METAL SAWING BAND MACHINERY

DIRECTIONS FOR USING

PP 362 G

Jesenice u Rakovníka
Zahradní 438
270 33 CZ
tel.+420 313 599 000
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We congratulate you on your decision to purchase our sawing band machinery which is designed for the cutting of rod materials of flat contours and pipes made from steel, cast iron and nonferrous materials.

Please read the following text carefully before the machinery is put into operation.

This manual will be reliable aide for the duration of machinery's service life.

You have chosen this machinery which affiliated with top class worldwide material cutting and is most noted for its power, economy and precision – properties which guarantiee a short term return on your investment.

We wish you every success in your venture and belive that our sawing machinery will contribute to this succes by means of its reliability and competence.

TM Jesenice spol. s r.o.

METAL BAND SAWING MACHINERY

Model	PP 362 G
Production number	.....
Voltage supply	3x400 V
Frequency	50 Hz
Day of delivery:	.....

SERVICE ADDRESS:

TM Jesenice, spol. s r.o.

Zahradní 438

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1. MACHINERY TECHNICAL DATA

1.0 Safety regulations

In general

This machine is equipped with various safety equipment for protection of service man as well as machine protection. But all safety aspect cannot be covered by this way. For this reason each person which is in contact with setting, attendance maintenance and repair of the machine must be familiar with this Instruction Manual and must comprehend all sections

- only qualified and expressly- by his superior chief-fixed person can attendant the machine. This person have to be trained in work safety regulations.
- it is strictly prohibited – without special command and approved documentation- to make modifications and changes on the machinery or equipment, by which the work safety could be jeopardized or machine could be destroyed.
- any malfunction during machine have to be reported to superior chief by attendance man.
- the attendance man is responsible for nobody is in close neighborhood of the movable parts.
- only qualified person with appropriate qualification can make the works on the electrical equipment.

In this Instruction manual there are 3 categories of the safety regulations

DANGER Breaking of the this instructions or their ignoratio can cause the loss of life

!

- connection in electric network as well as all maintenance works on the electric equipment can be made only by qualified person equipped with pertinent certification
- before the start of any maintenance works on the machinery the main switch must be “switched-off “ and then must be locked
- don’t attend the machine if you are under influence of drugs, alcohol and medicaments which influence your nervous system
- if you have any problems don’t attend the machine

WARNING Breaking of this instructions or their ignoranto can cause the important injury or machinery damage

!

- remember the location of the emergency switch to use it anytime
- to avoid the irregular machine attendance be familiar with function of all control components before start the working operation
- never touch in any conditions, the moving saw band in the working area by your hands
- keep clear and in order the machine surrounding area

- spread or splashed cooling fluid or oil immediately must be cleaned to avoid the persons slip and fall
- in the case that you have finished your work switch-off the machinery by main switch and lock the switch
- before the cleaning of the machine and before its maintenance switch-off the main switch never remove the safety guards and don't put out of operation their safety equipment
- during sawing machinery operation never reach under the machine arm- clamp of your hand and following in during could be caused
- preparing and adjusting works may be carried out only if the machinery is put out of operation or if it is in the "set" mode
- when the machine is put into operation neither should reach to area of moving parts by your hands nor enter and come to dangerous close to machine

CAUTION Breaking of these instructions or their ignoranto can cause the smaller **injury or machine damage**

!

- don't damage the machine nameplates
- don't wear the fly working suit
- during manipulation with material and cut pieces, weight of which over each the safety regulation limits, the means of mechanization must be used
- for attendance of lifting accessories and load binding the attendance person must have certificate
- for the load binding only these binding means may be used which response to lifted load
- shoes with steel inserts and oil proof half sole always must be wear
- for material setting, cut pieces removing as well as chips removing always wear the gloves to protect your hands from injury by sharp edges
- don't attend the control elements if you have bloves on your hands the incorrect selection of the control elements is then possible
- always use the correst saw band determined for particular material and cut conditions, dull saw band must be replaced in time
- long material must be supported to avoid its tilt over –don't measure the correct length of the cut parts if saw band is running
- maintenance works must be carried out by qualified personal
- before any works into hydraulic circuit the sawing machinery bands must be in its lowest position
- during replacement of any machine parts only these parts have to be used which satisfy original model, voltage and technical data
- use only specified kinds of the hydraulic oils and cooling fluids don't use pressurized air to machinery cleaning
- always assure the sufficient free working area and free access to machine
- don't put any tools or other things on the machine parts

Principles of the safety manipulation with cooling fluid

Cutting and cooling fluids (Emulsin H), for example on the basis of emulsifying petroleum oils are used in low concentration with water. Nevertheless the skin of the sensitive persons the sporadically can by ligtly damaged.For these resons it is necessary:

- to eliminate the direct contact with the skin and epithelium and to protect contact with oil contamination working suit
- the worker must use the means of protection (working suit, shoes, gloves and glasses) and to keep this means in clear as well as keep the principles of the personal hygiene

- before the start of the work the hands must be protected with suitable protection cream Indulona E, Indulona S
- don't smoke, drink and eat during work
- after work finishing and before eating the hands must be washed by warm water and soap and then treated with reparation cream Indulona A/64, A/85 or Reparon

The first Aid

By unintentional consummation – drink about 0.5 liter of the lukewarm water and then initiate a sicking up.It is suitable to eat about 10 tabalets of active carbon. Find the doctor.

Eyes touching – rinse the eyes by big volume of the lukewarm water for 10-15 minutes. Find the doctor

1.0 Description of the sawing band machinery PP 302G, PP 362G

In this execution the machinery is determined for the cutting of bigger number of the same dimensions pieces either separately or for the bundle cutting. Only perpendicular cutting is possible it means 90 degrees. The machine attendance will put the material onto transporter then he set the length of the cutting, requested number of pieces, technological parameter according to cut material quality, profile and size and then machinery works without attendace. The cut-off material drops into working table and by following piece thy are advanced on the slip to the transport box.

Automatic run of machinery is controlled by programmable automatic device, which is located in electrical box. The possibility of communication with its improves the machinery attendance and finding of the possible failures. All matter is detailed described in the independent instruction manual for eledtric part. For the material feeding there is feeding device with the second feeding vice. The vice moves on two guide rods by means of the feeding cylinder.

The feeding device is swivel arranged on the pin which is screwed in the frame. The compensation of the shape inaccuracies when material is clamped in the fixed vice is executed by this way.

The stroke of the feeding device is 500 mm by which the most od cut length is covered.

The cut length is adjusted by means of hand wheel, by slip of the fix stop, on the guide rods and it can be watched in 0.1 mm accuracy in the window of measuring device. Of course, the length longer than 500 also can be cut. The total length must be divided into several feedings of identical value inside 500 mm interval. (For example- for 750 mm of the length we set 2 strokes of 350 mm length).

For multiple strokes the control system will be utiliyed – see instruction manual for electric part. In the moment of the start of operation in automatic mode the is continously clamped by on of the vices- by both during cutting operation. The feeding is very precise and possible deviation is depended on deameter, weight and shape accuracy of the cut material.

Individual function of the machinery are and mutually blocked by program of the controlling system. By this system there are controlled also safety switches of the dangerous areas shields as well as saw band fracture. Also presence of the material inside the feeding vice is controlled by ray of the light sensor- if material is missing the machinery running is stopped.

The limit position of the feeding vice are sensed by contact-less sensors. The face of which have to be kept clear, from metal chips especially.

For the case of the danger or crash the machinery is equipped with emergency button by means of which the all machinery functions are blocked immediately.

For bundle cutting operations the adjustable vertical clamps can be installed into vice jaws and side guide of bundle onto transporter.

The machinery is designed for cutting in the spaces the temperature does not drop bellow zero otherwise the machine parts which are filled with vater-oil cooling mixtures could be destroyed.

1.0 Technical Data

1. Dimensions and weight

	PP 361	PP 361A	PP 362 G	PP 362A
Lenght	2 160 mm	2 160 mm	2170 mm	1 800 mm
Width	1 260 mm	2 290 mm	1260 mm	2 040 mm
Height	1 740 mm	1 740 mm	1800 mm	1 570 mm
Weight approx.	1050kg	1650 kg	1090 kg	1700 kg

2. Electrical Data

Main electric motor	1,5 kW, 2,2kW
Pump of hydraulic oil	0,55 kW
Pump of cooling fluid	0,09 kW
Control voltage	24 V DC/400 V/50 Hz

3. Saw Band

Dimensions	4400 x 32 x 1,1 mm
Speed of band at 50 Hz	24-53-83 m/min or 20-110m/min

4. Cut Range

90 degrees cut:

Maximal diameter of circular section	360 mm
Maximal square section	360 x 430 mm

45 degrees cut:

Maximal diameter Of circular section	305 mm
Maximal square section	360 x 305 mm

30 degrees cut – it is valid only for PP 361

Maximal diameter of circular section	215 mm
Maximal square section	360 x 305 mm

For PP 301 HU model the angle cutting is possible only up to 45 degrees
For PP 302 A only 90 degrees perpendicular cutting is possible
Measured noise level in operator's place if material is cut L_{pAeq} 72.2 dB (A)

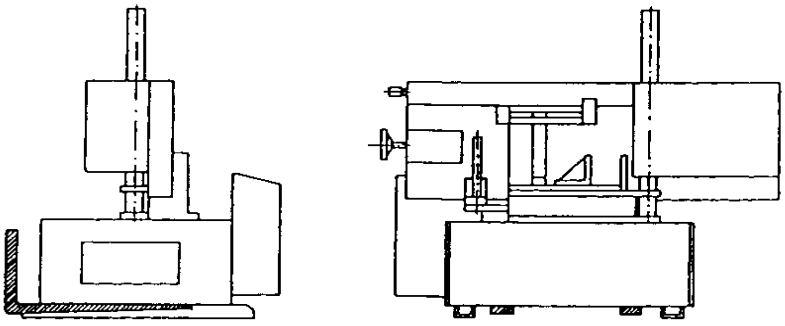
2. INSTALATION AND MOUNTING

2.1 Machinery transport

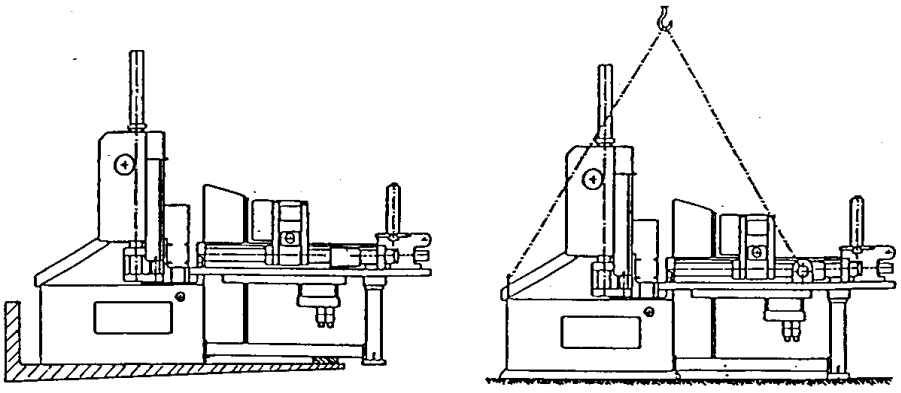
The semi-automatic sawing machines (without feeding equipment) are transferred by means od fork truck, the forks of which are pushed into space between two "U" profiles on the frame bottom.

