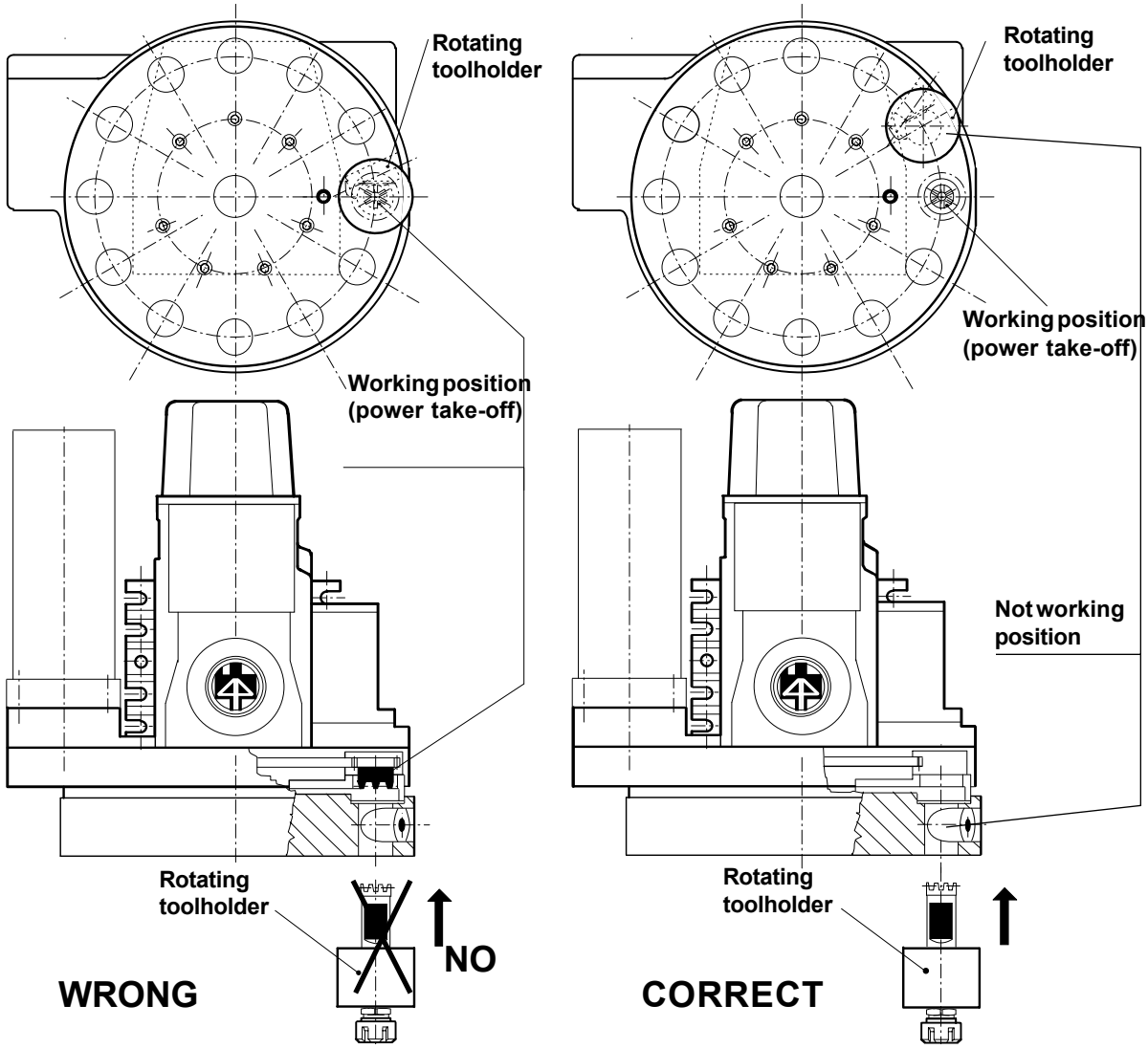
TOEM

series TURRETS

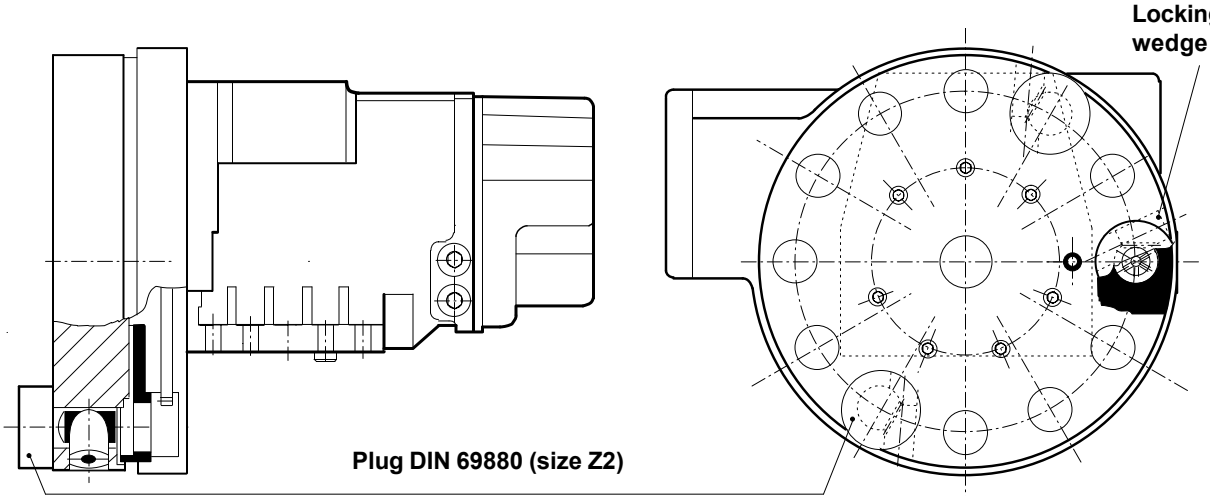
TECHNICAL MANUAL
for use & maintenance

Warning : All specifications included in this manual may be change without notice.

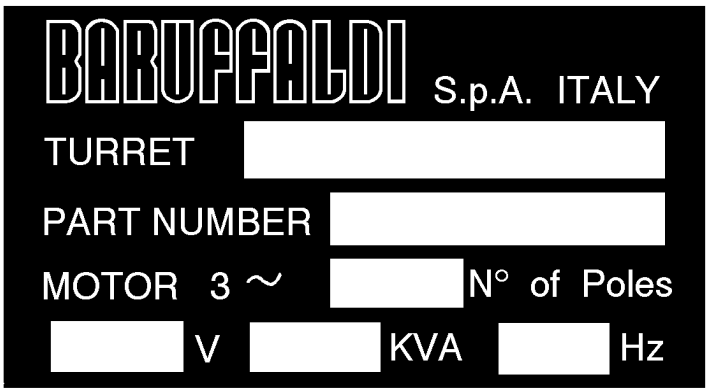
By installing the toolholder disk the fixing of the rotating toolholders must not be made in the working position (where there is the power take-off coupling) but in any other position.



At the end of the toolholder disk installation, all DIN 69880 seats which are not occupied by fixed or rotating toolholders, must be closed with plugs DIN 69880 (size Z2) and complete of suitable locking wedges.



