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J 04/67/1991

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## **INSTRUCTIONS MANUAL**

**ANKOM**

**2001 -09- 28**

# **HORIZONTAL BORING AND MILLING MACHINE AFT 130 P CNC**

**- MECHANICAL PARTS -**

**MODEL: AFT 130 P CNC**  
**Serial:102**

## FOREWORD

The machine Operating Manual is a guide at the customer's disposal aiming to let him know the AFT 130 P CNC horizontal boring and milling machine design, working and maintenance.

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## **1. MACHINE DESTINATION**

### 1.1 Domains of Use

The AFT 130 P CNC boring and milling machine is designed for milling, drilling and lathing large and middle sized work pieces made of cast iron, steel, aluminum or other materials, both in roughing and finishing regimes. The maximum load on the table center is 10000 kg.

Work pieces of a high complexity and accuracy can be machined. By using the special attachments, four or five surfaces can be machined by a single work piece clamping on the table.

These special attachments are delivered by means of a separate contract and extra-cost.

The machine features have 5 numerically controlled axes by means of SIEMENS electrical equipment (X- cross axis; Y- vertical axis; W- longitudinal axis) with numerical control.

The solutions which have been chosen for driving both the main movement and the feeds movements allow a wide range of speeds and continuously adjustable feed rates to be obtained, thus making possible the selection of optimal machining regimes, consequently ensuring opportunities for an economical use of the machine-tool.

Due to its high rigidity, using intensive machining methods and carbide tipped tools with this machine is also possible.

### 1.2 Conditions of use

The horizontal boring and milling machine of AFT 130 P CNC type is designed to be used as an independent work unit.

The hall where the machine is to be installed must be closed, normally heated and not permitting the direct action of the solar rays over the machine surfaces.

It is recommended to avoid locating sources of vibrations near the machine tool and current frequency of the main system not to fluctuate.

The environmental temperature limits are +5° C to +40° C, and the measured average for 24 hours is to be 25° C.

It is also recommended that the maximum altitude the machine is to function at not to be over 1000 meters.

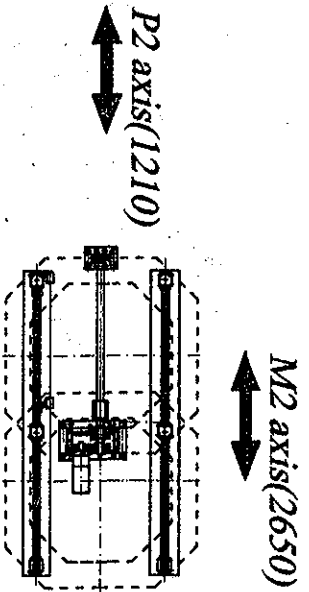
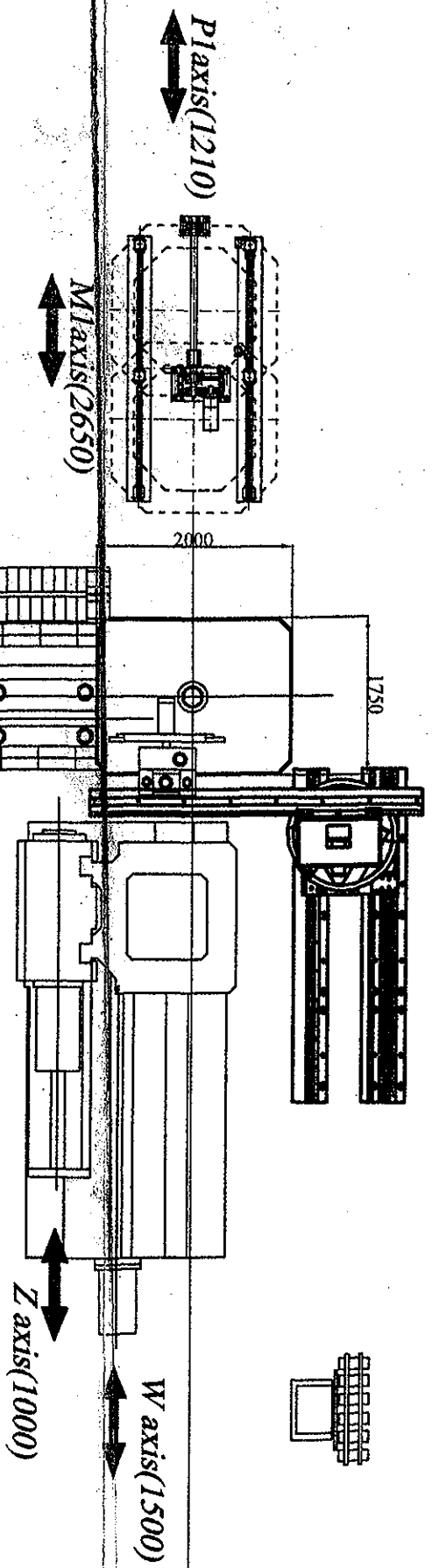
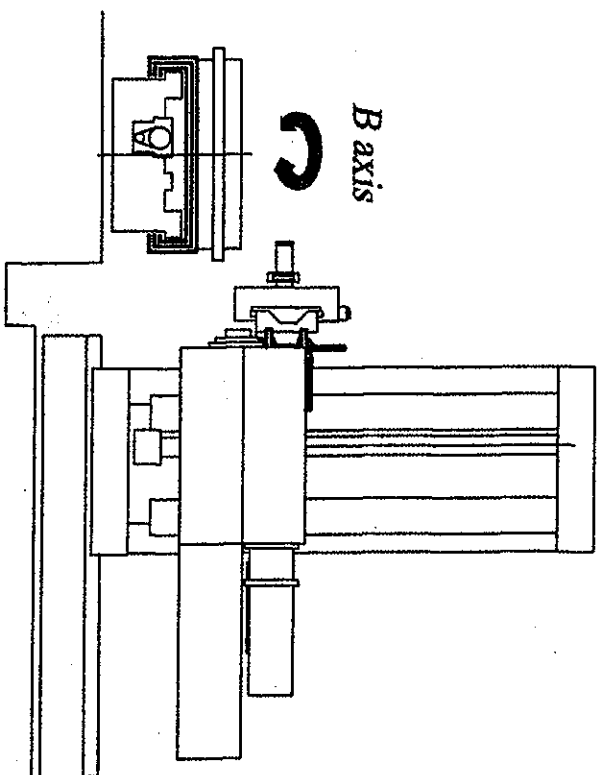
The environment should not exceed the normal contents of dust, acids or corrosive gas, and the air relative humidity not to exceed 50% at a 50° C temperature.

Unless the above conditions are attended the reliability of the machine may decrease.

### 1.3 Machine Coding

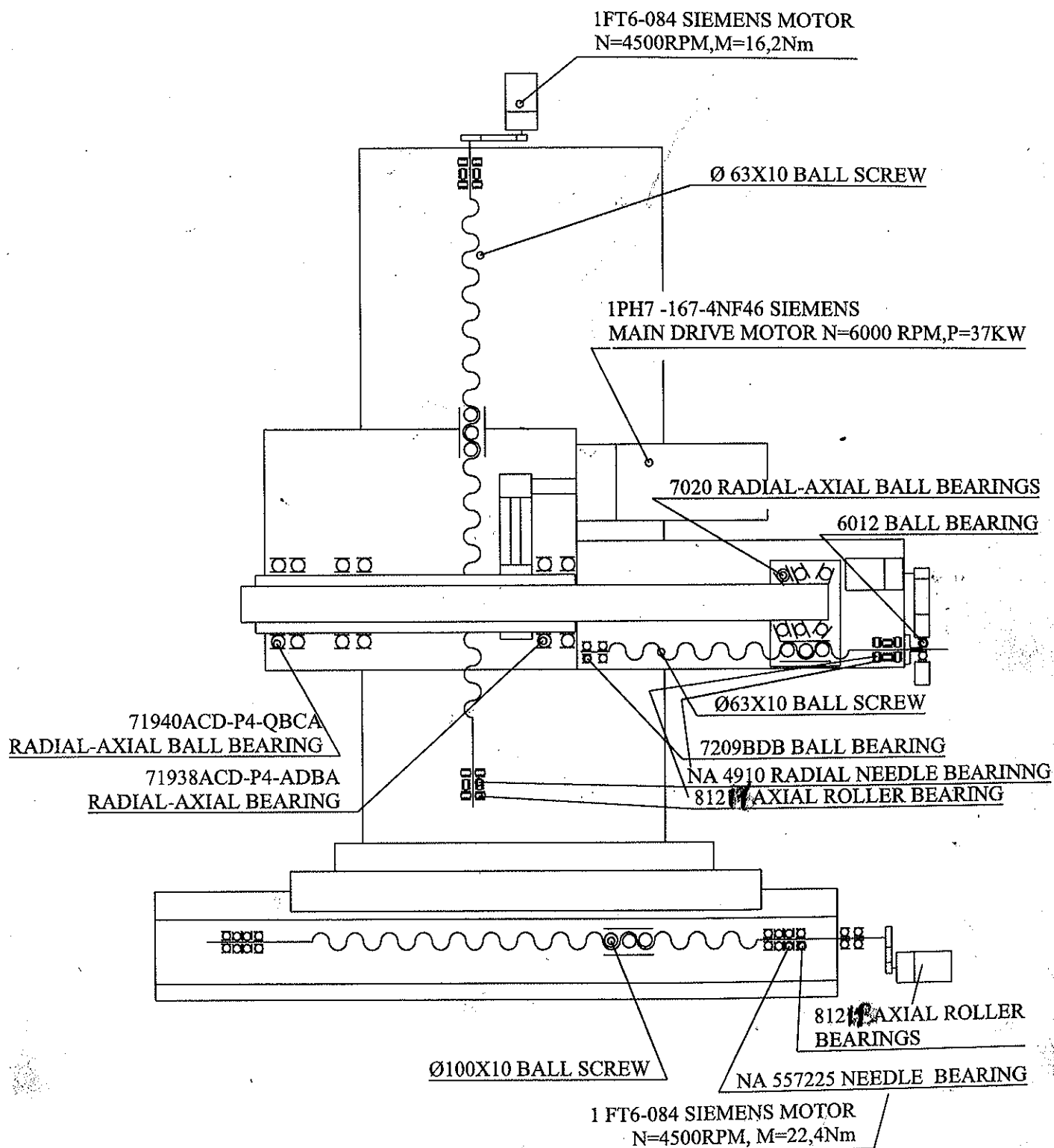
The horizontal boring and milling machine with a 130 mm spindle with 5 feed motors, has as short name: AFT 130 P CNC and the ID code: 2050.000.000.0.

Y axis(2500)



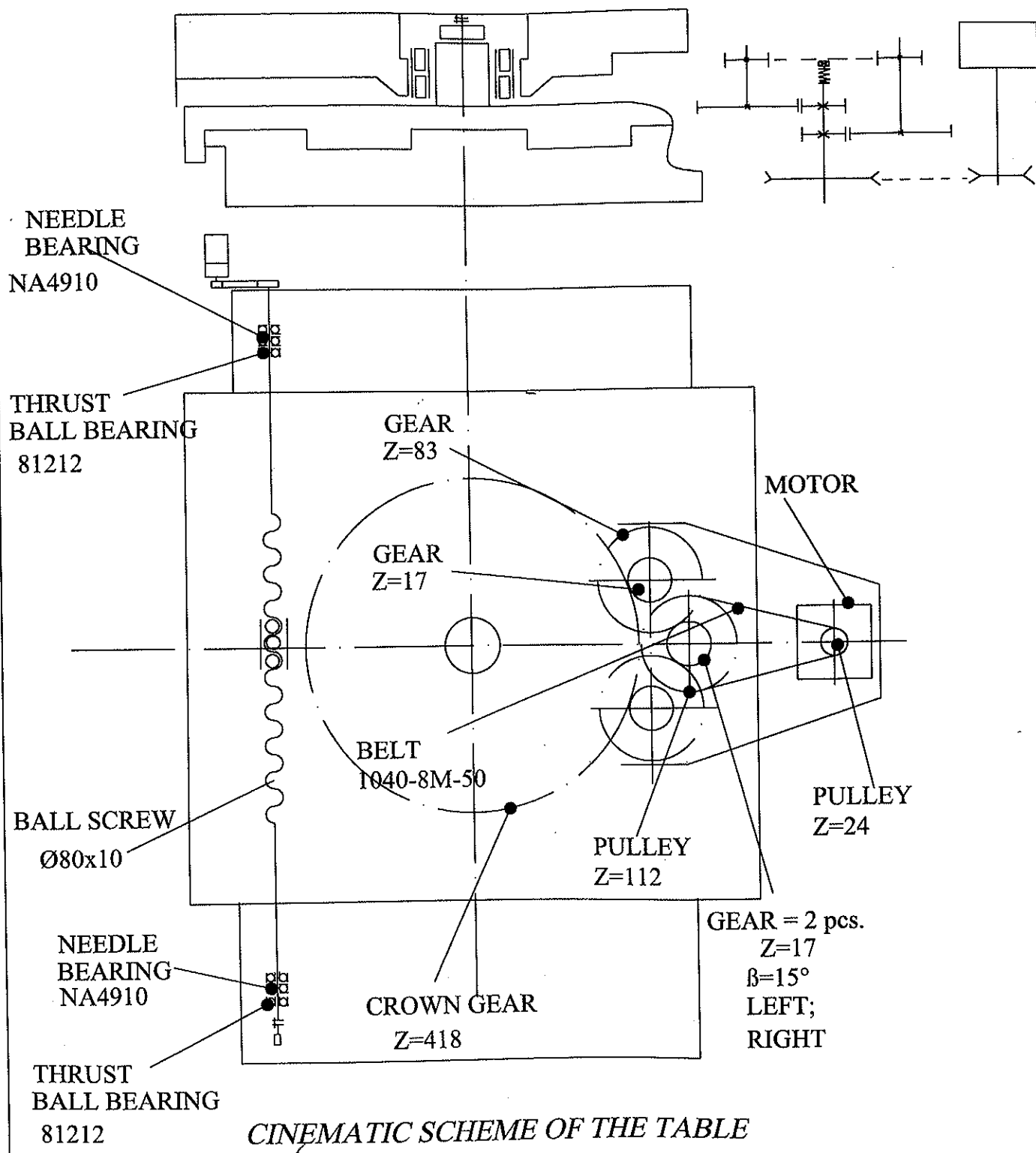
X axis(4000)

AFT 130 -P CNC (general view)



*CINEMATIC SCHEME OF THE MACHINE*





## **2. TECHNICAL FEATURES**

### *Milling and Boring Head*

- Boring spindle diameter 130 mm
- Boring spindle tapered bore BT 50
- Miller holder flange diameter 221,44 mm
- Speed ranges No 2
- Spindle speed  $5 \div 3000$  RPM
- Tool clamping automatic
- Main motor power (regime S1)  
(SIEMENS DC spindle motor and drive) 37 KW

### *Rotary Table*

- Dimensions 2000x1750 mm
- Table rotation speed 1,5 RPM
- Table indexing 360.000x0,001
- Indexing accuracy 6 seconds
- Maximum load on table center 10000 kg

### *Pallet changing system*

- Dimensions 2000x17500 mm
- Number of pallets 2
- Maximum load on each pallet 10000 kg
- Pallet changing time 3min

### *Maximum Travels*

- Table cross travel ( X - axis) 4000 mm
- Column saddle travel ( W - axis) 1500 mm
- Head vertical travel ( Y - axis) 2500 mm
- Boring spindle axial travel (Z- axis) 1000 mm
- Pallet 1 stroke ( P1 – axis ) 1210 mm
- Pallet 2 stroke ( P2 – axis ) 1210 mm
- Pallet 1 changing stroke ( M1- axis ) 2650 mm
- Pallet 2 changing stroke ( M2 – axis ) 2650 mm

### *Feeds*

- Feed axes selection automatic
- Work feed range on X, Y, Z, W, P1, P2, M1, M2  $2 \div 4000$  mm/min
- Rapid displacements on X, Y, Z, W, P1, P2, M1, M2  $2 \div 5000$  mm/min
- Lead screws type on X, Y, Z, W, P1, P2, M1, M2 axes ball-screw

***Electric Equipment***

- |                    |             |
|--------------------|-------------|
| • Electric cabinet | 380V, 50 Hz |
| • Control voltage  | 110V, 50 Hz |
| • Local circuits   | 24 Vd.c.    |
| • Installed power  | 51KVA       |

***Overall Dimensions***

- |                  |          |
|------------------|----------|
| • length         | 12000 mm |
| • width          | 11000 mm |
| • height         | 5550 mm  |
| Weight (approx.) | 85tons   |

***Feed Motors D.C. Operated***

- X axis - M = 16,2 Nm; N = 4500 RPM with ZF reducer
- Y axis - M = 16,2 Nm; N = 4500 RPM with ZF reducer
- Z axis - M = 10,4 Nm; N = 4500 RPM with ZF reducer
- W axis - M = 16,2 Nm; N = 4500 RPM with ZF reducer
- B axis - M = 22,4 Nm; N = 4500 RPM with ZF reducer
- P1 axis - M = 16,2 Nm; N = 4500RPM with ZF reducer
- P2 axis - M = 16,2 Nm; N = 4500RPM with ZF reducer
- T axis - M = 16,2 Nm; N = 4500RPM with ZF reducer
- M1 axis -M = 180 Nm ; Nmax = 300RPM
- M2 axis -M = 180 Nm ; Nmax = 300RPM

### **3. COMPONENTS, ATTACHMENTS AND SPARE PARTS**

**3.1 Component Subassemblies (The Mechanical Unit)**

The boring and milling machine AFT 130 P CNC type includes the following main subassemblies:

1. Table bed
2. Table saddle
3. Rotary table
4. Column bed
5. Column saddle
6. Column
7. Headstock
8. Arm
9. Boring spindle
10. Milling spindle
11. Automatic tool clamping mechanism
12. Feed mechanisms ( without motors )
13. Headstock balancing mechanism
14. Cooling unit (without pump )
15. Rotary table feed box
16. Pallet changing system :
  - pallet
  - pallet charging support
  - support pallet carriage
17. Hardened and ground ball screws
18. Travel limits on X, Y, Z, W ,P1, P2, M1, M2 axes
19. Control panel at floor
20. Telescopic guards (on X,W, axes)
21. Protective covers (Y axis )
22. Tools magazine
23. Mechanical hand
24. Rolling beam , tool changing unit, ball rails,

The Horizontal Boring and Milling Machine, AFT 130 P CNC model, is achieved in the variant with movable column and rotary table. The housing has vertical displacement on the column's guide-ways (Y axis) and it contains the assembly of main spindle in which the boring spindle is horizontally moving (W axis).

The rotary table is mounted on a saddle, which allows the travel performing in horizontal plan of the table, longitudinal travel on X-axis. The table also has a rotation movement around the B axis of the machine.

