VSS s.r.o.

Kosice Slovakia

Cap-Frame Eccentric Press SMERAL

Type LE400C

TECHNICAL PASSPORT-OPERATING INSTRUCTIONS MANUAL (ENGLISH)

F O R E W O R D

The submitted technical manual for the KJH 2 machine is envisaged for the guidance of technologists, technical superintendents, shop foremen and instructors, the same as for maintenance personnel and repairmen.

The present manual would fail in its purpose if those named above did not become acquainted with the information it contains. Full attention should, therefore, be paid to the instructions given below.

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K o š i c e

LE 400 C

Operating instructions - validity according to 4-D-01 1065.1

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4/N/06 1089.3/A 1/1

RECORDS ON MACHINE

/All records on machine displacements and repairs are to be stated on this page/

data	record	signature
	Inventory No.:	
	Delivered by:	
	No. of order:	
	Date of delivery:	
	Guaranted till:	
	Date and place of erection:	

GUIDING PARTICULARS OF MACHINE LE 400 C

Type of machine	mechanical single-frame excentric press
Type	LE 400 C
Manufacturer	VSS, s.r.o. Košice
Year of production	1999
Classification number	231 500
Overall machine width	2 900 mm
Overall machine depth	1 550 mm
Overall machine height	3 610 mm
Machine height above floor	3 360 mm
Total net weight of machine	24 000 kg
Operating motor voltage	
Frequency of network	
Total machine input	30 kW
Operating compressed air pressure	0,6 MPa
Total consumption of sucked air for one clutch engagement	33 dm^3

Inventory number

Supplier

No of order

Guaranty valid till

Place and date of installation

4-N-08 1023.3/A 1/1

LIST OF STANDARD ACCESSORIES

1. Upper ejector in ram
2. Bolster plate
3. Grease gun with armoured hose
4. Oil can
5. Pneumatic unit for adjusting the ram
6. Ratchet and worm box for adjusting the stroke length
7. Hand lever for fly-wheel turning
8. Spare safety breaking pieces 2 pcs
9. Foundation material, bolts and plates
10. Wrenches: ČSN 230610.2 - 8 x 10, 13 x 17, 19 x 24
    ČSN 230625.2 - 30, 36, 46
    ČSN 230651 - 50
    ČSN 230710 - 8, 17, 19, 22
    ČSN 230659 - handle
11. Various coupling material: screws, nuts, washers
12. Electric material to connect the distribution box with the machine
    cable CYKY 4 x 10 mm^2, 24 x 1,5 mm^2
    armoured packings, split pins
13. Tin box
14. Silamid tube 6 x 1 - 4000 mm
15. Joints, connections
16. Hose for lubrication ČSN 231492.2 - 16 x 500
17. Technical passport - instruction book
18. Foundation plan No. 1 - 21 - 9002 - 006

Complete standard accessories are supplied with the machine:

Date: Signature:

SPECIFICATION

Maximum pressure at the endof the stroke	4 000 kN
Depth of threat	450 mm
Stroke, adjustable within	30-160 mm
Maximum distance between ram and table	630 mm
Ram adjustable downwards by	120 mm
Nominal number of strokes	40 l/min.
Admissible number of single strokes	20 l/min.
Area of bolster plate	1 250 x 895 mm
Drop hole in bolster plate	Ø 400H8/370 H 11 mm
Thicknessof bolster plate	140 mm
Bolster area	1 250 x 900 mm
Bolster drop hole	630/360, Ø 450
Ram holding area	950 x 560
Output of electric motor	30 kW
Speed of electric motor	14 600 l/min.

The dimension and the shape of the holding surfaces is evident from the table of holding facilities.
The sketch A shows the tool holding area of the table. The dimensions of the bolster plate and araangement of tool holding slots are evident from the sketch B. The sketch C shows the clamping area of the ram. The accentric shaft is provided for the feed drive.

TOOL HOLDING CAPACITY AND FACILITIES

The measurements and profile of the clamping areas are given in the tables showing the tool holding capacity and facilities.
Sketch A shows clamping area of table
Sketch B shows clamping area of bolster plate
Sketch C shows clamping area of ram

Shut height of working zone

The lengbh og the ram stroke can be set according to requrement. It is set by swivelling the eccentric bush on the eccentric shaft. The total of the set eccentricities determines the total length of the ram stroke.

The calculation of the shut height of the working zone is based on the distance of the middle of the ram stroke path /ram travel/. The distance of the middle of ram travel /from the working area of the press table/ is calculated on the basis of press technical specifications - half the maximum length of the stroke has to be deducted from the minimum distance of the ram from the table area. When the ram is set for any length of stroke and provided the press is correctly set up, half the length of the ram stroke is performed above and half the length below, the middle of the total stroke. It follows that the maximum shut height resulting from the ram stroke is obtained when from the distance of the middle of the ram travel, half the maximum length of the stroke is deducted.
/Distance between table and ram in its bottom reversing point is minimum./

The minimum shut height resulting from the ram stroke is obtained with the ram set for the minimum stroke - half the lenght of the minimum stroke is deducted from the distance of the middle of the ram travel. /The distance between the table and ram in its bottom reversing point will be maximum./

The length of the ram stroke remaining unchanged, a further decrease of shut height can be obtained by adjustment of the ram downwards. The magnitude of the adjustment is deducted from the respective shut height resulting from the length of the ram stroke.
When working with the bolster plate the thickness of the bolster plate is deducted.

Springigg "opening" of working zone

Magnitude of springing "opening" of working zone in relation to loading is shown in the accompanying diagram.

F = loading of press - kN
A = "opening" of working zone including clearances unavoidable during press construction
B = springing "opening" of pressframe

APPLICATION - OUTPUT OF MACHINE

The LE eccentric presses are heavy-duty machines designed for serial production of pressings including shallow drawing. They are currently used for cold and hot shearing, trimming, cutting and bending parts of ferrousas well as non-ferrous metals.
The maximumpressure of the LE 400 C eccentric press is 4 000 kN which corresponds to a sheared area of approx. 10 000 sq. mm for material of 392 MPa strenght.

With medium lenght of stroke H_m = 95 mm, the maximum pressure can act at most 20° prior to bottom dead point.
The working pressure at various crank positions and stroke lengths is shown in pressure diagram Tab. No. 4-T-13 1040. It must be borne in mind thateven if the press is not loaded with a higher pressure than 4 000 kN, its drive andeccentric shalt can be overloaded by a larger torque and the electromotor by taking off the excessive quantum of energy. If, therefor, the servise life of the press is not to be shortened, both conditions must be adhered to, i.e. the press must not be overloaded either by exceeding, the rated pressure or by overpassing the permissible torque. When the press operates with single strokes, 20 cluth engagements p.m. canbe employed at most. More than 20 engegements p,m. would result in excessive heat as well as the mechanical stress and wear of cluth, brake andvalves, which,would cause quick shortening of the machine service lifeand would endanger the safety of attendance and press operation proper. For this reason, it is recommended to apply as far as possible repeated strokes or continuous operation, but only when the total energy required for pressing does not exceed 50 percent of the rated energy.
The rated useful energy of the press is intended for single strokes and is determined by the produck of the rated pressure and of the distance between the ram and bottom dead point, the crank being rotated through 20° and the stroke being set to mean length of H_m = 95 mm.

Therefore

$$A_{nom} = P_{nom} \cdot h_{nom}$$

$$\text{where } h_{nom} = \frac{H_m}{2} - \frac{H_m}{2} \cdot \cos \alpha$$

$$h = 47,5 - 47,5 \cdot \cos 20^{\circ}$$
$$= 47,5 \cdot /1-0,939/$$
$$= 47,5 - 0,061 = 2,9$$

$$A = 400\ 000 \cdot \frac{2,9}{1000} = \underline{\underline{11\ 600\ J}}$$

Since the press drive is dimensed for the above-mentioned values, the required energy for pressing must not excced the rated energy of the press, otherwisw the flywheel speed would decrease and the ram might at the bottom dead point, i.e. in the tool. When calculating the energy and pressure required for a certain job, it must be borne in mind that the necessary pressure cannot be reliably determined by current methods of calculating.

There is a number of factors /such as blunting tools, incorect play, unsuitable rounding off of edges, deviations of thickness and strength of material, as well as of its temperature, etc. /which increase the actual pressure, but it is very difficult to include them accurately in the calculation.

In orddr not to overload the press and thus not to reduce its service life, the calculated pressure must be increased by at least 30 percent. This ultimate value is valid for choosing the size of machine.

If, for instance, a required pressure P = 230 mp has been calculated and if the maximum stroke H = 160 mm is to be used, the pressing may start at most 20° before the bottom dead point, i.e. at distance of 6 mm above the bottom dead point.

This position corresponds namely with the point at which the product of tangential force and the radius $\frac{H}{2}$ equals the maximum admissible crankshaft torque. With increasing distance admissible crankshaft torque. With increasing

distance of the ram from the bottom dead point, i.e. with an increassing angle $\gtrless \alpha$, and with the radius $\frac{H}{2}$ remaining the same, the utilizable pressure decreases. if, for any reason, the angle is to be increased and the pressure P istto remain unchanged, the length of the stroke /radius $\frac{H}{2}$/ , must be decreased in order to prevent the permissible torque being exceeded.

For the rough orientation, the diagram Tab. No. 4-T-13 1040 can be used showing the approximate stroke length in relation to the required pressung P and to the thickness of the sheared sheet or to the depth of drawing. There is namely assumed that the distance of the ram from the bottom dead point must be at least the same as the thickness of the sheared sheet or the depth of thedrawing.

If, for instance, a sheet of 10 mm thickness is to be sheared and the required shearing pressure is 20 000 kN, the stroke H upto 120 mm or less must be elected. Especially in case of drawing, the recounting of the required working energy must not be omitted.

When cutting with a pressure exceeding by 50 per cent the rated press pressure especially when cutting a harder material $\sigma > 588$ MPa, a too sudden cutting--off the materiál may occur, whereby the energy accumulated through the springing of the upright and of the crank mechanism, violently increases the inertial mechanism, violently increases the inertial force of the ram The inertial force exceeding cinsiderably the proper shorkin pressure a feck the ball screw conecction of the ram and theconecting rod. It is therefore necessery to cut-off the pressing succesively to prevent the ball screw and its bearing from being overstreassed.

TECHNICAL DESCRIPTION AND PRINCIPLE OF MACHINE

The LE power gap frame eccentric press consists of following functional groups:

1. Frame
2. Ram
3. Countershaft
4. Clutch - Brake
5. Ram balancer
6. Unit drive
7. Control apparatus
8. Air distribution
9. Lubrication
10. Guards
11. Electric equipment

The kinematic diagram of the machine is shown in the table 4-T-14 1011.1. The basic part of the press is the frame welded of a steel cast piece and plates. The ram /1/ suspended on a ball screw screwed in the connecting rod is guided in prismatic adjustable gibs and is provided with anoverload release and a mechanically operated upper ejector. The distance between the table and the ram can be changed by screwing the ball screw into the connecting rod. The stroke length can be changed within given limits by turning the eccentric sleeve provided on the eccentric shaft.

The machine is driven by V-belts /2/ from electromotor /3/ through the flywheel /4/ keyed on the countershaft /5/. In the flywheel a friction diaphragm clutch interlocked with the brake with metal ceramic elements /6/ is mounted.

The engaged clutch transmits the motion from countershaft by means of the gears /7/, on the eccentric shaft /9/ mounted in two bearings. The rotating motion of the eccentric shaft is transformed by the connecting pin /10/ into a rectilinear motion of the ram.

The machine is electropneumatically controled, which enables an easy attendance and safe operation. The lubrication is central, the oil under pressure being supplied by an automatically driven pump.

SETTING UP THE MACHINE

The foundation is made of rammed concrete according to the enclosed foundation plan /1-21-9002-006/.

The local conditions and the soil bearing power are to be taken into account when building the foundation. A detailed calculation will be made by the customer's building contractor.

The frame and foundation plates for fastening the foundation bolts are to be embedded in the concrete. All foundation accessories, i.e. ribbed plates for covering the foundation pit, the frame, foundation bolts and plates are supplied by the manufacturer. The machine must be set up on properly set concrete to prevent any latter setting down.

On the foundation built in accordance with the foundation plan, the upright is set up and levelled with 0,1 - 0,15 mm accuracy within a 1 000 mm length. Levelling is to be checked by means of a precise water level which is placed on the cleaned bolster, namely in both the lengthwise and crosswise directions. After setting up and levelling the upright, the heads of the foundation bolts are inserted into the foundation plates, swivelled by 90° and the nuts are slightly tightened. The machine is grouted and after the concrete has set, the foundation bolt nuts are tightened. Then assembling the machine can begin, under supervision of a manufacturer's erector who will specify the assembly process.

To facilitate levelling of the upright, it is recommended to set the same on tapered support plates. Prior to setting the upright on its foundation, the foundation bolts are to be hung in corresponding holes in the upright or put in the foundation holes.

DESCRIPTION OF MAIN PARTS OF MACHINE, THEIR OPERATION AND MAITENANCE

The chief of department is responsible for the good condition of the machine, must be acquainted with it and solve on one's own all operation problems. Maintenance, repairs and possible transfer, too, are to be carried out by specialists, who are perfectly conversant with the machine function.

It is very importat to become well acquainted with the machine and its operation-before starting it. Special attention should be paid, in particular, to its lubrication and maintenance.

Ten principle rules of correct handling:

1. The correct setting up of the machine on its foundation and correct adjustment are the basic conditions of accurate performance.
2. Only a skilled worker who is perfectly conversant with the machine function, should be entrusted with the adjustment.
3. Neither tools nor other objects should be laid on the guide and functional surfaceb of the machine.
4. Prior to starting each shift, clean the machine of dust and impurities.
5. Do not clean the machine with compressed air, which drives impurities between the moving parts, thus causing quick woar and puts the machine out of operation prematurely.
6. Do not underestimate the inspection of the lubrication system and proper machine lubrication. Correct distribution of lubricant eneures the long service life of the machine.
7. Do not neglect to inspect functional parts - clutch, brake, slide-valve, cam-this prevents accidents.
8. Do not overload the machine. Overloading causes early wear of the press.
9. Check the play of the ram guides, this will increase the service life of your tools.
10. Adhere strictly to the operating and maintenance instructions. Their careful observance ensures precise operation, a long service life and prevents accidents.

In order to maintain a good check on the condition of the machine, it is recommended to keep a machine inspection book in which is recorded all regular inspection results, defects which have been detected, their causes and the manner of repairing them.

F R A M E Fig. 8 4-T-20 1025.1

The frame is welded of two parts. The front part of the press frame /1/ is of cast steel, the rear frame part is made of steel plates. For anchor bolts the holes are provided in machine bottom plate for fixing the machine to the foundation. The table /10/ is provided with a drop hole and with two tool holding slots of T - shape /size 28 according ČSN 02 1030/. These two slots can be used for the direct tool holding, as a rule, however, they serve for holding the bolster plate /9/. The bolster plate /9/ is provided with the same slots. The spacing of these slots and the size of the bolster plate drop -hole are apparent from the table showing the tool holding facilities. The circular opening in the bolster plate is adapted for employment of the pneumatic cushion equipment. Underneath the table there is sufficient space for a bin to receive the dropping pressings. At both sides of the table, boxes are provided for fixing the terminal board and air distribution system.

On the front of the rame are the ram guide - ways /6/. The ram is guided by two adjustable gibs. For adjusting the correct play between the adjustable gibs and the ram, the set screws at the guideways sides are used. The play values are specified in the inspection accuracy record of machine.

In the rear part of the frame, the openings /7/ are provided for mounting the countetshaft antifriction bearings.

The plain bearing /4/ is mounted in the upper part of the frame, two bearing bronze bushes /3/ for carrying shaft are mounted in the flange /2/ axially adjustable by the screws /5/ in the rear welded part of the frame.

Defects which may occur and their remedy:

The guideways and gibs should be kept clean and well lubricated.
Inadequate lubrication can cause the ram to seize.

CLEARANCE IN PLAIN BEARINGS AND SLIDING WAYS

Manufacturing clearance in the bearings of the eccentric shaft:

0,30 - 0,40 mm /0,012 - 0,0158 on/. in the front bearing
0,20 - 0,30 mm /0,008 - 0,012 on./ in the rear bearing.

An excessive increase of clearance in these bearings results in noisy run of the gearings and their wear.
Manufacturing clearance in the connecting rod eccentric bush is
0,13 - 0,18 mm /0,005 - 0,007 in./.
Excessive increase of this clearance results in "knocking" in the bottom reversing point of the ram.

After the above mentoined clearance, have increased to about their double, it is recommended to replace the bronze bearing liners with new ones.
During the acceptance test, the ram travel is checked for accuracy with the guiding strips adjusted for an overall clearance of 0,05 mm /0,002 in./. For normal operation, however, the strips are adjusted for a mean clearance of 0,1 mm /0,004 in./. Generally, depending on the job and accuracy required, this clearance is set within 0,07 - 0,155 mm /0,0027 - 0,006 in./.

For rough works with heating it is necessary to increase the clearances above the given values. The clearance magnitude depends on the steady state ram temperature.

R A M Fig. 9 4-T-20 1045

The rotating motion of the eccentric shaft is transformed by the connecting rod /1/ into a rectilinear motion of the ram /2/. In the connecting rod is screwed-in the ball screw /6/ locked against getting loose by the insert /3/ with two tightening screws. This arrangement enables the distance between the table and the ram according to the designed height of the applied pressing tool to be changed. The ram can be adjusted by maximum of 120 mm in the upward direction. When adjusting the ram air pressure in the balancer is to be set to 4 atm.g. and then two screws of the insert /3/ are to be loosened. A pneumatic tightening unit /23/ is put on the square of the ball screw shaft /4/. After opening a cock the compressed air is supplied through a hose into said pneumatic tightening unit. By turning the screw /4/ the screw wheel /5/ is perated transmitting the motion on the ball screw. By turning in clockwise sense the distance between the table and the ram decreases, which can be roughly watched on the gauge /22/. When rotating in the anticlokwise sense the ram drops. After having adjusted the necessary distance, the air supply cock is to be closed, the tightening unit to be removed and the screws of the insert /3/ to be tightened. The ram is suspended on the ball of the ball screw by means of the ball insert./7/. The ball insert is positioned in a flange screwed in the ram. During the operation the pressure of the ball screw is transmitted on the ball screw bearing plate /8/. The paly between the ball screw is transmitted on the ball screw bearing plate /8/. The paly between the ball screw and the ball screw bearing plate with the ball insert should be approximately 0,05 mm. If this play increases due to wear up to the maximum of 0,25 mm, it must be reduced to the initial value, i.e. 0,05, by grinding the lower circuit of the ball insert in the ram flange. Below the ball screw bearing plate in the ram cavity the insert /10/ is placed which prevents the press from being damaged by overload. The machine being excessively overloaded the release crushes down. When exchangring the crushed release the cover /13/ must be dismantled. Only the safety inserts supplied by the producer can be used for replacement. It is not allowed to replace safety inserts produced by the machine user as this can result in serious damaging of the machine.

Vypracoval:	Schválil:		Nahradzuje:
Preskúšal:	Dňa:	Zmena	Dňom: Podpis:

On the lower part of the guide gibs the bracket /14/ with setting screws are fixed which bear against a rule of the upper ejector. These setting screws must be set with each stroke lengthh change. The upper ejector being not used, we recommend to screw out the setting screw in order to prevent them from being damaged. In the transversal ram space the rule /9/ of the upper ejector is inserted. The upper ejector operates so that the rule is brought into the upper position in the ram cavity by means of the pin passing through a vertical hole in the clamping shank of he tool. When the ram after having completed the stroke returns in the upper dead point, the projecting rule end bears against the setting screws screwed into the brackets /14/. The ram completes the upward motion and the rule borne against the setting screws drives out the pin off the shank of the tool and looses the pressing off the upper part of the pressing tool. Prior to starting the operation with a new tool, the stroke and the distance between the ram and the table being changed, don't forget to adjust the setting screws of the ejector. Incorrectly adjusted screws can cause the bending of the setting screws of the ejector or the loosening of the brackets.

In the lower ram surface a cylindrical hole in provided for putting in the tool clamping shank,. The clamping shank is clamped by the jaw /11/ which is tightened by means of the screws /12/. On the shaft eccenter is slid-on the eccentric sleeve /15/ which is on its rear side provided with a saw-type toothing /16/. In the front wall of the eccentric sleeve is inserted the packing piece /17/. The saw-type toothing of the eccentric sleeve and of the eccentric ring are pushed into mesh by the nuts /18 and 19/ bearing against the packing piece /17/. These nuts are locked by screws.

The stroke is adjusted always with a stopped electromotor. First, the screws of the nut /18 and 19/ are loosened and the nuts are screwed off at least by 15 mm. Then the screws /20/ attaching the safety plate /21/ to the connecting pin are loosened. The eccentric sleeve is to be shifted off the shaft so as to bring the saw-type toothing out of mesh. On the toothed rim the stroke adjustment unit /table 4-T-22 1022/ is to be put and the eccentric

sleeve is to be turned by a lever with a ratchet put on the shaft square of the adjustment unit. The stroke length is to be adjusted according to the scale stamped on the face of the eccentric sleeve. The adjustment unit is to be removed and the eccentric sleeve is to be shifted up to the frame.
We must see to it the saw-type toothings intermesh in a correct way. The nuts are to be screwed-in and locked by tightening the screw.

Defects which may occur and their remedy :

During the machine operation still increasing temperature of guide surfaces has been stated. This is caused by a taugh ram motion chich may result of:

a/ too tightened guide gibs
b/ insufficiently lubridated guide surfaces
c/ guide surfaces going to get seized

These defects can be remedied in following ways :

a/ the guide gibs are to be loosened and the play in the guide ways is to be adjusted so as to correspond with the acceptance record,
b/ the tubricating piping is to be checked and oil supply to be renewed,
c/seizings on guide surfaces are to be removed by scraping the gibsand ram guide surfaces.

Attention!

ECcentric ram load is restricted by the machine construction.
Ramming operation must not be affected by lateral forces. Unit pressure to the sideway of the ram must not exceed 2,5 MPa.

REPLACEMENT OF PRESSURE SAFETY DEVICE , Fig. 10 4-T-20 1078

If the rated pressure of the press is exceeded, the pressure safety device is crushed.

1. To ensure that the safety device retains its ability to resist to the desirable extent even after being replaced and to avoid continued damaging of the press, it is necessary to see that the bearing surfaces of both the safety device and ram are thoroughly cleared of impurities. Grushed particles of the safety device remaining on the bearing surfaces after crushing of the safety device prevent the replacement safety device seating correctly. Possible damage caused to the bearing surface /rises around scratches/ has to be rectified. If these hints are neglected, the safety device may be crushed even at lower pressures.

2. On a lid serving to close the cavity housing the safety device is fixed a bent metal sheet piece, which presses the safety device against the rear wall and thus ensures its centring. During the crushing of the safety device, this sheet piece is deformed. Therefore, it is necessary to bend it again and to see that the safety device is again pressed against the rear wall. When the safety device is left loose, it may occur that, due to its shifting, it is loaded eccentrically and that it breaks even at a low pressure. When the bearing surfaces are seriously damaged, they can be rectified only by remachining and by putting a new metal plate on them. The bent hodingdown metal sheet piece must not be replaced by a solid holding-down bolt, block, etc. If such a non-floating coupling is provided, sudden deformation of the crushed safety device would threaten the safety of the machine operator.

3. The pressure safety device is made of high-quality grey cast iron of a minimum tensile strength of 25 kp/sq.mm. The specified hardness of the machined surfaces is 180 - 240 Brinells. The profile of the safety device, as shown on the accompanying sketch, corresponds to a carrying capacity which is by about 20 % higher than the rated pressure of the press. For safety reasons, no modifications on this device, in respect of profile and material, must be carried out without our consent.

3.0 Along with the production of the security insert of 422425 quality the certificate according to 421241.19 must be issued.

3.1 Chemical composition "Se" in narrow range of 0,90 - 0,93

3.2 Tensile strength of separately cast bars according to ČSN 422425, minimum strength 250 Nmm^{-2}.

3.3 Casting hardness 170 - 200 HB is to be measured after grinding the upper front face "H" and the measured value is to be stamped in place of "N".

4.0 Melt number and wording LE 400 cast in the casting in place of "T" and not to be damaged!

5.0 "K" necking-down dimension is to be selected and carried out in dependence on the stamped hardness value in place of "N" according to the diagram; at dimensions of Ø $220^{+0,1}$ in place of radii R 1 we do not allow any pouring defects.

CLUTCH - BRAKE , Fig. 11 4-T-21 1015/A

The press is equiped with multiple disc friction type clutch-brake with membrane pressure space. The clutch sets in motion the eccentric shaft, the brake steps it, and that is why they are to be maintained properly and kept free from any defect.

The clutch is actuated by compressed air, the pressure of which shall be high enough to make clutch-engaging smooth and without slipping. The required pressure is checked by a pressure switch which disconnects electric current supply into control cirsuit when the air pressure is not sufficient and thus prevents entry of compressed air with unsufficient pressure into clutch cylinder.

The clutch is is built in flywheel /1/. Thy flywheel is mounted on bushing /2/ by means of two antifriction bearings /3/ that are separated from each other by the spacing bushing /4/. Against axial shifting the flywheel is ensured with sover /5/. On the grooving of the clutch shaft the disc /7/ is placed, with which by means of screws /8/ and pins /9/ the middle plate /10/, with rivet lining /20/ is connected. The middle plate /10/ touches with one friction area the supporting plate /11/, firmly connected with the flywheel by screws /12/ and spacing bushing /13/. Between the spacing bushing /13/ and the supporting plate /11/ there are washers /17/. The trusting plate /14/ guided on spacing bushings /13/ touches the other friction area. The piston /15/ formed by plate is located in a pressure space, generated in the flywheel and sealed by the membrane /16/.

The compressed air is supplied in the direction of the slutch axle into the branching /18/ and under the cover /19/ to the membrane /16/.

After the clutch is engaged, the pressure distributor lets compressed air, in the clutch axle direction, through the tubes into the space under the membrane. The membrane bends under the pressure of compressed air and shifts

the piston and the thrusting plate that in its turn presses the middle plate and its lining against the supporting plate. On the ground of existing friction the revolving flywheel connects with the clutch shaft which sets in motion too. The pinion of the clutch shaft transfers torque to the gear which is keyed on the eccentric shaft and press stroke results.

Clutch disengagement is performed by an automatic cam, which by means of the limit switch disconnects the compression air supply to the clutch. Piston and plates returns to their normal position and the clutch shaft is stopped by the brake, while the flywheel keeps revolving. Brake as well as the clutch is built in the flywheel. On the middle plate /10/ there is riveted a friction lining /21/. The friction lining /21/ touches the fixed plate /22/, which is fitted in the bushing /2/ and on the other side the friction plate contacts a movable plate /23/. Under the fixed plate there are adjustable washers /27/. The movable plate is tightened to the fixed plate /23/ by brake springs /24/. Functionally is the brake combined with the clutch through the force off screw /25/ and thrust bearing /26/.

When the clutch is engaged, the axial movement of the membrane and the piston is transfered through the thrust bearing and the force off screw to the movable plate which overpowers the brake springs and releases the middle plate as well asthe clutch shaft. After clutch disengagement the movable plate is pushed by the brake springs action against the friction areas and the brake stops the clutch shaft.

When the press is in operation, constant attention is to be paid to the functioning and adjustment of the clutch-brake system. It is neccesary to check, at one shift once a day, at two-shifts twice a day in amonth, the clearance between the thrusting plate /14/ and the flywheel /1/, the minimal size of which, when brake applied, is 3 mm /Fig. 14/.

When this clearance becomes less than 2 mm the clutch must be adjusted by means of washers 17 and 27 so that the thrusting plate /14/ does not touch the flywheel. If that should happen the bracking power would decrease and the personnel of the press would be endangered. The lining shall be checked for wear. When the lining is new, the thrusting plate rases at above 3 mm. If the thrusting plate rases more than 5 mm then it is necessary to adjust the clutch -brake by adjustable washers /17, 27/. By adding or removing the washers the plates shall be so adjusted that when the brake is applied, the clearance between the thrusting plate and flywheel has tc be 3 mm and the clearance between the plates and the friction lining presents approximately 1 mm.

