

USE INSTRUCTIONS

for
electromechanic turrets
TS series
34.0120
34.0160
34.0200
34.0250

Before of the setting at work, consult the use instructions and follow them!
It is allow only to experts, who examined the instructions, to work on the toolholder turret.




Responsability and warranty are excluded when:

- warning and use instructions are not followed
- turret is set at work in a wrong way
- turret maintenance is not followed correctly
- function modifications of every kind are introduced without the manufacturer authorization
- original spare parts are not used

WARNING:

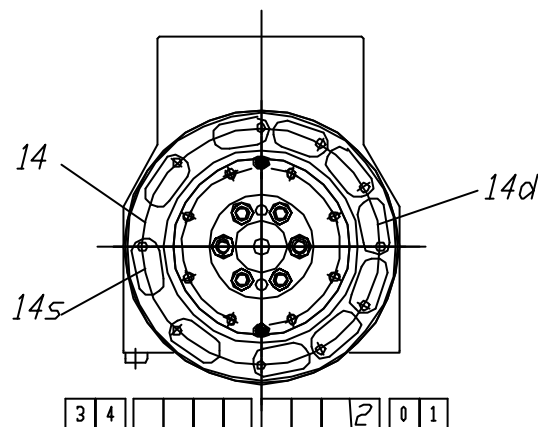
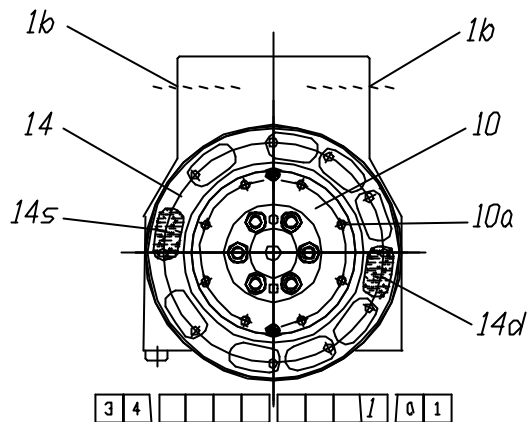
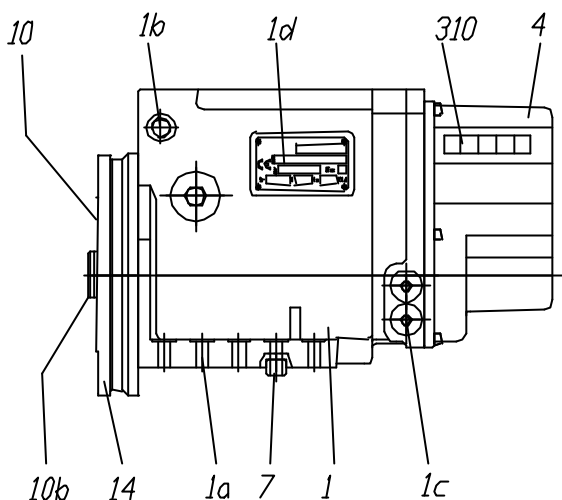
- this sign** points out operations of special care
- a wrong process can cause damage to the turret
- wrong process cause wrong setting up
- wrong process can endanger the safety of the operator.



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Edition October 1998	Revision	 BARUFFALDI SpA San Donato Milanese Italy	Page2/43

1 Structure of the turret

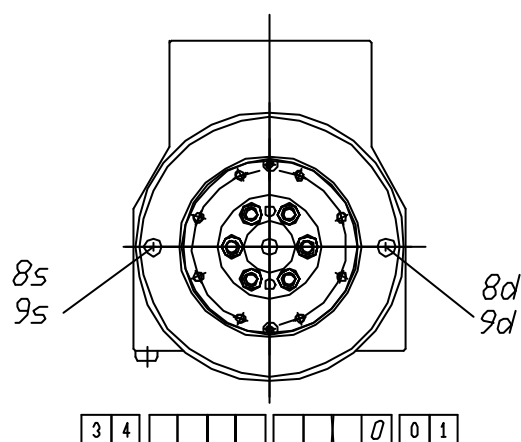
1.1 Type with coolant distributor: 1-2 code



- 1 Casing
- 1a Clamping holes on the machine
- 1b Coolant inlet holes
- 1c Cable through holes (on both sides)
- 10 Rotating crown
- 10a Disk clamping holes
- 10b Disk centering
- 14 Coolant distributor
- 14s/d Possible interception areas of coolant
- 4 Rear cover
- 310 Cables terminal board
- 1d Data plate
- 7 Reference bush
- 8 Cooling valve
- 9 Plug for unused hole

1.2 Type without coolant distributor: 0 code

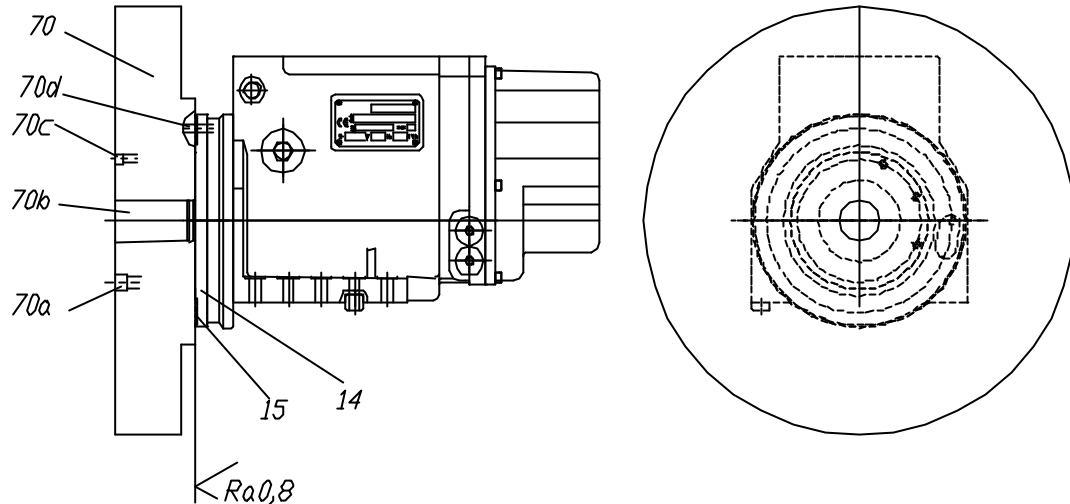
- 8 Cooling valve
- 8s/d Cooling valve assembly position
- 9 Plug for unused hole
- 9s/d plug assembly position



Fix the casing (1) containing the indexing element on the machine using proper screws (place screws on clamping holes 1 a), in doing this operation refer to the bush (7). Fix the tool-holder disk on the rotating crown (10). The electrical connection must be done on the terminal board (310). Coolant connection must be done in one of the holes (1b), the coolant outlet occurs through the cooling valve (8):area (14s) or (14d).

1.3 Directions for the toolholder disk construction

1.3.1 Disk for turret with coolant distributor (type1-2)



70 - Disk

70b-Hole centering (H5 tolerance)

70a-Holes for fastening screws

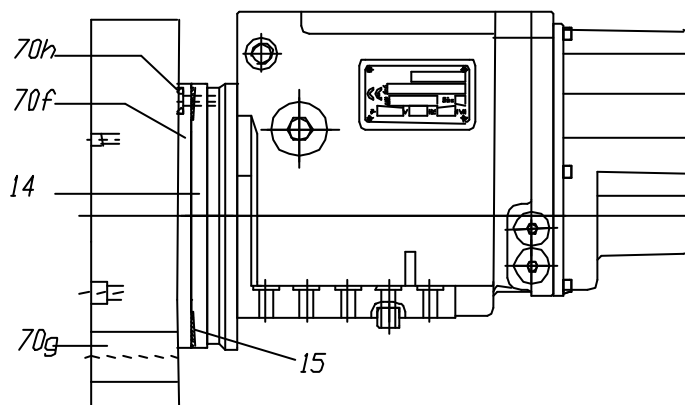
70c-Preholes to put a possible pin(check the catalogue)

70d-Holes for coolant interception, their position on the rear surface of the disk must coincide to the interception area marked by the frontal gasket (15)

14 -Coolant distributor

15 Frontal gasket

- Disk rear plane without interruption on the surface in contact with the frontal gasket: if this doesn't occur, put a gasket (70F) with o-ring grommet (70H) between the disk(70) and the distributor(14)

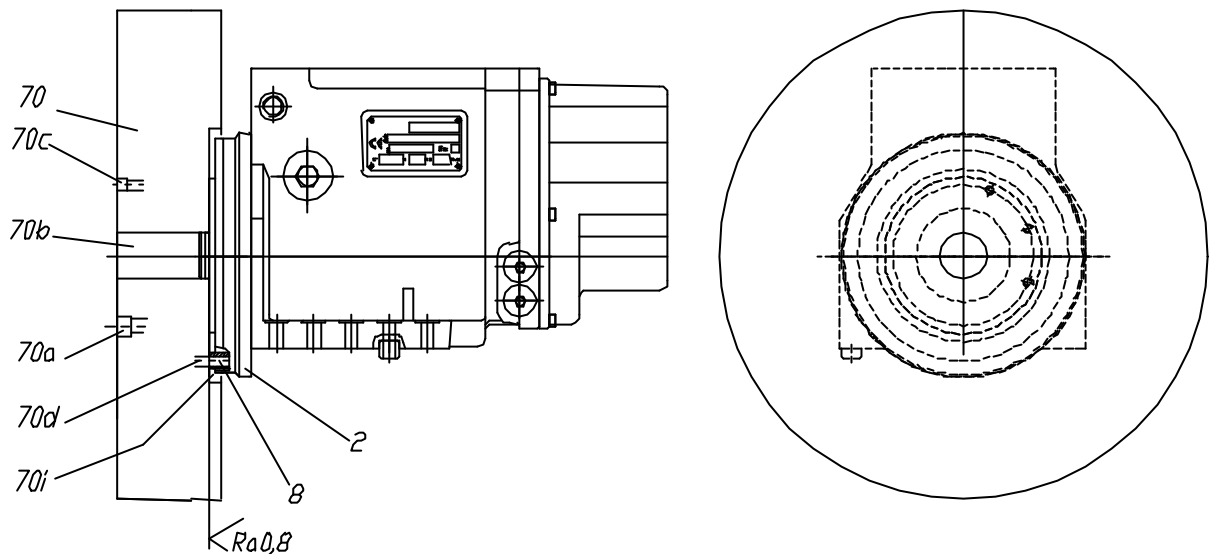


70f-Intermediate ring

70h-O-ring grommet

70g-Holes in contact with the frontal ring (15)

1.3.2 Disk for turret without coolant distributor (type 0)



70 -Disk

70b-Hole centering (H5 tolerance)

70a-Holes for fastening screws

70c-Preholes for possible pin (check the catalogue)

70i-Labyrinth seal with fix plate (2):check the catalogue for dimensions

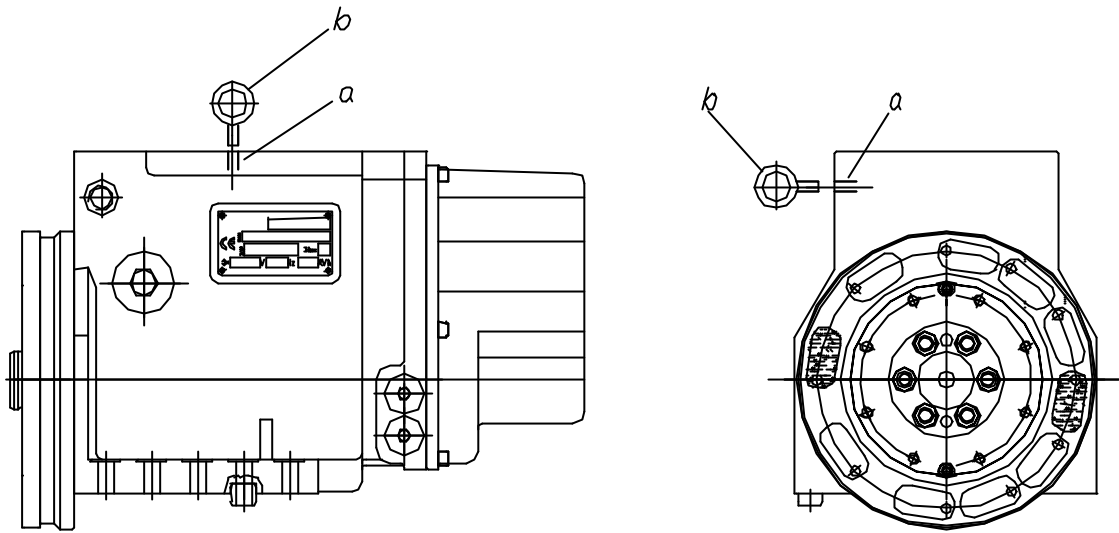
70d-Holes for coolant interception, they coincide with the cooling bush (8) (check the catalogue for dimensions)

8 -Cooling bush

-Rear plane of the disk in contact with the bush (8) it has no interruption and a roughness of 0,8 (Ra)

2 Setting at work

2.1 Advice during transfer

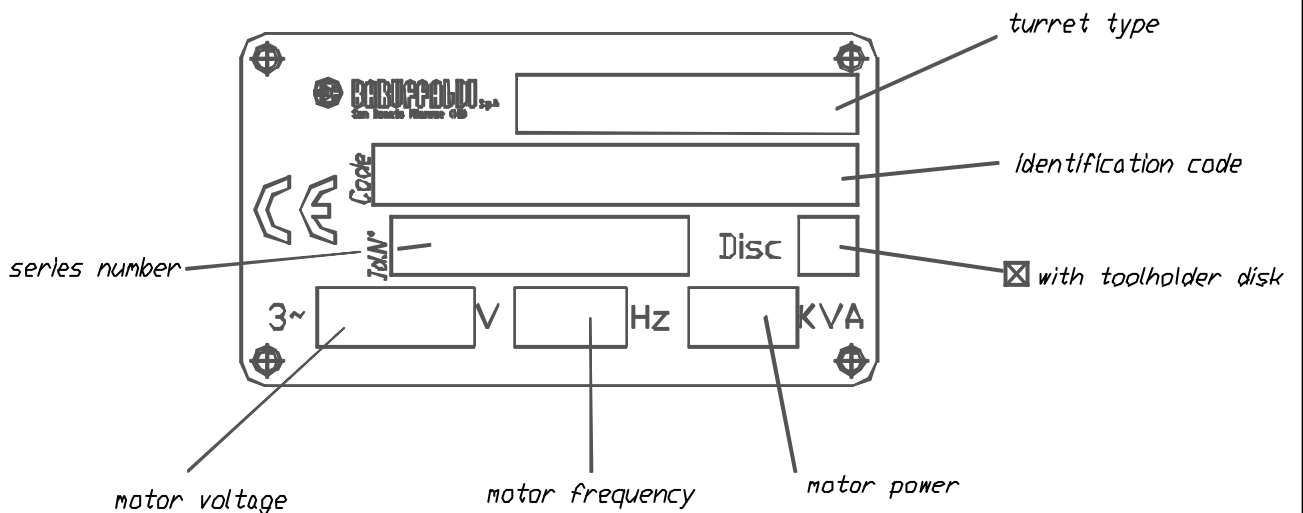


- a Hole for ring bolt
- b Ring bolt (not supplied)

Schedule

Size	TS120	TS160	TS200	TS250
Turret weight without toolholder disk Kp		60	97	130
Hole dimension a	M12	M12	M12	M16