## 3.2 Gears List

No.	Datum mark denomination	Modulus; No. of teeth	Pcs.	Datum mark code	Remarks
1.	Pulley	Z = 76; p = 14	1	2044.031.004.0	Spindle
2.	Pulley	Z = 41; p = 14	1	2050.030.014.0	
3.	Pulley	Z = 112; p = 8	1	2044.091.030.0	B axis drive
4.	Pulley	Z = 24; p = 8	1	2050.200.302.0	
5.	Gear	Z = 83; m = 3	1	2044.091.020.0	
6.	Gear	Z = 83; m = 3	1	2044.091.037.2	
7.	Pinion	Z = 17; m = 3	1	2044.091.057.0	
8.	Pinion	Z = 17; m = 3	1	2044.091.058.0	
9.	Shaft pinion	Z = 17; m = 4	1	2044.091.028.0	
10.	Crown gear	Z = 418; m = 4	1	2044.101.002.0	
11.	Shaft pinion	Z = 17; m = 4	1	2044.091.044.2	
12.	Pulley	Z = 40; p = 8	1	2048.170.108.0	X axis drive
13.	Pulley	Z = 72; p = 8	1	2050.300.107.0	Z axis drive
14.	Pulley	Z = 40; p = 8	1	2048.170.108.0	
15.	Pulley	Z = ; p = 8	1	2048.140.001.0	Y axis drive
16.	Pulley	Z = 40; p = 8	1	2048.170.108.0	
17.	Pulley	Z = ; p = 8	1	2048.130.001.0	measuring system
18.	Pulley	Z = 90; p = 8	1	2044.043.001.0	
19.	Pulley	Z = 90; p = 8	1	2044.031.016.0	W axis drive
20.	Pulley	Z = 40; p = 8	1	2048.170.108.0	
21.	Pulley	Z = 72; p = 8	1	2048.170.209.2	P 1 axis drive
22.	Pulley	Z = 72; p = 8	1	1431.033.010.0	
23.	Pulley	Z = 48; p = 8	1	1431.033.011.0	P 2 axis drive
24.	Pulley	Z = 72; p = 8	1	1431.033.010.0	
25.	Pulley	Z = 48; p = 8	1	1431.033.011.0	Pallet support
26.	Crown gear	Z = 212; m = 6	2	2050.130.030.0	
27.	Pinion	Z = 21; m = 6	2	2050.130.032.0	
28.	Rack	Z = 117; m = 4	2	2050.130.031.0	
29.	Rack	Z = 117; m = 4	2	2050.130.040.0	
30.	Gear	Z = 28; m = 4	2	2050.120.107.0	

## 3.3 Bearings List

Pos.	Bearing Type	Symbol	Dimensions	Pcs	Remarks
1.	Radial roller bearing	NUP 314 EMA	φ70 x φ150 x 35	2	headstock balancing
2.	Radial ball bearing	6019	φ95 x φ145 x 24	6	Pendant pannel
3.	Radial- axial ball bearing	7206 BP5	φ62 x φ30 x 16	1	headstock
4.	Radial- axial ball bearing	7204 BP5	φ47 x φ20 x 14	1	

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Pa'

5.	Angular contact radial-axial ball bearing	71940ACD-P4-QBCA	$\phi 200 \times \phi 280 \times 38$	4	spindle
6.	Angular contact radial-axial ball bearing	71938ACD-P4-ADBA	$\phi 190 \times \phi 260 \times 33$	2	
7.	Radial needle bearing	NA 4910 P6	$\phi 50 \times \phi 72 \times 22$	2	X axis ball-screw
8.	Roller thrust bearing	81212	$\phi 60 \times \phi 95 \times 26$	4	
9.	Ball bearing	7209 BDB	$\phi 45 \times \phi 85 \times 19$	2	Z - axis drive
10.	Axial roller bearing	81211	$\phi 55 \times \phi 90 \times 25$	2	
11.	Radial needle bearing	NA 4910	$\phi 50 \times \phi 72 \times 22$	1	
12.	Ball bearing	6012-2RS	$\phi 60 \times \phi 95 \times 18$	1	
13.	Radial needle bearing	NA 4910	$\phi 50 \times \phi 72 \times 25$	2	Y axis
14.	Axial roller bearing	81211	$\phi 55 \times \phi 90 \times 25$	4	
15.	Axial roller bearing	81211	$\phi 55 \times \phi 90 \times 25$	4	W axis feed drive
16.	Radial needle bearing	NA 557225	$\phi 55 \times \phi 72 \times 25$	2	
17.	Angular contact radial-axial ball bearing	7020CTA-P4-TBT	$\phi 100 \times \phi 150 \times 24$	4	arm
18.	Radial axial tapered-roller bearing	32020XP5	$\phi 100 \times \phi 150 \times 32$	2	
19.	Radial ball bearing	6016	$\phi 80 \times \phi 125 \times 14$	2	B axis feed drive
20.	Radial axial tapered-roller bearing	32012 XA	$\phi 60 \times \phi 25 \times 25$	4	
21.	Radial roller bearing	NU 1007	$\phi 42 \times \phi 62 \times 14$	2	
22.	Radial roller bearing	NU1012M	$\phi 60 \times \phi 95 \times 18$	2	
23.	Thrust ball bearing	51204	$\phi 20 \times \phi 40 \times 14$	2	
24.	Angular contact radial-axial ball bearing	7009ATA-P4-DB	$\phi 45 \times \phi 75 \times 16$	2	Tool clamping
25.	Radial roller bearing	NN3032 KMP51	$\phi 165 \times \phi 240 \times 60$	1	B axis measuring system
26.	Radial ball bearing	6006-2RSRP4	$\phi 30 \times \phi 55 \times 13$	2	
27.	Radial ball bearing	6205-2RSR	$\phi 25 \times \phi 52 \times 15$	64	Pallet
28.	Radial ball bearing	6310-2RSR	$\phi 50 \times \phi 110 \times 27$	4	
29.	Thrust ball bearing	51180	$\phi 400 \times \phi 480 \times 65$	2	Support pallet
30.	Radial ball bearing	6032MA	$\phi 160 \times \phi 240 \times 38$	4	
31.	Radial ball bearing	6015-2ZR	$\phi 75 \times \phi 115 \times 20$	4	
32.	Thrust ball bearing	51232	$\phi 160 \times \phi 225 \times 51$	2	
33.	Radial axial ball bearing	6306	$\phi 30 \times \phi 72 \times 19$	4	Cylinder pallet
34.	Axial roller bearing	81212	$\phi 60 \times \phi 95 \times 26$	2	P 1 axis drive
35.	Radial needle bearing	NA 4910	$\phi 50 \times \phi 72 \times 22$	1	
36.	Radial ball bearing	62102-2RSR	$\phi 50 \times \phi 90 \times 20$	1	
37.	Axial roller bearing	81212	$\phi 60 \times \phi 95 \times 26$	2	P 2 axis drive
38.	Radial needle bearing	NA 4910	$\phi 50 \times \phi 72 \times 22$	1	
39.	Radial ball bearing	62102-2RSR	$\phi 50 \times \phi 90 \times 20$	1	



**3.4 Electrical Motors List**

1. Spindle motor 1PH7 - 167 - 4NF46 - OAAO: P = 37KW,  
n max = 6000 RPM; of SIEMENS type
2. Feed motor 1FT6 - 084 - 8AH7; 16,2 Nm (for W, Y, X, P1, P2, axis actuating)  
N = 4500 RPM; of SIEMENS type
3. Feed motor 1FT6 - 102 - 1AC71-1AA0; 16,2 Nm (for B axis actuating)  
N = 4500 RPM; of SIEMENS type
5. Feed motor 1FT6 - 082 - 8AH7; 10,4 Nm (for Z axis actuating)  
N = 4500 RPM; of SIEMENS type
6. Feed motor 1FT6 - 081 - 8AH7; 6,6 Nm ( for T axis actuating )

#### **4. MEASURING AND CHECKING DEVICES**

#### **4.1 List of devices**

- level according to DIN 877 - precision 0,02 mm/m;
  - rule;
  - gauges;
  - autocollimator or laser-interferometer;
  - comparator's support with precision acc. DIN 879 (0,01; 0,002; 0,001)
- dial;
- square;
  - checking and control rod (length = 300 mm; BT 50 type);
  - checking cylinder (volet);
  - noise measuring device;
  - vibrations measuring device;
  - rough measuring device;
  - temperature;
  - installed (rated) power.

#### **4.2 Devices Destination**

These devices are used for measurements achieving, prescribed in the reception sheets, which are accompanying this handbook.

With these devices the following checking are to be performed:

- the guide-ways linearity in vertical and horizontal plane on the bed;
  - the perpendicularity of the table given its cross motion direction;
  - the flatness of table's surface;
  - the parallelism of the table surface given the bed;
  - run-out of the internal tap of the broach;
  - run and side out of true run-out of the main spindle on centering surface;
  - the perpendicularity of broach axis given the column's guide-ways;
  - the parallelism of broach axis to the table's surface in vertical plane;
- the rectilinearity of the broach displacement;
- the parallelism of main spindle's axis;
  - the perpendicularity of table's surface given the vertical displacement of the headstock;
  - the perpendicularity of the main spindle's axis given the guiding slot;
  - the rectilinearity of headstock's displacement.

## **5 . SPECIAL TOOLS, ACCESSORIES AND SPARES**

**5.1 List of Standard accessories**

- 5.1.1. –Tools kit for machine erection and commissioning
- 5.1.2. –Parts for machine positioning and fastening onto the base
- 5.1.3. –First endowment parts
- 5.1.4. –Spare parts for two years of functioning

**5.1.1. TOOLS KIT FOR MACHINE ERECTION  
AND COMMISSIONING**

<b>No.</b>	<b>Denomination</b>	<b>Code</b>	<b>Pcs.</b>	<b>Remarks</b>
1.	Test rod	2050.645.001.0	1	For measuring G4; G9;G11;G13;G23;
2.	Test rod	2050.645.002.1	1	For measuring G24
3.	Force measurement device	2050.645.003.0	1	For measuring G15;G16;
4.	Rotary shaft device	2050.645.004.0	1	For measuring G24
5.	Dial gauge support	2050.645.005.0	1	For measuring G20
6.	Control cylinder	2050.645.006.0	1	For measuring G8
7.	Swinging device	2050.645.007.0	1	For measuring G8

**5.1.2. PART FOR MACHINE POSITIONING AND  
FASTENING ONTO THE BASE**

<b>No.</b>	<b>Denomination</b>	<b>Code</b>	<b>Pcs.</b>	<b>Remarks</b>
8.	Bed foundation bolt	2045.512.001.0	46	Welded structure
9.	Leveling blocks	2014.310.280.1	46	Subass.
10.	Foundation jack screw	2050.680.001.0	68	
11.	Foundation bolts	2050.680.003.0	84	Welded structure
12.	Washer	2067.170.112.0	84	
13.	Screw	2067.170.115.0	72	
14.	Adjustment plate	2065.170.107.0	56	
15.	Nut M30x1,5	2050.680.005.0	160	
16.	Plate	2050.680.007.0	2	

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17.	Plate	2050.680.008.0	2	
18.	Clamping support	2050.680.010.0	2	Welded structure
19.	Screw	2050.680.014.0	12	
20.	Nut M24	STAS 4071	46	
21.	Washer N24	STAS 5200	46	
22.	Nut M16	STAS 4071	46	
23.	Pin Ø 5x40	STAS 1599	46	
24.	Nut M12x1,5	STAS 4071	68	
25.	Nut M24	STAS 4071	12	

### 5.1.3. FIRST ENDOWMENT PARTS

SLITDEAR

The wear parts are the pieces and the elements considered as usable during the warranty period and which should be delivered together with the machine proper, by the manufacturer

- LEVERERAS SOM RESERVDEAR

Pos.	Denomination/Dimensions	Code / Supplier	Pcs	Subassembly
1.	O-ring $\phi 50,16 \times 5,33$	Fartec Brasov	8	Accessories clamping devices
2.	O-ring $\phi 33,4 \times \phi 3,53$	Fartec Brasov	8	
3.	O-ring $\phi 21,2 \times \phi 2,65$	Fartec Brasov	4	
4.	O-ring $\phi 33,5 \times \phi 3,55$	1266.335.35	2	Balancing
5.	Sleeve $\phi 90 \times \phi 115 \times 12$	2060.090.10	2	X axis driven
6.	Sleeve $\phi 80 \times \phi 100 \times 10$	2060.080.10	4	Y axis driven
7.	Sleeve $\phi 80 \times \phi 105 \times 10$	2060.080.10	6	W axis driven Z axis driven
8.	Sleeve CSC 3220	Italia	12	Arm
9.	O-ring $\phi 69 \times \phi 5,3$	126669053	1	
10.	O-ring $\phi 109 \times \phi 3,55$	Fartec Brasov	1	Z axis driven
11.	Sleeve CSC 3018	Italia	20	B axis driven
12.	O-ring $\phi 325 \times \phi 5,3$	Fartec Brasov	2	Main spindle
13.	O-ring $\phi 320 \times \phi 3,8$	Fartec Brasov	2	
14.	O-ring $\phi 246 \times \phi 6$	Fartec Brasov	1	
15.	O-ring $\phi 12 \times \phi 2$	Fartec Brasov	12	
16.	O-ring $\phi 266,1 \times \phi 7$	Fartec Brasov	1	
17.	O-ring $\phi 45 \times \phi 5,3$	1266.450.53	1	Tool clamping
18.	O-ring $\phi 25 \times \phi 3,55$	1266.250.35	1	
19.	O-ring $\phi 28 \times \phi 2,6$	1266.280.26	1	
20.	O-ring $\phi 20 \times \phi 2,65$	1266.200.26	1	

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21.	O-ring $\phi 90 \times \phi 5,3$	1266.900.53	1	Tool clamping
22.	O-ring $\phi 69,2 \times \phi 5,33$	Busak-Shamban	2	
23.	Back-up-ring BP4900700	Busak-Shamban	2	
24.	O-ring $\phi 91,45 \times \phi 5,33$	Busak-Shamban	1	
25.	Back-up-ring BP4900902	Busak-Shamban	2	
26.	O-ring $\phi 145 \times \phi 5,3$	Fartec Brasov	2	
27.	O-ring $\phi 28 \times \phi 3,55$	Fartec Brasov	2	
28.	O-ring $\phi 22,4 \times \phi 2,65$	Fartec Brasov	1	
29.	O-ring $\phi 38,7 \times \phi 3,55$	Fartec Brasov	1	
30.	Spring	2045.310.028.0	2	
31.	Sleeve	974712201	46	Column slide
32.	O-ring $\phi 32,93 \times \phi 3,53$	Busak-Shamban	4	Mechanical hand
33.	O-ring $\phi 15 \times \phi 3$	Busak-Shamban	4	
34.	Clamping jaws	2050.600.001	4	
35.	Roll	3012.800.243.0	4	
36.	O-ring $\phi 50 \times \phi 56 \times \phi 3$	Busak-Shamban	1	
37.	Sleeve UM7050	Busak-Shamban	1	Headstock balancing mechanism
38.	O-ring $\phi 153,3 \times \phi 165,36 \times \phi 3$	Busak-Shamban	2	
39.	Guide way –wiper R5060	Busak-Shamban	1	
40.	Sleeve UM165140	Busak-Shamban	1	
41.	O-ring $\phi 177,4 \times \phi 184,46 \times \phi 3,53$	Busak-Shamban	2	
42.	Ring GP7301700	Busak-Shamban	2	
43.	O-ring $\phi 49,5 \times \phi 3$	Fartec Brasov	12	Table
44.	O-ring $\phi 129,3 \times \phi 5,7$	Fartec Brasov	12	
45.	O-ring $\phi 39,5 \times \phi 3$	Fartec Brasov	12	
46.	O-ring $\phi 28,17 \times \phi 3,53$	Busak-Shamban	8	Automatical tool changer
47.	Back-up-ring BP3200280	Busak-Shamban	16	
48.	O-ring $\phi 50,16 \times \phi 5,33$	Busak-Shamban	8	
49.	Back-up-ring BP4900502	Busak-Shamban	16	

## **5.1.4. SPARE PARTS FOR TWO YEARS OF FUNCTIONING**

<b>Pos.</b>	<b>Denomination/Dimensions</b>	<b>Code/ Supplier</b>	<b>Pcs</b>	<b>Subassembly</b>
1	Timing belt	800-8M-50	1	W axis driven
2	Timing belt	1120-8M-50	1	Y axis driven
3	Timing belt	1200-8M-50	1	Z axis driven
4	Timing belt	1778-14M-40	3	Headstock

# HORIZONTAL BORING AND MILLING MACHINE

## AFT 130 P CNC

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5	Timing belt	1040-8M-50	1	B axis driven
6	Timing belt	960-8M-50	1	X axis driven
7	Timing belt	1600-8M-20	1	Headstock
8	Electromagnetic brake	FEA5	2	Y axis driven Z axis driven
9	Electromagnetic `brake	FEA10	1	X axis driven
10	Spring 8	2044.091.087.0	1	B axis driven
11	Hydraulic motor	MHL- 41.0.100.1A	7	Total machine
12	Spring	φ50x φ25,4x3	84	Tool clamping
13	Self lubricating bushing	2044.045.010.0	5	
14	Bushing	2045.582.239.0	2	
15	Bushing	2045.582.240.0	2	
16	Ball	197005310	2	
17	O-ring φ45 x φ5,3	1266.450.53	1	
18	O-ring φ25 x φ3,55	1266.250.35	1	
19	O-ring φ28 x φ2,6	1266.280.26	1	
20	O-ring φ20x φ2,65	1266.200.26	1	
21	O-ring φ90x φ5,3	1266.900.53	1	
22	O-ring φ69,2 x φ5,33	Busak-Shamban	2	
23	Back-up-ring BP4900700	Busak-Shamban	2	
24	O-ring φ91,45 x φ5,33	Busak-Shamban	1	
25	Back-up-ring BP4900902	Busak-Shamban	2	
26	O-ring φ145x φ5,3	Fartec Brasov	2	
27	O-ring φ28x φ3,55	Fartec Brasov	2	
28	O-ring φ22,4x φ2,65	Fartec Brasov	1	
29	O-ring φ38,7x φ3,55	Fartec Brasov	1	
30	O-ring φ325 x φ5,3	Fartec Brasov	2	Main spindle
31	O-ring φ320 x φ3,8	Fartec Brasov	2	
32	O-ring φ246 x φ6	Fartec Brasov	1	
33	O-ring φ12xφ2	Fartec Brasov	12	
34	O-ring φ266,1 x φ7	Fartec Brasov	1	
35	Sleeve CSC 3220	Italia	12	Arm
36	O-ring φ69 x φ5,3	126669053	1	
37	O-ring φ50,16x5,33	Fartec Brasov	8	Accessories clamping devices
38	O-ring φ33,4 x φ3,53	Fartec Brasov	8	
39	O-ring φ21,2 x φ2,65	Fartec Brasov	4	
40	O-ring φ50x φ56x φ3	Busak-Shamban	1	Headstock balancing mechanism
41	Sleeve UM7050	Busak-Shamban	1	
42	O-ring φ153,3x φ165,36xφ3	Busak-Shamban	2	



# HORIZONTAL BORING AND MILLING MACHINE AFT 130 P CNC

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43	Guide way –wiper R5060	Busak-Shamban	1	
44	Sleeve UM165140	Busak-Shamban	1	
45	O-ring $\phi 177,4 \times \phi 184,46 \times \phi 3,53$	Busak-Shamban	2	
46	Ring GP7301700	Busak-Shamban	2	
47	O-ring $\phi 28,17 \times \phi 3,53$	Busak-Shamban	8	Automatical tool changer
48	Back-up-ring BP3200280	Busak-Shamban	16	
49	O-ring $\phi 50,16 \times \phi 5,33$	Busak-Shamban	8	
50	Back-up-ring BP4900502	Busak-Shamban	16	
51	O-ring $\phi 49,5 \times \phi 3$	Fartec Brasov	12	Table
52	O-ring $\phi 129,3 \times \phi 5,7$	Fartec Brasov	12	
53	O-ring $\phi 39,5 \times \phi 3$	Fartec Brasov	12	
54	O-ring $\phi 32,93 \times \phi 3,53$	Busak-Shamban	4	Mechanical hand
55	O-ring $\phi 15 \times \phi 3$	Busak-Shamban	4	
56	Sleeve	974712201	46	Column slide
57	Sleeve CSC 3018	Italia	20	B axis driven
58	Sleeve $\phi 85 \times \phi 130 \times 15$	206008550	1	Tool magazine
59	Sleeve $\phi 95 \times \phi 130 \times 12$	206009530	1	
60	Sleeve B40x 60x10	206004020	1	
61	Sleeve $\phi 90 \times \phi 115 \times 12$	2060.090.10	2	X axis driven
62	Sleeve $\phi 80 \times \phi 100 \times 10$	2060.080.10	4	Y axis driven
62	Sleeve $\phi 80 \times \phi 105 \times 10$	2060.080.10	6	W axis driven Z axis driven
63	O-ring $\phi 109 \times \phi 3,55$	Fartec Brasov	1	Z axis driven

## 5.2 List of Normal Accessories

- Tool cooling installation = piping arrangement of the machine
- Guide ways lubrication piping