When the clutch is engaged the clearance on both sides of the friction lining presents 1 mm.
When the clutch is engaged the clearance on both sides of the friction lining presents 1 mm. At every adjustment the thickness of the lining is to be checked so that it does not sink below the rivet line. Mind the minimum thickneess of the lining is approximately 5 mm, otherwisw the lining is to be changed for new one.

At two shifts it is necessary to check the membrane twice in a year, at one shift once a year. In case the grease penetrated the friction areas, through degreasing it is to be carried out.

Oiled up, worn or unproper adjusted lining and plates of the clutch may cause delay in actuation of the clutch slipping.

In these cases the brake can also be applied with time delay and the slide can get over the upper position. Brake is adjusted in accordance with the control device. The braking force can be set up to some expert by prestressing the brake springs..

ECCENTRIC SHAFT AND COUNTERSHAFT , Fig. 13 4-T-22 1025.1

The eccentric shaft /1/ is mounted in bronze bearings pressed in the frame. In the eccentric shaft /in front of its rear frame bush/ the gear /2/ is keyed intermeshing with the countershaft /3/. The pinion and shaft are made as one integral steel piece. The countershaft is mounted in two antifriction bearings /4 and 5/. The front bearing /4/ is accesible after removing the cover through the front hole provided in the frame. The rear bearing box is closed by the covers /6/.

Defects which may occur and their remedy:

a/ Antifriction bearings of eccentric shaft heat up considerably
b/ Gear run is noisy
c/ Axial play appears in countershaft

Causes and remedy of said defects:

a/ Probable seizing. Check grease supply. Scrape bushes and regrind eccentric shaft in their contact points.
b/ Worn bushes. To be exchanged.
c/ Loosening of cover /7/. Cover screw to be tightened.

CONTROL MECHANISM, Fig. 14 4-T-22 1063

In any of the regime whatsoever requiring change of instruments, stroke readjustment or ram readjustment takes place the change of inertial forces as well. In stroke readjustment changes also the eccentric position, which results either in not reaching or exceeding the upper dead center by ram.

On the machine there is a sequence cam switch connected within the control mechanism of the press. The latter makes it possible to set the press in motion in copperation with the switch changing over regimes according to the technological necessity. The proper switch /1/ is set in the rear of the stand up in beneath the gear cover. The drive is made out by means of double chains /2/, the cams being adjusted right in the assembly at the manufacturer, they need not be changed in the course of the machine operation unless, of course, the brake efficiency changes. The regulations of the cams in the switch is brought about by means of the control box /3/ mounted at the side of the stand. According to the indications of the plate /4/, chain wheels are turned in a certain direction in agreement with the stroke size change executed.

The effort to stop the ram in its upper position by means of the brake tightened leads to excessive wear of the lining, and the ram moves and stops in equal practically.

Control Mechanisms, Fig. 14

The press run is controlled by programmed switch VH 1 FO 5.

The adjustment of the programmed switch according to the cam shape developed /upper part of Fig. 12/ is determided by following requirements:

1. The starting position A corresponds to the upper dead centre. The ram is set to motion by pressing the knobs /individual strokes - two - hand lewering/. The knob should be held until position B has been reoched.

2. In position B, contacts K2, K3 resp. take over the function of knobs, the ram coming to a stop in front of position B. The adjustment of this position may well correspond to the standard ČSN 21 0711, part V., article 20 and 21 resp.

The principal press shaft may turn by a whole revolution only, if the coupling is controlled by the starting mechanism in the course of the working stroke. This control period may not be so short as to prevent, in quite a reliable way the infuries due to additional reaching into the working apace of the press with respect to the stroke size adjusted. Should the coupling be controlled for a shorter period of time, the working stroke of the press should be interrupted.

3. Behind the position C, it is not possible to start the press, due to switching off contacts K4 and K5 resp. by repeated pressing or keep it going continuously by repressing them. Practically, the switching off of the contacts K4 and K5 respectively follows right after switching the contacts K2 and K3 resp. into position B. The restarting may not take place until the contacts in position E at the end of the eccentric shaft, close in front of the initial position A has been switched on.

This adjustment is in agreement with the standard ČSN 21 0711, section V., article 28.

4. Position D indicates the onset of both the declutching and braking. The press ram is usually required to come to a stop in the upper dead centre after completing the stroke. In using the upper ejector in press ram, the ram is required to stop behind the upper dead centre. The stopping position in the upper dead centre changes in dependence of following influencies:

In every change of the mode of operation on the machine which was accompanied by the change of tools and by, adjustment of the slide-stroke, change of innert forces and also a change of the position of eccentricity take place. This is followed by the change of the position in which the slide stops.

In all these it is therefore necessary to provide for press run adjustment, i.e. for stopping it in the upper position by means of adjustment of program switch /switch control/. The program switch is provided therefore with an adjustable coupling /3/ which is on the inlet shaft. By means of this adjustable clutch it is possible to adjust stopping of the slide. The adjustment is performed by turning the worm /4/ which end is so designed as to make its turning by screw drive possible. For the purpose of reading the slide-holding position the program switch has an angular dial /5/ with an indicator /6/.

Program Switch Handling

The program switch is located on the right side of the press when taking the front view. The drive is transfered by means of chain gearing from the eccentric shaft, with gear ratio 1:1.

The cams become accesible after removing the cover. According to the aforementioned description there are two

cams intened for each of the contacts. Two and two contacts are coupled in series so that in the case of failure the slide cannot be set in motion. The fifth free cam can be used for feeding control or material insertion.

The cams are released by turning clamping sheets /1/. For this reason, the sheets are provided with cuts. The complete removal of segments and insertion of new ones is posible after slight forcing of the loosened clamping sheets. The clamping is carried out by reverse turning. This operation is carries out after main current switch has been turned off. The correct position of cams is set up in the manufacturer's shop and a new one has to be carried out when failure occurs or in the case of change.

UNIT DRIVE , Fig. 15 4-T-22 1008

The machinesis driven by the electric motor /3/ mounted in the cavity of the rear part of the frame. It is placed on the horizontal plate of the bracket /4/. Slots in the vertical bracket plate allow the bracket to be shifted vertically after loosening the bolts /5/. The vracket is lifted and lowered by the lifting screws /6/. When diamantling the motor, uscrew the screws/5/ and remove the motor together with the bracket. On the shaft of the motor, the polley /2/ is keyed, which drives by the V-belts, the flywheel of the machine.

The V-belts must be correctly tightened. Excessively released bets are subject to cross vibrations when running, tend to jump out of their groeves and slip. Correctly tightened belts vibrate elastically. If the belts are too tight, their service life is considerably shortened.

After several weeks of operation, during which the belts slacken slightly and their lengths consolidates, they are to be tightened again. When tightening the belts, loosen the screws /6/ and lower the bracket together with the motor. After completing the adjustment, the screws /5/ have to be firmly retightened. It is recommended to check the fixing bolts of the electromotor and the bracket once a week, in order to make sure that they have not become loose.

L U B R I C A T I O N, fig. 16 4-T-26 1022

The correct lubrication of the entire machine is an important factor in the trouble-free operation of the eccentric presses and theor long service life. The most important lubricating points are connected to the central forced feed lubrication system. The other are lubricated by hand, either by a pressure grease gun or by a drip oil can.

The oil tank is located inside the frame on the right hand of the machine when viewed from the front. The filler of the tank is in the upper part of the fixing flange pluged with a plug. Always fill oil through the fine sieve located in the filler. The front part of the tank is made of organic transparent glass so that the oil level in the tank can be inspected and refilled if necessary. Below the flange there is the drain openning closed by a plug with packing.

A forced feed lubricator type ON 12 B with 12 branches is employed for feeding the oil to the lubricating points. The quantity of the delivered oil can be regulated within 0,00 - 0,115 cu.mm per one revolution of the main lubricator shaft. Prior to regulation, the hand crank and cover must be removed. By screwing the regulating screw into the piston, its stroke is increased, by screwing it out, its stroke is reduced. This also applies to the quantity of the oil supplied to the respective branch. The lubricator should be dismantled at least once a year and cleaned with kerosene. When reassembling, make sure, that the pistons are put in according to their numbering, since they are fitted together with the corresponding bores in the lubricator body.

The employed lubrication tubes are 6 x 1 cm in diameter. The supply of lubricant to the moving lubrication points is realised by means of flexible hoses.

For the central lubrication use the "Dark oil 11". Prior to start working, lubricate the lubricating points by hand by turning the lubricator

handle on the lubricator. All lubricating points provided with lubricating heads are to be lubricated with a hand-operated screw grease gun. The lubricating heads serving for antifriction bearings are accessible through the slit provided in the flywheel guard after the flywheel has been turned with hand.

All points with limited motion indicated in the table "Lubrication survey" are to be greased twice a week by the drip oil can. The ball bearing with the ball screw is to be lubricated prior to each shift. Used the "Dark oil 11".
Prior to starting work, lubricate the lubricating points by hand by turning the lubricator handle on the lubricator.

Check regularly the oil level in the tank and, if necessary, fill up the oil. All lubricating points provided with lubricating heads are to be lubricated with a hand-operated screw grease gun. The lubricating heads serving for lubricating the antifriction bearings are accessible through the slit provided in the flywheel guard after the flywheel has been turned with hand. All points with limited motion indicated in the table "Lubrication survey" are to be greased twice a week by the drip oil can. The ball bearing with the ball screw is to be lubricated prior to each shift. Used the "dark oil 11".
When lubricating gears proceed in the following way:
Clean the gears carefully /mechanically and chemically/.
Lubricate the clean gears with OPR lubricant.
After 6 weeks the tubricant coat must be renewed without cleaning the base. After 6 - 8 month clean the gears carefully and lubricate it again.
The antifriction bearings must be dismantled once a year, washed in petrol and after having dried filled with a fresh PH 2 grease maximum to the half.
Once in 6 month the pipes and the distributors of the central lubrication system are to be cleaned and rinsed with kerosene.

Quality conditions of lubricants				
Physical and chemical properties	OL - J2 ČSN 65 6610	OD - 11 ČSN 65 6660	T - PH2 ČSN 65 6918	OP /OPR x/ / Cataloque CHEMA 1954
Kinematic viscosity cSt	15+20/50°C	99+114/50°C	-	430-455/100°C
Corresponding with °E	2.5	13 + 15	-	55-60/100°C
Flash point in open crucible °C min.	180	155	-	140
Setting point under	0	-14	-	-
Neutralization number of oil,acidity/KOH quality/ max.	0,08 mg/g	1,4 mg/g	0.3% of weight	1,0 mg/g
Oxidation value max.	0,35	-	-	-
Ash in percentage of the weight	0,02	-	2.5	3,0
Thickness at 20°C max.	-	0.955	-	-
Reaction of water layer	-	neither acid nor basic	-	-
Contents of asphaltenes in percentage of the weight max.	-	0,3	-	3,0
Mechanical impurities,in percentage of the weight max.	-	0,05	noue	-
Water content in percentage of the weight max.	-	0,05	0,1	-
Drop point °C min.	-	-	160	+30
Penetration at 20°C	-	-	260 - 300	-
Degree of consistence	-	-	2	-
Corrosion test	-	-	negative	-
cSt of oil used for manufacture	-	-	21 20°C	-
Corresponding with °E	-	-	3	-

x/ Dark oil OPR=Dark oil OP, dilute 16% of trichloro-ethylene

LUBRICATION CHART

Group	Lubricated point	Applied lubricant	Kind of lubrication
Frame	Right rear gib /3/	Dark oil 11	Lubricator ON 12 A
	Right lateral gib /4/		
	Rear bearing of eccentric shaft from left /5/		
	Rear bearing of eccentric shaft from right /6/		
	Left lateral gib /7/		
	Left rear gib /8/		
	Front bearing of eccentric shaft from left /11/		
	Front bearing of eccentric shaft from right /12/		
Ram	Connecting rod /1/,/2/		
	Thread of hall screw		Oil cup
	Ball pin		
	Ram adjustment bearings		By hand with grease gun
	Worm gearing of ram adjustment		
Countershaft	Front bearing of countershaft	Grease PH 2	twice a year
	Rear bearing of countershaft		
	Gear	Lubricant OPR	By hand with spatula
Eccentric shaft	Seeting of eccentric sleeve on shaft	Grease PH 2	By hand with grease gun 1xafter,24 hours
Stroke adjustment	Worm toothing	Lubricant OPR	By hand with spatula
	Seating of worm shaft	Dark oil 11	Oil cup
Clutch	Flywheel bearings	Grease PH 2	By hand with grease gun twice a year
Air supply	Bearings of air supply		When dismantled
Brake	Swivelling lever	Dark oil 11	Oil cup
	Pins		
Control apparatus	Bearings of control apparatus	Grease PH 2	when dismantled
	bevel toothing	Lubricant OPR	By hand with spatula
	Bearing of end switch	Dark oil 11	Oil cup
Ram Balancing	Right balancing cylinder /9/		Lubricator ON 12 A
	Left balancing cylinder /10/		

A I R D I S T R I B U T I O N, Fig. 17 4-T-27 1080/A

The clutch diaphragm and the ram balancer are operated by compressed air. In the piping there are incorporated the followinf elements, locking cock /1/, air cleaner /2/, reduction valve /3/, pressure gauge /4/, air--blast circuit breaker /5/, oil sprayer /6/, air box /7/ and electromagnetic distributor /8/. The air is led out of the distributor through into the air inlet body /9/ mounted on the rotating clutch cover.

The compressed air is led through the reduction valve /10/ into the air box of the ram balancer /12/. To this piping there are attached the pressure gauge /11/, safety valve /14/ and both cylinders of the ram balancer. For the correct function of the clutch, brake and ram balancer, the air pressure of 0,45 - 0,5 MPa is required. The pressure of the air supplied through the reduction valve is set up to these values. On the pressure gauge the correct setting is supervised, whereby the air-blast circuit breaker breaks the electric control circuit after the pressure of the supplied air has decreased to 0,38 MPa. The sucked atmospheric air is humid and in the air boxes water condenses. From time the water is to be drained off through the cocks /13/.

We reserve all rights to fit a new cleaner instead of that in Fig. 16.

A I R C L E A N E R, 4-T-27 1014

The air cleaner cleans the air passing into the supply piping. Filter housing /1/ contains cylindrical filter /2/ made of a wire sieve. The cleaner is closed by closing screw /3/ with a seal, which serves for fixing the filter in the cleaner cavity.

The air flow passes through the sieve which retains all impurities and coarse particles of dust.
The cleaner sieve should be removed once a month and cleaner of the retained impurities.

REDUCTION VALVE 4-T-27 1015

/0,5 MPa throttle with connection 3/4" B 330827 - KOVOLIS Hedvikov/

The reduction valve is designed for the automatic keeping of the adjusted pressure in the pipework. The pressure gauge placed in the pipework beyond the reduction valve indicates the adjusted pressure.

The pressure air is supplied into the valve body /in the arrow sense/ to the valve /1/ which is permanetly forced in its seat by the spring /2/. When tightening the spring /6/ by the screw /7/ secured by the nut /8/, the disphragm /4/ is deflected downwards by the piston /5/, the piston /3/ is moved from its initial position and simultaneously the valve /1/ is forced down. Thus the valve /1/ is forced off its seat and the pressure air is allowed to flow in the space behind the valve.

When the pressure beyond the valve increases so much that its force, acting on the piston /3/, overcomes the force of the spring /6/, the whole mechanismus returns to its initial position and the valve /1/ seats again. After the pressure in the space beyond the valve /1/ has decreased, the flow through the reduction valve is restored, the pressure being no longer able to overcome the spring force.

Thus the air pressure is kept by the reduction valve automatically at the adjusted level as required for the correct function of the machine.

The reduction valve is adjusted to 0,4 ÷ 0,5 MPa /4,5 ÷ 5 atm/, according to the air supply conditions /the greater the supply, the lower the pressure/.

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PRESSURE SWITCH, Fig. 20 4-T-27 1016/A

Type: VR 2D 51 or TSV 6F Range of pressure:
Adjustability: LP 0,05 - 0,4 MPa; PI 0,06 - 0,4 MPa
Adjusting: lower dead point 0,36 MPa; pressure interval: 0,1 MPa

The pressure switch breakes the electrical circuit in following cases:

1. the air pressure must not decrease to the level, in which sufficient clamping of the clutch plates is secured.

2. The air pressure must be sufficient for releasing the brake of the press.

The press must be inoperable unless a sufficient air pressure level is secured.
The machine delivered to the customer is set up in the production factory to the required functional pressures. During transport or installing operations of the machine the pressure switch can be damaged or its adjustment changed by undesirable vibrations or shocks, so that it is unable to function reliably. However in respect of the safety of operation and personnal the pressure switch must be inspected and readjusted if necessary. If the machine operates in a humid environment it is recommanded to inspect the device once in two years, from time to time to unscrew the external earthing screw and to let the condensed water be drained off.
The correct operation of the switch is to be checked at least once a week.

OIL ATOMIZER 4-T-27 1048

Grease nipple VMT 15 - /or a spare type 521 - R 1/2" A"/

To ensure correct machine operation, it is important to form a weak oil film on the functional surfaces of the airoperated mechanisms whereby their motion is facilitated and the inner surfaces protected from the corrosive effects of water included in the form of vapour in the compressed air.

In the oil atomizer, oil drops are atomized by streaming air thus forming an oil mist which is carried by the air to the application points.

The oil quantity can be set by a regulation screw which is accessibly arranged on the top of the lubricator. By turning the regulation screw in the clockwise direction, the oil quantity is decreased, by turning it in the anticlockwise direction, it is increased. The operation of the lubricator can be checked through a sight glass.

The oil quantity can be easily supervised through a transparent cylinder which forms the oil tank.

The lubricator capacity is 250 ccm. The pressure lubricator is perfectly sealed so that losses due to leaking oil are eliminated. The pressure lubricator is to be re-filled with pure J2 machine oil, rid of impurities.

Leaking or entering of any false air in case of some defective sealing can deteriorate the correct operation of the atomizer.

AIR SUPPLY, Fig. 22 4-T-27 1019/A

From the electropneumatic distributor, the compressed air is supplied into the clutch. Since the working space of the clutch is revolving is revolving along with the flywheel, the air inlet is arranged so that the stationary air intake piping may be attached to the rotating clutch.

The air intake body /1/ is screwed to branching body /4/ that has its air inlet opening /16/ and air outlet openning /9/. Between the air inlet body and the branching body a rubber membrane /6/ with an opening in the middle is inserted and this membrane is supported by a perforated insertion piece /5/. In the air inlet body there is also a connection /2/ which is placed in bearings /10/ and sealed by a packing ring /12/. On the outer end there is a connection provided with a thread G 3/4" for joining the supply piping.

When letting the compressed air in, the air flows through the opening in the rubber membrane. On the ground of throtling there is an overpressure in front of the membrane and underpressure behind it. For this reason the membrane is pressed to the branching body, it closes the air outlet opening /9/ and the compressed air flows into the clutch.

When switching off, the distributor disconnects the air supply, the air escapes from the clutch and by means of overpressure it places the membrane in its normal position. When the membrane is in the normal position, the air outlet opening is freed, the air pressure in the clutch drops and the clutch is released.

Maximum air inlet body radial run-out 0,4 mm and maximum axial run-out 0,2 mm do not effect the right function and the press output.

4-N-27 1067.3/A

ELECTROPNEUMATIC DISTRIBUTION APPARATUS 4-T-27 1115

The electropneumatic distribution apparatus is remotely controlled by pushbuttons or by a treadle. The impuls being given the electropneumatic distribution apparatus lets in or out the compressed air off the control cylinder of the clutch-brake /arrow O/. Thereby, the press ram is set in motion and vice versa.

The electropneumatic distribution apparatus consists of the distributor proper /1/ which controls the air passage from the air box /P/ to the clutch--brake /O/ and of two threeway electromagnetic valves /2,3/ controlling the operation of the distributor proper by means of the auxilliary circuit of the compressed air /P1 and O1/. Into the circuit the valves are incorporated in parallel.

The compressed air is supplied directly from the air box through the pipe-work "P" into the distributor /1/. The auxiliary circuit "P1" branches off the main supply and its passage is throttled at the point of the attachment to the electromagnetic valves by the orifice plate /4/, the passage diameter of which equals to 1,5 mm. The orifice plate is soldered on to the hole of the supply pipe. The doubling of the electromagnetic valves and the incorporated orifice plate serve for preventing the press stroke from being repeated. If one valve were damaged and only one valve would be disconnected, the outlet hole of one electromagnetic valve only should be sufficint for letting the air off the distributor. Similarly, if only one of these valves were connected, the compresed air should escape by the second valve so that the distributor cannot operate.

A t t e n t i o n !

The oulet holes of he three-way electromagnetic valves must be kept free. Through clossing of the outlet holes makes possible work with one valve only, this procedure is inadmissible, because it threatens the safety of the machine operator.
It is necessary to take continuous care of the electropneumatic distribution apparatus because on its function the safety of the machine operator is dependent. Every day prior to the beginning of the shift its condition and function has to be checked. A detailed description of the operation of the distributor and the valves is given in the following chapters.

THREE-WAY ELECTROMAGNETIC VALVE 4-T-27 1116

6 VZ - 24 V D.C

The electromagnetic valve serves for controlling the pneumatic mechanisms and in connection with the distributor also for controlling the press proper.

The compressed air is supplied in the P1 arrow direction below the supply stpping arrangement. As soon as the electromagnet coil gets an electric impulse, the core /1/ is drawn in into the coil. Thereby, the passage through the channel /6/ into the outlet O_1 connected with the controlled space is set free.

As soon as the electric impulse steps operating, the electromagnetic core actuated by the spring /4/ returns in the initial position. The air off the control space streams back through the channel /6/ to the outlet openning /3/ and from here into the A atmosphere.

A push-button is privided in the upper part of the core of the electromagnet. When this button is depressed, the core slides into the coil and thereby an air supply is admitted. This button can be used during tests of the distributor. In case of normal operation, the button has to be locked by a rubber cap with steel insert in order to avoid undesirable engagement by an unauthorized person.

The elctromagnetic valve is fed with a voltage of 24 V,D.C. Correct working is guaranteed within ± 2 V. The feeding voltage has to be checked on the terminals of the valve once in 2 months at the minimum. The voltage having dropped below the specified limit /due to ageing of the selenium rectifier/, it is necessary to increase the voltage by changing the connectiom of the tap on the transformer on the switchgear cabinet.

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D I S T R I B U T I O N

The distribution is an air operated three-way valve. As soon as the electromagnetic valves in the control circuit have set free the air passage, the compressed air penetrates through the channel /1/ into the space under the piston /2/ and displacement the piston with the attached parts in the upper position. Thereby the cone /4/ bears against the passage of the air supplied from the P direction into the controlled space in the O direction.

When the air is let out of the space under the piston /2/ after the electromagnetic valves of the controlled circuit have been switched off, the piston affected by the air pressure in the distributer and by the spring /7/ returns to its initial position. The cone /5/ shuts the passage through the distributer body and the cone /4/ enables the air to blow off the O space into the A atmosphere.

The piston /2/ sealed by a cuff with the insertion piece /3/ privides at the same time a guiding of the whole valve cone placed on the piston rod /6/. The other end of the piston rod is guided by the collar /8/ being continuously forced by the spring /7/ to the upper lid of the distributer body. If the piston rod /6/ were jammed in the collar /8/, the collar together with the piston rod would be shifted downwards /the distributer meeing switched off /which enables the air supply to be shut in the controlled space. The safety pin /9/ affected by the spring /10/ enters the shoulder of the upper face of the collar and prevents any further shifting-over of the distributer as well as the machine from being started. It is necessary to adjust the preliminary stress of the spring so that the clamping by the pin /9/ may not impede the collar in the distributer body from moving.

4-M-27 1058.3 1/1

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MACHINE ELECTRIC INSTALLATION

Machine electric installation is determined to
a/ drive the machine
b/ control the machine electropneumatically
c/ lighting

Electric installation locating
a/ in separate box fig. 27, 27a
b/ on the machine fig. 26

Electric installation functional chart is on attached drawing. To follow function according to functional chart is necessary table No. 1.

DESCRIPTION OF FUNCTION

1. Drive of machine

Machine is driven by three - phase electric motor with short - circuit armature MA 1. Electric motor start is made by automatic star - delta starter Y/D. Change over switch time from Y into D of automatic star - delta starter Y/D is adjusted by time - relay KT 1 (20 - 30 sec.) in workshop of manufacturer.

To electric motor protection against short circuit serve fuses FU 1 and in the same time they serve as open - phase circuit breaker for the whole machine.

Against overcurrent is electric motor protected by over-current circuit breaker relay FA 1. Electric motor´s current value is possibility to follow on ampere meter PA 1.

2. Electropneumatic vontrol of machine

Electropneumatic control serves to control clutch-brake. Into clutch - brake lead-in wire is connected electropneumatic valve YV 1 - 2. Electromagnets are controlled by contactors KM 4 and KM 5 with sequence switch SA - 1.2-5 change over

switch SA 2.1-10 and push-buttons SB 4, SB 5, SQ6 they form a group of instruments for separate kinds of works and control of press ram.

Compressed air pressure used for machine operation is checked by pressure - switch SP 1, which permit machine operation only when air pressure reaches prescribed value.

3. Machine lighting

In case of buyer special request is machine equiped with socket for portable lamp 24 V AC. Then socket is supplied via step-down transformer TC 2. On standard machine is opening for socket plugged-in.

MACHINE LEAD-IN WIRE, DISTRIBUTION BOX AND MACHINE WIRING

1. Lead-in wire

At wire cross section stating is necessary to take into consideration electric motor especially long time starting at heavy masses rotating. At machine operation rises slip up to 20 %. Lead-in wire has to be of so cross section, that voltage decrease will not affect motor´s moment.

2. Interconnection of distribution box and machine

Interconnection between distribution box and machine is executed by multi-core cables. Use of multi-core cables determines table on page 54.

Values mentioned in table are valid for machine and distribution box placing according to layout plan.

START AND CONTROL OF MACHINE

1. Start of machine drive

Switch-on switch QS 1 into position I. If everything is all-right, on distribution box will lights up white signalling light HL 1. By depressing of push-button SB 3 (START) on distribution box start motor. After motor starting will lights up green signalling light HL 2 on distribution box. Motor switch-off is to be made by depressing of push - button SB 1 (CENTRAL STOP) on machine, SB 2 (STOP) on distribution box.

2. Press ram lowering - at machine are following ways of operation and start:

a/ single strokes by both hands
b/ single strokes by foot, (foot operated switch)
c/ adjusting by two hands
d/ permanent operation by foot (foot operated switch)
e/ permanent operation by both hands
f/ repeated strokes by foot (foot operated switch)
g/ repeated strokes by one hand.

a/ Single strokes by both hands

Change over switch SA 2 on distribution box set into position "Single strokes by two hands". Press ram put into operation by push-buttons START (SB4, SB5) on machine control panel. Push-buttons must be depressed so long time while press ram over-runs bottom position. If push-buttons are released earlier, press ram will stop. In case, that in press tools is putted-in material, it must be taken out. Only after repeated depressing of push-buttons SB4, SB5 will press ram finish its stroke. If after push-buttons SB4, SB5 depressing press ram will not finish its stroke, use regime "C". Depressing of push-buttons

SB4, SB5 must be made in the interval shorter than 0.5 sec. (principle of coincidence). When this codition is not fulfilled, press ram will not put into operation and starting must be repeated. Time interval 0.5 seconds is checked by time relay KT2.

b/ Single strokes by foot

Change over switch SA2 on distribution box set into position "Single strokes by foot". Press ram put into operation by foot operated switch (SQ6) depressing.