2.2 Data plate



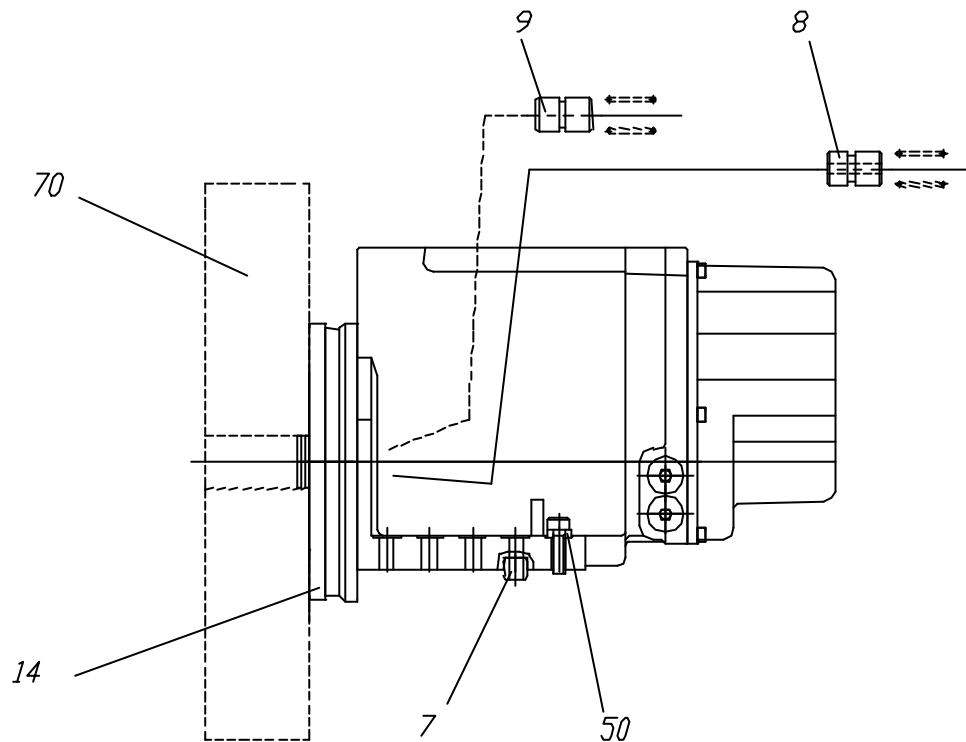
2.3 Delivery terms

The turret is provided with:

- Use guide
- Test certificate
- Cooling bush (8), O-ring and spring
- Plug for coolant block (9), O-ring and spring
- Reference bush (7)
- Lock washers (60)

Motor (150), distributor (14) , N° of positions, speed rotation and toolholder disk as specified on the order

- The turret is provided with oil lubricant and locked on position 1
- Types with coolant distributor 1-2, are provided with cooling bush (8) and with plug for coolant block (9) placed in the right slots



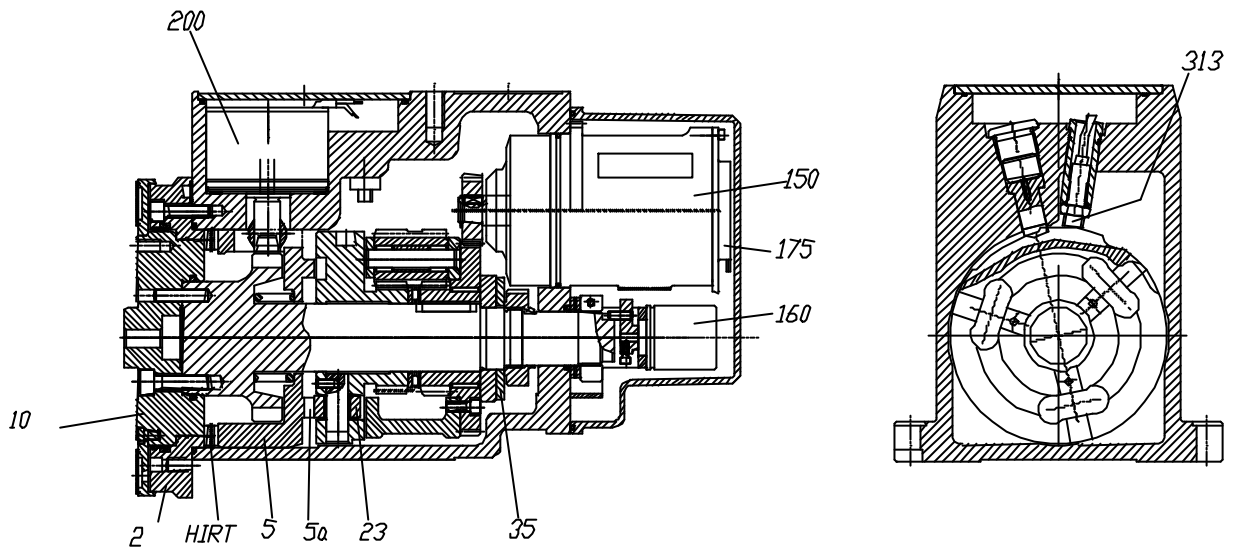
2.4 Technical data

<u>Size</u>		<u>TS120</u>	<u>TS160</u>	<u>TS200</u>	<u>TS250</u>
Moment of inertia of Carriable masses (disk included) Kgm ²	Type 0	1.1	2	4.5	7.5
	Type 1	0.8	1.4	3.5	5
Bearable weight (disk included)	Kp	30	40	120	160
Unbalancing moment (during rotation)	Nm	10	15	40	60
Max tangential torque (locked turret)	Nm	800	1850	3500	6900
Max overturning torque in pressing direction	Nm	690	1600	5100	11000
Max overturning torque in lifting direction	Nm	280	690	2300	4600
Indexing frequency maneuvers /h		750	750	750	750
Indexing precision		+/- 6"	+/- 6"	+/- 6"	+/- 6"
Accuracy of repeatability		+/- 2"	+/- 2"	+/- 2"	+/- 2"

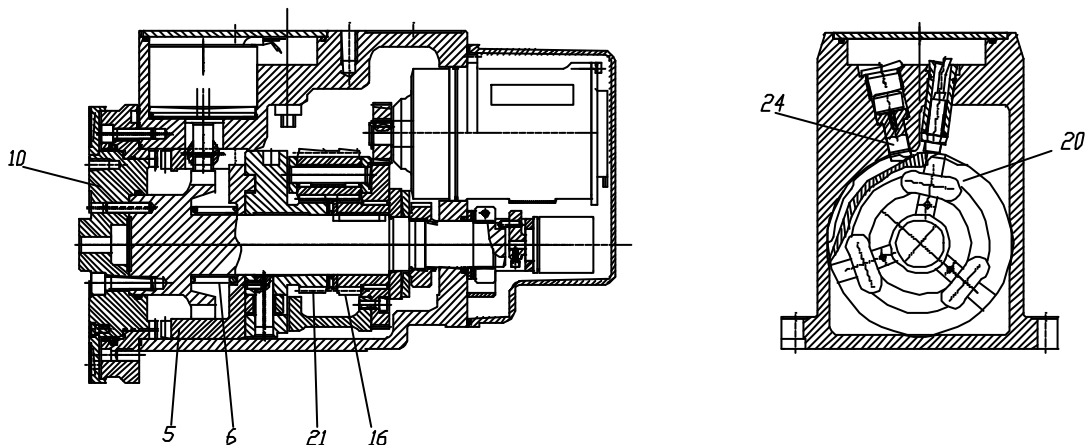
2.5 –Working description**2.5.1 –Locked turret conditions**

- Motor (150) is de-energized
- Brake (175) is fed
- Eletromagnet (200) is de-energized
- The stop proximity switch is turned on (313)
- The strobe signal of the angular encoder is switched on (160)

The Belleville washer (35) through the three rollers(23) pushes against as many cam ends(5a) of the short-circuited crown(5) keeping in touch the Hirt frontal toothing of the elements (2) (5) (10).

**2.5.2 Sequence of the position changing**

- De energize the brake
- Energize the motor, through two gearing-down, the motor puts on rotation the planetary gear (21) and the roller-carrier (20). The roller-carrier stops its rotation against the mechanical lock (24) after doing a pre-established angle. During this stroke the central spring (6) pushes backwards the short-circuited crown (5) causing the descent of the rollers (23) from the cam end (5a) unlocking the movable crown (10) that is put on rotation through the second planetary gear (16).



2.5.2 After passing the position former to that one of arrival(&) when the signal of the angular encoder (160) is switched on energize the eletromagnet (200) that causes pressure on the latch (41).When the arrival positioning is reached (%), at the signal.of the angular encoder, de- energize the motor.

The latch (41), pushed by the eletromagnet (200) goes trough the proper prepositioning slot of the divider (11) locking the rotation of the crown (10) and of the tool-holder disk.

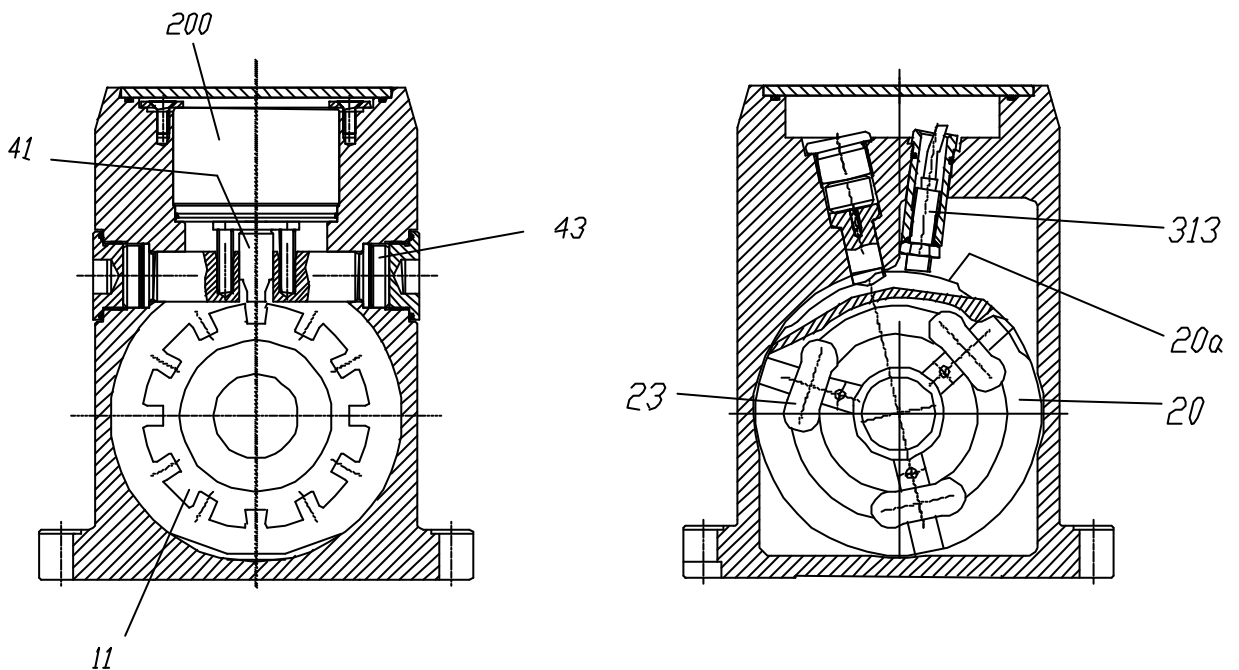
The resulting impact is deaden by the rubber pads (43).

After a determined dwell (t1) , re-energize the motor with a reverse rotation to the former one.

The rollers (23) going up to the cam ends (5a) push the crown (5) forward causing the coupling of the **Hirth** crowns.

The passage of the profile (20a) of the rollers carrier (20) puts in order the locking proximity (313) indicating the locking of the turret that occurs when the rollers (23) have reached the cam ends (5a) and have preloaded the Belleville washer (35).

On arrival of this signal, the motor is de-energized, the brake is energized, the eletromagnet is de-energized, whereas the latch (41) pushed by the springs (45) comes out from the slot of the divider (11).

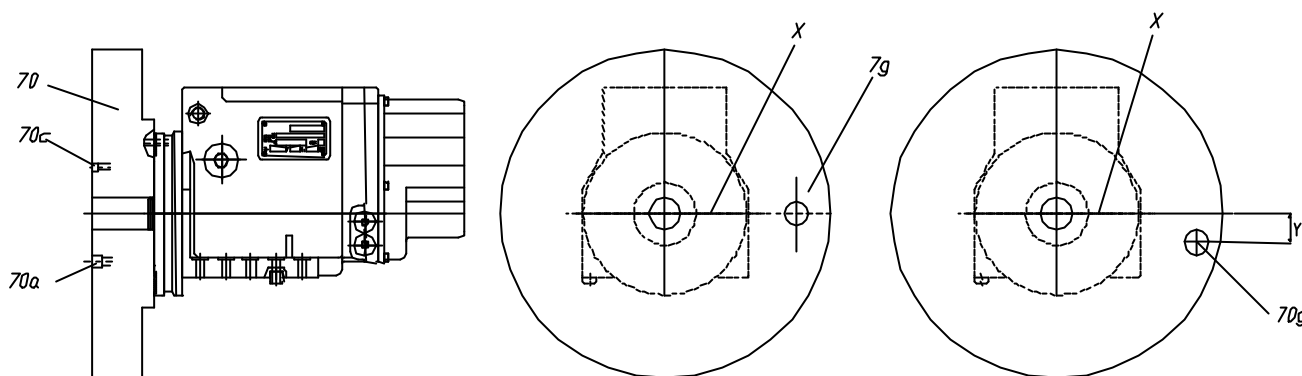


The drawings picture the phases corresponding to the clockwise rotation of the tool-Holder disk.

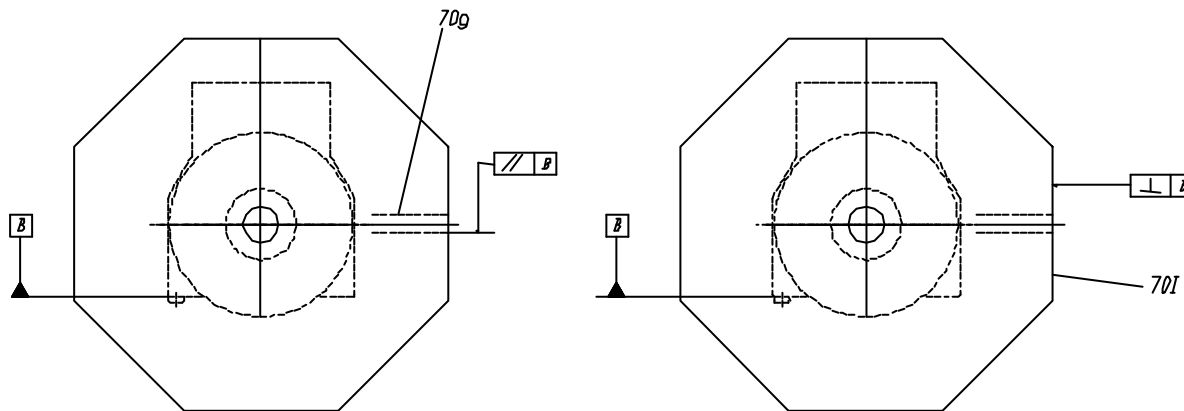
The phases are specular for counterclockwise rotation.

2.6 Toolholder disk assembly on the turret

- Assembly the disk (70) on the turret with the screws (70a) slightly tension the screws
- Turn the disk so that the seats (70 g) are aligned with respect to the (x) or (x-y) axis of the turret
- Tighten the screws
- Check again the alignment of the seats (70g) with the axis of the turret
- Drill and ream the holes (70c) for dowel alignment on the disk (note:for the maximum allowable depth of hole see chart).



- Polygonal disk: line up the seats (70) or the planes (70I) with respect to the face (B) of the turret -



Schedule of the fastening screws of the disk

Type of turret	TS120	TS160	TS200	TS250
Quality screws 12,9	M8	M8	M10	M12
Tightening torque Nm	39	39	77	135

Warning:

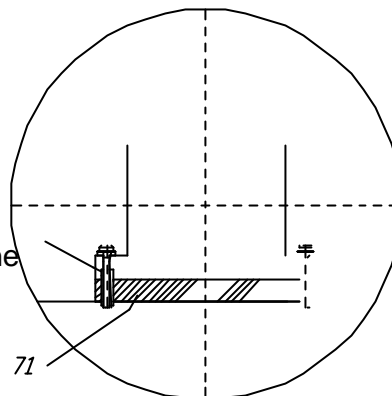
Prior to assembly and alignment of the disk it is essential to ensure that the turret is in a locked position



2.7 Turret assembly on the machine

- Take the dimension (A) between the axis and the plane of the turret saddle
- Take the dimension (B) between the toolholder seat and the face of the turret
- Snug the thickness (71) to (S): it's the difference between (A) and (B).