The full automatic sawing machines also can me transferred by means of truck with correspond loading capacity (for machines weight - see technical Date section) with extended forks which will reach till base of the feeding equipment or by lifting equipment with ropes which are passing through 4 eyes located on the frame feeding equipment (see figure).

Gamme type PP 30-
PP 36-



Gamme type
PP30 – A
PP 36-A



For gripping to 4 eyes 2 ropes fo 3.2 m or longer must be used. Lifting capacity of one rope have to be at least 1000 kg.

After replacement of the machine onto its working location remove the packing and wood battens,
remove the wood wedge which secures an arm of the machinery from its releasing.

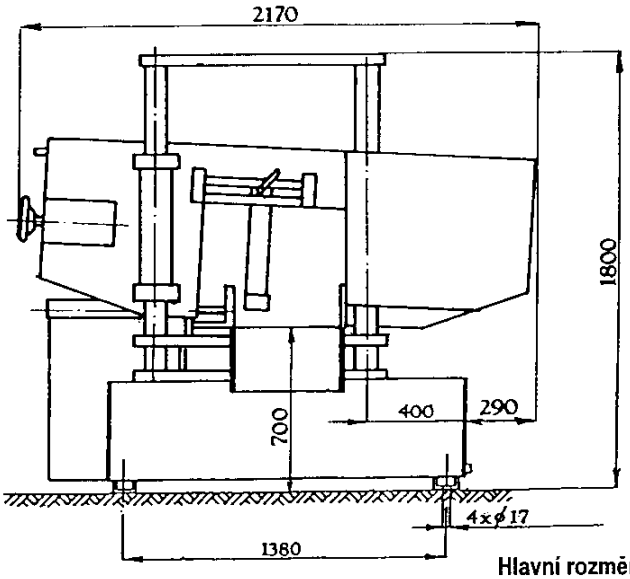
2.2 Space for the machinery installation – main dimension place of the attendance

During the machine installation the pay attention to securing of necessary access for the attendance especially to control components.

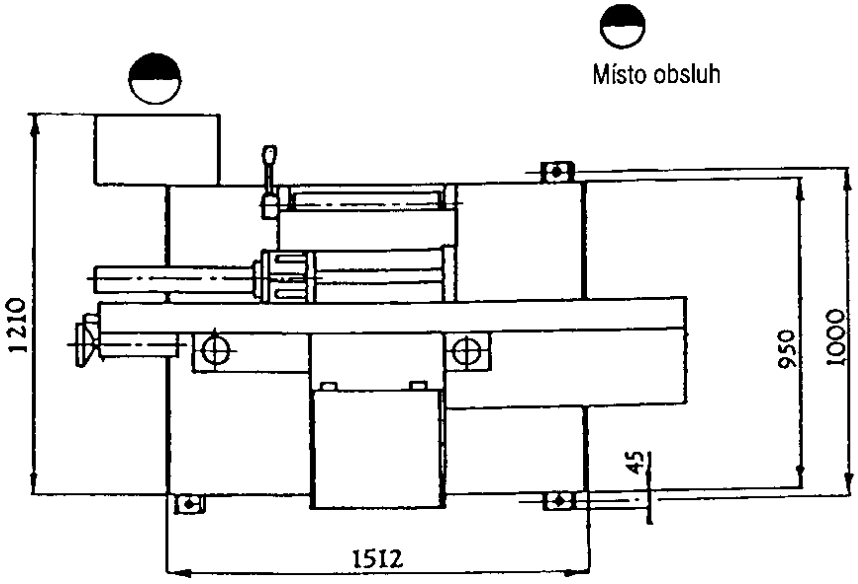
This space have to be selected and secured to:

- it was sufficiently demarcated of machinery to avoid danger of injury of attendance by other machines, cranes, lift trucks and the others
- it was secured the lighting which is sufficient for safety work
- cut-off material was put into appropriate container (pallets) and approach of this apace was safety assured

PP 362 G

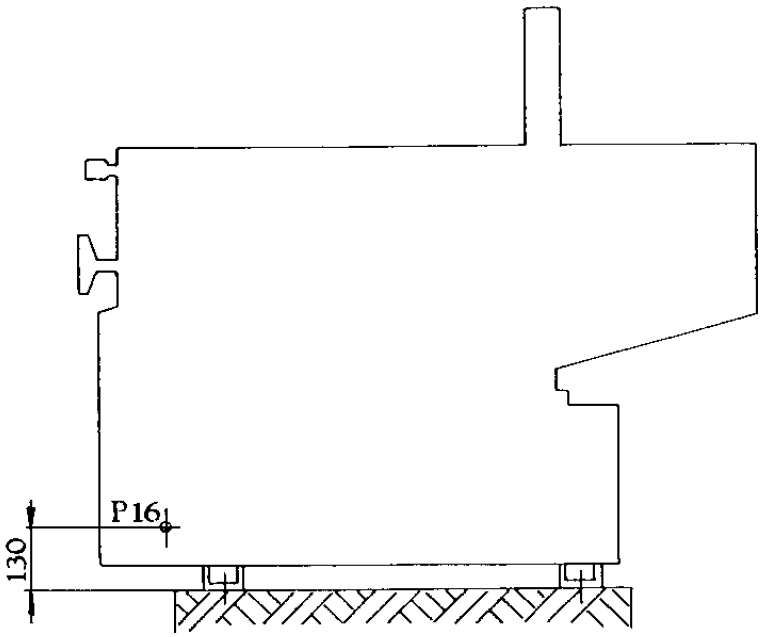


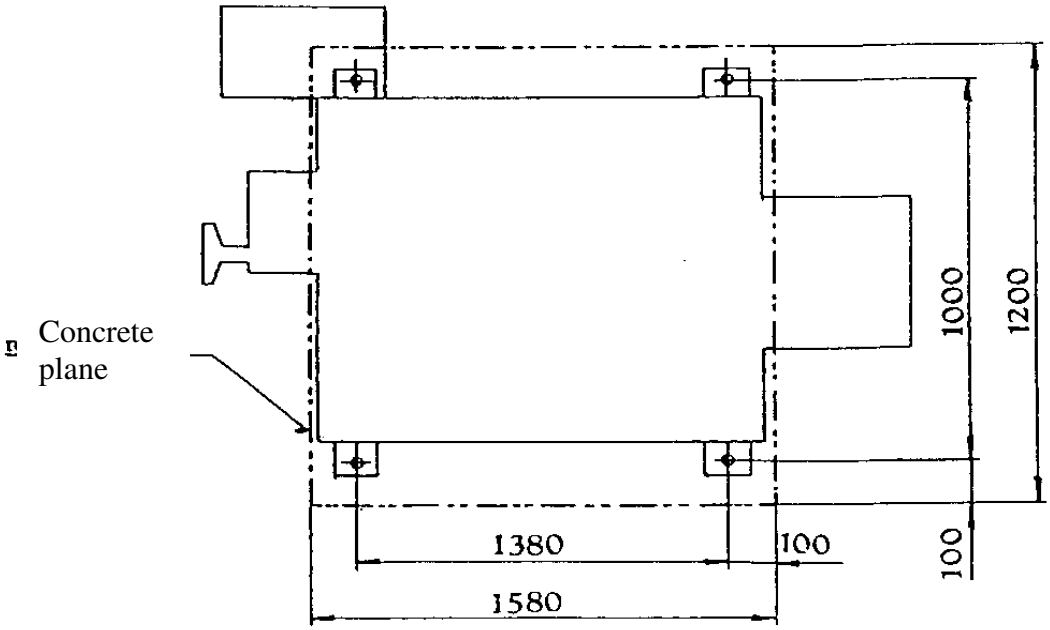
Hlavní rozměry stroje PP 362



2.3 Foundation plan

WARNING Secure the safety leveling of the machine and its fixing to solid surface, **corresponds to loading generated by machinery and cut – of means of cross water level set the machinery in both horizontal directions The**





2.4 Mounting

- clean the machinery, chromeplated piston rods especially, columns rules of the vice
- by oil slightly coat guide rules of the vice
- if roller transporter is as a part of the machine it must be vertically adjusted according to vice bed and in the cross derection it must be adjusted according to vice fixed jaws
- for model automatic level the transporter by ruler across beds of both vices meanwhile run away with feeding vice to its limit position from the fixed vice
- for cutting of the full profile materials of larger diameters and length it is recommended the positioning of the roller transporter approx. 0.5 mm above level of the vice bed
- if transporter is not set correctly then this fact influence on the band undercutting

2.4.1 Connection to electrical supply

DANGER

All works on the electric equipment may be carried out by authorized person **equipped with respective electrical qualification**

- check if electric network voltage is identical with nameplate data
- make the protection of the supply line in accordance of the input power of the machinery
- connect the machinery by means of cable 4 x 2.5 mm^2 (Cu) into terminals in the control electrical box
- check the correct direction of the rotation of the electric motors according to arrows marked on the moving wheels or onto covers of electric motors. If direction is not corresponding, change the wires in the clamps of the supply terminal block
- being familifar with function of of the individual control elements it is necessary to carry out the revision of electric equipment

2.5 Working fluids

2.5.1. Hydraulic fluid

- Tank capacity 14 liters
- Hydraulic oil OH HM 32
- Viscosity 28.8-35.2 $mm^2 s^{-1}$ at T=40^oC
- Inflammation point 180^oC
- Solidification point -40^oC
- Viscosity index 105

If hydraulic oil is either refilled or replaced then filtered oil have to be used having 18/15 code of purity.

