



BARUFFALDI S.p.A

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Edizione  
Edition **11-93**

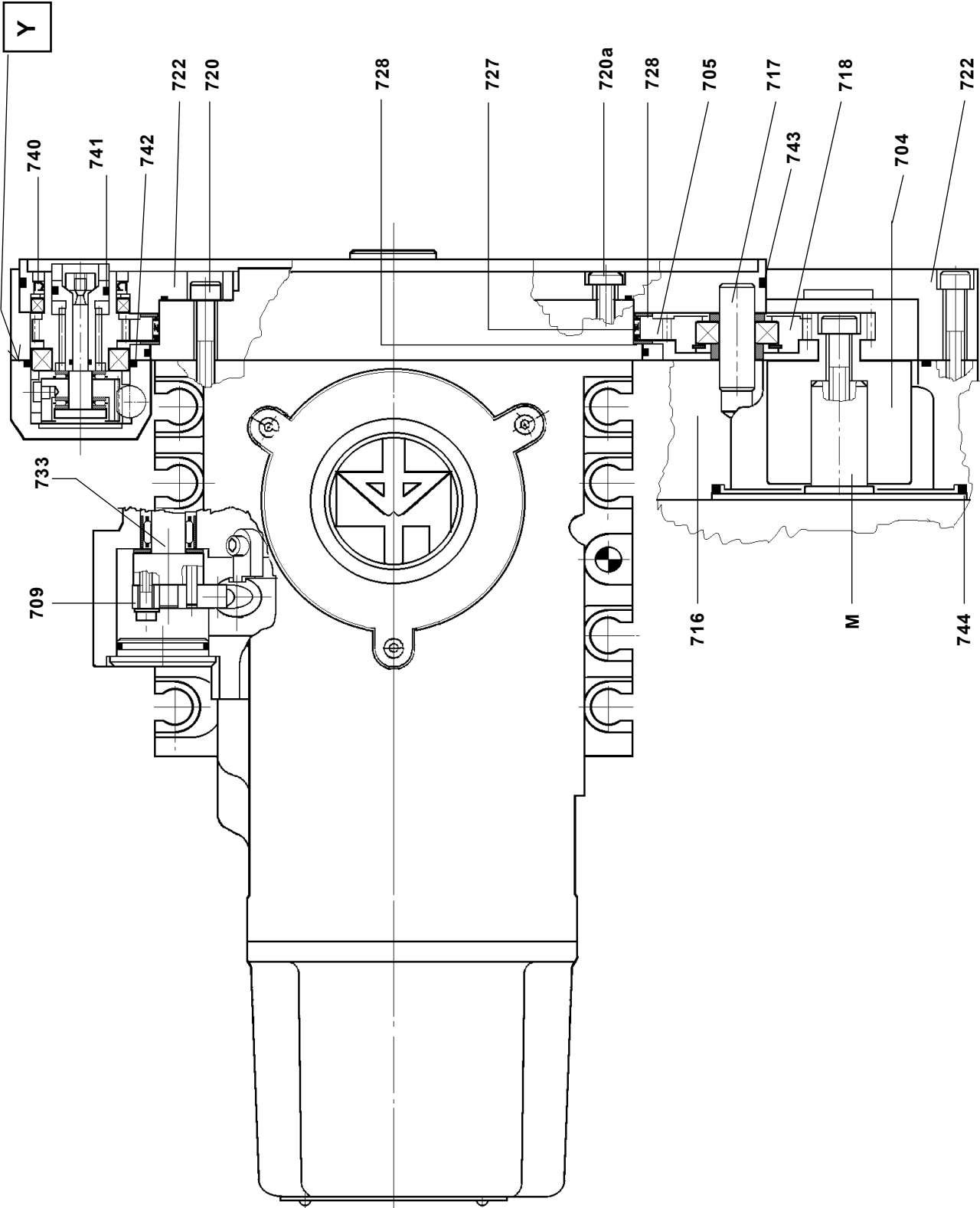


BARUFFALDI S.p.A.

ASSEMBLY DRAWING  
(section view)

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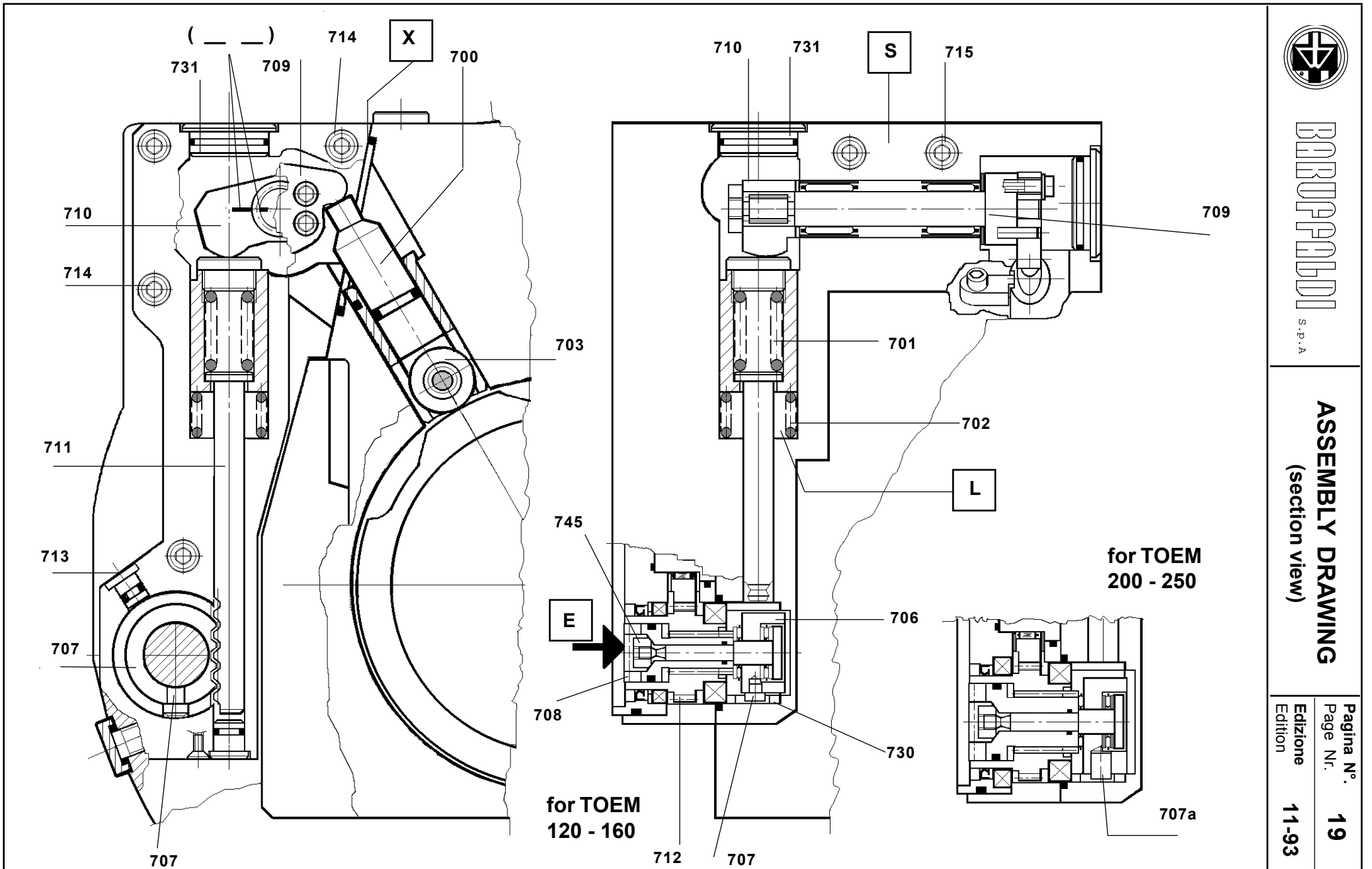


BARUFFALDI

S.p.A.