Following elemental operation as in description at group "a".

c/ Adjusting by two hands

Change over switch SA2 on distribution box set into position "Adjusting by two hands". At adjusting utilize only energy of rotating fly-wheel. Motor must be switched off, green signalling light HL2 on distribution box doesn't light. Press ram moves only in case, when push-buttons "START" (SB4, SB5) are depressed.

d/ Permanent operation by foot

Change oversswitch SA2 on distribution box set into position "Permanent operation by foot". Press ram put into run by depressing of pedal of foot operated switch. When press ram put into run must be pedal of foot operated switch released before press ram reaches bottom position, in other case press ram carries out only one stroke. Stopping of press ram will be carried out by depressing of pedal of foot operated switch which is depressed up to press ram will stop in top position.

c/ Permanent operation by both hands

Change over switch SA2 on distribution box set into position "Permanent operation by both hands". Press ram put

into operation by push-button "START" (SB4, SB5).

After press ram put into run must be push-button SB4, SB5 released before press ram reaches bottom position, in other case press ram carries out only one stroke.

Press ram stopping can be made by depressing of any of push-buttons SB4, 5 up to time, when press ram stops in top position.

f/ Repeated strokes by foot

Change over switch SA2 on distribution box set into position "Repeated strokes by foot". Press ram put into run by depressing of pedal of foot operated switch. Press ram repeats strokes up to time, when pedal is depressed.

g/ Repeated strokes by one hand

Change over switch SA2.1-10 on distribution box set into position "Repeated strokes by one hand".

Press ram put into run by depressing of push-button "START" (SB5). Press ram repeats strokes up to time, when push-button is depressed.

WARNING!

In regime "Single strokes" (control by two hands and by foot) is machine´s run-out controlled. Run-out critical angle is signalled by signalling light HL3 (yellow).

Opening contacts of contactor S9 lock machine control. Repeated put into operation is possible only after fault clearing, while press ram is set into starting position.

Resetting of press ram into starting position is to be carried out by regimes: "Permanent operation", "Repeated strokes" of "Adjusting".

MARKS USED IN WIRING DIAGRAM

Machine	Distribution box	Function
SB1		Push-button "CENTRAL STOP"
	SB2	Push-button "STOP"
	SB3	Push-button motor "FORWARD"
SB4,5		Push-button "START"
SQ6		Foot operated switch
	KT1	Time relay of automatical change over switch Y/D
	KT2	Time relay of coincidence principle
	PC1	Electromagnetic stroke counter - ZP
	FA1	Over current relay for motor protection MA1
	HL1	White signalling light-machine connected to electrical network
	HL2	Green signalling light-motor in D start
	HL3	Yellow signalling light - run - out checking
	HL4	Red signalling light - valve checking
	HL5	Yellow signalling light - compressed-air pressure checking
SP1		Compressed - air distribution pressure switch
SA2.1-5		Press regime program switch VH1 F 05
SA2.6		Program switch cam-run-out checking
MA1		Press drive electric motor
	QS1	Press main switch-off
	FU1	Fuses of drive electric motor
	FU4	Fuses of transformer TC1 primary winding
	FU6	Fuses of secondary winding TC1-220 V
	FU 7,8,9	Fuses of secondary winding TC1-20,24,29 V
	FU 11	Fuses of transformer TC3 primary winding
	FU 12	Fuses of secondary winding TC3 - 220 V
	PA1	Ampere meter for motor MA1 current measuring
	KM1,2,3	Contactors of automatical starter Y/D
	KM4 - 7	Press control contactors
	KM9	Contactor of run-out checking circuit
	KA10	Auxiliary relay - valve checking

	TC1	Transformer for control circuits and circuits of 20, 24, 29 V feeding
	TC3	Transformer for valve feeding
	SA2.1 - 10	Cam switch for press regime adjusting
YV 1-2		Two-way electric-pneumatic valve
	FU 13	Fuse of transformer TC2 ZP primary winding
	FU 14	Fuse of transformer TC2 ZP secondary winding
	TC2	Safety protecting transformer of lighting ZP
	C1 - C8,9	Interference eliminating capacitor
	US1	Regulated power supply
	XT 1,2	Terminal boards of distribution box
	XS 3	Socket of foot operated switch
	XS 4	Socket of 24 V AC ZP lighting
XT 5		Machine terminal board
	R_1 - R_3	Resistances

ZP - Special accessories

CAM CHANGE OVER SWITCH REGIME DIAGRAM

MACHINE´S REGIME	WAY OF CONTROL	CONTROL ELEMENTS	CHANGE OVER SWITCH CONTACTS									
			SA 2.1	.2	.3	.4	.5	.6	.7	.8	.9	.10
Single strokes	By two hands	Push-buttons SB4, SB5		X	X					X	X	
Single strokes	By foot	Foot operated switch SQ6		X		X				X		
Adjusting	By two hands	Push-buttons SB4, SB5	X						X			X
Permanent operation	By foot	Foot operated switch SQ6		X		X		X				
Permanen operation	By two hands	Push-buttons SB4, SB5		X	X			X			X	
Repeated strokes	By foot	Foot operated switch SQ6		X		X			X			
Repeated strokes	By one hand	Push-button SB5		X	X		X		X			

X - closed contact

LIST OF ELECTRIC INSTALLATION INSTRUMENTS

Mark	Instrument		Type
SB1	Red control push-button	1 opening contact 380V,50Hz	6A - T6H 0/1 red
SB2	Red control push-button	1 opening contact 380V,50Hz	6A - T6A 0/1 red
SB3	Green control push-button	2 closing contacts 380V,50Hz	6A - T6A 2/0 green
SB4,5	Green control push-button	2 opening contacts 2 closing contacts 380V,50Hz	6A - T6H 2/2 green
SQ6	Limit switch	1 closing contact 500V,50Hz 1 opening contact 500V,50Hz	- 2 KS6 FK 1/1
KT1	Time relay	1 change over contact	TX11,KC,220VAC,ZR1+100S
HL1	White signalling light	24 VAC	T6E 24V AC white
HL2	Green signalling light	24V AC	T6E 24V AC green
HL3	Yellow signalling light	24V AC	T6E 24V AC yellow
HL4	Red signalling light	24V AC	T6E 24V AC red
HL5	Yellow signalling light	24V AC	T6E 24V AC yellow+TR 220/24V
SP1	Pressure switch-switching-on pressure	0.46 MPa switch-off pressure 0.36 MPa	TSV 6E
SA1.2-6	Programm switch		VH 1 F 05
QS1	Three - pole cylindrical switch	500V AC 100 A	V 100 RZ 01
FU4,FU6	Melting fuse insert	4A slow	No. 2410-4T
FU7,8,9, 11,12	Melting fuse insert	4A standart	No. 2410-4
KM1	Air-brake contactor	3 main contacts 40A AC 4 auxiliary contacts 6A AC 2/2	V 40-E 220 V AC
KM2,KM3	Air-brake contactor	3 main contacts 100 A AC 4 auxiliary contacts 6A AC 2/2	V 100 E 220 V AC
KM9,4,5,6, 7,9	Air-brake contactor	3 main contacts 16A AC 4 auxiliary contacts 6A AC 2/2	K 16E 220V AC
KT2	Time relay	1 closing contact 1A	N2HS, 220V AC, 0.5 sec.

LIST OF ELECTRIC INSTALLATION INSTRUMENTS

Mark	Instrument		Type
KA 10	Auxiliary relay	3 change over contacts	R 15 3P 24V DC
TC1	Transformer primary winding	0-220,380, 415, 500V	TH 34 JNCTU 4050-015
	secondary winding	0-185,220,265,320VA, 0-20, 24V	E 150 x 60
TC3	Transformer primary winding	0-220,380,415,500V	
	secondary winding	0-220V, 125VA	
SA2.1-10	Cam switch		NUK 16 752/3300
YV 1-2	Two-way electric - pneumatic	valve 220V AC	3 VEE 25 DC (ROSS)
XT1	Terminal board	terminal connectors in line No.6035-30	6035-30
XT5	Terminal board	terminal connectors in line	6035-10
XT2	Terminal board	terminal connectors in line	6036-11
PA1	Ampere meter		FP 80 0-100/200A
FU1	Fuse insert	100A slow	F 100 P
FA1	Overcurrent relay		R 101-34A (R100-1A+3xJT150)
MA1	Three-phase asynchronous electric motor 30 kW 1485 r.p.m. 3x380V, 50Hz		F 200 LK 04
XS3	Seven-pole socket 380V AC 6A		ZM 7 PO
C1,2,3	Capacitor M25 250V AC		TC 253
C5,6,7,8	Capacitor M1 250V AC		TC 252
C9	Capacitor 2M 1000V		TC 487
R1,2,3	Film resistor 470 ohm, 0.5 W		TR 144
US1	Regulated power supply		ZRC 3.2

Note: Manufacturer keeps the right to change type of instruments and their locating.

LLIST OF ELECTRIC INSTALLATION INSTRUMENTS (SPECIAL ACCESSORIES)

Mark	Instrument	Type
PC2	Electromagnetic stroke counter	Z-F-593,220V AC,0.02A
XS4	Socket for lighting	5515-7790
FU13	Fuse insert 2A	2410 - 2
FU14	Fuse insert 6A	2410 - 6
TC2	Protecting transformer of lighting primary winding: 0-220, 380, 415, 500V secondary winding: 0-24V, 125VA - JBCT - 0125 - IP 00	

LIST OF ELECTRIC INSTALLATION INSTRUMENTS (REGULATED POWER SUPPLY ZRC 3.2

Mark	Instrument	Type
C1	CAPACITOR	TE 986 500 M
C3	CAPACITOR	TE 988 100 M
VD1+4	DIODE	KY 708
VD5	DIODE	KY 130/80
R1	TRIMMING RESISTANCE	TP 011 680 Ohm
XT 12	TERMINAL BOARD	6310-10-12 poles
C2	CAPACITOR	TE 154, 20 M
IO1	INTEGRATED CIRCUIT	MA 7824

DATA OF ELECTRIC MOTOR AND INSTRUMENTS FOR DIFFERENT VOLTAGES

Mark	Specification	3 x 220	3x380	3x415	3x440	3x500
FA1	Protecting overcurrent relay	R100-1A+ 3xJT150	R101-34 27-40A	R101-34 27-40A	R101-34 27-40A	R101-23 27-40A
MA1	Three-phase asynchronous el. motor with short circuit armature started Y/D	F200LK04 380/220V	F200LK04 660/500V	F200LK04 720/415V	F200LK04 760/440V	F200LK04 860/500V
FU1	Melting fuse insert	F160P slow 160A	F100P slow 100A	F100P slow 100A	F100P slow 100A	F 60P slow 60A
PA1	Electromagnetic ampere meter	FP 80 0-100/200A	FP 80 0-60/200A	FP 80 0-100/200A	FP 80 0-100/200A	FP 80 0-60/120A

TABLE OF INTERCONNECTING CABLES BETWEEN MACHINE AND DISTRIBUTION BOX

1. Power cirucuit

Cable´s number	Feeding network	Cabel	Cable length (m)	Number (pcs)
8,9,10, 14,15,16	3 x 220 V	CYKY 4x16 mm^2	5	2
	3 x 380 V 415 V 440 V 500 V	CYKY 4x10 mm^2	5	2

2. Control circuit

Cable´s number	Cabel	Cable length (m)	Number (pcs)
21,23,57,58,59,60,61,62,63, 68,69,73,75,76,81,91,92,94, 96,97,98,99,52,53,64,65,66	CMSM 37 x 1 mm^2	5	1

SAFETY IN OPERATION, PREVENTION AGAINST ACCIDENTS CAUSED BY ELECTRIC CURRENT

The machine is equipped with all safety precautions conforming with the corresponding standard.

The eletric equipment is effected according to the valid regulations of the ČSN - ESČ. The electromotor is protected against overload by fuses and the thermal relay. Part of the electric equipment is located in the switch box outside the machine. The safety of the press is ensured by application of the Standard ČSN 21 0711 "Safety Precautions for Eccentric and Crank Presses". All dangerous spaces, rotating and moving parts which are within reach of the servicing or maintenance workes are covered by guards and coloured according to the Standard Specification ČSN 01 2720.

By the emergency push-button STOP, the ram motion can be stopped in any position and simultaneously the electromotor switched off. The machine is equipped with doubled electric protection against the stroke repetition.

The rated pressure of the press must not be exceeded. In the ram, a breaking piece is located which breaks if the overload is 20 per cent above the rated pressure.

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WORK SAFETY - CHECKING AND MAINTENANCE

From the point of view of the work safety and the press service life it is necessary to check daily:

1. Oil condition in the lubricating tank	-machine off	-maintenance man
2. Operation of lubricating device	-machine off	- " -
3. Operating of oil atomizer	-machine on	- " -
4. Condition of brake bands	-machine off	- " -
5. Brake adjustment	-machine off and of	- " -
6. Operation of air supply	-machine - " -	- " -
7. Operation and condition of distributor	- " -	- "-
8. Fastening, condition and drive of the control mechanism	- " -	- " -

At least weekly:

1. Adjustment of air-blast circuit-breaker	-machine on	-maintenance man
2. Adjustment of reducing valves	- " -	- " -
3. Air cleaner	-machine off	- " -
4. Dewatering of air box	-machine of	- " -
5. Condition of switch box	machine on and off	- " -
6. Sticking to the lubricating plan	machine of	- " -
7. Sticking to checking and adjustment	- " -	foreman

At least monthly:

1. Clutch condition	machine on and off	maintenance man
2. Condition of driving mechanism	- " -	- " -
3. Condition of bearings	- " -	- " -
4. Condition of release	- " -	- " -

Always when changing the press work it is necessary to adjust:

1. Control mechanis	machine of mad off	adjuster
2. Upper ejector	- " -	- " -

All faults of the press and its mechanisms reported by the operator to the foreman must be recoreded in a defects book and it must be mentioned when and how the fault has been remedied. In the records about the machine are recorded all significant defects, especially those that have resulted in an accident, as well as all redesigns and changes. The producer should be informed of all principal and repeated defects or significant improvements.

TRANSPORT OF MACHINE, ITS ASSEMBLY IN CUSTOMER'S PLANT, GUARANTEES.

The machine is prepared for packing after the acceptance test in the manufacturers plant. All parts liable to damage are carefully secured. Surfaces and machine parts which are subject to corrosive influences are protected by a protective coating or preserved. The sliding surfaces of the frame and other parts are sered against impacts. When ordered the press will be installed by an assembler. The press LE 400 C is packed into twe packings.

Packing of machine

The packing of machine must conform to the transport regulations as far as the customer's plant. For inland, the machine is transported under a tarpaulin, the other parts are packed in causes, according to the instructions of the respective Foreing Trade Corporation and transporter.

The cases containing the machine and its parts are provided with marks showing its centre of gravity, suspensions spots, the case number and dimensions.

The completeness of the consignment is supervised in accordance with the packing list. 1. Complete machine without the fly-wheel.
2. Fly-wheel, electric distribution box + covers -electremeter and other accesserids of the press.

Transport

The consignment is marked with the consigners and consignees adress, order number, machine type, serial number, gross and net weight. The dimensions of the consignment must conform with transport possibilities as far as the consignees plant.

Storing

The manufacturer does not take on the responsibility for damages and defects of the press caused by its storing prier to putting the machine into operation.

The costs of possible dismantling and assembling of the machine, i.e. cleaning, etc. which it will be necessary to carra out after putting the machine, which has been stored for more then 3 months into operation, will be paid by customer.

The levelling of the machine in the customer's plant will be carried out on special order only. The cost of this will be changed according to the valid regulations. The sequence of assembling will be determined by the manufacturer's erector.

Guarantees

The manufacturer is responsible for the desing, function, use and choice of material, as well as the workmanship of the machine, including spars parts supplied together with the machine, within 12 months from the date the last delivery part was supplied, but at the latest six months from the time the machine was put into operation.

The conditions of the guarantee acknowledgement and the procedure of defects remedy is precisely stated in the technical specification of the machine.

The manufacturer grants to the customer's inspector all technical data and means for taking ever the machine according to the technical specifications.

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LIST OF USED BEARINGS, SEALING RINGS AND CHAINS

Clutch:	radial ball bearing 6240	ČSN 02 4633		1 pcs
	radial ball bearing 6038	ČSN 02 4633		1 pcs
	membrane, rubber quality 7645	drw 4-21-2065-38	t=3x975x975	1 pcs
	sealing 32, white technical felt	ČSN 02 3655		1 pcs
	bearing 51 172	ČSN 02 4730		1 pcs
Ram:	radiall ball bearing 3306	ČSN 02 4666	30/72 x 30,2	2 pcs
Countershaft:	radial ball bearing 23136	ČSN 02 4707	180/300 x 96	1 pcs
	radial ball bearing 22236	ČSN 02 4705	180/320 x 86	1 pcs
	nut KM 36	PN 02 3630		2 pcs
	plate MBA 36	PN 02 3640		2 pcs
	sealing 200, technical felt	PN 02 3655	t=13,5 x 20 x 695	1 pcs
Counterbalancing mechanism:	chrome leather, cuff	drw.no. 5 52 1092		2 pcs
	cuff, chrome leather	drw.no. 5 52 1093		2 pcs
	sealing, klingerit	drw.no. 5 52 1093	t=2 x 130 x 130	2 pcs
Unit drive:	V-belt, rubber-textile		25/16 x 5300	6 pcs
Control apparatus:	radial ball bearing 6203	ČSN 02 4636		1 pcs
	radial ball bearing 6204	ČSN 02 4636		1 pcs
	locking ring 17	ČSN 02 2930		1 pcs
	locking ring 20	ČSN 02 2930		2 pcs

List/Počet listov:

Distributor:	cuff ADAST	Bk 554S	60/48 x 6	1 pcs
	insert of U cuff ADAST	Bk 553S	59/48 x 5,5	1 pcs
	sealing cone, rubber 622418,3	5 974 018	t=10 x 46 x 46	1 pcs 5-21-3500-003
	sealing cone, rubber 622418,3	5 974 019	t=10 x 38 x 38	1 pcs 5-21-3500-002
	sealing, rubber 622418,3	5 974 107	t=1 x 82 x 85	2 pcs 5-21-2085-024
Air supply:	radial ball bearing 6007	ČSN 02 4633	35/65 x 14	2 pcs
	sealing 10	ČSN 02 3655		1 pcs
	cuff U 28 x 48	ČSN 02 9261.2		1 pcs
	membrane, rubber 50°Sh, mixture no. 7645, drw.no.		3-21-2065-017	1 pcs
	nut KM 7	ČSN 02 3630		1 pcs
	washer MB 7	ČSN 02 3640		1 pcs

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TEST RUNNING OF THE MACHINE

Prior to start the machine the respective grease is to be removed from all the preserved parts. In course of running-in the machine, the correct function of lubrification system is very important. Make sure whether the oil tank is filled with oil and then by turning the lubricator handle let the oil enter all points attached to the central lubrication system. All lubrication points indicated in the table 4-T-26 1026.1 are to be lubricated by the grease gun or by drip oil can.

Prior to set the machine in run the preper tightening of all machine joints is to be chacked especially of the connecting rod, electromotor bolts and the of contershaft bearing box covers. Also the adjustment of the air pressure is to be checked.

During the test run of the machine without load the right function and the reliable run of the machine are verified. The bearings temperature of the excentric shaft and countershaft and of all slip seatings is to be observed. The test run without load lasts 4 hours including 2 hours of individuel strokes running.
The test run under load lasts another 4 hours more.

After the running-in the whole machine, especially the ball pivot, slide bearings and brake are to be checked. The slide bearings temperature should be less than 60°C. The brake temperature must not surpass 110°C. The clutch temperature can reach 80°C maximum. The ball pivot must be pure without any traces of dragging.

INSTRUCTIONS FOR ORDERING SPARE PARTS

In ordering spare parts it is necessary to state:

a/ Machine type
b/ Production year
c/ Serial No. of machine
d/ Number of pieces required
e/ Name of part
f/ Machine group to which part belongs
g/ No. of drawing or standard

In case the customer does not know either the name or ref. number of the part required, he can state in his order the ref. numbers of the position and the ref. numbers of the figure of this manual, in which the part is illustrated.

LIST OF SPARE PARTS - LE 400 C

V = exchangeable
L = to be fitted
X = can be delivered with the machine

Denotation Groupe	Table Position	Standard drw. No!	Material dimension	Service life in strokes V-L-X	Weight	Pieces per one machine
Membrane clutch-brake	4-T-21 1015/A 16	4-21-2065-038	Rubber quality 50°Sh	3, 000 000=2 700hour V-X	1,9	1
Lining clutch-brake	4-T-21 1015/A 20	3-21-1225-065	OSINEK 7040	5, 000 000=4 500hour L-X	0,66	12
Spring clutch-brake	4-T-21 1015/A	4-21-215e-033	14260.3	5, 000 000= V-X	0,13	3
Spring clutch-brake	24 4-T-21 1015/A	4-21-8450-107	14260.3	5, 000 000 V-X	0,32	12
Lining clutch-brake	4-T-21 1015/A 21	4-21-1225-067	OSINEK 7040	3 000 000 L-X	0,42	12
Cuff Ram balancing	4-T-27 1049 4	4-21-2058-010	chrome leather	3, 000 000 L-X	0,06	2
Membrane Air supply	4-T-27 1019.1/A 6	3-21-2065-017	rubber 50°Sh mixture No .7645	3 000 000 V-X	0,12	1
Sealing 10 Air supply	4-T-27 1019.1/A 11	ČSN 02 3655	10	3 000 000 L-X	0,01	1
Sealing ring Lubrication		ČSN 137931	Js 5	eventual exchange V	0,001	30
Cuff U Air supply	4-T-27 1019.1/A 12	ČSN 02 9261.2	U 28x48	3 000 000 L-X	0,02	1

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Denation Groupe	Table Position	Standard Drw. No.	Material Dimension	Service life in strokes V-L-X	Weight	Pieces per one machine
Sealing ring Distributor		ČSN 137931	Js 6	Eventual exchange V	0,001	10
Sealing ring Distributer	4-T-27 1063 4	5-21-3500-003	622418.3	V-X	0,014	1
Sealing ring Distributer	4-T-27 1063 5	5-21-3500-002	622418.3	V-X	0,008	1
Sealing ring Distributer	4-T-27 1063	5-21-2085-024	622418.3	L	0,006	2
Three-way electromagnetic value	4-T-27 1116		6 VZ 24 V=	V	1	1
Cuff Distributor	4-T-27 1063		Bk 554s ADAST	V	0,02	1
Insert Distributor	4-T-27 1063		Bk 553s ADAST	V	0,02	1
Push-button green	according to the year of production			in case of need to be replaced V-X	0, 03	2
Push-button red	- " -			in case of need to be replaced V-X	0,3	1
Adjustment Ram	Elastic blok JU 30	5230-08		in case of need to be replaced V-X	0,59	2
Rivet 6x25 Brake		ČSN 022381.7	Cu	V-X	0,01	126

List/Počet listov:

Air Cushions, Fig. 29 4-T-34 1016

The air cushions provided with movable pistons make it possible to carry out extracting operations on single - acting presses. They may also be used for pulling out cuttings of impacts. Their pulling out force is produced by compressed air coming from air distribution system or form a separate compressor unit.

The required force nesessary for the extracting operations may well be adjusted by means of pressure reducer. After filling the fan connected with compressed air inlet, there is no air consuption at all /the possible losses may only be due to lack of tightness/.

The air cushions are design so as to be used on presses with or without table plate /height L/ or /hight L_1/ by simple piston rod exchange. In the case of change of production programme, need the air cushions not be dismantled completely.

The air cushion is attached to the lugs in the table cavity. It consists of two cylinders 1 and 4 tightened together by screws 3. Pistons 4 and 5 are in cylinders 1 and 2 packed by leather collars 6. The piston rod consists of afew parts. On the pin of the lower part of the piston rod 7 and interchangeable tube 8 is fed nad, into the latter pin 9 is inserted with cushion plate 10 sliding in the bushing 11 mounted on table plate 12 or table insert 13. The compressed air is led into cover of the low the cylinder /24/ and through the hole into the piston rod it streame into the upper cylinder 1, lifting the pistons 4 and 5 as well as the cushion plate connected therewith. The resulting load of the cushion plate 10 may not be an off-centre one.

If the charakter of the pressing operations requires overfall, the cushion may easily and quickly be dismantled.

By lifting cushion plate 10, the exchangeable tube 8 is released and both part are put into the store. After this partial dismantling, the opening in slide 15 may be enclosed by sliding valve 16.

The air cushions represent special accessories of the press and therefore they are subject to separate order.

TECHNICAL DATA

Size Figure Table	Force at 0,6 MPa kN	Ø D mm	Z mm	Ø d mm	Ø d_1 mm	L mm	L_1 mm	Air inlet	Vieght kg	Refers to press
OVV 360/12 Fig. 29 4-T-34 1016	120	360	70	250	480	1195	1095	G 1 1/2"	415	LE 160 LE 160 C
OVV 450/18 4-T-34 1016	180	450	85	280	578	1265	1155	G 1 G/2"	592	LE 250 LE 250 A LE 250 C
OVV 525/25A 4-T-34 1024	250	525	75	320	655	1716	1575	G 1 1/2"	1035	LE 400 LE 400 C

Air cushion accessories, Fig. 30 4-T-34 1018

Working force of the air cushion /1/ is adjustable. By adjusting pressure reducer /7/ air pressure necessary for the air cushion is obtained. The amount of air pressure is indicated by manometer /8/.

Since the air cushion works without air exhaust, there arise no energetic losses, the proper compressed air consuption being excluded theoretically. To avoid the compressed air getting back into the inlet pipeline and, consequently, the undesirable air pressure fluctuations in the said pipeline, a pressure vessel is arranged in fron of the air cushion. In LE presses, this vessel is divided in a battery nounted on the press bottom. There are no requirements presented in association with working space enlargenent. The individual pressure vessels are provided with air valve /6/. Every pressure vessel supplied is accompanied with a revision book.

The reverse air impacts produced in the course of the performance are taken up by non-return valve /3/. The unexpected pressure increase exceeking 6 atm is handled by safety valve /5/. In utilizing full stroke of the air cushion, the pressure in the vessels increases by about 0,1 MPa. The rate pressure of the air cushion is obtained if, in this case, the pressure reducer is adjusted to 6 atp.

The air streaming into the air cushion entrains the oil fog forming in the oil sprayer /2/ lubricating the collars and gliding surfaces of the cylinder. The oil consuqption is a negligible one.

SUPPLEMENT TO THE OPERATING MANUAL OF LE 400/C PRESS

Construction of the press with 3 VEE 25 DC valve in the air distribution system

Valid from production number onwards

Elaborated by: Mr. Rendoš Štefan 1. 7. 1982

CONTENT

GENERALLY

Regarding press safety work increasing against stroke repeating was compressed-air distribution designed so, that instead of electric - pneumatic distributor fig. 23, 24, 25 and description of page 42 - 44 is used doubled three-way valve 3 VEE 25 DC - manufacturer is ZPA National Enterprise Prešov.