The oil without impurities is a basic presupposing of the correct machine operation. Contaminate oil causes most of the failures and problems of the hydraulic circuits. That oil causes also easier wearing of the control and power components and their function can be decreased or impossible.

Pursuant to this fact the increasing of the standing time expenses, repairs, spare parts purchasing, and other expenses are followed.

WARNING

The hydraulic oils are petroleum products and increased care have to be kept with manipulation with them. Used oils have to be delivered to appropriate firm. Splashed oil must be removed immediately to avoid of environment destruction and slipping of elimination

This oil can be exchanged for power classes HM and HV pursuant to European specification CETOP RP 91 H in the viscosity classes ISO VG 32 and 46. Some selected oil producers are quotted in the table bellow.

	HM 32	**HM 46**	**HV32**	**HV46**
Benzina	OH HM 32	OH HM 46	OH HV 32	OHHV46
ARAL	VITAM GM 32	VITAM GF 46	VITAM HF 32	VITAM HF 46
BP	ENERGOL HLP32	ENERGOL HLP46	ENERGOLSHF32	ENERGOL SHF46
AGIP	OSO 32	OSO 46	-	ARNICA 46
CASTRO L	HYSPIN AWS32	HYSPIN AWS46	HYSPIN AWH32	HYSPIN AWH46
ELF	ELFOLNA 32	ELFOLNA 46	HYDRELF DS32	HYDRELF DS46
ESSO	NUTO H32	NUTO H46	UNIVIS HP32	UNIVIS HP46
MOBIL	MOBIL DTE 24	MOBIL DTE 25	MOBIL DTE 13	MOBIL DTE 15
ÖMV	HLP32	HLP46	HLP-M32	HLP-M46
POLSKO	HYDROL 20	HYDROL 30	-	BOXOL 26
SHELL	TELLUS OIL 32	TELLUS OIL 46	TELLUS OIL T 32	TELLUS OIL T 46
TEXACO	RANDO HD A32	RANDO HD B46	RANDO HD AZ32	-
VALVOLINE	ULTRAMAX AW32	ULTRAMAX AW46	ULTRAMAX AW 32-HVI	ULTRAMAX AW 46-HVI

2.5.2 Cooling Fluid

WANRNING

The cooling pump must not be put into operation without cooling fluid charged in the tank otherwise the pump failure- its seizure- can occur

For this reason the breaker circuit (QF3) of the cooling pump is switched off by producer before machinery expedition. After a filling of the cooling fluid to the tank this breaker – located in the electric box have to be switched on.

Cooling fluid tank capacity is 65 liters (PP 301) or 100 liters (PP 361). Cooling fluid is filled dirctly to the tank after shift out the weasel for the chips. It is discharged with plug located on the frame side. The cooling fluid is not included in the machine delivery.

The properties of the cooling fluids

The cooling fluid based on the mixture of water and emulation oils decreases a friction force and avoids an overheating of the saw band, lead away generated heat and service life of the band is increased by this way. After vaporization of water portion the oil film stick on the band and protect it against corrosion.

The chips, which would be occur the tamping of the tooth space and them fracture of the tooth, are floated out by cooling fluid. For this reason the fluid is supplied on both entry and

exit of the band from cut material and it volume can be regulated by means of ball valves. Significance of the cooling fluid is increased with cut power of the machinery and with material quality.
The cooling fluid is not used if cast iron, bronze, stainless steel or special alloys steel are cut. We will advice you in special problems of the cutting. From the emulation oils produced in Czech republic we recommend you “EMULZIN H”. This oil mixed in the ratio quoted in the section 6.6. For economical using of the emulation oils and testing of the right ratio of the concentation we recommend you the “Fluid Tester Meopta” apparatus which is produced by Meopta Prerov Company, CZ.

WARNING 	**The “EMULZIN H” is a petroleum product. From the point of view of ecology its sliding from the tank must be prevented. If cooling fluid is replaced the special liquidation regulations strictly must be adhered**

From the point of view of the health safety regulations the principle stated in the section 1.1 – safety directions, have to be adhered.

Replacement of the cooling emulsin

During machinery operation there is decreasing in volume of the fluid by vaporization, spraying and adhering to the chips. This decreasing must be compensated by fresh fluid by this process the fluid is refreshed and its ageing is revealed very slowly. On the other side the fluid is in aggressive contact with air and metals, it is contamine with dust, metalic oxides and also is attacked by anaerobic bacteria. The Attack by the bacteria, by which the emulsion is disintegrated, is appeared when machinery is out of the operation for long time. Aeration of the emulsion during operation destroys the bacteria.

6-8 weeks of operation is recommended time period of replacement of the emulation fluid

After 6 month at least it is necessary to replace the cooling fluid. The tank must be precisely cleaned with following flushing of all cooling system with hot water with 3 per cents of crystalline coda.

By visual the fluid can be judged:

- oil film on the fluid surface marks that fluid is unstable
- sediments on the tank bottom and walls and stuck surfaces on the machinery say that fluid is old and contamine
- from the intensity of the “milk” color of the fluid can considered that fluid concentration is decreased. In the limit case the corrosion spots appears on the cut parts and on the machinery
- putrefactive odour and like blue color are barking of the bacteria attack

From the foreign emulsion there is possible to use for example: CUTOL 2000, OEMETA UNIMET AS 22 OR (ÖMV). No problematic from the standpoint of ecology but more expensive the oil must lubrication by means of additional equipment can be recommended. The yets spray the special fluid into cut place. On your request we can give you more detailed information concerned to this method or we can contact you with supplier which assures installation too.

2.5.3 Gearbox Oil

The lubrication means are under process of aging and they must regularly renewed for this reason.
The band sawing machines are equipped with worm gear units from “Berges” or “Lenze” firms having indentical connection dimensions.

Berges BH 63 worm gear units are charged by producer with 0.8 liter of MOBIL SHC 632 synthetic oil.

For next oil replacement producer recommends synthetic oils as following:

Manufacturer	ARAL	BP	SHELL	TEXACO
Kind of oil	DEGOL GS460	ENERGOL SG-XP 460	V-OEL 1409	SYNLUBE CLP 460

LENZE worm gear units are charged by producer with 1.1 liter of synthetic oil exclusively from Kluber Lubrication firm with KLUBERSYNTH GH 6-460 oil. This oil is especially suitable for this type of worm gear units (Worm=made from steel, gear=made from bronze).

If obtaining of this oil is impossible then it can be replaced by oil based on the synthetic basis (poly glycol) PGLP 460 series.

2.5.4 Lubricants

They are not specified exactly and it is possible to use any industrial lubricants determined for bearings.

2.6 Storage of the Machinery

- the wood beams must be screwed to machine frame
- cooling fluid must be discharged, remained parts of the fluid have to be blown-out by pressurized air and then the machine must be dried
- all non-lacquered part must be protected against corrosion
- the siccative agent must be placed on the machinery
- the machinery must be packed into plastic foil and this one have to be welded
- the machinery have to be stored in dry place

2.7 A liquidation of the Machinery

- discharge the cooling fluid
- discharge oil from all hydraulic system
- dismount all machine parts
- all parts must be sorted according to class of scrap (steel, cast iron, non-ferous metals, rubber, cables. Electronical components, plastic material) and to send to specialized companies or to specialized liquidation

WARNING 	**The petroleum products attacks the environment. Used oil should be send to scaps. The cooling fluid have to be liquidate in specialized firm which is equipped with appropriate technology**

3. ATTENDANCE OF THE MACHINERY

WARNING 	**Before the machine put into operation you must be familiar with individual control elements. Study the Instruction Manual carefully. Don't switch-on the machinery before all safety WARNING! shields are located on their places.**

3.1 A Hydraulic Power Unit

The hydraulic power unit is as compact whole with electric motor, oil tank and the basic block of the hydraulic directional control valves for arm stroke and fixed vice. It is located into bottom part of the machinery frame and is accessible after perforated shield is removed. The hydraulic oil is filled from upper side after the air-bleeding cap is unscrewed. The oil is discharged by unscrewing of the plug which is located in the bottom of the tank. On bottom part of the hydraulic power unit block there is adjusting screws of the oil pressure delivered by pump. This pressure is set by producer and can be re-adjusted only by service technician during warranty period. Otherwise this step is judged as guaranty conditions impairment. The adjusted pressure can be watched on the manometer which is delivered as standard.

Automatic model of the sawing machinery has interconnection of the hydraulic power unit and independent block of the directional control valves by means of hydraulic hoses. For the reason of the electric motor and whole hydraulic power unit cooling it is prohibited a covering of the ventilation holes of the cover.

3.2 A Cutting Speed Adjusting

The optimal cutting speed have to be adjusted before the cutting operation according to dimension, quality and material profile. The speed can be changed after opening of the cover, by transferring of the "V"- belt on the motor driving pulley and driven pulley on the worm gear unit (table 1).

Release the tightening screw grip (it is secured with M 10 nut), transfer the belt and strength it again by tightening screw. The right tightening can be judged by your thumb: press by thumb in the center of the blet distance and belt deflection should be about 10-15 mm.

WARNING 	The transfering of the belt can be executed only when machinery has **off by means of main switch**

For the standard models there is possible to select three cutting speeds (see Technical Data section). The middle cutting speed mostly is used. After reaching of some experiences with sorts of cut material it is possible to increase the cutting speed. The operation time is then decreased. If too high cutting speed is adjusted then cam be heart "whistling" noise generated by vibration or oscillation. In this case the cutting must be decreased.

The saw band service life is increased by this way. The lowest speed is used for stainless steels and some tool steels, when cooling fluid is not used. Saw band producers determinate the recommended cutting speeds in their catalogues according to band type and material being cut as well as the cooling fluid using (more detailed information - see Cut Technology section).

3.3 A Feed Rate Adjusting

The machinery equipped with throttle valve (table 11/4) for continous adjustment of feed rate. The valve is located on the movable arm. By knob clockwise rotation the feed rate is decreased till zero valuei i.e. the arm is stopped. The numbers and lines on the valve grip are only for basic inforamtion and serve for adjusting the same feed rate in the case that we manipulate with the valve in the time period between cuttinng operations.

