

**FROM THE TOP SIDE**

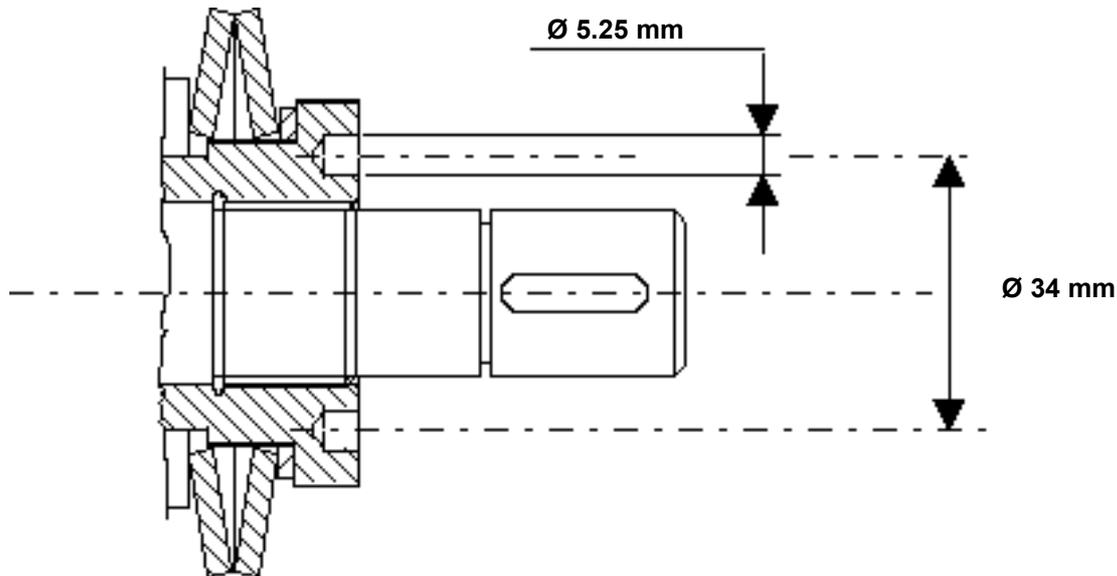
Take off the 044 top cover. Untighten the screws 300, extract the 042 proximity support with 301 proximity. Remove the 314 screw and extract the 049 support with 313 proximity, remove the 046a washers, extract the 200 electromagnet, extract the 017 lock and its 047 spring. Remove the 019 covers from the the two sides, extract the 018 shock absorbing pins provided with the 032 pads. Remove the 400 cover (oil drain and oil loading hole).

**FROM THE REAR SIDE**

Take off the 011 cover, untighten the scrws 302 and remove the 160 encoder, the 303 seeger, the 030 footstep and the 304 cushion pad.

**FROM THE FRONT SIDE**

Take off th toolholder disc, untighten the screws 305, take off the dowels 306, extract the entire central body composed by 003 mobile ring gear, 002 fixed ring gear, 005 indexing head, 006 roller carrier set, 007 spider set, 020 ring nut, Belleville washers 307, 025-026 spacers. If dismantling this set too were necessary, unscrew the ring nut, with a particular tool, and extract all the other components.



Whenever the turret is disassembled check the state of the following elements which will have to be replaced in case of a negative result:

- 308 principal gasket
- all the grommets type O - ring
- 032 cushion pads

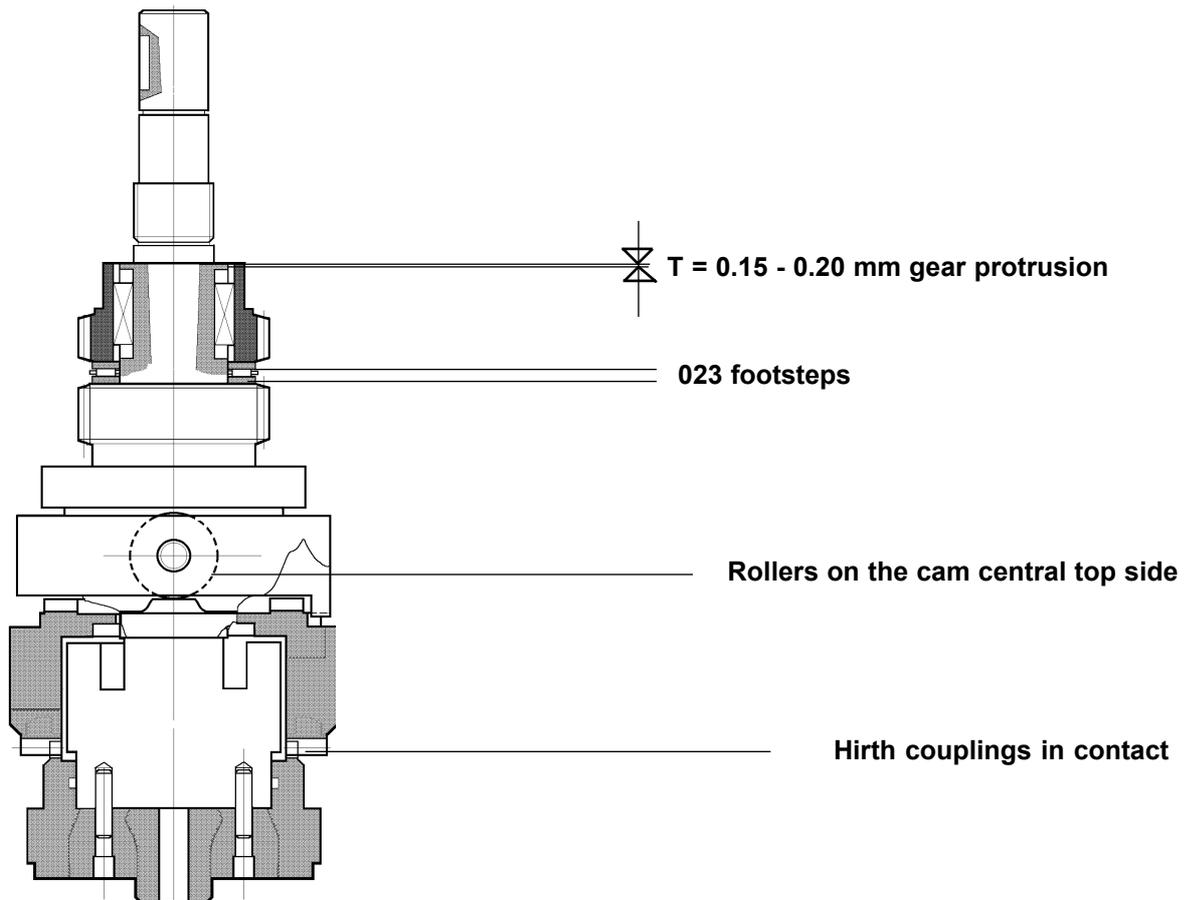
and the following elements (only when the central body has been completely disassembled):