- You must absolutely avoid that chips or extraneous bodies get through the DIN 69880 seats or locking wedge seats: before removing the fixed or rotating toolholders from the disk, clean the interested zone with air jet. The respect lacking of these procedures can cause damages and compromise the correct operation of the turret. CLING STRICTLY PLEASE



Type - turret size

Serial number

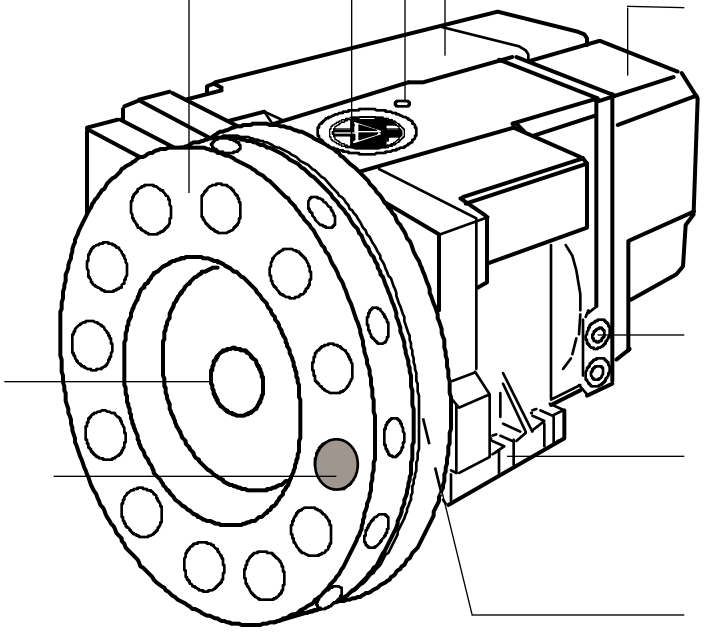
Number of poles in motor

Motor supply voltage

Motor power

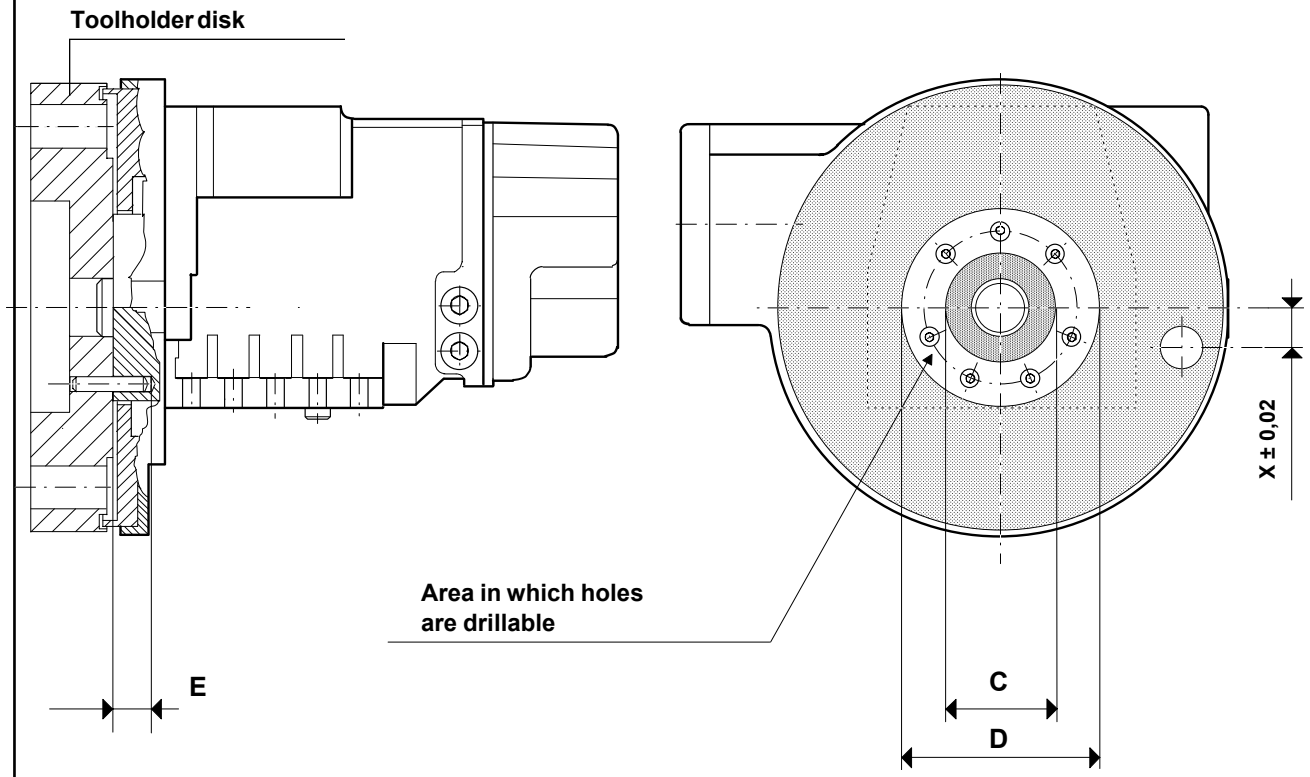
Motor supply frequency

The turret series TOEM consists of a fixed part (casing) containing all the elements for indexing and a moving part (rotating ring gear) where the toolholder disk is installed.
A coupling (power take-off) located behind the disk, operating in rotation through a supplementary motor, drags the toolholder spindle plated to it.
The turret series TOEM, normally provided with 8 and 12 positions, change from a position to the following one rotating both in counterclockwise and clockwise direction.



Turret size	Power cable outlet hole diameter
TOEM 120	PG 13,5
TOEM 160	PG 13,5
TOEM 200	PG 16
TOEM 250	PG 16

The toolholder disk is installed and fixed with screws, while its orientation is determined by suitable drilling and pinning.
The DIN 69880 seats must be aligned with respect to the nominal dimension X foreseen with a maximum error of +/- 0,02 mm.
It is even possible not to install the dowels in order to allow, in case of impact, the slipping of the toolholder disk with respect to the rotating ring gear; then the dowels can be lined up again.
The picture represents the maximum allowable depth of hole on the rotating ring gear and the areas where they can be made.