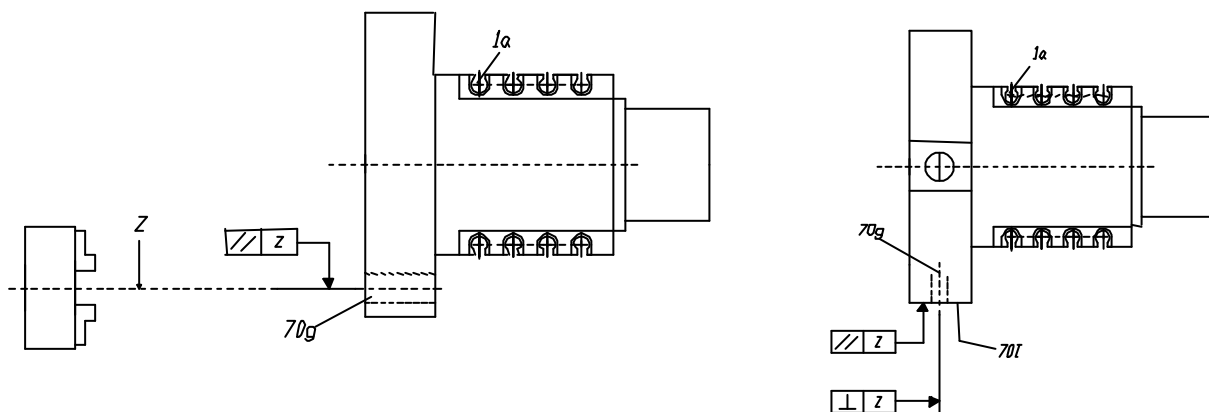
Z = axis of the machine
 X = axis of the turret
 71 = snug thickness
 W = plane of the turret saddle
 7 = fiducial bush
 70g = Toolholder seat
 1a = Fastening screws on the machine



Schedule of the fastening screws of the turret on the machine

Type of turret	TS120	TS160	TS200	TS250
Quality screws 12,9	M8	M10	M12	M16
Tightening Torque Nm	39	77	135	280

- Assembly the turret complete of the disk (70), the bush (7) and snug thickness (71) on the machine carriage.
- Slightly tension the screws (1a), align the toolholder seats (70g) or the faces (70l)
- Lock the screws (1a) then check again the disk alignment.



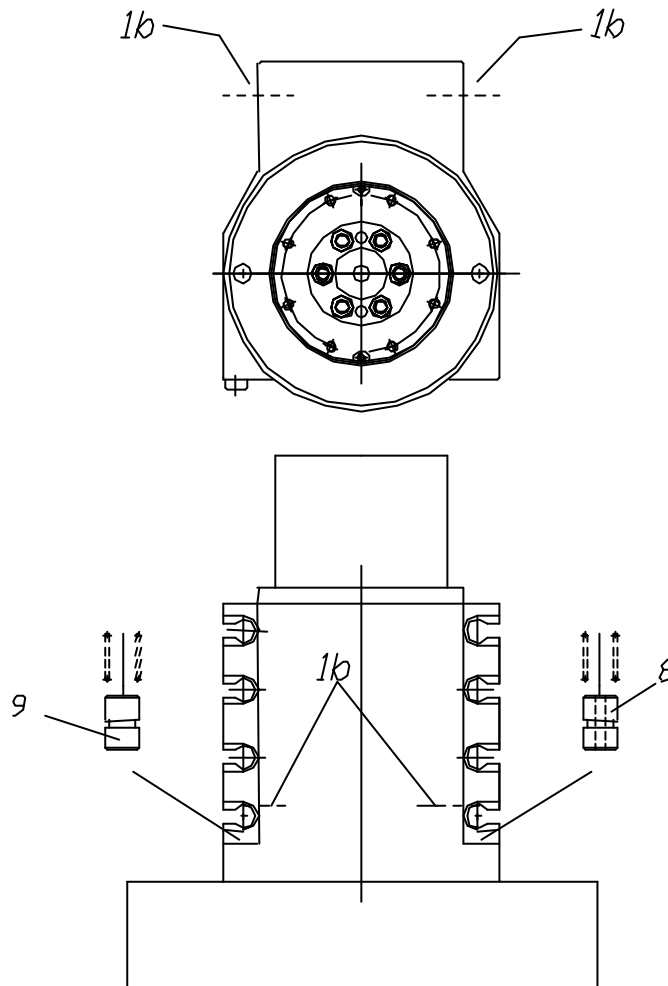
Note:

All checking and setting up must be done with locked turret. The face on which the turret is assembled must be clean without deformation or strain and with a flatness value of 0,01/100 mm.



2.8 Coolant Feeding

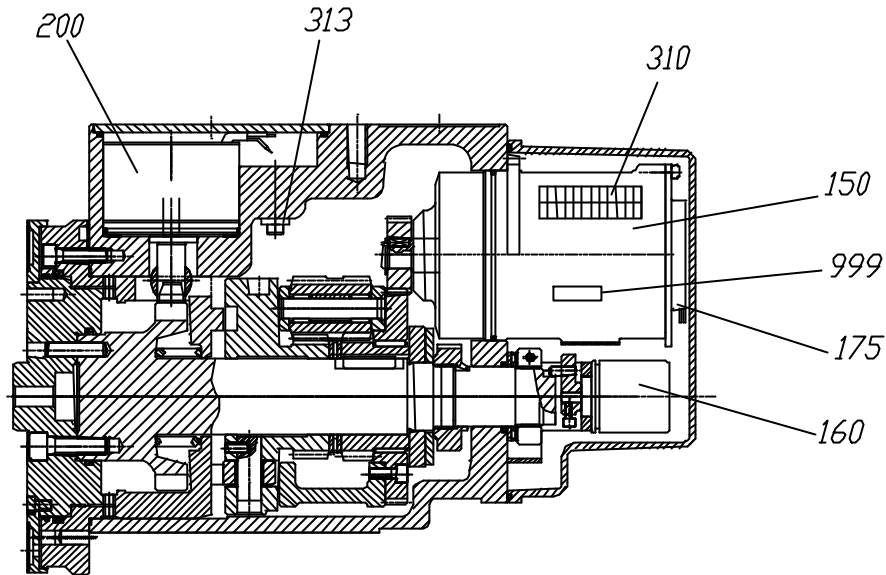
- Link to one of the holes (1b) the coolant feed pipe (the other hole must be plugged)
- Check that the coolant interception valve (8) is assembled on the side of the turret where there is the outlet of the coolant; on the opposite side there must be the clog (9)



The drawing pictures the use of the coolant on the right side
For the use on the left side reverse the assembly of the valve (8) and of the clog (9)

2.9 Electrical cutaway view

2.9.1 Components/connections to the terminal board

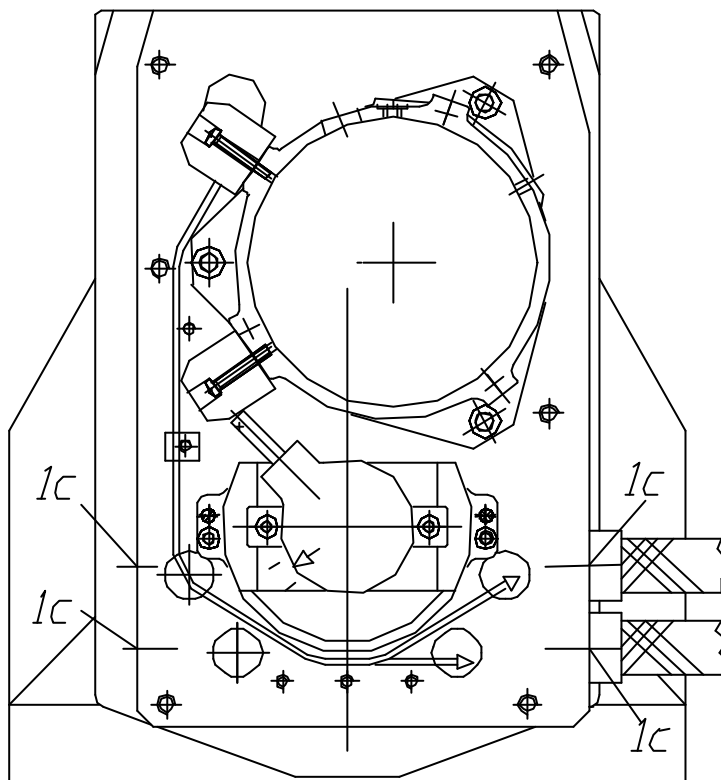


Ref.	Components/features	Colours/ Cables	Terminal (310)	Note
160	Absolute encoder 1°Bit 2°Bit 3°Bit 4°Bit Parity Strobe + 24 Volt 0 Volt Shield	White Yellow Green Violet Red Black Brown Blue Yellow-Green	1 2 3 4 5 6 7 8 9	
313	Locking Proximity + 24 Volt 0 Volt Exit	Brown Blue Black	7 8 11	PNP-NO Ripple 10% Max 300 mA Short circuit protection
200	Electromagnet 24 Volt DC	Orange Orange	12 13	24 V – 65 Watt 50% ED
999	Bimetallic thermostat	White White	14 15	Contact usually closed (it is open at 120°C)
175	Brake 24 Volt DC	Black Black	16 17	24 V – 18 Watt 100 % ED
150	Three phase motor Power :according to size Voltage: on request (See data plate)	Black X Y Z Red Red Red Yellow/green	18 U V W ⊕	Ground
310	Terminal boards			

2.9.2 Wiring Harness

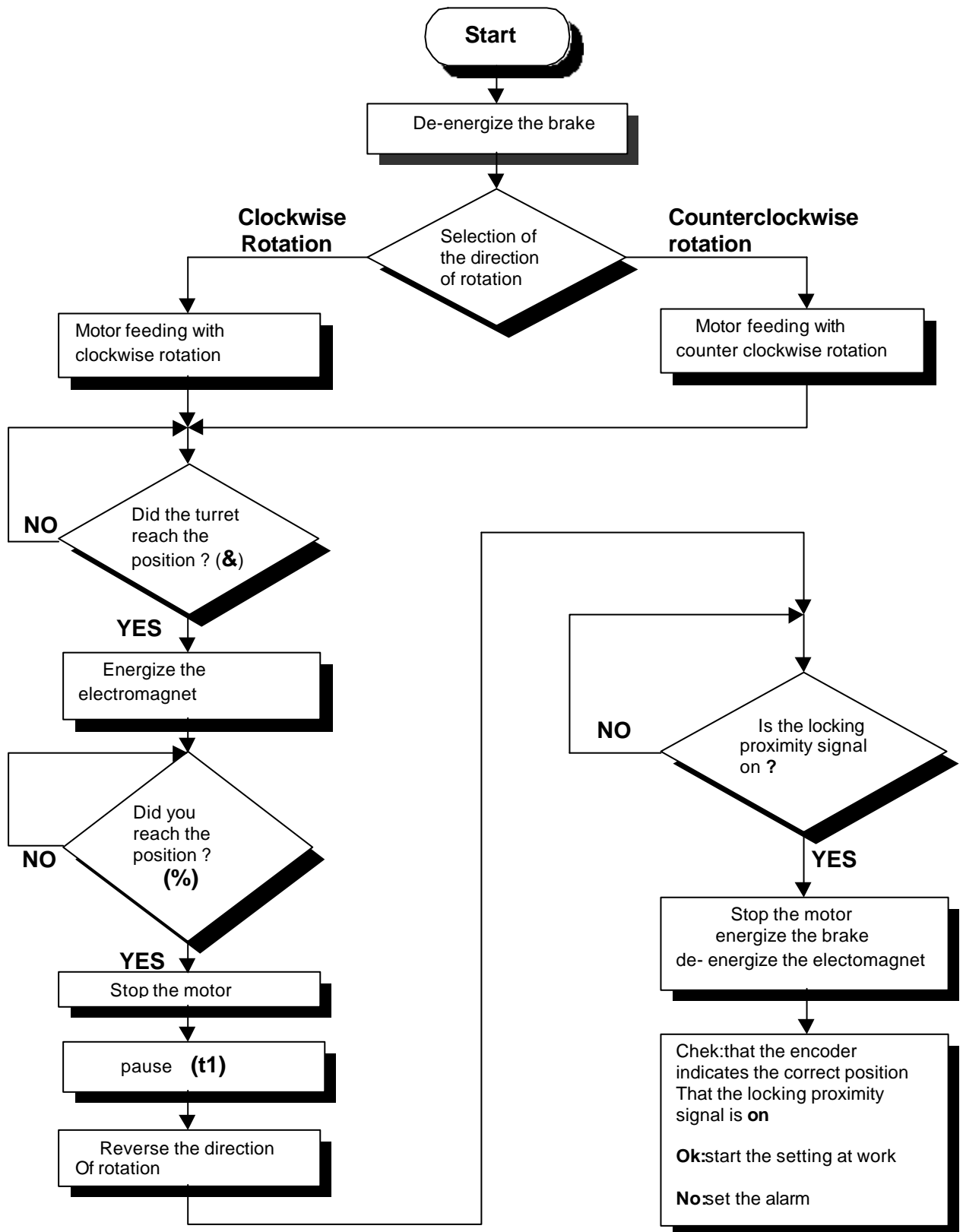
The wiring harness onto the turret must be done according to the wiring diagram (2.9.1). Cables must be arranged so as to prevent them from being squashed or peeled, especially when the rear cover is installed (4) for this reason there are anchorage clips on the plane below the terminal boards: we advise to use them. If they're damaged, please replace them.

Cables must be kept tight by the side of the turret. Any slackness has to be tucked away in a non dangerous area. Two threaded holes (1c) are placed on the sides of the turret for the supply cable outlet and for the application of the leakage protection tube. Use and setting of the connector and of leakage protection of cables must prevent the coolant liquid from leaking into the turret. Holes not used for the outlet of cables must be hermetically sealed.



After having finished the wiring harness try the correct connection of the phases: call on from the **CNC** the nearest position to the actual one . The change of position must occur in the shortest run. If this doesn't occur inverse the cables of the motor on the terminal board (310). Mount the cover (4) and the o-ring.

2.9.3 Diagram flow

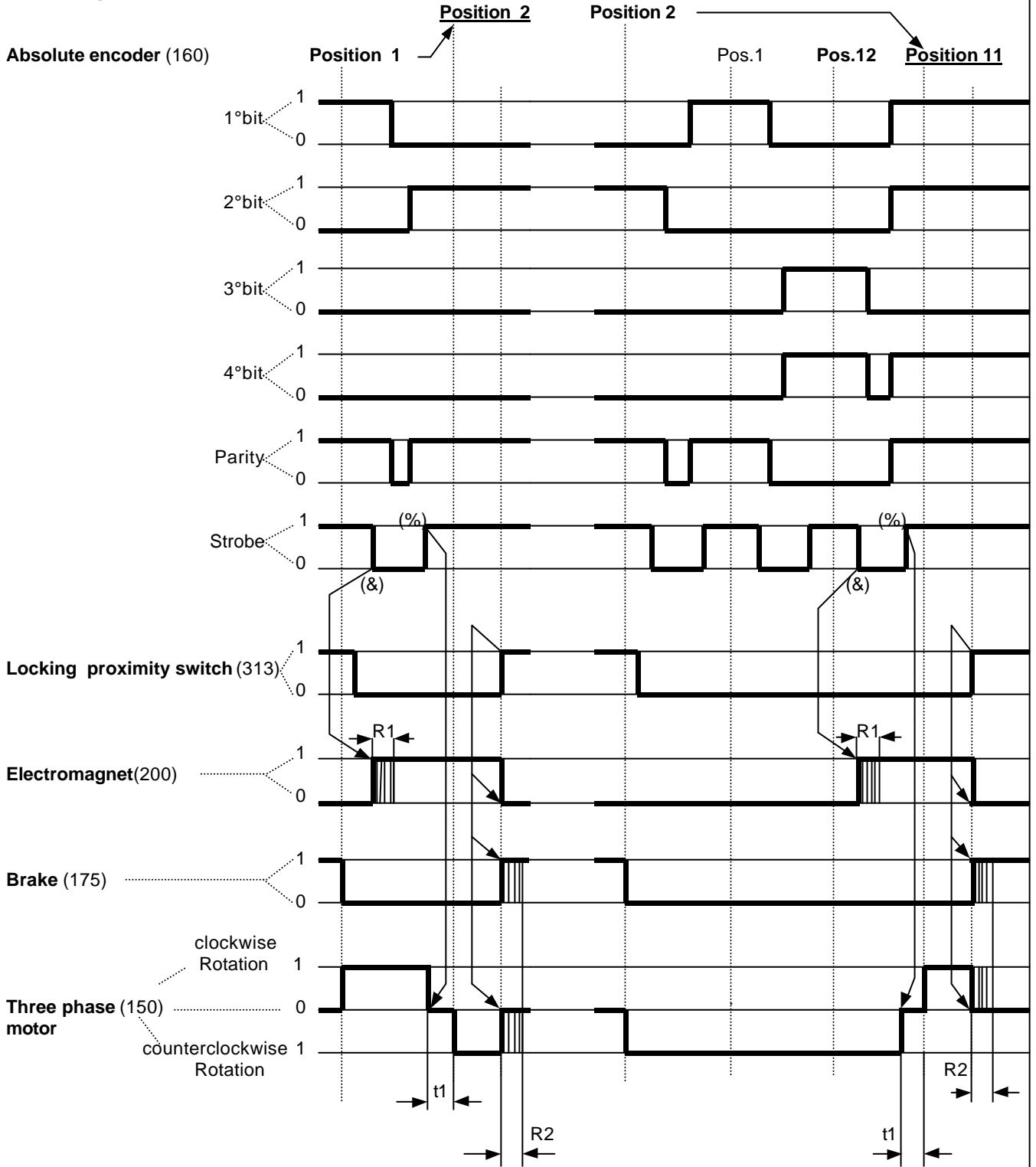


(&) The position is reached: the strobe is at level 0 of the former position.with respect to the selected one

(%) Selected position: the strobe is at level 1 of the selected position

(t1) Pause (see time schedule chapter 2.9.4)

2.9.4 Operation chart



Time schedule (ms.)