- cam surface
- rollers
- Hirth couplings
- all gears
- supporting plate of the 003 ring gear with the 002 one



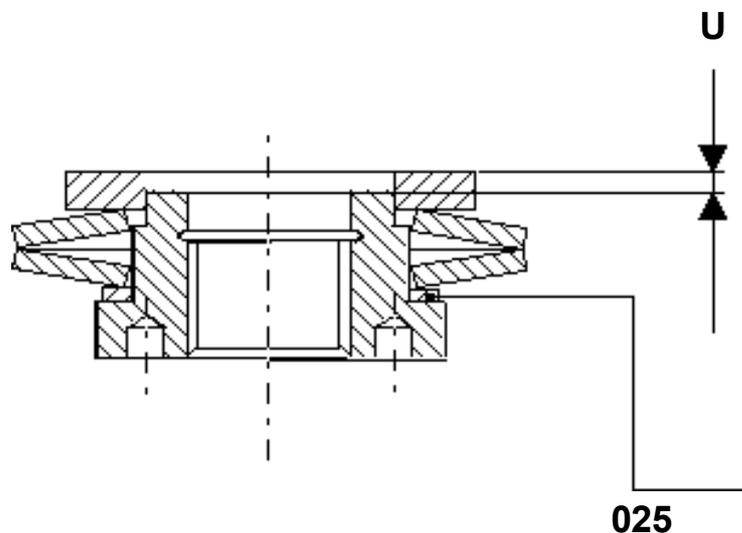
If one of the particular elements of the central body is replaced (except the 007 spider), before assembling it again, the values T and U, which determine the right load, will have to be checked and set up:

- assemble the elements as shown in the picture with the Hirth couplings touching, and the rollers on the cam top side. Make sure that the value T is between 0.15 - 0.20 mm. If it is not, grind new 023 footsteps so that the recommended values include the T one.



- assemble the elements as shown in the picture; make sure that the value U is included in the values of the table. If it is not, grind a new 025 spacer so that the recommended values include the U one.

Value U (mm)  
1.2 +/- 0.05



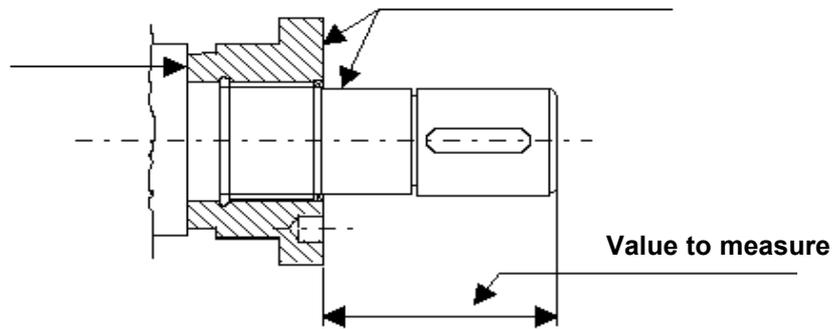


**WHEN RE-ASSEMBLING EVERYTHING:**

- insert the keys 309 into the corresponding seats (identical marks), keeping the threaded holes towards the 020 ring nut and in touch with the bottom of the nuts.
- Make sure that the 008 gear keys smoothly (if it does not, reverse the assembly position with respect to the keys).
- Make sure that the ring nut is completely locked; to do this, follow the following instructions:
- before the final assembly, put temporarily aside the elements 026-307-025, screw down the ring nut until it touches its seating, carry out the measurement between the 005 spacer face and the ring nut top side; mark the position of the ring nut with respect to the spacer.