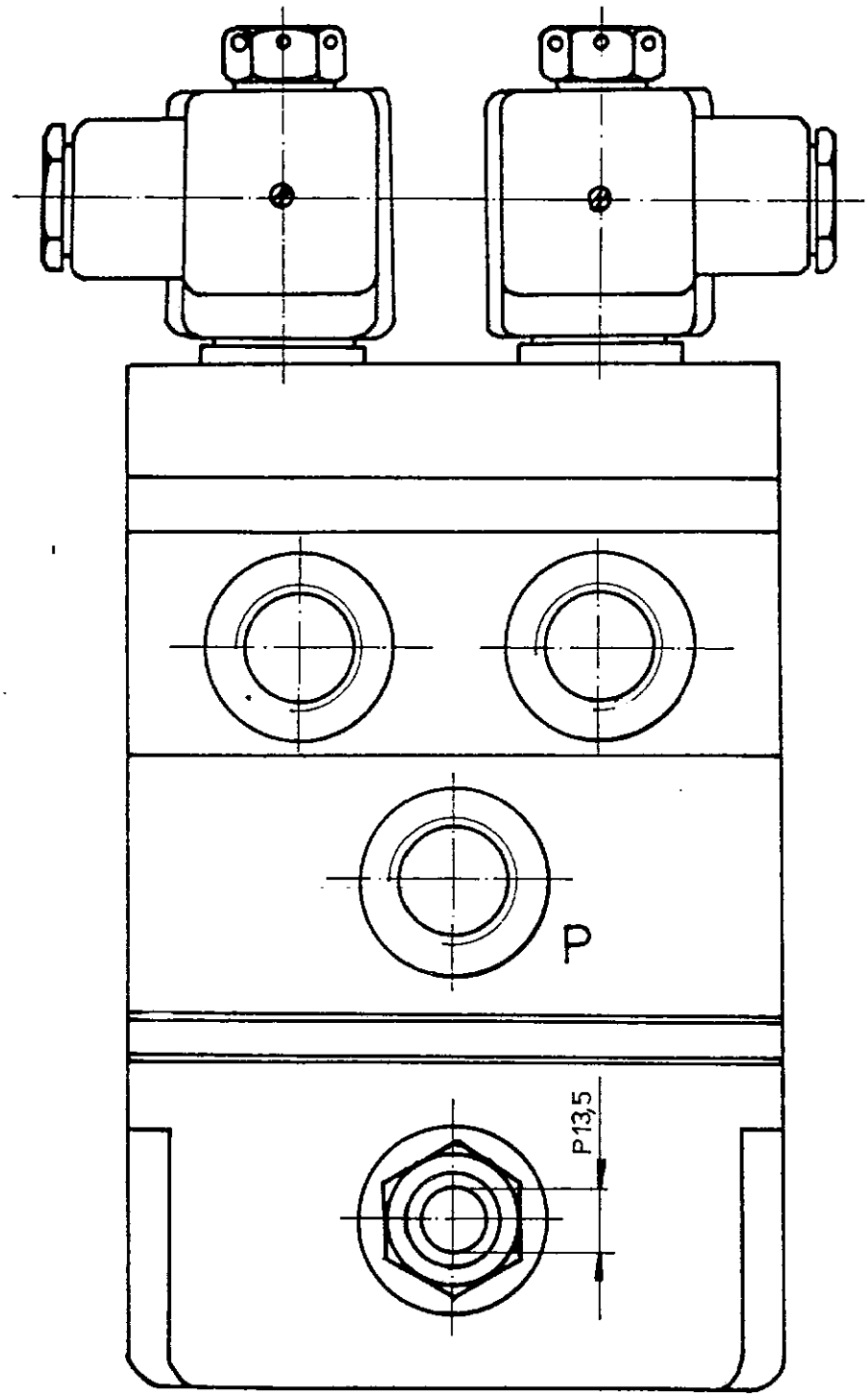
In this supplement are added chapters, in which are mentioned all changes rised from valves exchange. Particularly, the mentioned valve description and change in wiring with valve´s function is mentioned in chapter "Electromagnetic valve" on page 102.

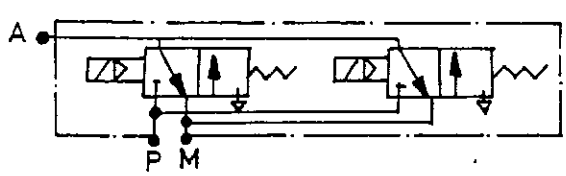
ELECTROMAGNETIC VALVE Figure 32

The LE 400 Č press is fitted up with double three-way valve 3 VEE 25 DC. The electromagnetic valve is remotely controlled by push-buttons or foot switch. It is designed to let in or to let out upon given impuls the compressed air from the clutch-brake control cylinder. Hence the press ram is set in run and on the contrary.

The valve consists of valve body fitted with two pairs of seats, whose rate of flow is controlled by olosing elements interconnected by tie rods. The body is closed from one side by flange carrying two electromagnets controlling separately one pair of seats, and from other side by plugs where tie rods are passing through. On the lower side of the body there are in separate case two inductive sensing elements and an orifice plate controlled by tie rods serving for control of dynamic function of valves.

Air pressure supplied to inlet branch "P" is getting through auxiliary bypass under seats, whose rate of flow is controlled by cores of electromagnets. After simultaneous connection of coils to voltage the cores are set into operating position with the aid of electromagnetic force and hence the flow pasage into the room above control pistons is open. The pistons are shifted in the guiding of the body and by means of tie rods they displace the closing discs into open position, while the pistons are closing the outlet passage. In this position the passage from pressure supply to clutch-brake is open. After disconnection of voltage from coils the cores take back their initial position, they close the bypass, and simultaneously they connect, however, the room above the control pistons with the atmosphere. Pressure under pistons is resetting them and hence the outlet seats are open. The motion of pistons under the spring loaded effect is also followed by closing discs and they close the compressed air inlet from the supply. In this position the passage from consumer to atmosphere is open. The extended tie rods are lead into the room outside the valve, where orifice plate is controlled. Wehn the valve is broken /red signalling lamp is on/, the control is blocked. After the master switched off and the breakdown is removed the control circuit is again capable of functioning.





Obr. 32

2nd APPENDIX TO THE OPERATOR'S MANUAL ON THE PRESS

TYPE LE 400-C

DESIGN WITH ROSS AND HERION VALVES

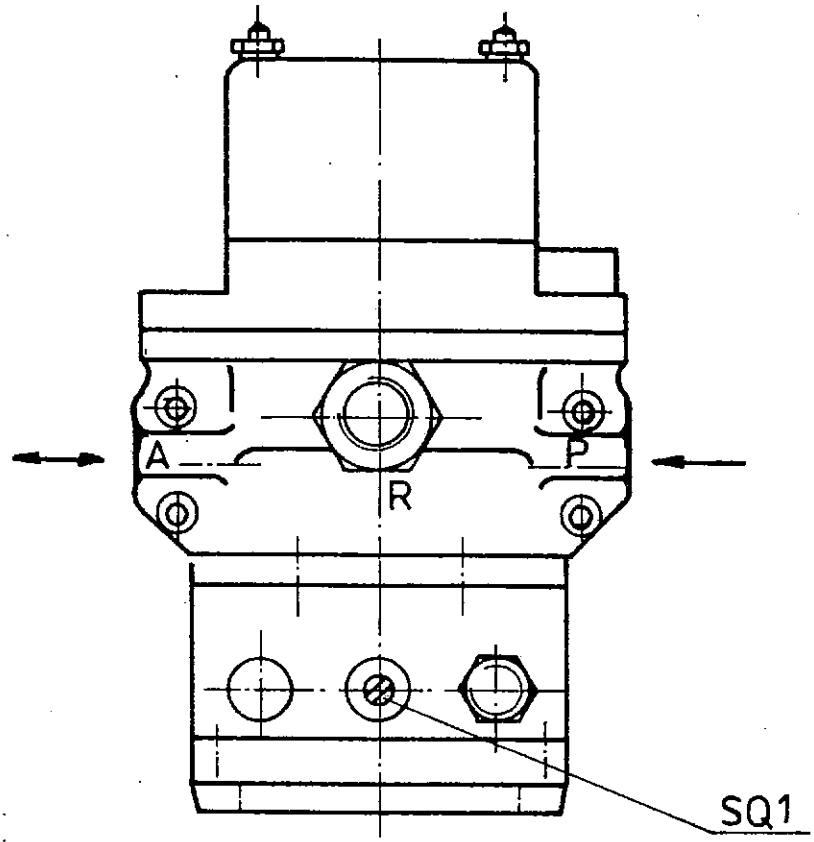
18 November 1982

Elaborated by:
Rendoš Štefan

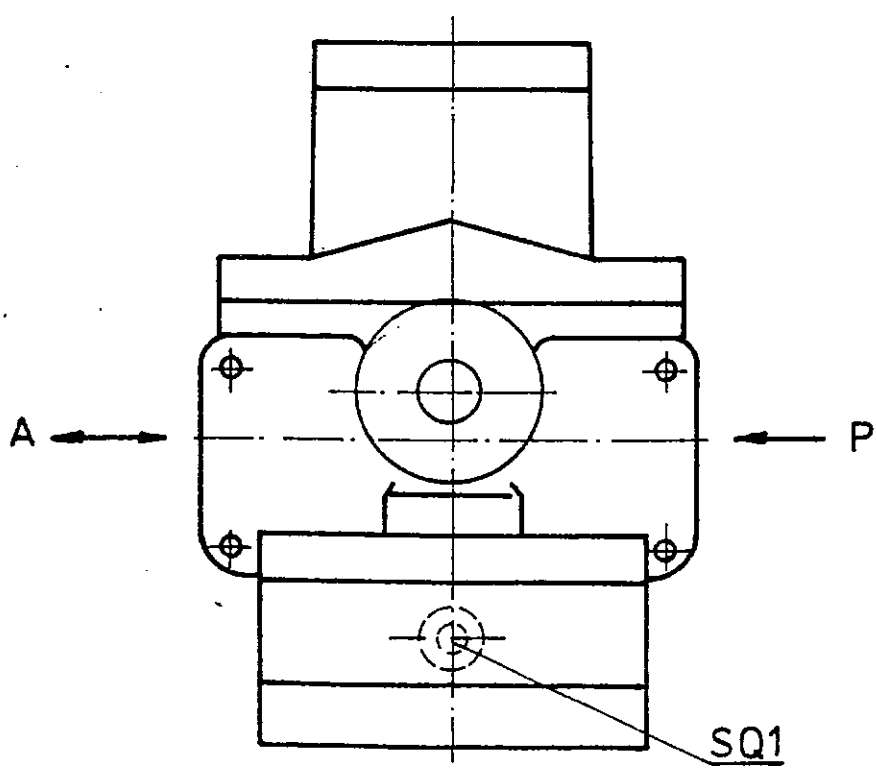
T A B L E O F C O N T E N T :

D E S C R I P T I O N :

In presses type LE 400-C may, besides the valve type 3 VEE 25D, be used also either HERION valve type 2475601.0800 R1" or ROSS valve type D 3573 C 6017 R1".
All the three valve types are parallelled and so in case of failure of one of the pair the machine stops immediatelly. Illuminated LED of the switchbox indicates failure and if push buttons of the control board depressed the machine is impossible to be put into operation. If even after depressing the SQ1 push button /provided in bodies of ROSS and HERION valves - see Figure 1 of the Appendix/ won't the control circuit de-lock, the broken valve should be replaced by a new one.
/In the type 3 VEF 25 D ZPA valve delock the system by turning the QS1 main switch off/.
For all the three valve types an all-purpose wiring diagram No.3-21-9001-005 is provided.



HERION



ROSS

The change note No. 1

LE 400-C

1/ On page 14 there is testprotocol.

2/ The figures 9, 10 are common.

3/ The fig. 12 falls off. With the former LE-types there were two figures; one for the clutch and one for the brake. With the LE-C presses the clutch and brake form one unit. For this reason the fig. 11 remains only.

4/ All positions in figures are described in text.

The change note No.2

WORK SAFETY - NOISE

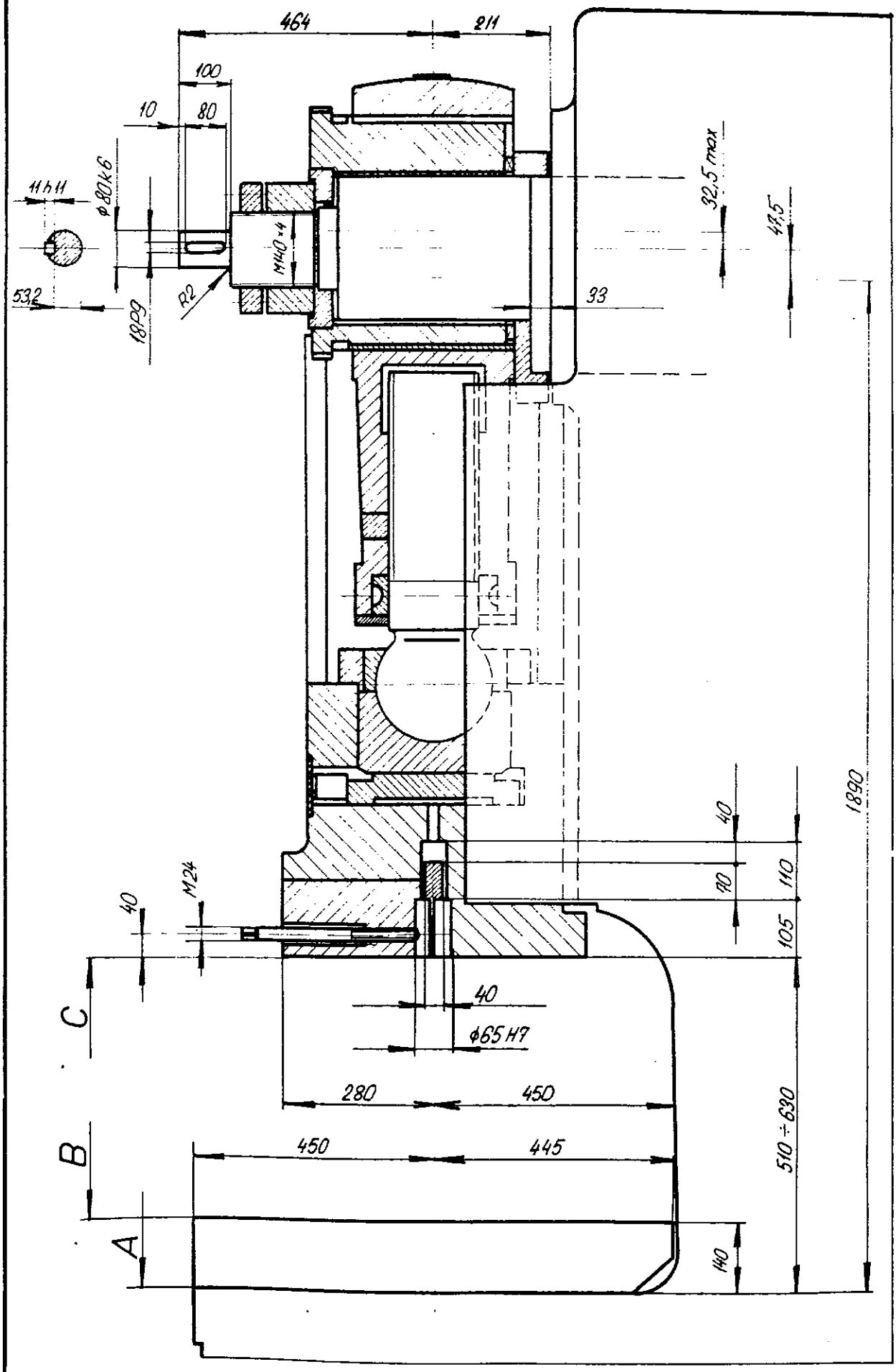
The machine produces during the operation the noxious noise which is created in the different levels in accordance to the type of technological operations.

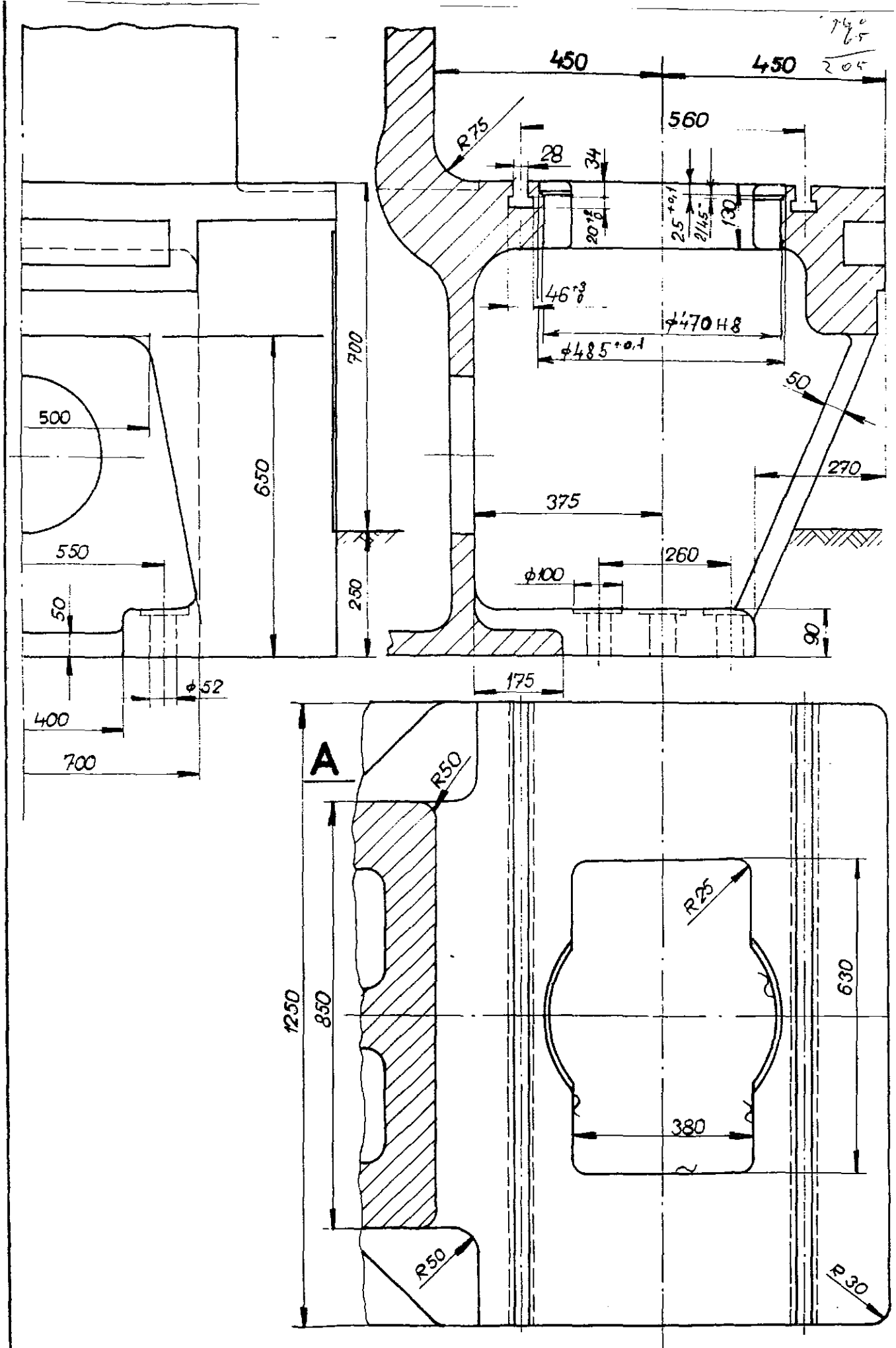
The noise level is regularly lower than 90 dB during technological operations as bending, pressing, forging and deep drawing.

Shearing tools produce strong noise, mainly parallely ground. The noise level increases to 112 till 115 dB /AI/ during the shearing when the tool without special improvement is applied.

It is necessary to employ especially prepared tools provided with varied types of oscillation absorbers or to apply safety measures to protect the operator, for example: personal protecting devices, the organization of pauses, etc.

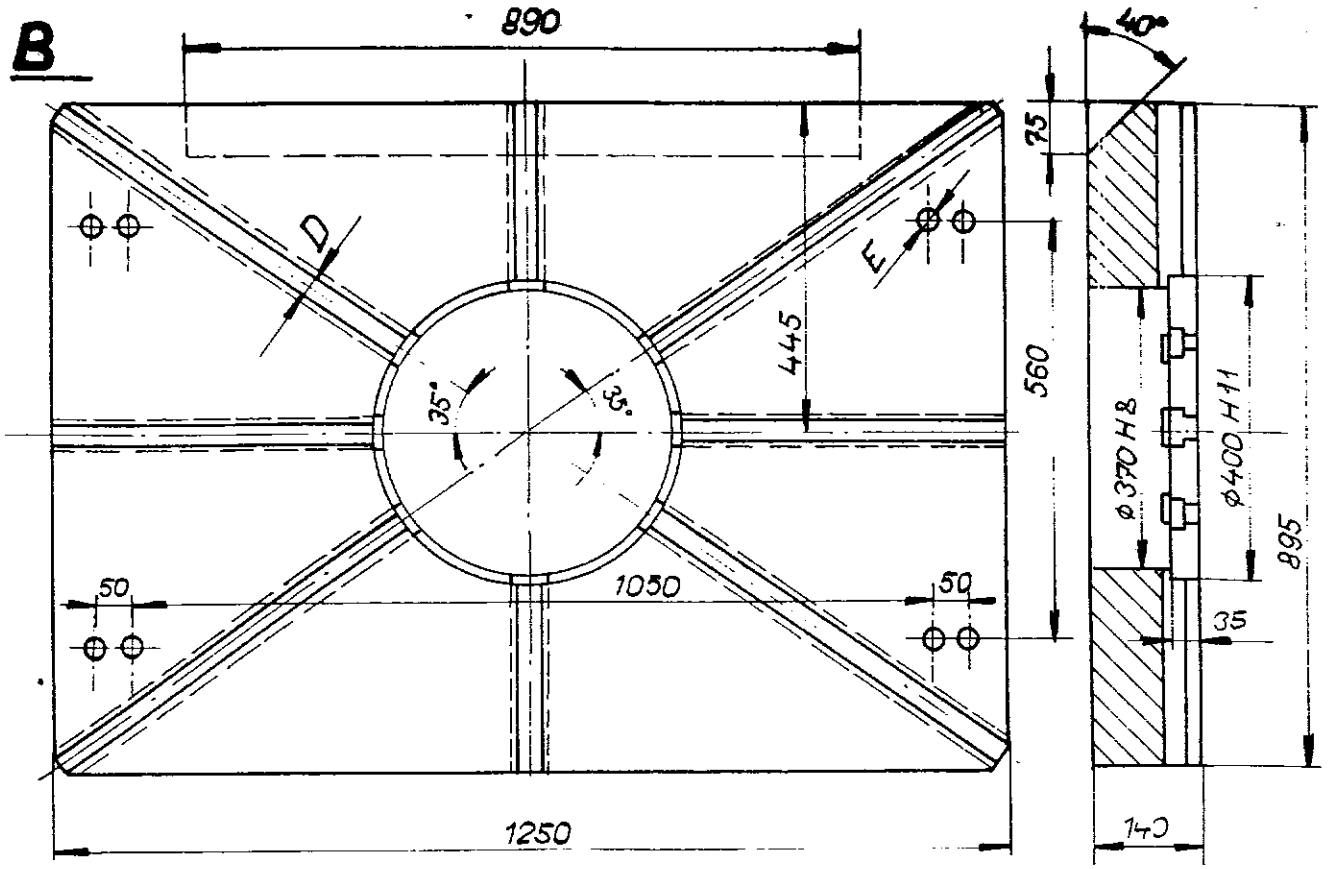
The text written above supplements next pages:
LE 160-C on page 78
LE 250-C on page 69
LE 400-C on page 62

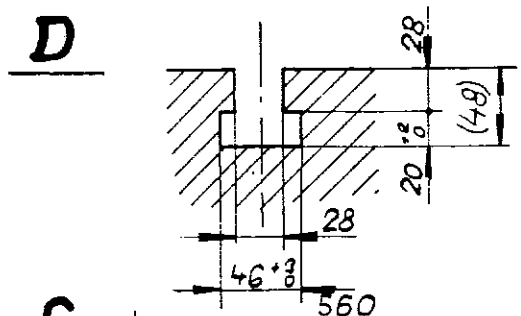

464
211
100
10
80
11h11
ϕ80k6
M140×4
R2
53,2
180,9
32,5 max
48,5
33
1890
40
90
110
105
M24
40
40
ϕ65H7
280
450
450
445
510÷630
140
C
B
A

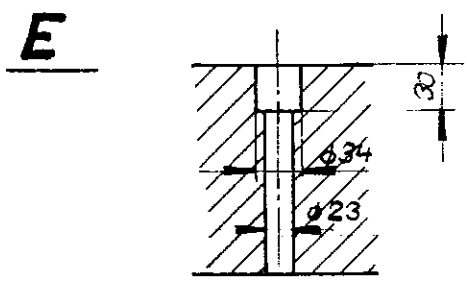


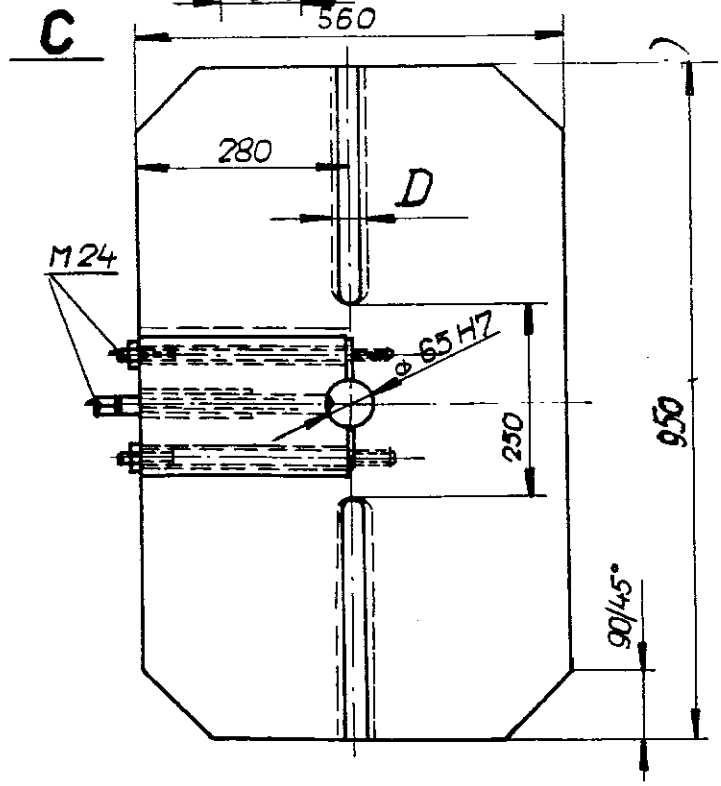
4-T-12 1043 2/3
4-T-12 1043/A

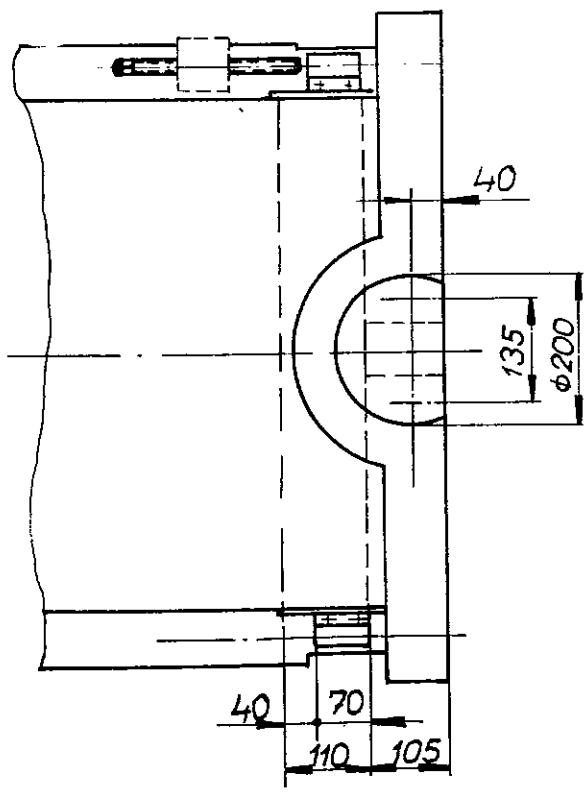
OBR. 2.





