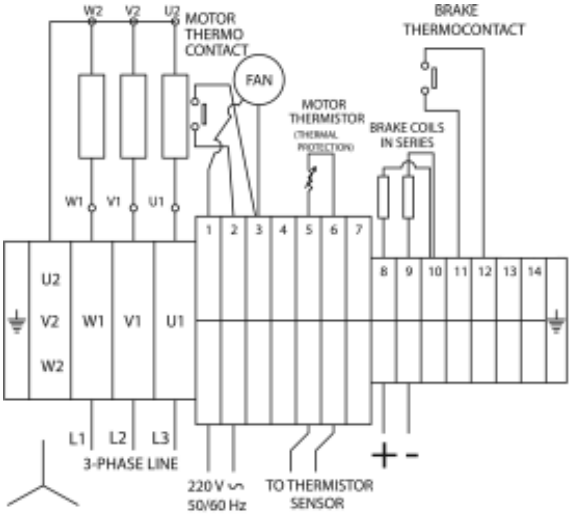


motor 240



motor 270

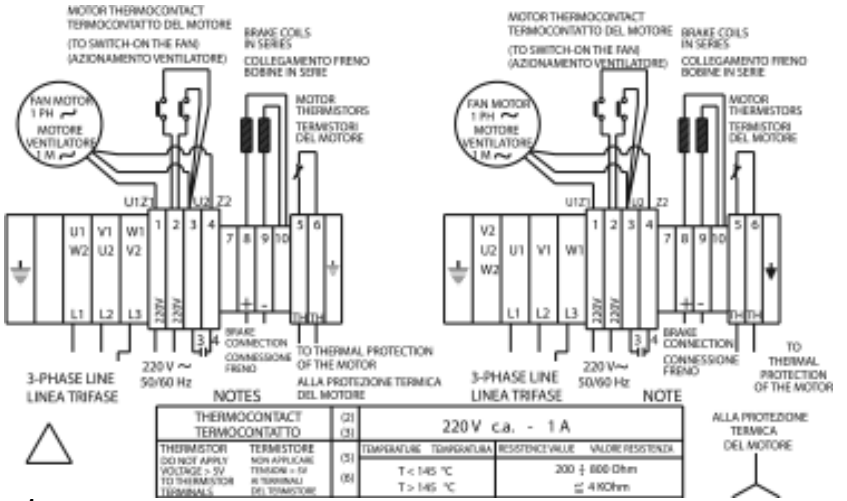
MOTORS VF



NOTES NOTE

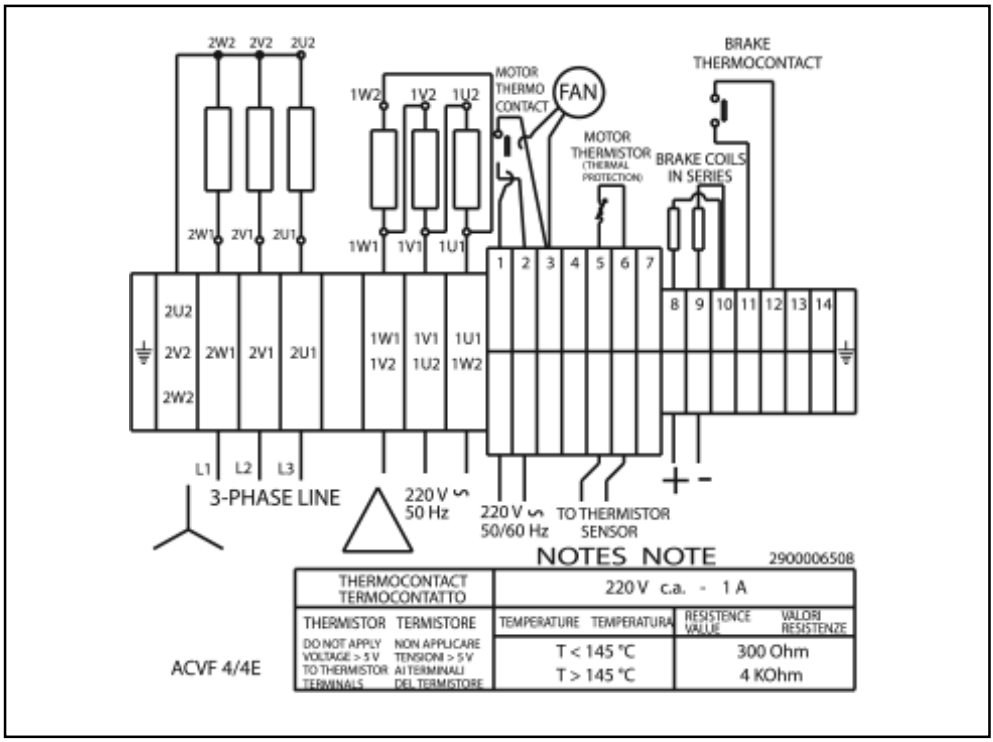
THERMOCONTACT TERMOCONTATTO	220 V c.a. - 1 A	
THERMISTOR TERMISTORE	TEMPERATURE TEMPERATURA	RESISTENCE VALUE VALORI RESISTENZE
DO NOT APPLY VOLTAGE > 5 V TO THERMISTOR TERMINALS NON APPLICARE TENSIONI > 5 V AI TERMINALI DEL TERMISTORE	T < 145 °C T > 145 °C	300 Ohm 4 KOhm

motor 240



motor 270

MOTOR 240 VF 4/ 4E



IMPORTANT: For AC2 and VF motors always connect the 220 alternating voltage to the terminals of the fan.

The gear is already filled with the correct quantity of oil (see pag. 50).

ELECTRIC CONNECTIONS

Motors AC2

The Star and Delta connections in AC2 motors depend to the feeding voltage (380-400V).

To change from Star to Delta connection, disconnect the red wires U2, V2 and W2 from Star centre, both for high and low sped, and connect them according to the plan (U2 with V1, V2 with W1 and W2 with U1) of page 37.