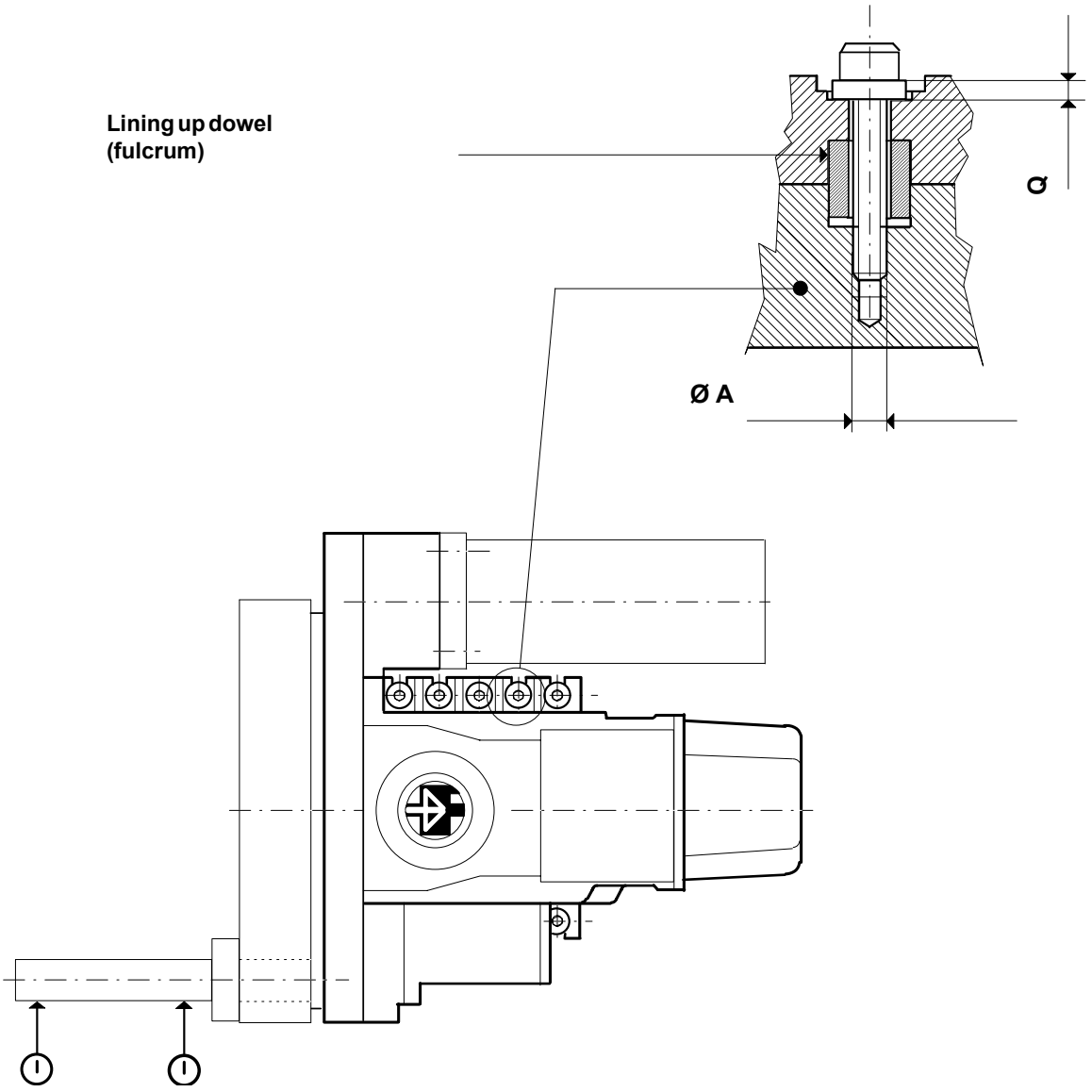


E Maximum depth of the drillable holes on the rotating ring gear

X Nominal dimension

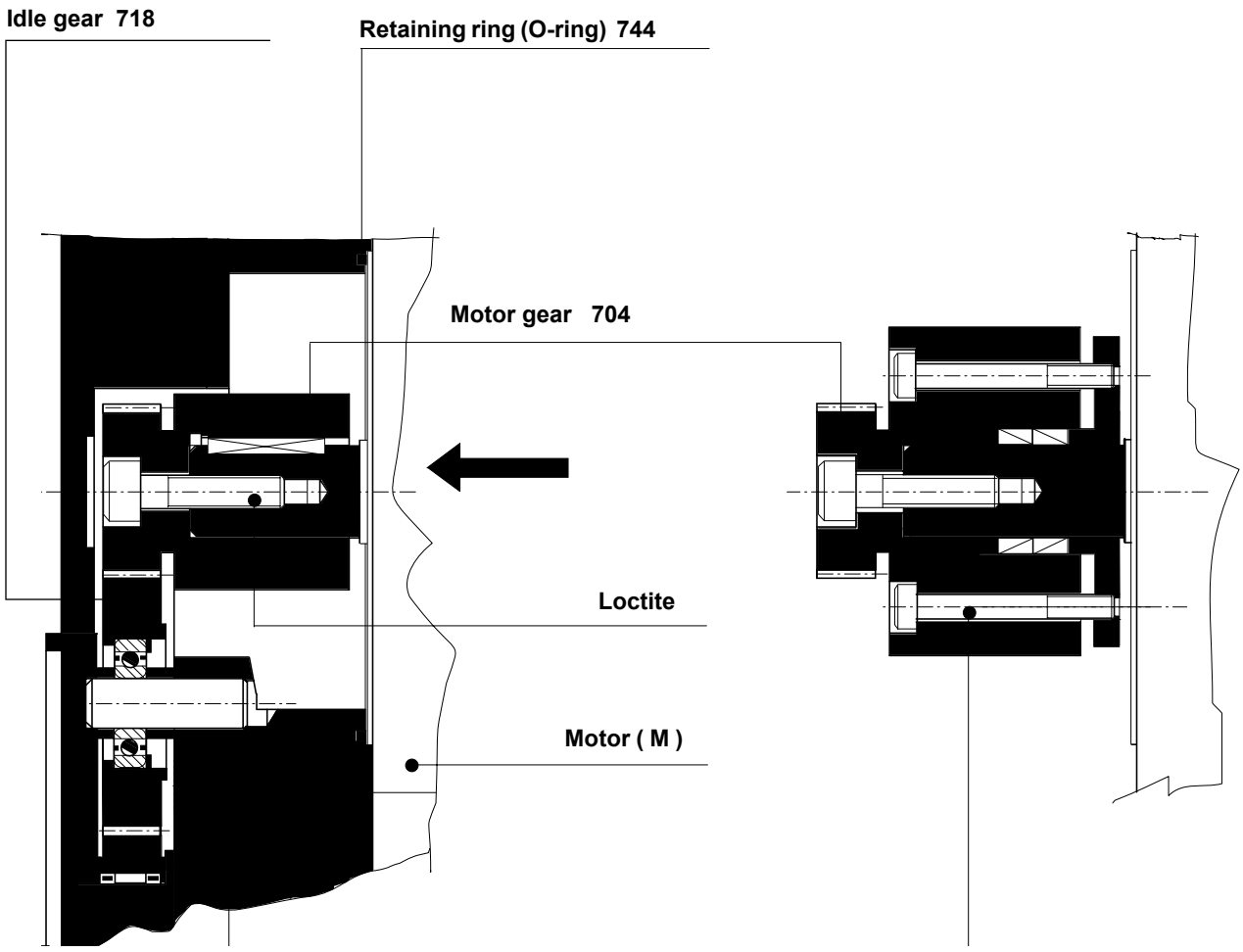
Turret size	C (mm)	D (mm)	E (mm)
TOEM 120	82	98	15
TOEM 160	88	128	15
TOEM 200	110	156	20
TOEM 250	130	194	20

The mounting surface where the turret has to be installed must be clean and not damaged. Its flatness error must be within 0.01/100 mm.
If necessary adapt the height by inserting a packing plate under the base of the turret.
By using the line-up dowel, mounted in suitable position and fixing screws almost fully tightened, line up the turret, or rather the toolholder disk, with the spindle axis, then tighten the screws and carry out a new control.
IMPORTANT NOTE
Whenever checking the lining up and the centre height of the turret or of the toolholder on it, the turret must be in a locked condition. If this rule is not followed, problems in the setting up will arise.



Turret size	Ø A (mm)	Washer thickness Q (mm)
TOEM 120	M 8	6
TOEM 160	M 10	6
TOEM 200	M 12	8
TOEM 250	M 16	8

By installing the supplementary motor for the toolholder rotation, make sure of the retaining ring presence 744 between the flange and the motor and, meanwhile, verify that the idle gear 718 is mounted in the correct position; the position changes according to the requested transmission rate.