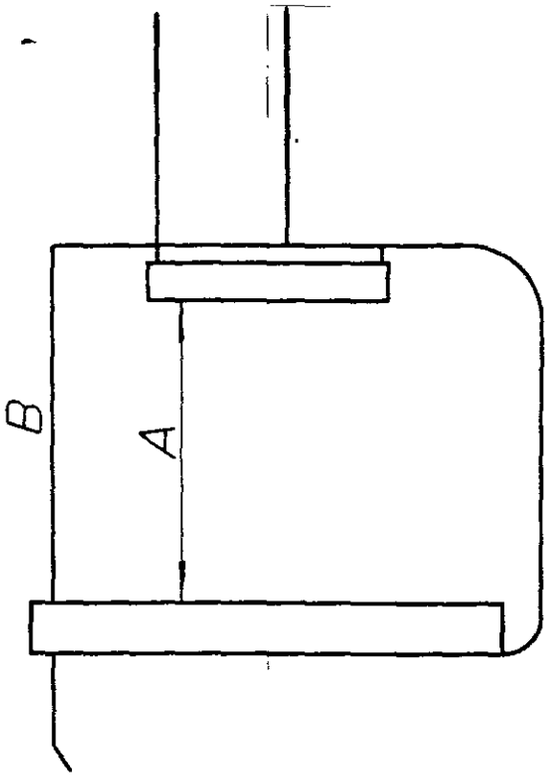


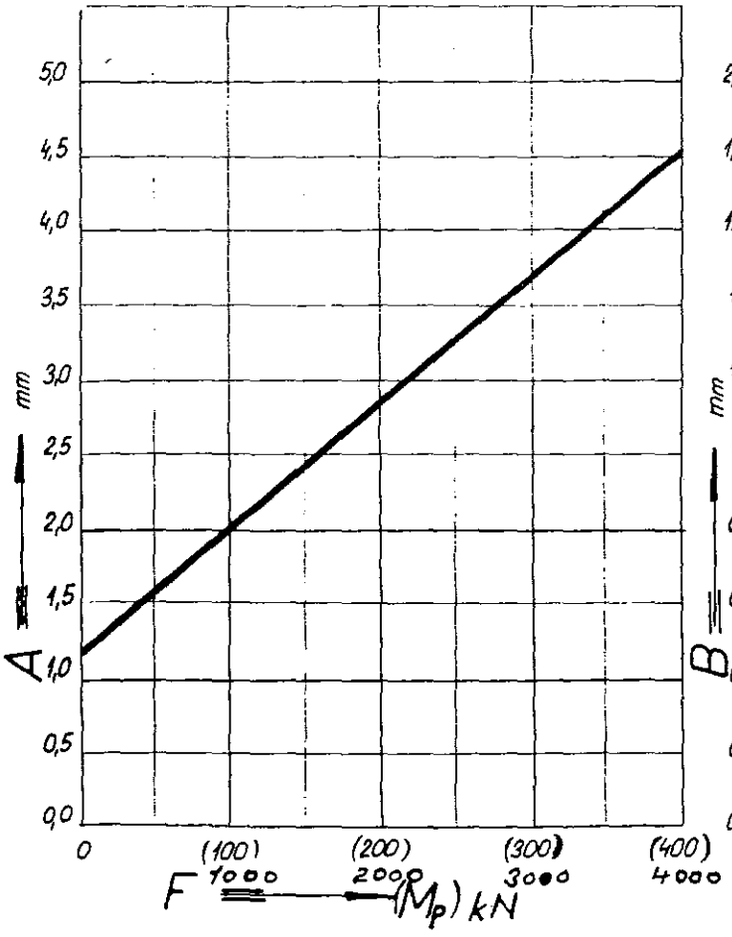


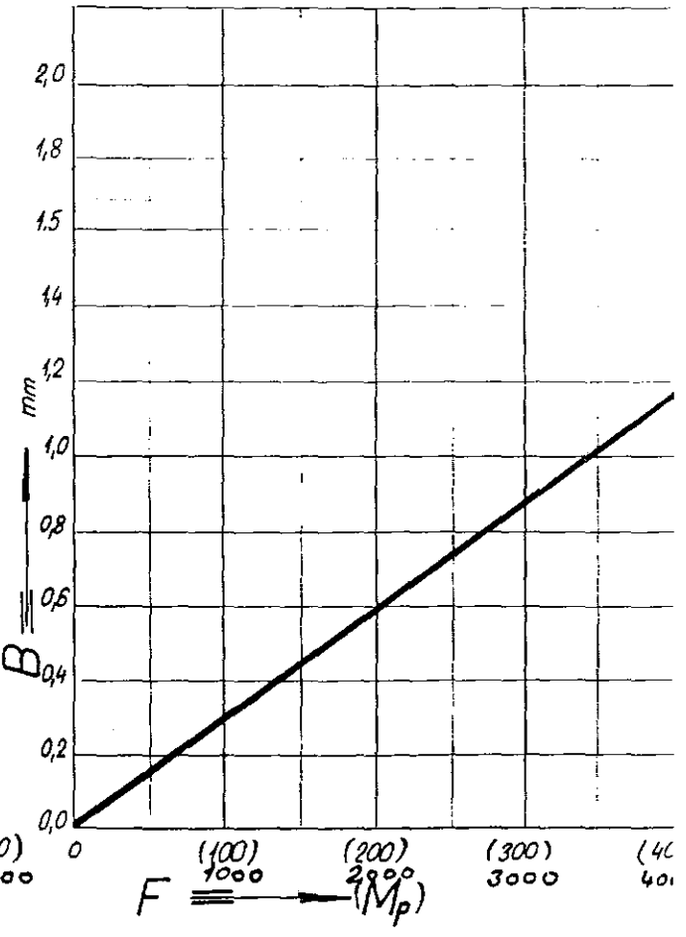


4-T-12 1043
4-T-12 1043/A 3/3

OBR.3



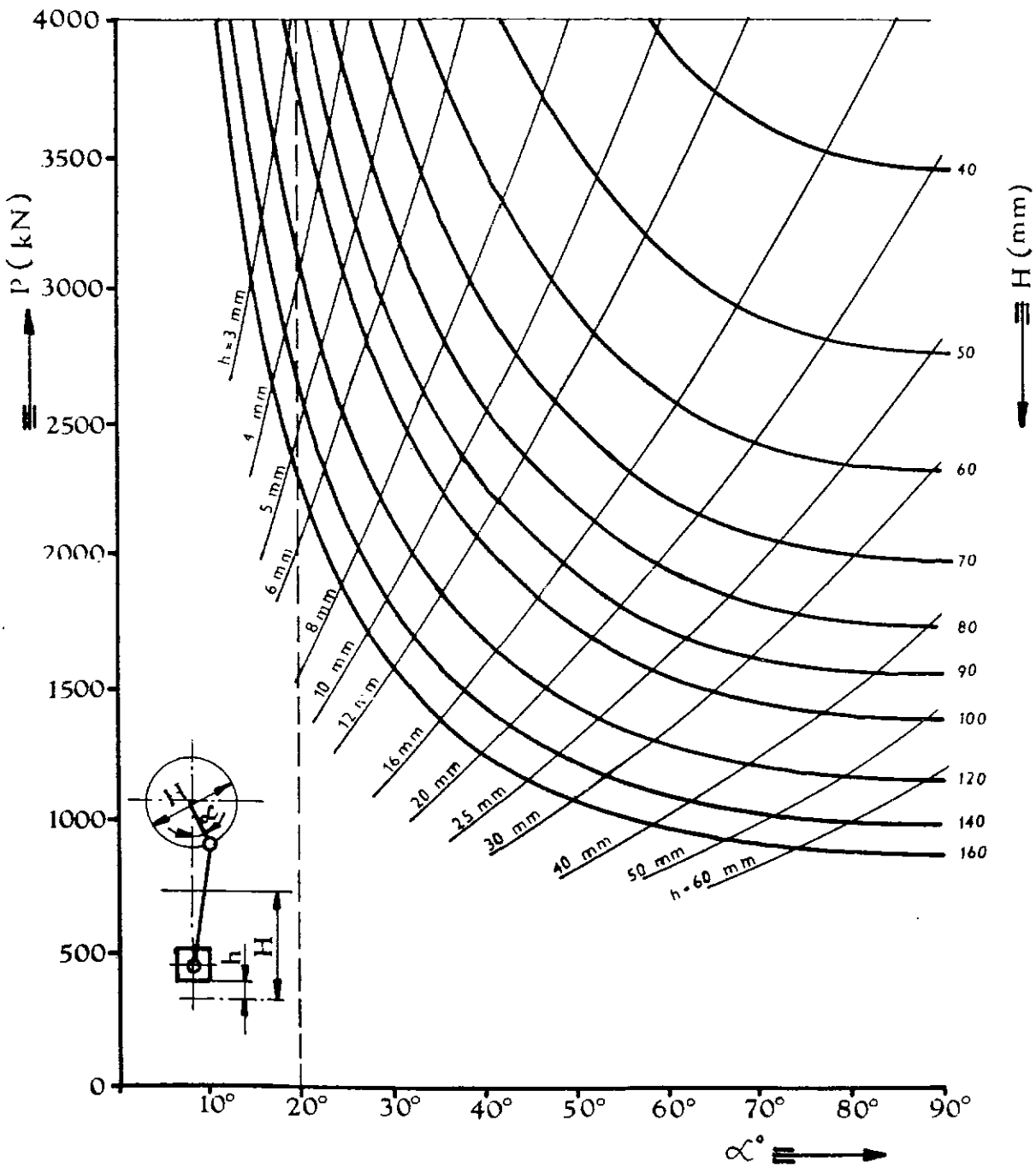




4-T-12 1095

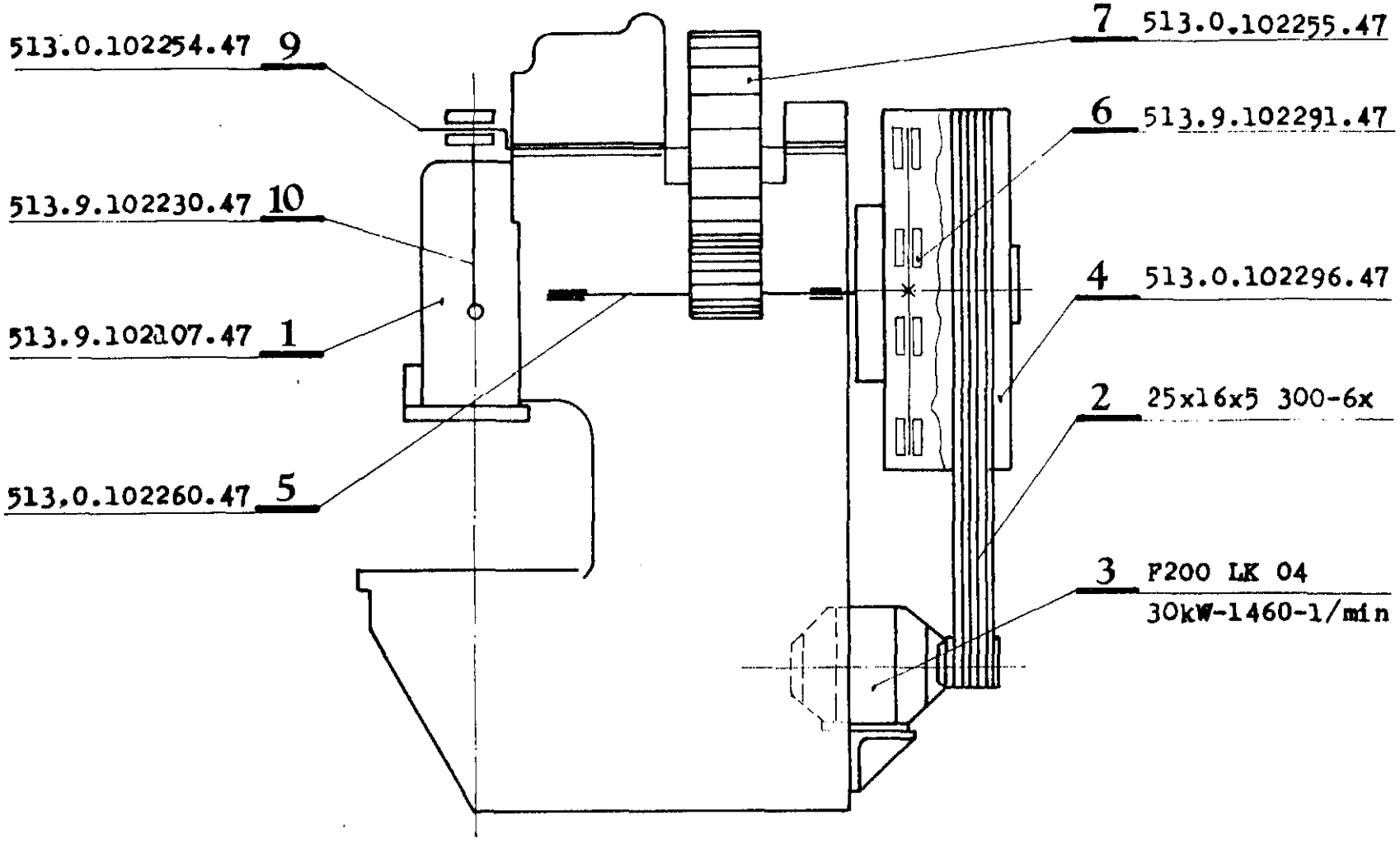
OBR.4

LE 400-C



obr. 5

4-T-13 1040



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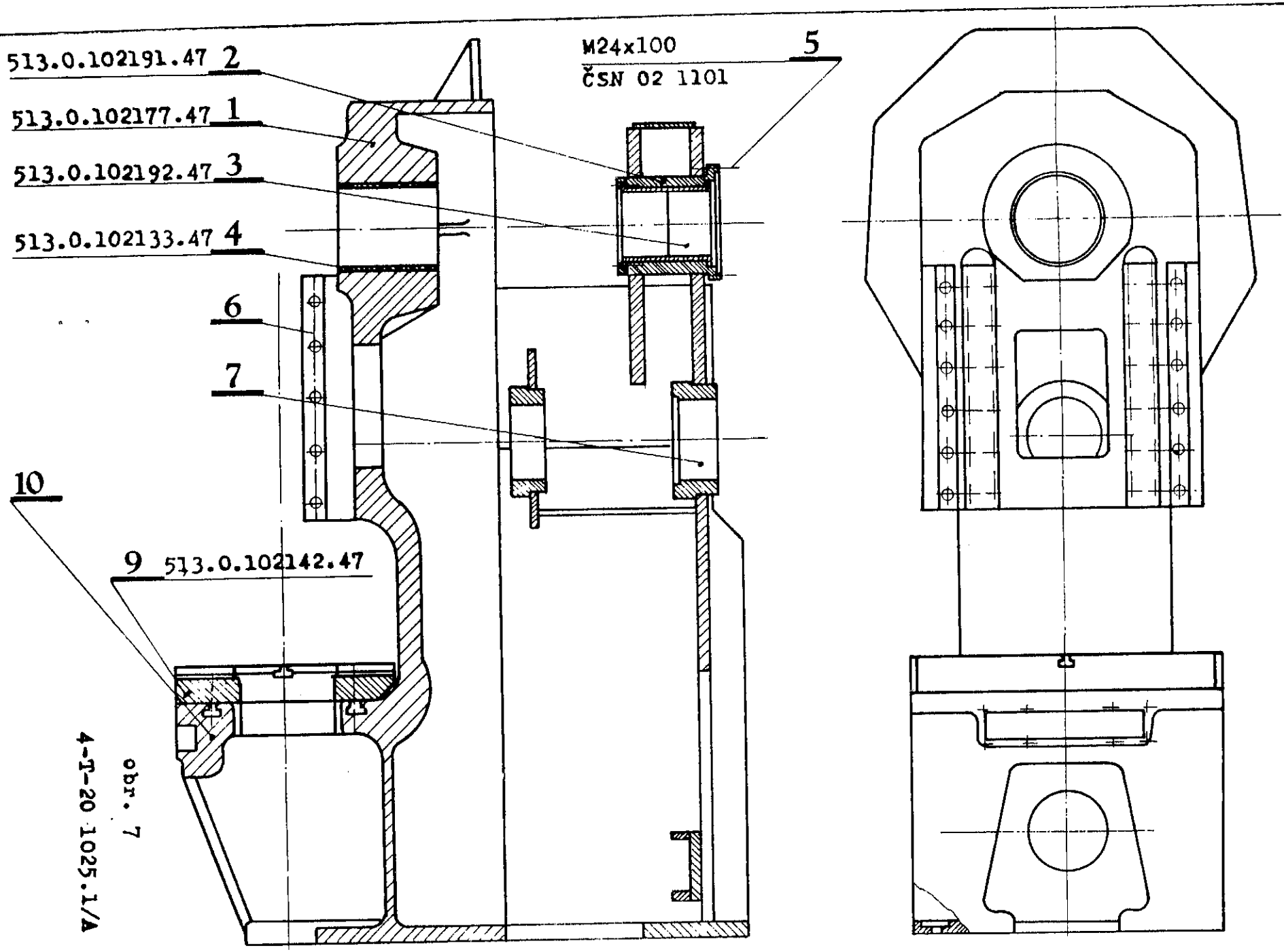

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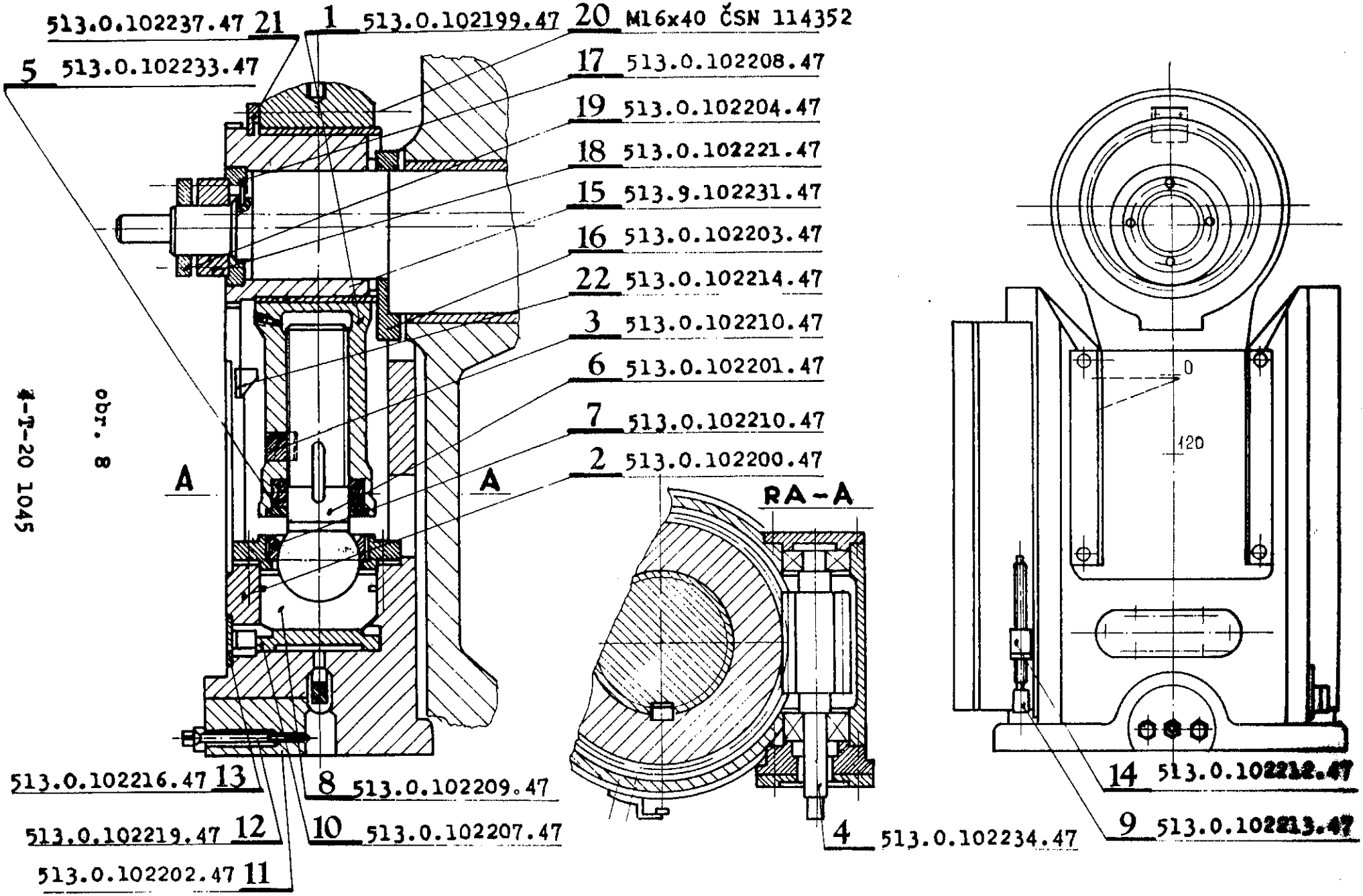
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20 M16x40 ČSN 114352
5 513.0.102233.47
17 513.0.102208.47
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3 513.0.102210.47
6 513.0.102201.47
7 513.0.102210.47
2 513.0.102200.47
A
A
RA-A
0
120
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8 513.0.102209.47
513.0.102219.47 12
10 513.0.102207.47
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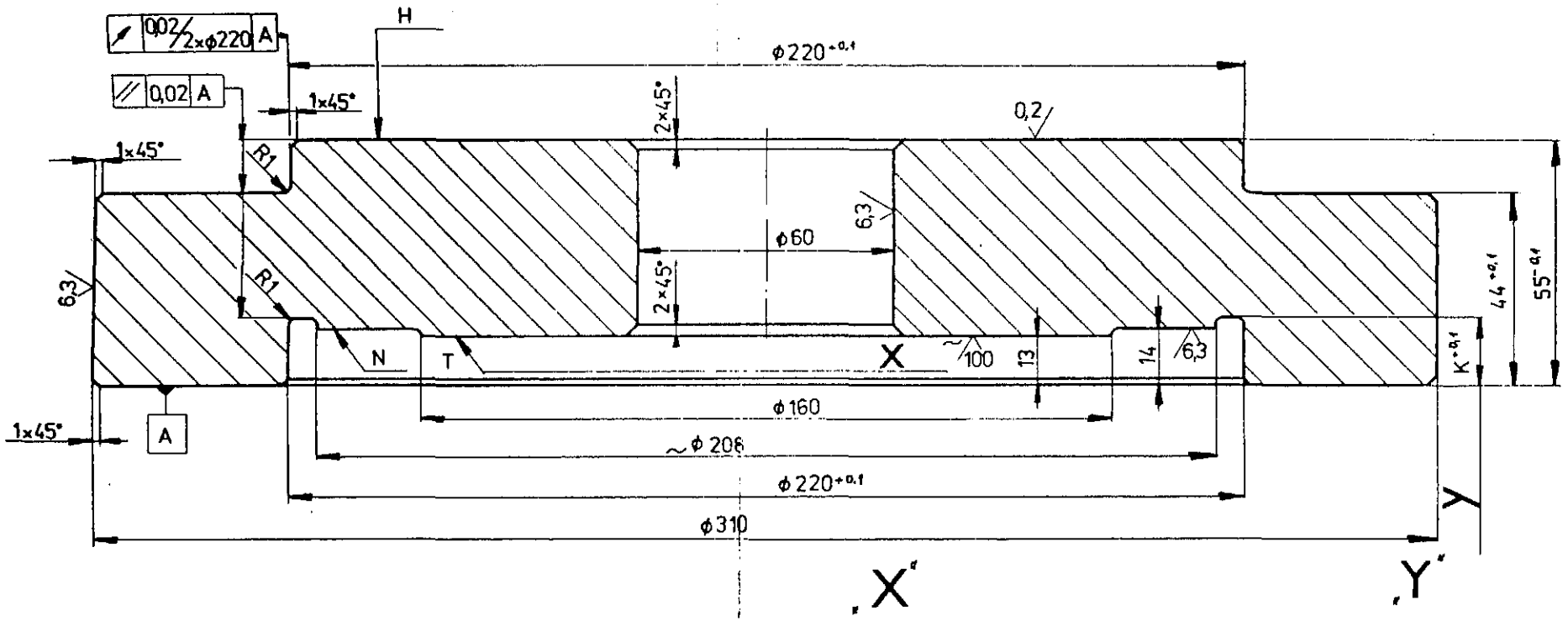
4 513.0.102234.47
14 513.0.102212.47
9 513.0.102213.47
4-T-20 1045
obr. 8

LE 400 C



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170	14,00
171	14,05
172	14,10
173	14,15
174	14,20
175	14,25
176	14,30
177	14,35
178	14,40
179	14,45
180	14,50

HB	„K +0,1"
181	14,55
182	14,60
183	14,65
184	14,70
185	14,75
186	14,80
187	14,85
188	14,90
189	14,95
190	15,00
191	15,05

HB	„K +0,1"
192	15,10
193	15,15
194	15,20
195	15,25
196	15,30
197	15,35
198	15,40
199	15,45
200	15,50

Vyliate číslo tavby a text LE 400 C, písmo 10 mm	Podľa tabuľky
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Numéro coulé de la fonte et le texte LE 400 C, lettres 10 mm	Selon la table
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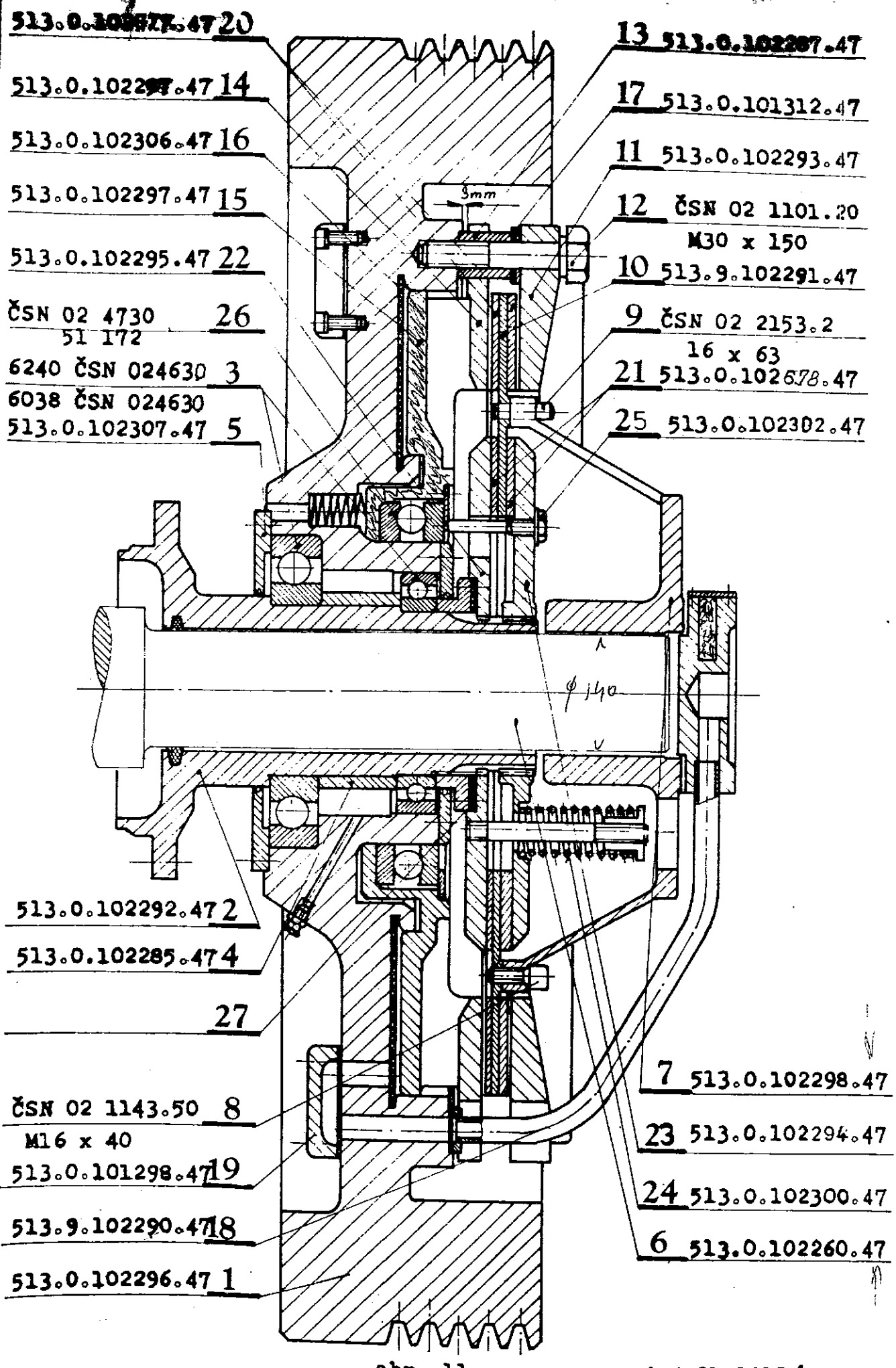
Obr. 9 - 10