**ASSEMBLY DRAWING**  
(section view)

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- Set out the turret in open position (unlocked)
- Remove the screws 714 and 715
- Remove all the support ( S ) complete of gear 712, (to facilitate the removing of this last, hit the ends ( E ) with a plastic hammer).
- Remove the supplementary motor ( M )
- Take off the toolholders disk
- Disassemble the flange 716
- Extract the pin 717 and the idle gear 718
- Take off the dowels 719 and the screws 720 & 720a
- Extract the plate unit 721 and the counterplate 722
- Take off the dowels 723 and the screws 724
- Separate the plate 721 from the counterplate 722
- Remove the central gear 705 complete of bearing 727 and thrust blocks 728
- If the disassembly of the components inserted in the support ( S ) is required:  
extract the lock pin 713, remove the gear 712 complete of coupling 708, reel 706, lead nut 730 and pins 707 or 707a
- To disassemble the rack 711 the cover 731, and the levers 709 & 710 must be removed.

#### **WHEN REASSEMBLING EVERYTHING**

Oil all the retaining rings (O-Rings etc.) with grease, brake all the screws with "Loctite" and lubricate all the mechanical components; beside it, for what the assembly of the elements belonging to the support unit ( S ) is concerned, follow the following instructions:

- Insert the rack 711 complete of springs and containers 701 in the seat L; by using a small pin (as on table page 21) and with a suitable manual press compress the spring 702 with value (C) (see page 21); in this condition it must be inserted the unit ( I ), composed by the gear 712, by the reel 706, by the lead nut 730 and by the pins 707, in the seat in such a way that the tooth ( D ) of the reel 706 fit the space ( V ) of the rack 711 and that the slot ( A ) is in correspondence with the hole ( F ).

Insert the lock pin 713 in the seat ( A ).

Eliminate the press action.

Push the gear 712 towards the bottom of the seat ( Z ) in such a way that the lead nut 730 goes in the ledge. In this condition, the extremity (E) of the coupling 708 must be on line with the extremity ( E ) of the gear 712; if this does not happen, the reason is caused by the insertion of the tooth ( D ) of the reel 706 in the wrong space of the rack 711; in this case the assembly of these elements must be made again .

Reassemble the lever 710 on the pin 733, with the marks ( \_ \_ ) aligned, (see picture page 19)

During the assembly phase of the support ( S ) on the turret, the screws 714 and 715 must be alternately screwed in such a way to determine the support on the 2 tables (X) & (Y) (see picture on page 18).

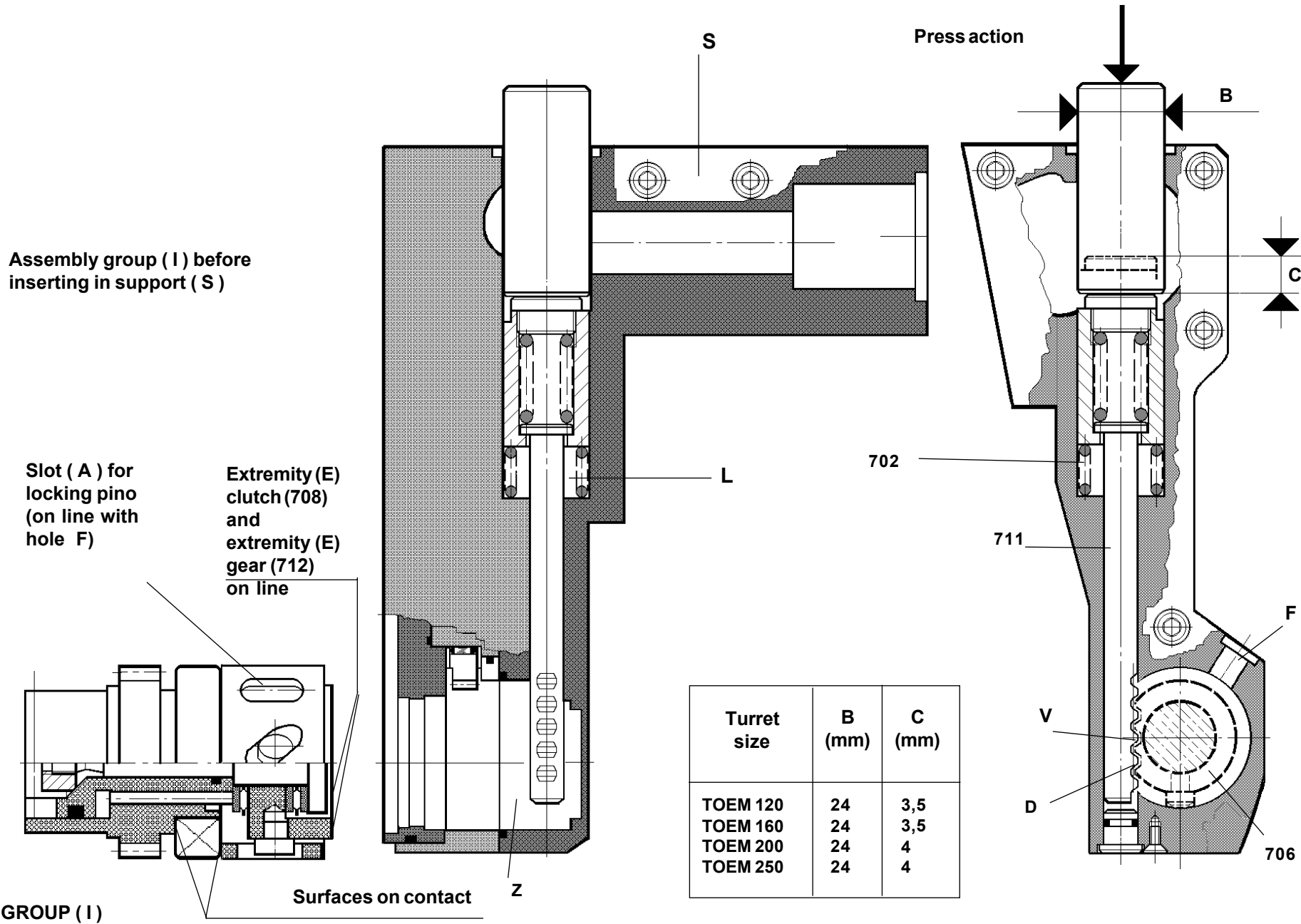


**BARUFFALDI**

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**TURRET DISASSEMBLY**  
(Related to the toolholders rotation)

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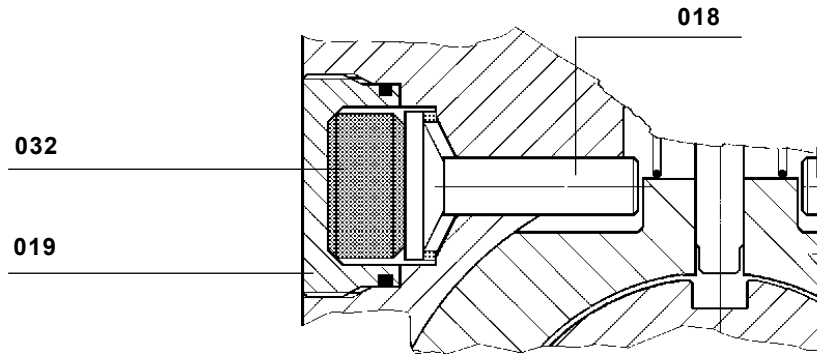




**FROM THE TOP SIDE**

Take off the 044 top cover, remove the screws 300, extract the 042 proximity support complete of proximity 301; take off the 049 support complete of proximity 313, remove the 046a washers, extract the 200 electromagnet, extract the 017 lock with related 047 spring.