Only downward feed rate can be adjusted by this valve. The upwards feed rate is constant.

During cutting operation is necessary to observe the soft touching of the band with material. The band service life is decreased by high speed of contact between band and material. From the moment of the mutual contact the feed force, and dependently on this fact, also feed rate are regulated automatically (see section 3.4).

3.4 A Feed Force Regulation

The machinery is equipped with continuous hydraulically controlled cut feeding by means of the throttle valve.

The next device is an automatic regulation of the cutting force named as “block of the push force”. If you look towards the machine from the side of the vice this block is located on the left side of the arm above the saw band. In this point the saw band is quided by two horizontal installed bearings from the band side. If saw band touch the cut material its upper edge presses into tungsten carbide plate and by means of this plate acts the piston and ball. The ball closes the fluid flow overpowering both forces generated by fluid pressure and preloading of Bellewille springs. By clockwise rotation of the screw with grip the preloading of the Bellwille springs is increased and consequently the band force to material is incerased.

The adjusting screws has a nameplate with marking of minimal and maximal pressure to cut material. Its value must be regulated according to size, quality a profile of the cut material.

The basic pressure 2,5 MPa is set by producer. It is only fine regulation but it must be always carried-out in position “Arm stop” when the hydraulic system is depressurized to avoid the regulation screw sealing “O”- ring destruction. Well adjusted and properly operated the feeding force regulation can be monotored this way that feed rate is variable during cutting operation according to cut profile. For example, when “I” or “U” or closed shape profile are cut, the feed is lower when cutting is access their horizontal walls and then feed is increased in the vertical ones. Also when circle shaped material is cut the lowest speed is visible on the largest diameter.

From the facts mentioned above there is resulted that full and thick-walls materials are cut it is possible – after soft contact between band and material, full opening of the throttle valve and feed rate is controlled automatically according to material resistance.

Only when either thin walls profiles are unknown quality materials are cut it is necessary to adjust the feed rate by throttle valve.

3.5 Adjusting of the arm upper position

There is limit switch located on the arm which is controlled with adjustable sleeve (table 11/1) sliding on the piston rod in both direction after releasing of the locking screw. During movement of the arm upwards a limit switch is pressed with adjustable sleeve and arm is stopped. By this way the lost operation time is decreased because the adujstable ring is set in that position to stop the band immediately above the material after its movement from the cut if working operation id finished (about 10 mm).

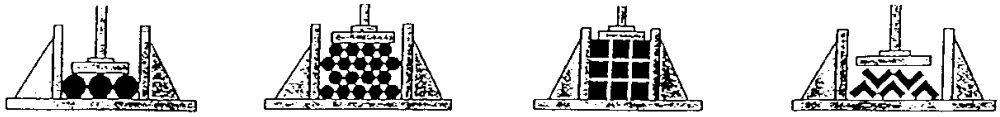
3.6 Material Clamping

The fixed vice (table 4) is controlled by hydraulic cylinder (table 5) during its whole stroke range. As optional accessories there is possible to deliver the regulation of the cut force - it is advantageous for thin walls profiles cutting. For the bundle cutting operation there is possible to deliver the clamps destermined for clamping for upper side.

The right arrangement of the material between vice jaws is essential. It is advantageous for profile steel to arranged it obliquely for this reason that the smallest difference is between the longest and the shortest length od the cut and arising advantages are:

- the lowest loading of the band
- the cutting time is decreased
- possibility of teeth destroying is decreased too
- the band service life is increased

Bundle Clamping



The Examples of Right Arrangement and Clamping of material

3.7 An Adjustment of the Cutting Length

When the pieces with identical length are repeatedly cut it is possible, for basic execution of the sawing machine to set the length od cutting by means of the stop which is delivered with machinery.

For “Automatic” machinery the length of the cut is adjusted by changing of the position of stop of feeding vice with hand wheel. The wheel is equipped with measuring device on which the accuracy of the stop position is possible to set in 0,1 mm tolerance.

After the first piece cutting the possible deviation of the length can be corrected.

The stroke of the feeding device is 500 mm the mostly lengths are covered by this dimension. The longer pieces can be cut too by multiplication of the feeding device strokes. The smaller identical length can be cut by dividing to more feeding to 500 mm.

An Example: For 750 mm length the stop will be adjusted to 750 : 2 = 375 mm with 2 as number of feedings. For determination of the stroke multiples there is possible to use the automatic control system see Instruction Manual for electric part.

3.8 The Cutting of the Thin Workpieces

When thin plates are cut then before the end of the operation the plate is tilted away by pressure of the band. The plate is scored perpendicularly to original cut by running band. For mentioned reason it is necessary to support that plate by means of suitable hook in its vertical position till cutting operation is complete.

WARNING 	Never hold the plate by your hand

3.9 Cleaning of the Sawing Band

The machinery is equipped with wire brush, which is driven by band movement (table 12). This brush cleans the saw band from the stuck chips which can cause a tamping of the tooth space which have influence on band service life as well on the cut operation accuracy. For these reasons the brush the must be checked from time to time. If necessary the brush must be returned or replaced.

The brush must be slightly pressed into teeth. By higher pressure force the brush service life is decreased or it is damaged.

Even when the chips are mostly wiped by wire brush the small amount of the chips can be entered by band into frame space. For this reason it is necessary to open the cover and clean off the chips from this space before start the work.

WARNING 	**The cleaning of the wire brush as well as the frame space cleaning when wheels protecting cover is opened have to be executed always if WARNING! main switch is switched – off.** **….but always wear yours hands protection!**

3.10 Oblique Cutting

The oblique cutting which is perpendicular to working table can be executed by:

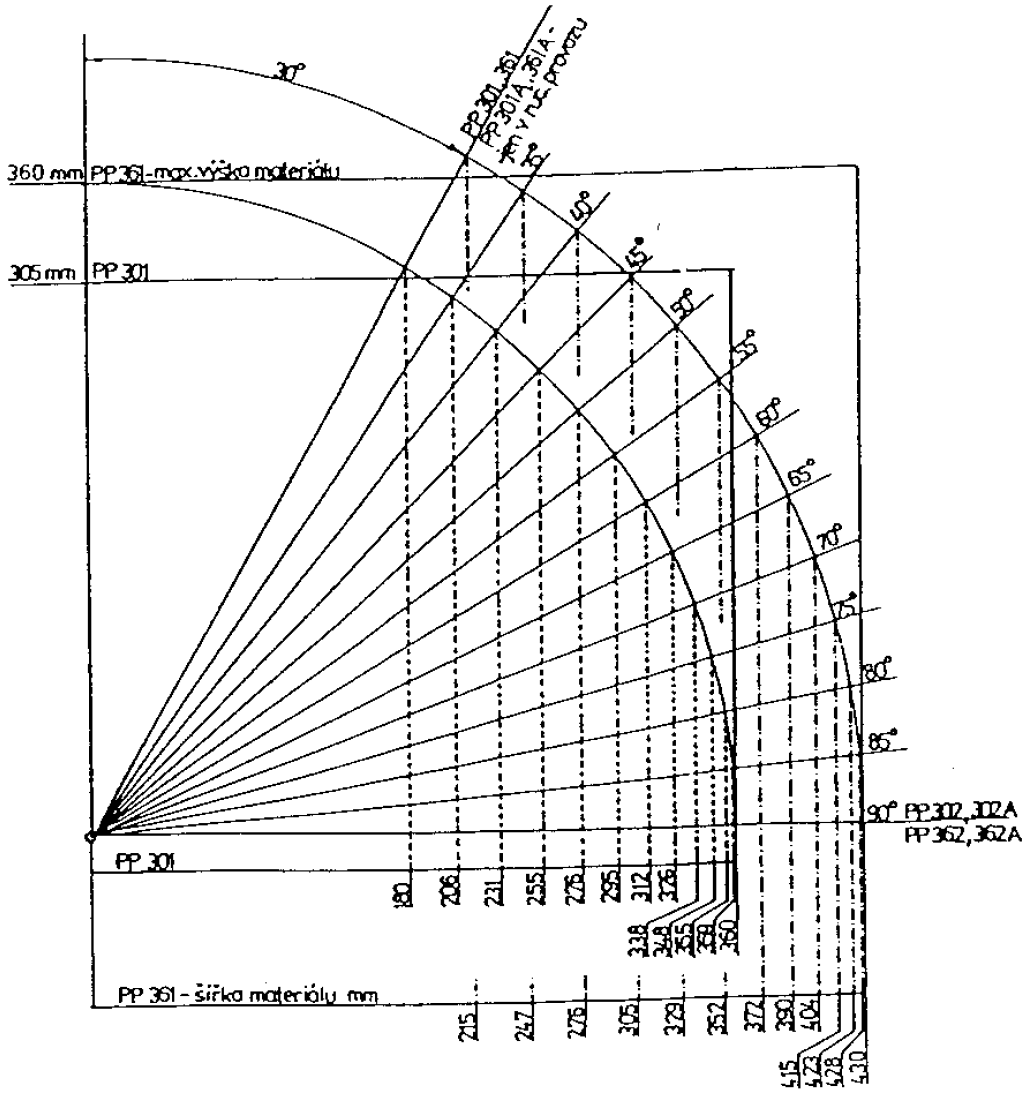
One column sawing machines PP 301 and PP 361	in range 90° - 30°
One column sawing machines PP 301 HU and PP 361 HU	in range 90° - 45°
One column sawing machines PP 301 A and PP 361 A	in range 90° - 30°
	but only in manual mode

Two column sawing machines PP 302, PP 302 A, PP 362 and PP 361/2A – oblique cutting is impossible for these models.

Reposition for the oblique cutting is carried out by releasing of arresting wheel and angular displacement to selected angle in stated range (table 8/15). By means of arresting wheel the arm is then locked. To accurate setting of the angle there is scale graduated in 1° on the arc of the working table and edge of the yellow gauge.