4-T-20-1078/A



obr. 11

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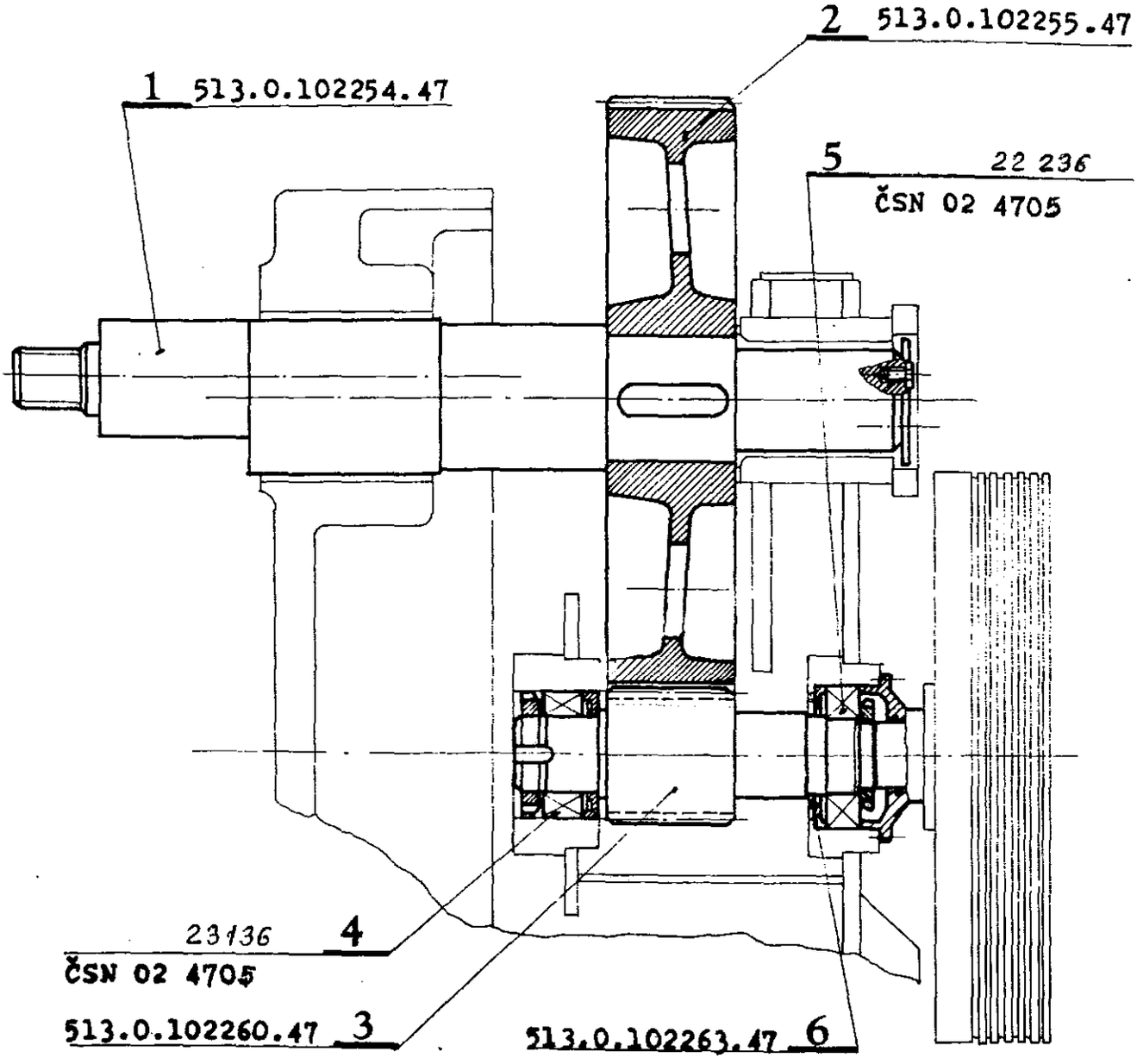
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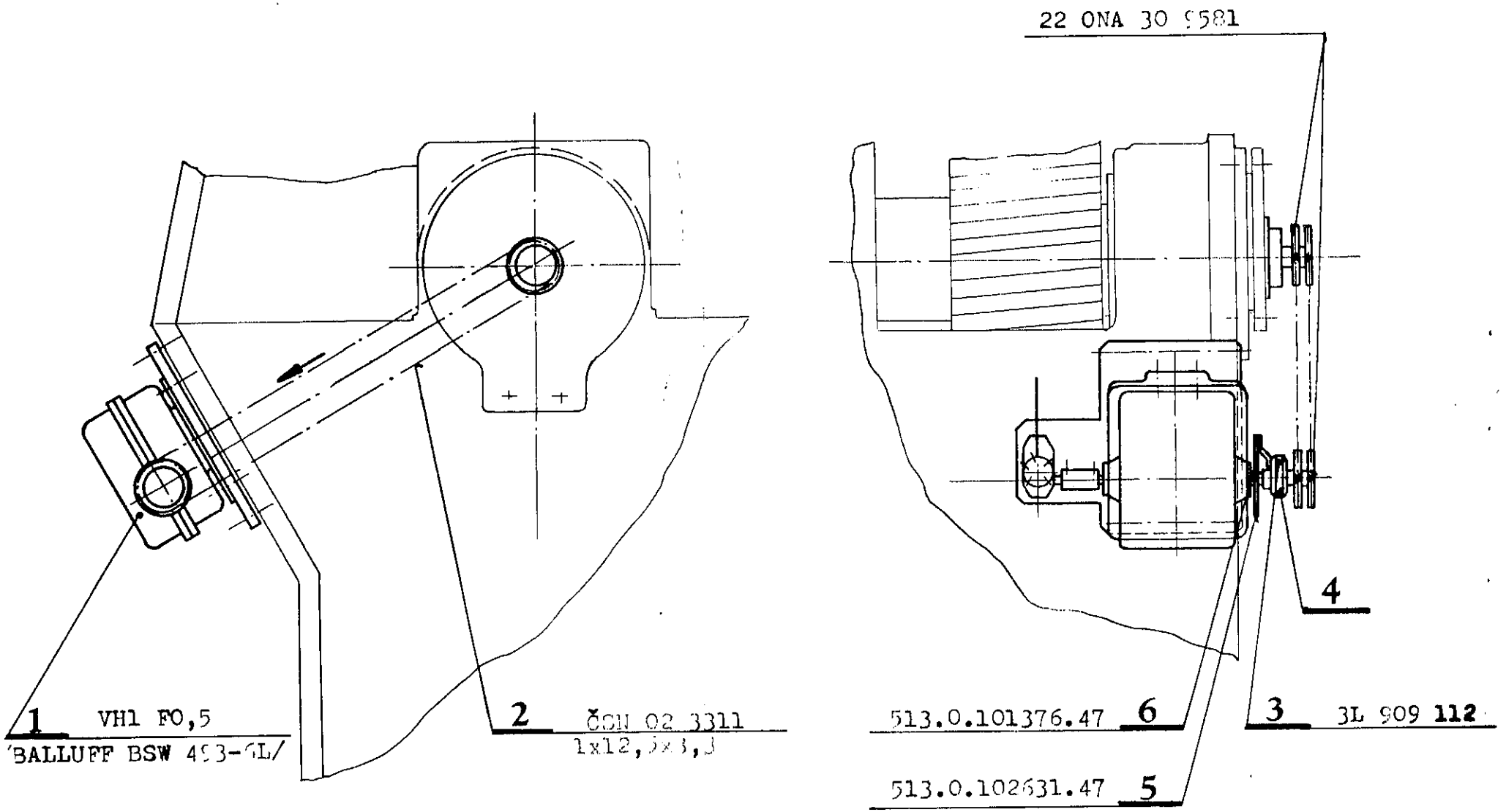
obr. 13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1 VH1 FO,5
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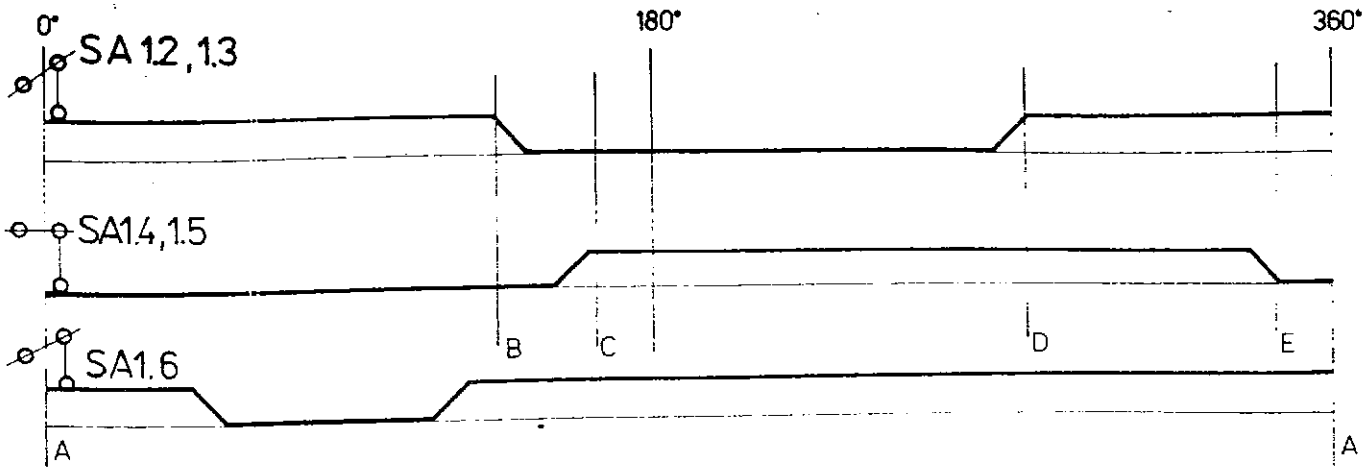
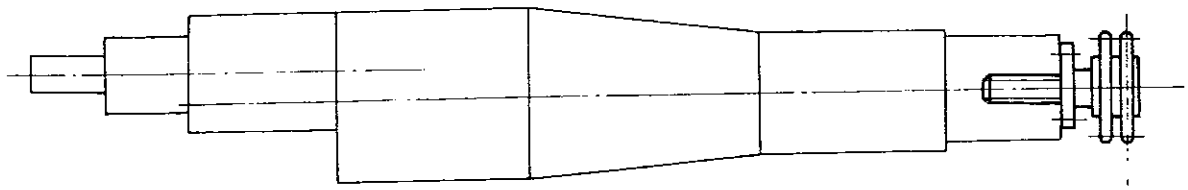
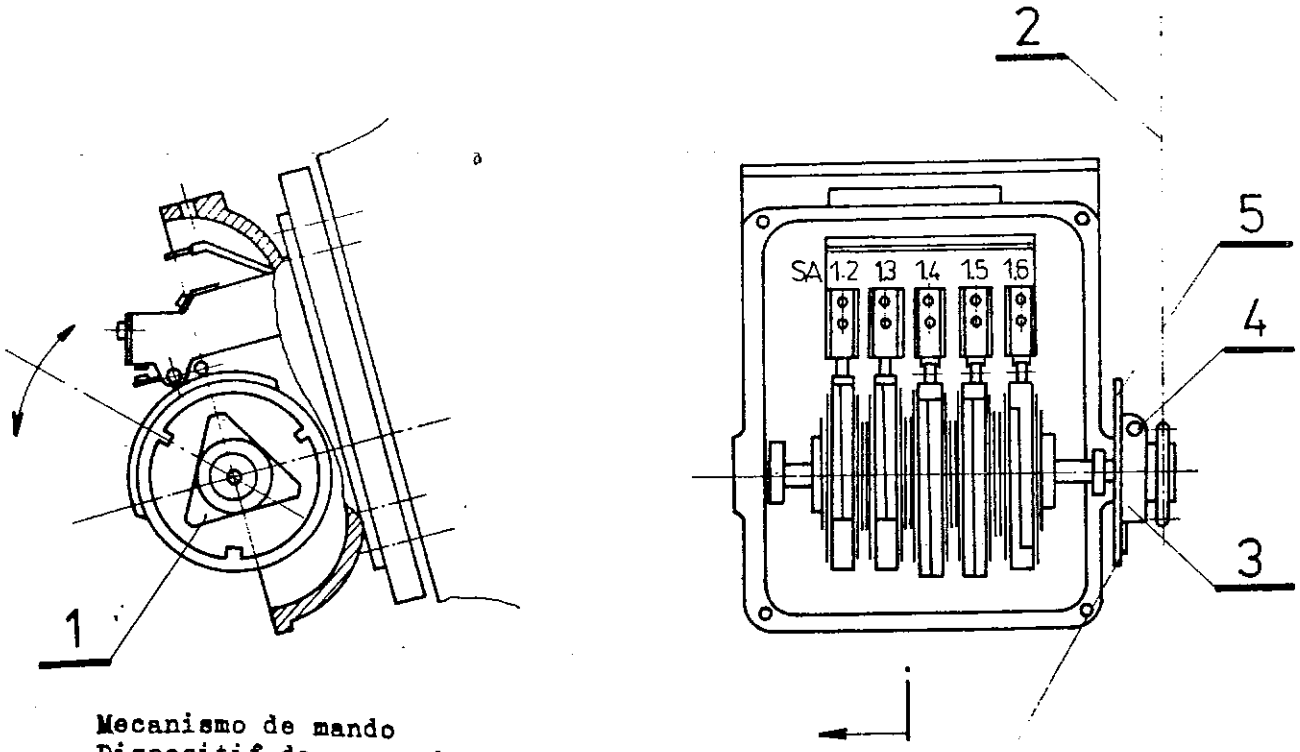
3 3L 909 112
4

obr. 14



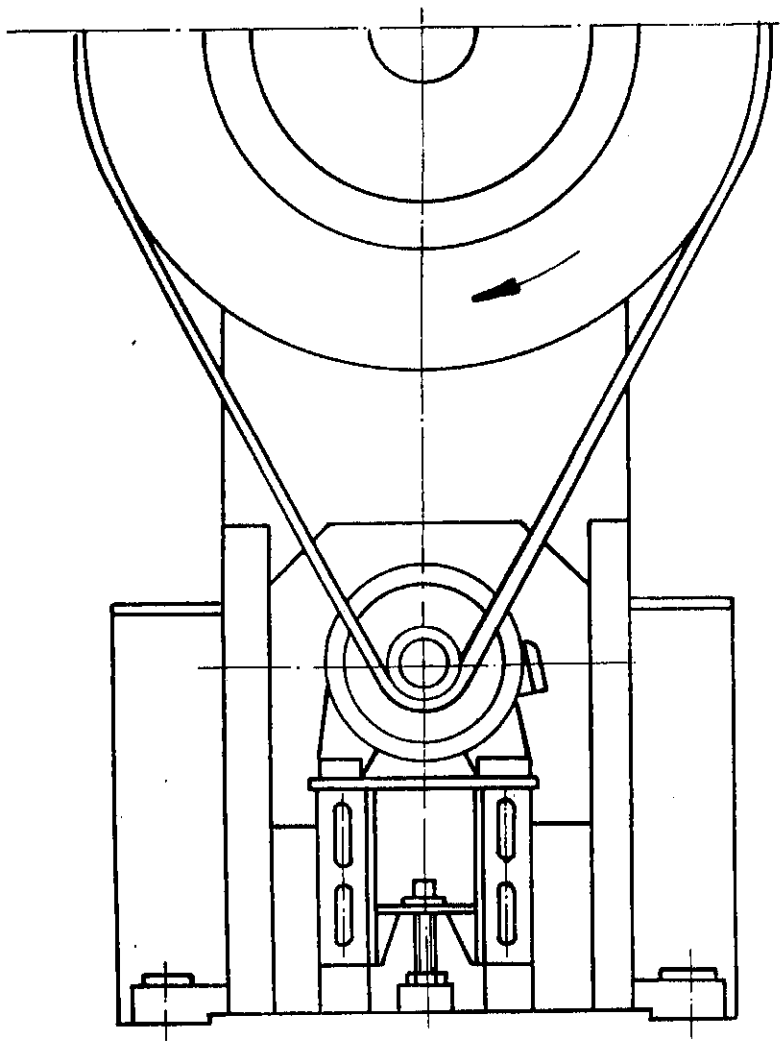


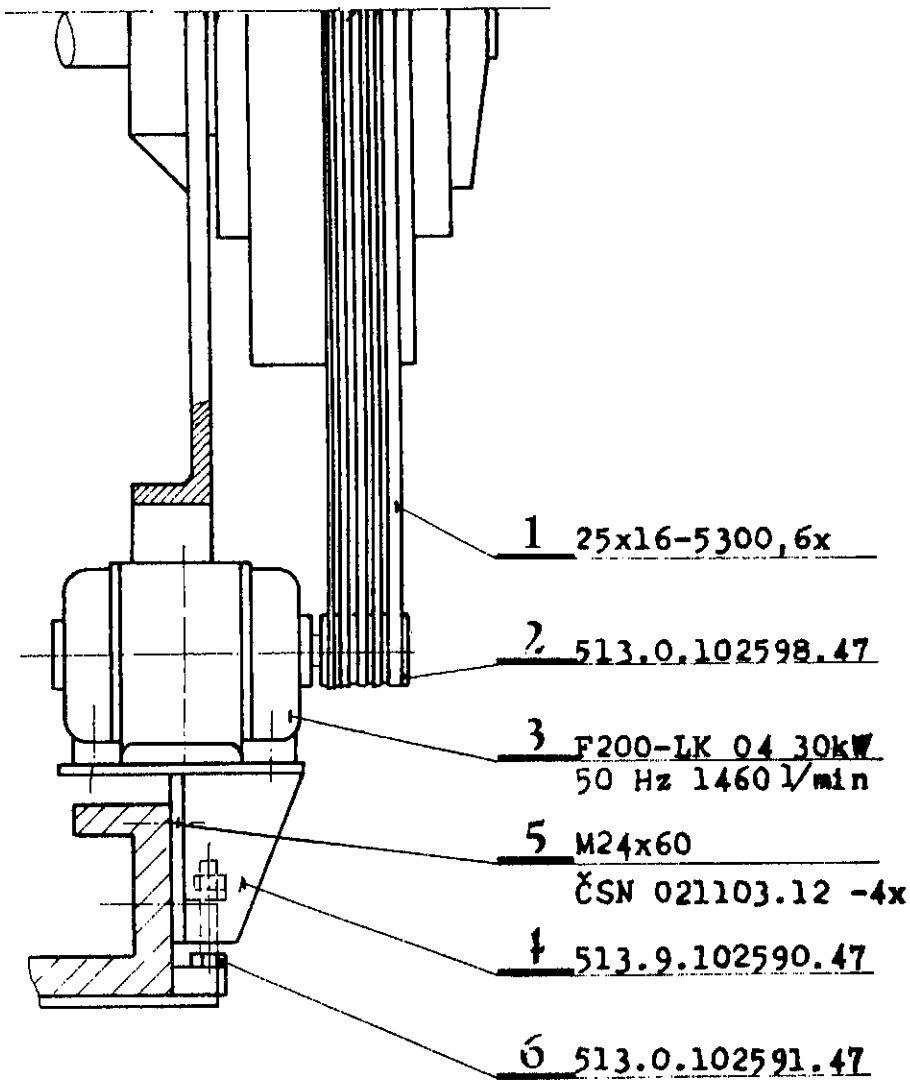


Mecanismo de mando
Dispositif de commande
Steuerwerk
Control mechanism
Механизм управления

RIADIACE ÚSTROJENSTVO LE 400 C

obr. 14 a





tab. 15

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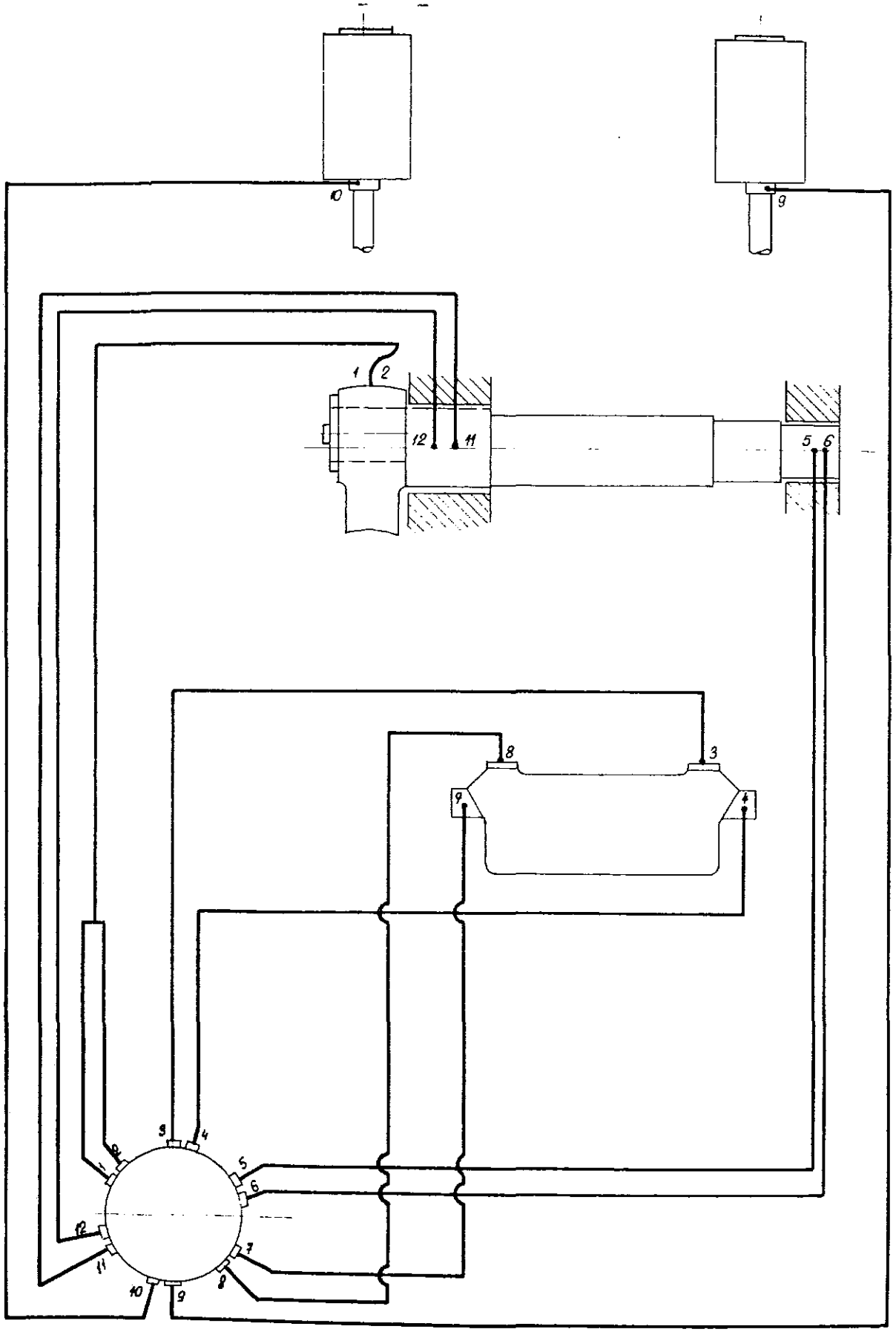
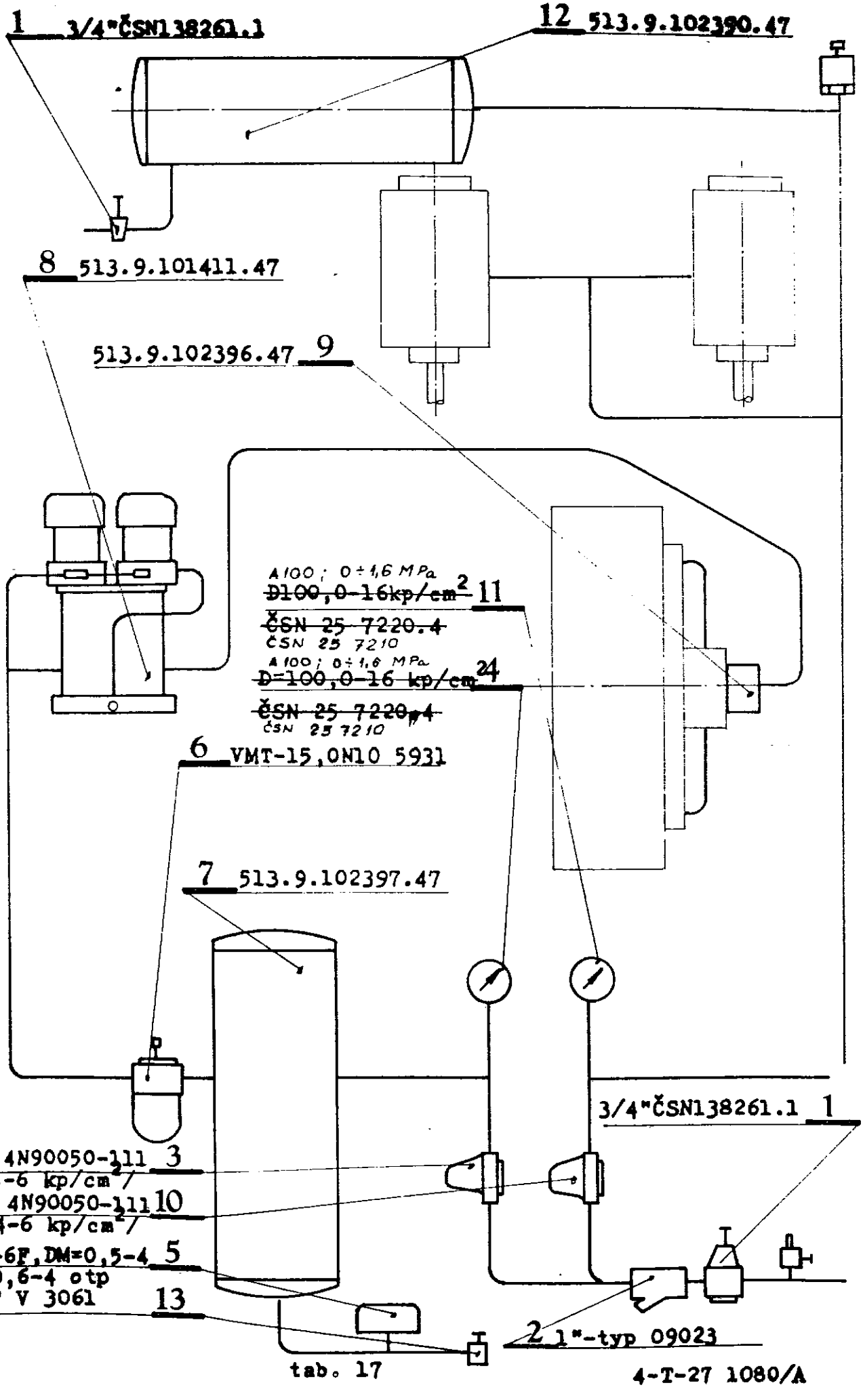