Remove the 019 cover from the two sides, extract the 018 shock absorbing pins complete of 032 pads.



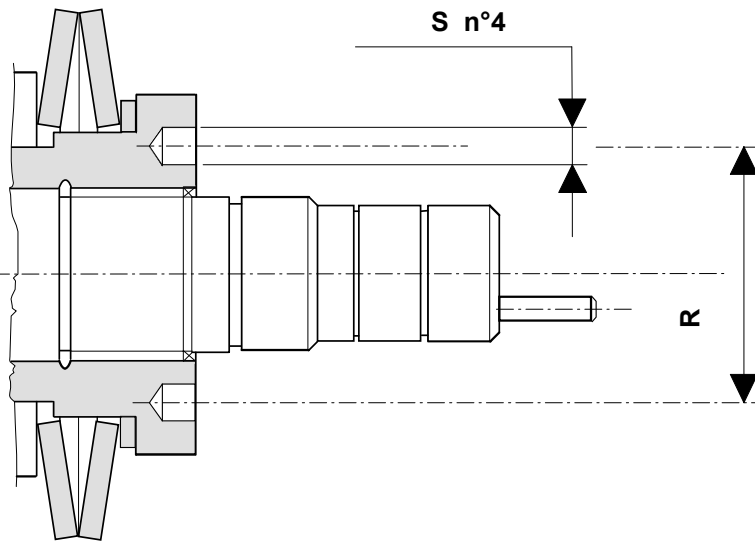
**FROM THE REAR SIDE**

Take off the 011 cover, remove the screws 302 and remove the 043 encoder support complete of 160 encoder, take of the 303 seeger, remove the 030 thrust block and the 304 bearing.

**FROM THE FRONT SIDE**

Take off the toolholder disk, remove the screws 305, take off the dowels 306. Move the push rod 700 towards outside (  $\hat{U}$  ), extract the entire central body composed by 003 mobile ring gear, 005 indexing head, 006 roller carrier set, 007 spider set, 020 ring nut, 307 belleville washers, 025 - 026 spacers.

If dismounting this set too were necessary, unscrew the ring nut with a particular tool and extract all the other components.



Turret size	Diameter R (mm)	Diameter S (mm)
TOEM 120	44	8,25
TOEM 160	44	8,25
TOEM 200	56	8,25
TOEM 250	56	8,25

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 main gasket
- all retaining rings type (O-ring)
- 032 cushion pads

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

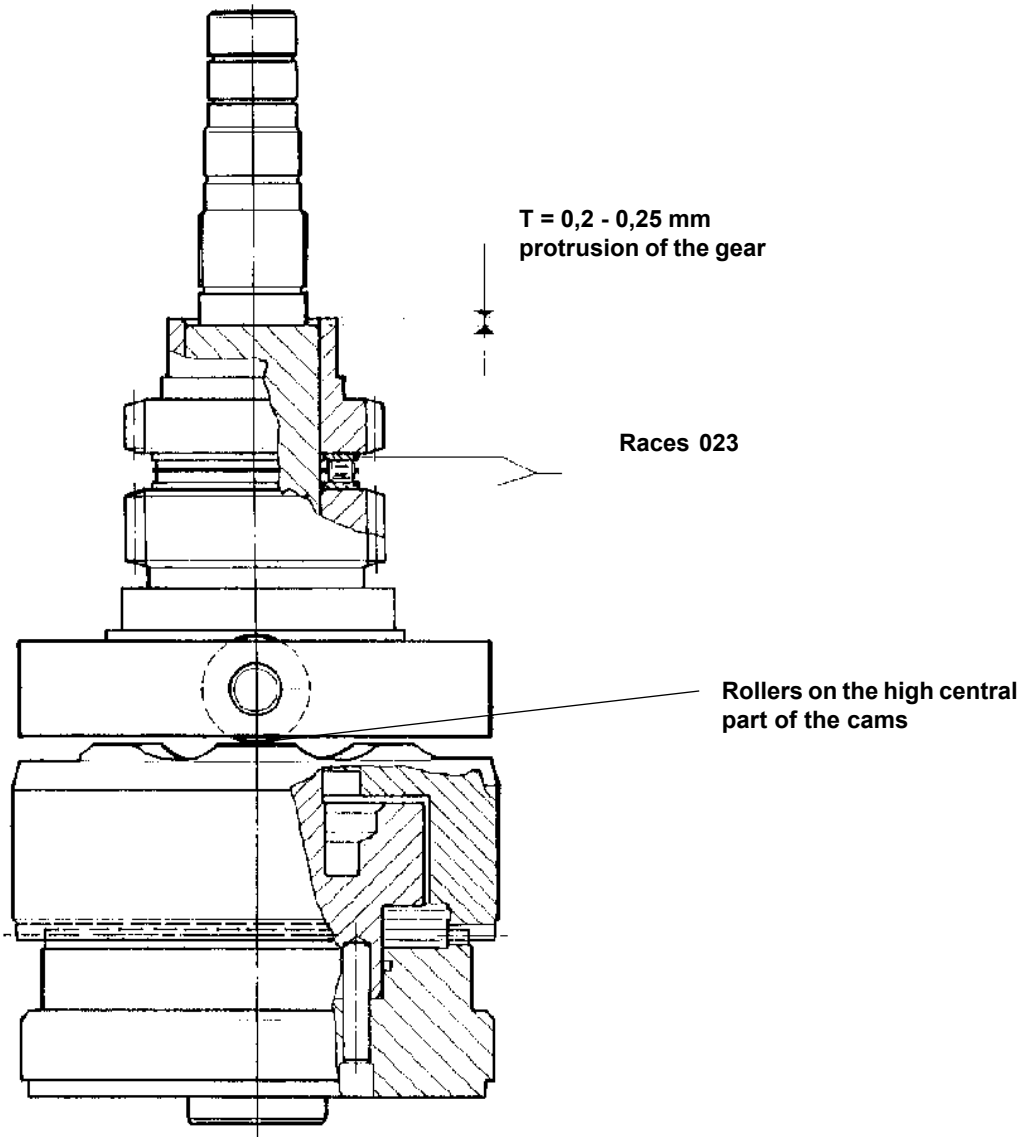
- cam surfaces
- rollers
- HIRTH couplings
- all gears
- support plate of the 003 ring gear with the 002 one.



If any of the parts composing the central sub-assembly (except the satellite carrier 007), has to be substituted it is necessary on reassemble to check and reset the distances T and U which determine the correct loading of the spring.

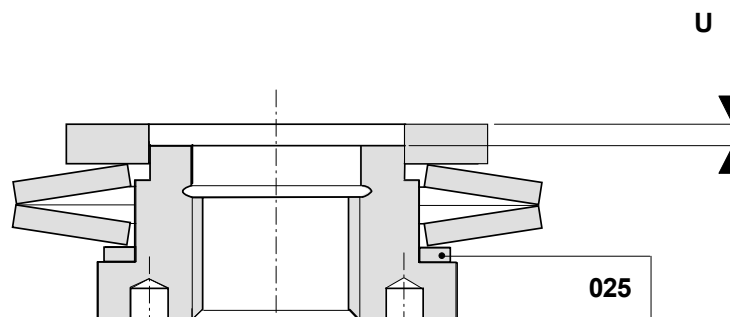
Reassemble the parts, as shown in the figure, with the HIRTH teeth in contact and the rollers sitting on the raised parts of the cams, check that the value of T is inside of the range indicated (0,2 - 0,25 mm).

If it is not then grind new races 023 to bring the value of T within the prescribed tolerance.



Assemble the parts as shown, then check that the value of U is between the ranges in the table below. If it is not then grind a new distance piece 025 to it so that U falls within the ranges specified in the table.