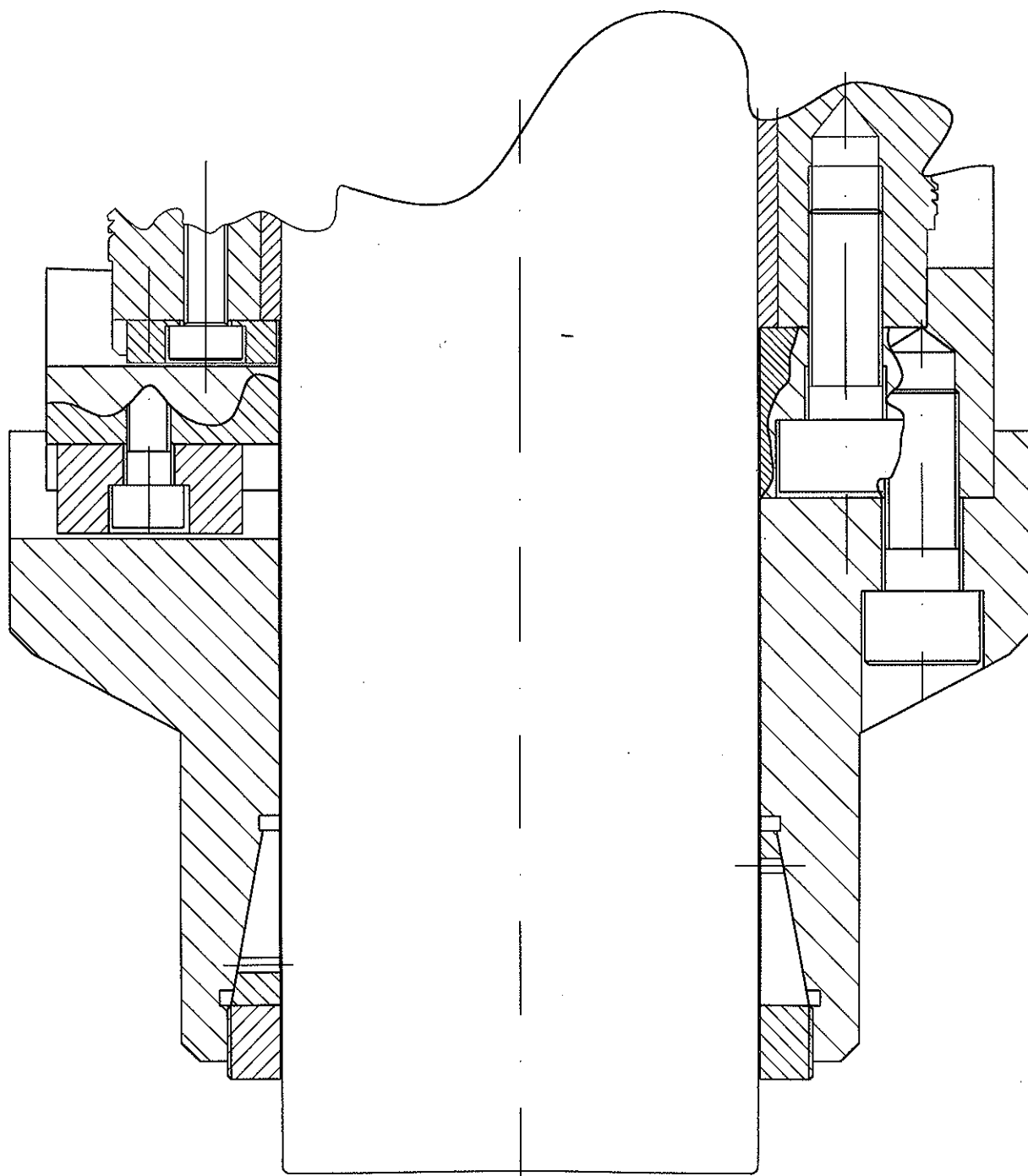
## 5.3 List of Special Accessories

5.3.1. <u>Bearing support</u>	2050.650.000.0
5.3.2. <u>Automatic indexed milling head</u>	2050.690.000.0
5.3.3. <u>Support automatic indexed milling head</u>	2050.695.000.0
5.3.4. <u>Tool magazine - 60 tools</u>	2050.500.000.0
5.3.5. <u>Mechanical hand</u>	2050.600.000.0
5.3.6. <u>Automatical tool changer</u>	2050.670.000.0

**5.3.1. BEARING SUPPORT**

For the machining of some surfaces, for which the boring spindle has to On a frontal side of the tubular spindle a tapered bushing of antifriction material is placed, having a radial cut in order to become elastic during its axial displacement on the tapered surface of the tubular spindle, displacement achieved by means of a nut.

\* It's to mounted on the frontal side of the milling spindle, by four screws .



BEARING SUPPORT

### **5.3.2. AUTOMATIC INDEXED MILLING HEAD RMH 3000**

#### **1. Destination**

RMH 3000 is an accessory, who is adaptable for CNC machine-tools (plano-millers, boring and milling machine-tools, etc).

It is designed for complex configuration parts machined by milling, drilling, boring; combining its movements with the movements of the machine.

#### **2. General description**

The head consists of three cast housings, a fixed one automatically fastened to the headstock using 4 pincers, the second one which accommodates the secondary shaft and hydraulic pistons for clamping in indexed position, and the third, which accommodates the secondary shaft and hydraulic pistons for clamping in indexed position and the third, which accommodates the milling spindle. The second and third housings can be rotated and indexed in 144 positions by 2,5 deg. angular pitches each.

Rotation axes of the mobile housings are 0 deg. and 45 deg. from the machine spindle axis.

Head milling spindle is made of hardened alloy steel,  $860 \div 950$  HV, and mounted on high accuracy and rigidity bearings as follows:

- Front side : set of 3 radial – axial ball bearings
- Rear side : set of 2 radial – axial ball bearings

Bearings lubrication is provided by high-speed grease.

Rotation from the machine spindle is transmitted to the head milling spindle by means of two bevel gearings, 1:1 ratio. For obtaining high speeds the bevel gears are Gleason type, hardened and ground.

Gears lubrication is provided with special high-speed grease.

Precision frontal teeth coupling manufactured of heat-treated alloy steel assure the indexed position.

Head clamping to the indexed position is hydraulic. For new indexing, head un-clamping is performed mechanically in the 45 deg. plane by means of disk springs, and by using machine boring spindle feed, in the 0 deg. plane.

Head rotation and re-location is performed by machine spindle. When indexing, the same hydraulic circuit as for tool releasing clamps the head milling spindle.

Tool clamping is automatic, using disk springs and tools releasing is hydraulic.

Tool cooling through spindle is also provided as standard accessory .

### MAIN TECHNICAL DATA

Main spindle	BT50
Main spindle maximum speed	rpm 3000
Maximum transmitted power	kW 18
Diameter of clamping flange	mm 410
Centering diameter	mm 310
Rotation angle in 45 deg. plane	deg. $\pm 180$
Rotation angle in 0 deg. plane	deg. $\pm 180$
Number of indexing positions in both planes	- 144
Indexing position pitch	deg. 2,5
Indexed accuracy	sec. (10) $\pm 5$

### GEARS LIST

Poz.	Code	Name	Z/M	Material	Pcs
1	2050.690.010.0	Gear	21/5	18MnCr10	1
2	2050.690.011.0	Gear	21/5	18MnCr10	1
3	2050.690.012.0	Gear	17/5	18MnCr10	1
4	2050.690.013.0	Gear	17/5	18MnCr10	1

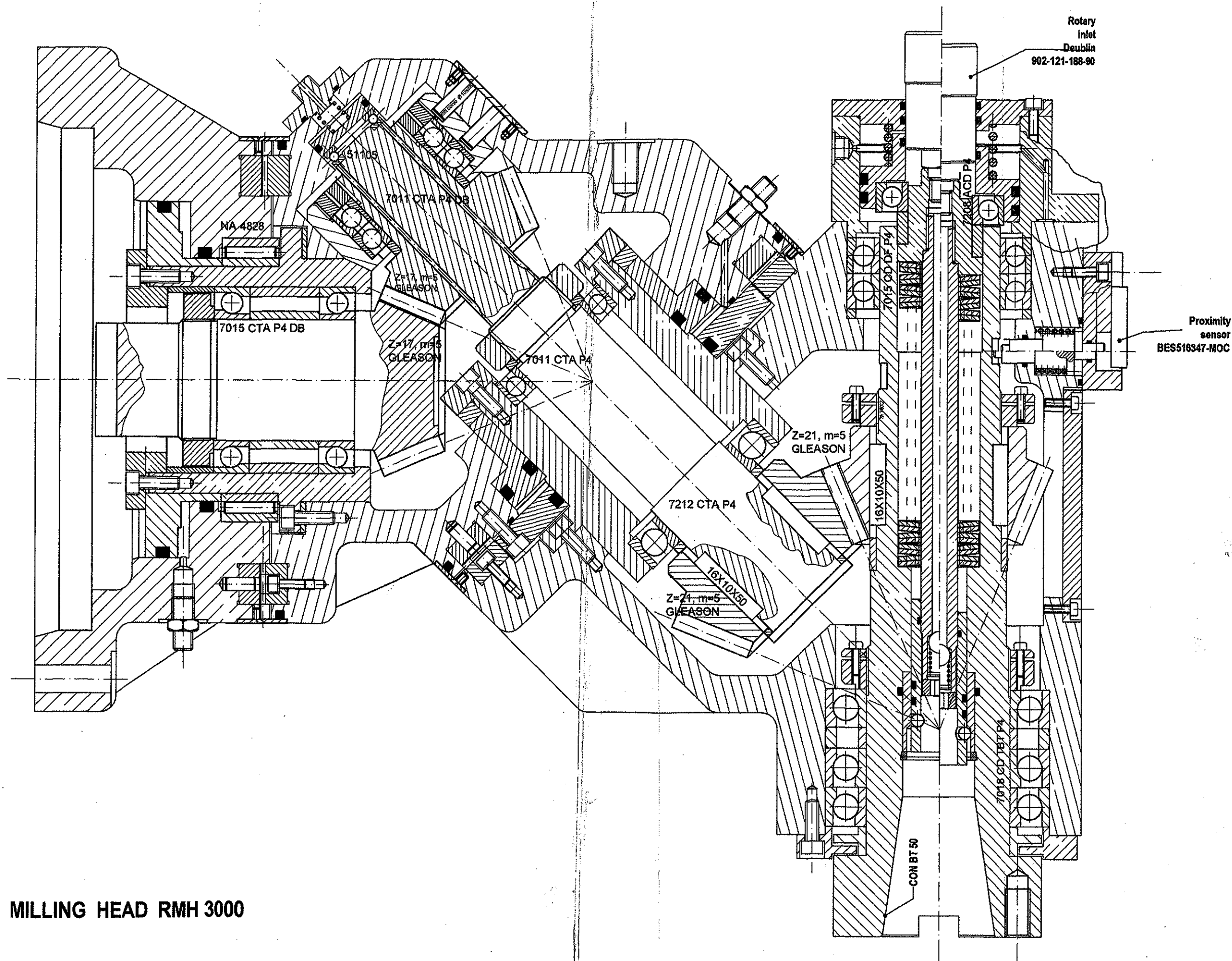
### BEARINGS LIST

Pos.	Bearing type	Symbol	Dimensions	PCs.
1	Radial axial ball bearing	7018 CD-TBT-P4	$\Phi 140 \times \Phi 190 \times 26$	1 set (3pcs)
2	Radial axial ball bearing	7015CD-DF-P4	$\Phi 115 \times \Phi 170 \times 22$	1 set (2pcs)
3	Radial axial ball bearing	7208ACD	$\Phi 80 \times \Phi 40 \times 18$	1
4	Radial axial ball bearing	7212CTA- P4	$\Phi 60 \times \Phi 110 \times 20$	1

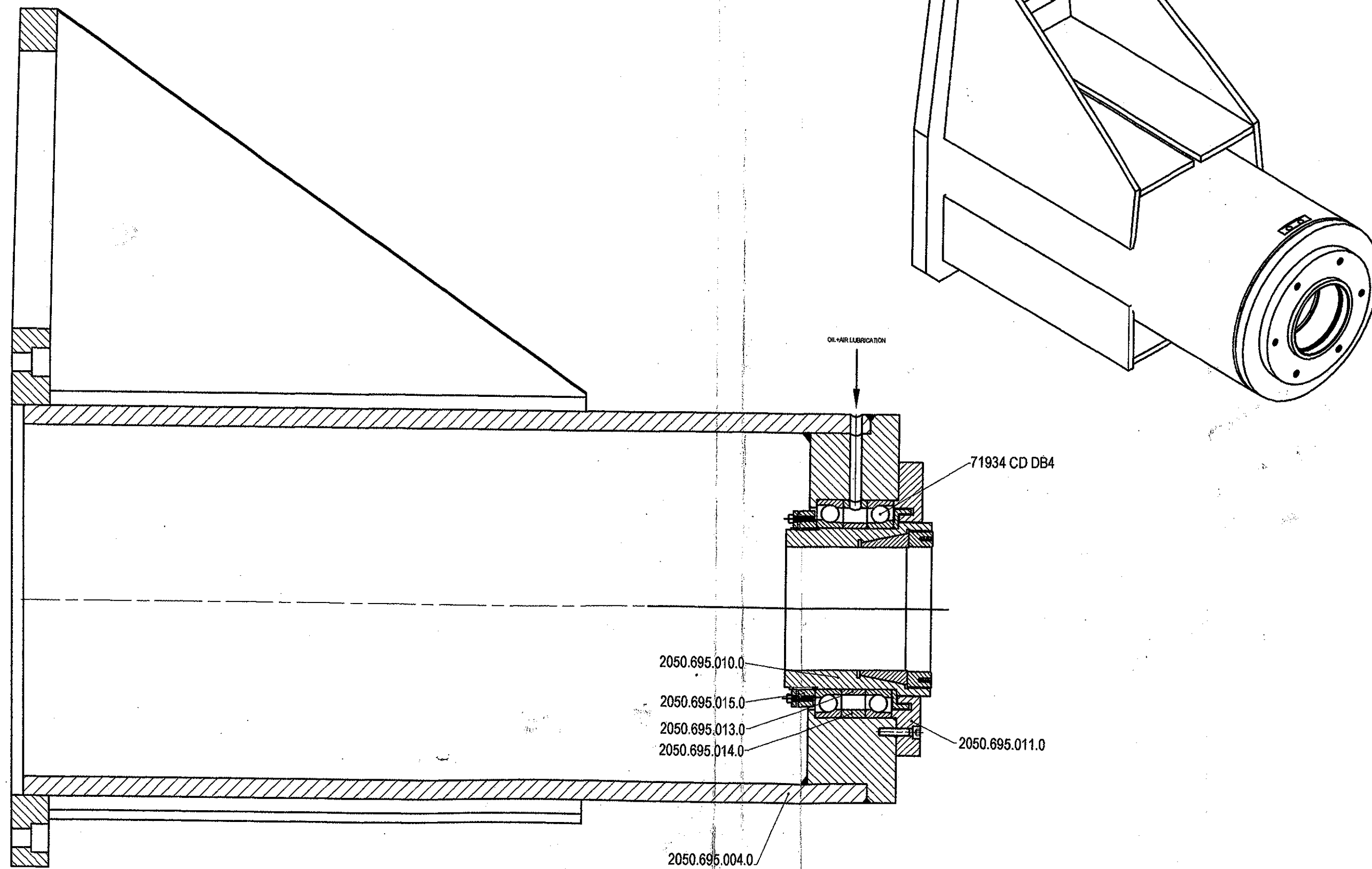
**HORIZONTAL BORING AND MILLING MACHINE  
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5	Radial axial ball bearing	7011CTA-P4DB	Φ55xΦ90x18	2
6	Radial axial ball bearing	7011CTA-P4DB	Φ55xΦ90x18	1
7	Radial axial ball bearing	7015- CTA-P4DB	Φ115xΦ170x22	2
8	Radial axial ball bearing	5115	Φ40xΦ60x11	1
9	Radial neadle bearing	NA4828	Φ140xΦ175x35	1
10	Radial ball bearing	6003-P5	Φ17xΦ35x10	1
11	Thrust ball bearing	51113	Φ65xΦ90x18	4
12	Thrust ball bearing	51104	Φ25xΦ35x10	4
13	Needle bearing	NA 4901	Φ12xΦ24x13	1
14	Needle bearing	NA 4906	Φ30xΦ47x17	1
15	Radial axial ball	3208	Φ40xΦ80x30	1



INDEXED MILLING HEAD RMH 3000



RHM 3000 MILLING HEAD SUPPORT



**5.3.4. MAGAZINE (60 TOOLS); 5.3.5. MECHANICAL HAND;**

**5.3.6. AUTOMATICAL TOOL CHANGER;**

The following parts compose the tool changer:

1. Mechanical hand; is designed to clamp BT 50 tools and the distance between two tool axes of 900mm. Double action hydraulic cylinders insure the axial and spin movement of hand.
2. Tool magazine; is chain type, fastened on the shop floor by a rigid welded structure support. It is positioned in vertical plane in the backside of the column. The chain is actuated by a variable speed feed motor through a planetary gear reducer( $i=1;10$ ) and a duplex worm reducer. The wormed gear is fastened to the chain gear.
3. Mechanical hand transport device; permits access in the main spindle area from the tool magazine of the mechanical hand due to a series of moving elements as follows:
  - 3.1 Movable rail in welded structure witch sustains the "V" guide-ways for the mechanical hand displacement. The mechanical hand movement is obtain from a rotary hydraulic motor and a pinion chain transmission positioned between "V" guide-ways. The movable rail moves along its support on roller guide-way INA RUE 45 DOE type. Rail movement is taken from a rotary hydraulic rotor and transmitted through a no backlash free planetary gear reducer( $i=1:4$ ) to a pinion and chain transmission.
  - 3.2 . The rail movable support has two displacements as follows: an alternative linear movement on roller guide-ways INA RUE DOE 45 type actuated by the same mechanism described before; and a  $90^\circ$  rotation actuated by a hydraulic double action piston and backlash free pinion and rack mechanism. All displacements have deceleration on stroke ends, confirmation on proximity sensors and mechanic buffers stop. The tool changing system permits tool changing with or without CNC milling head and also frees the machine working area after tool changing took place.

**5.3.4. Tools magazine**

- |   |        |
|---|--------|
| • Tools magazine capacity (number of tools) | 60     |
| • Tool clamping taper                       | BT50   |
| • Pitch                                     | 130 mm |
| • Maximum dia.of two joint tools            | 250 mm |

• Tool maximum length	500 mm
• Chain speed	9000mm/min.
• Tool maximum weight	30 Kg
• Driving motor maximum torque	16,2 Nm
Tools max. weight ( full magazine )	1800 Kg

Tools magazine is designed for the tools - and tool - holders stocking (60 - tool - holders) and to prepare the necessary tool for the next operation, so reducing the operating time of the machine - tool.

Tool magazine consists of a 60 links chain and of 60 tool - holder supports.

Tool holder supports are provided with a tool clamping system with balls and springs, a ranking number (1 → 60) and an indexing system for placing the tool.

Tool magazine is attached to a support, which is fixed to the shop floor. On the same support, the drive reducer of the chain B fixed.

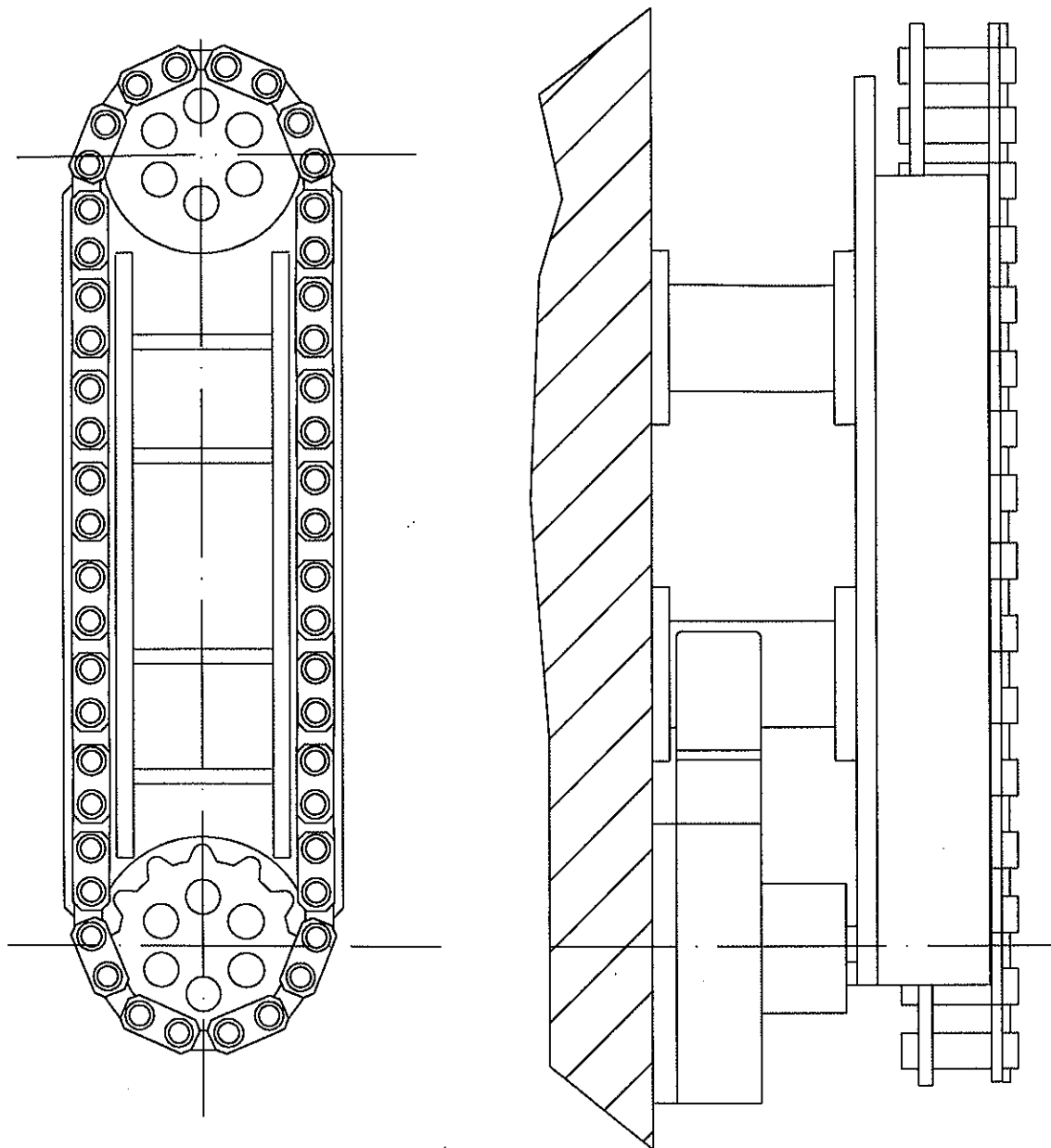
This is a wormed gearing reducer, with the 1/40 reducing ratio. The drive unit (motor and planetary gear reducer having ratio of 1/10) is mounted on the reducer; connection between motor spindle and reducer input spindle being achieved by means of elastic coupling. Chain driving wheel B mounted on the output reducer shaft.