4-T-28 1022

OBR. 16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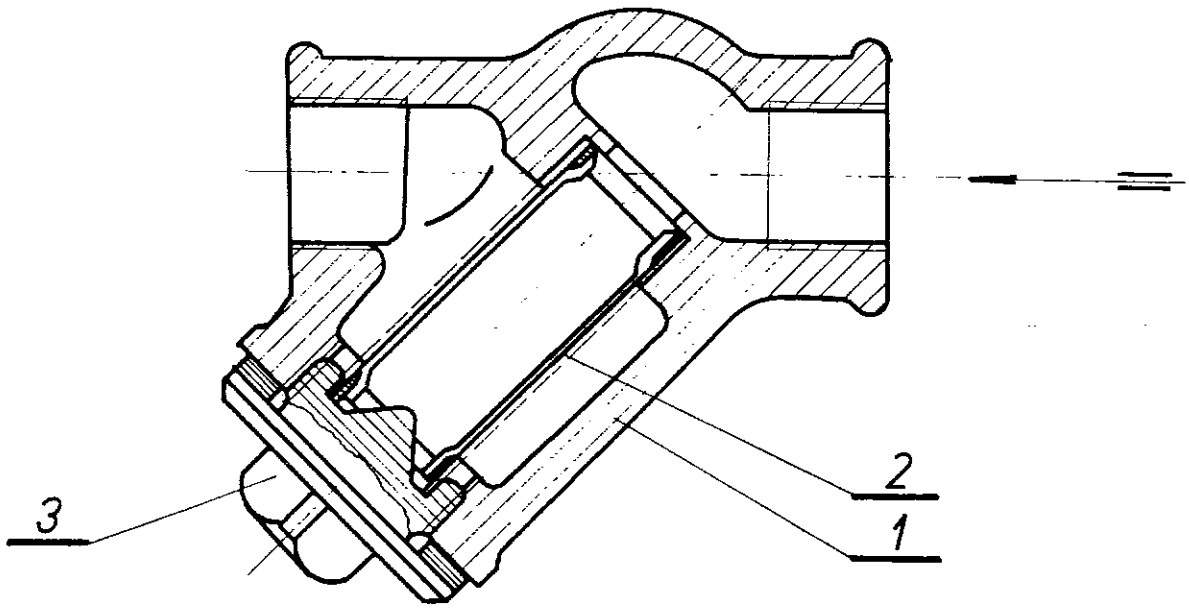
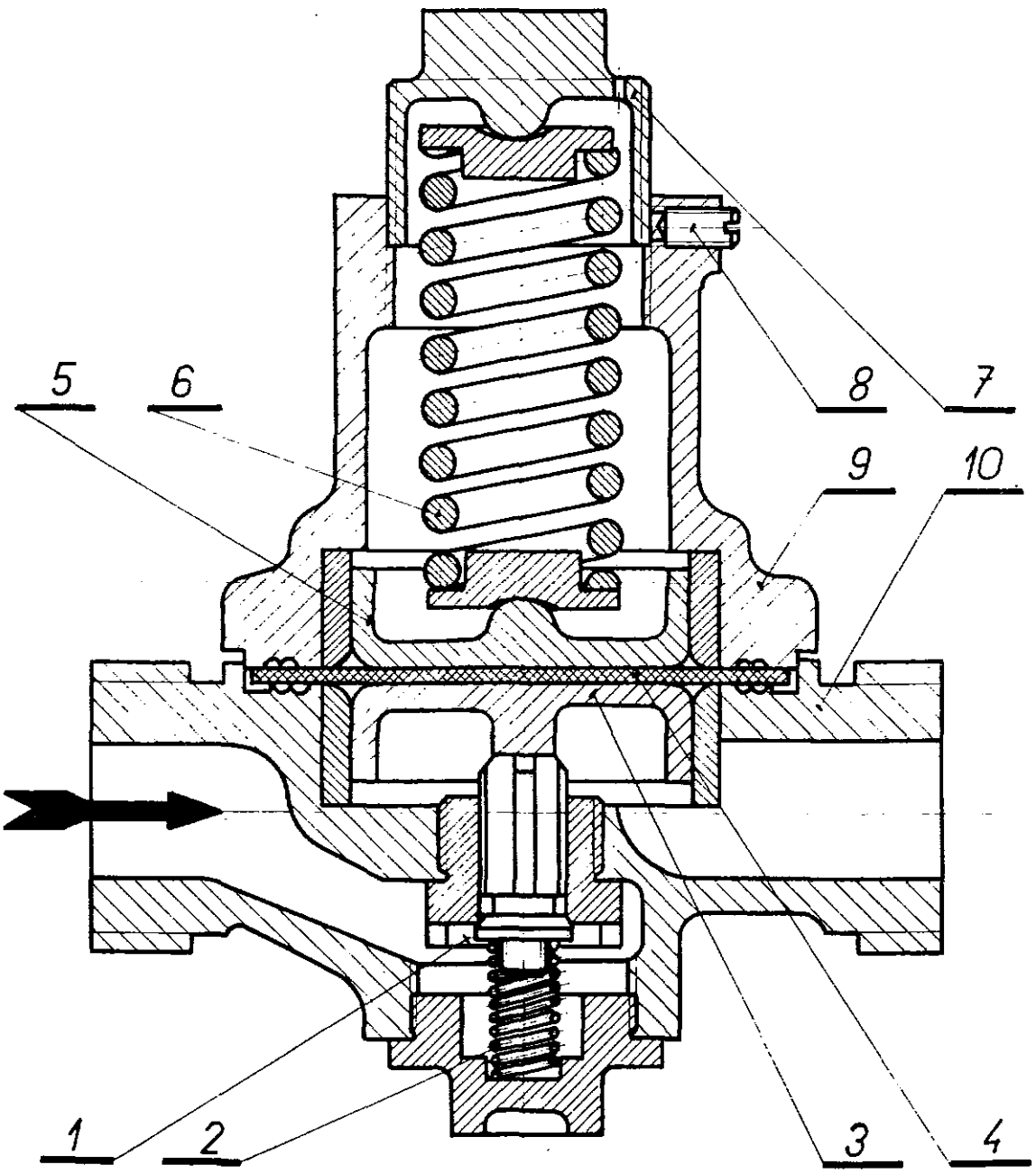
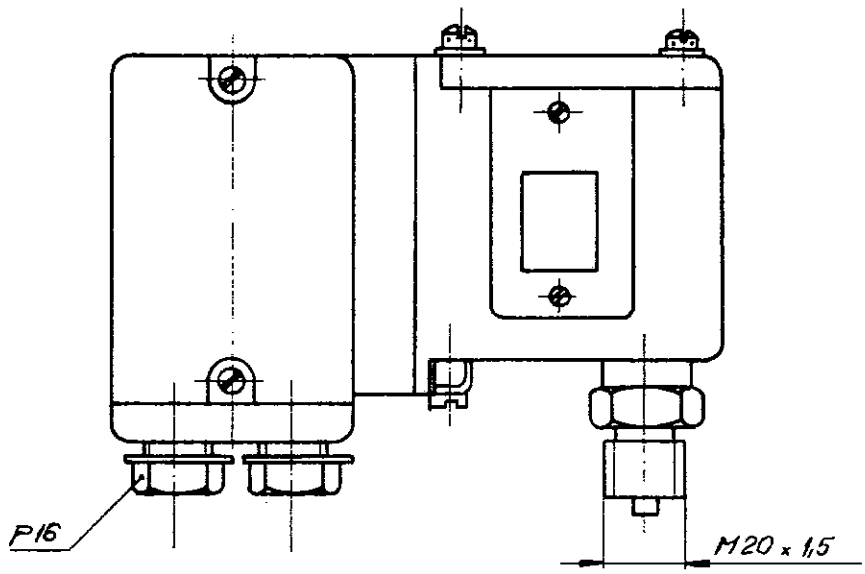
12 513.9.102390.47
8 513.9.101411.47
513.9.102396.47 9
A100; 0÷1,6 MPa
~~D100,0-16kp/cm²~~ 11
~~ČSN 25 7220.4~~
ČSN 25 7210
A100; 0÷1,6 MPa
~~D=100,0-16 kp/cm²~~ 24
~~ČSN 25 7220.4~~
ČSN 25 7210
6 VMT-15,0N10 5931
7 513.9.102397.47
3/4"ČSN138261.1 1
3/4"4N90050-111 3
/4-6 kp/cm²/
3/4 4N90050-111 10
/4-6 kp/cm²/
TSV-6F,DM=0,5-4 5
T1=0,6-4 otp
1/4" V 3061 13
2 1"-typ 09023
tab. 17
4-T-27 1080/A

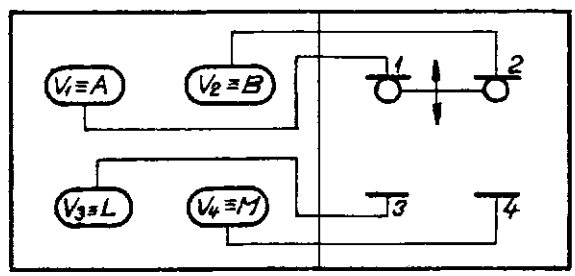

3
2
1

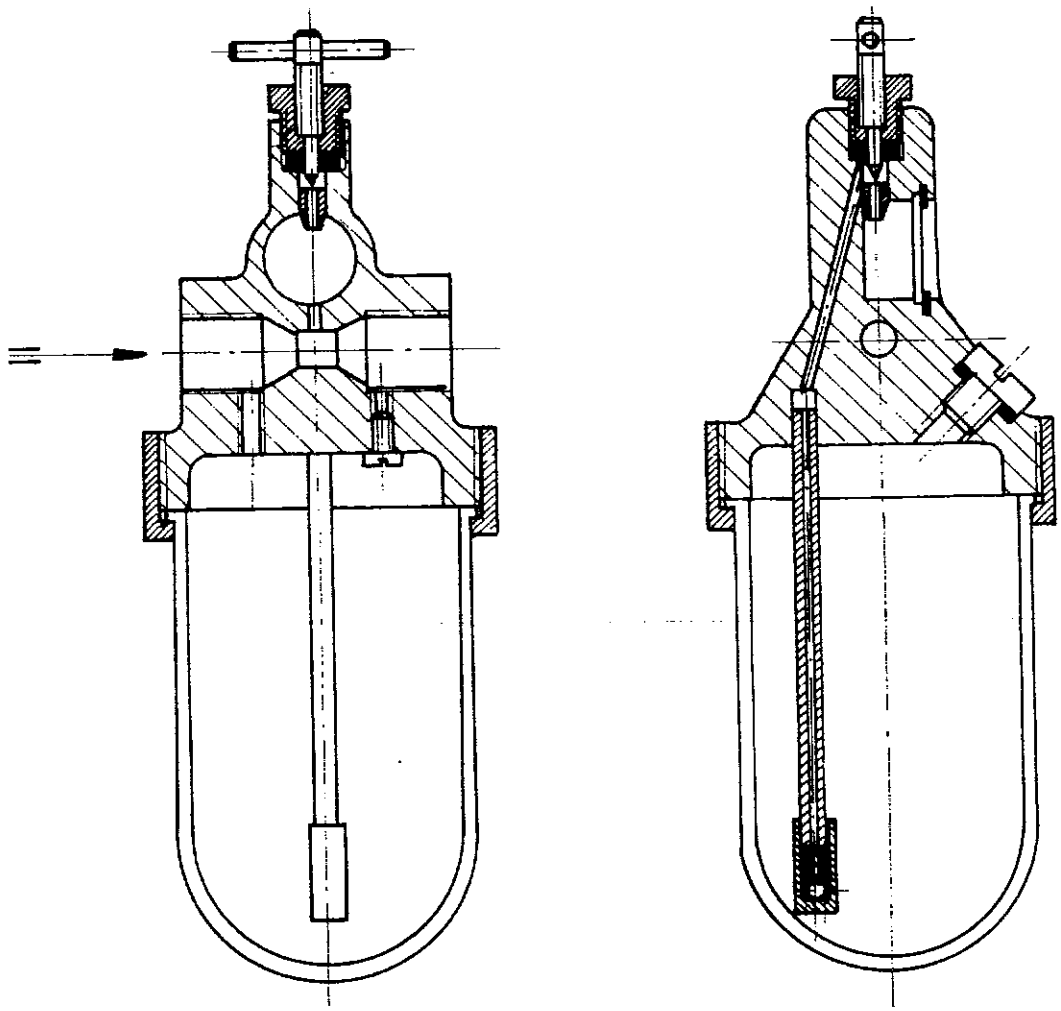


4-T-27 1015

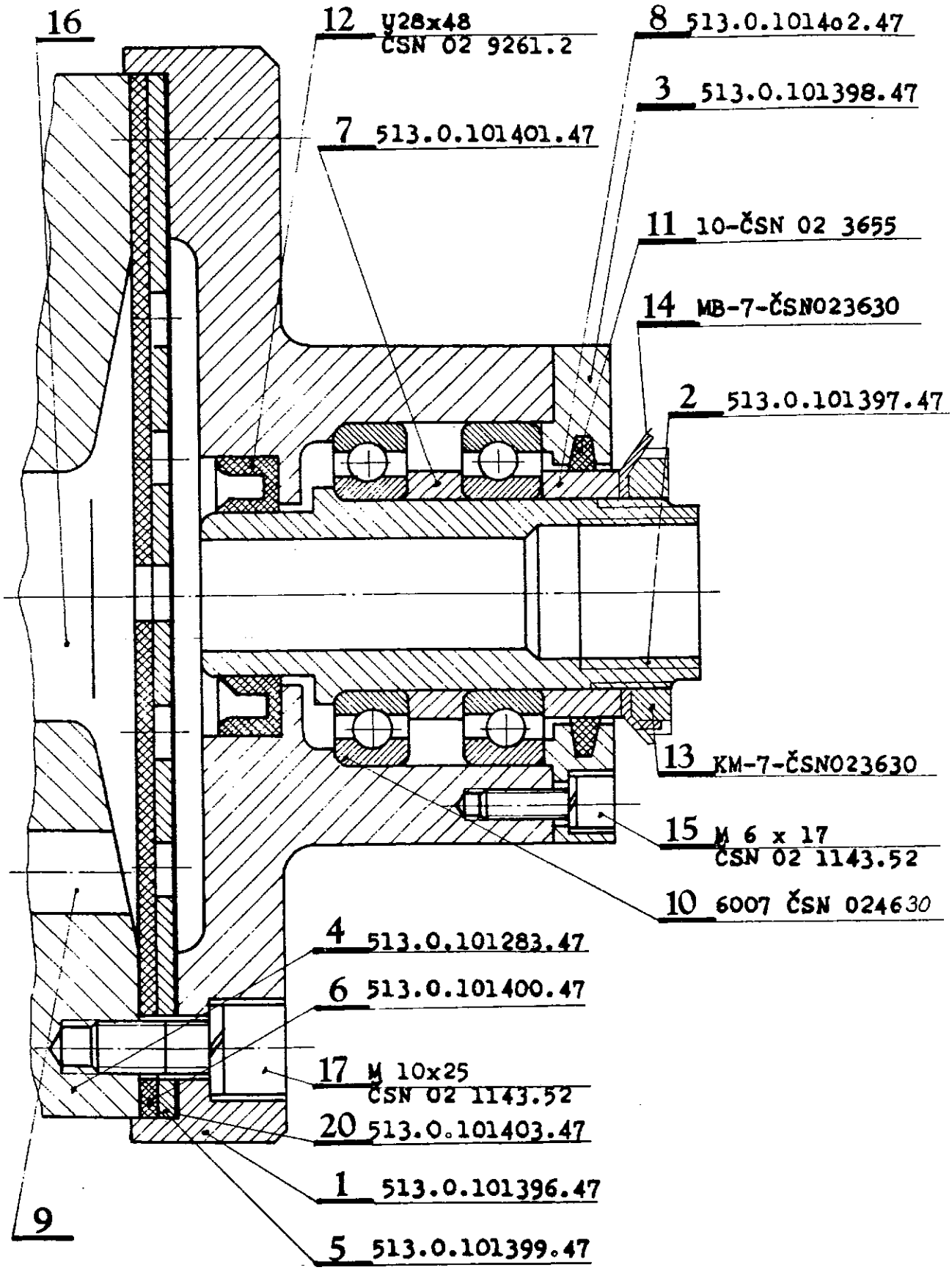
OBR. 19


P16
M20 x 1,5

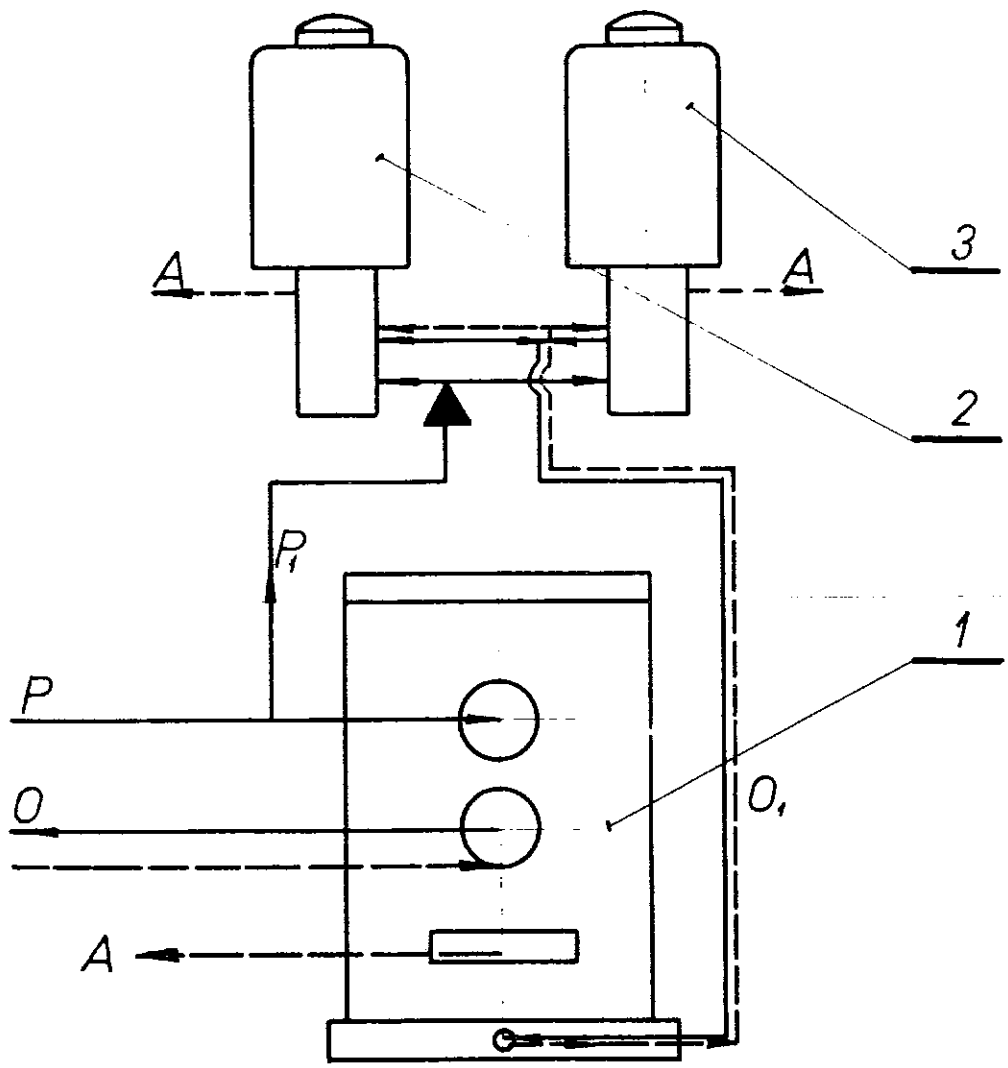

V1≡A
V2≡B
V3≡L
V4≡M
1
2
3
4

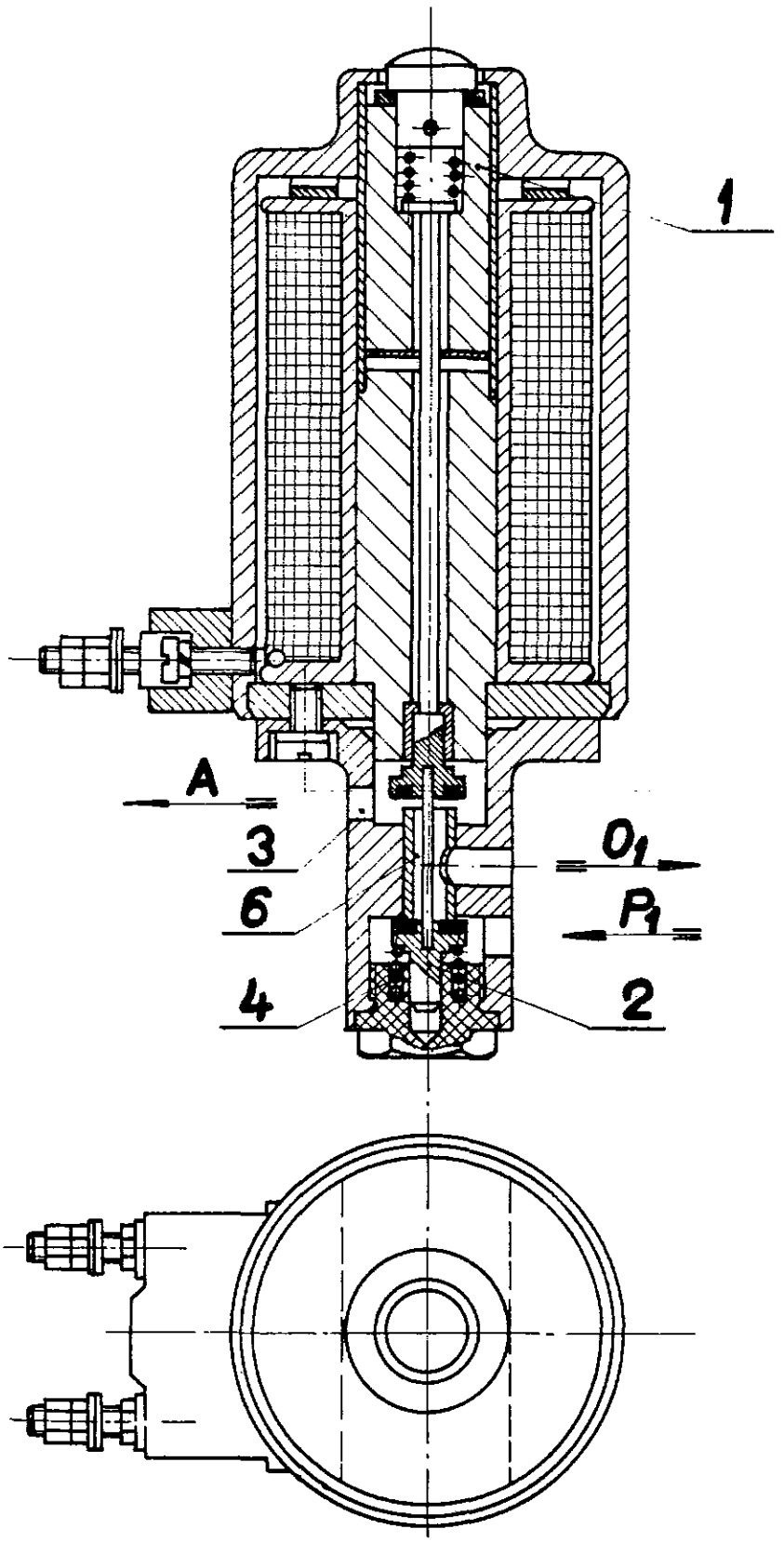


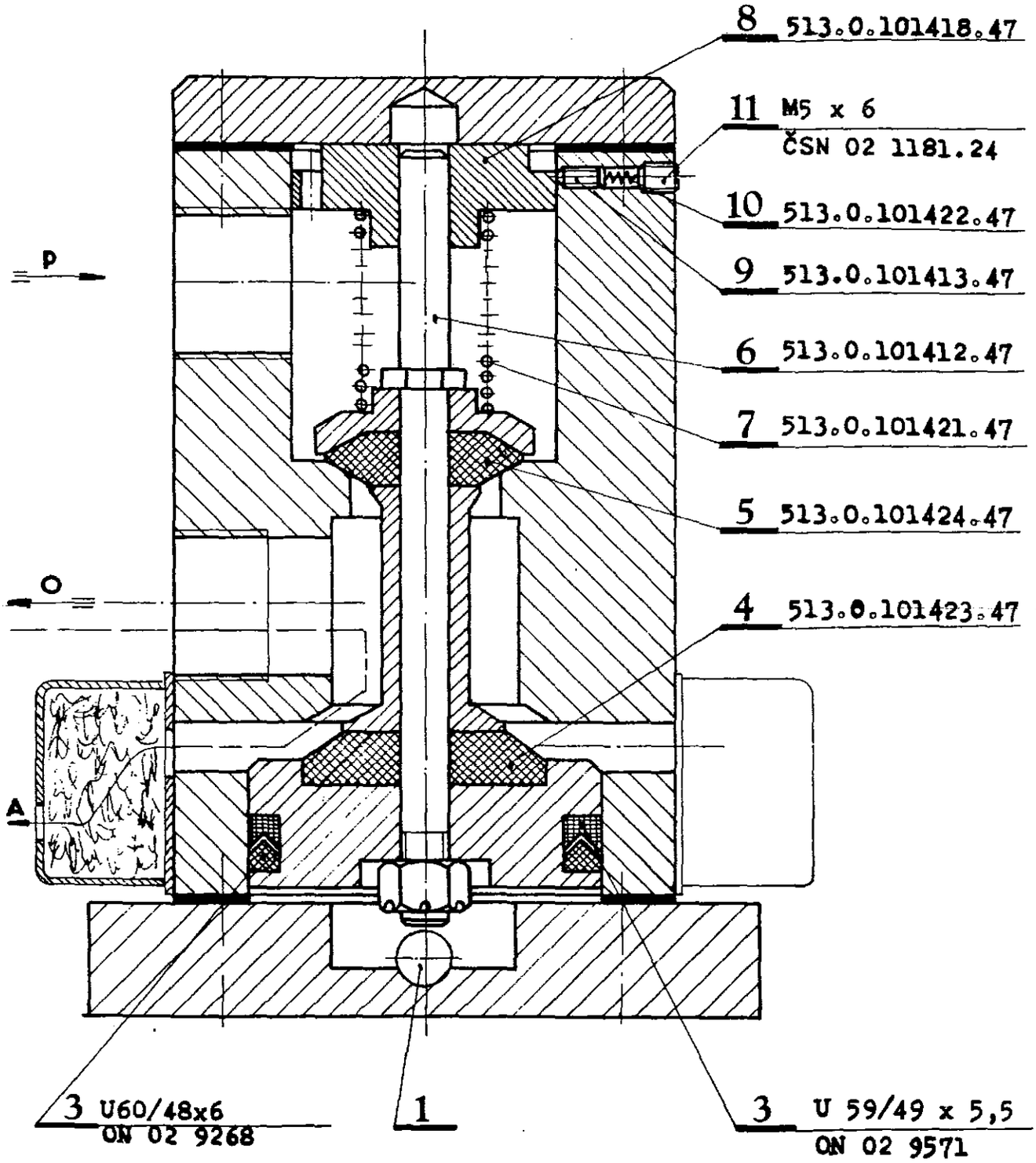
OBR.21


16
12 U28x48 ČSN 02 9261.2
8 513.0.101402.47
3 513.0.101398.47
7 513.0.101401.47
11 10-ČSN 02 3655
14 MB-7-ČSN023630
2 513.0.101397.47
13 KM-7-ČSN023630
15 M 6 x 17 ČSN 02 1143.52
10 6007 ČSN 024630
4 513.0.101283.47
6 513.0.101400.47
17 M 10x25 ČSN 02 1143.52
20 513.0.101403.47
1 513.0.101396.47
5 513.0.101399.47
9