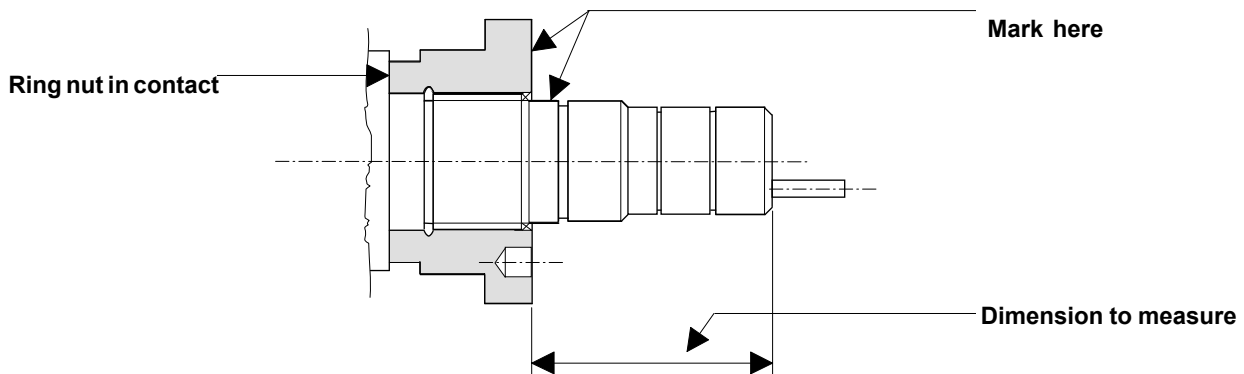
Turret size	Dimension U(mm)
TOEM 120	1,8
TOEM 160	2,1
TOEM 200	1,7
TOEM 250	2



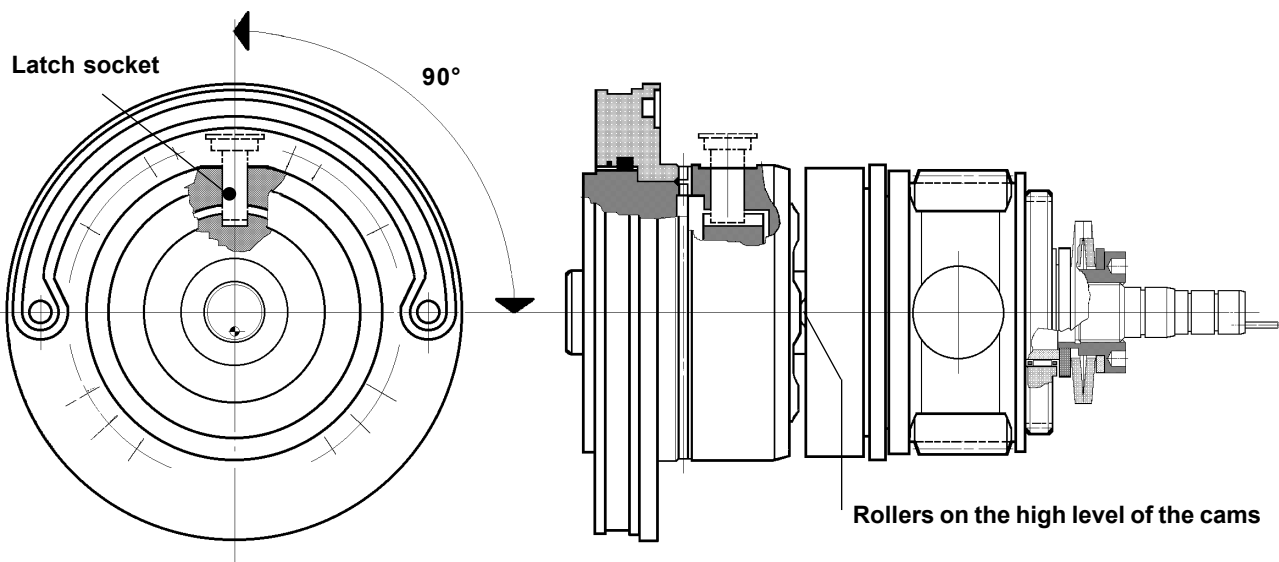


**DURING COMPLETE REASSEMBLE**

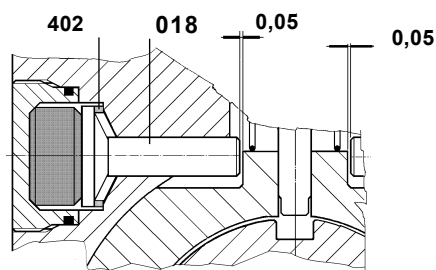
- Insert the keys 309 into their corresponding key-ways (with identical marks) keeping the threaded holes turned towards the ring nut 020 and in contact with the bottoms of the key-ways.
- Check that pinion 008 has a good sliding fit. If it does not, take it off and assemble it the other way with respect to the keys.
- Check that the ring nut is thoroughly tightened. To make sure of this follow these instructions:  
Before final assembly temporarily set aside parts 026 - 307 - 025, screw down the ring nut till it touches its seating, measure the distance between the end of the divider 005 and the top surface of the ring, mark the position of the ring nut in respect to the divider.



Then unscrew the ring nut, assemble the parts 026 - 307 - 025, screw on the ring nut, check that it reaches the same position as before. Make this check by measuring the distance and observing that the marks coincide. Before inserting the central sub-assembly into the carcass, rotate the satellite carrier 007 until the sealing of the latch is in perpendicular position towards the coolant interception holes of the crown 002; insert the latch 017, rotate the satellite carrier 007 by hand until the HIRTH teeth engage (rollers on the level parts of the cams). Release the latch.



After assembling all the parts add right amount of the correct type of lubricant to the carcass through the oil hole (see page 25).



Lubricate O-ring 318 with heavy grease or vaseline.



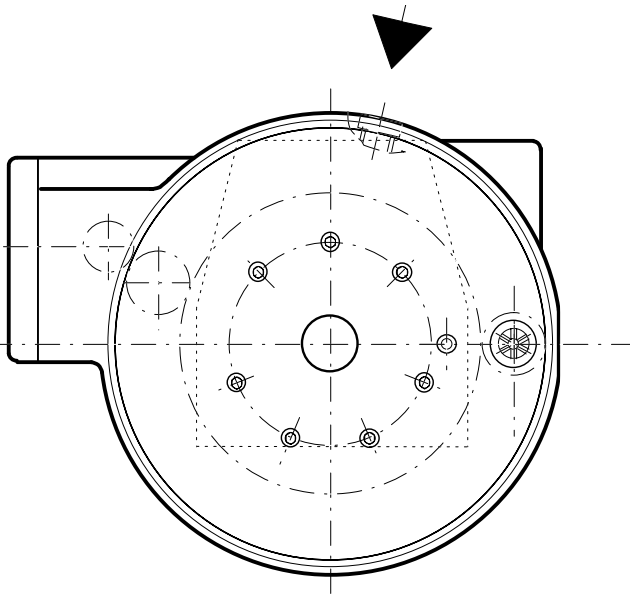


The mechanical moving parts of the turret are permanently lubricated.  
The lubricant must be renewed only after eventual complete dismantling of the turret.  
The lubricant, with viscosity 80 SW 90, must be compatible with rubber & teflon.  
The following table indicates the quantities to be used.

Turret size	Quantity of oil Kg
TOEM 120	0,500
TOEM 160	0,700
TOEM 200	1,500
TOEM 250	2,000

### LUBRICATION OF THE ROTATING TOOLS MECHANISM

The mechanism of the rotating tools is lubricated with oil 80 SW 90. The oil must be changed every new re-assemble.  
For this reason on the top of the 722 counterplate is located the hole for the filling.