Near by the driving wheel, two proximity switches are meant to count tools in the magazine - A third proximity switch is placed on the tools-magazine support and is meant to show "O" position (beginning of tools counting).

### **Operation Safety Requirements**

1. Tools - magazine has been designed in accordance to Labor Safety Norms provisions and CEE 392/89 requirements.
2. At the beginning of work, general status of the attachment will be checked, as well as tool clamping in each tool holder support in the magazine.  
Operation will not be started without the protection cover been mounted and access door locked.
3. Access door of the magazine cover is mechanical and electric interlocking provided. The cover will be visibly provided with warning and forbidding labels, in order to prevent operator access while machine functioning, irrespective of the reason.

Buyer will visibly display the operation and labor safety instruction. Their obeying is compulsory



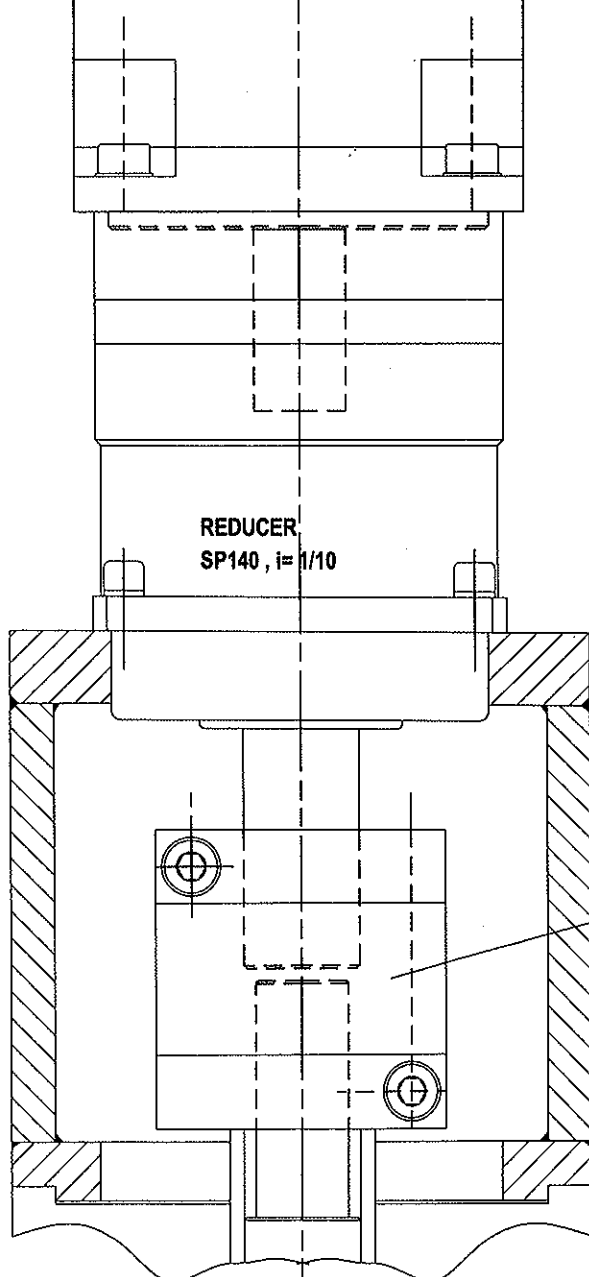
*TOOLS MAGAZINE*

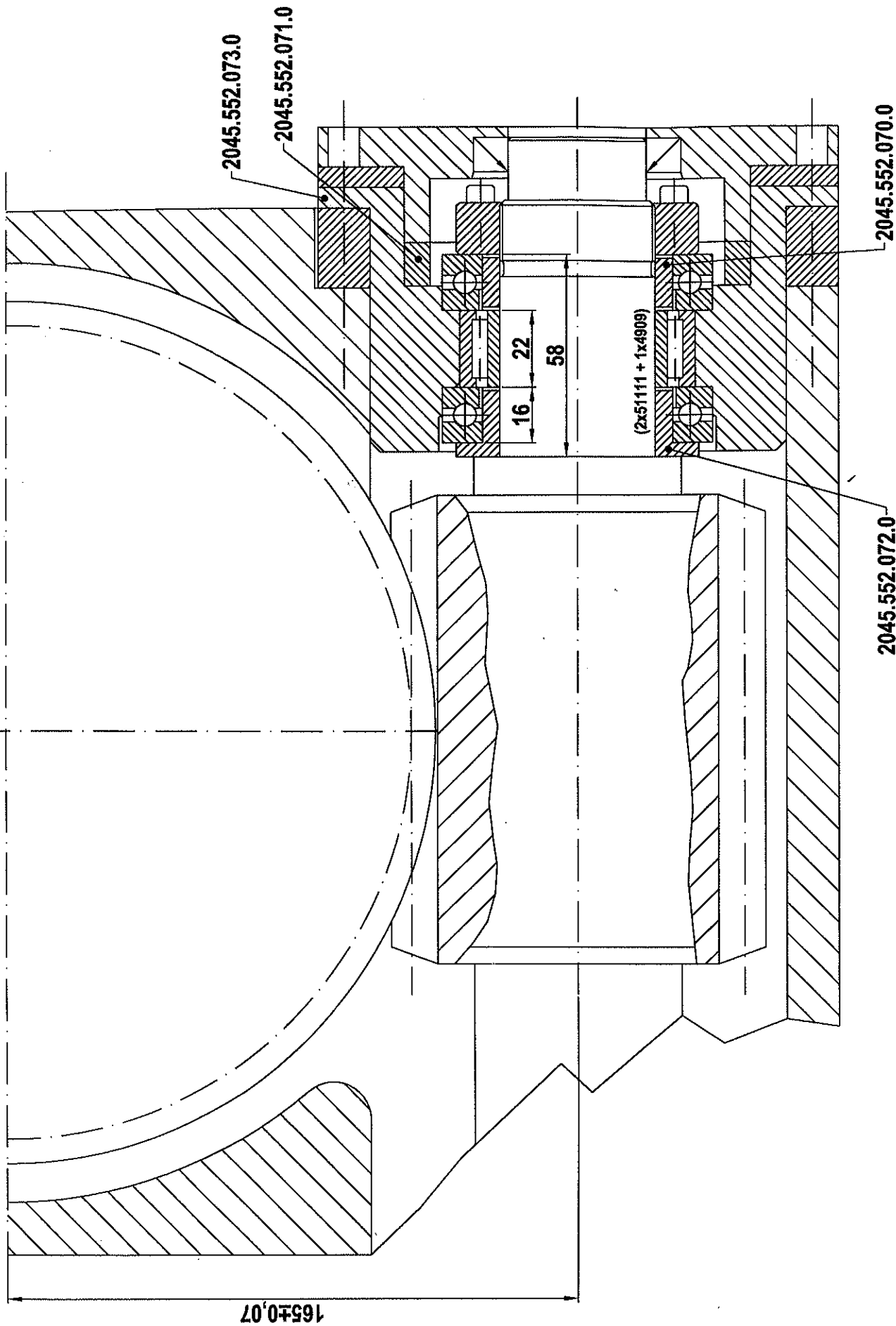
ELECTRIC  
MOTOR - SIEMENS  
1FT6-081  
( 6,6 Nm ; 4500rpm )

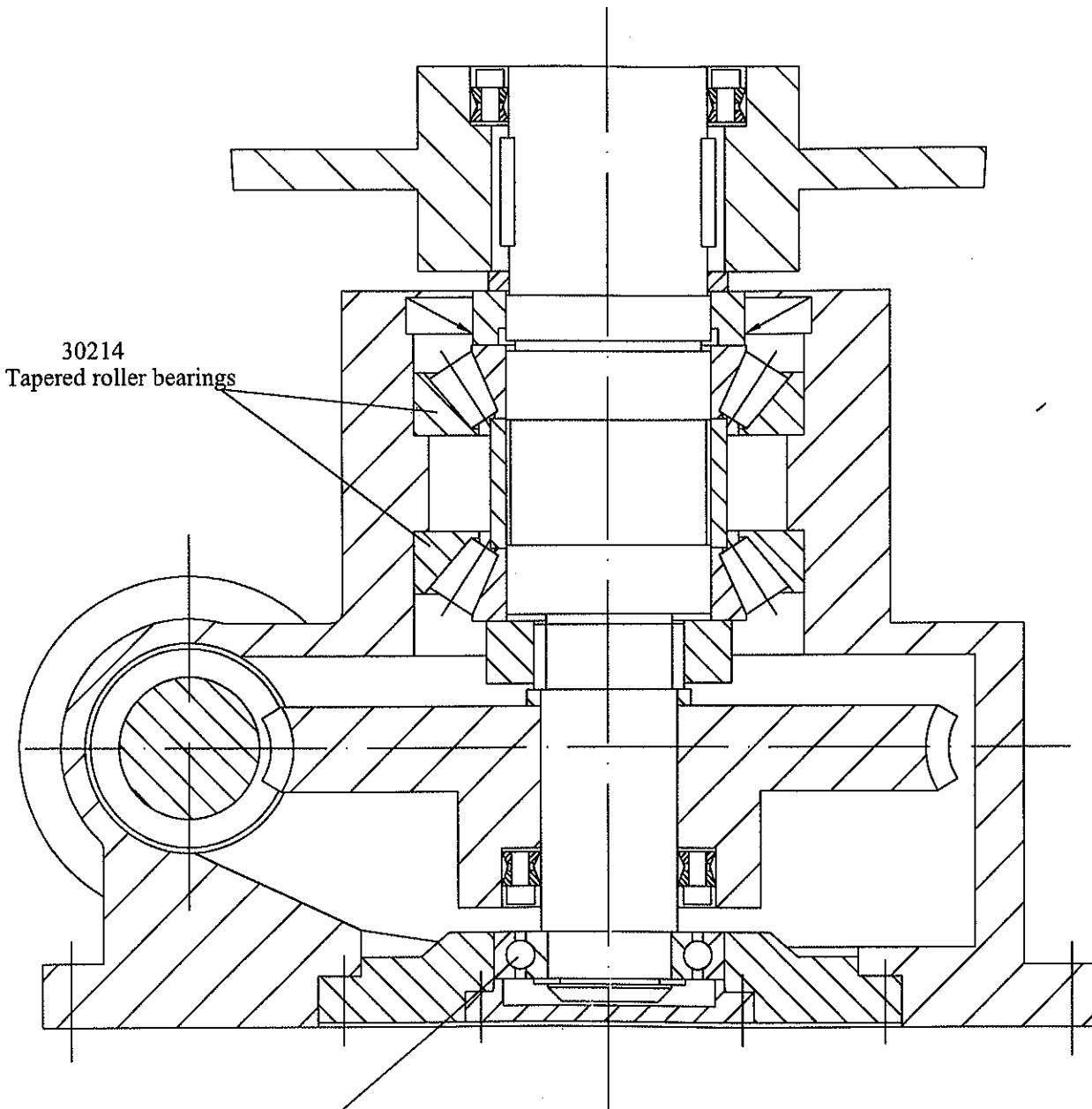
REDUCER  
SP140 ,  $i = 1/10$

COUPLING  
KM270-JACOB

TOOL MAGAZINE DRIVE





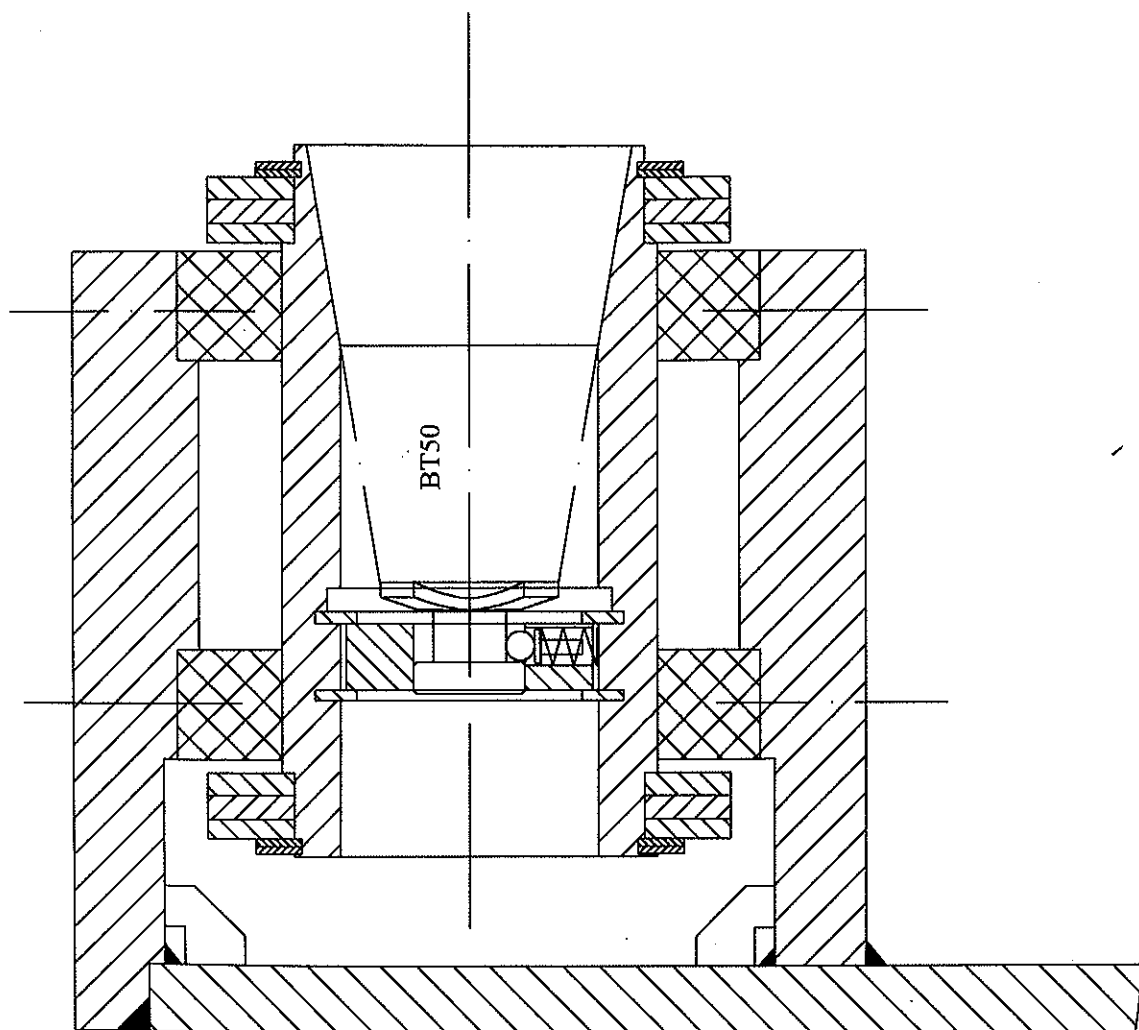


30214  
Tapered roller bearings

This technical drawing shows a cross-section of a mechanical assembly. A central vertical shaft is supported by two tapered roller bearings (30214) in the upper section. Below this, a horizontal shaft is supported by two radial ball bearings (6309). The assembly is housed within a complex structure with various cutouts and mounting points. Hatching is used to indicate different materials or sections. Leader lines point from the text labels to the specific bearing components.

6309  
Radial ball bearing

TOOLS MAGAZINE



*TOOLS MAGAZINE*

## 5.3.5. Mechanical hand

## 5.3.6. Automatical tool changer

### Technical characteristics

- Length 900 mm
- Motion by means of hydraulic motor ( $Q = 50 \text{ cm}^3/\text{rev.}$ )
- Rated pressure 70 bar
- Rated torque 10 daNm
- Rated speed 200 rpm
- Speed of linear displacement of mechanical hand at hydraulic motor rated speed 0.84 m/s

### GEAR LIST

No.	Datum mark denomination	Modulus; No. of teeth	Pcs.	Datum mark code	Remarks
1	Worm	mf1=6 mf2=6,1 z=1	1	2045.552.046.0	Tool magazine
2	Worm gear	mf1=6 mf2=6,1 z=40	1	0788.100.030.2	
3	Gear	3/40	1	2045.495.025.0	Mechanical head
4	Piston	3/29	1	2045.495.104.0	
5	Gear	4/60	1	2050.670.040.0	Automatical tool changer
6	Piston	4/23	1	2050.670.041.0	