Type	TS120	TS160	TS200	TS250
Pause t1 (minimo)	150 ms.	150 ms.	200 ms.	250 ms.
Lag R1 (max)	30 ms.	30 ms.	40 ms.	40 ms.
Lag R2 (max)	30 ms.	30 ms.	40 ms.	40 ms.

& = strobe at 0 level of the previous position with respect to the selected one.

% = Selected position:the strobe is at level 1

Times (t1,R1,R2) are directly measured by the switches onto the turret.



2.9.5 Description of the operation chart (2.9.4)

The operation chart represents the required sequence foreseen to pass from position 1 to position 2 following a clockwise rotation (facing the toolholder disk of the turret) from position 2 to position 11 the turret goes through a counterclockwise rotation. The sequence requires: to de-energize the brake (175) and to energize the motor in the selected rotation. Wait until the strobe signal of the former position (&) at 0 level with respect to the selected one. Then energize the electromagnet of pre-indexing (maximum lagging admitted R1 must be respected). With the electromagnet energized wait the strobe signal of the selected position (%). At this signal stop immediately the motor. After a pause (t1) inverse the rotation. Wait the signal of the locking proximity. To stop the motor, energize the brake respecting the lagging admitted (R2) and de-energize the electromagnet. First check if there are the signals of positioning and of locking, then go on with the working cycle.

The signal of locking proximity must always be checked.

If the signal doesn't appear an **alarm** condition must be activated



Code chart of the angular coder (encoder)

POSITION	1° BIT	2BIT	3° BIT	4° BIT	PARITY	STROBE
1	■				■	■
2		■			■	■
3	■	■				■
4			■		■	■
5	■		■			■
6		■	■			■
7	■	■	■		■	■
8				■	■	■
9	■			■		■
10		■		■		■
11	■	■		■	■	■
12			■	■		■

3 Maintenance

Any kind of maintenance or disassembly must take place with locked gears, cold surfaces and de-energized motor

**3.1 Lubrication**

Lubrication of the mechanical gears of the turret last during the entire life of the turret. The replacement of the lubricant must be done again only after complete disassembly of the turret. The lubricant with a viscosity 80 sw 90, must be compatible with the rubbers and with the tephlon. In the chart, here below, the are the quantities to use..

Size of the turret	Quantity of lubricant l.
TS120	0.3
TS160	0.5
TS200	1
TS250	1.5

3.2 Breakdown search and repair

Any kind of maintenance or disassembly must take place with locked gears, cold surfaces and de-energized motor



Anomalies	Probable causes	Checking	Remedies
A The turret doesn't start the rotation	1 The motor is de-energized	Check on the terminal board (310) that the motor is energized by the proper voltage	Restore the proper energy feeding
	2 There is a breakdown in the motor	Check the isolation and the resistance of the phases	Change the motor
	3 Intervention of the thermic probes	Check that the admitted N° of maneuvers have not been exceeded	Wait the restore of the probes. Bring at the admitted value the N° of maneuvers
		Check that the anchor of the electromagnet(200), when it is de-energized, is at high position	Oil the sliding seat of the anchor and remove anything prevents the sliding
		At starting phase, mistakenly the electromagnet(200) is de-energized	Restore the right working of the cycle (chapter 2.9.3 and 2.9.4)
	B The turret doesn't reach the position	1 Intervention of the thermic probes	See A3 (of this chart)
2 The electromagnet(200) is energized before the previous station (&) to that one of arrival (see chapter 2.9.3 and 2.9.4)		Check the sequence of the working cycle (see 2.9.3 and 2.9.4)	Restore the proper working of the cycle (chapter 2.9.3 and 2.9.4)
		Check the signals from the encoder (160) are correct and sequentially right	Restore the working of the encoder, replace the encoder
3 Minimum times of pause(t1) of the cycle are not respected		Check the sequence and the value of times (see 2.9.3 and 2.9.4)	Restore the pause value (t1) as suggested (2.9.3 and 2.9.4)

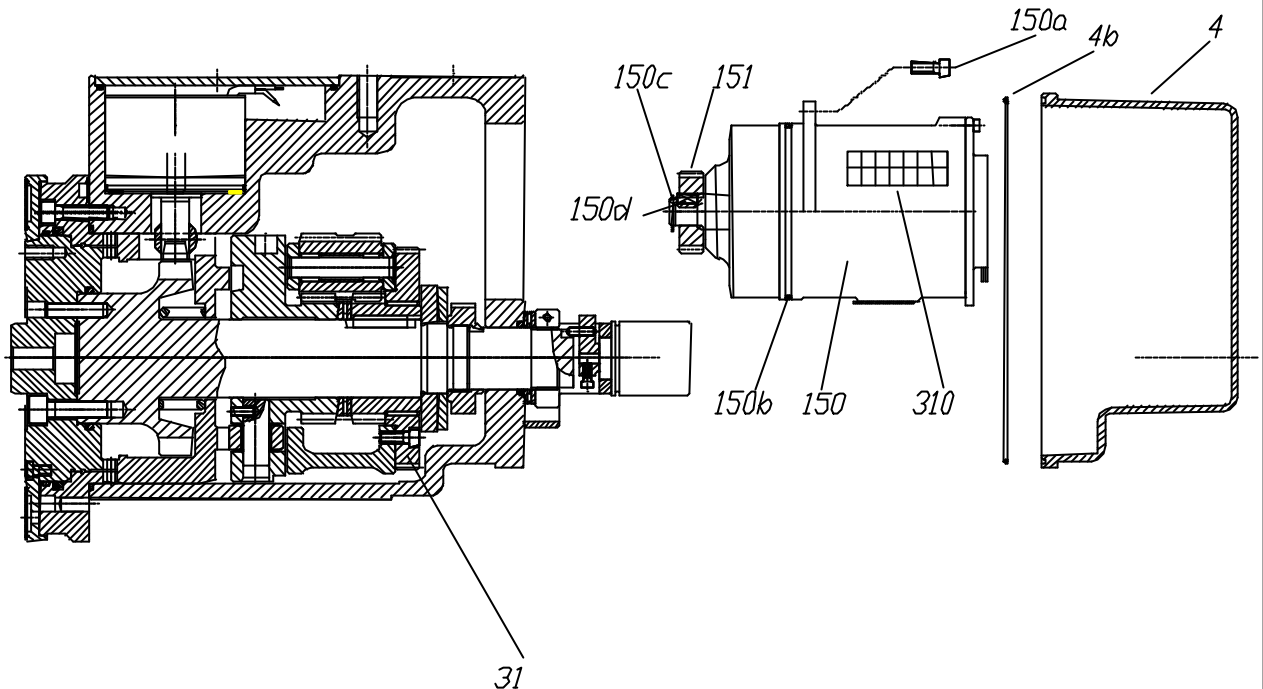
3.2 Breakdown search and repair

Anomalies	Probable causes	Checking	Remedies
Unlocked turret	1 There isn't the signal of the locking proximity (313)	Check the proper working of the proximity	Replace the proximity
		Check the proper regulation of the proximity	Regulate the proximity
	2 The brake(175) doesn't intervene or there is a lagging	Check the proper brake energizing	Restore the brake energizing
		Check the proper brake working	Replace or restore the brake
		Check the times of motor de energizing and of brake energizing are respected(as established in the cycle)	Restore the proper cycle working (see 2.9.3 and 2.9.4)
	3 Start up again the motor(do this starting with the unlocked turret) with a reverse rotation to the opportune one	Check the rotation direction of the motor in relation with the rotation direction of the disk during the locking phase	Lock the turret by hand(chapter 3.4) or(if it's requested) improve the power factor from CNC
The turret overtakes the selected position	1 The electromagnet is de- energized (200)	Check if it is energized properly	Restore the proper energy
	2 There is lagging during the electromagnet energizing(200)	Check the lagging maximum value as from cycle (see ch 2.9.4)	Restore the right working of the cycle(ch 2.9.4)
	3 There is a breakdown in the electromagnet(200)	Check the working of the electromagnet	Change or restore the working
E The turret continues rotating without stopping	There aren't signals from the encoder (160) see ch 2.9.5	Check the right working (input and output)	Replace the encoder and restore the right working

3.2 Breakdown search and repair

Anomalies	Probable causes	Checking	Remedies
F The turret searches the new position through the longest run	The energizing phases of the motor are inverted	Check the energizing phases of the motor (150)	Invert the 2 energizing cables of the motor
G Harsh impact during indexing	1 The minimum values of pause(t1) are not respected:see the cycle (ch2.9.4)	Check the values and the repeatability of the pause (t1)	Restore the minimum values of pause (t1) as suggested
	2 Excessive settling of the cushioning rubber- pads (43)	Check the preloading of the rubber pads	Replace the rubber pad or reset the preloading
	3 The moment of inertia of the applied masses is higher than the admitted one	Check the value of the inertia moment of the applied masses(disk included)	Restore the value of the applied masses within the limits of technical data(see ch 2.4)
	4 Out of balance moment of the applied masses higher than the admitted one	Check the value of the out of balance of the applied masses	Restore the value of the applied masses within the limits of the technical data (see ch 2.4)
H Snapping rotation of the disk	Out of balance moment of the applied masses higher than the admitted one	Check the value of the out of balance of the applied masses	Restore the value of the applied masses within the limits of the technical data (see ch 2.4)

3.2.1 Replacements of the electric motor (150)

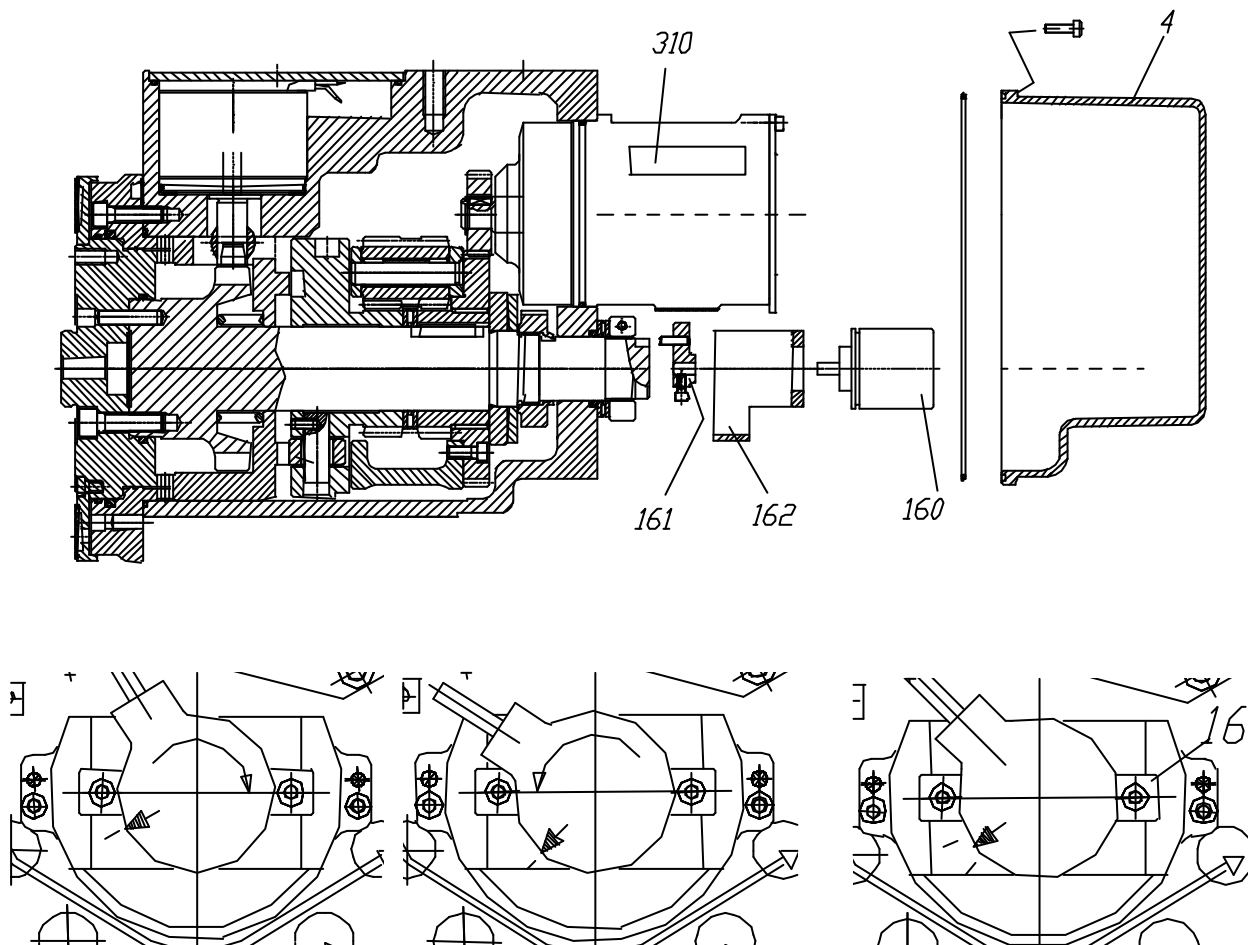
**Working phases :**

- Take off the cover (4), take off the o-ring (4b).
- Take note and mark the position of cables and clamps (scheme 2.9.1)
- Disconnect the cables from the terminal board (310).
- Unscrew the screws (150a), extract the motor set (150) complete with the terminal board (310)
- Take off the circlip (150c), remove the gear (151) and the key(150d); assembly them again on the new motor set.
- Check the integrity and presence of the o-ring (150), grease the o-ring.
- Assembly the motor on the casing taking care that the gear(151) fits the proper one(31).
- Screw and tighten the screws (150a)
- Set the wiring harness of the cables as shown (scheme 2.9.7)
- Check the proper connection of the phases of the motor:
call on from the **cnc** the nearest position to the actual one. The change of position must occur in the shortest run. If this doesn't occur inverse, on the terminal board (310), the energizing cables of the motor.
- Mount the rear cover (4) and the o-ring.