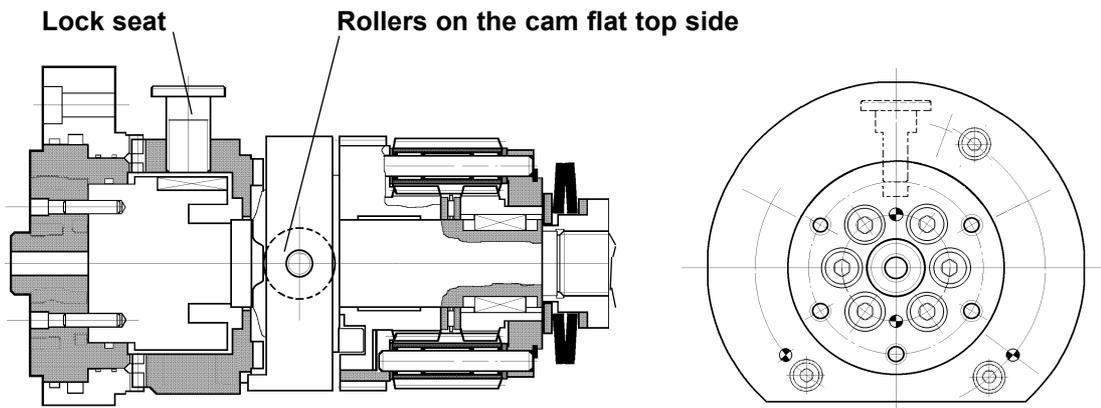
Ring nut in contact

Match mark



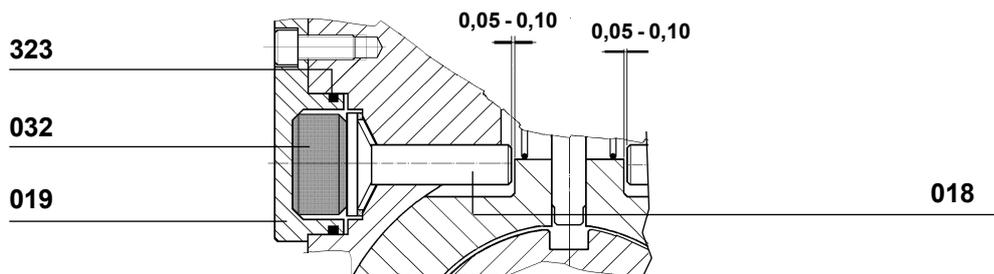
Release the ring nut, assemble the elements 026-307-025; screw down the ring nut again, making sure that the axial position reached is the same previously measured with the coinciding marks.

Before putting the central body into its casing, rotate the 007 spider until the lock seat becomes perpendicular to the holes for the coolant liquid interception of the 002 ring gear; insert the 017 lock; rotate the 007 spider by hand until the Hirth coupling are locked (rollers on the cam tops). Extract the lock 017.



Before assembling the motor 150, place the casing on the plane, keeping the motor set vertical: through the casing seat hole, insert the type and amount of lubricant according to page 19.

The 400 sealing plug must be installed after the assembly motor set.





The turret mechanical elements are lubricated for life.

The lubricant must be replaced only in case the turret has been completely disassembled.

For a quick filling, pour the oil into the casing near the motor seat.

The lubricant (viscosity 80 SW 90) must be compatible with rubbers and teflon. In order to use the oil inlet hole (use this hole to add small amounts of oil) remove the 044 top cap and the 400 sealing plug.

The table below indicates the right amounts to use:

**LUBRICANT AMOUNT**

**0.3 Kg.**

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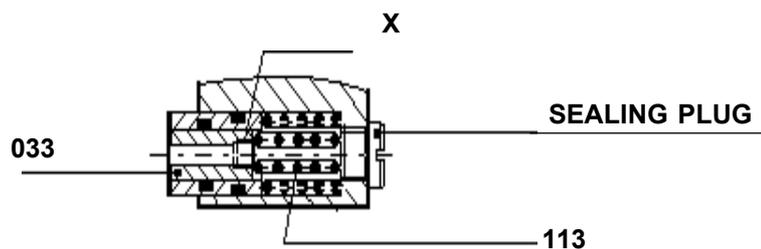
**REPLACEMENT OF THE COOLANT BUSH**

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Remove the sealing plug, take off the 113 spiral spring, thus extract the 033 bush by using the proper thread X.

Scrape off the scale from the seats; grease the outside of the new bush, thus put it into its seat, checking its sliding.

**X = M 8**  
**Depth = 3 mm**





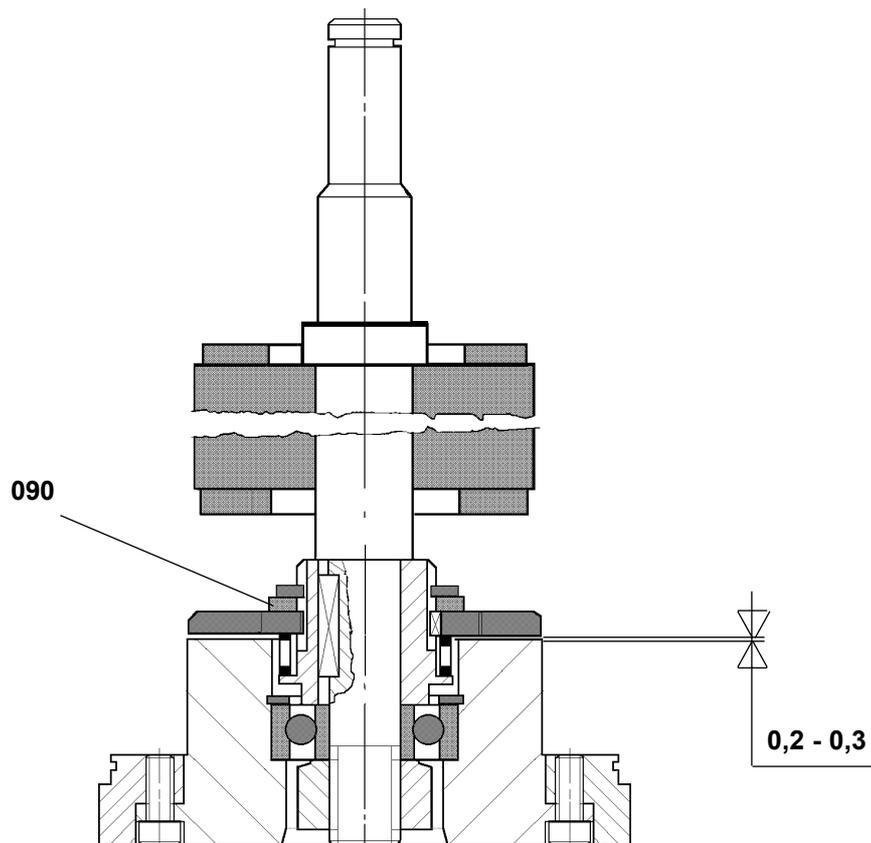
Remove the 011 rear cover, the 044 top cover, take off the 400 sealing plug and disassemble the terminal block supports 045 and 045a. Disconnect the feeding cables of the motor, the brake and thermostat from the terminal block. Release the screws 311, extract the 150 motor set. Disassemble the 015 gear and install it on the new motor set. Install the motor set on the casing, connect the cables to the terminal block. Check the correct connection of the motor feeding phases: from the control carry out a tool change calling up the nearest station. If the motor phases have been properly connected, the change of station should follow the shortest route; if they have not, invert two motor feeding cables on the terminal block. Assemble the motor again in the opposite order.