### BEARING LIST

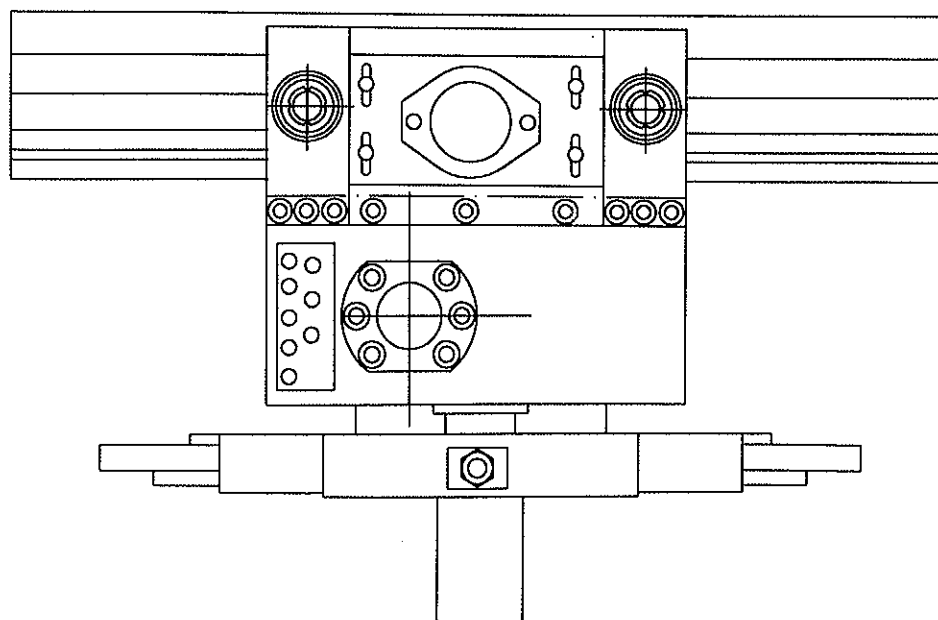
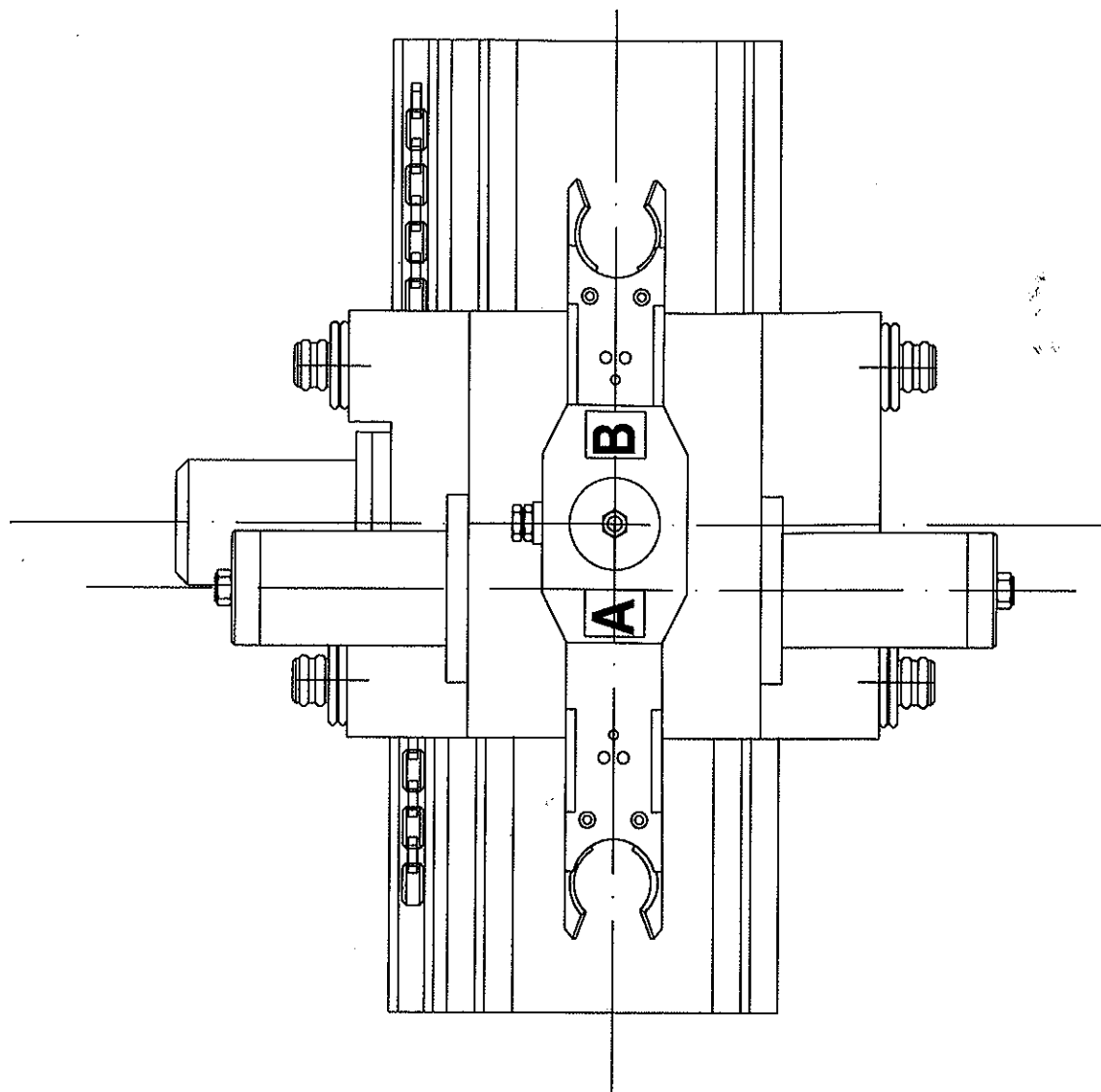
Pos.	Bearing Type	Symbol	Dimensions	Pcs	Remarks
1	Radial-axial roller bearing	30214	$\varnothing 70 \times \varnothing 125 \times 26$	4	Tool magazine
2	Radial-axial ball bearing	6309	$\varnothing 45 \times \varnothing 100 \times 25$	1	



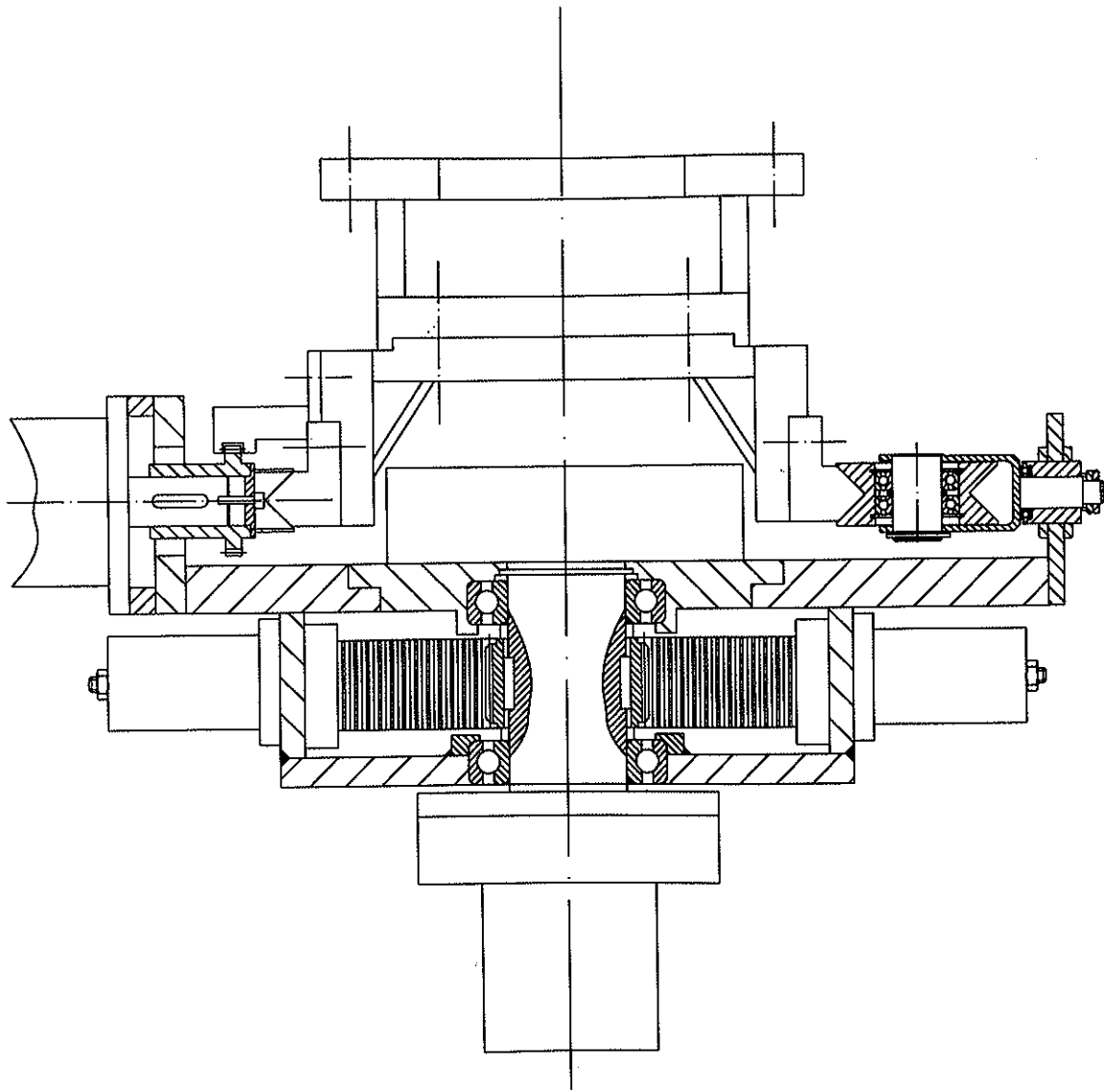
# HORIZONTAL BORING AND MILLING MACHINE AFT 130 P CNC

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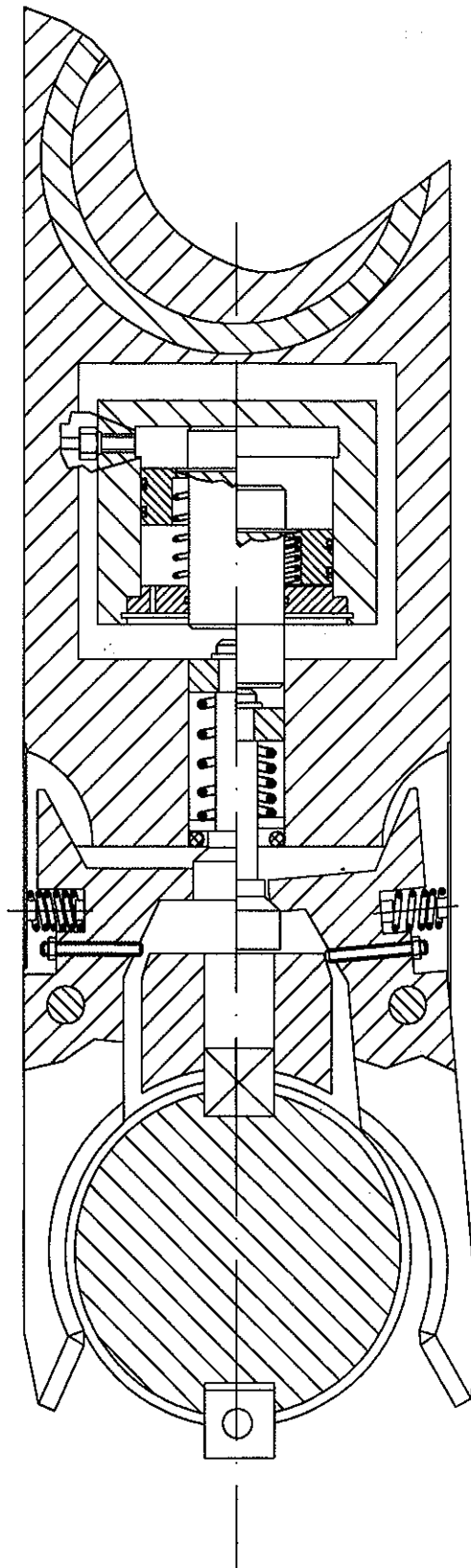
3	Radial-axial ball bearing	6209	Ø45xØ85x20	1	
4	Thrust bearing	51111	Ø55xØ78x16	2	
5	Radial needle bearing	NA4909	Ø45xØ68x22	1	
6	Radial ball bearing	6018-2RS	Ø45xØ68x22	2	
7	Axial ball bearing	5110S	Ø25xØ42x11	4	Mechanical head
8	Radial ball bearing	6004-RS	Ø20xØ42x12	8	
9	Radial-axial tilt roller	32220A	Ø100xØ180x49	2	Mechanical hand transport device
10	Radial-axial tilt roller	32040XA	Ø200xØ310x70	2	
11	Radial ball bearing	6038	Ø190xØ290x46	2	