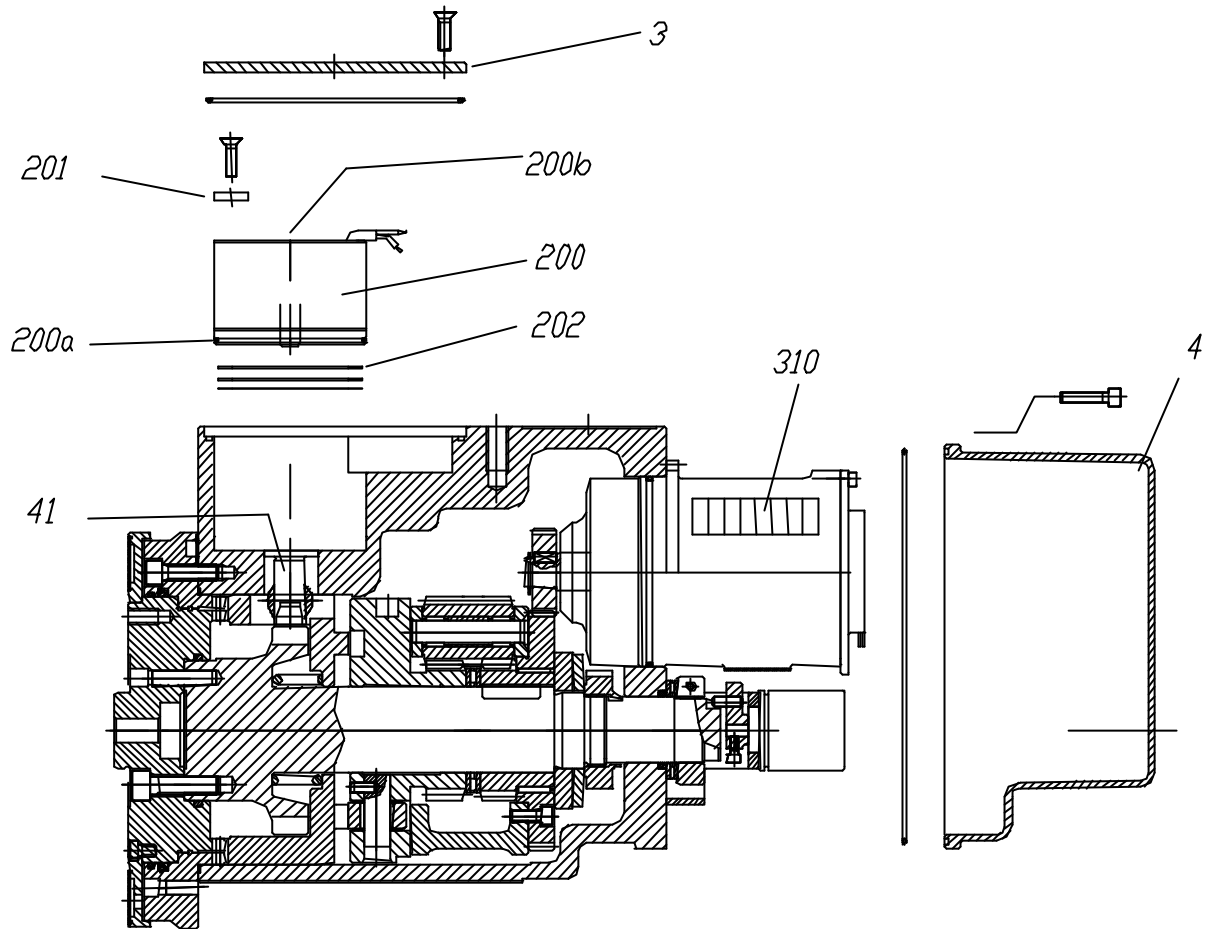
3.2.2 Replacement of the angular encoder (160)

Working phases :

- Take off the rear cover (4), disconnect from the terminal board (310) the cables of encoder.
- Remove the support (162) together with the encoder (160).
- Disassemble the hub (161).
- Take off the clips (163), and remove the encoder.
- Mount again the encoder onto the support (162) and the hub (161) on the shaft of the encoder.
- Assemble the hole onto the turret.
- Execute the wiring harness on the terminal board (310) following the scheme 2.9.1
- Before fixing the encoder, regulate it:
With the turret locked and in position, slowly turn the encoder till the strobe signal disappear (detectable by the device or voltmeter).
- Mark the encoder position with respect to the support (162).
- Slowly turn the encoder on the other side till the strobe signal disappears and mark on the support the new position. In such a way the area covered by the strobe signal is determined
- Turn backwards the encoder, positioning the mark between the two marks signed before onto the support (162).
- Lock the clips (163).
- Assemble the rear cover (4) and the o-ring.



3.2.3 Electromagnet replacement (200)

**Working phases :**

- Remove the top cover (3)
- Take of the rear cover (4)
- Disconnect the cables of the electromagnet (200) from the terminal board
- Withdraw the cables
- Remove the clips (201)
- By using the extraction hole (200b) withdraw the electromagnet (200)
- Mark the assembly position of the lock (41) with respect to the rectangular slit of the case
- Check if there is the o-ring(200a) and grease it
- Assemble again the new electromagnet
- Connect the cables of the electromagnet (200) to the terminal board (310)
- Assemble the top cover (3) complete of the o-ring
- Assemble the rear cover(4) complete of the o-ring (4)

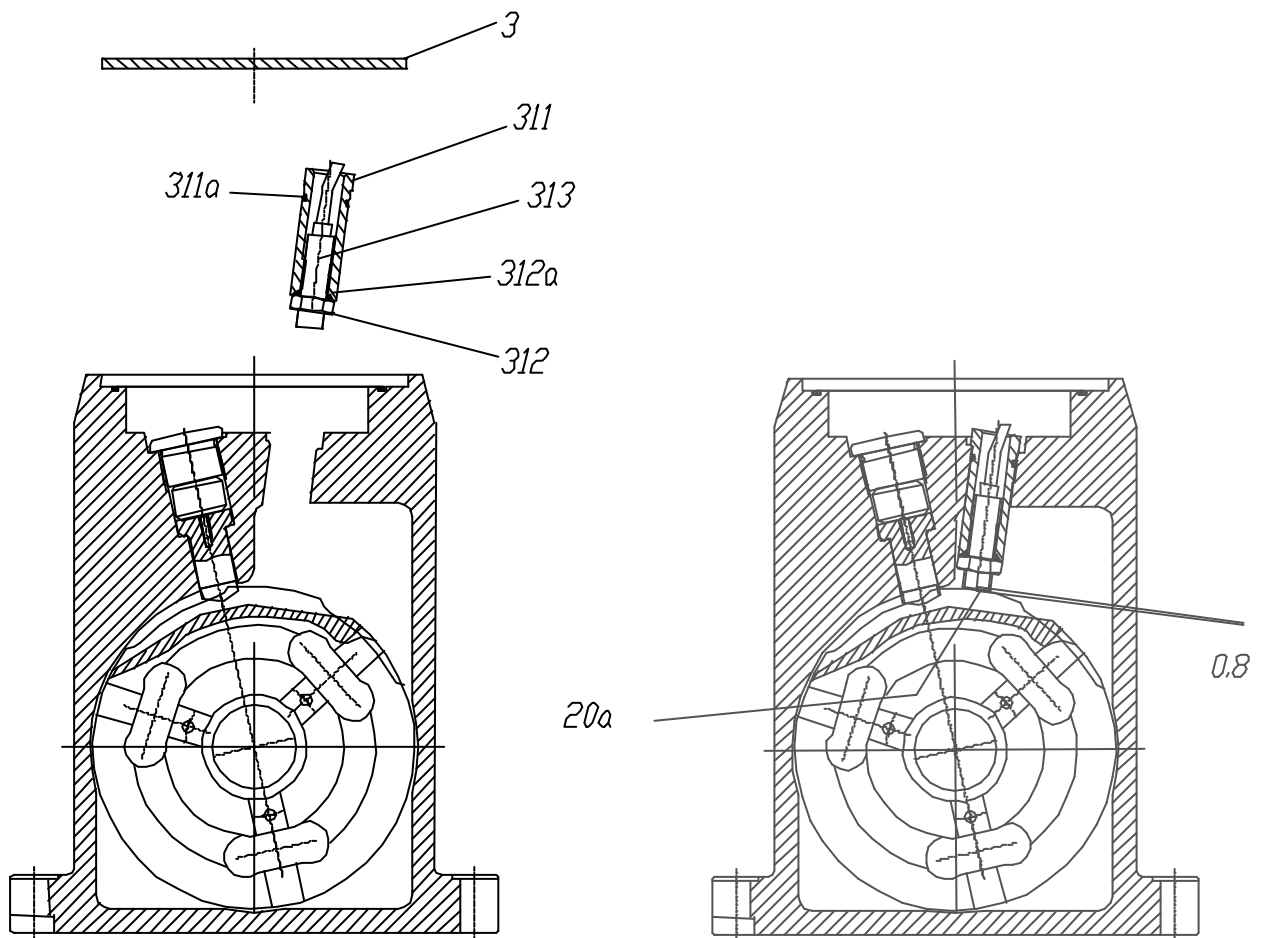
During assembly.

- check if there are all the spacers (202)
- check the proper assembly position of the lock (41) with respect to the slit of the case



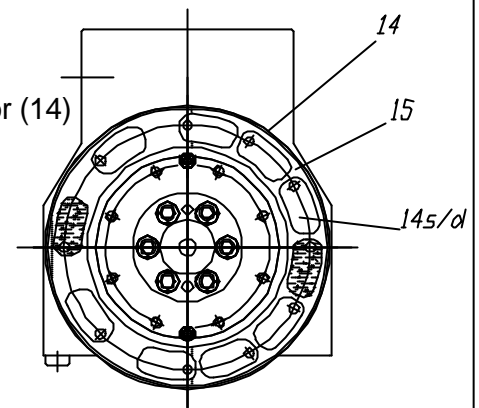
3.2.4 Replacement of the locking proximity (313)

- Remove the rear cover (4)
- Disconnect the cables of the proximity (313) from the terminal board (310): see chart(2.9.1)
- Remove the top cover (3)
- Remove the support (311) complete of the proximity (313)
- Unscrew the nut (312)
- Remove the o-ring (312a)
- Remove the proximity
- Screw the new proximity on the support (311)
- With the turret locked,adjust the distance of the proximity at the value of 0.8 respect the intervention cams (20a)
- Assemble the o-ring (312a)
- Lock tighten the nut (312)
- Assemble everything on the case seat
- Connect the cables to the terminal board (310):see the chart 2.9.1
- Check the proper working of the turret
- Assemble the covers (3) and (4) with their o-rings

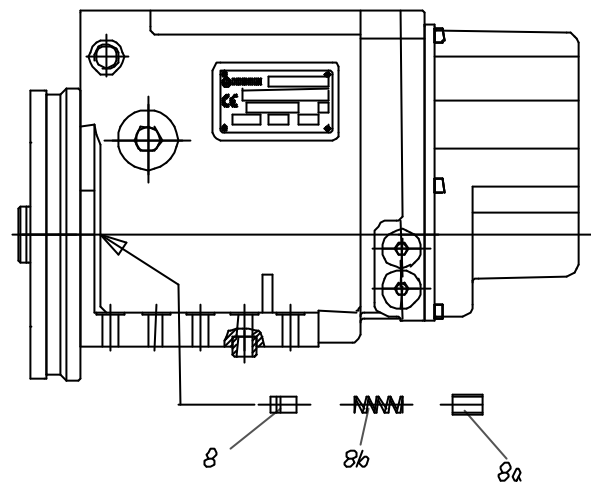


3.2.5 Replacement of the frontal gasket (15)

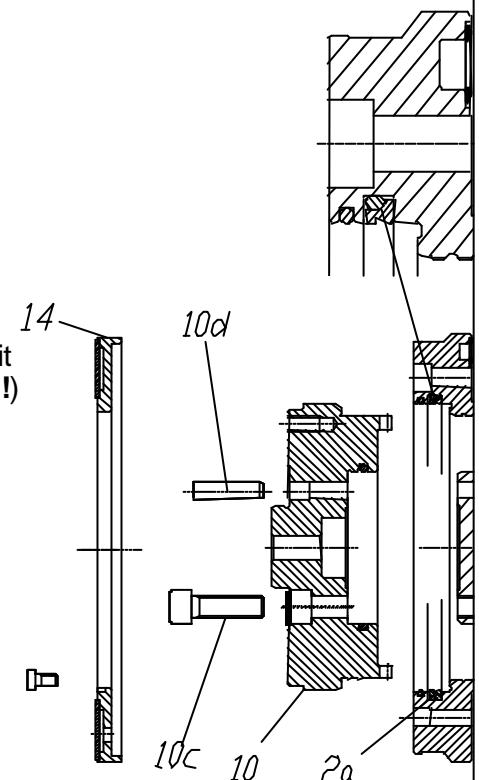
- Remove the damaged gasket (15)
- Clean and remove grease from the surface of the distributor (14)
- Remove the protective film from the new gasket
- Put the gasket onto the distributor (15) overlapping symmetrically the slits respect to the pits (14 s/d)
- Press the gasket so that it uniformly adheres on the entire surface of the distributor

**3.2.6 Replacement of the cooling valve (8)**

- Remove the sealing plug (8a)
- Remove the spring (8b)
- Take off the bush (8) and the O-Ring
- Clean the seat from possible deposits
- Grease the o-ring of the new bush
- Put the bush in its seat
- Assemble the spring and the plug (8a)

**3.2.7 Replacement of the main rotating gasket**

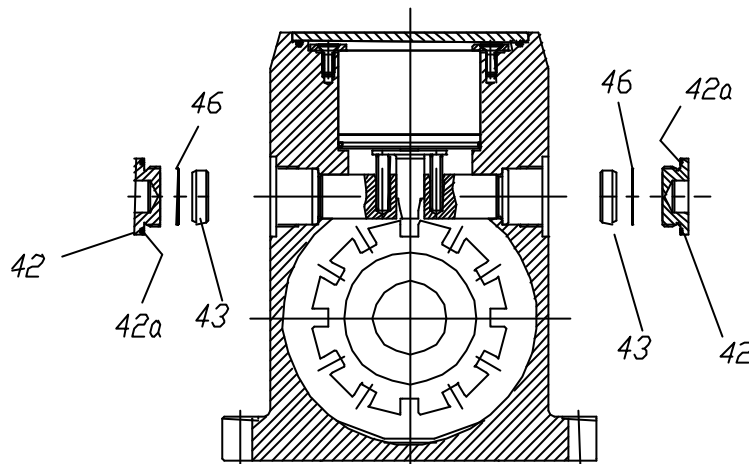
- Remove the distributor (14)
- Remove the screws (10c)
- Take off the pins (10d)
- Remove the crown (10)
- Take off the gasket from its seat (2a)
- Grease the new gasket
- Put the gasket in the seat, as shown in the picture, spread it uniformly and without blowings (**don't scratch or damage !**)
- Assemble again the crown (10), the pins (10d), the screws (10c) and the distributor (14)



3.2.8 Replacement of the rubber pads (43)

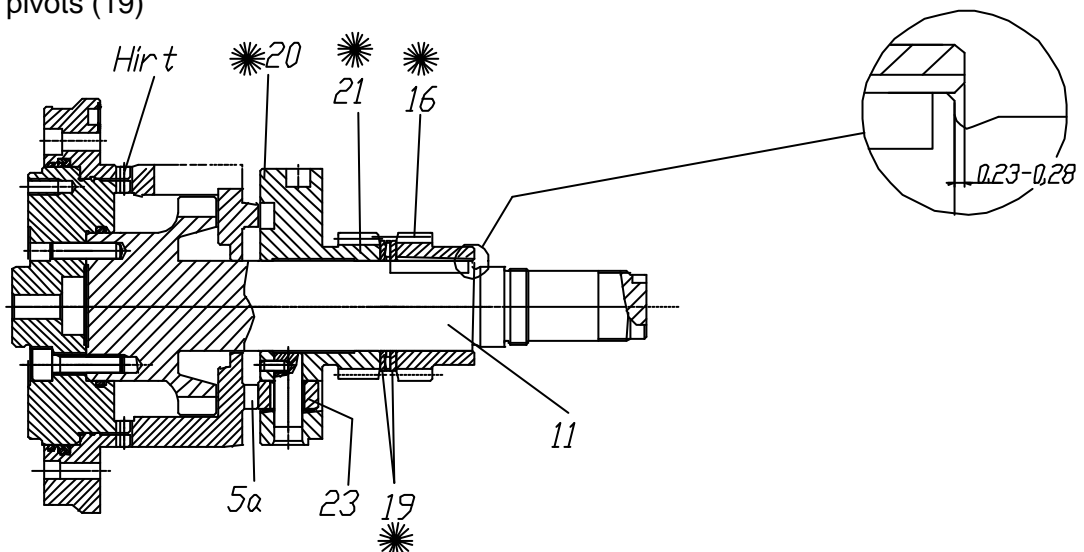
Working phases :

- Unscrew the plugs on the sides (42) together with the o-ring
- Remove the rubber pads (43) and the thickness adapters (46)
- Assemble the new rubber pads (43)
- Check that after the assembly the rubber pads are preloaded.the value must be between 1,3 and 1,6 mm.This value results from the numbers of thickness adapters (46)
- Check the o-ring (42a)
- Screw thighten the plugs(42)