## PRE - INDEXING ELECTROMAGNET REPLACEMENT

Take off the 044 cover top, the 042 support, remove the 046a washers, extract the 200 electromagnet; remove the 011 rear cover and disconnect the electromagnet feeding cables. Install the new electromagnet into the casing and lock it with the two washers. Assemble the proximity support again provided with 301 proximity, and adjust it (see page 22). Connect the electromagnet cables to the terminal block (see the electrical diagram), assemble the top cover and the rear cover again.

## BRAKE MAGNET REPLACEMENT AND AIR GAP SETTING

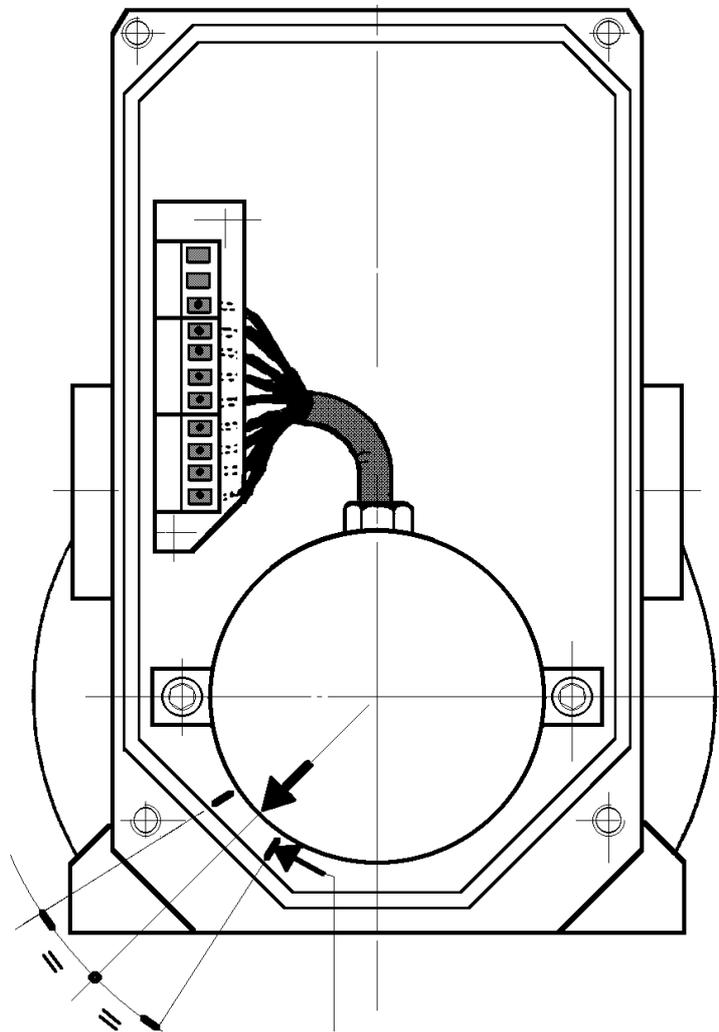
Remove the 011 rear cover, take off the 044 top cover, remove the 400 sealing plug, untighten the fixing screws of the 045 and 045a terminal blocks, disconnect the brake cables. Disassemble the 150 motor set and the 015 gear. Disassemble the deteriorated brake and replace it with the new one. Set up the air gap (0.2 - 0.3 mm) to measure vertically using the 090 spacers). Assemble everything again in the opposite order.



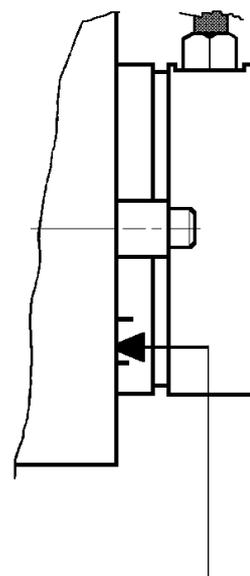


Remove the 011 rear cover, disconnect the encoder cables from the 310 terminal block, take off the 067 holders and extract the encoder, paying attention to the nut in the shaft. Assemble the encoder in the opposite order, and connect it to the terminal block. Before fixing the encoder permanently, set it:

stop the turret in any locked position, slowly rotate the encoder until the strobe signal (detectable both by instrument and voltmeter) disappears. Mark the encoder position with respect to the support. Slowly rotate the encoder in the opposite direction until the strobe signal disappears again; mark the new position on the support. In this way the strobe signal area is spotted. Rotate the encoder backwards so that the mark is half way between the two marks on the casing. Block the 067 holders, install the rear cover again.