It is necessary to keep in mind that oblique cutting mode maximal cutting range decreases proportionally to selected angle (in horizontal axis)

CUTTING RANGE IN OBLIQUE MODE



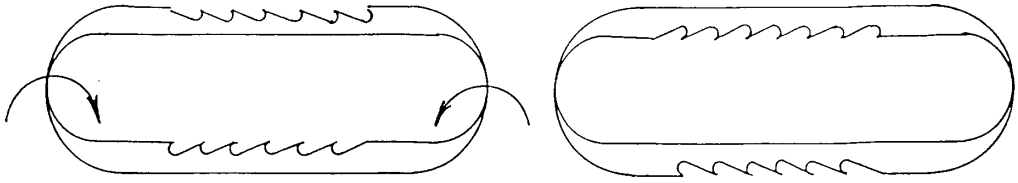
3.11 Replacement of Saw Band

- control elements switch to position “Adjustment” – start of saw band motor is blocked
- start the hydraulic power unit
- adjustment ring for setting of the arm upper position transfer to its extreme upper position
- open the cover of the driving wheels and remove the yellow cover on the adjustable arm of saw band guiding
- release the arm of wire brush and decline it downwards

WARNING 	**Always protect your hands with gloves if you replace the saw band**

- by rotation of the hand wheel of band tensioning the band is released. Push the band from guide bearings and jaws and remove it
- check the new saw band if top of teeth are pointed towards cutting direction (towards block of feeding). If teeth are in opposite direction them must be twisted. Otherwise the saw band is destroyed during the first cutting operation

Twisting of the saw band



- fit the saw band into rotary wheels and its back edge press to step on the wheel periphery (table 2). Teeth must be pointed from the step on the wheel periphery. In the opposite case this step will be gradually cut-off
- in this lower part twist saw band in 90 degrees by jig which is delivered with machinery and carefully put it between bearings and jaws this way to sit the back edge bears against tungsten carbide plate and adjustable arm bearing
- slightly strength the band by means of hand wheel of tensioning
- shut the cover of rotary wheel, give the switch into either “Operation” or “Manually” position
- switch-on the saw band electric motor for the short time period to sit the saw band by this short time run
- again switch into “Adjustment”position, open the wheels cover and check if saw band is lacated in its right position, if it is not grabbing with wheel steps (squeling noise can be heard in that case) of it is not running out from the rotary wheels. 3.11 It these failures are visible - see “Adjusting and saw Band Geometry”section
- slightly press the wire wheel into the teeth on the saw band and tight its arm
- install the yellow cover on the adjustable arm
- close the cover of the rotary wheels and switch to “Operation”mode

3.11.1 Saw band tensioning

The correct tensioning of the saw band is essential for both machinery accuracy and its cutting power. Tensioning screw strengths the band against the Bellewille springs preloading. During gradually tensioning the narrow gap is created between the bracket of the tensioning screw and ring which is jointed with screw by means of pin. (table 3). If saw band is tensioned correctly then mentioned gap is 2 mm. For the checking of this distance there is 2 mm sheet gauge swivel installed on the bracket. It must be possible to pass this gauge through the gap without resistance in upper position (table 3/9).

WARNING 	**If operation of the correct tensioning of the band (checking of the gap) is finsihed the gauge must be swiveled back to its lower position**

If gauge would be forgotten in the gap, it means in its upper position, the tensioning screw would not be returned back by force of the Bellwille springs and machine would not be stopped by limit switch. It is clear that if the saw band is not installed into machinery or if the band is free the machinery cannot be switched-on. On the separate order there is possible to order the measuring instrument for checking of correct saw band tensioning.

3.11.2 Adjusting of the Saw Band Geometry

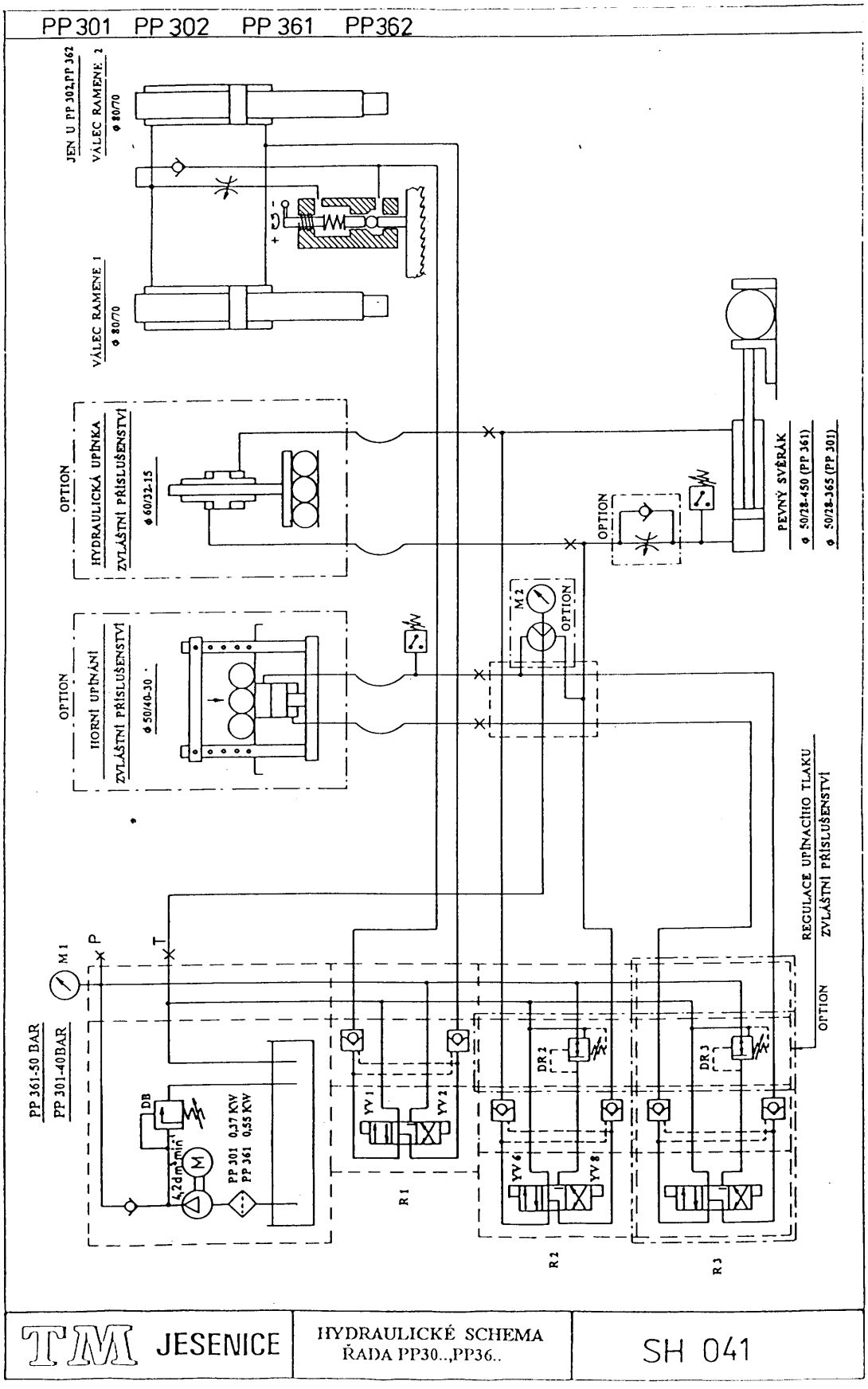
The adjusting of the rotary wheels and saw band is carefully made by manufacturer.

Running off or scrapping with steps of the wheels can be caused by non-alignment welding of the saw band or by its deflection. For this reason try to exchange the former band for new one before the changing of geometry

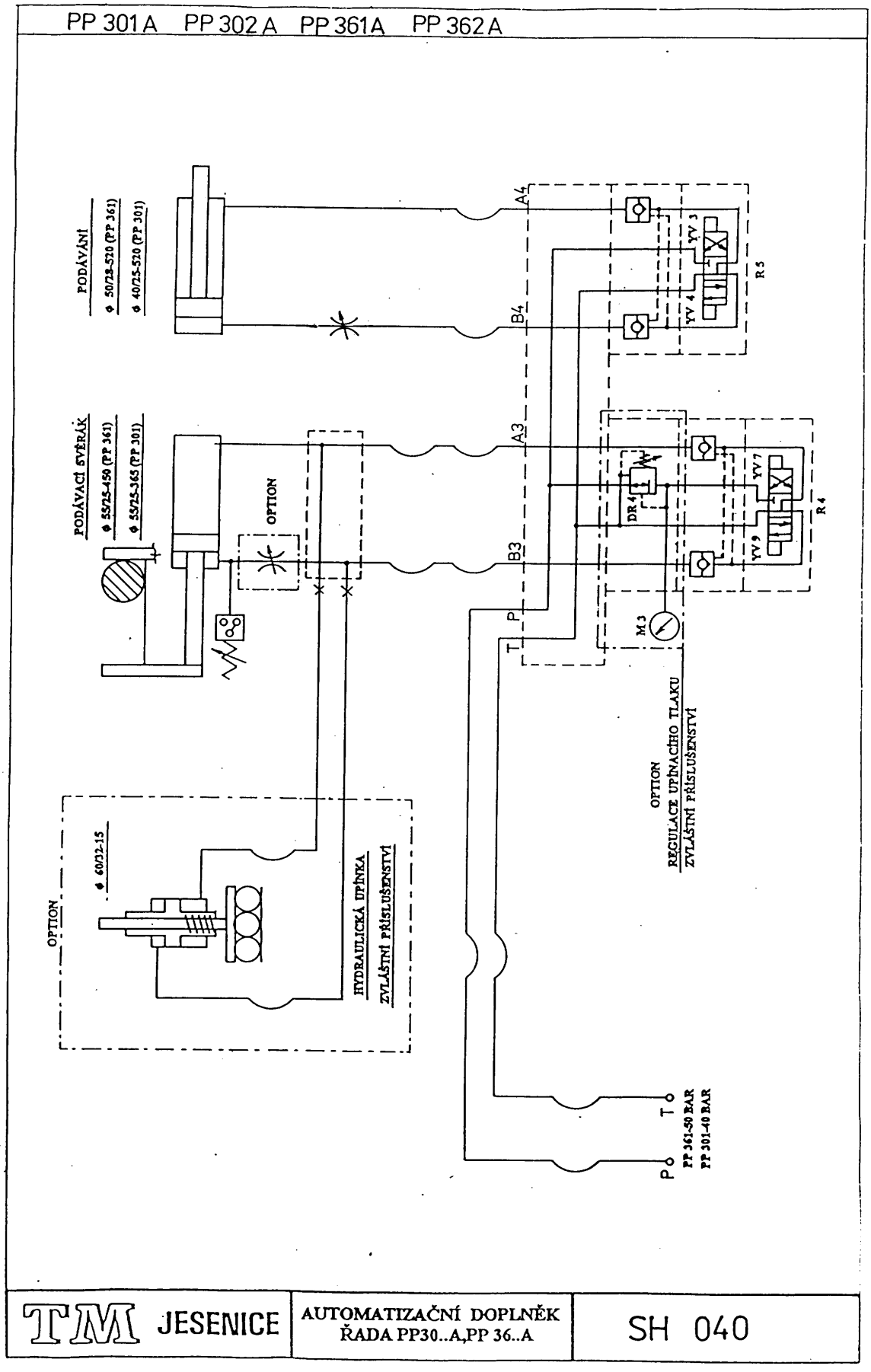
- driver tensioning rotary wheel is located on the pin with cube (table 2). After releasing of two M 10 fixing bolts there is possible to swivel with cube. By swiveling of the rotary wheel round its vertical axis the parallelity of both in the horizontal plane is reached and correction of the saw band running on the wheels can be carried out by this way
- the saw band must not slip, run-off, from the rotary wheel. On the other side, the back edge of the saw band would not be crapped with the step on the wheel periphery. This scrapping is heard as “band squeak”during machinery operation
- the driving wheel is possible to correct too. It is carried out by 4 sunken screws which are located in the flange of the worm gear unit and after partially releasing of M 10 nuts by means of which the worm gear units is fixed