On the contrary, to change from Delta to Star connection, disconnect the red wires U2, V2 and W2 from the terminals of the previous point and connect them in the terminal of Star centre both for high and low speed.

IMPORTANT: connect always the AC voltage 220V to terminals 1 and 2 of the fan.

BEFORE ANY CHANGE TO ELECTRICAL CONNECTIONS IN AC2 MOTORS, PLEASE CHECK THE EXISTING FEEDING VOLTAGE.

Motors VF

the connection type Star or Delta depends on the feeding voltage. With feeding voltage 380-400V the connection is Star type, while with voltage 220-230V is Delta type.

To change from Star to Delta connection, disconnect the red wires U2, V2 and W2 from Star centre and connect them according to the plan (U2 with V1, V2 with W1 and W2 with U1) at page 38.

On the contrary, to change from Delta to Star connection, disconnect the red wires U2, V2 and W2 from the terminals of the previous point and connect them in the terminal of Star centre.

IMPORTANT: connect always the AC voltage 220V to terminals 1 and 2 of the fan.

Motors VF 4 / 4E

The principal winding of this type of motor has a Star connection (with feeding at 380-400V), while the secondary emergency one has a Delta connection (with feeding 220-230V).

IMPORTANT: connect always the AC voltage 220V to terminals 1 and 2 of the fan

The plan present at page 39 refers to motor size 240. For the disposition of auxiliaries of motor 270 refer to the VF plans at page 38.

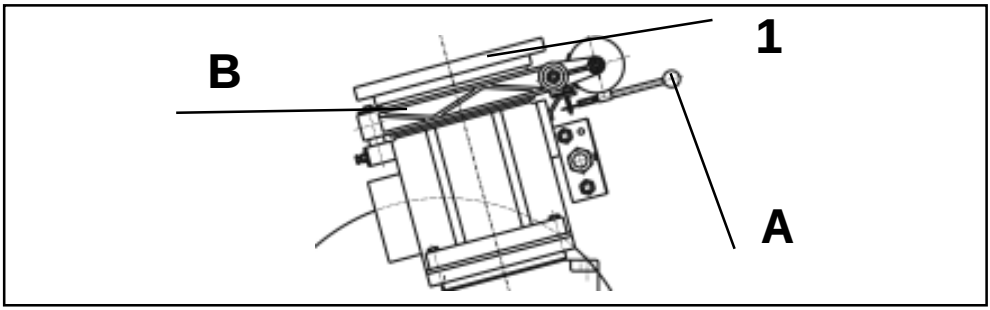
INSTRUCTIONS ON MANUAL OPERATION IN CASE OF EMERGENCY

CARRY OUT THE FOLLOWING OPERATIONS IN THE ORDER INDICATED:

1. Switch off the main switch in machine room.
2. Firmly hold the flywheel B for the manual operation.
3. Open the brake shoes 1 by acting on lever A and constantly exerting a sufficient force to open them.
Move the flywheel B in the most suitable direction in order to take the cabin to the nearest floor and level with the reference mark on the steel ropes (where existing).
4. Release the brake lever A

WARNING: NEVER REDUCE BRAKE SPRING TENSION TO FACILITATE THE MANUAL OPERATION

In case the safety brake on the slow shaft is present, before carrying out any of the operations listed above, release the brake manually according to the specific instructions.



SAFETY AND MAINTENANCE INTERVENTIONS

Should the counterweight be laid down to carry out interventions on the installation or to manually lift the cabin by means of the sheave, a ROPE-CLAMP must be fitted. For sheave wide 115mm use tool code 3000004430. For sheaves wide 80mm use rope clamp code 3000004000 or 3000004040 (the last one only for Ø 450 and 480mm).
The tool code 3000004430 (Drw. A) is made up of a bent and welded L bracket with thrust screws and a plate.It is applied to the sheave as showed in drw. A.

The screws 1 exhert pressure on plate 2 which bucks the ropes 3, while the projection 4, fixed to the bracket, bucks the pressure of screws 1 under the sheave edge.
By means of screws 5 the position of the bracket can be adjusted, but it has to be kept in orthogonal position with regard to the sheave 6.
Act on the screws 1 and 5 simultaneously and alternatevely.

IN THIS POSITION THE ROPES ARE CLAMPED.

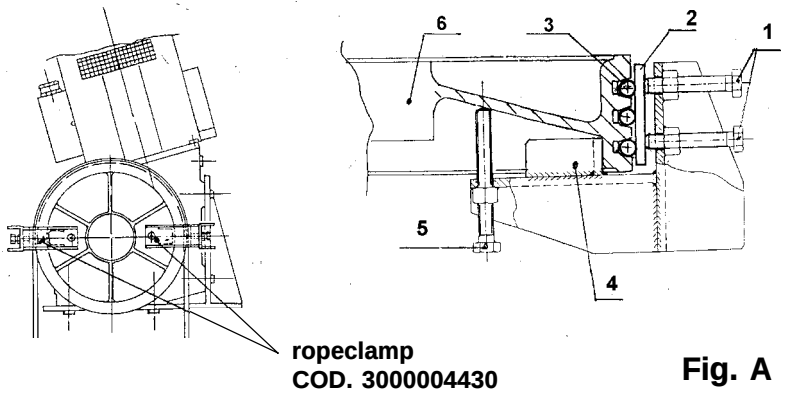


Fig. A

To rest simply the installation only one rope clamp is required, while to lift manually the cabin two ropeclamps have to be mounted as showed in drw. B. They have to be moved alternatevely according to the sheave rotation.

The same procedures seen at previous point are valid also for the rope clamp of drw. B. This rope clamp can be used for sheave wide 80 mm and allows the clamping of the ropes by bucking the flanks of the same ropes.