Marks on the casing



Marks on the encoder

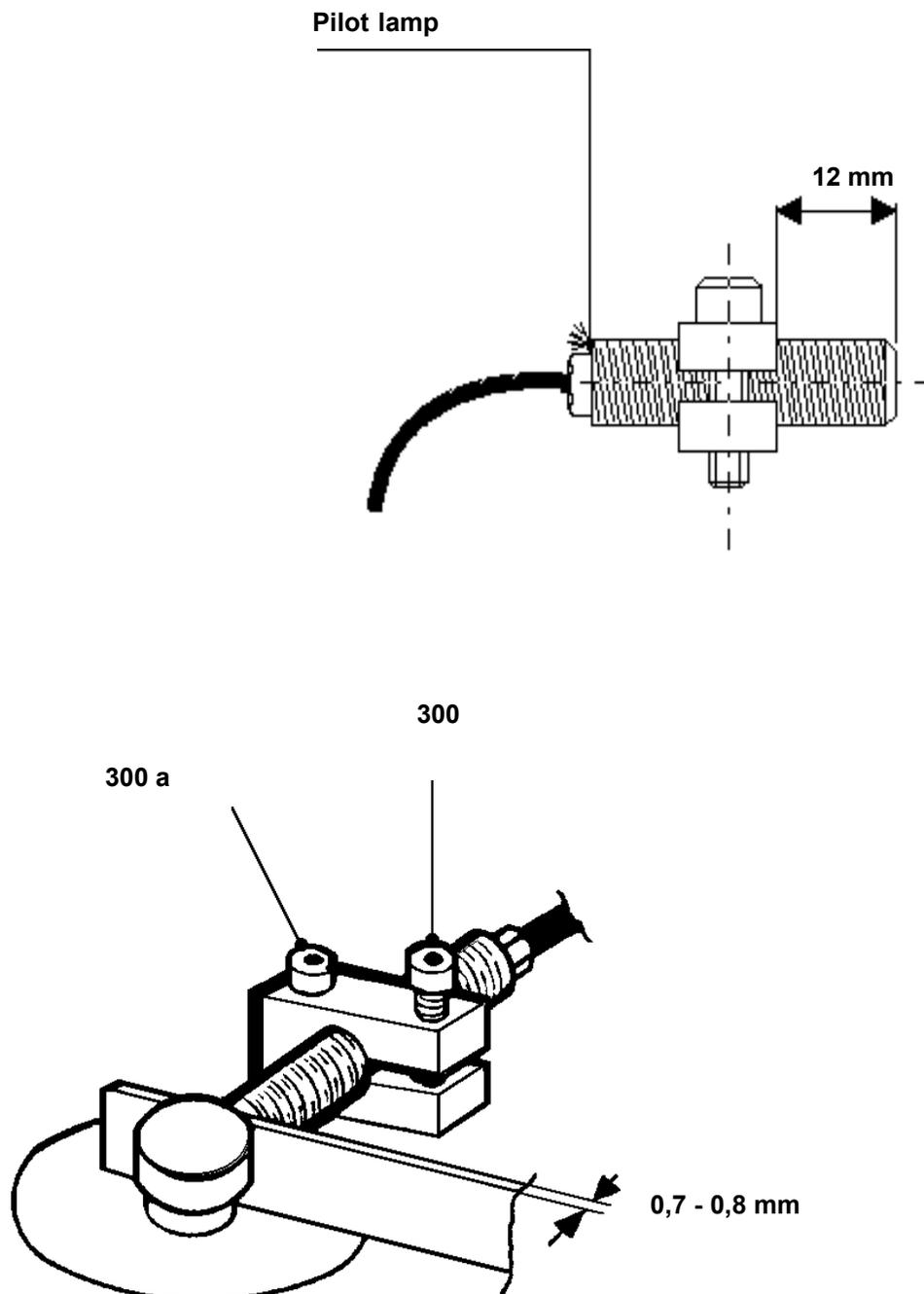


Remove the 044 top cover, the 042 support provided with 301 proximity. Remove the 011 rear cover, disconnect the proximity cables from the 310 terminal block, remove the proximity. Screw the new proximity into the support as far as the protrusion value X. Install the support and fix it with 300a screws so that the pilot light at the proximity end becomes visible.

Interpose a shim of 0.7 - 0.8 mm (see the picture) and bring the proximity into contact with the shim. Fix the screws 300 - 300a with a tightening torque of 3 Nm and lock them with Loctite.

Connect the cables to the terminal block, with energised proximity make sure they work properly:

with the turret locked, by lowering the electromagnet end of a value between 1.8 - 2.5 mm the (red) pilot lamp on the proximity rear side will light up. Install the rear cover and top cover again.