4. HYDRAULICS

4.1 Hydraulic Diagram of PP 30.. and PP 36.. sawing band machineries



4.2 Hydraulic diagram – automatization accessory



4.3 Used Hydraulic Components

Hydraulic power unit	HYTOS SMA 03-31/12-S11.0-H 14LS.0-0024 (ZOEBL MC4-AD-V1A-R25-PM-ML2 T08-F1)	
Directional cotrol valves	HYTOS	RPE3-063 Y11/02400 LED
	Rexroth	4WE6 J5 XAG 24 NK4
	Parker	D1VW 4C NJP
	ARON	AD3 EO3 CM 24V DC
	Q Hydraulik	4WE6 J51/AG24 NZ4
	TOS	RSE2-063 Y11/024SA1
Hydraulic lock	HYTOS	2 RJV1-06-MC
	Rexroth	Z2 SRK6-1-1X/V
	Parker	CPOM 2 DD
	ARON	AM3 UP/AB
	Q Hydraulik	Z2 S6-40
	TOS	VJH2M1-06/C1
Check valve	Ermeto	RHD 8-PL
	HYTOS	VJ2-06005-M2
	Q Hydraulik	S6 A1 P
Needle throttle valve		FT 1237/2-01G (G1/8") FT 257-2-14 (G1/4")
Glycerol manometer		63 0-63 Bar

6. THE TECHNOLOGY OF CUTTING

6.1 Sawing bands in general

The producers of the savings bands state in their catalogues the particular recommendation of the band kind, its shape, arrangement and teeth rake.

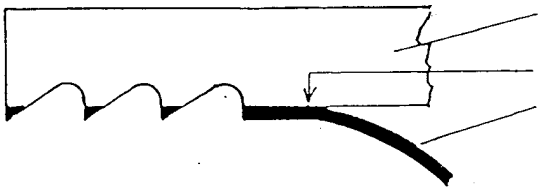
The right choice of the sawing band according to its dimension, profile and quality of cut material has a great influence to operation economy and geometry accuracy of the cut section.

For your orientation we state the short survey of the contemporary standard of the saw bands sphere

Material of the saw bands

- special steel
- BI-METAL with high - speed steel surfaced on the teeth tips
- HM teeth are made from sintered carbides with 1500 HV hardness

The mostly is used BI-METAL band like this.



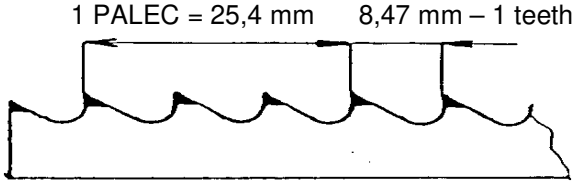
Spring steel which is resistant against alternating

Welded by electron beam
HSS high speed steel built-up onto teeth tips

Teeth arrangement

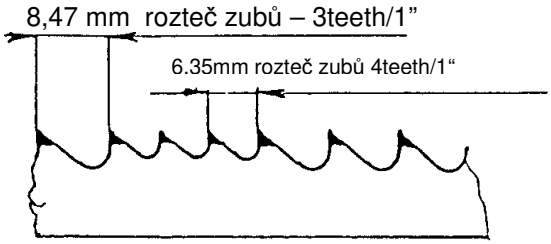
The size of teeth is determined by their number at 1 inch distance

Constant teeth



All teeth have identical depth
An Example: 3 teeth per 1 inch
25.4:3=8.47 mm

Variable teeth

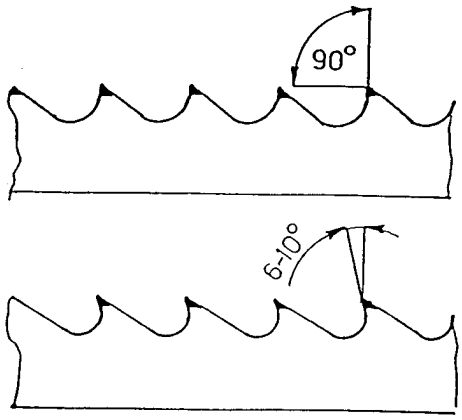


An Example 3-4teeth/1” is reduced and noise is reduced
25,4 : 3 = 8,47 mm too. The quiet running of the
25,4 : 4 = 6,35 mm band increases its service life

Variable pitch of teeth and depth according with it suppress the oscillation and vibrations, breaking teeth and improves of the cut surface. By one kind of the variable teeth large range of the section cam be covered.

Variable teeth with O* front rake they are suitable for the pipe cutting and profiles small section in bundles. Variable teeth with positive front rake assures cutting of the profiles and large sections in bundles.

Teeth shape



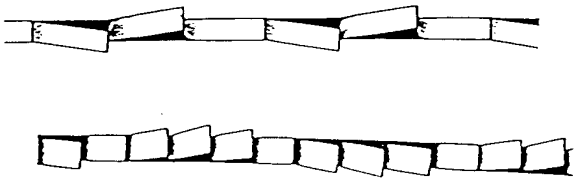
"S" – standard –O* rake

universal, suitable for steel cutting, cast iron, cast steel

"K" – Klauenzahn – positive front rake (6-10 °)

For large diameters of material, high grade steel, alloy steel

Teeth rake



Standard – Universal using- steel, cast steel, non ferous metals

Wave – Hollow profiles with thin walls, sheets, thin walls pipes

6.2 Running-in of saw bands

This section is valid for both new and reground bands.

The high cutting power is reached with sharp cutting edges which have extremely small radius of the blade. To rach the maximal service life of the band the running-in operation is recommended only in 50 per cents of the speed rate stated for cut material. By this way the breaking of the extreme sharp edges is avoided at larger sections of the material especially. These micro – fragments cause the following break of other teeth.

If you watch the vibration or noise cased by oscillation after installation of new band a little bit decrease the cutting speed.

For small sections of cut materials it is recommended section area about 300 cm^2 in decreased feeding mode for the running-in operation.

For larger section the running-in time is about 15 minutes.
Then increase the feeding rate up to optimal value.

6.3 Grinding of the sawing bands

The service life of the sawing band can be increased if you don't admit its total blunting but the band will be sent into special service in time.

Pursuant to its blunting the band can be reground once or twice maximal. Reground of the bands with more number of teeth than 8 teeth/1" is not economic. Also variable teeth bands up to 4/6 teeth/1" can be ground. (No finer) The special service made also teeth rake.

6.4 Welding of the saw bands

Fractured saw band can be welded only in special service which is equipped with welding machine with electronic controlled temperature of welding.

6.5 Selection of teeth number of the saw band according to cutting section length

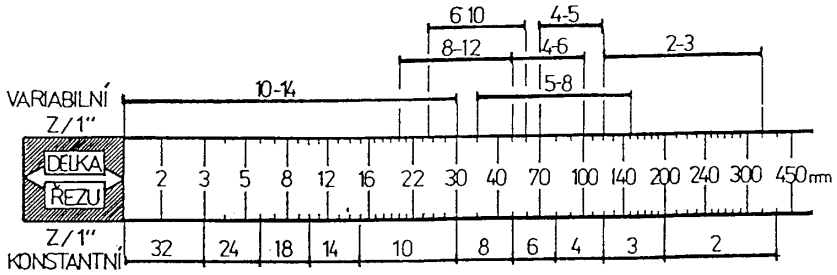
It is started as general:

- for long cutting section the raw teeth are used. Larger spaces are not tamped with chips. Tamped teeth spaces cause the teeth breaking and vice vers
- for short cutting section the fine teeth are used to avoid to take a bite into edge material. The operation is more economic if more teeth are in engagement.

A general formula for number of teeth which are in engagement simultaneously.