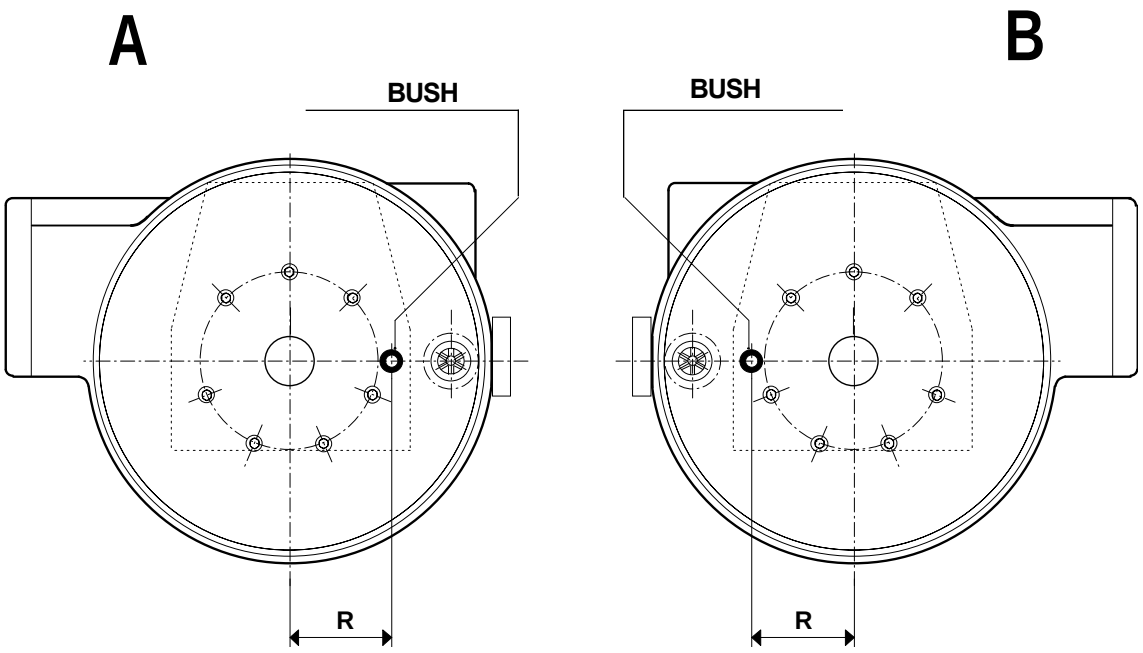


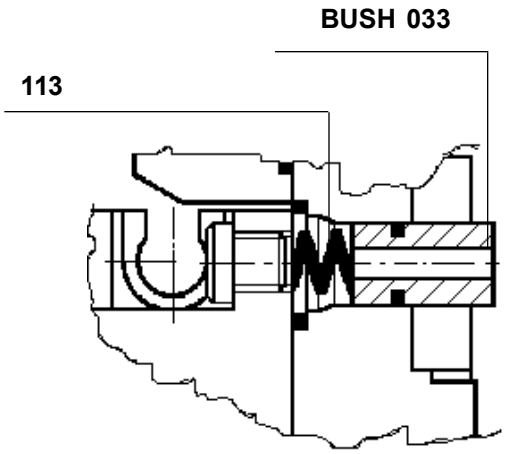
Another installation position of the idle gear (according to the transmission ratio)

Tighten the screws with "Loctite"

Tighten with "Loctite" the screw (or screws) which fix the gear on the motor shaft.

It is possible to make coolant liquid feed holes on both sides of the turret, connect the feed pipe to the chosen hole. The not utilized hole for the coolant liquid feed must be plugged.
A bush 033 pre-loaded by a spring 113 (installed on the power take-off side) transfers the coolant liquid from the turret to the toolholder disk.