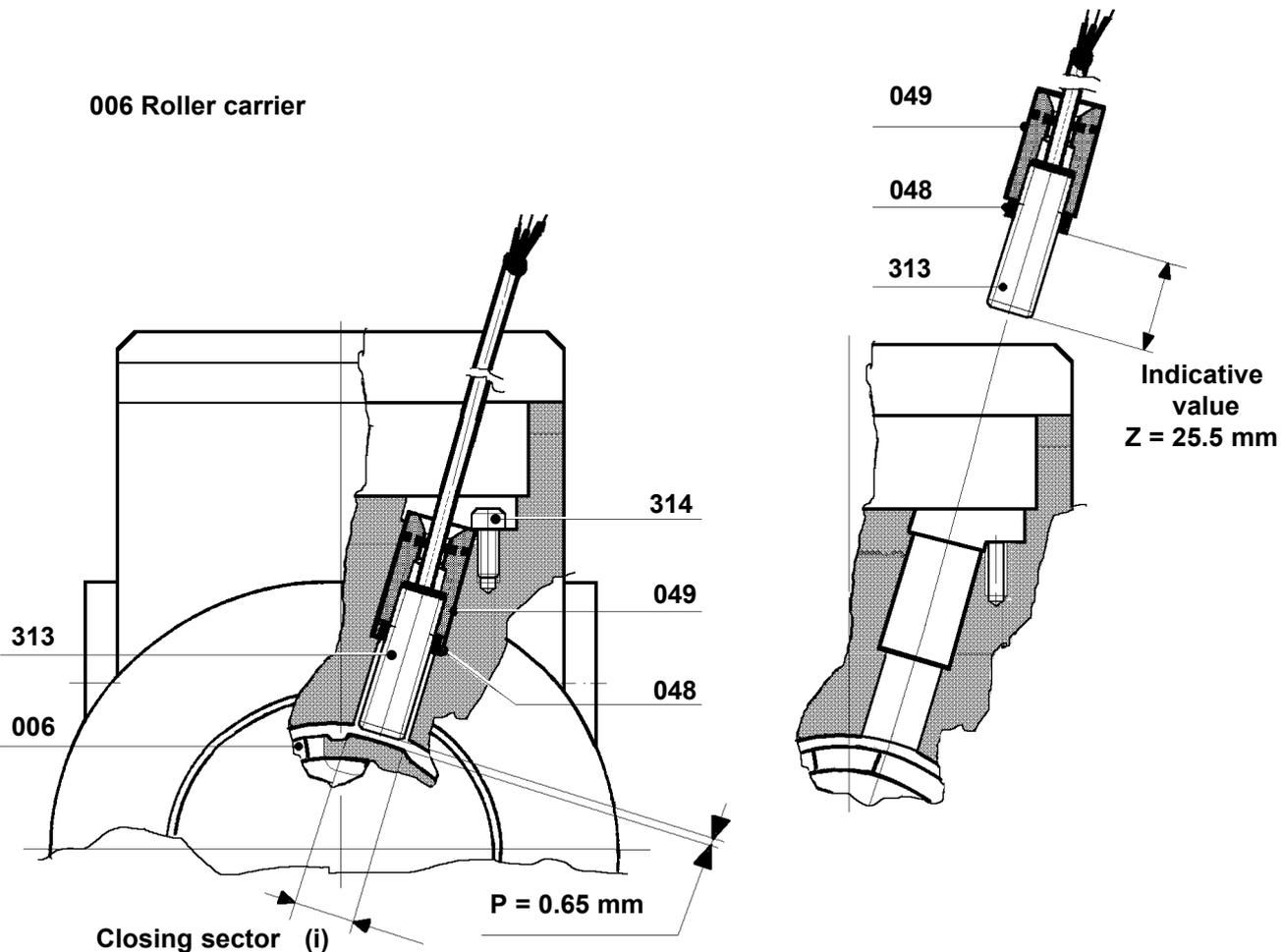
Remove the 044 top cover, untighten the 314 screw, extract the 049 support, take off the 011 rear cover, disconnect the 313 proximity cables from the terminal block. Remove the 150 motor and the 400 hermetic cap.

Unscrew the 048 nut ring, unscrew and remove the 313 proximity. Screw the new support into the support as far as the value Z (see the picture). The value Z in the picture is indicative, and correct setting of the operating distance P might require a shift from the value Z.

The amount of the operating distance is measured with a feeler gauge. The measurement must be carried out working from the turret rear side, that is to say from the motor seat

$$P = 0,65 \text{ mm}$$

To measure P, the closing sector (i) of the 006 roller carrier must be against the proximity that is to say with the turret locked. If it is not so, lock it by hand (see page 24). After setting up the operating distance value P, screw the 048 ring nut (tightening torque 3 Nm). Install and fix the 049 support again with the screw. Assemble the 150 motor set again and the 400 sealing plug. Connect the proximity cables to the terminal block (see the electrical diagram). With the proximity energised, the pilot lamp on the control will light up thus indicating that the turret is locked. Install the rear cover and the top cover.





### What to do if the positioning cycle is uncomplete (due to an emergency or casual stop)

Remove the 011 rear cover and the 044 top cover, release and extract partially the 048 proximity support, disconnect the feeding cables of the motor and of the brake from the 045a terminal block (but keeping the proximities fed). By using a hexagonal spanner (see the table) rotate the 012 motor shaft so that the toolholder disc rotates in the same direction as it did when stopped. At the same time push the 073 core of the 200 electromagnet until the 017 lock enters a hole in the 006 indexing head. Keeping the core pushed, reverse the motor shaft rotation until the (red)= pilot lamp of the 313 proximity (visible on the control board) lights up. Rotate the shaft again of a further turn, making sure that the pilot lamp is still on. The motor shaft will have to rotate in the same direction as the one before the reversal in the following cases:

- if the disc direction when it stopped is unknown
- if there is a mechanical stop after the reversal without succeeding in locking the turret.

Tighten the wire clip, reconnect the cables to the terminal block, install the top and rear cover.

Spanner Size

5 mm

**IMPORTANT:** for an automatic positioning, please refer to the electrical manual



**After around 400.000 manoeuvres:**

- check the sliding of the 073 core of the 200 electromagnet by pushing the core end many times and by letting it recover through the 047 spring effect; then rotate it some turns. Remove any possible partreak of contamination from the core and the nearby parts. Oil the core external surface which penetrates into the electromagnet.

- Check the wear - rate of the 033 coolant bush and replace it if necessary.