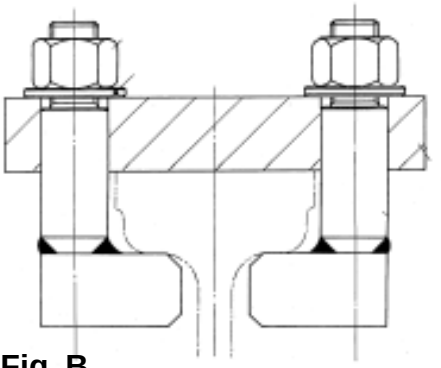
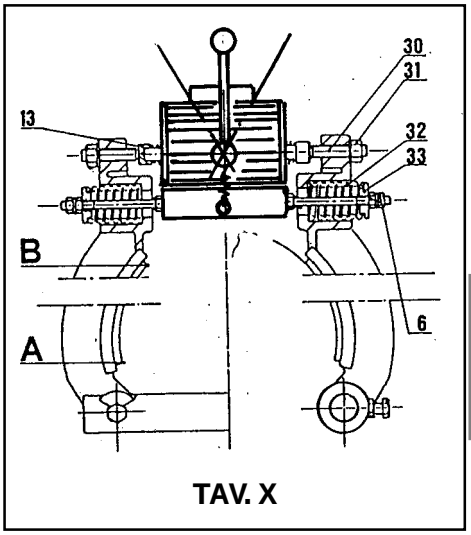


Fig. B

BRAKE ADJUSTMENT

DRUM BRAKE VERSION

Adjustment should be done when the machine is **unsupported**. First check that when the electromagnet is turned on, the brake unlocks. If this does not occur, proceed as follows: (**refer to chart x**). When the brake is turned off, loosen locking nuts **31** and loosen set screws **30** so that they are distanced by a few millimeters (approx. 4) from end stops **13**, manually checking that the end stops **13** are in the external end position. Loosen nuts **6** leaving washers **33** in contact with springs **32**. With the shoes in contact with the drum, re-tighten set screws **30** moving end stops **13** towards the brake centre by **1 mm**, and then tighten locking nuts **31**. With the electromagnet energised, check that the friction lining of the shoe does not touch the brake drum; just check that in point **B** of the drawing a space of at least approx. **0.5/0.8 mm** exists. This space should extend along the complete arc of the brake lining even if it slightly decreases up to point **A**. If this does not occur, **only in this case**, it becomes necessary to adjust the eccentric pin which regulates the brake shoe-drum coupling. With the electromagnet **de-energised**, loosen locking nuts **31** and set screws **30** so that they are distanced by several mm (approx. 4) from end stops **13,** manually



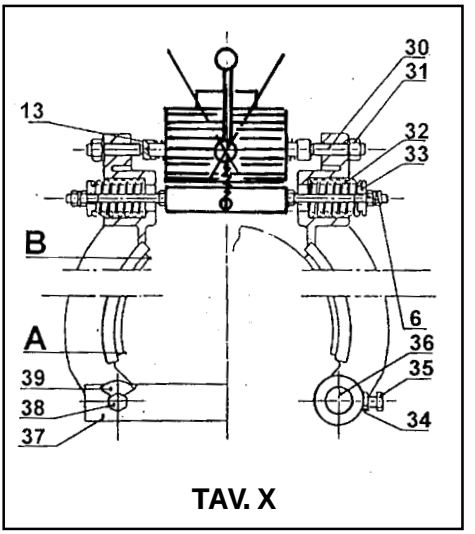
TAV. X

checking that the end stops **13** are in the external end position. Loosen nuts **6** leaving washers **33** in contact with springs **32**. Back off screws **38**, disconnect the pin connection **37** from the Belleville springs **39**. Loosen the nuts **34** and screws **35** and adjust the eccentric pins **36** (using a spanner or screwdriver according to machine version) until the shoes fully engage with the brake drum. Tighten screws **35** and nuts **34**, fit the Belleville springs **39**, pin connection **37** and tighten screws **38**. Next, with shoes in contact with drum, tighten the adjusting screws **30** to move the end stops **13** approximately 1mm toward the brake centre, and tighten the lock-nuts **31**. This done, adjust spring **32** as described in the chapter "**Braking adjustment**".

BRAKE ADJUSTMENT

DRUM BRAKE VERSION

Adjustment should be done when the machine is **unsupported**. First check that when the electromagnet is turned on, the brake unlocks. If this does not occur, proceed as follows: (**refer to chart x**). When the brake is turned off, loosen locking nuts **31** and loosen set screws **30** so that they are distanced by a few millimeters (approx. 4) from end stops **13**, manually checking that the end stops **13** are in the external end position. Loosen nuts **6** leaving washers **33** in contact with springs **32**. With the shoes in contact with the drum, re-tighten set screws **30** moving end stops **13** towards the brake centre by **1 mm**, and then tighten locking nuts **31**. With the electromagnet energised, check that the friction lining of the shoe does not touch the brake drum; just check that in point **B** of the drawing a space of at least approx. **0.5/0.8 mm** exists. This space should extend along the complete arc of the brake lining even if it slightly decreases up to point **A**. If this does not occur, **only in this case**, it becomes necessary to adjust the eccentric pin which regulates the brake shoe-drum coupling. With the electromagnet **de-energised**, loosen locking nuts **31** and set screws **30** so that they are distanced by several mm (approx. 4) from end stops **13,** manually