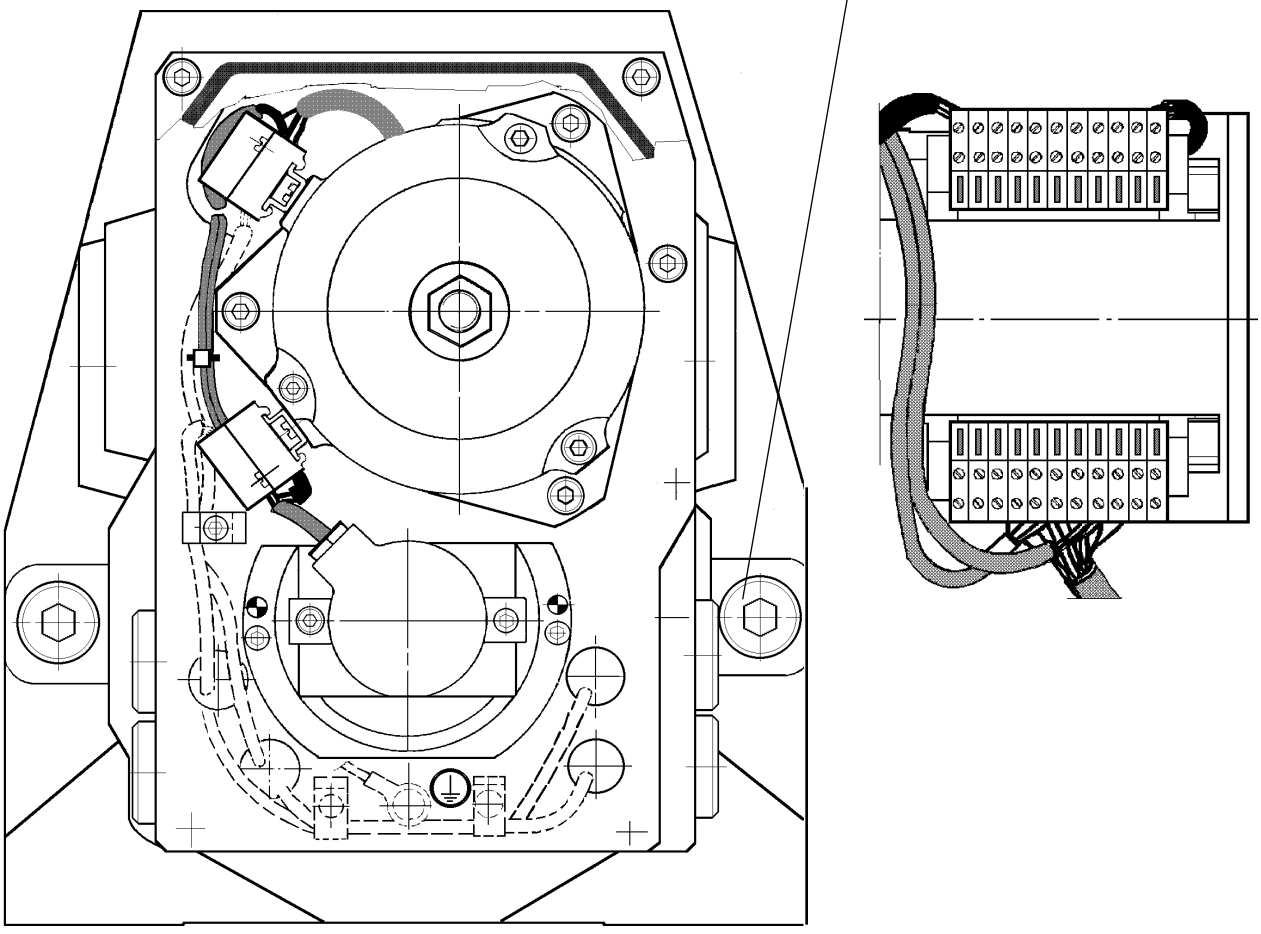




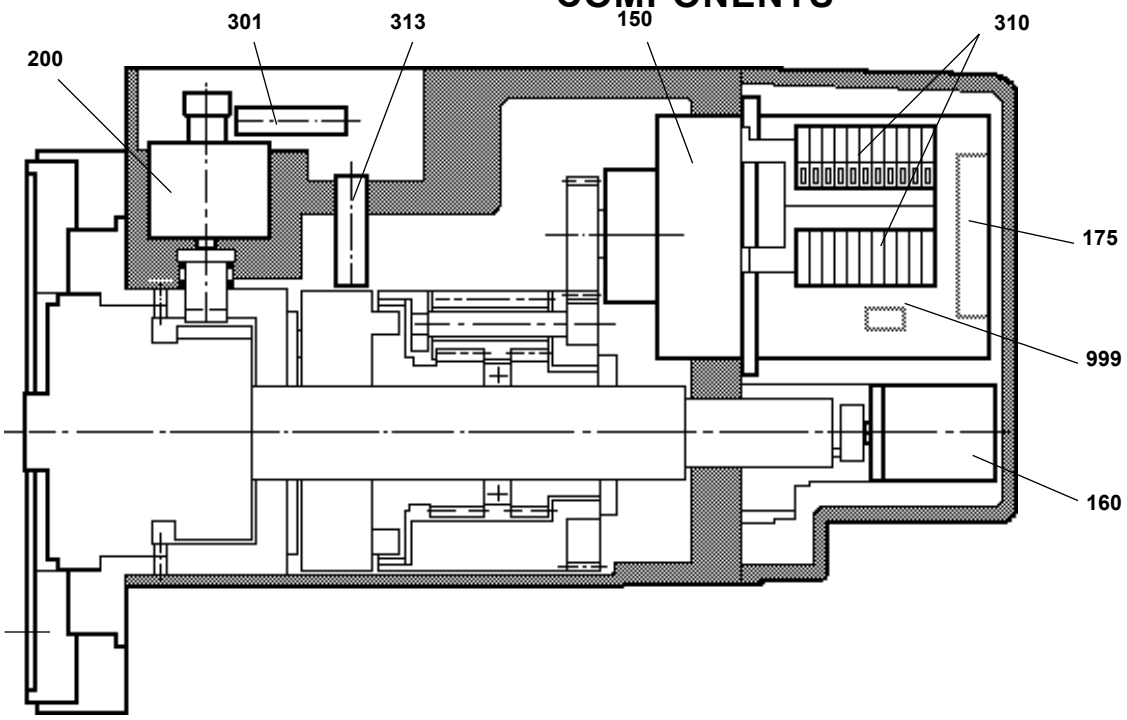
Turret size	R (mm)
TOEM 120 TOEM 160 TOEM 200 TOEM 250	75 90 109,5 134

Wiring inside the turret must be execute according to the scheme on page N° 11.
Wires must be arranged carefully so that they cannot be damaged or stripped in any way, particularly when finally closing the rear cover 011. Suitable anchoring brands are provided for this reason below the terminal blocks and we recommend their use, and their substitution with new ones in case of deterioration.
The wires must be kept close to the edge of the turret, any slackness being tucked away in safe spaces and fixed back with bands.
The sides of the turret each have two threaded holes for electric cables and reception of their protective conduits. The unions and the conduits must be arranged and fixed in such a way as to ensure that the liquid coolant cannot possibly penetrate into the inside of the turret.

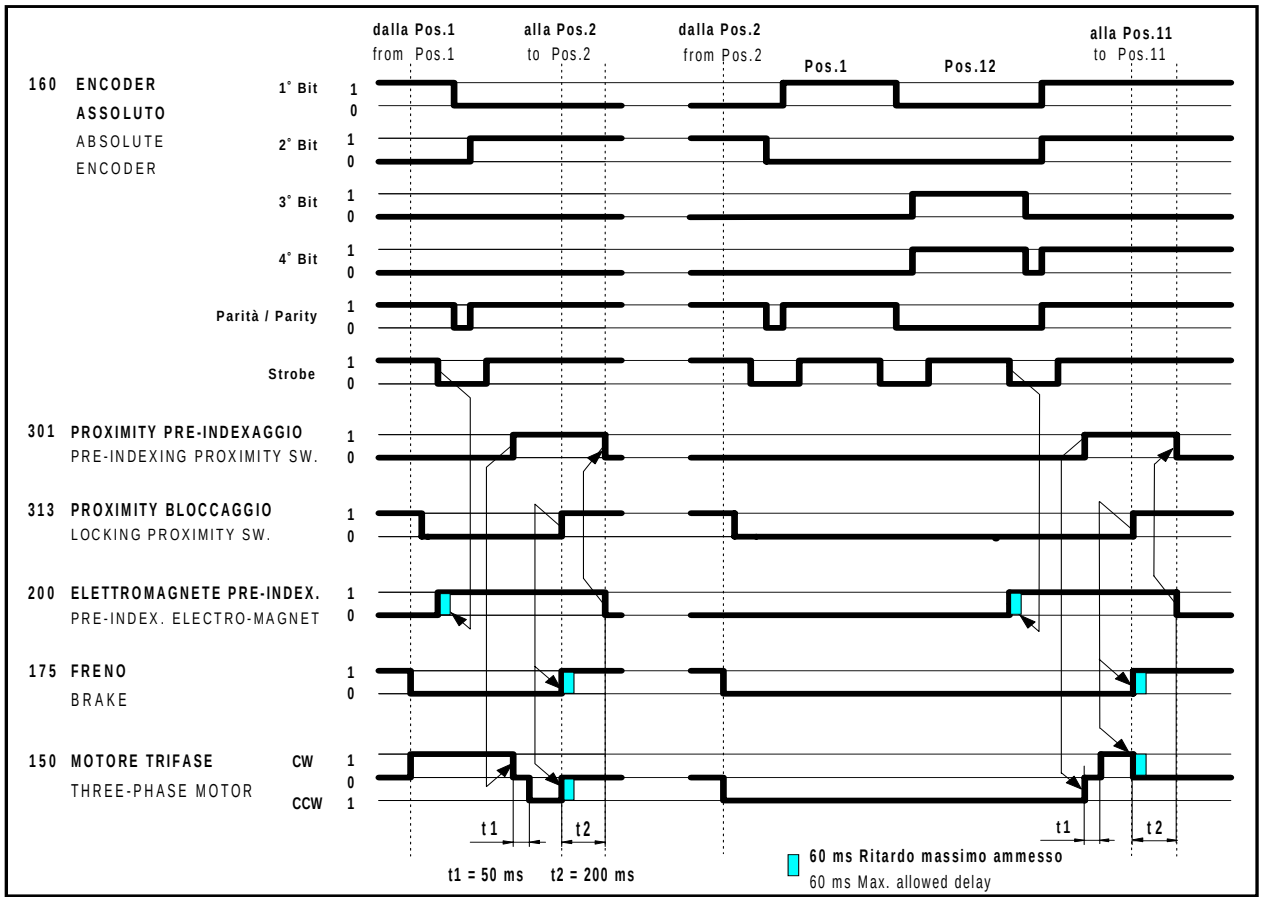
Any holes not used for the passage of cable must be hermetically sealed



After having finished the wiring carry out the test of correct phase connection of the AC motor (see page N° 26)



Ref.	Component - Specification		Colour - Connection		Type - Notes
160	ABSOLUTE ENCODER BINARY code	1° BIT 2° BIT 3° BIT 4° BIT PARITY STROBE + 24 Volt 0 Volt Screen	White Yellow Green Violet Red Black Brown Blue Yellow/Green	1 2 3 4 5 6 7 8 9	Encoder model 10 for TOEM 120 - 250 Power supply 24 Volt DC Ripple 10 % Outputs PNP 50 mA max. Short-circuit protection Screened cable
301	PRE-INDEXING PROXIMITY SWITCH	+ 24 Volt 0 Volt Output	Brown Blue Black	7 8 10	Diam. 12 mm L= 45 mm Power supply 24 Volt DC Ripple 10 % Output PNP-NO max. 300 mA Short-circuit protection
313	LOCKING PROXIMITY SWITCH	+ 24 Volt 0 Volt Output	Brown Blue Black	7 8 11	
200	PRE-INDEXING ELECTRO-MAGNET	24 Volt DC	Orange Orange	12 13	24 Volt 60 Watt 50 % ED
999	THERMOSTATIC SWITCH Temperature probes		White White	14 15	Normally closed type contact. (until 120°C)
175	BRAKE	24 Volt DC	Black Black	16 17	
150	THREE-PHASE MOTOR		Blacks X Y Z Red Red Red Yellow/ Green	18 U V W 	110 Volt 50 / 60 Hz 220/380 Volt 50 / 60 Hz Ground
310	TERMINAL BLOCK				



CYCLE DESCRIPTION

• The above operation diagram shows the sequence to be followed in order to move from position 1 to position 2, in clockwise rotation (with the turret toolholder disk in front), and from position 2 to position 11 in counterclockwise rotation.