- Check the 315 - 308 gasket state; if they are deteriorated or clearly worn out, they must be replaced.

- To check the gaskets: release the screws 331, extract the dowels 332 and the 003 mobile ring gear. If a large amount of oil leaks out, load it again.



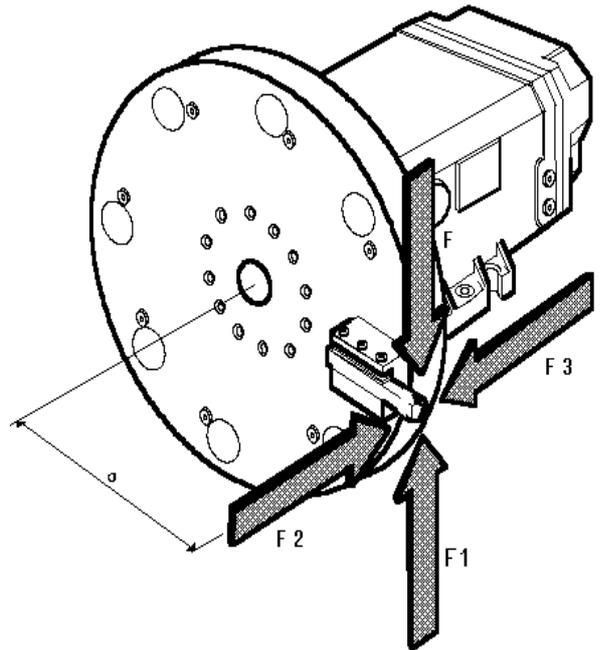
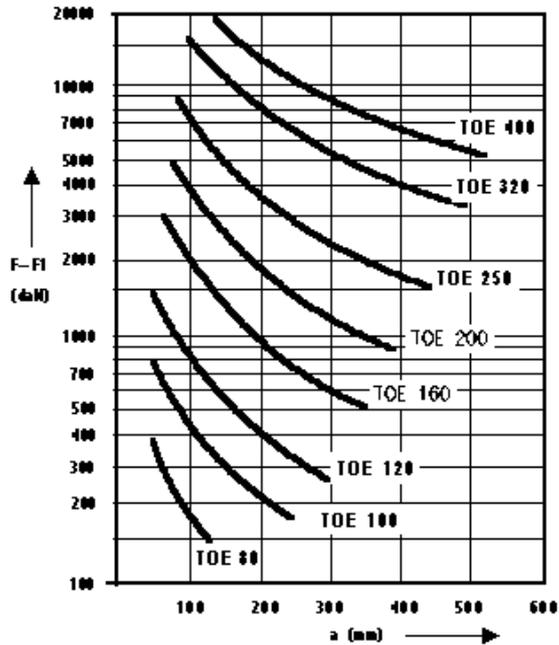
|            |                                      |
|------------|--------------------------------------|
| <b>032</b> | <b>Pads (n. 2)</b>                   |
| <b>455</b> | <b>Pads (n. 3)</b>                   |
| <b>033</b> | <b>On - off coolant liquid valve</b> |
| <b>150</b> | <b>Motor set</b>                     |
| <b>160</b> | <b>Encoder set</b>                   |
| <b>175</b> | <b>Brake magnet</b>                  |
| <b>200</b> | <b>Electromagnet</b>                 |
| <b>301</b> | <b>Pre - indexing proximity</b>      |
| <b>308</b> | <b>Gasket</b>                        |
| <b>313</b> | <b>Locking proximity</b>             |
| <b>315</b> | <b>O - ring</b>                      |
| <b>316</b> | <b>O - ring</b>                      |
| <b>317</b> | <b>O - ring</b>                      |
| <b>318</b> | <b>O - ring</b>                      |
| <b>319</b> | <b>O - ring</b>                      |
| <b>320</b> | <b>O - ring</b>                      |
| <b>321</b> | <b>O - ring</b>                      |
| <b>322</b> | <b>O - ring</b>                      |
| <b>324</b> | <b>O - ring</b>                      |
| <b>325</b> | <b>O - ring</b>                      |
| <b>326</b> | <b>O - ring</b>                      |
| <b>327</b> | <b>O - ring</b>                      |
| <b>328</b> | <b>O - ring</b>                      |
| <b>329</b> | <b>Seal ring</b>                     |



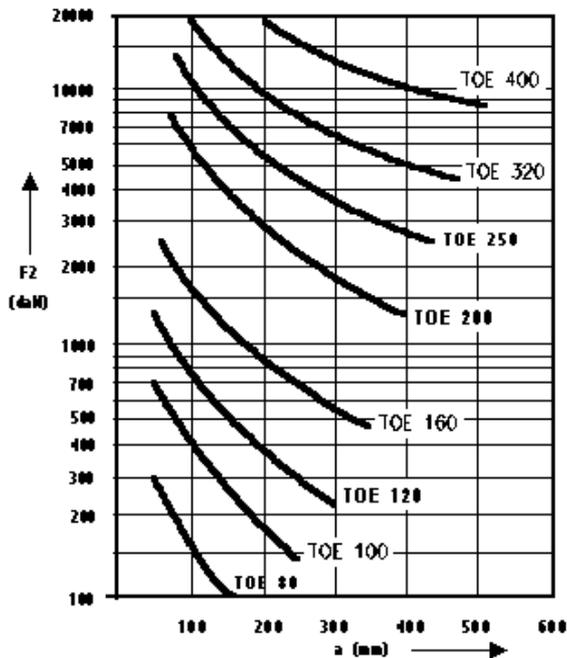
| <b>TURRET SIZE</b>  |                        | <b>TOE 100</b>     |                    |                    |
|---|------------------------|--------------------|--------------------|--------------------|
| <b>Ratio code</b>   |                        | <b>TOE 100/..0</b> | <b>TOE 100/..1</b> | <b>TOE 100/..2</b> |
| <b>Maximum moment of inertia of carriable masses</b>  | <b>Kgm<sup>2</sup></b> | <b>0.20</b>        | <b>0.15</b>        | <b>0.10</b>        |
| <b>Tangential torque</b>  | <b>Nm</b>              | <b>350</b>         | <b>350</b>         | <b>350</b>         |
| <b>Max. out of balance torque by weight carried when turning axis of the turret is in horizontal position</b> | <b>Nm</b>              | <b>0.6</b>         | <b>0.6</b>         | <b>0.6</b>         |
| <b>Accuracy of repeatibility</b>  | <b>(Degr)°</b>         | <b>+/- 2"</b>      | <b>+/- 2"</b>      | <b>+/- 2"</b>      |
| <b>Weight of standard turret</b>  | <b>Kg</b>              | <b>19.6</b>        | <b>19.6</b>        | <b>19.6</b>        |
| <b>Manoeuver</b>  | <b>N° p/h</b>          | <b>840</b>         | <b>1020</b>        | <b>1200</b>        |