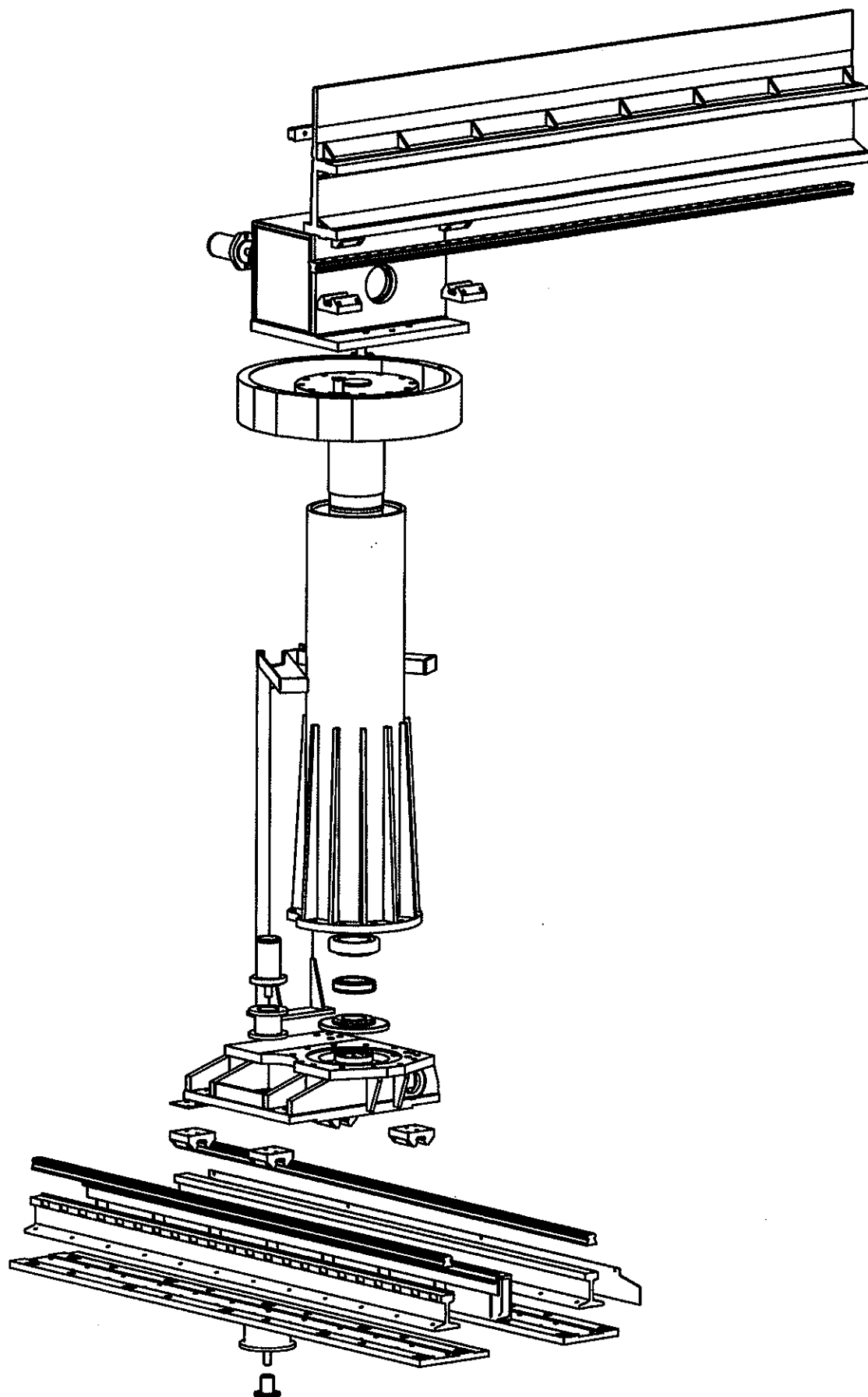
**MECHANICAL HAND**



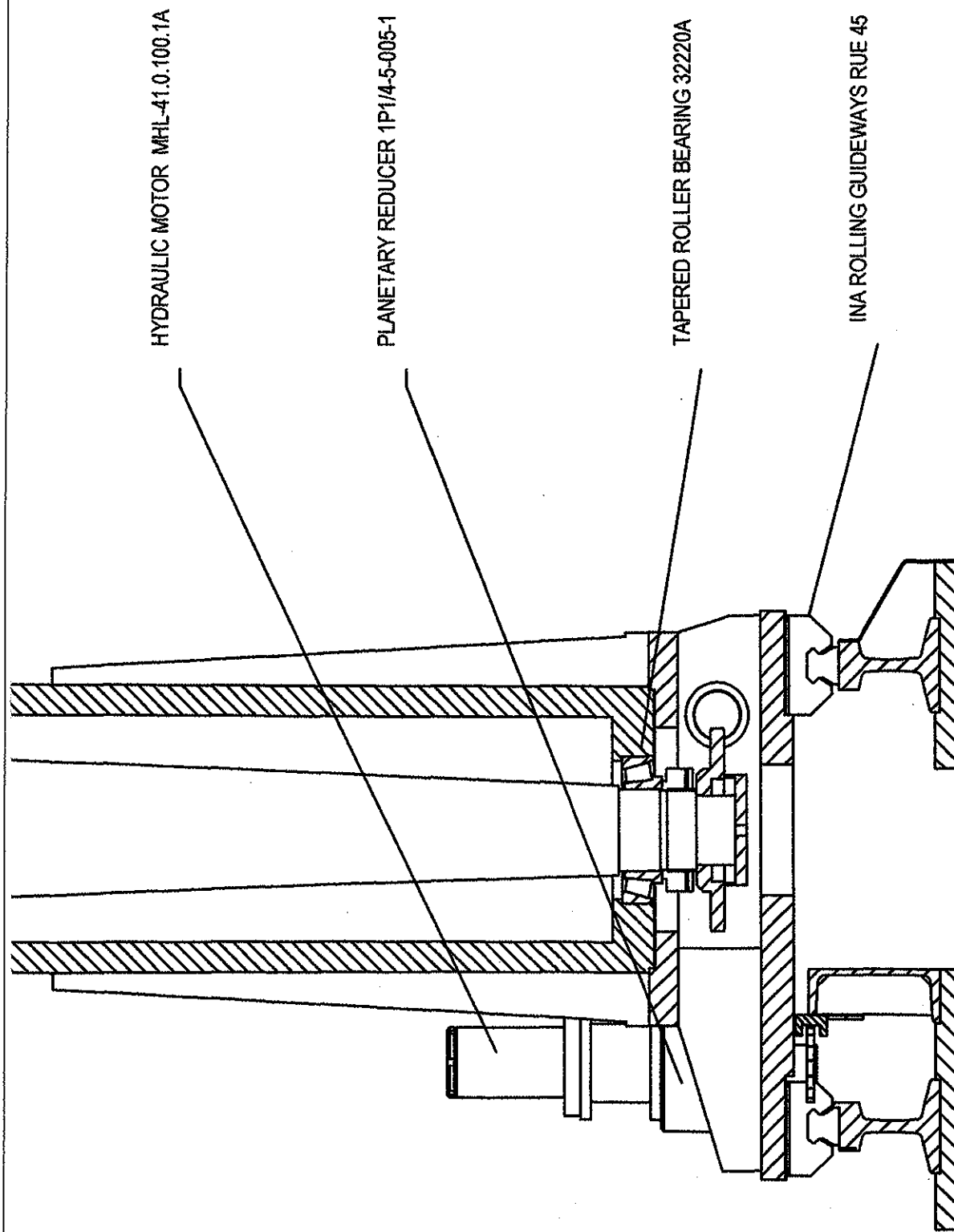
*MECHANICAL HAND*



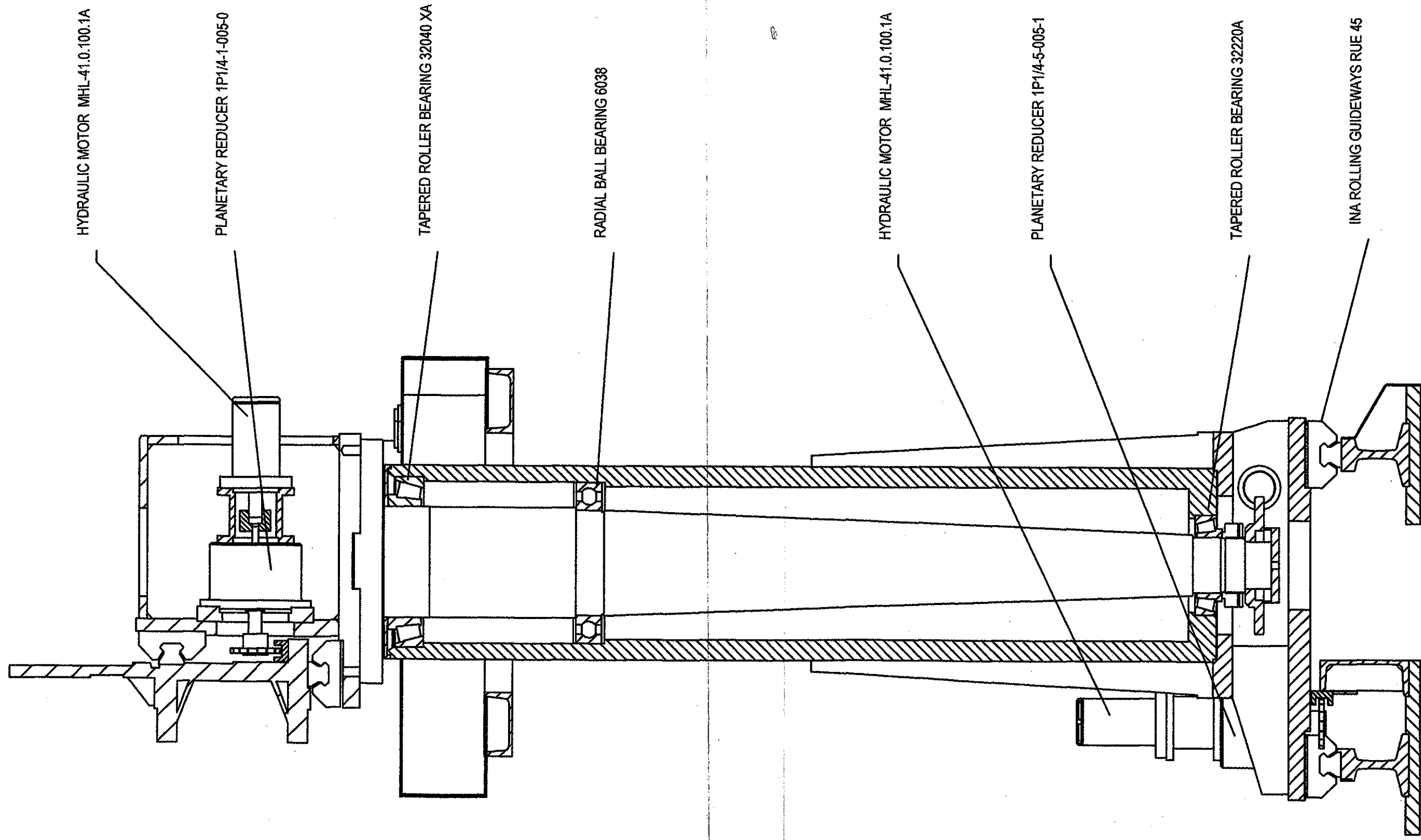
MECHANICAL HAND



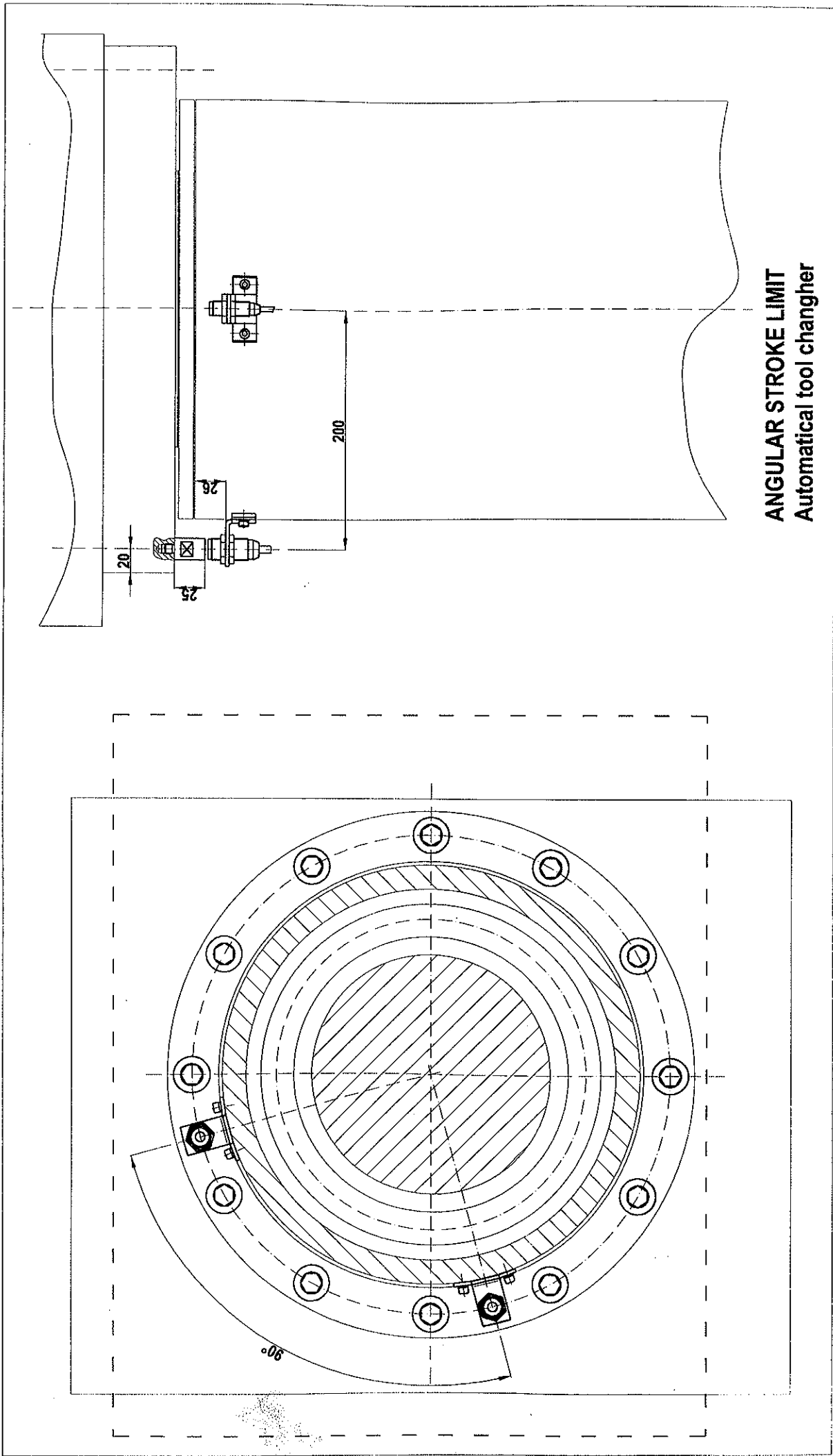
AFT 130-P AUTOMATIC TOOL CHANGER



## AFT 130-P AUTOMATIC TOOL CHANGER



AFT 130-P AUTOMATIC TOOL CHANGER



**ANGULAR STROKE LIMIT**  
Automatic tool changer



## **6. FUNCTIONING DIRECTIONS**

**(Machine description)**

### **6.1 Generalities**

The horizontal boring and milling machine AFT 130 P CNC type is designed with movable column and ram. The constructive solutions adopted provide a high accuracy and reliability to the machine as well as the travel and feed rates on the ten axes (X, Y, Z, W, B, P1, P2, M1, M2, T ) provide a wide range of machining possibilities, able to meet the customer's requests.

The machine controls are located on a pendant panel (designed such as to be moved by the operator close to the work area).

### **6.2 Column bed**

The column bed has a perpendicular position on the table bed, being made by special cast iron. It also has three hydrostatic guide-ways the main guide-way being placed in the middle. This bed allows the movement of the entire assembly formed by column saddle, column and headstock perpendicular on the movement of the table saddle. Portant guideways are plated with alloy steel hardened and ground ( $50 \pm 2$  HRC). Parallel to the bed on its rear side, it is placed the cable holder chain, for electric and hydraulic connection of the movable parts on the bed.

### **6.3 Column**

The functional role of the column is to sustain the headstock.

The column is made of special cast iron, by having a ribbed construction with double walls, which provides a particular rigidity.

The headstock travels along the vertical guide-ways of the column (Y - axis). The column is fixed to the bed by means of screws .

On the upper side of the column, another important subassembly is mounted, that is the roller support which provides both the leading screw bearings on Y axis.

The headstock balancing is performed by hydraulic piston . It is linked to the headstock by a five wire ropes.

The guideways are alloy steel plated of 50 HRC  $\pm 2$  hardness.

#### **6.4 Headstock**

The headstock features a special cast iron prismatic close construction, which is provided with stiffening walls and ribs.

The headstock performs the Y axis travel, by its mixed friction sliding along the vertical guide-ways of the column, through the ball screw nut, which is mounted inside the headstock.

The headstock guideways are made of antifriction bronze. These are applied upon the cast iron body of the headstock by means of a special adhesive and additionally fixed by brass screws.

For headstock column guideways backlash overtaking, 3 sets of bronze wedges are provided. One set is designed for main guide-way backlash along the boring spindle axle overtaking and the other two sets, located within the closing counter-plates (front side and rear side) are designed to take over the backlash along the perpendicular direction to the boring spindle.

Between the closing counter-plates, both on the front side and the rear side one plate with 7 clamping piston is provided. These pistons act directly onto the rear surface of the column guideways.

In order to prevent and take over the headstock upsetting torque an additional guiding based on 3 pre-stressed needle bearings by means of nuts, is provided. On the opposite side of the boring spindle, the arm and the main drive motor are located.

The headstock accommodate also the bushing for cooling the main spindle bearings. This bushing is provided with axial holes through which the cooled oil in a close circuit flow. The headstock is provided with automatic accessories clamping devices. The headstock balancing is hydraulic.

#### **6.5 Milling Spindle**

The spindle assembly is composed of the milling spindle and the boring spindle.

The milling spindle is tubular shaped and features a high rigidity. Its front side is provided with slots for guiding and using various tools and devices.

The milling spindle bearing within the headstock is performed as follows: 4 radial-axial bearings 71940ACD-P4-QBCA type is provided for its front side. Two bearing is provided for the rear side, these are radial-axial bearing 71938ACD-P4-ADBA type.

Both front side and rear side bearings are pre-stressed by means of nuts.

The main spindle bearings are lubricated with oil mist using Willy Wogel equipment.

Two alloy steel bushings 0,5 mm thickness nitrided inside are mounted on the milling head.

The gear box is a ZF made planetary gear reducer with two steps(1:1;1:4). Belt transmission between gear box and milling spindle is  $i = 41:76$ .

There are as well the bronze wedges, which transmit the motion to the boring spindle by taking this motion from the pulley of the teeth belt transmission and the tool training pieces. The heavy-duty regime work is not admitted unless the two tool training pieces are mounted. The boring spindle is located inside the milling head. Its external diameter is 130 mm. The maximum rotational speed for the main spindle is 3000 rpm.

## **6.6 Boring Spindle**

The boring spindle is guided inside the milling head by means of nitrided bushings. It has a tubular construction and its front extremity is provided with an BT 50 tapered boring, which allows automatic tool clamping and unclamping by means of the mechanical - hydraulical system located inside the boring spindle. The pulling rod permits tool cooling through spindle. Tool cooling is also available through out side headstock. The boring shaft taper is provided with air blow for dust removal.

The boring spindle is made of alloy steel. Both its external surface and taper for tool clamping and unclamping are nitrided on a 0,5 mm thickness, which means a  $860 \div 950$  HV hardness after hardening. It is also provided with two diametrically opposite wedge slots ensuring the wedge sliding along Z- axis travel = 1000 mm.

The rear side bearing consists of two radial-axial ball bearings 7020 CTA P4 TBT(100x150x24=3pcs) type. These are mounted within the special cast iron bearing of the arm. This one is actuated by the ball screw nut, which creates the Z axis feed motion.

Boring spindle locking is hydraulically performed, by means of bronze pistons, located both sides of the arm bearing.

Additionally, locking by the electromagnetic brake mounted to the ball screw shaft can be used.

## **6.7 Automatic Tool Clamping - Unclamping Mechanism**

The tool clamping -unclamping mechanism is located inside the boring spindle and of the back bearing body.

Tool clamping - is mechanically performed by means of a disk-springs set which actuates, through a rod, a tweezers system which draws the intermediate part fixed into the BT 50 tapered bore.

Tool unclamping is achieved by means of a double action hydraulic drum, which compresses the disk-springs set, thus releasing the shank.

The total stroke of the drum is of 14 mm (6 mm of empty running and 8 mm of active travel).

The machine doesn't work unless the tool clamping is confirmed.

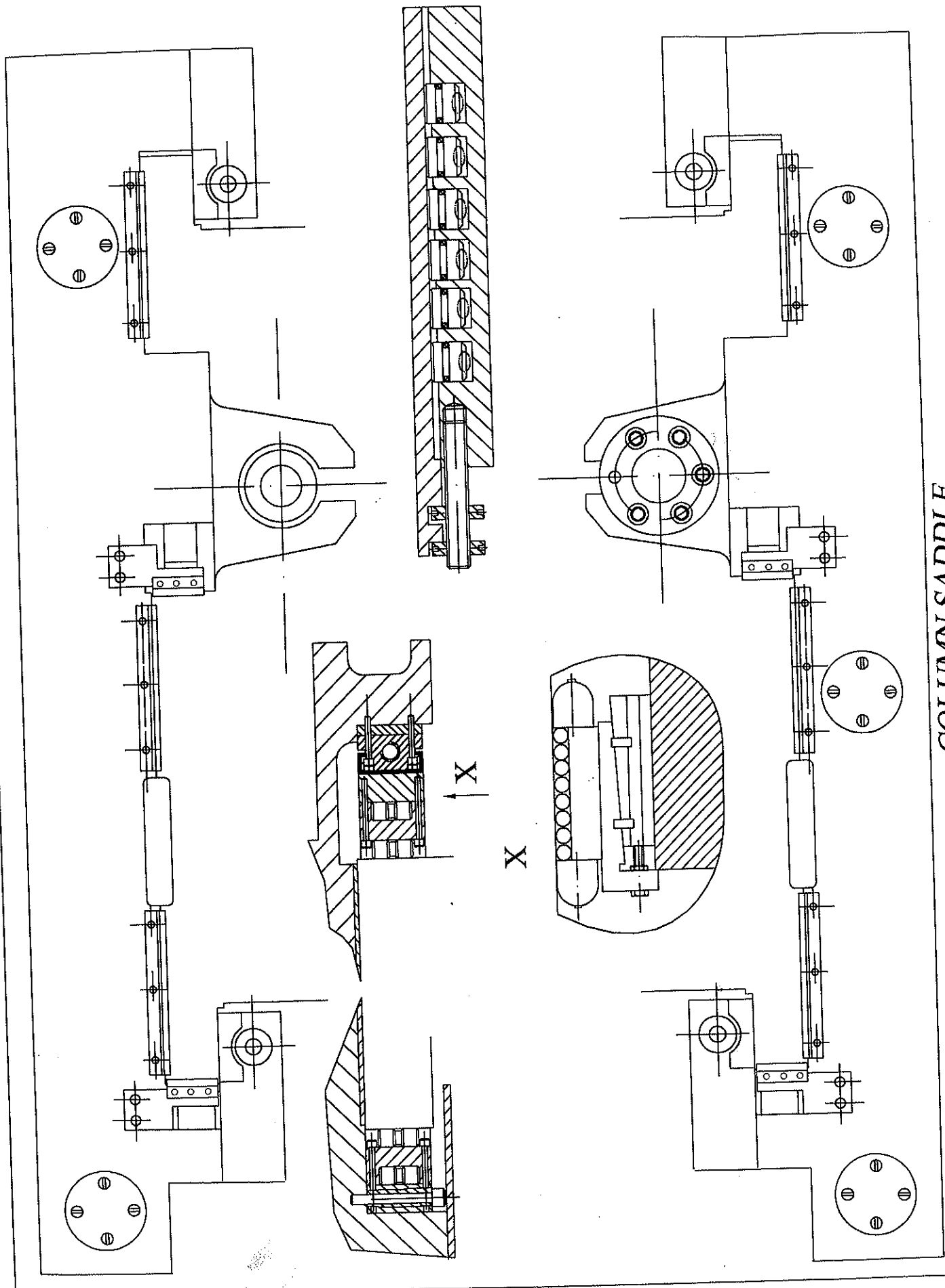
This confirmation is done by means of a proximity induction detector of BES 516-105-BO-C\* type. It is located on the rod extremity.

In order that the piston not to remain in contact with the tool clamping rod nut (which provides the rotation with the boring spindle simultaneously) a detector to confirm the piston withdrawn position (the withdrawn empty running travel is of 6 mm), is provided. Its type is CM 3359.

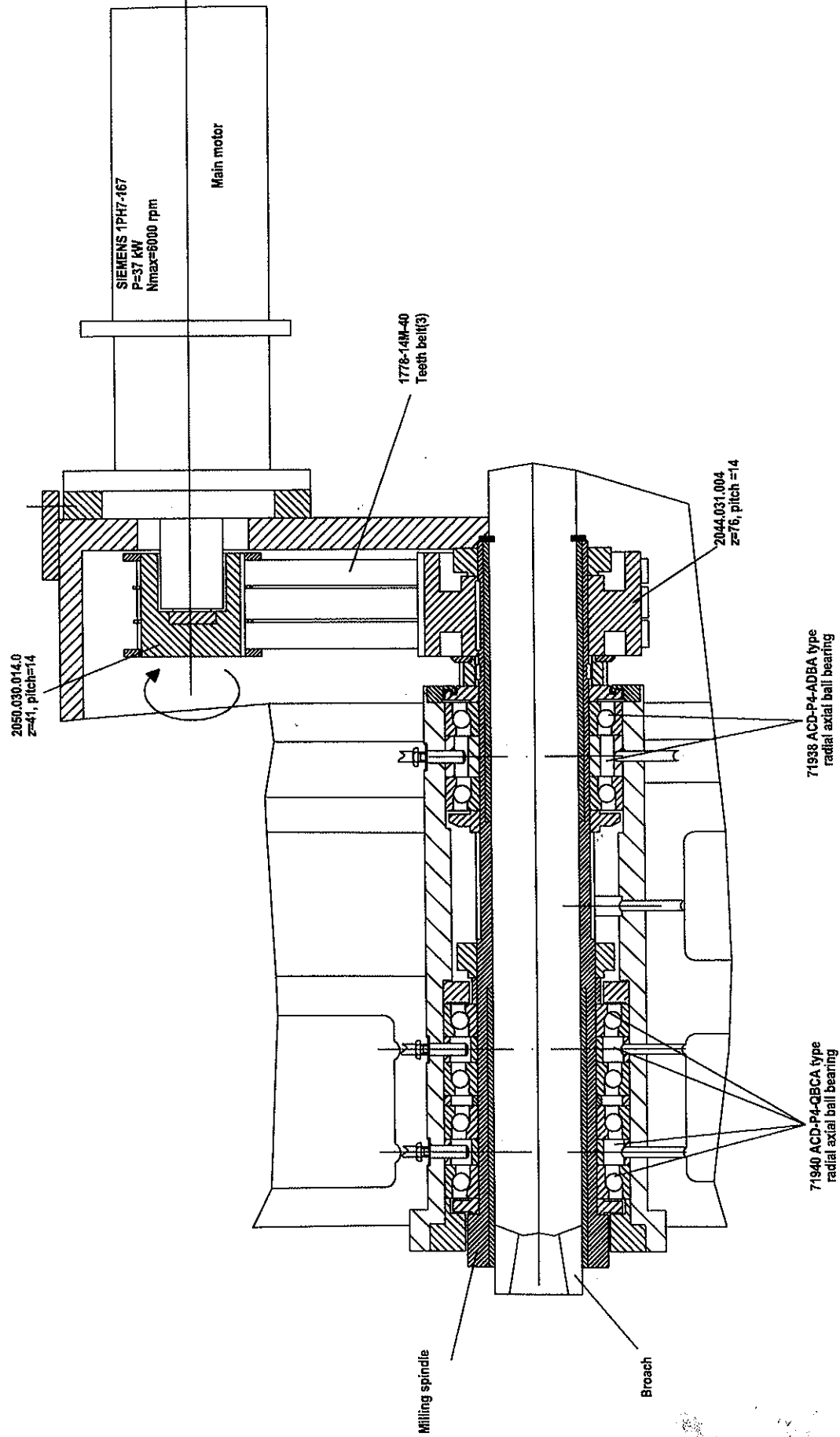
The disk-springs set is made up of 84 disk-springs ( $\Phi 50 \times \Phi 25,4 \times 3$ ) with the characteristics as mentioned in the picture.

Running manner of the spring's packet for tool holding.