Teeth number in	Material machinability	
	light	**heavy**
minimal	3	6
optimal	6-12	12-24
maximal	24	49

Nomogram for quick determination of teeth number according to cutting section length



A table for quick determination of teeth number for cutting of pipes

S /mm/	20	40	60	80	100	120	150	200	300	500
2	32 S	24 S	18S	18S	14S	14S	10-14 S	10-14S	8-12 S	6-10 S
3	24 S	18S	14S	10-14S	10-14S	10-14S	8-12 S	8-12 S	6-10 S	5-8 S
4	24 S	14S	10-14S	10-14S	8-12 S	8-12 S	6-10 S	6-10 S	5-8 S	4-6 K
5	18S	10-14S	10-14S	8-12 S	6-10 S	6-10 S	6-10 S	5-8 S	4-6 K	4-6 K
6	18S	10-14 S	8-12 S	8-12 S	6-10 S	6-10 S	5-8 S	5-8 S	4-6 K	4-6 K
8	14S	8-12 S	6-10 S	6-10 S	5-8 S	5-8 S	5-8 S	4-6 K	4-6 K	3-4 K
10		6-10 S	6-10 S	5-8 S	5-8 S	5-8 S	4-6 K	4-6 K	4-6 K	3-4 K
12		6-10 S	5-8 S	5-8 S	4-6 K	4-6 K	4-6 K	4-6 K	3-4 K	3-4 K
15		5-8 S	5-8 S	4-6 K	4-6 K	4-6 K	4-6 K	3-4 K	3-4 K	2-3 K
20			4-6 K	4-6 K	4-6 K	3-4 K	3-4 K	3-4 K	2-3 K	2-3 K
30				3-4 K	3-4 K	3-4 K	3-4 K	2-3 K	2-3 K	2-3 K
50						3-4 K	2-3 K	2-3 K	2-3 K	1.4-2 K
75								2-3 K	1,4-2 K	1,4-2 K
100									1,4-2 K	0,75-1,25K
150										0,75-1,25K
200										0,75-1,25K

6.6 Selection of recommended cutting speeds (mm/min)

Material	`CSN	DIN	Saw band			Emulsion
			Steel	Bi-M	HM	%
Structural steel	10370	St 37	40-60	70-90		10
	10420	St 42	40-60	70-90		10
	11500	St 50	35-50	50-70		10
	11600	St 60	35-50	50-70		10
Free-cutting steel	11109	9S20	50-70	80-120		15
	11110	10S20	50-70	80-120		15
Carburizing steel	12021	C 10	50-70	80-100		15
	12023	C 15	50-70	80-100		15
	14220	16 Mn Cr 5	35-45	55-65		10
	16125	21 NiCrMo2	35-50	45-55		10
	16420	14 NiCr14	35-40	40-50		10
Heat treatment steel	12040	C 35	40-60	60-75		5
	12050	Ck45	40-60	60-75		5
	13142	40 Mn4	40-50	50-65		5
	15142	42CrMo4	35-45	50-60		5
	16240	36NiCr6	35-45	45-60		5
	16342	34CrNiMo6	35-45	50-60		5
Nitriding steel	14340	34CrAl16	30-35	40-50		5
High-speed steel	19820	S3-3-2	20-30	35-45		3
	19824	S18-0-1	20-30	35-45		3
	19830	S6-5-2	20-30	35-45		3
	19852	S6-5-2-5	20-30	35-45		3
Steel for roller bearings	14100	100 Cr6	25-35	55-70		3
	14109		25-35	55-70		3
Spring steel	13270	65Si7	30-40	40-60		3
	15260	50CrV4	30-40	40-60		3
Tool steel	19255	C125W1	30-40	40-50		3
	19436	X210Cr12	20-30	25-40	60-70	-
	19501	100CrMo5	25-35	40-50		-
	19541	X32CrMoV33	25-35	45-55		5
	19663	56NiCrMoV7	30-40	40-50		5
	19732	45WCrV7	30-40	40-50		-
Stainless steel	17240	X5CrNi189	-	30-40	50-60	10
	17347	X100CrNiMoTi1810	-	30-40	50-60	10
	17353	X6CrNiMoTi1810	-	30-40	50-60	10
Creep resisting steel	17113	1.4713	-	15-25	35-45	10
	17134	1.4922	-	15-25	35-45	10
	17255	X15CrNiSi2520	-	15-25	35-45	10
		1.4742	-	15-25	35-45	10
		1.4980	-	15-25	35-45	10
Steel for valves	17115	X45CrSi93	20-30	30-40	50-60	5
		X45CrNiW189	-	30-40	50-60	5
Heat treated steel		1000-1500 N/mm^2	-	20-30		5
Hardened steel		45-65 HRC	-	-	20-40	5
Cast steel	422630	GS38	30-40	50-60		3
	422660	GS60	30-40	50-60		3

Material	**ČSN**	**DIN**	**Pilový pás**			**em.**
			Ocelový	BI-Met.	HM	%
Cast iron	422415	GG15	30-40	40-50		-
	422430	GG30	30-40	40-50		-
	422540	GTW-40	30-40	40-50		-
	422305	GGG50	30-40	40-50		-
Copper	CU	KE-Cu	60-80	100-150		10
Brass	423220	CuZn40	100-200	100-300		3
	423223	CuZn40Pb2	100-200	100-300		3
Tin bronze	423016	CuSn6	60-80	100-120		3
	423018	G-CuSn8	50-70	80-100		3
Red bronze	423135	G-CuSn5ZnPb	50-70	80-120		3
	423138	G-CuSn10Zn	50-70	80-120		3
Alluminium bronze		CuAl18	30-45	50-70		15
		CuAl8Fe	25-35	35-45		15
		G-CuAl10Fe	20-30	30-40		15
Leaded bronze		G-CuPb25	60-80	100-150		3
Tin-lead bronze		G-CuPb15Sn	60-80	100-150		3
Alluminium	424004	Al99,5	80-400	80-800		25
wrought	424400	AlMoSi1	80-400	80-800		25
Alluminium alloy	424412	AlMg2	80-400	80-800		25
wrought	424515	G-AlSi6Cu4	80-400	80-800		25
Alluminium alloy	424352	G-AlSi12	80-400	80-800		25
cast						
Thermo plastics	PVC, PTFE, PE, PS		100-400	100-400		-

7. LUBRICATION AND MAINTENANCE

DANGER 	**Before start of any maintenance works, switch-off the main switch, lock it to prevent anybody to switch-on the machinery during maintenance**

WARNING 	**The maintenance works can be carried out only by qualified personal. If same parts must be replaced use only that spare parts which corresponds with original model, voltage and value. By using of noncorresponding parts the machinery safety can be limited or it!can be damaged**

Every day

- rotary wheels, their periphery on which the saw band is running especially, as well as the saw band clean from chips
- clean from chips all area under covers of the rotary wheels, both guides of saw band, bed of vice, all guides on which parts are moved and all machinery surrounding

For chips removing only short handled brush can be used (no rag) for mechanical impurities or stuck chips removing the cooling emulsion can be used.
The agents which attack the lacquer, rubber and plastic must not be used. These agents should not be mixed with cooling fluid.

WARNING 	Never use the pressurized air to machine cleaning from chips. The flying chips can cause the person injury and to damage the guide, sealing and other functional surface

- check the level of cooling fluid
- oil the bed of vice and all guide surfaces

Every week

- lubricate with grease all red marked grease nipple
- according to need to clean the tank of cooling fluid
- checking of leakage of pipe fittings and hydraulic components - to tighten or replace. If any leakage were watched then oil have to be checked and refilled

ATTENTION! In the case of hose rupture all oil can be lost. A seizure the oil pump is possible

Every year

- replace the oil in hydraulic power unit. Before tank opening the plug and its surrounding must be cleaned properly to avoid of impurities entering into tank

Instructions for installation and dismounting of the hydraulic components

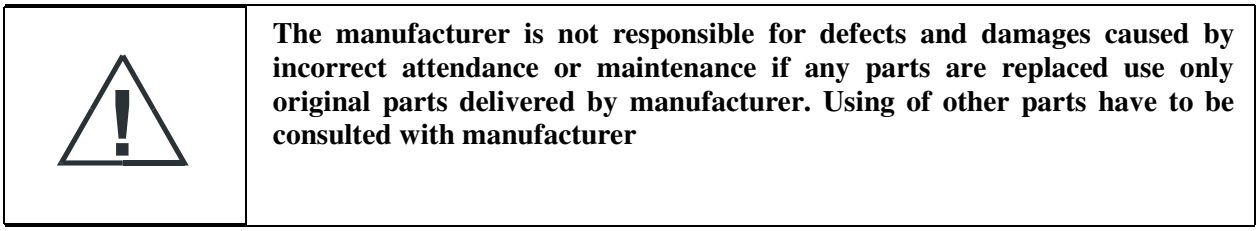
- any works on the hydraulic circuit must be carried out if hydraulic power unit is out of operation. Fittings and connection must be disconnected slowly to possible pressure decreasing and working fluid could not to spray out
- keep clean! Any impurities can cause a malfunction of hydraulic components
- disconnected pipelines and opened ports in the hydraulic blocks must be plugged or covered
- avoid a penetration of the cloth fibers into hydraulic circuit

The Maintenance of the Worm Gear Unit

Sawing band machineries are equipped with Frenštát pod Radhoštěm worm gear units which have the same installation dimension.

The Worm Gear Units in General

- oil sorts- see section 2.5.3
- before oil replacement switch- off the main switch and lock it
- replace the oil until it is hot
- during oil replacement clean the worm gear unit too
- replace a shaft sealing if any leakage is visible to avoid the warm gear unit damage
- don't mix the synthetic oils with mineral ones
- install the new sealing to discharging plug
- used oil have to be liquidate according to current regulations