TAV. X

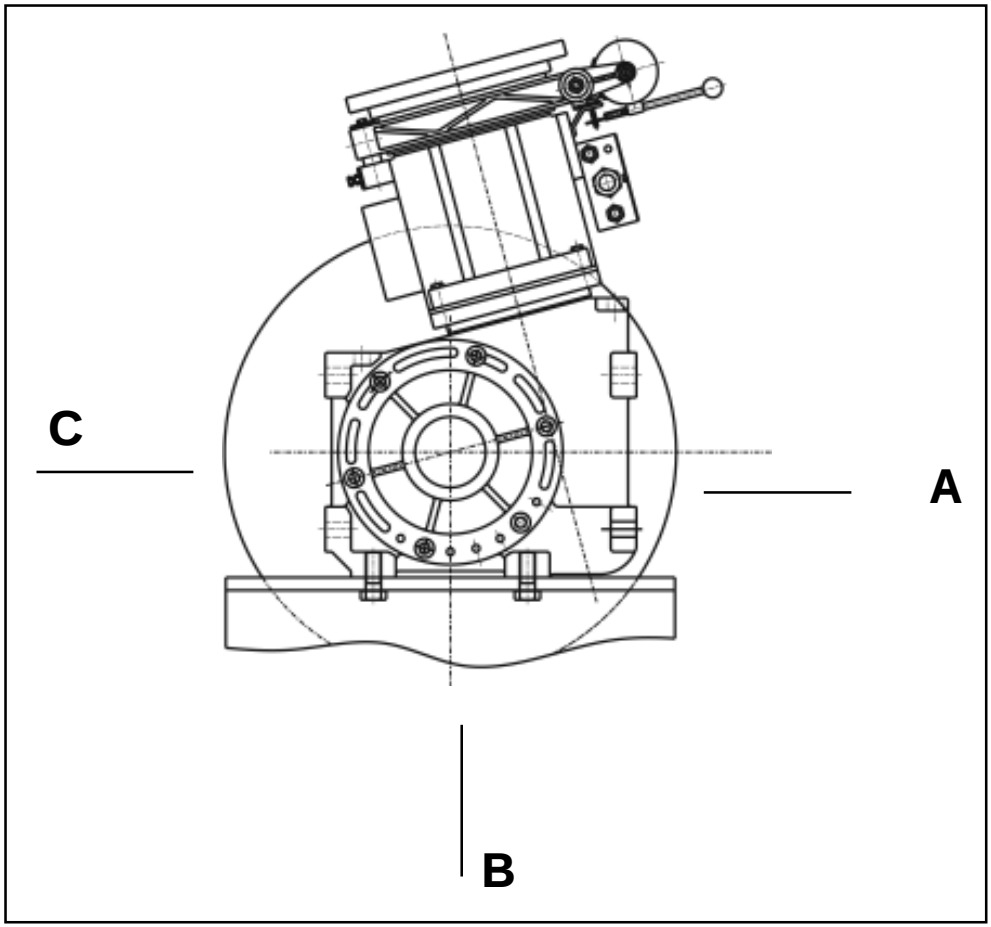
checking that the end stops **13** are in the external end position. Loosen nuts **6** leaving washers **33** in contact with springs **32**. Back off screws **38**, disconnect the pin connection **37** from the Belleville springs **39**. Loosen the nuts **34** and screws **35** and adjust the eccentric pins **36** (using a spanner or screwdriver according to machine version) until the shoes fully engage with the brake drum. Tighten screws **35** and nuts **34**, fit the Belleville springs **39**, pin connection **37** and tighten screws **38**. Next, with shoes in contact with drum, tighten the adjusting screws **30** to move the end stops **13** approximately 1mm toward the brake centre, and tighten the lock-nuts **31**. This done, adjust spring **32** as described in the chapter "**Braking adjustment**".

FIXING ON THE FRAME

Take care to position the gear either in vertical or in horizontal position on a frame as indicated in the figure.
This frame must be fixed in a way able to support the installation loads and has through holes for the fixing of the gear.
For this purpose the figure at page 46 shows the overall and fixing dimensions required.

The gear presents only **ONE POSITION FOR THE SHEAVE** and the useful lower horizontal and vertical bearing/supporting surfaces are **A, B** and **C**.

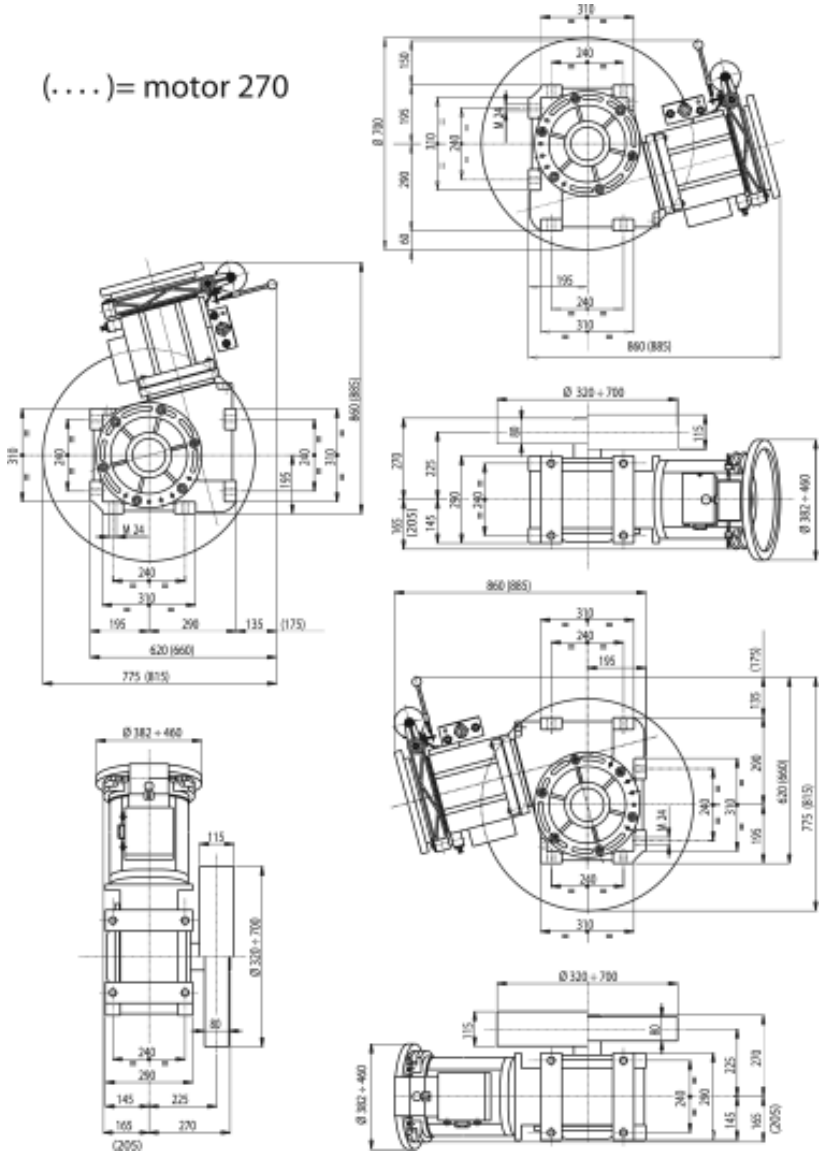
NOTE: the gear must be fixed by means of screws M24x3 with a class of resistance of at least 8.8 and applying a tightening torque of 500 Nm.