• The brake is first de-energised and the motor feed for rotation in the direction selected. When the falling wavefront of the STROBE signal for the previous station is arrived at, the pre-indexing electromagnet is energised as quickly as possible (within the maximum permitted delay time).

• With the electromagnet energised, the pre-indexing proximity switch signal is awaited, which confirms that rotation has been halted by means of the index key. Upon reception of this signal the motor is immediately halted and the rotation sense is reversed after a 50 ms pause.

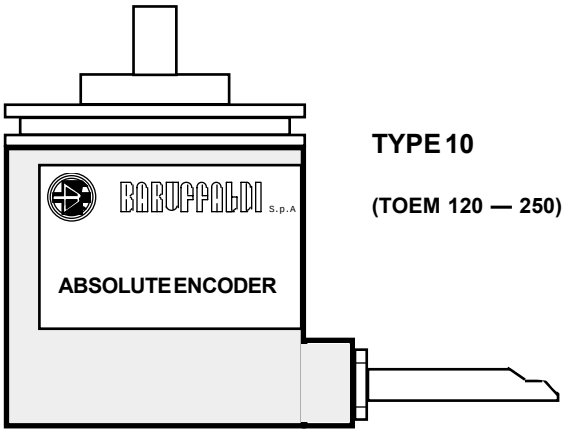
• The locking proximity switch signal is then awaited, before halting the motor as rapidly as possible and energising the brake (within the maximum permitted delay time).

• A safety check can be carried out at this point and consent for machining can be given, followed by electromagnet de-energising after a 200 ms pause.

• In order to make easier the entering of the take power-off with the correspondent in the rotating toolholder, during the rotation of the disk (position change), the DC/AC motor of the rotating tools must be feeded in order that the take power-off rotate at 500 - 700 RPM (please consider the ratio between motor and take power-off).

NOTE: The maximum care should be taken regarding the permitted delays, particularly their repeatibility. (Delays should be measured directly on the turret component devices).

ENCODER WIRING



TYPE 10

(TOEM 120 — 250)

A (1° BIT)	WHITE
B (2° BIT)	YELLOW
C (3° BIT)	GREEN
D (4° BIT)	VIOLET
PARITY	RED
STROBE	BLACK
+ 24 VOLT	BROWN
0 VOLT	BLUE
Screen	YELLOW-GREEN

ENCODER CODE TABLE

POSITION	A	B	C	D	PARITY	STROBE
1	●				●	●
2		●			●	●
3	●	●				●
4			●		●	●
5	●		●			●
6		●	●			●
7	●	●	●		●	●
8				●	●	●
9	●			●		●
10		●		●		●
11	●	●		●	●	●
12			●	●		●

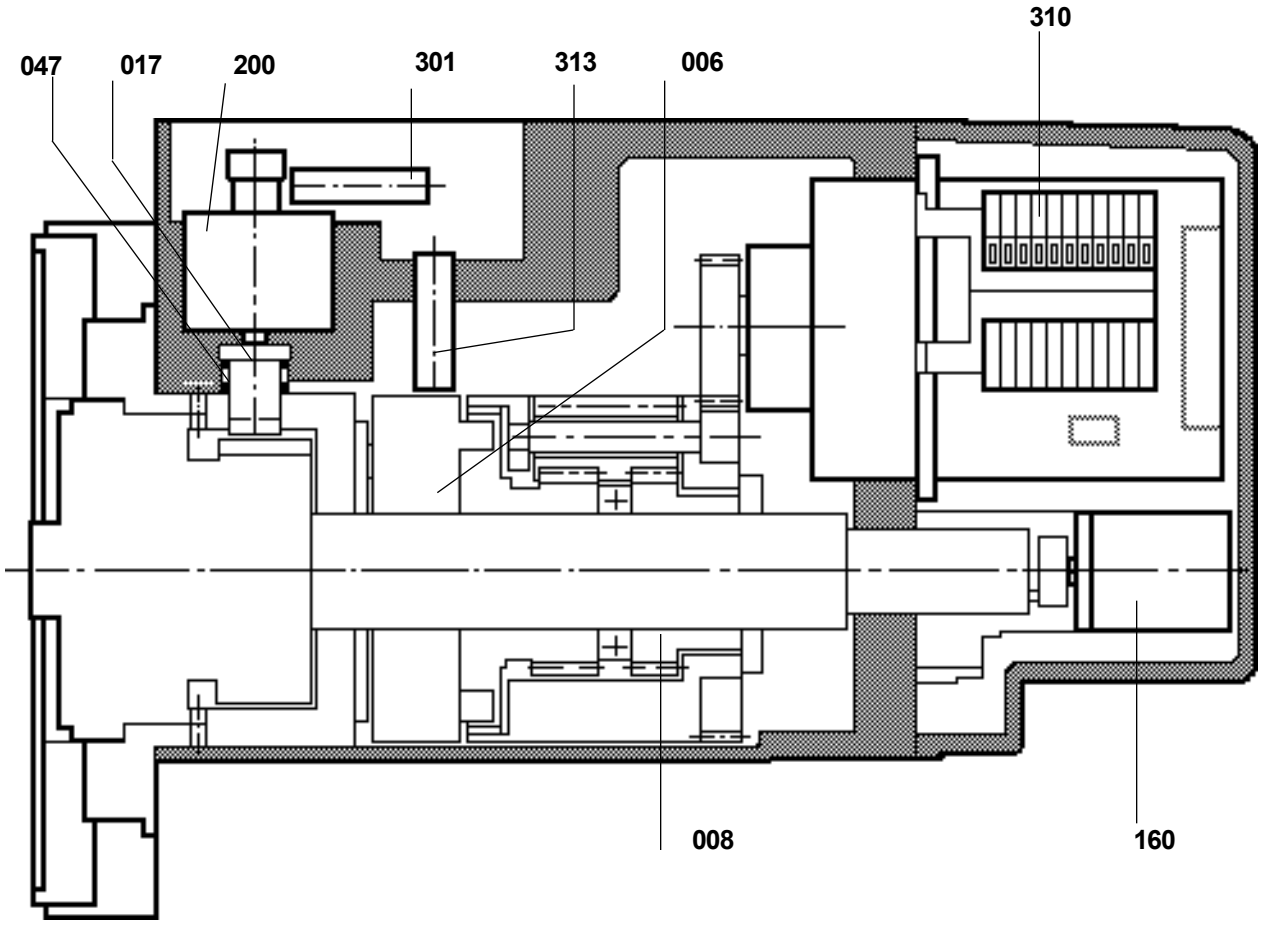
SPECIFICATIONS

- Power supply DC 24 Volt +/- 10 % Ripple 10 %
- PNP Outputs (max. load 50 mA) BINARY code
- PARITY Check and STROBE signal
- Reverse polarity protected
- Output short-circuit protected
- Connection to be made with 8-pole screened cable