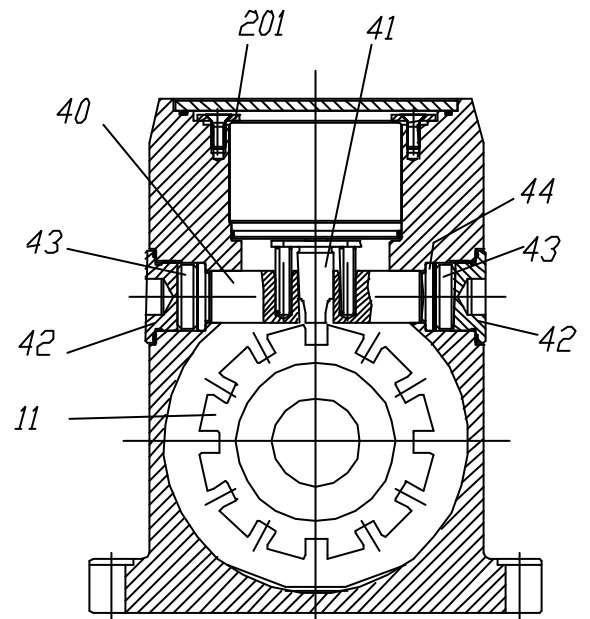
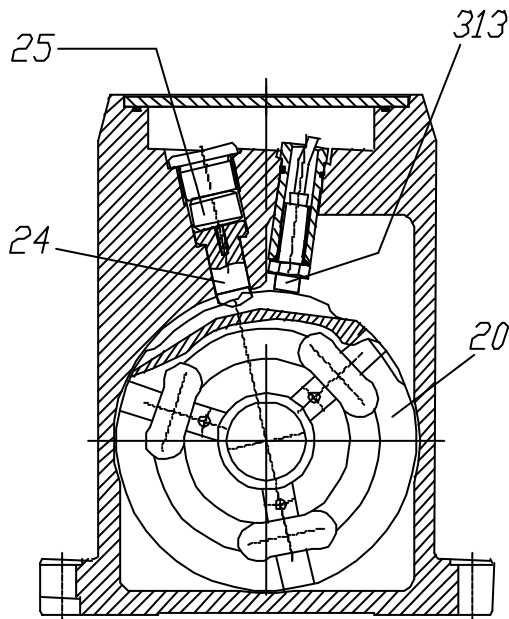
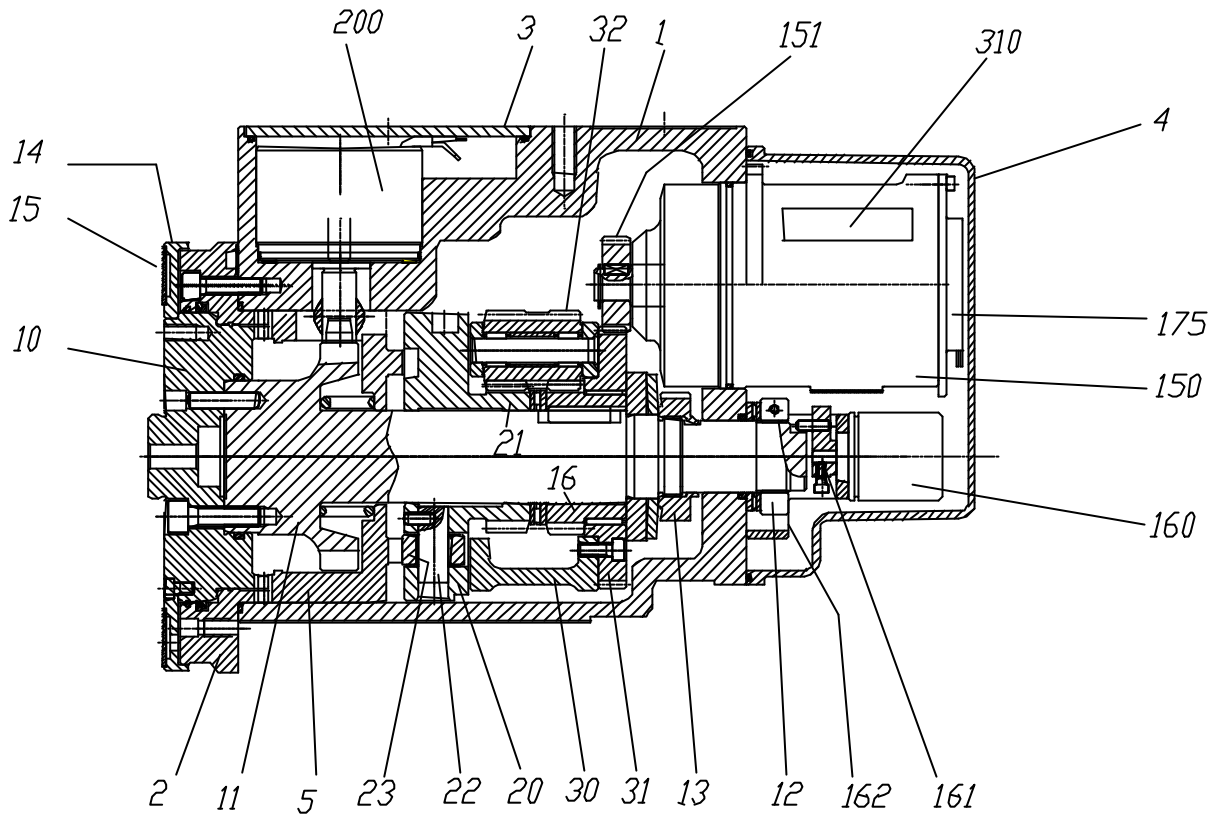
3.2.9 Replacement of components of the central unit

Set up the preloading of the Belleville washer (35) in case of replacement of one of the part marked in the picture with (*).With the Hirth toothing in touch and the rollers (23) on the top side of the cams (5a) the gear (16) should protrudes from the plate of the dividing shaft (11) of a value between 0,23 and 0,28 mm.This setting up is performed adapting the thickness of the pivots (19)



3.3 Assembly-Disassembly

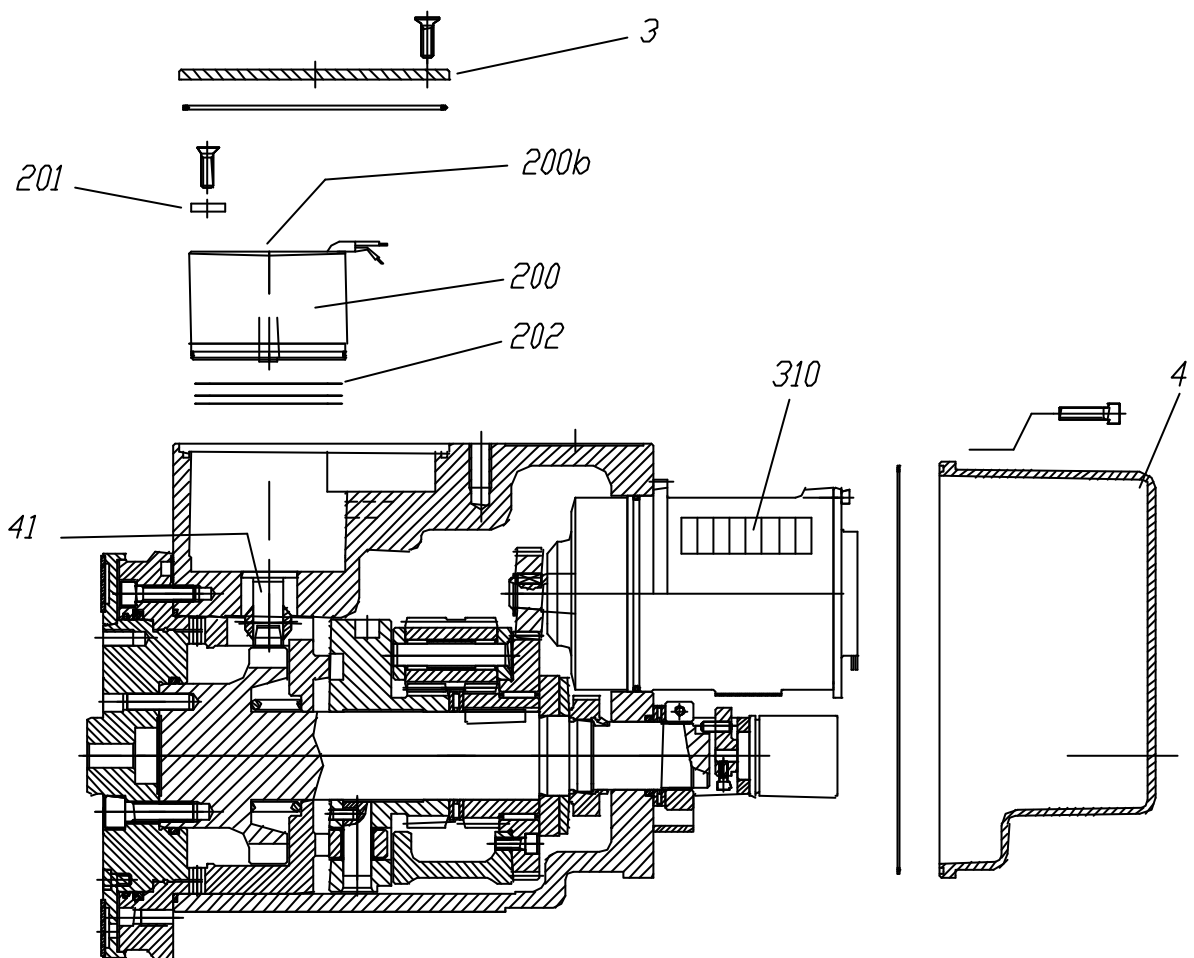
3.3.1 Turret chart



3.3.2 Disassembly-Assembly of the electromagnet (200)

Working phases :

- Remove the rear cover (4)
- Disconnect the energizing cables of the electromagnet (200) from the terminal board (310)
- Withdraw the cable
- Remove the top cover (3)
- Take off the clips (201)
- By using the extraction hole (200b), withdraw the electromagnet (200)
- Remove the thicknesses (202)
- Mark** the assembly position of the latch (41) with respect to the rectangular slit of the case



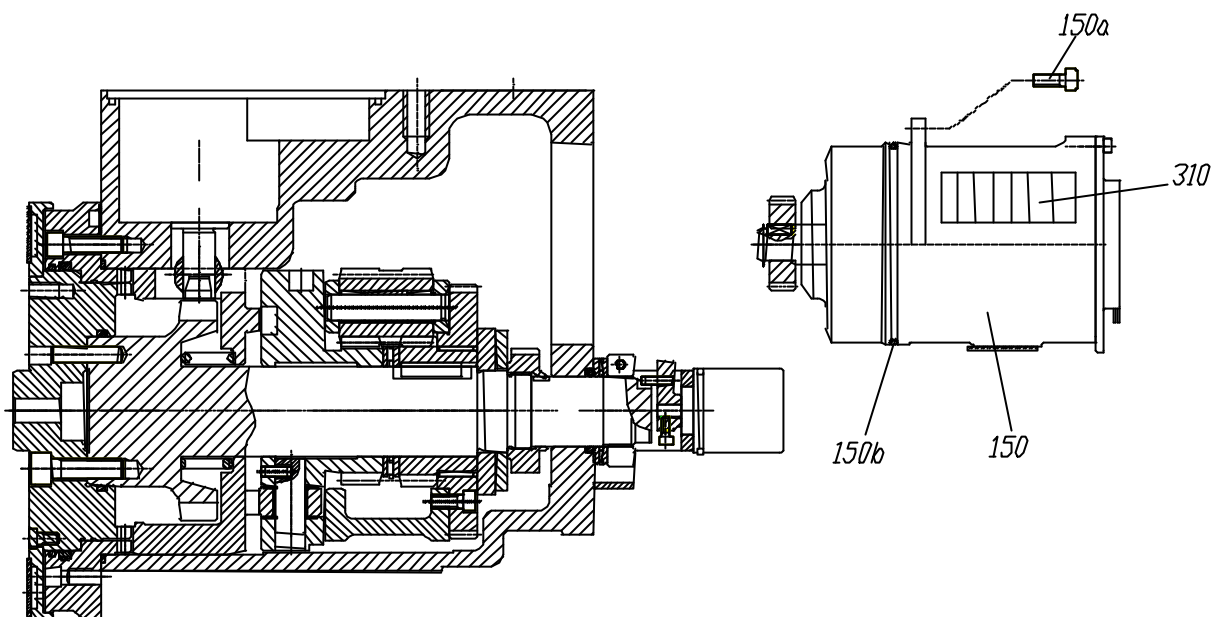
Assembly:

- Check the integrity of the o-ring
- Grease all the o-ring with thick grease and position them in the proper seats
- Assemble all the thicknesses (202) on the bottom of the electromagnet seat
- Check that the latch (41) is properly positioned in the rectangular slit of the case



3.3.3 Disassembly Assembly of the motor unit

Take note and mark the position of the cables and of the clamps (sch. 2.9.1)

**Working phases :**

- Disconnect all the cables(except those of the top position: clamps 14-15-16-17-18 U-V-Z)
- Remove the screws (150a)
- Withdraw the motor unit (150)

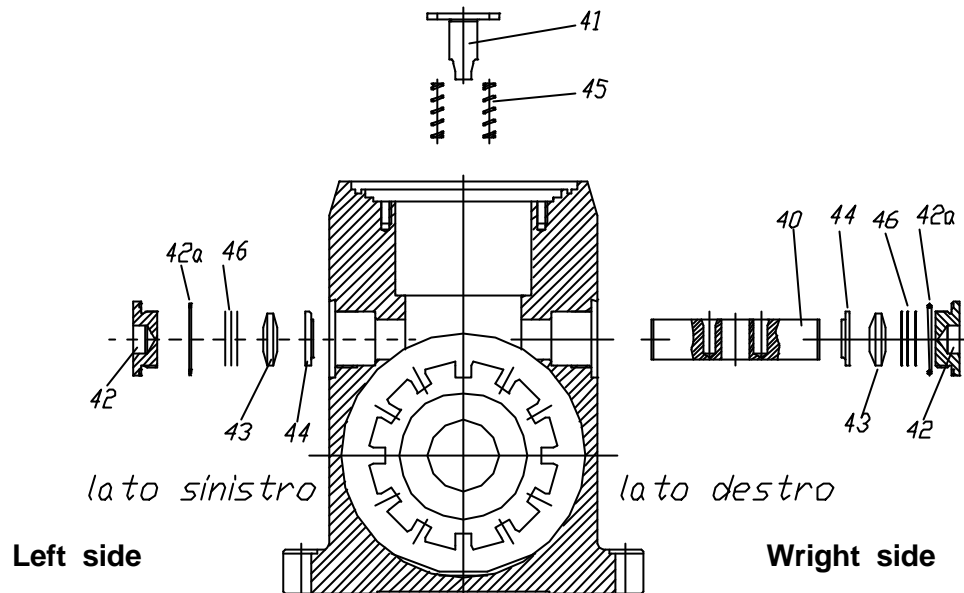
Assembly :

- Perform the wiring harness of the energizing cables of the motor as they were before, (with the same motor phases) according to the scheme 2.9.1
- check the integrity of the o-ring (150b)

3.3.4 Disassembly/Assembly of the elements of pre-indexing, of locking and of proximity

Mark and take note of the assembly position of all the elements.