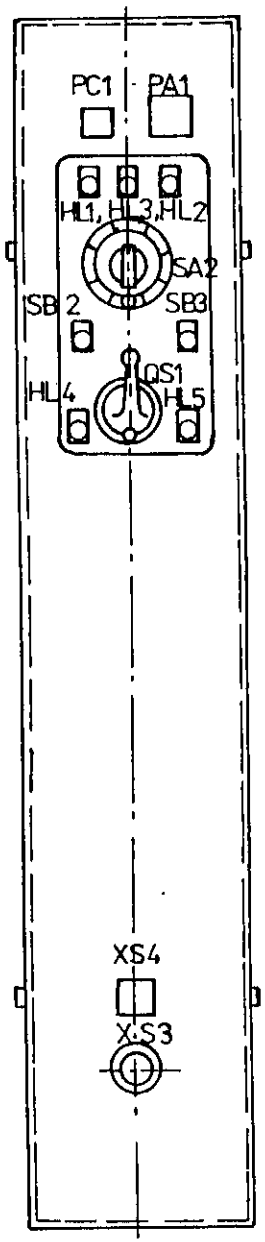
obr. 22

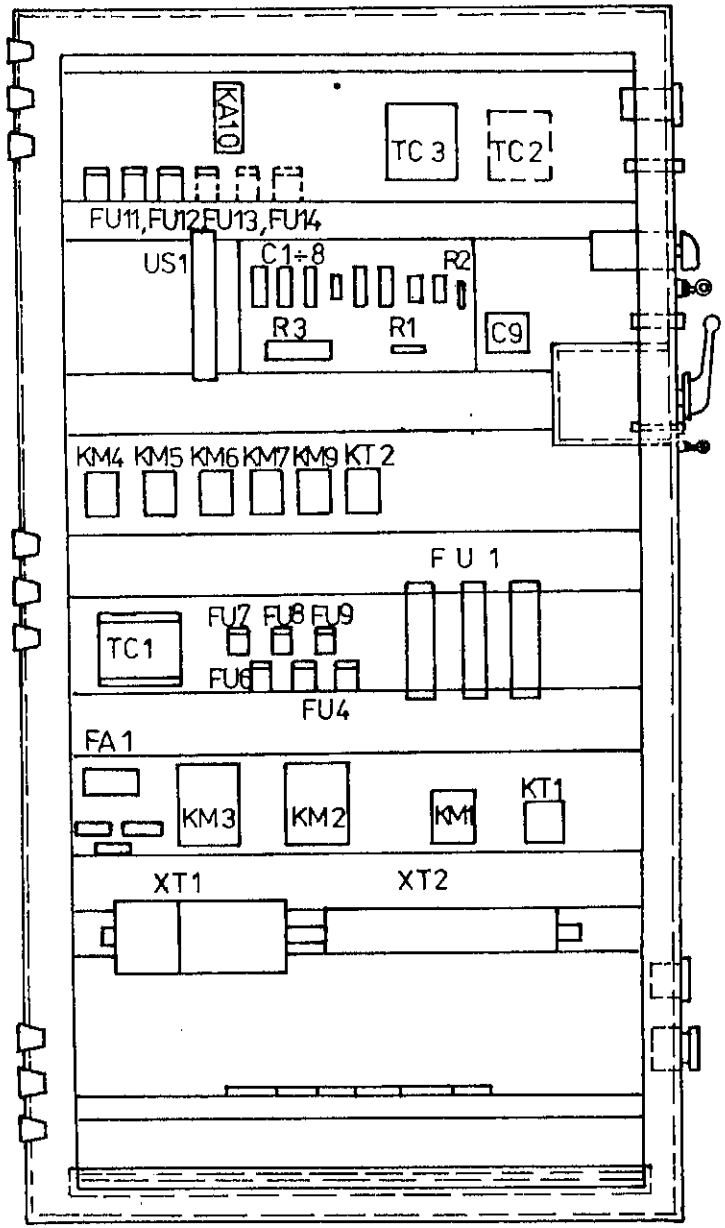

A
A
3
2
P1
1
P
O
O1
A


1
A
3
6
4
O_1
P_1
2


8 513.0.101418.47
11 M5 x 6
ČSN 02 1181.24
10 513.0.101422.47
9 513.0.101413.47
6 513.0.101412.47
7 513.0.101421.47
5 513.0.101424.47
4 513.0.101423.47
P
O
A
3 U60/48x6
ON 02 9268
1
3 U 59/49 x 5,5
ON 02 9571

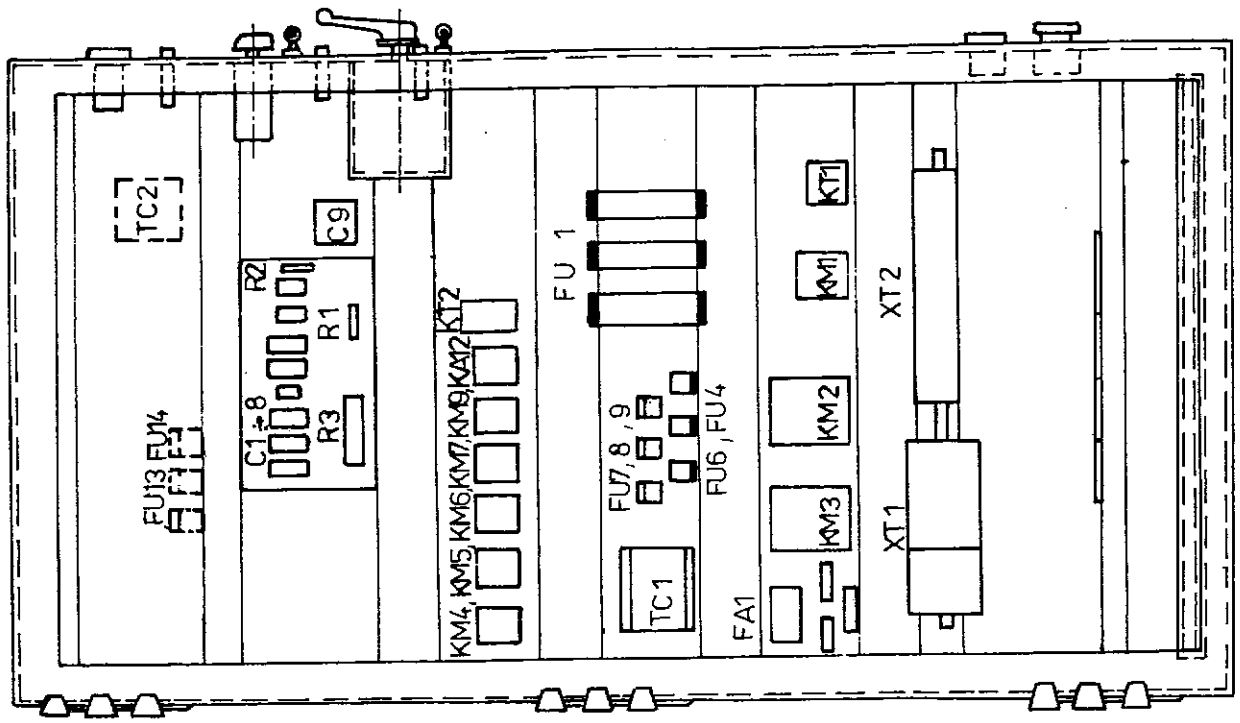
obr. 25

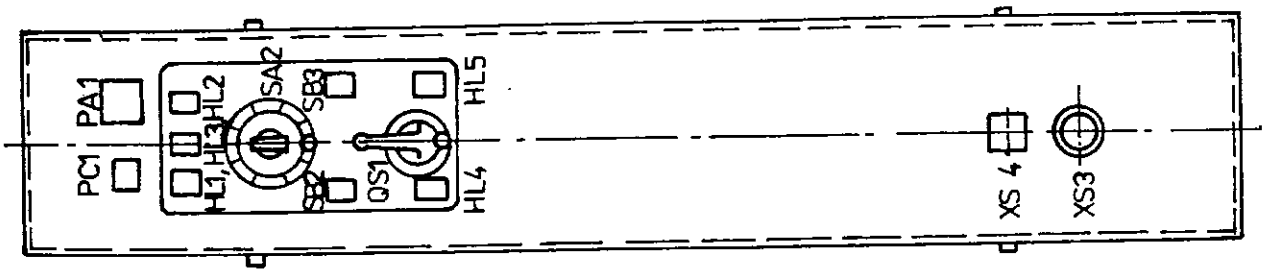




obr. 26.

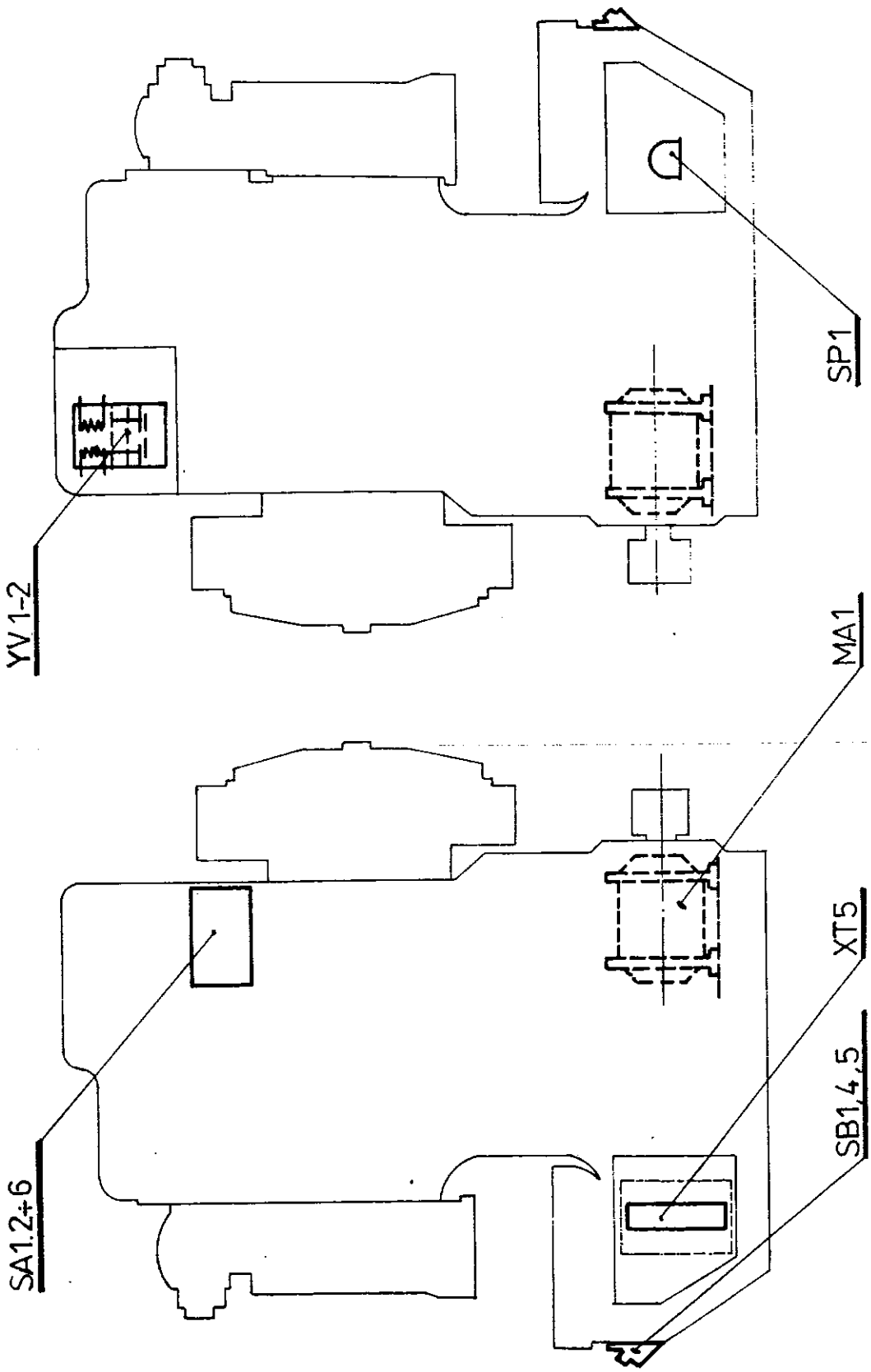
3x220÷550V 50,60 Hz





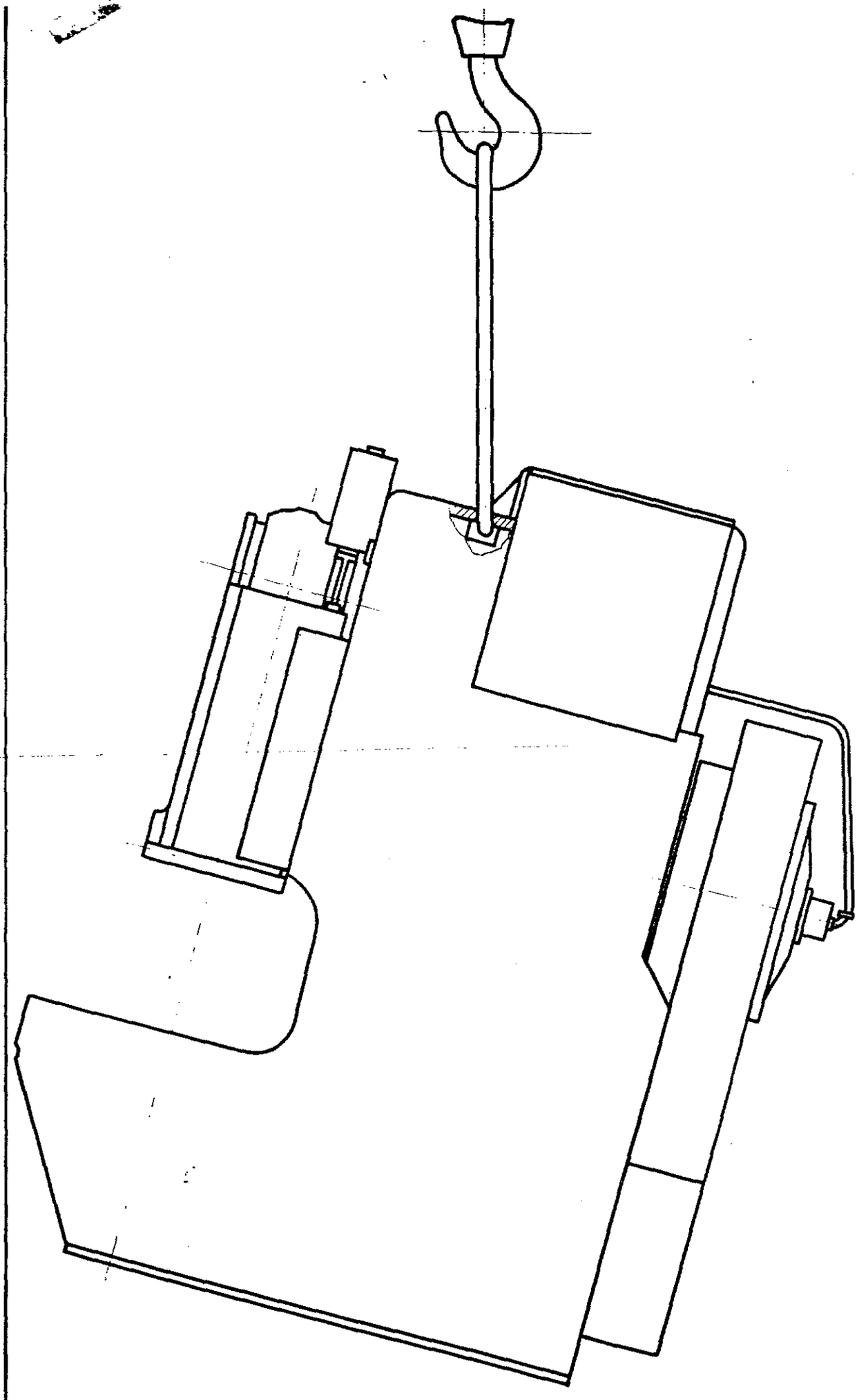
3x220÷550V 50-60Hz
YV1-2 fy ROSS, HERION

4-T-28-1099/B obr. 26 a



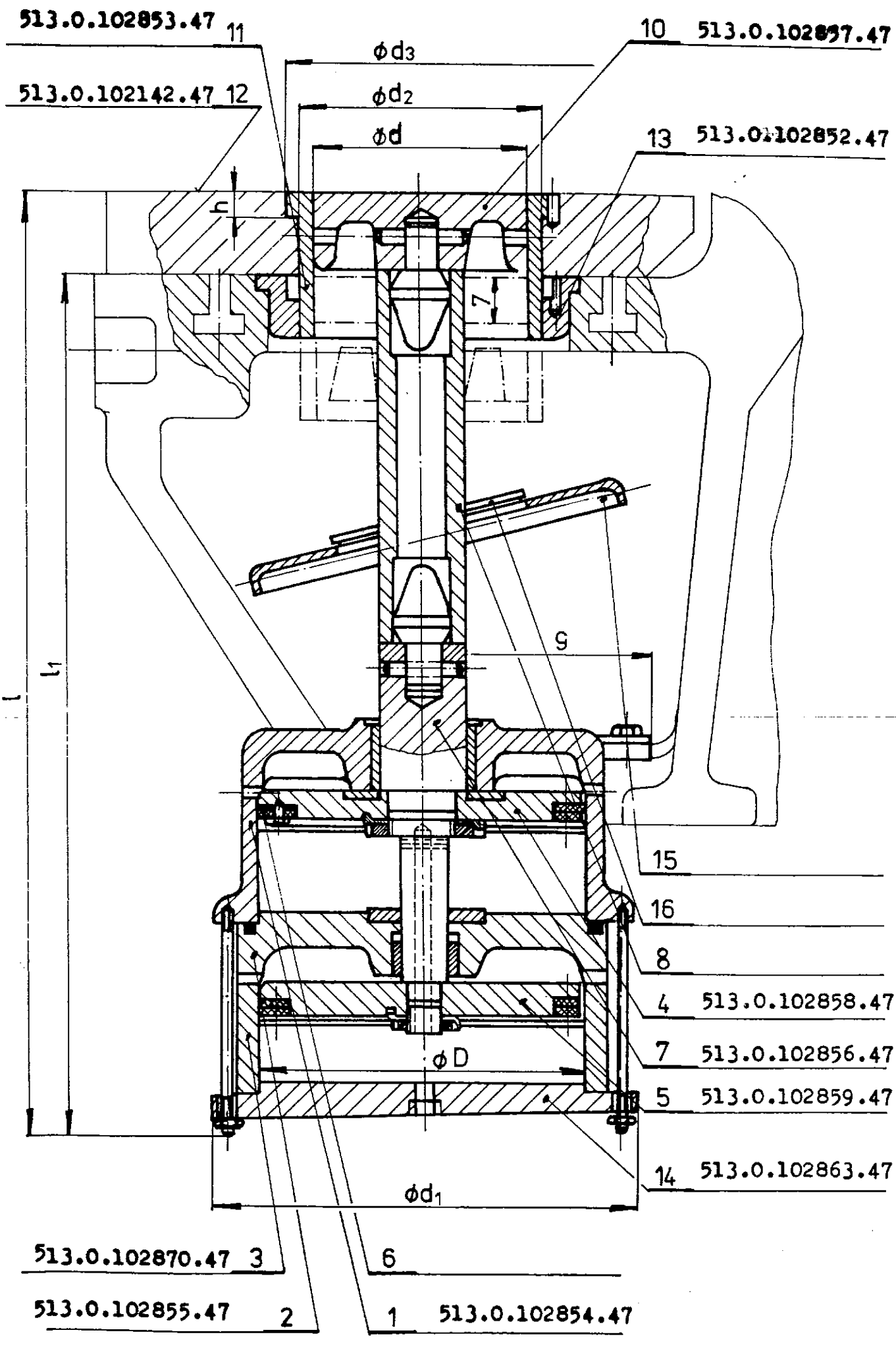
obr. 27

4-T-28 1100/A



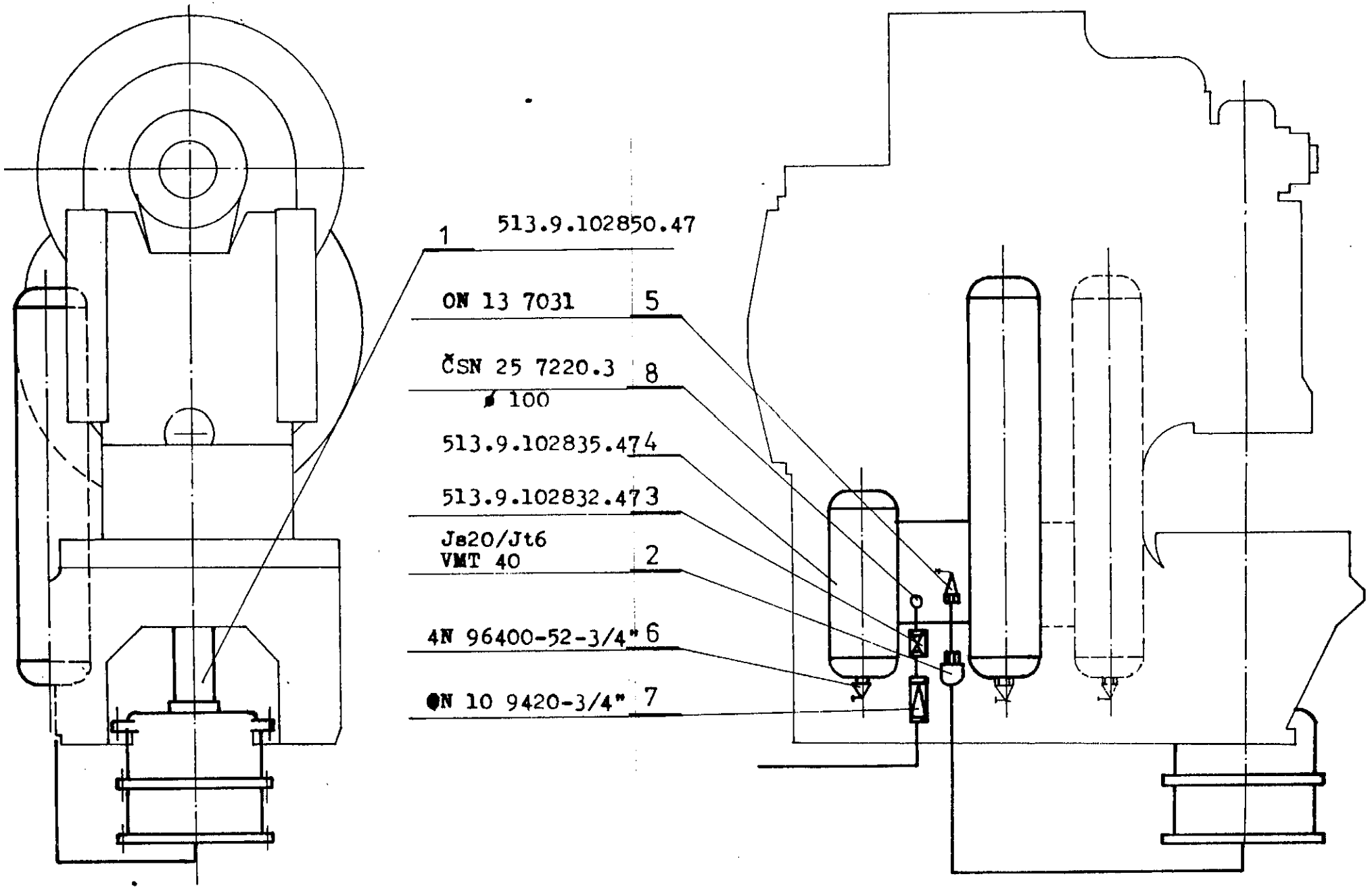
4-T-91 1008.1

OBR. 28



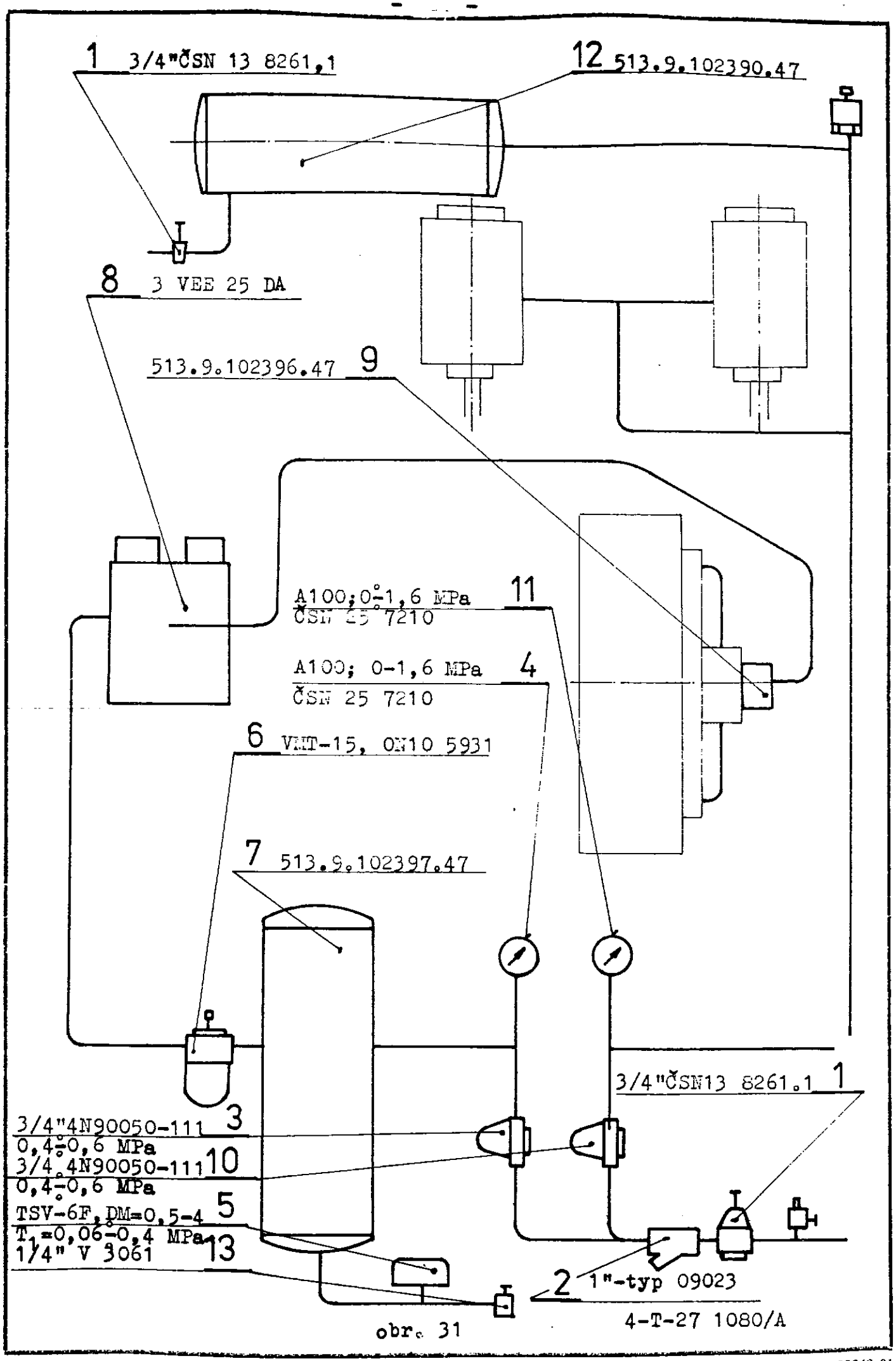
obr. 29

4-T-34 1016/A



●br. 30

4-T-34 1018/A


1 3/4"ČSN 13 8261,1
12 513.9.102390.47
8 3 VEE 25 DA
513.9.102396.47 9
A100;0÷1,6 MPa 11
ČSN 25 7210
A100; 0-1,6 MPa 4
ČSN 25 7210
6 VHT-15, ON10 5931
7 513.9.102397.47
3/4"ČSN13 8261.1 1
3/4"4N90050-111 3
0,4÷0,6 MPa
3/4"4N90050-111 10
0,4÷0,6 MPa
TSV-6F, DM=0,5-4 5
T1=0,06-0,4 MPa
1/4" V 3061 13
2 1"-typ 09023
4-T-27 1080/A

obr. 31