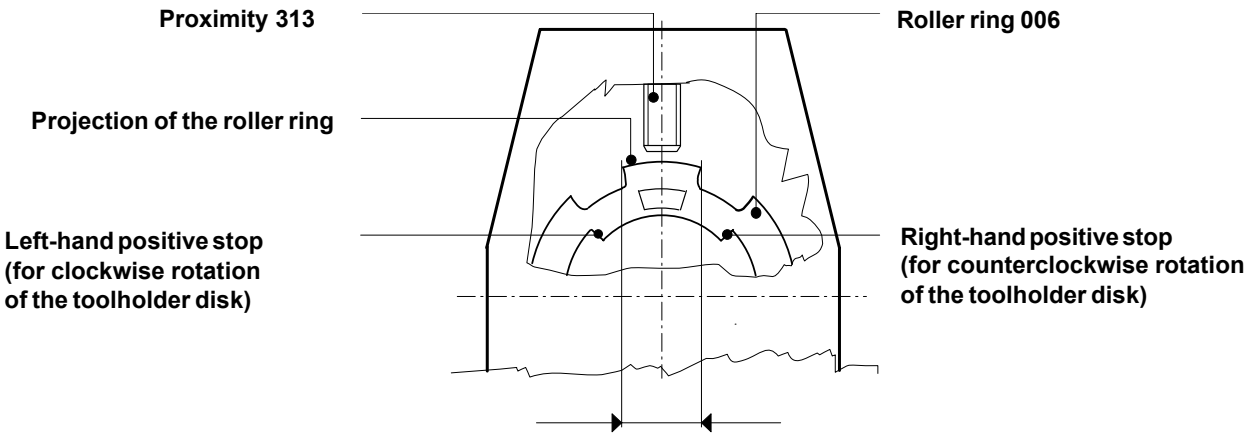
ORIGINAL SHUT-DOWN STATE OF THE TURRET:
- Brake connected
- Motor disconnected
- Electromagnet disconnected
- Rotating crown 003 linked to the fixed crown 002 through the short-circuiting crown 004.
The dished springs press, by means of three rollers on three cam ends of the short-circuiting crown, keeping the Hirth teeth of the crown in contact.

SEQUENCE FOR A CHANGING OF POSITION:

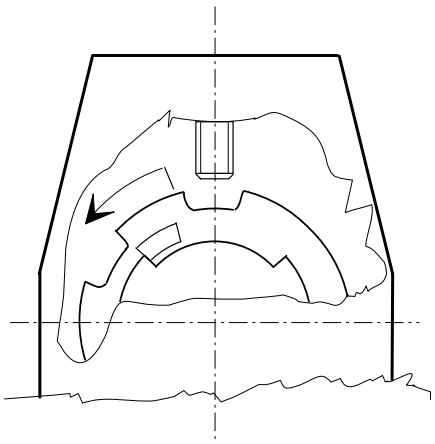
Electricity is cut off from the brake and connected to the motor which, through reduction stages (the first coaxial and the second epicycloid), starts rotating the planetary roller ring 006 which stops, after a preset angle, against a positive stop.
During this phase the central spring 034 pushes the short-circuiting crown back, causing the cam ends of the roller to descend and thus disconnect the movable crown which is then made to rotate by the pinion 008.
Nearing the destination station, on the signal given by the angular encoder 160, the electromagnet 200 is excited and pushes the catch 017 to make it enter the appropriate pre-positioning recess in the divider 005 thus stopping the rotation of the crown and the associated toolholder disk.
The resulting shock is absorbed by the buffer pads 032.
The completed insertion of the catch into the recess and consequent stopping of the rotation of the disk, is signalled by the pre-indexing proximity switch 301.
Arrival of this signal causes the revers of the rotation of the motor, and thus also of the planetary roller ring 006; so that the rollers rise on their cam ends and push the short-circuiting crown ahead, causing the Hirth teeth to engage.
Passage of the external profile (i) of the planetary roller ring 006, activates the locking proximity switch 313, indicating that the turret is closed, or, in other words, that the roller are on the extreme end of the cams.
When this signal arrives current is cut off from the motor end the brake 175 goes into action to stop it. Immediately afterwards the electromagnet is deactivated, and consequently the catch is pushed out of the recess in the divider by the spring 047.



Turret locked (rollers on the high central part of the cams)

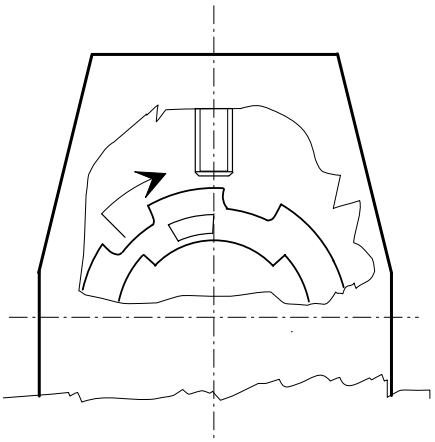


(i) Sector of operation of the proximity switch 313 (corresponding to the highest part of the cam)



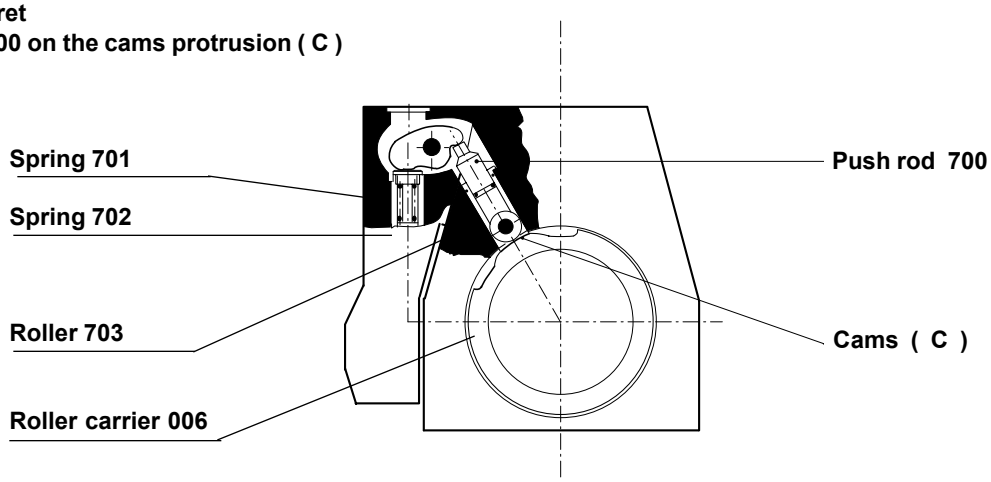
Turret unlocked (rollers on the bottom of the cam; Hirth teeth disengaged)

Turret locked (rollers at the beginning of high level part of the cam). Proximity switch 313 triggers.