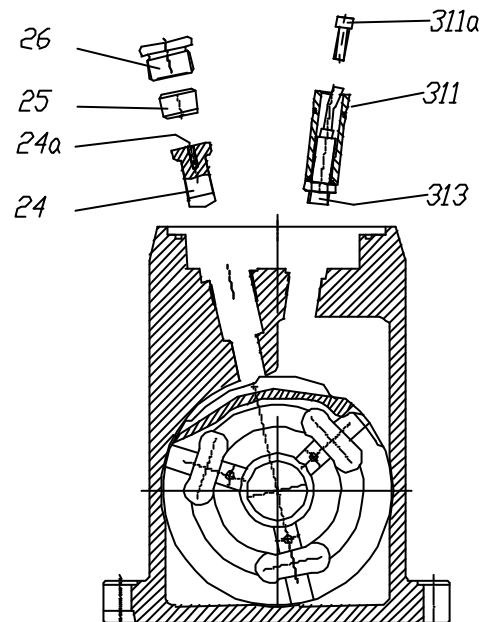
Keep apart the elements of the **wright** side from those of the **left** side



Working phses :

- Withdraw the latch (41) and the springs (45)
- Unscrew the side nuts (42) and the O-ring (42a)
- Remove the rubber pads (43), the thicknesses (46) and the spacers (44)
- Withdraw the rod (40)

- Unscrew the plug (26)
- Remove the rubber pads (25)
- Take note** of the lock steak position (24), remove it by using the threaded hole (24a)
- Unscrew the screw (311a), remove the support (311) complete of the proximity (313)

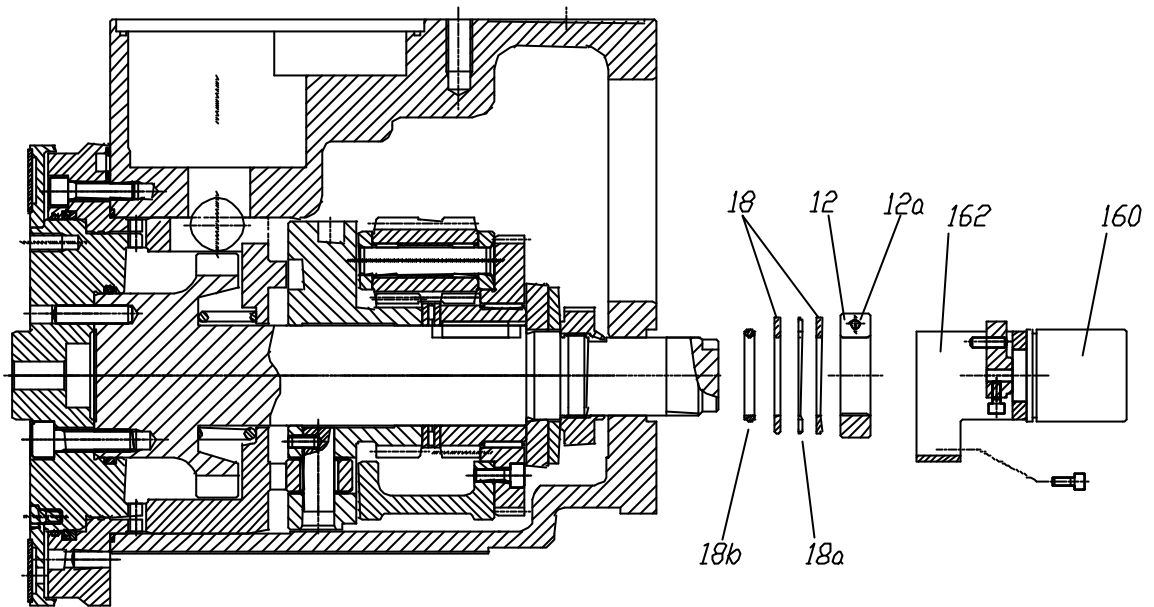


Assembly

- Assemble all the elements as they were before (both in the same position and side)
- Check the latch position (41) with respect to the rectangular slit of the case
- Check the integrity of the o-rings (42a)
- Grease with thick grease the o-rings



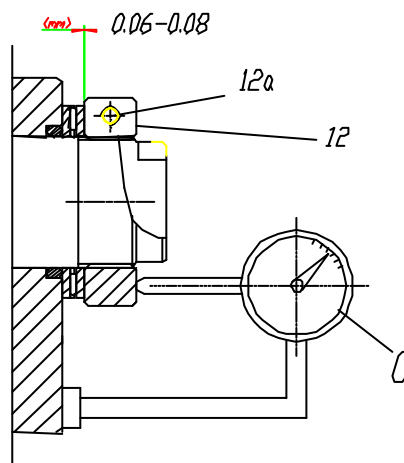
3.3.5 Disassembly/assembly of the angular encoder (160) and of the rear ring nut (12)

**Working phases :**

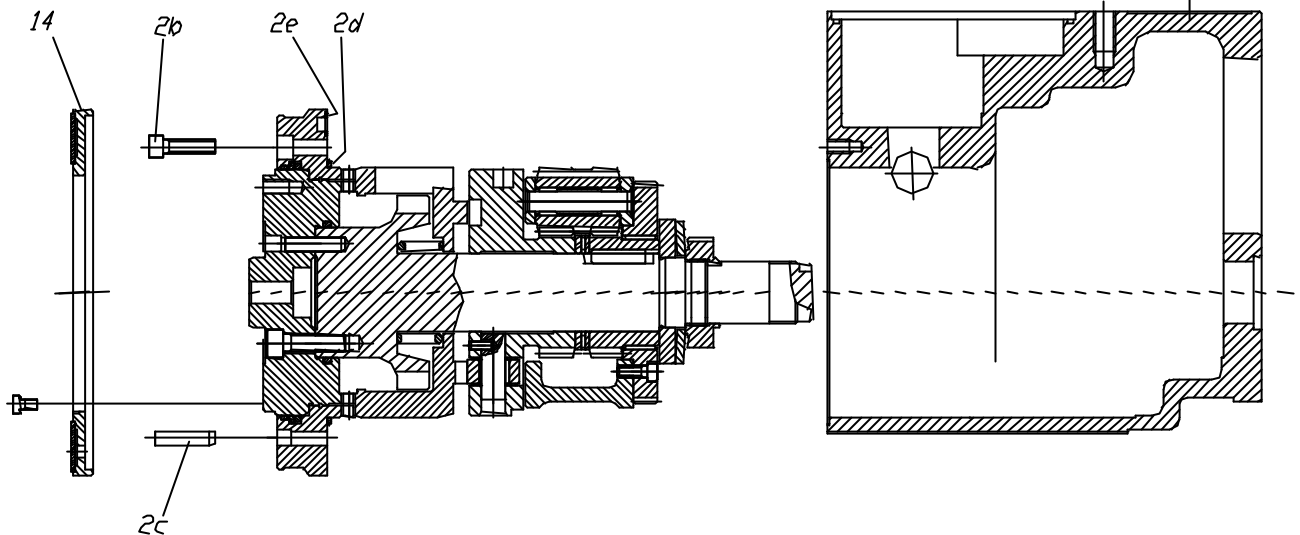
- Remove the support (162) and the encoder (160)
- Unloose the tangential screw (12a)
- Unscrew the ring nut (12)
- Remove the pivots (18), the bearing (18a) and the o-ring (18b)

Assembly:

- Grease the O-ring (18b)
- screw the ring nut (12) keeping the tangential screw (12a) stretched
- with the turret mechanically close, **by using a dial gauge (C)** check the axial position of the ring nut (12); before screw it tight then unscrew it of a value between 0,06 and 0,08 mm (functional end play)
- Lock tight the tangential screw checking by using the dial gauge (C) that the end play set before doesn't suffer changes



3.3.6 Disassembly/assembly of the central group

**Working phases :**

- Remove the distributor (14)
- Unscrew the screws (2b)
- Remove the pins (2c)
- Withdraw the entire central group

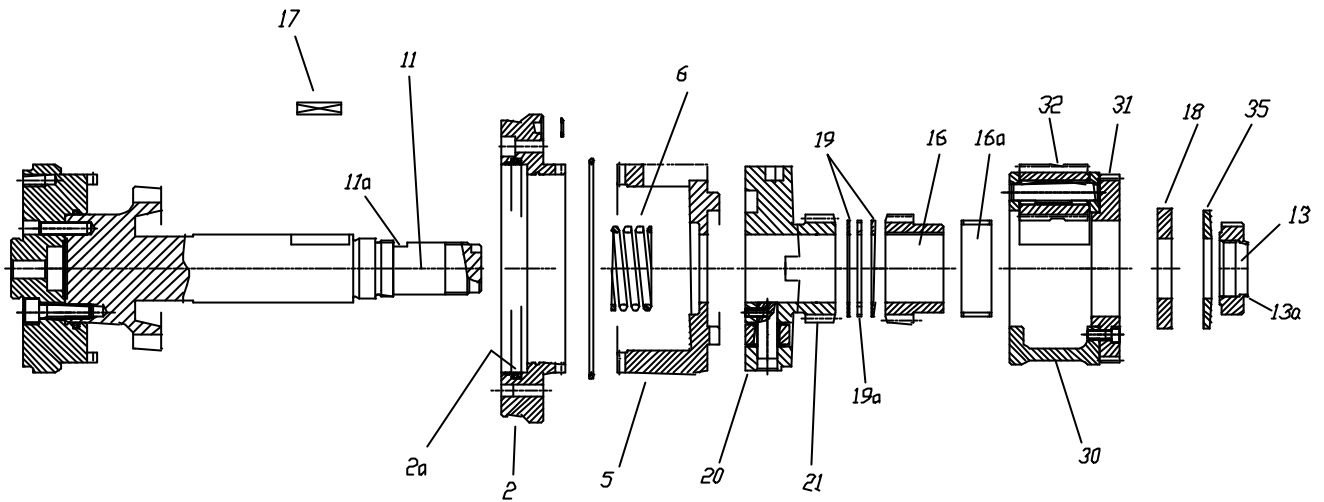
Assembly:

- Check the conditions of the O-ring (2d)
- Check if there is the seal(2e), control the proper position in the seat
- Tight the screws (2b) with the torque wrench setting as shown in the schedule here below

Schedule:screws 2 b

Size of the turret	TS120	TS160	TS200	TS250
Screw size	M8	M8	M10	M12
Torque wrench setting Nm	35	35	65	10

3.3.7 Disassembly/ assembly of the central elements

**Working phases :**

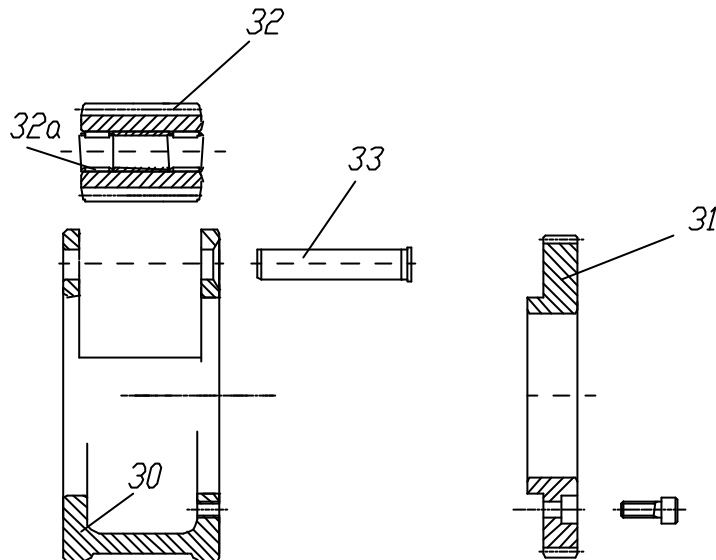
- Lift the upsetting limbs (13a) of the ring nut (13)
- Unscrew the ring nut (13)
- Withdraw the Belleville washer (35), the pivot (18), the planetary gear carrier (30), the gear (31) and the planetary gear (32)
- Withdraw the gear (16)
- Remove the key (17), the pivot (19) and the bearing (19a)
- Withdraw the gear (21), the roller carrier (20), the short-circuiting ring gear (5), the spring (6) and the stationary ring gear (2)

Assembly:

- Check the rotating gasket (2a)
- Lock tight the ring nut (13) performing the upsetting of the limb (13a) in correspondence of the 2 niches (11a) of the indexing head (11).

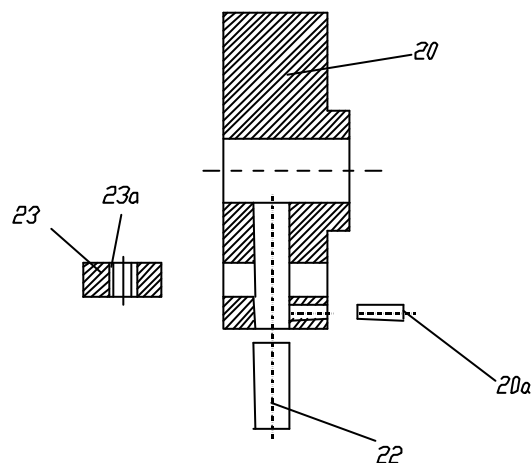
3.3.8 Disassembly/assembly of the planetary gear (32)

- Remove the gear (31)
- Withdraw the pins (33)
- Remove the planetary gear (32) and the bearings (32a)

**3.3.9 Disassembly/assembly of the rollers (23)**

This operation must be carried out only for the replacement of these parts

- remove the spring pins (20a)
- Withdraw the pins (22)
- Take off the rollers (23) and the pins (23a)

**Assembly:**

Check all the pins (23a)

Chart

Size	TS120	TS160	TS200	TS250
N° of the pins per roller	32	32	28	28

3.4 Manual unlocking/locking of the turret

These operations must be carried out when the cycle has not been completed (due to emergency or casual stop). When the c.n.c. doesn't accept "tool change" starting from "unlocked turret" condition do manually the following operations :

- De energize the turret (CNC desactivated)
- Remove the rear cover (4) and the top cover (3)
- Insert the hexagonal wrench (6 mm) into the end of the motor shaft. Turn the motor shaft so that the tool-holder disk (70) turns in the directions as during the stop. Simultaneously push the pin of the electromagnet (200) till the insertion of the latch (41) into a cave of the indexing head (11) stops the disk rotation (70)

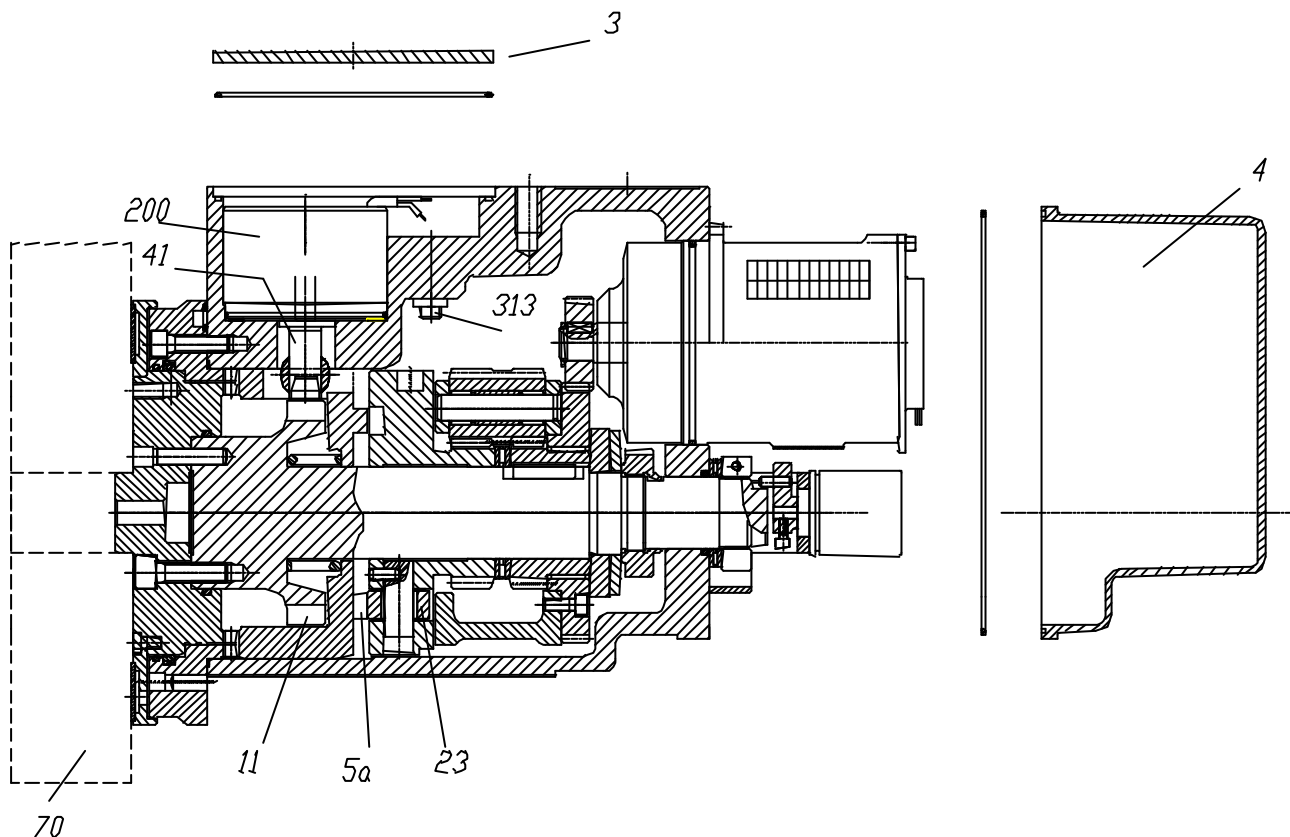
With the pin pushed, reverse, the motor shaft rotation till the rollers (23) reach the tops of the cams (5a). First there must be a phase of resistance, secondly there must be a slight and continuous phase (during these phases, the internal reaction of the turret has not to prevail the two phases causing a reverse rotation of the motor shaft).