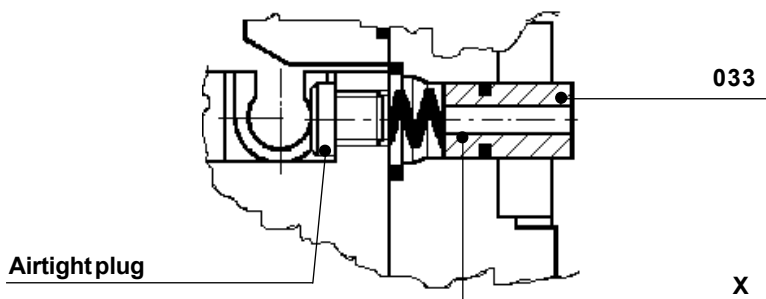


Turret size	Quantity of lubricant Kg
TOEM 120	0,150
TOEM 160	0,200
TOEM 200	0,300
TOEM 250	0,400

### SUBSTITUTION OF THE COOLANT BUSHING

Take off the airtight plug or the feeding pipe connector of the coolant, take off the spiral spring; then extract the bush 033 complete of O-Ring 322 by using a suitable thread X.

Clean the seating from any eventual incrustation, grease the outside part of the new bushes complete of O-ring, then insert them in their seating and check the sliding.





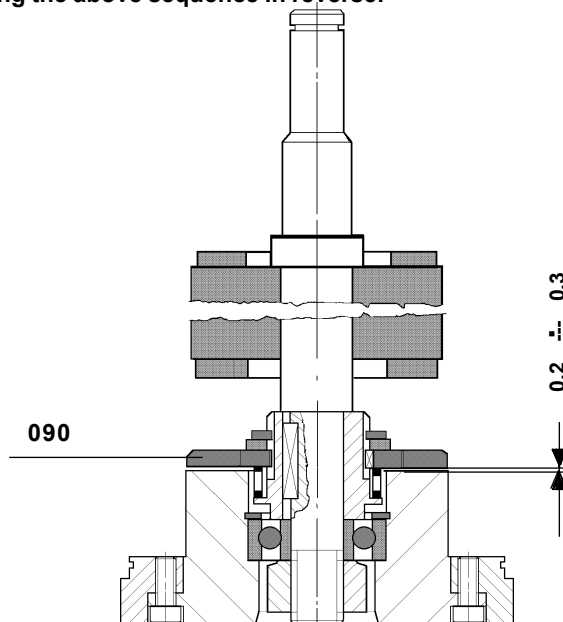
Remove the rear cover 011, disconnect the leads connecting terminal block to the motor, the brake and the thermal probes (heat sensor). Unscrew screws 311, extract the motor unit 150. Disassemble the gear 015 and remount it on the new motor unit. Mount the motor unit in the carcase and reconnect the electric wiring to the terminal block. To check that the phases are properly connected, perform a tool change by calling up the nearest station ... if the phases are properly connected, the change of station will take place by the shortest route, if the disk goes the long way round then interchange two motor supply wires at the terminal block (phase rotation).  
Replace the rear cover.

## SUBSTITUTION OF THE PRE-INDEXING ELECTROMAGNET

Remove the top cover 044, remove the support 042, remove the washers 046a, extract the electromagnet 200. Remove the rear cover 011 and disconnect the electromagnet supply leads. Mount the new electromagnet in the carcase and fix it down with the two washers. Replace the support complete with its proximity switch 301 and reset it (see page 28). Connect the electromagnet lead wires to the terminal block (see electrical connection schemes page 11).  
Replace top and rear cover.

## SUBSTITUTION OF THE BRAKE MAGNET AND ADJUSTEMENT OF THE AIR GAP

Remove the rear cover 011, extract the motor unit 150 and the gear 015. Disconnect the brake leads. Remove the defective brake magnet and substitute it with the new one. Adjust the air gap (0,2 - 0,3 mm to be checked in a vertical position and acting on the distance pieces 090). Reassemble the whole by following the above sequence in reverse.



TOEM 120 - 160 - 200 - 250



Remove the rear cover 011, disconnect the encoder leads from the terminal block 310, remove the stirrups 067 and extract the encoder. Remove the driving hub 035 and mount it on the new encoder.

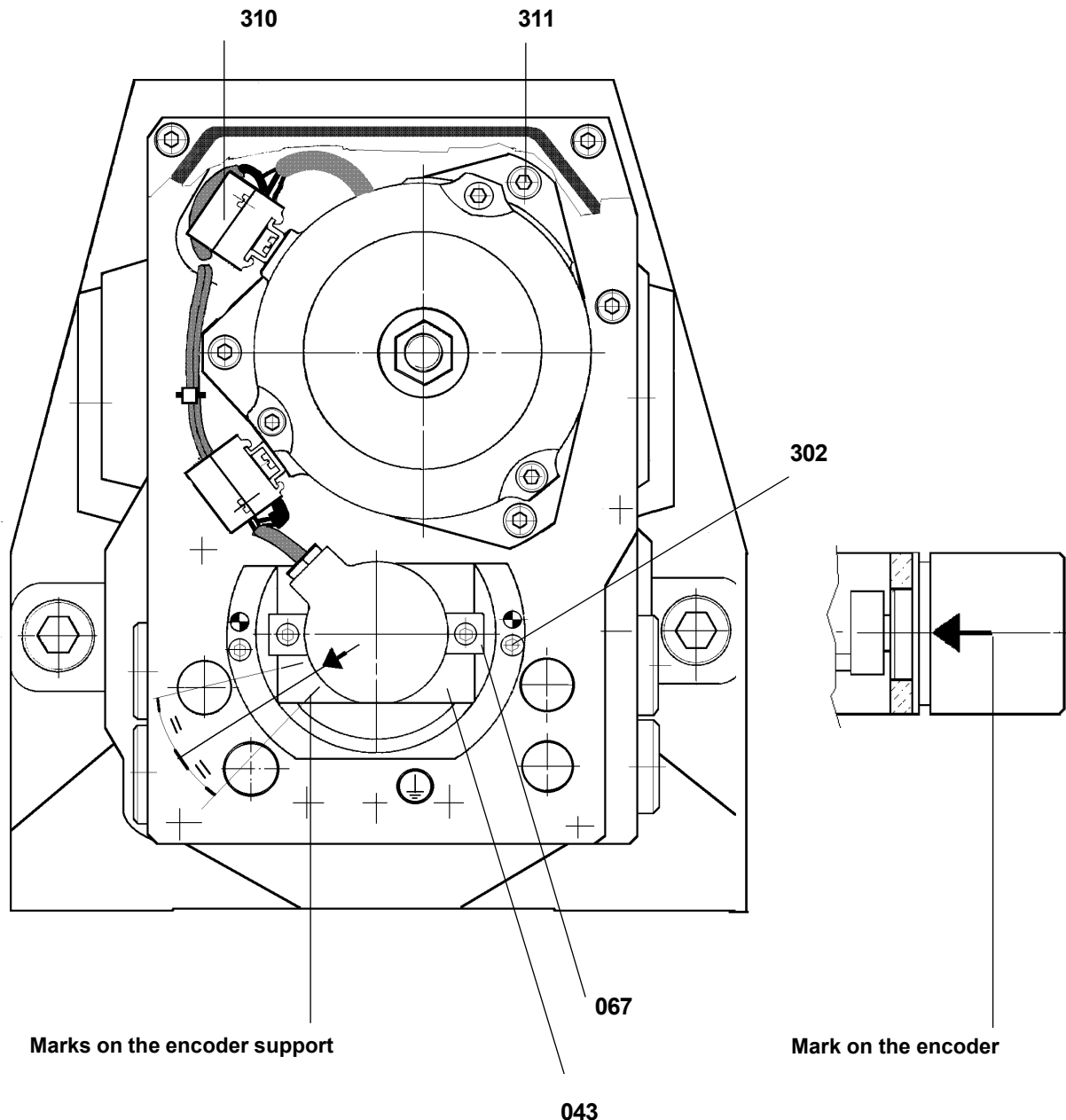
Remount the encoder following the above instructions in reverse and connect it to the terminal blocks. Before finally fixing the encoder set it as follows:

Lock the turret in any position, rotate the encoder slowly until the STROBE signal disappears (this can be checked on the control system or with a voltmeter).