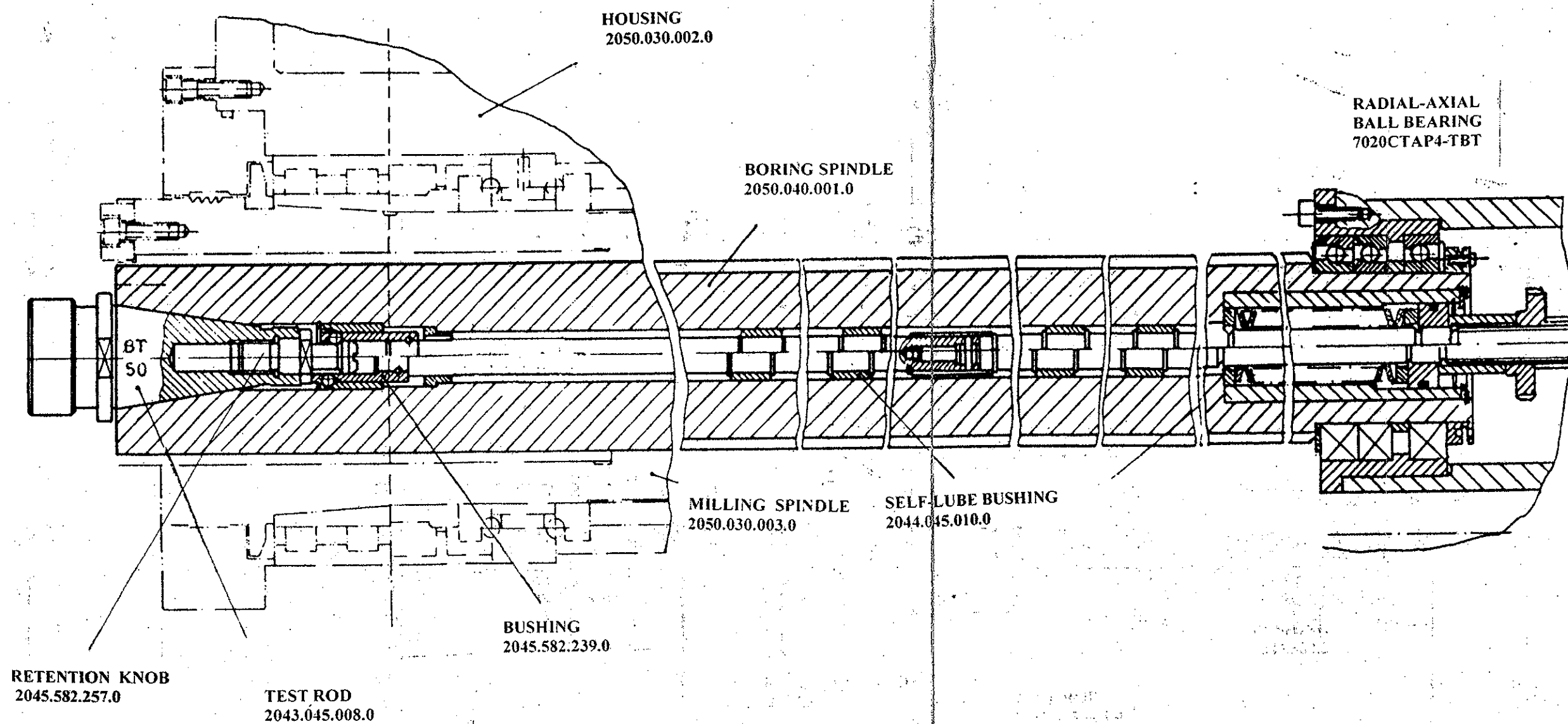
Stage no.	Stage springs	Springs packet length (mm)	One spring elong. (mm)	Springs packet force (daN)	Remarks
1.	Free state	298.2	0	0	Theoretical situation
2.	Pressed state	279.0	0.457	1390	Situation in which it not does exist tools with cone in the bore shaft and pressure in cylinder for tool travelling, neither.
3.	Fixed tool position	275.75	0.534	1624	Towards to the 2 stage the rod the rod has made a travel of 3.3 mm. (0,129")
4.	Raveled tool position	267.75	0.725	2144	Rod travel for tool raveling is 8 mm. (0,314") towards to stage 2
5.	Completely squeezed	252	1.1	3180	Theoretical situation



COLUMN SADDLE



## MAIN SPINDLE TRANSMISSION



TOOL CLAMPING  
INTERNAL TOOL COOLING



### **6.8 Arm**

The arm has a cast iron construction being rigidly fixed on the rear side of the headstock. It is of open type and both the back bearing of the boring spindle and the tool clamping-unclamping drum are sliding inside it. The bearing slides along two rectilinear guideways. The locking of its travel is hydraulically performed by means of locking parts made of bronze, equally located on the two guide-ways.

Inside the arm the bearings of the ball screw for the boring spindle feed (Z-axis) are located, as well as the cams for travel limitations on the same axis.

### **6.9 Rotary table**

#### **6.9.1 Table bed**

The main component of the rotary table supporting the entire construction of product is made in a welded structure. The bed has 2 guide-ways plated with hardened steel thin plates. The bed is sustained on the foundation by means of leveling blocks and locked to those by special foundation bolts.

The guiding surfaces are protected by means two telescopic covers. The ends of the maximum travel on saddle are limited by special mechanisms sensing extreme position as follow:

The microswitches block is fitted on the saddle and the cams support is fitted on the both ends of the bad.

On the bed are also fitted assemblies as ball screw bearings, saddle displacement feed box, the drag cable chain support .

#### **6.9.2. Slide**

The slide is made of special cast iron. Guide ways in contact with the table bed are plated with bronze. The slide upper side is provided with special table , prepared for pallet receipt and clamping.

The slide guiding accuracy along the table bed is provided by backlash taking – over and adjustment roller – packs system. On the slide mirror 10 exterior and 3 interior pockets are provided for hydraulic weight discharging of table and work-piece. The lubrication is hydrostatic type. The pump and oil tank are positioned inside the slide. The slide is not provide with blocking devices.

#### **6.9.3. Rotary table**

The table is made of special cast iron . The table two circular guide-ways are turcite plated.

Table is specially prepared for pallet clamping , achieved by means of 6 hydraulic cylinders ( located inside the machine table ), providing 10.000daN force .

8 angular fixtures , positioned on the machine table ( tow rows of four pieces each , with angled surface following 2 perpendicular directions), provide the pallet accurate positioning and the required stability while machining . An extra support, with spherical top surface, on each corner of the table provides an additional stiffness to the pallet clamping. 20 pistons inside 2 blocking plates provides table clamping. Table is also provided with 4 closing plates positioned in each corner of table.

All fixtures and supports are air blown for cleaning , before each pallet changing. The pallet clamping is confirmed by increased air pressure in blowing system due to contact between mating surfaces.

#### **6.9.4. Pallet system**

Pallet system consists of two pallet stations , positioned so that pallet change is possible at the ends of table travel ( $X1=X2=4000/2=2000\text{mm}$ ) , giving the middle position for the table ( table axis is in the same plane with spindle axis).

Pallet linear travel from the “ rest station “ towards the machine table, is achieved by means of two roll ways (supporting rolls are placed inside the pallet and the direction rolls on the roll ways ends ).

When pallet is taken over, table roll ways are in the same plane ( matching ) with the rest stations ways and when clamping the pallet on the machine table , ways go down 25mm , actuated by 6 clamping cylinders .

Pallet transfer towards and from the machine table is achieved by means of ball screw on each rest station .

After pallets tacking over , rest stations top plate rotates  $90^\circ$  in order to free the work area of the machine table .Rest stations top plates drive is achieved by hydraulic motor , and gear transmission .

Each end position of moving elements ( pallet lifting – going down , pallet change , top plate  $90^\circ$  rotation ) is provided with limit switches for position confirmation. When large work-pieces are to be machined(max. 5.5M) the rest stations can be moved in perpendicular direction to table bad( 1210mm stroke). Rest station supports are mounted on 2 roller packs guide-ways. The feed mechanism is of variable speed motor, planetary gear reducer ,teeth belt transmission and ball-screw.

End strokes are confirmed by micro-switches. Because of safety reasons the pallet changing position(to machine side) is defined by mechanical buffers because.

The pallet rest station turrets are provided with hydraulic indexing cylinder to prevent  $0^\circ$  and  $90^\circ$  position accidental rotation.

When mounting pallet onto rest station turret the roll support cod:2050.150.010.0 should be oriented in opposite direction to machine headstock.

**ATTN:** Work pieces center of mass should be positioned on pallet symmetry axis.

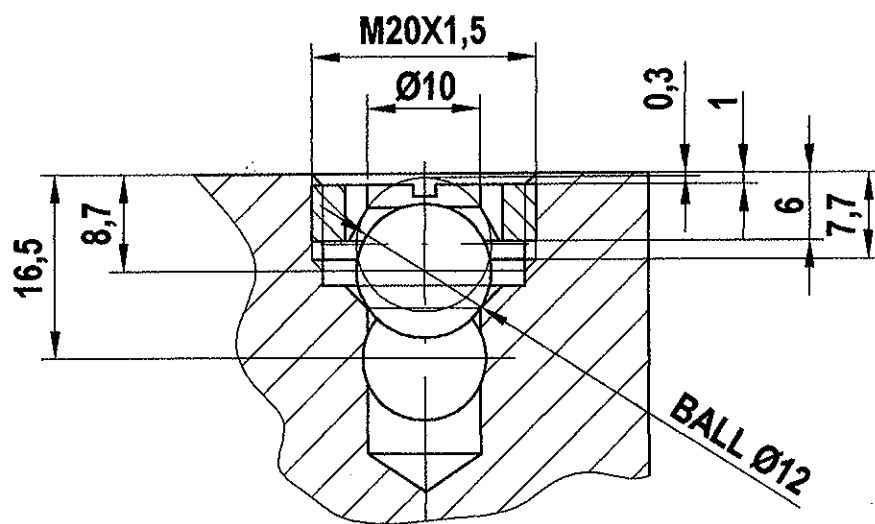


TABLE SLIDE AIR-OIL VALVE

A - A

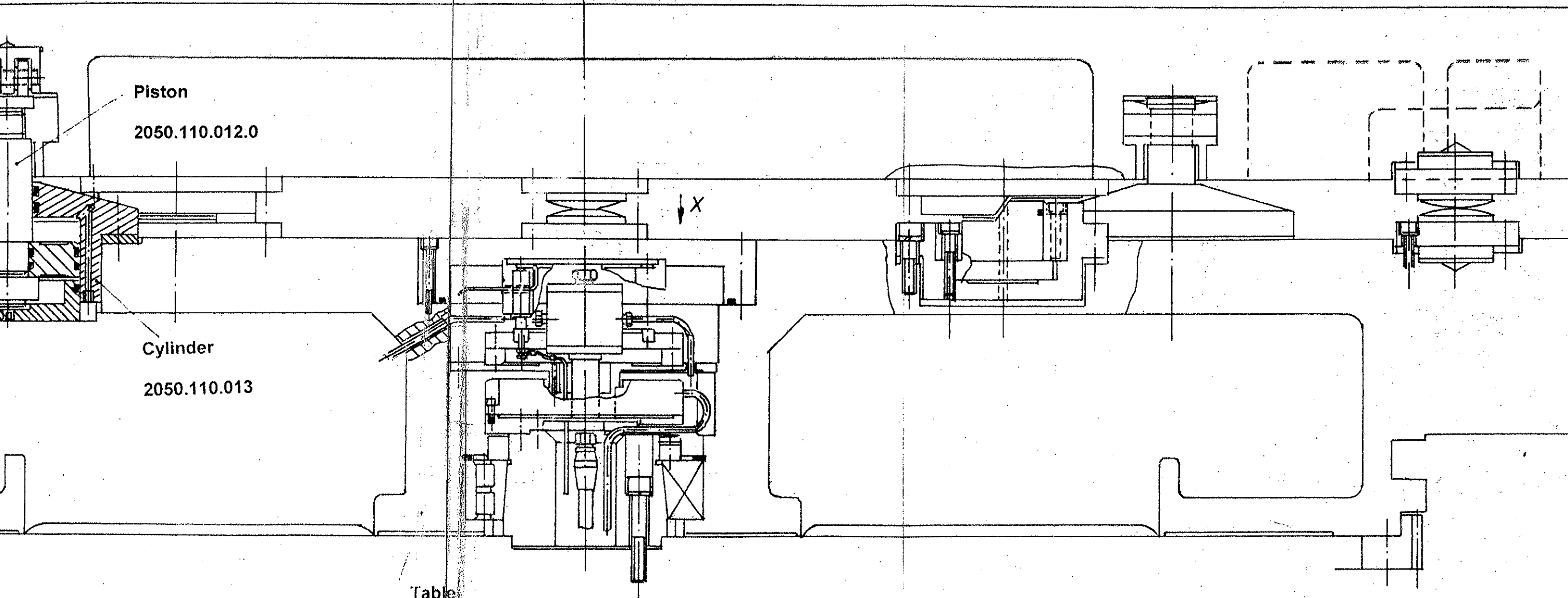


Table  
2050.110.001.0

"X"

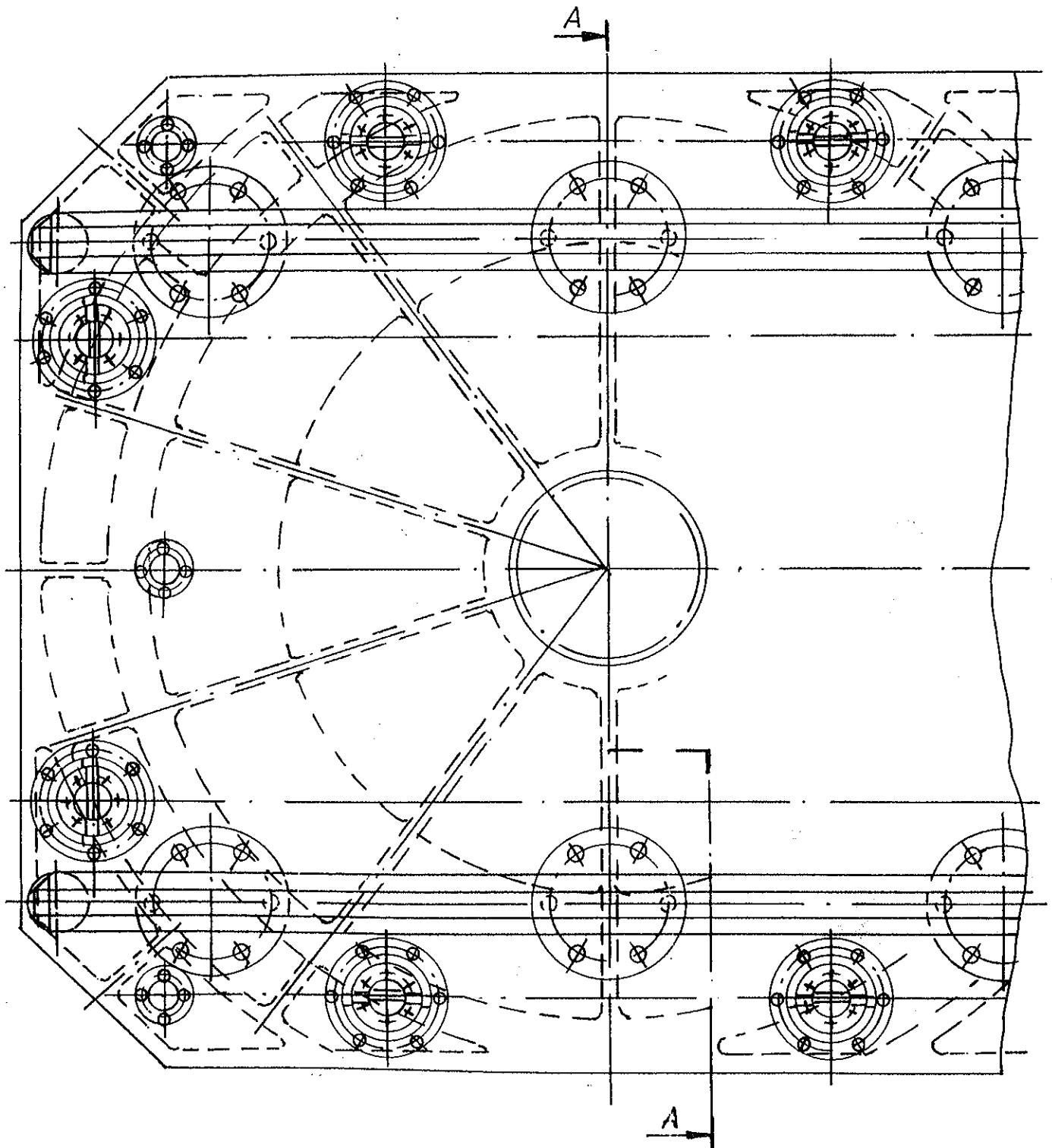
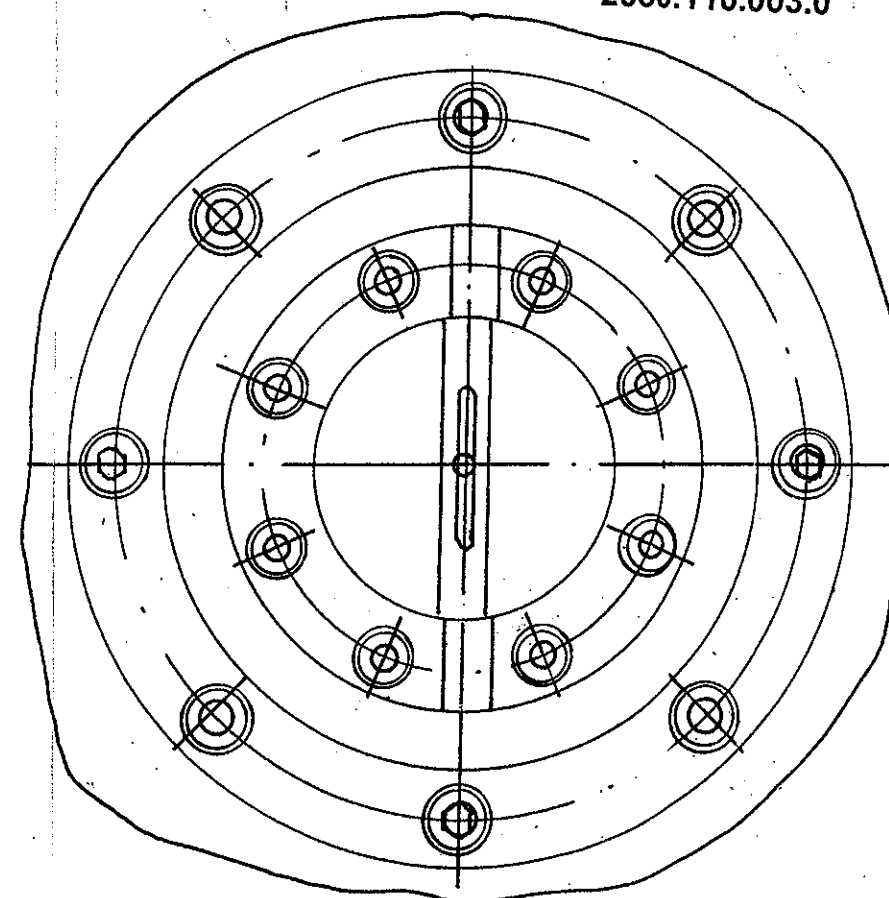
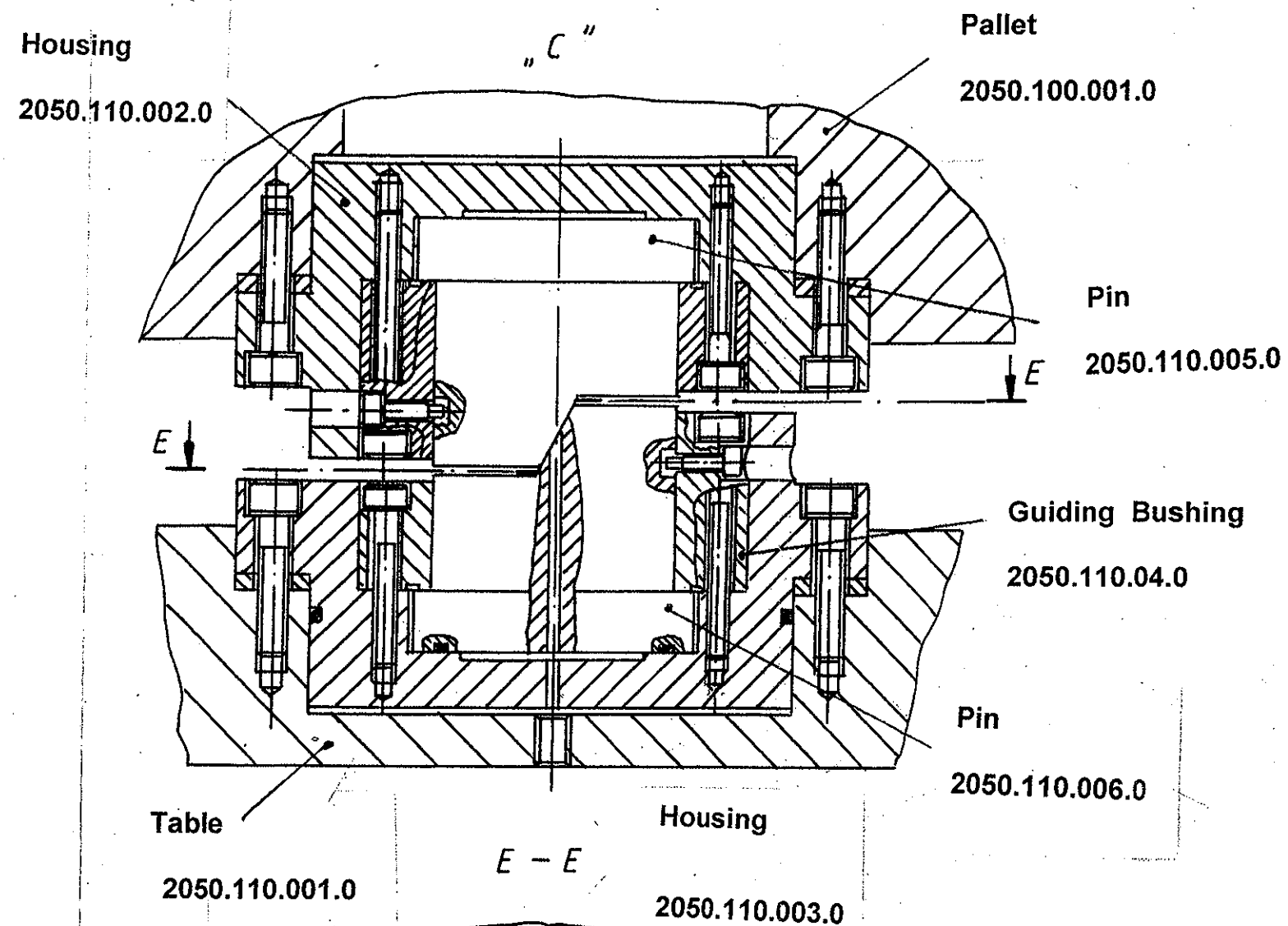
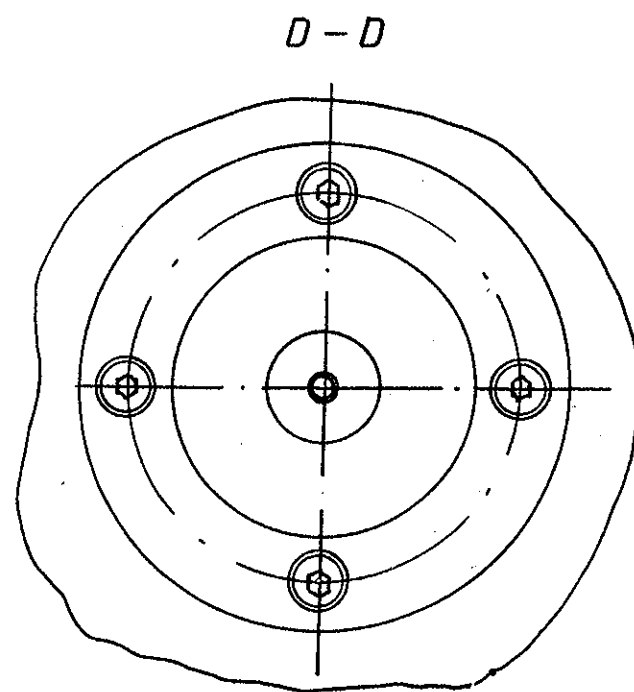
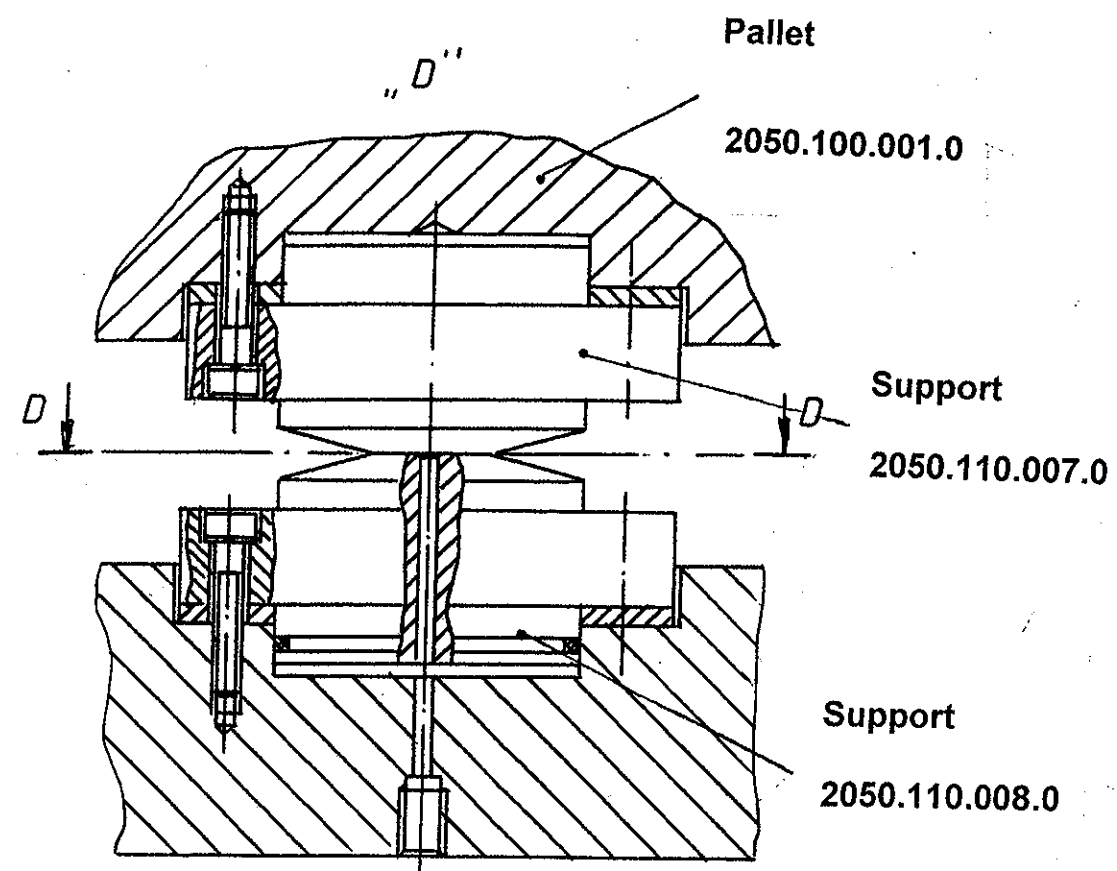
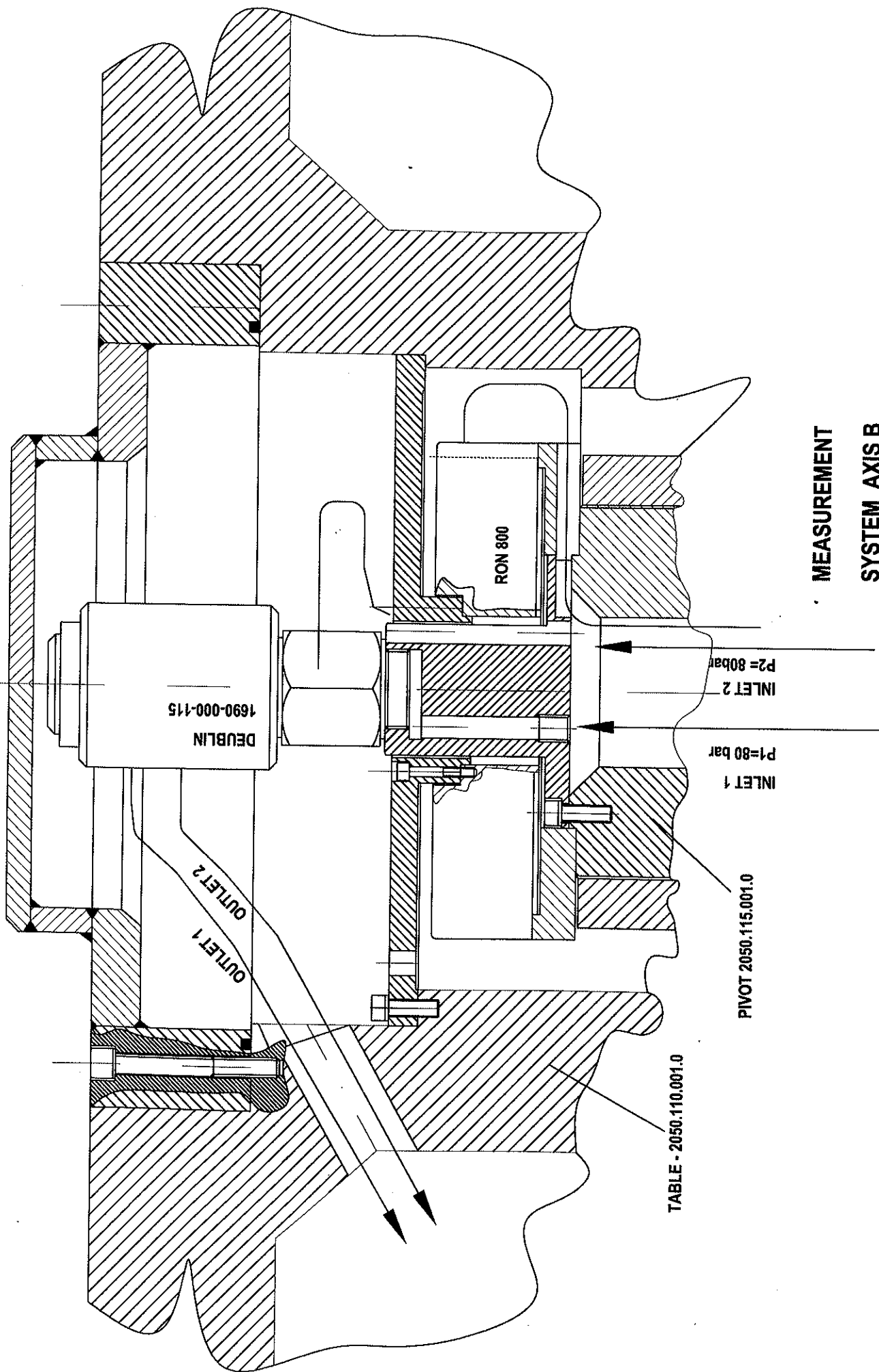