FIXING TO THE FRAME

GEAR WITH FIXING AND OVERALL DIMENSIONS

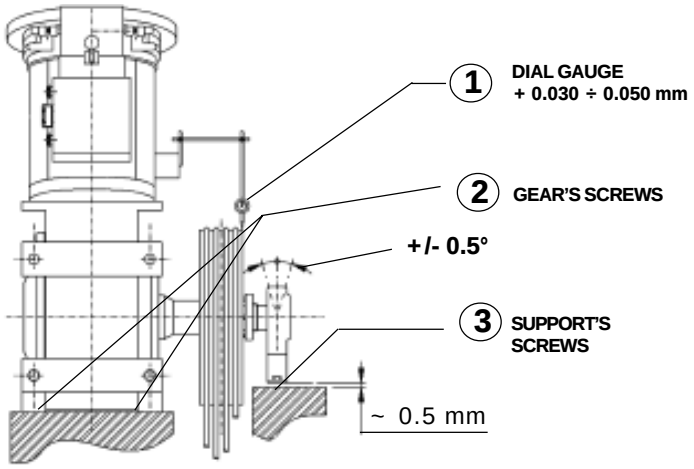
(. . . .)= motor 270



POSITIONING ON THE FRAME

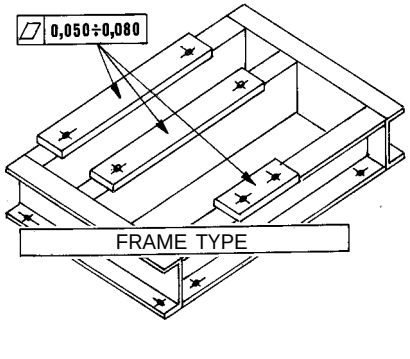
These operations are standard practice with all machines mounted on a frame and serve to keep the slow shaft perfectly horizontal once the plant is in traction. They prepare the frame for the inevitable structural deformations which could occur.

CASE A: Slow shaft with external support, ropes direction downwards



Alignment diagram

Set the gearbox on the frame and check that a space exceeding **0.5 mm** remains between the frame and the support. If not, the gearbox should be raised using



calibrated shims until the required height is reached. Fit and completely tighten the bolts to fix the gearbox to the frame.

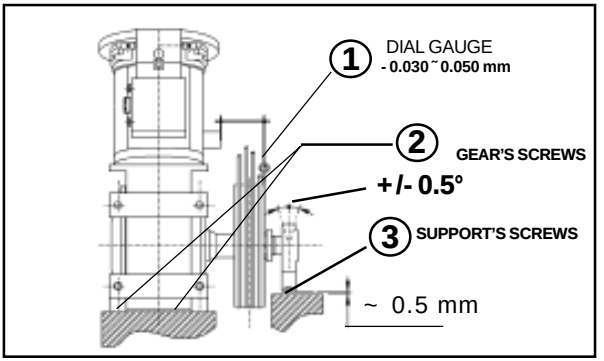
Mount the magnetic base with dial gauge as shown in the drawing.

After re-setting the dial gauge, insert the calibrated shims between the support and the support surface so that the dial gauge indicates a change in height of approx. **0.03÷0.05 mm.**

Now fit the fixing bolts for the external support and completely tighten. For tightening torque see following chart. The dial gauge, after fixing, must show a change in height of approx. 0÷0.05 mm. If not, add or remove shims under the external support until achieving the value indicated above.

DIAMETER	MOMENT
M16	170 Nm
M18	283 Nm
M20	400 Nm
M24	500 Nm

CASE B: slow shaft with external support, ropes direction upwards



Alignment diagram

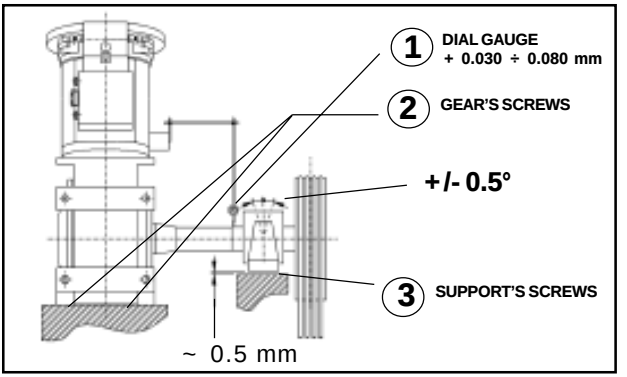
Set the gearbox on the frame in alignment with the appropriate fixing holes and check that a space exceeding **0.5 mm** remains. If not, the gearbox should be raised using calibrated shims until the required height is reached. Insert and completely tighten the bolts fixing the gearbox to the frame. Mount the magnetic base with dial gauge as shown in the drawing.

After re-setting the dial gauge, insert calibrated shims between the support and the support surface (a smaller amount than that indicated in case **A**) so that a space is left of approx. **0.1 mm.**

Fit and completely tighten the fixing bolts to the external support. For tightening torque see chart on **page 47**. The dial gauge, after fixing, must show a lowering of approx. **0,03÷0.05 mm.** If not, add or remove shims under the external support until achieving the value indicated above.