Mark the encoder and make a corresponding mark on its support. Slowly turn the encoder in opposite direction until the STROBE signal again disappears, and mark the new position on the support.

This defines the region in which there is a STROBE signal. Slowly turn the encoder until the mark on the shaft is half way between the two marks on the support.

Tighten the stirrups 067 and replace the rear cover.





Remove the top cover 044, remove the support 042 together with the proximity switch 301. Remove the rear cover 011, disconnect the proximity switch leads from the terminal block 310, and remove the proximity switch. Screw the new proximity switch into the support until it projects by the correct amount "X".

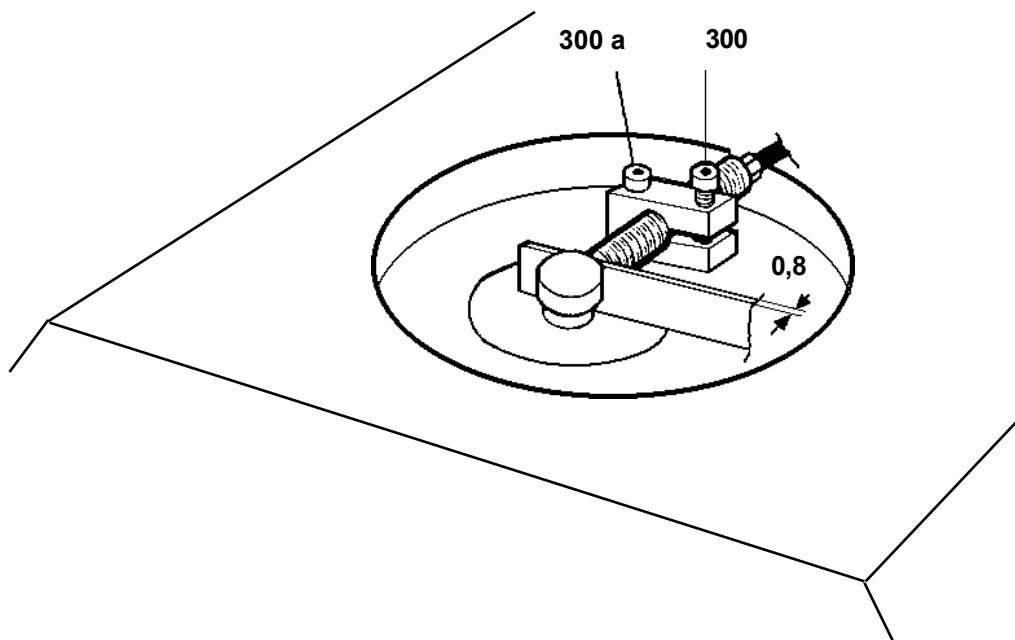
Assemble the support fixing it with the screw 300a in such a way that the LED (luminous indicator) on the end of the proximity switch is visible. Insert a 0,8 mm thickness gauge (see figure) and bring the proximity switch into contact with the thickness gauge.

Tighten the screws 300 - 300a with a torque of 3 Nm and block them with LOCTITE.

Connect the leads to the terminal block, and check that the proximity switch operates correctly when live, as follows:

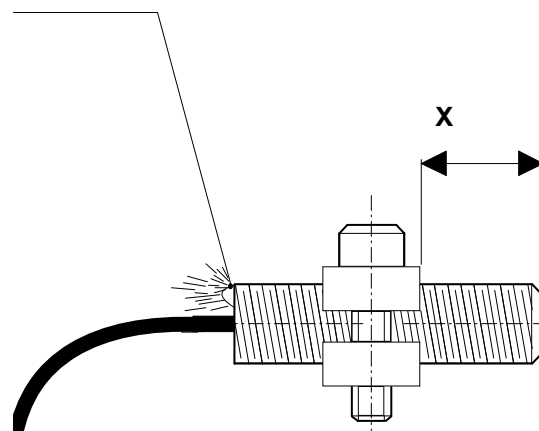
- With a turret closed (locked) on lowering the end of the electromagnet by an amount between 1,8 and 2,5 mm the luminous "red" indicator on the back part of the proximity switch should light up.

Replace the rear cover and the top cover.



Turret size	X (mm)
TOEM 120	18,3
TOEM 160	18,3
TOEM 200	18,3
TOEM 250	18,3

Luminous indicator





Remove the top cover 044, unscrew screw 314, extract the support 049, take off the rear cover 011, disconnect the leads of proximity switch 313 from the terminal block. Unscrew the ring nut 048, unscrew and remove the wire clip 058, and remove the proximity switch.

Screw the new proximity switch into the support by amount needed to make dimension "Z" equal to figures in the table below.

The dimension given for "Z" in the table are however only indicative, and correct setting of the operating distance "P" may require departure from those values.

The amount of the operating distance is obtained by difference:

$$( P ) 0,8 \text{ mm} = V - Z$$

where "V" and "Z" are actual measured values.

To measure "V" the closing sector (i) of the roller ring 006 must be against the proximity switch, that is to say with the turret in the locked condition.

If it is not in this state the carry out the closing operation manually (see page 15).

After adjusting the value of the operating distance "P" screw down the ring nut (tightening torque 3 Nm).

Peen over the edges of the ring nut, thread the wire clip 058 on the proximity switch leads.

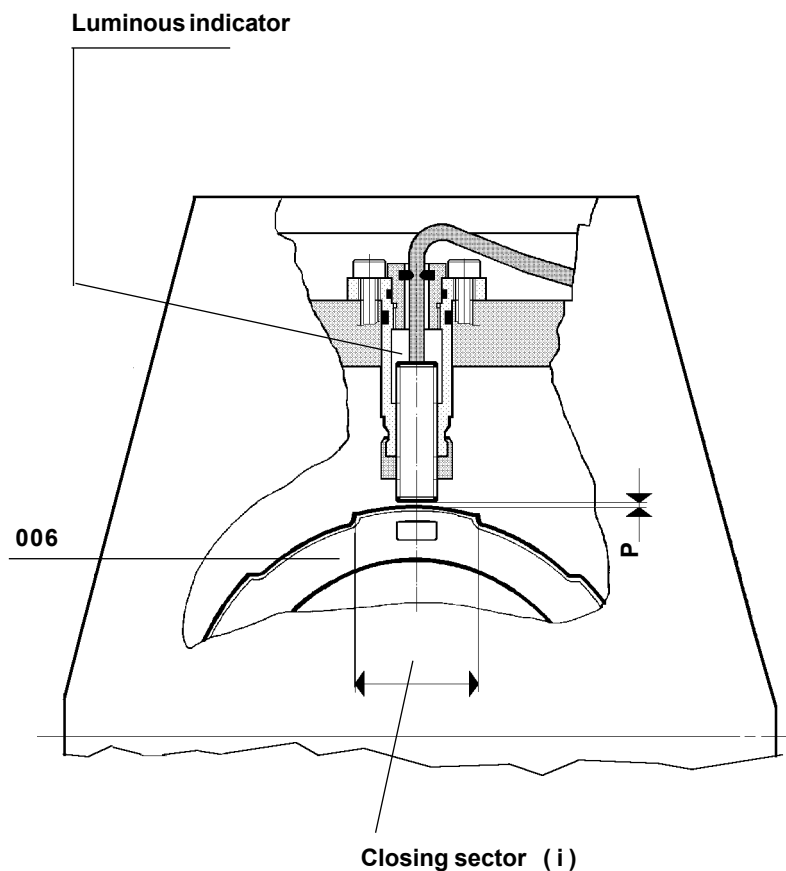
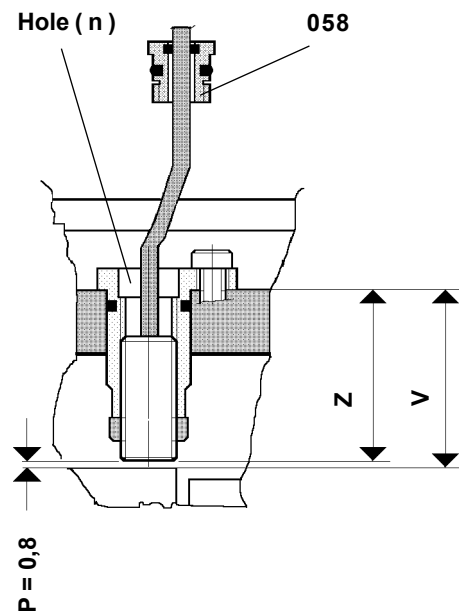
Replace and screw on the support 049.