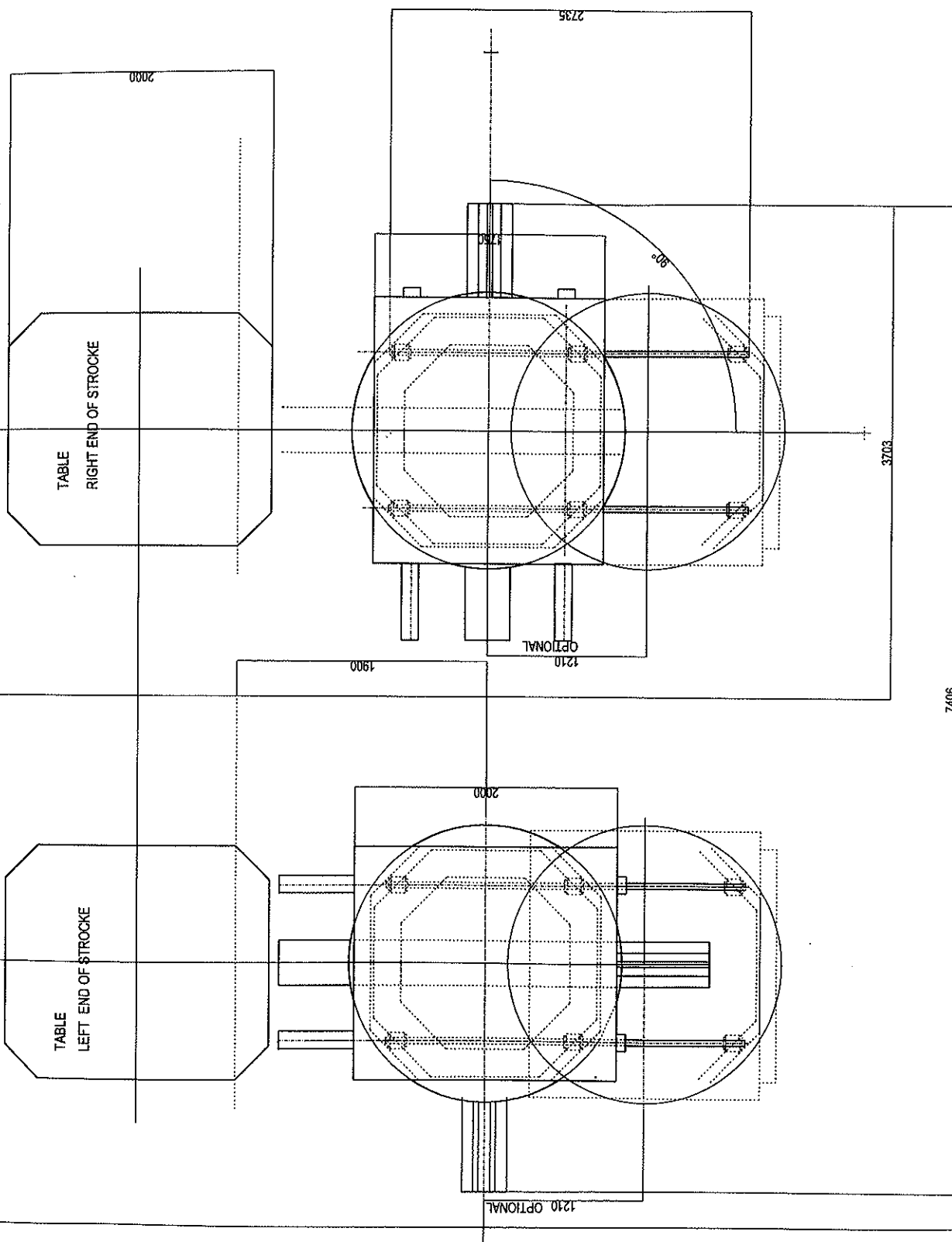
TABLE 2/3





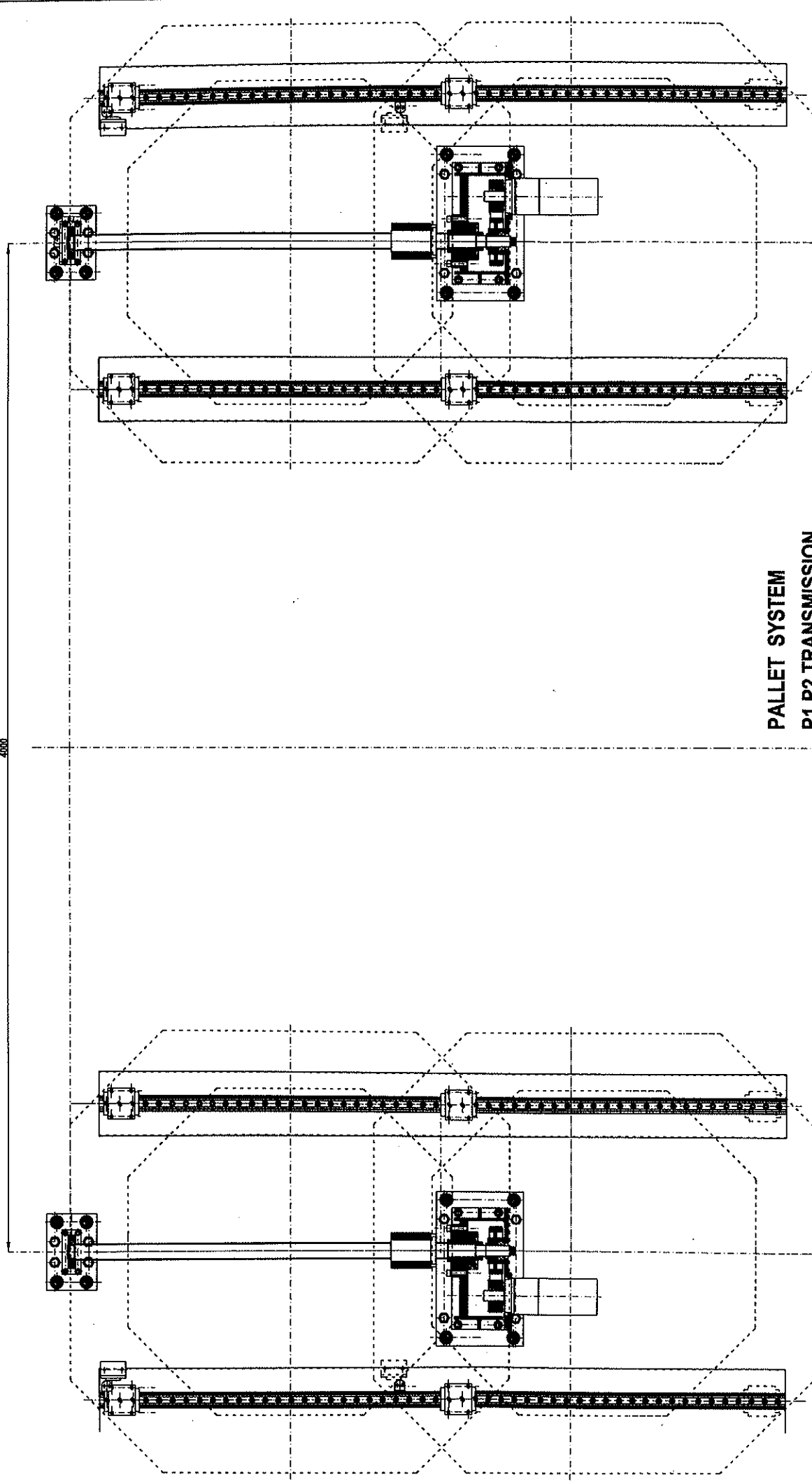
# AFT 130-C.N.C.-P PALLET SYSTEM

7406

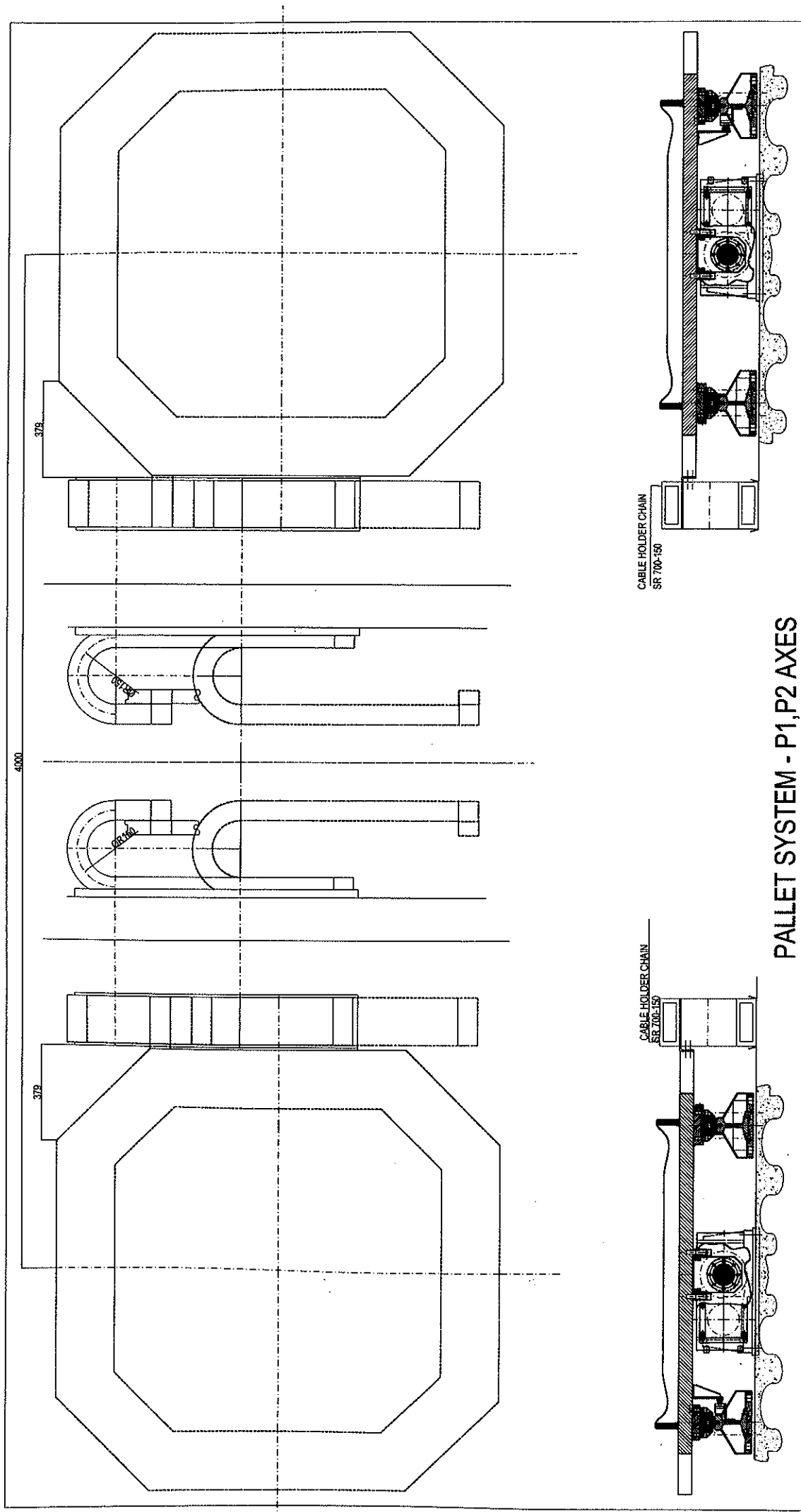




4000



PALLET SYSTEM  
P1,P2 TRANSMISSION



PALLET SYSTEM - P1,P2 AXES