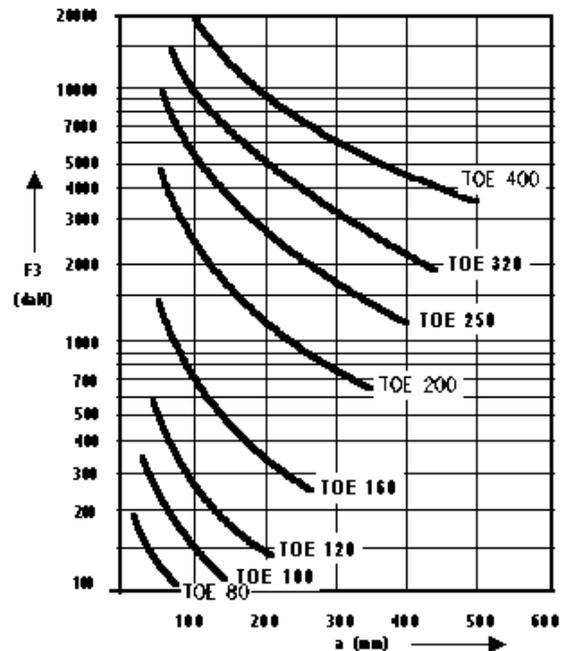
As a function of the  
tangential thrust F and F1



As a function of the  
pressing axial force F2



As a function of the  
lifting axial force F3





| PROBLEM   | REASON   | SOLUTION  |
|---|--|---|
| The turret does not start   | <p>There is no motor rotation</p> <p>Damaged motor</p> <p>Thermostat emergency switch in function</p>  | <p>Reset the motor feeding</p> <p>Replace the motor (see page 20)</p> <p>See next point</p>   |
| The turret does not complete the indexing cycle due to the thermostat, emergency switch or to uncomplete cycle signal | <p>Higher number of indexes/hour than permitted one</p> <p>With released turret in selected station and energised motor, there is no 301 pre-indexing proximity signal</p> <p>Pre-indexing proximity damaged</p> <p>The pre-indexing proximity is not properly set</p> <p>With released turret in the selected station and energised motor, there is no 313 locking proximity signal</p> <p>Damaged locking proximity switch 313</p> <p>The locking proximity switch 313 is not properly set</p> <p>Restart after an emergency or casual stop in the opposite direction with respect to the proper one</p> <p>Electromagnet core jamming</p> | <p>Reduce the number of manoeuvres (see the technical data table on page 27)</p> <p>Replace the pre-indexing proximity (see page 22)<br/>Einstellen des vorindexierten Näherungsschalters (s. Seite 22)</p> <p>Replace the locking proximity (see page 23)</p> <p>Set the locking proximity (see page 23)</p> <p>See page 24</p> <p>See page 25</p> |
| Der Revolverkopf übergeht die vorindexierte geforderte Station  | Elektromagnet errät sich spät  | Überholen des Kontrol-Apparates   |
|   |  |   |



| <b>PROBLEM</b>   | <b>REASON</b>  | <b>SOLUTION</b>   |
|--|--|---|
| The turret does not remain locked                                  | Delay in motor de-energise and braking<br>There is no brake feeding<br>Damaged brake<br>Brake excessively worn   | Reset the control equipment<br>Reset the control equipment<br>Replace the brake magnet (see page 20)<br>Replace the entrefer (see page 20)  |
| The turret keeps rotating without stopping at the selected station | Damaged angular encoder<br>Damaged electromagnet<br>The electromagnet is de-energised or the voltage is lower than necessary<br>Power cable continuity faulty                                  | Replace the angular encoder (see page 21)<br>Replace the electromagnet (see page 20)<br>Reset the voltage in the suggested value<br>Reset the continuity  |
| The turret approaches the called station through the longest route | Inverted motor phases  | Reconnect the phases properly   |
| Excessive impact during the pre-indexing                           | Excessive elasticity of the cushioning pads<br>Higher moment of inertia of the applied masses than the permitted one<br>Higher unbalancing moment of the applied masses than the permitted one | Replace the cushioning pads<br>Reset the moment of inertia of the applied masses till the permitted one (see page 27)<br>Reset the applied unbalanced masses till the permitted one (see page 27) |
| Disk stick-slip-motion   | Higher unbalancing moment than the permitted one   | Reset the applied unbalanced masses till the permitted one  |
|  |  |   |