Connect the proximity switch leads on the terminal block (see wiring scheme).

With the proximity switch live the red luminous indicator on the end of the proximity switch should be visible through the upper hole "n" in the support 049.

When this indicator is lit the turret is in the locked condition.

Replace the wire clip, the rear cover and the top cover.



Turret size	Indicative value of Z (mm)
TOEM 120	60,7
TOEM 160	59,7
TOEM 200	60,7
TOEM 250	75,7



Call up from the console a "tool change" (the nearest one) keeping to the same direction of rotation that the turret (the toolholder disk) had when it stopped. If this is not known and the "change" called for does not go through to completion (namely not locking or bringing about the operation of the heat sensor), proceed as follows:

- Noted the direction of the disk rotated during the attempted (unsuccessfully) "tool change"; call up from the console the nearest station which can be reached by rotating the disk from its present position in the opposite direction to that of the previous attempt.

If the control refuses to accept a "tool change" starting from the condition of "turret unlocked", then carry out the necessary operations manually as follows:

- Remove the rear cover 011 and the top cover 044, unscrew and partially extract the wire clip 058, disconnect the motor and the brake leads from the terminal block 310 (still keeping the proximity switches connected; please note the order of the motor wires, in order to avoid wrong connection at the end of operations).

Using a hexagonal spanner (see table) turn the motor shaft 012 by hand so that the toolholder disk rotates in the same direction as it did when it stopped and at the same time push the core 073 of the electromagnet 200 until the latch 017 enters a recess in the divider 005.

Keeping the core pushed reverse the rotation of motor shaft until the red indicator of proximity switch 313 lights up and can be seen from above through the hole (n).

Make the shaft rotate for another turn but working so that the indicator still remain lit.

If the direction in which the disk was rotating when it stopped is not known and a mechanical block is encountered after the reversal and the turret will not lock, the shaft must be made to rotate in the same sense as that proceeding the reversal.

Screw on the wire clip, reconnect the leads to the terminal block (care the phases of the motor leads), replace top and rear covers.

Turret size	Size of spanner CH (mm)
TOEM 120	5
TOEM 160	5
TOEM 200	5
TOEM 250	5



<b>Pads (2 off)</b>	<b>032</b>
<b>Fluid coolant valve</b>	<b>033</b>
<b>Motor unit</b>	<b>150</b>
<b>Encoder unit</b>	<b>160</b>
<b>Brake magnet</b>	<b>175</b>
<b>Electromagnet</b>	<b>200</b>
<b>Pre-indexing proximity switch</b>	<b>301</b>
<b>Wiping seal</b>	<b>308</b>
<b>Locking proximity switch</b>	<b>313</b>
<b>O - ring</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>323</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>Rotating seal ( MIM )</b>	<b>740</b>
<b>O - ring</b>	<b>741</b>
<b>O - ring</b>	<b>742</b>
<b>O - ring</b>	<b>743</b>



**TECHNICALDATA**

		TOEM 120	TOEM 160
Max. torque at the take power	Nm	15	20
Max. power	kW	4	5
Max. speed at the take power	g/min RPM	6000	6000
Ratio (RPM motor / RPM take power)		1 ---	1 ---

**TECHNICALDATA**

		TOEM 200	TOEM 250
Max. torque at the take power	Nm	60	80
Max. power	kW	9	12
Max. speed at the take power	g/min RPM	4000	4000
Ratio (RPM motor / RPM take power)		1 1,315	1 1,520

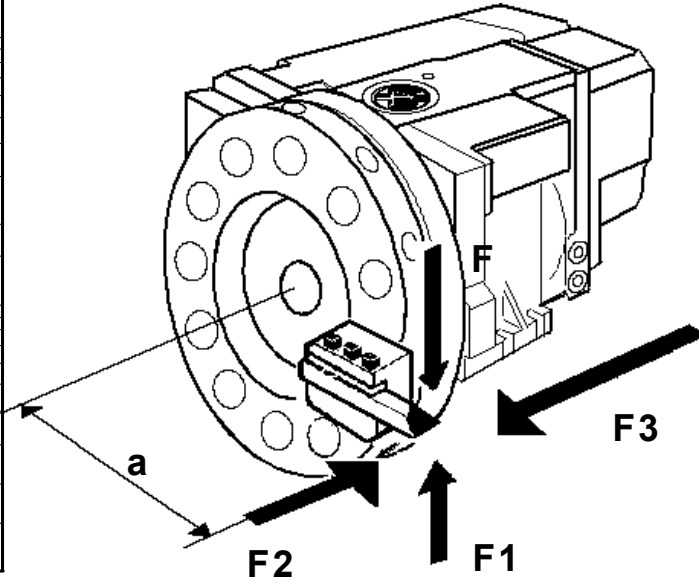
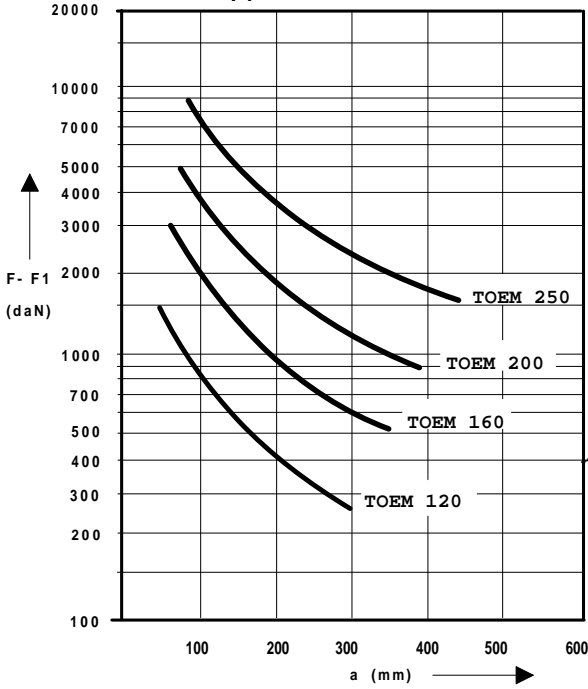