CASE C: slow shaft with intermediate support, ropes direction downwards

Alignment diagram

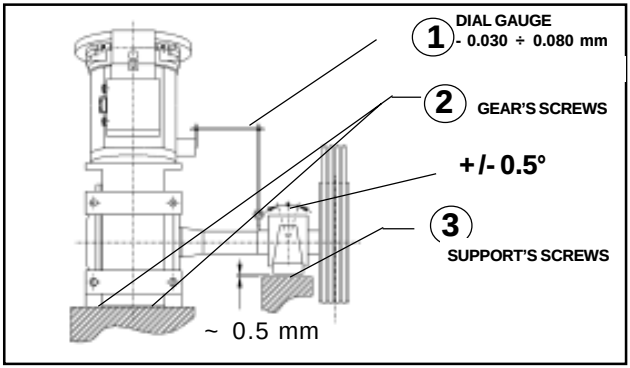


Set the gearbox on the frame in alignment with the appropriate fixing holes, position the shims, if needed, under the support, and check that a space exceeding **0.5 mm** remains between the shim and support. If not, the gearbox should be raised using calibrated shims until the required height is reached. Fit and completely tighten the bolts fixing the gearbox to the frame. Mount the magnetic base with dial gauge as shown in the drawing.

After re-setting the dial gauge, insert the calibrated shims between the support and the support surface so that the dial gauge indicates a change upwards of approx. **0.03÷0.08 mm.** Now fit the fixing bolts for the external support and completely tighten. For tightening torque see chart on **page 47.** The dial gauge, after fixing, must show a change upwards of approx. **0÷0.08 mm.**

If not, add or remove shims under the external support until achieving the value indicated above.

CASE D: slow shaft with intermediate support, ropes direction upwards



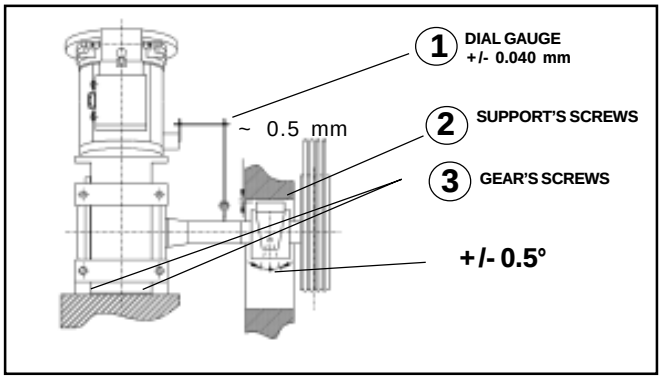
Alignment diagram

Set the gearbox on the frame in alignment with the appropriate fixing holes, position the shims, if needed, under the support, and check that a space exceeding **0.5 mm** remains between the shim and support. If not, the gearbox should be raised using calibrated shims until the required height is reached. Fit and completely tighten the bolts fixing the gearbox to the frame. Mount the magnetic base with dial gauge as shown in the drawing.
After re-setting the dial gauge, insert the calibrated shims between the support and the support surface so that the dial gauge indicates a change inferior to that indicated in case **C** so that a space of approx. **0.1 mm** remains.
Now fit the fixing bolts for the support and completely tighten. For tightening torque see chart on **page 47.** The dial gauge, after fixing, must show a lowering of approx. **0.03÷0.08** mm. If not, add or remove shims until achieving the value indicated above.

ENGLISH

CASE E: slow shaft with intermediate support, ropes direction upwards

Alignment diagram



Set the gearbox on the frame in alignment with the appropriate fixing holes position the shims, if needed, under the support, and check that a space exceeding **0.5 mm** remains between the shim and support. If not, lower the gearbox support surface until the indicated value is reached. Fit and completely tighten the bolts fixing the gearbox to the frame. Mount the magnetic base with dial gauge as shown in the drawing. After re-setting the dial gauge, insert the calibrated shims between the support and the support surface without ever forcing the shims which could otherwise alter the dial gauge value of "0". Now fit the fixing bolts for the support and completely tighten.
For tightening torque see chart on **page 47.** The dial gauge, after fixing, must indicate a **±0.04** mm value modification. If not, add or remove shims until achieving the value indicated above.

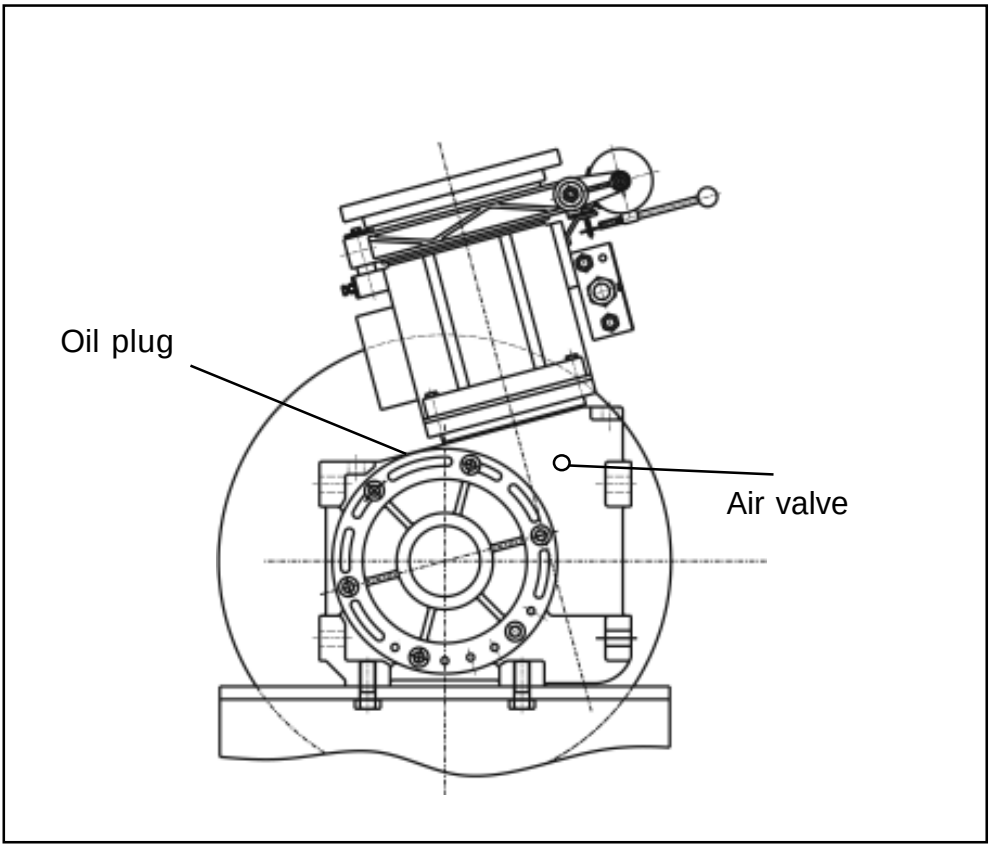
LUBRICATION

- The oil used for lubrication is a special oil with a synthetic polyalfaolefinic base, with special additives showing higher characteristics than normal “EP”.