When:

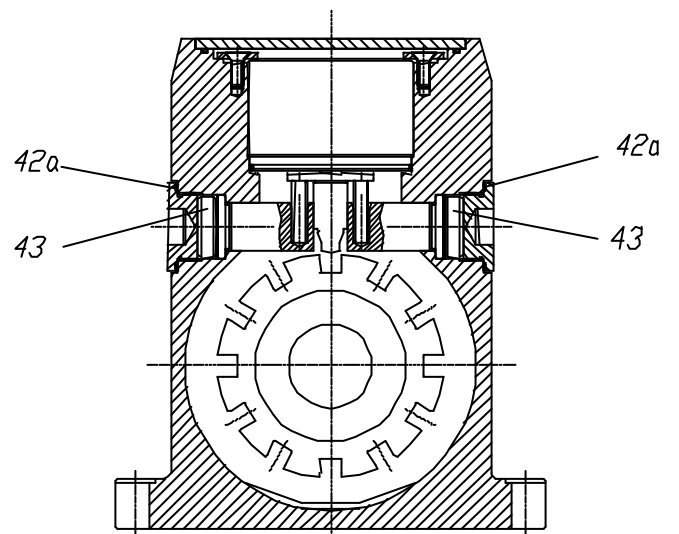
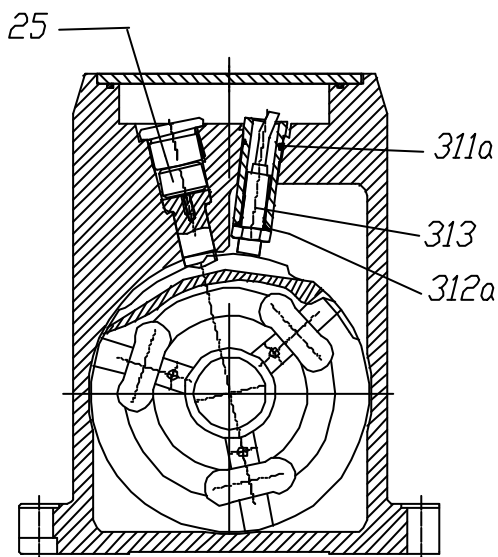
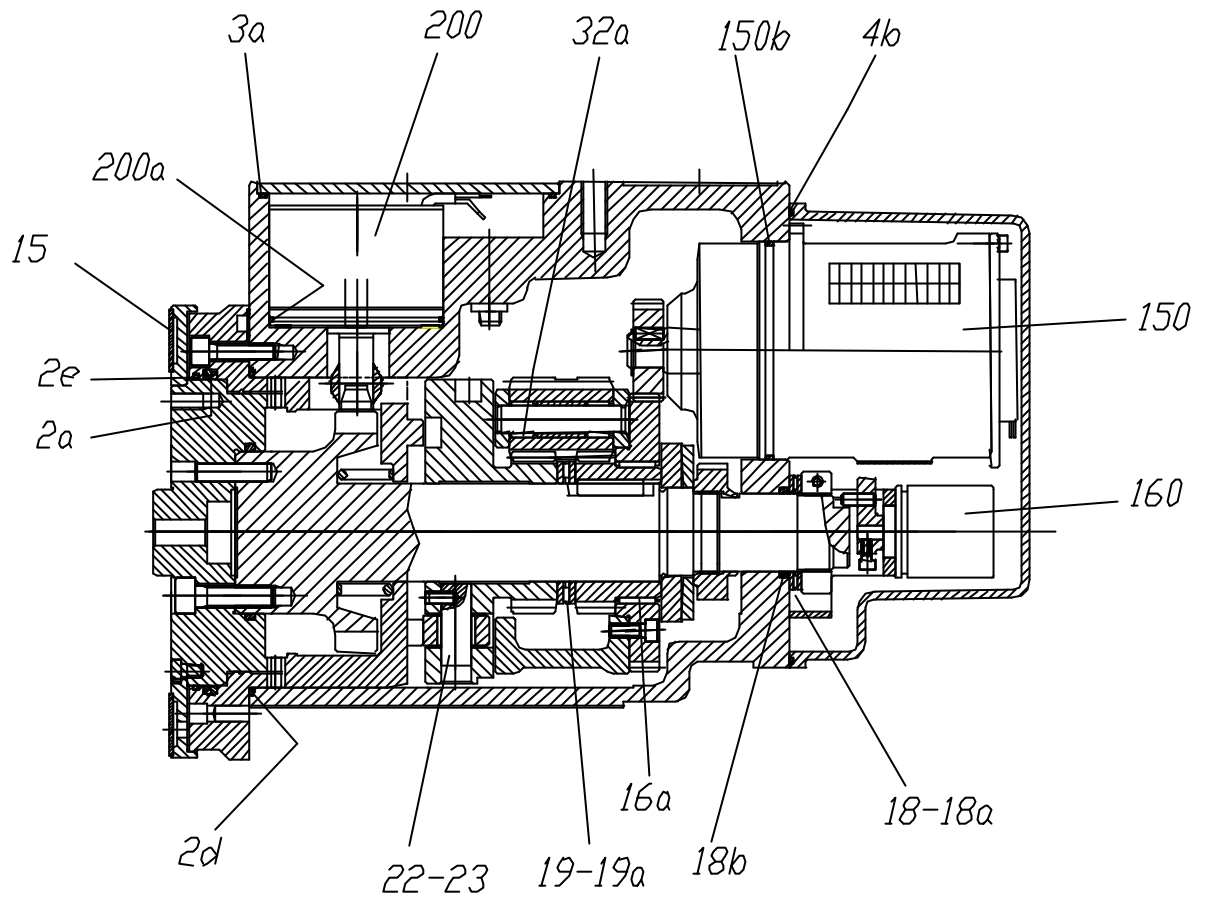
- The sense of rotation of the disk during the stop is unknown
 - It is ascertain a mechanical stop without the possibility of closing the turret
- After the reverse rotation of the motor shaft, turn the motor shaft in the same direction it had before the reverse rotation.

Energize the turret and check if the signal of the locking proximity is on (313).

Assemble the top cover (3), the rear cover (4) and o-rings.



4 Spare parts (frame of reference)



4.1 Spare parts list for TS120 (see frame of reference chapter 4)

Ref.	Code	Denomination	Type	Qtt.y
150	34.0160.231.01	Motor unit 110 V-50/60 Hz	Baruffaldi- 4 poles	1
150	34.0120.231.01	Motor unit 110 V-50/60 Hz	Baruffaldi- 6 poles	1
150	34.0160.230.01	Motor unit 220 V-50/60 Hz	Baruffaldi- 4 poles	1
150	34.0120.230.01	Motor unit 220 V-50/60 Hz	Baruffaldi- 6poles	1
150	34.0160.230.01	Motor unit 380 V-50/60 Hz	Baruffaldi- 4 poles	1
150	34.0120.230.01	Motor unit 380 V-50/60 Hz	Baruffaldi- 6 poles	1
160	999.192.07439	Encoder 8 positions	Baruffaldi	1
160	999.192.07440	Encoder 12 positions	Baruffaldi	1
200	34.0200.250.01	Electromagnet	Baruffaldi	1
15	17.0120.196	Frontal gasket 8 pos.	Baruffaldi	1
15	17.0120.195	Frontal gasket 12 pos.	Baruffaldi	1
16a	999.149.07515	Radial bearing	K55/62/18-INA	1
18	999.149.03981	Terminal pivots	AS3047-INA	2
18a	999.149.04280	Axial bearing	AXK3047-INA	1
19	34.0120.035.01	Central pivots	Baruffaldi	2
19a	999.149.01747	Axial bearing	AXK4060-INA	1
22-23	34.0120.200.01	Complete roller	Baruffaldi	3
25	34.0160.027.01	Transmission pad	Baruffaldi	1
32a	999.148.07068	Radial bearing	K10/14/13-INA	4
43	34.0160.025.01	Rubber pad	Baruffaldi	2
2a	999.305.02560	Main gasket	21B021120A46-PRP	1
2d	999.223.04131	O-Ring	O-R 156	1
2e	999.223.01006	O-Ring	O-R 157	1
3a	999.223.07387	O-Ring	O-R 130x2.5	1
4b	999.223.07333	O-Ring	O-R 169	1
18b	999.223.05291	O-Ring	O-R 216	1
42a	999.223.01939	O-Ring	O-R 029	2
150b	999.223.05146	O-Ring	O-R 154	1
200a	999.223.04887	O-Ring	O-R 040	1
311a	999.223.02080	O-Ring	O-R 017	1
312a	999.223.02083	O-Ring	O-R 111	1
313	999.231.07505	Proximity (Honeywell)	922.LA12APP2	1
8	17.0120.033	Cooling bush	Baruffaldi	1
8c	999.223.02358	O-Ring for cooling bush	O-R 010	1

4.2 Spare parts list for TS 160 (see frame of reference chapter 4)

Ref.	Code	Denomination	Type	Qtt.y
150	34.0160.231.01	Motor unit 110 V-50/60 Hz	Baruffaldi- 4 poles	1
150	34.0160.230.01	Motor unit 220 V-50/60 Hz	Baruffaldi- 4 poles	1
150	34.0160.230.01	Motor unit 380 V-50/60 Hz	Baruffaldi- 4 poles	1
160	999.192.07439	Encoder 8 positions	Baruffaldi	1
160	999.192.07440	Encoder 12 positions	Baruffaldi	1
200	34.0200.250.01	Electromagnet	Baruffaldi	1
15	17.0160.196	Frontal gasket 8 pos.	Baruffaldi	1
15	17.0160.195	Frontal gasket 12 pos.	Baruffaldi	1
16a	999.148.04888	Radial bearing	K60/65/20-INA	1
18	999.149.00993	Terminal pivots	AS3552-INA	2
18a	999.149.05585	Axial bearing	AXK3552-INA	1
19	34.0160.035.01	Central pivots	Baruffaldi	2
19a	999.149.00994	Axial bearing	AXK4565-INA	1
22-23	999.148.07125	Complete roller	Baruffaldi	3
25	34.0160.027.01	Tansmission pad	Baruffaldi	1
32a	999.148.06960	Radial bearing	K12/16/13-INA	4
43	34.0160.025.01	Rubber pad	Baruffaldi	2
2a	999.305.07132	Main gasket	21B021400A46-PRP	1
2d	999.223.01018	O-Ring	O-R 161	1
2e	999.223.01018	O-Ring	O-R 161	1
3a	999.223.07387	O-Ring	O-R 130x2.5	1
4b	999.223.07333	O-Ring	O-R 169	1
18b	999.223.05349	O-Ring	O-R 220	1
42a	999.223.01939	O-Ring	O-R 029	2
150b	999.223.05146	O-Ring	O-R 154	1
200a	999.223.04887	O-Ring	O-R 040	1
311a	999.223.02080	O-Ring	O-R 017	1
312a	999.223.02083	O-Ring	O-R 111	1
313	999.231.07505	Proximity (Honeywell)	922.LA12APP2	1
8	34.0200.039.01	Cooling bush	Baruffaldi	1
8c	999.223.00792	O-Ring for cooling bush	O-R 012	1

4.3 Spare parts list for TS 200 (see frame of reference chapter 4)

Ref.	Code	Denomination	Type	Qtt.y
150	34.0200.231.01	Motor unit 110 V-50/60 Hz	Baruffaldi- 6 poles	1
150	34.0200.230.01	Motor unit 220 V-50/60 Hz	Baruffaldi- 6 poles	1
150	34.0200.230.01	Motor unit 380 V-50/60 Hz	Baruffaldi- 6 poles	1
160	999.192.07439	Encoder 8 positions	Baruffaldi	1
160	999.192.07440	Encoder 12 positions	Baruffaldi	1
200	34.0200.250.01	Electromagnet	Baruffaldi	1
15	17.0200.196	Frontal gasket a 8 pos.	Baruffaldi	1
15	17.0200.195	Frontal gasket a 12 pos.	Baruffaldi	1
16a	999.148.04889	Radial bearing	K68/74/20-INA	1
18	999.149.05574	Terminal pivots	AS4565-INA	2
18a	999.149.00994	Axial bearing	AXK4565-INA	1
19	34.0200.035.01	Central pivots	Baruffaldi	2
19a	999.149.05751	Axial bearing	AXK5578-INA	1
22-23	999.148.07127	Complete roller	Baruffaldi	3
25	34.0200.027.01	Transmission pad	Baruffaldi	1
32a	999.148.07272	Radial bearing	K15/21/21	4
43	34.0200.025.01	Rubber pad	Baruffaldi	2
2a	999.305.02561	Main gasket	21B021750A46-PRP	1
2d	999.223.02711	O-Ring	O-R 167	1
2e	999.223.02711	O-Ring	O-R 167	1
3a	999.223.07388	O-Ring	O-R 150x2.5	1
4b	999.223.02562	O-Ring	O-R 272	1
18b	999.223.03893	O-Ring	O-R 224	1
42a	999.223.05193	O-Ring	O-R 032	2
150b	999.223.07067	O-Ring	O-R 158	1
200a	999.223.04887	O-Ring	O-R 040	1
311a	999.223.02080	O-Ring	O-R 017	1
312a	999.223.02083	O-Ring	O-R 111	1
313	999.231.07505	Proximity (Honeywell)	922.LA12APP2	1
8	34.0200.039.01	Cooling bush	Baruffaldi	1
8c	999.223.00792	O-Ring for cooling bush	O-R 012	1

4.4 Spare parts list for TS 250 (see frame of reference chapter 4)

Ref.	Code	Denomination	Type	Qtt.y
150	34.0200.231.01	Motor unit 110 V-50/60 Hz	Baruffaldi- 6 poles	1
150	34.0200.230.01	Motor unit 220 V-50/60 Hz	Baruffaldi- 6 poles	1
150	34.0200.230.01	Motor unit 380 V-50/60 Hz	Baruffaldi- 6 poles	1
160	999.192.07439	Encoder 8 positions	Baruffaldi	1
160	999.192.07440	Encoder 12 positions	Baruffaldi	1
200	34.0200.250.01	Electromagnet	Baruffaldi	1
15	17.0250.196	Frontal gasket a 8 pos.	Baruffaldi	1
15	17.0250.195	Frontal gasket a 12 pos.	Baruffaldi	1
16a	999.148.04889	Radial bearing	K68/74/20-INA	1
18	999.149.05574	Terminal pivots	AS4565-INA	2
18a	999.149.00994	Axial bearing	AXK4565-INA	1
19	34.0200.035.01	Central pivots	Baruffaldi	2
19a	999.149.05751	Axial bearing	AXK5578-INA	1
22-23	999.148.07127	Complete roller	Baruffaldi	3
25	34.0200.027.01	Transmission pad	Baruffaldi	1
32a	999.148.07272	Radial bearing	K15/21/21-INA	4
43	34.0200.025.01	Rubber pad	Baruffaldi	2
2a	999.305.07455	Main gasket	21B022200A46-PRP	1
2d	999.223.03438	O-Ring	O-R 173	1
2e	999.223.04295	O-Ring	O-R 269	1
3a	999.223.07388	O-Ring	O-R 150x2.5	1
4b	999.223.02562	O-Ring	O-R 272	1
18b	999.223.03893	O-Ring	O-R 224	1
42a	999.223.05193	O-Ring	O-R 032	2
150b	999.223.07067	O-Ring	O-R 158	1
200a	999.223.04887	O-Ring	O-R 040	1
311a	999.223.02080	O-Ring	O-R 017	1
312a	999.223.02083	O-Ring	O-R 111	1
313	999.231.07505	Proximity (Honeywell)	922.LA12APP2	1
8	34.0250.039.01	Cooling bush	Baruffaldi	1
8c	999.223.00561	O-Ring for cooling bush	O-R 014	1

5 Documentation for special setting up

In case of :

- Replacement of parts marked with (*)
- Phase displacement among the divider (11) and the crown (10),
Special setting up must be carried out. Procedures for these setting up are on request.