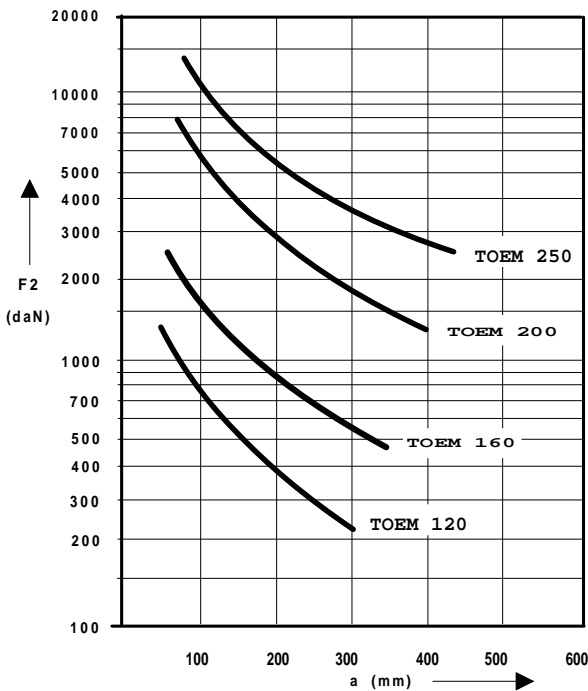
<b>TURRETSIZE</b>	<b>TOEM 120</b>		<b>TOEM 160</b>		
<b>Code number of transmission ratio</b>	<b>TOEM 120/..0</b>	<b>TOEM 120/..1</b>	<b>TOEM 160/..0</b>	<b>TOEM 160/..1</b> <b>TOEM 160/..2</b>	
<b>Moment of inertia of transportable masses (Kgm)</b>	<b>0,65</b>	<b>0,50</b>	<b>1,3</b>	<b>0,8</b>	<b>0,5</b>
<b>Tangential couple applicable with turret locked (Nm)</b>	<b>800</b>		<b>1850</b>		
<b>Unbalanced couple with horizontal axis (Nm)</b>	<b>10</b>		<b>15</b>		
<b>Repetition accuracy (grad)°</b>	<b>+ 2"</b>		<b>+ 2"</b>		
<b>N° of movement / hour</b>	<b>750</b>		<b>750</b>		
<b>TURRETSIZE</b>	<b>TOEM 200</b>		<b>TOEM 250</b>		
<b>Code number of transmission ratio</b>	<b>TOEM 200/..0</b>	<b>TOEM 200/..1</b>	<b>TOEM 250/..0</b>	<b>TOEM 250/..1</b>	
<b>Moment of inertia of transportable masses (Kgm)</b>	<b>4,5</b>	<b>3,0</b>	<b>7,5</b>	<b>4,5</b>	
<b>Tangential couple applicable with turret locked (Nm)</b>	<b>3500</b>		<b>6900</b>		
<b>Unbalanced couple with horizontal axis (Nm)</b>	<b>40</b>		<b>60</b>		
<b>Repetition accuracy (grad)°</b>	<b>+ 2"</b>		<b>+ 2"</b>		
<b>N° of movement / hour</b>	<b>750</b>		<b>750</b>		



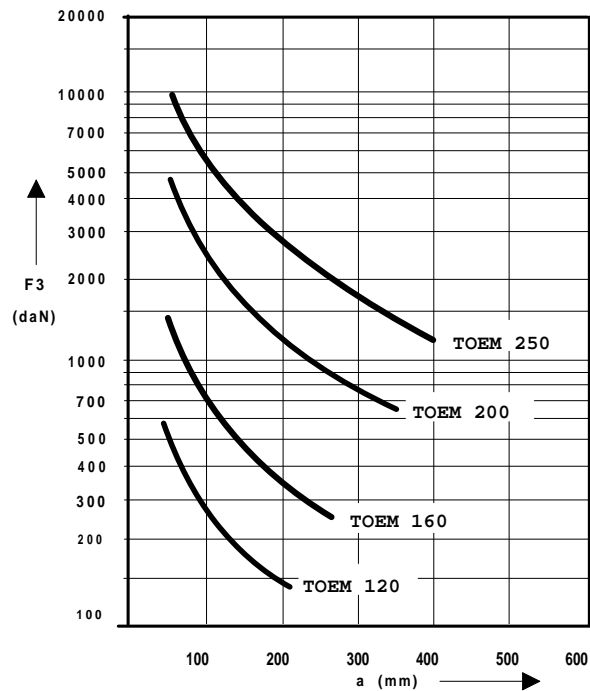
As a function of the tangential thrust F & F1



As a function of the pressing axial force F2



As a function of the lifting axial force F3



After having selected the size of turret according to the above criteria, check that the moment of inertia to be applied is below the maximum values given in the table of Technical Data.



<b>PROBLEMS</b>	<b>CAUSE</b>	<b>REMEDY</b>
Turret does not start	No power at motor  Motor defective  Heat sensor in operation	Get power to the motor  Substitute the motor unit (see page 26 )  See next point
Turret does not complete its indexing cycle either because the heat sensor operates or an incomplete cycle is indicated.	Number of movement / hour above the maximum permissible  With the turret free in the position required and with current supplied to the motor there is no signal from the pre-indexing proximity switch 301  Pre-indexing proximity switch in defective  Pre-indexing proximity switch not correctly set  With the turret in the required position and with current supplied to the motor there is no signal from the locking proximity switch 313  Locking proximity switch is defective  Locking proximity switch out of adjustment  Restart after an emergency or accidental stop, but in opposite direction to that most convenient  Blockage of the electromagnet's core	Reduce the number of movements (see technical data page 33)  Substitute the pre-indexing proximity (see page 28)  Adjust the pre-indexing proximity sw. (see page 28)  Substitute the locking proximity sw. (see page 29)  Adjust the locking proximity switch (see page 29)  See page 30  See page 30
The turret overrun the pre-indexing station required	Electromagnet exited late	Overhaul the control apparatus



<b>PROBLEMS</b>	<b>CAUSE</b>	<b>REMEDY</b>
Turret does not stay locked	Delay in switching off the motor and in the braking  Brake defective  Brake wear excessive	Overhaul the control apparatus  Substitute the brake magnet (see page 26)  Readjust the air gap in the brake (see page 26)
The turret continues to rotate without stopping at the required station	Angular encoder defective  Electromagnet defective  Power does not reach electromagnet or voltage is below that specified  Break in the electrical leads	Substitute the angular encoder (see page 27)  Substitute the electromagnet (see page 26)  Bring power supply up to specified value  Eliminate the interruption
The turret approaches the required station by the longer path	Inverted phases in the power supply of the motor	Correct the connection of the phases (see page 30)
Excessive shock in pre-indexing	Excessive travel of the buffer pads  Moment of inertia of the masses in use is above the permissible maximum  Moment of unbalance of the masses in use is above the permissible maximum	Substitute the buffer pads  Bring the moment of inertia of the masses in use down to a permissible figure (see page 33)  Bring the moment of unbalance of the masses in use down to a permissible figure (see page 33)
Disk rotates in jerks	Moment of unbalance above the permitted	Bring the moment of unbalance of the masses in use down to a permitted value (see page 33)



<b>PROBLEMS</b>	<b>CAUSE</b>	<b>REMEDY</b>
The rotating toolholder does not rotate	<p>Rotating toolholder failure</p> <p>Supplementary motor failure</p> <p>The input to the supplementary motor is missing</p> <p>The teeth clutch (P) of the take power does not precess during turret locking phase</p> <p>The take power teeth clutch (P) in spite of progressing does not fit into that one of the toolholder: the toolholder disc is not properly aligned</p>	<p>Restore the toolholder integrity or replace it with a new one</p> <p>Replace the supplementary motor (see page 20)</p> <p>Restore the input</p> <p>Clean the zone adjacent to the teethclutch (P) from eventual chips, lubricate with brush</p> <p>Verify the operation of theprogress kinematic motion and restore it</p> <p>Realign the toolholder disc</p>
The turret stops during the rotation (in spite to the fact that the indexing motor is correctly feeded)	<p>The take power teeth clutch (P) does not move backward on turret unlocking phase</p>	<p>Clean the zone adjacent to the teeth clutch (P) from eventual chips, lubricate with brush</p> <p>Verify the operation of the progress kinematic motion and restore it</p>