- SASSI before shipping has filled the gear with 6,5 litres oil.

- **Do not top up**
- **The quantity of oil is sufficient for the overall gear life**

The gear is equipped with at least one oil plug positioned in such a way to facilitate the possible oil drainage independently from the final installation position.
On its side, on the casing, behind the sheave, there is an air valve, which enables the automatic release of the overpressure generated by the pumping of the working members.

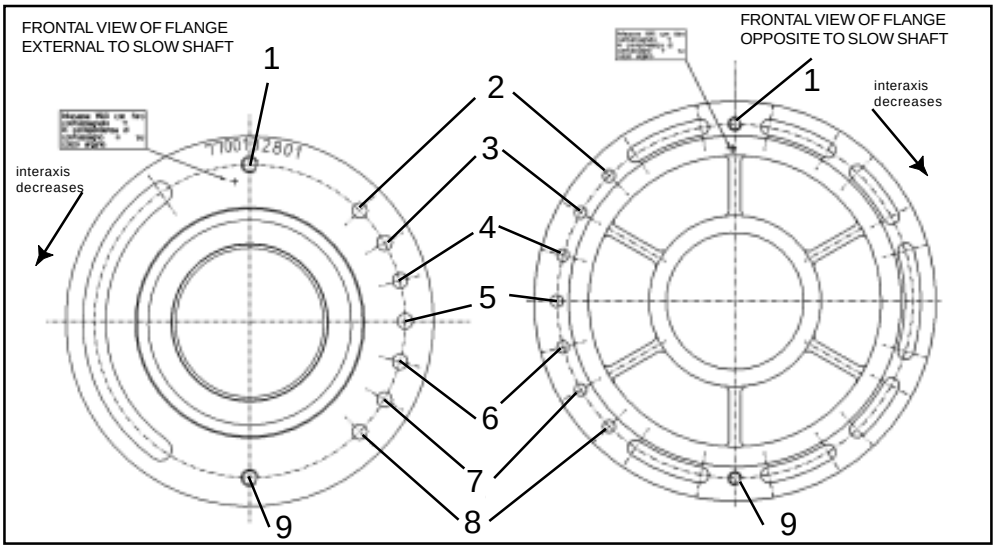


CHECKING THE WORM/WORMWHEEL BACKLASH

It is extremely important to check the worm/wormwheel backlash. (see picture) Remove the cables from the sheave, place a dial gauge on one of the surfaces of the gearbox head so that the probe is positioned against the head of one of the screws joining the flange with the cable sheave (sheaves type) Close the brake and manually turn the sheave to the left and to the right so that the radial back lash measurement can be read on the dial gauge.The position of the flange bolts on the flange for sheave correspond more or less to the position of the wormwheel reference radius of the wormwheel that is 136 mm. In case of spoked type pulley equip the probe of the dial gauge with an extension to reach one of the internal spokes at a distance o 136mm from the slow axis.

Worm/Wormwheel gear back lash values.

Check every 3000 running hours or at least once a year whether the maximum

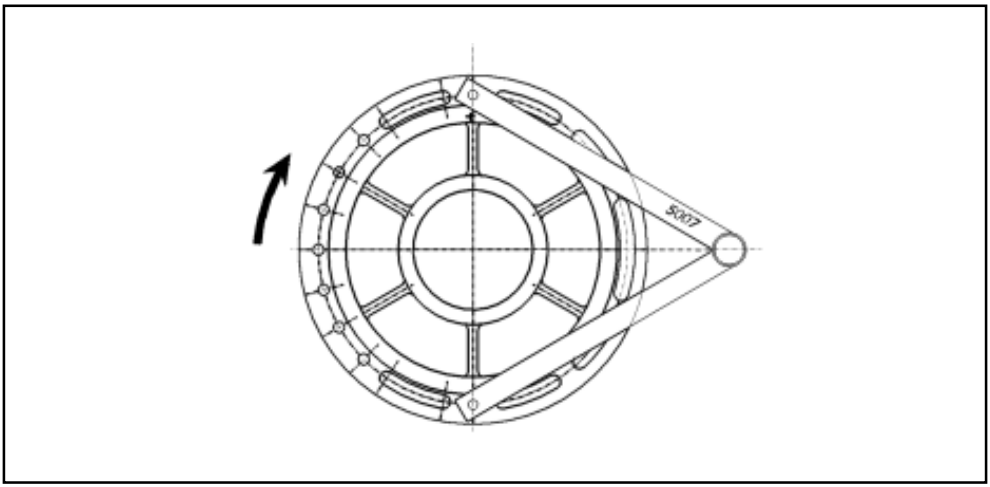


values of the a/m backlash exceed 0.3 mm in case of gear with sheave diameters of more than 560 mm, or 0.5 mm in case of gear with sheave diameters less/equal than 560 mm: in this case follow the following instructions.

The two flanges showed in the drawing of the previous page are positioned on the slow shaft and allow the adjustment of the worm/wormwheel backlash thanks to their eccentricity. They have a series of holes - indicated with the numbers from 1 to 9 - which care useful for the interaxis adjustment. A rotation of the eccentric flanges corresponding to the distance existing between the two subsequent holes causes a change in the interaxis equal to about 4 hundreth of millimeter.