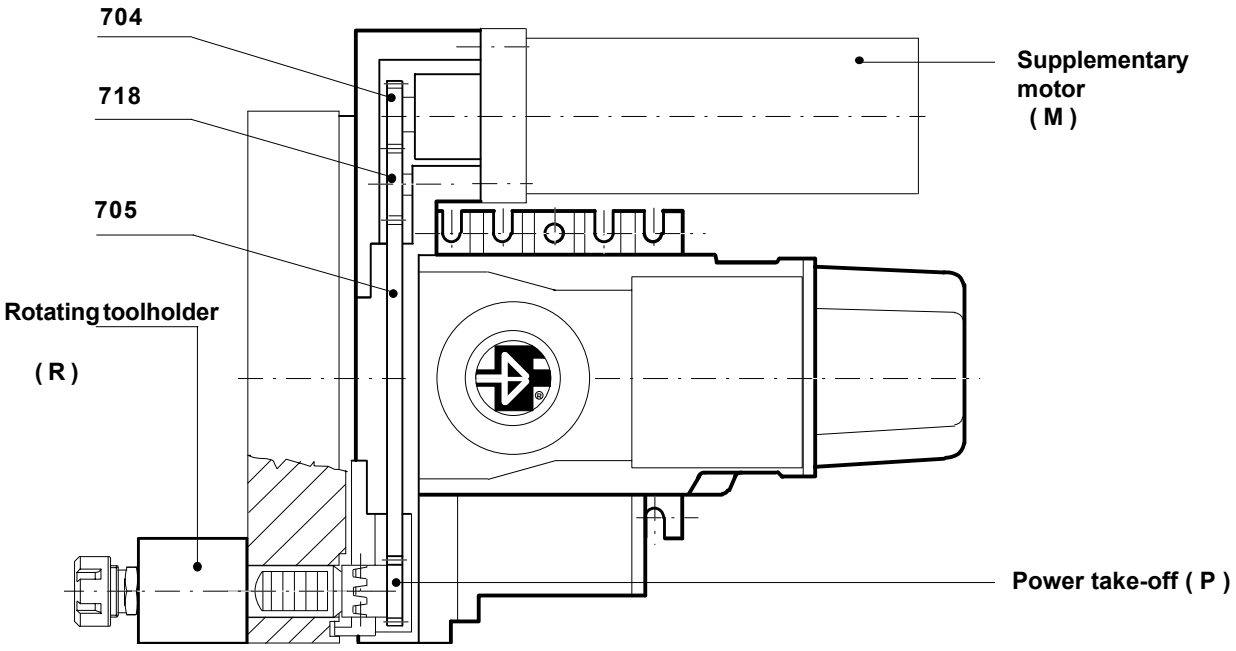


The above diagrams show the phases corresponding to a clockwise rotation of the toolholder disk.
The movement (or phases) with counterclockwise rotation are the mirror image of the above.

STARTING CONDITIONS :
- Locked turret
- Push rod 700 on the cams protrusion (C)

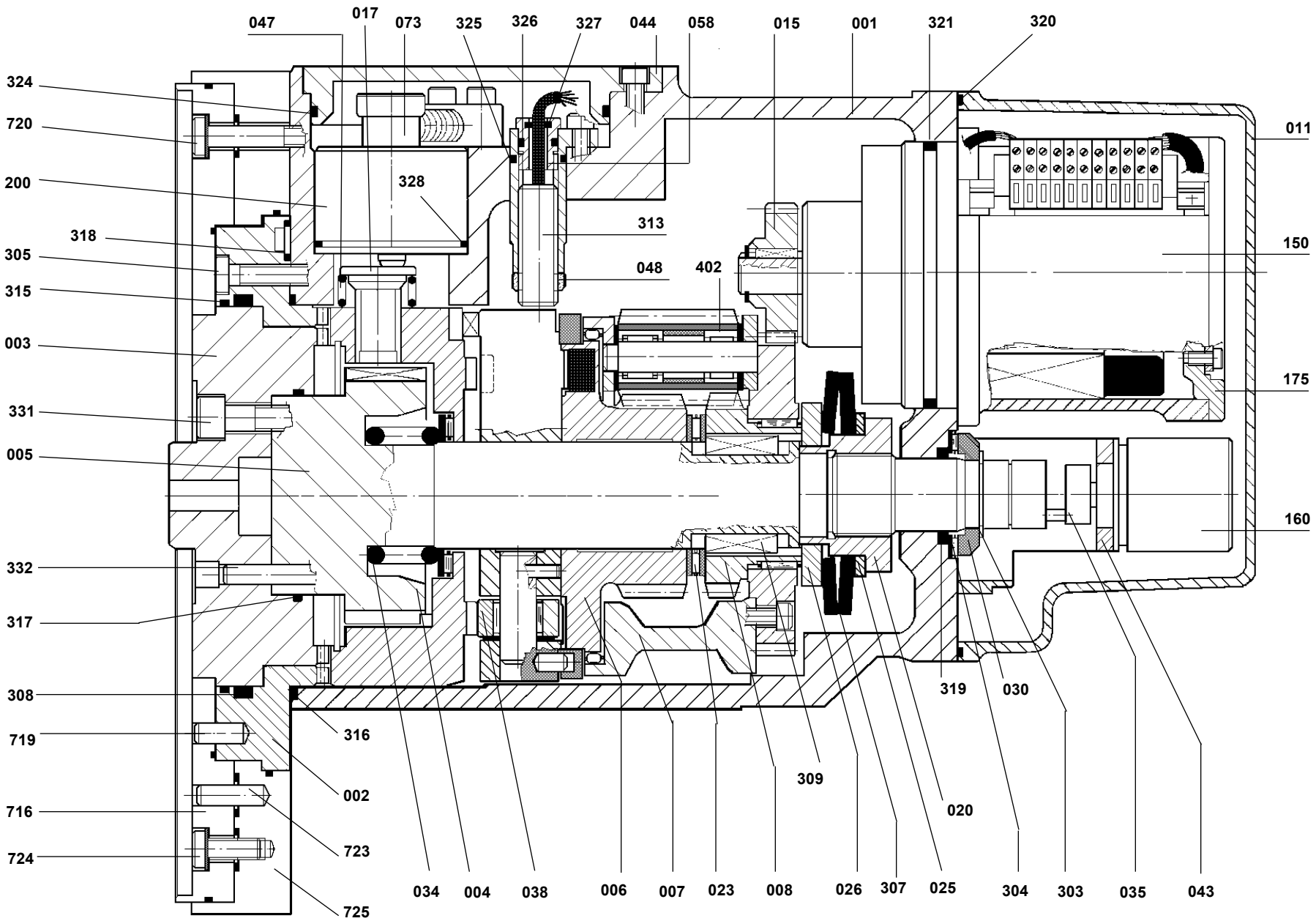


- Power take-off engaged on the shown toolholder.
With supplementary motor in rotation, the motion is transferred, through the gears 704 - 718 and 705, to the power take-off (P) then to the toolholder (R).



DISENGAGEMENT SEQUENCE FROM THE TOOLHOLDER OF THE ACTUAL STATION AND REPLACEMENT WITH A NEW TOOLHOLDER OF ANOTHER STATION.

During the phase of station change, the cams (C) reported on the roller carrier 006 make with it a predetermined angular rotation.
The push rod 700 which cooperates with the cams (C) by means of the roller 703, by being pushed through a levers system from the spring 702, it comes down from the cams top. At the same time, under the action of the spring 701, the indexing rack makes the roll 706 rotate, while the pins 707 fixed on it, by sliding in as many sloping slots determine the axial moving; therefore the sliding coupling in the gear is pulled back releasing in this way from the toolholder.
During the rotation phase of the toolholder disk, the action of the spring 701 keeps the coupling 708 in backward position.
During the clamping phase, by reversing the rotation direction, the cams (C), push the rod 700 outside, then the push rod put forward the indexing rack 711 through the levers 709 - 710 and spring 701 determining the rotation and the axial movement of the roll 706 and of the coupling 708 up to fit the correspondent of the facing toolholder.



BARUFFALDI S.p.A

ASSEMBLY DRAWING
(section view)

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Edizione 11-93
Edition