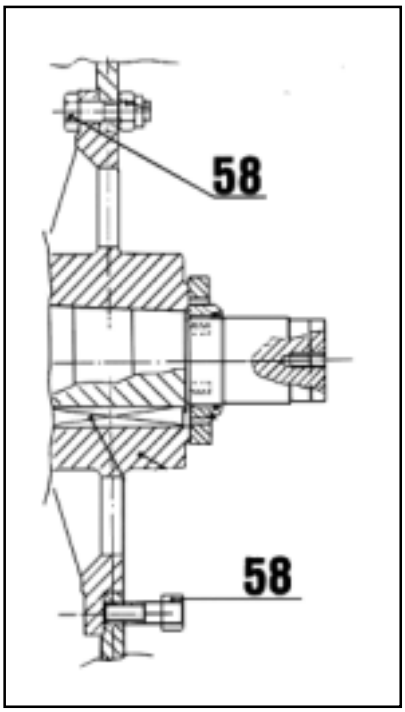
Very important: this rotation must be carried out in the same direction and of the same holes number to avoid wrong disalignement of the slow shaft. The condition of maximum interaxis worm/wormwheel is reached if both flanges are positioned with hole 1 in correspondence of the mark ‘+’ present in the machine body; if the flanges are turned and blocked in the following holes the distance of the axis worm/wormwheel tends to constantly decrease. Carry out these operations without ropes and applied loads to the sheave. To rotate the flange use tool 5007.

At the end tighten the fixing screws M10 of the flange at a torque of 50Nm. Total screws: two in the flange on sheave side and eight in the opposite one.



INSTRUCTIONS TO REPLACE THE SHEAVES

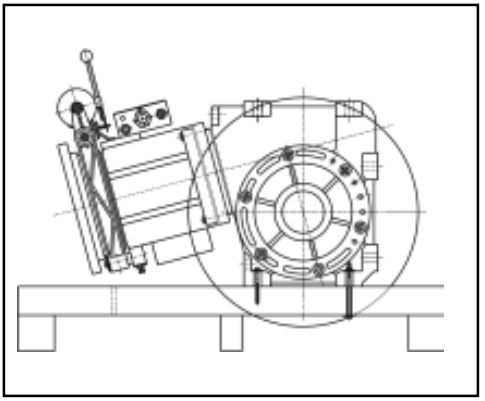
The traction sheaves are specially designed for gear TORO for diameters between 320 and 400 mm. These are one part traction sheaves without flange; in case of periodical checks A. Sassi advise to replace the sheave when the action of the ropes have worn the undercut by the half of its initial depth value.
The sheaves of other type are coupled to a flange by means of 5 bolts M14, with related self locking nuts and one calibrated bolt M16x55.
For the replacement of this type of sheave please refer to the instructions valid for the previous sheave type.
To extract the sheave from the flange insert three screws M14 in the threaded holes of present in the flange (see drw. particular. 58).



In case of replacement A. Sassi wil supply sheaves with holes specially designed for bolts M14. The drilling Ø 17mm with H7 tolerance for the calibrated bolt has to be carried out together with the flange to obtain the exact boring of the hole. The dimension of the calibrated section of the bolt is 17k6.
Both one part traction sheaves and sheaves are fixed by means of a special nut M65x2, which is locked by five M16 high resistance screws. The screws are tightened in sequence with a tightening torque of 100Nm and are specially designed to prevent the unscrewing of the nut. As additional safety measure, Loctite type 243 is applied to the threads to assure tightening. A steel-made spacer between the ring nut and the sheave prevents the surface of the hub to be deformed by the frontal screws, whicht act on it. This fact assure a constant thrust.

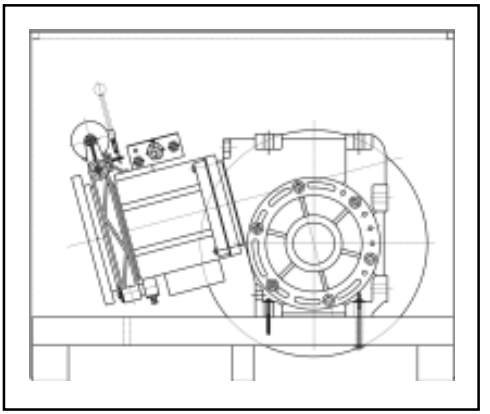
PACKING AND TRANSPORT

THE GEAR CAN BE HANDLED FOR SHIPPING IN PALLET / CARDBOARD BOX / BOX

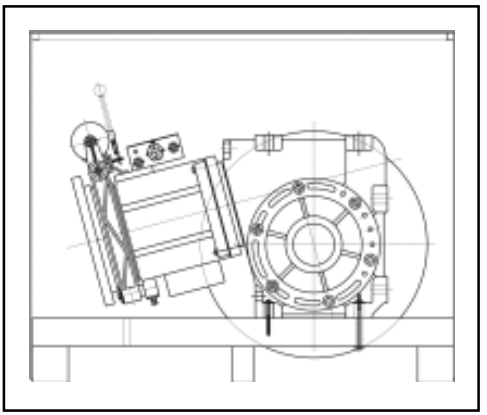


PALLET ARRANGEMENT

CARDBOARD BOX ARRANGEMENT



NOTE:
No overstorage during transport



BOX ARRANGEMENT

NOTE:
One box (only one!) can be stacked onto another one only if the boxes have identical dimensions

PERIODICAL CHECKS

Carry out the normal checks on the machine periodically. The frequency of the checks depends obviously on the operation cycles of the installation.

- every 6 months with operation cycles up to 2 hours a day
- every 3 months with operation cycles higher than 2 hours a day

Herefollows we indicate the most important checks to be carried out on the machine.

IMPORTANT!

In case of interventions on the machine, please use only original spare parts supplied by ALBERTO SASSI.

OIL: In case of light oil sweating in the ending part of the shaft or in the vent plug do not add oil.
Should anomalous oil leakages occur, please contact directly the after-sales department of ALBERTO SASSI indicating the machine serial number to fasten the solution of the problem.

BRAKE: As far as the brake drum is concerned, please refer to page 43 and 44.

GROOVES OF THE SHEAVE: see instruction at page 53

BACKLASH: please refer to instructions at page 51