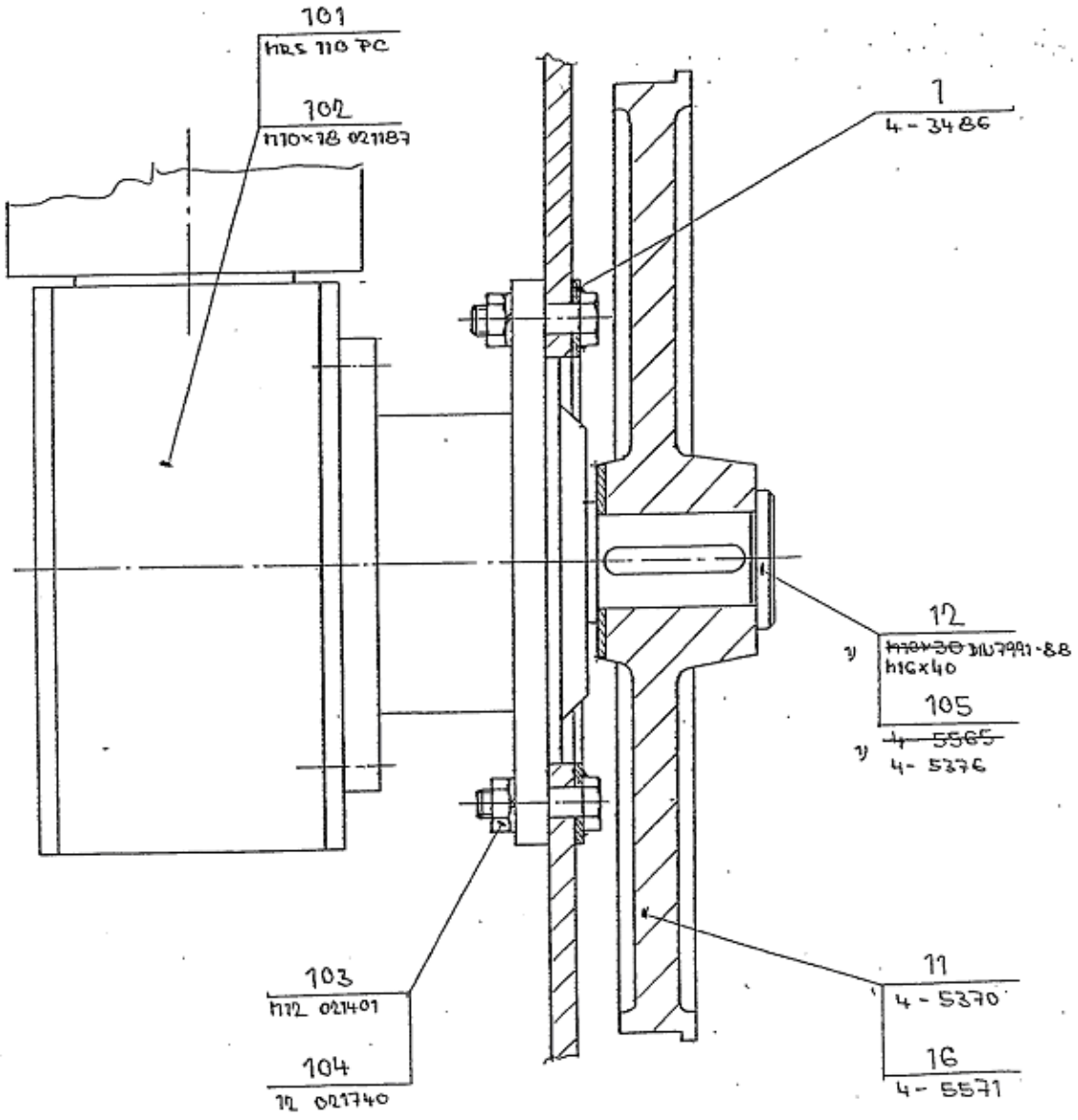
The manufacturer is not responsible for defects and damages caused by incorrect attendance or maintenance if any parts are replaced use only original parts delivered by manufacturer. Using of other parts have to be consulted with manufacturer

7.1 Ordering of the spare parts

In the following tables there are machinery main groups assemblies displayed. If ordered the spare parts it must be quoted as following:

- machinery model
- production number
- table number and item of requested part

7.2 List of tables



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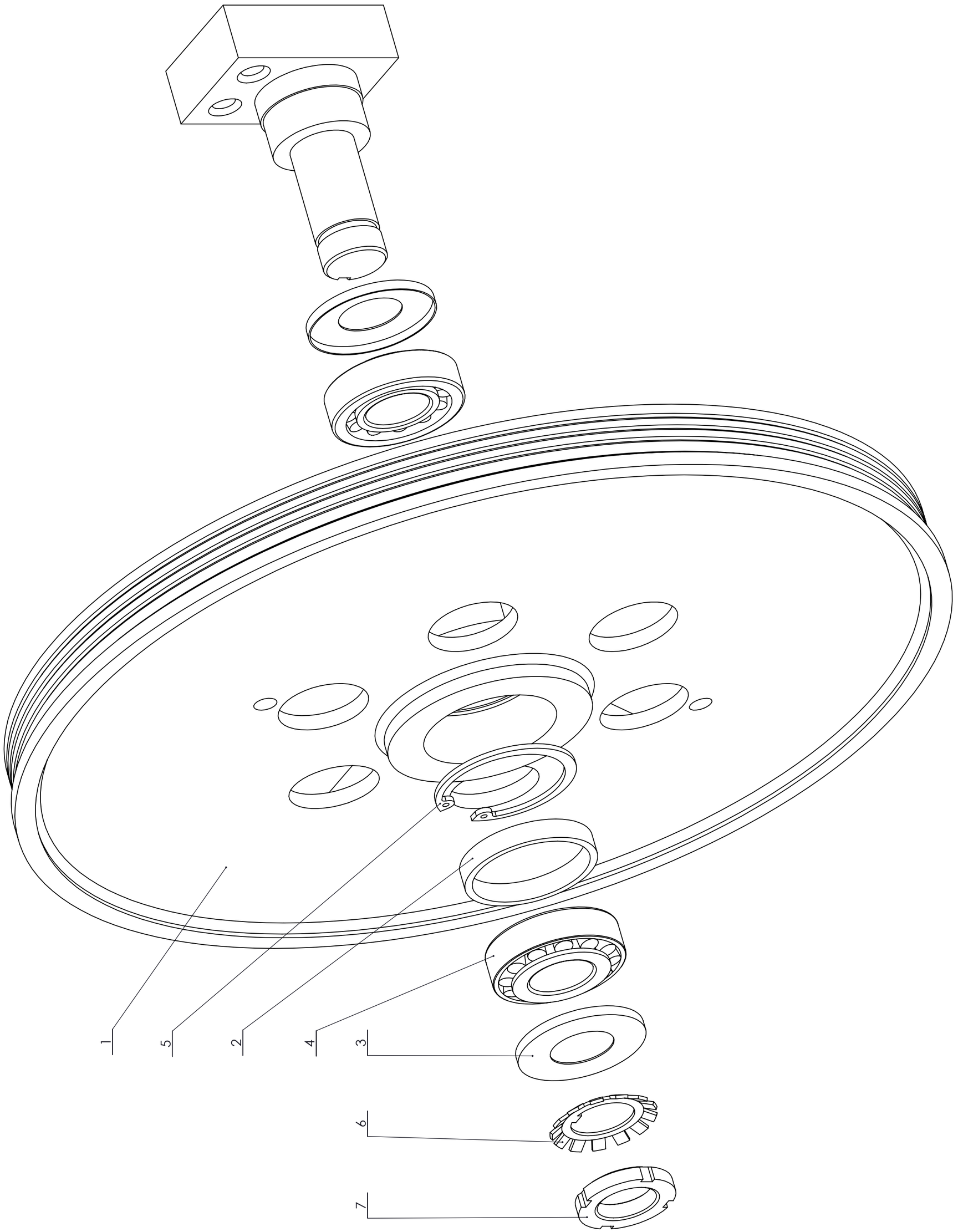
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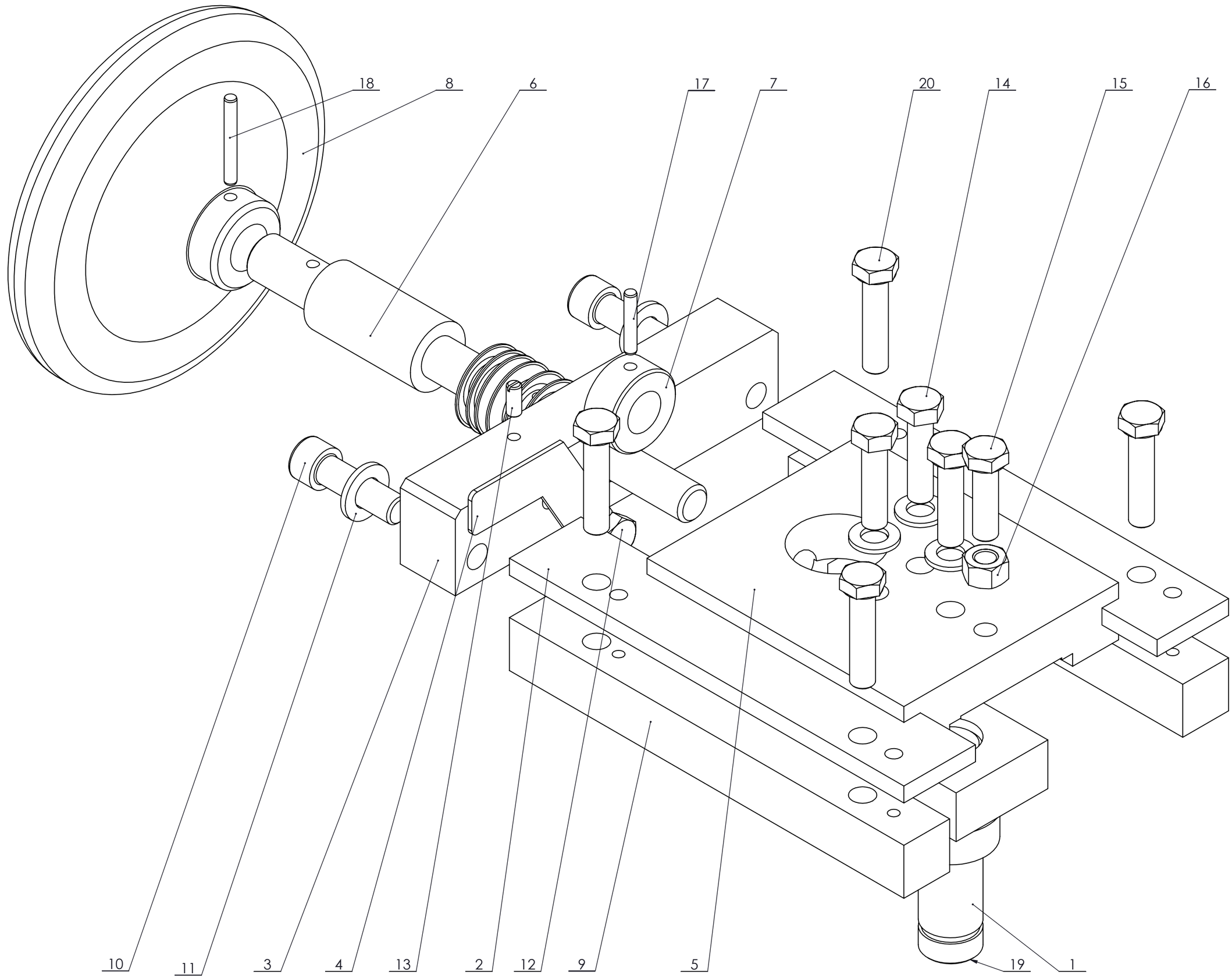

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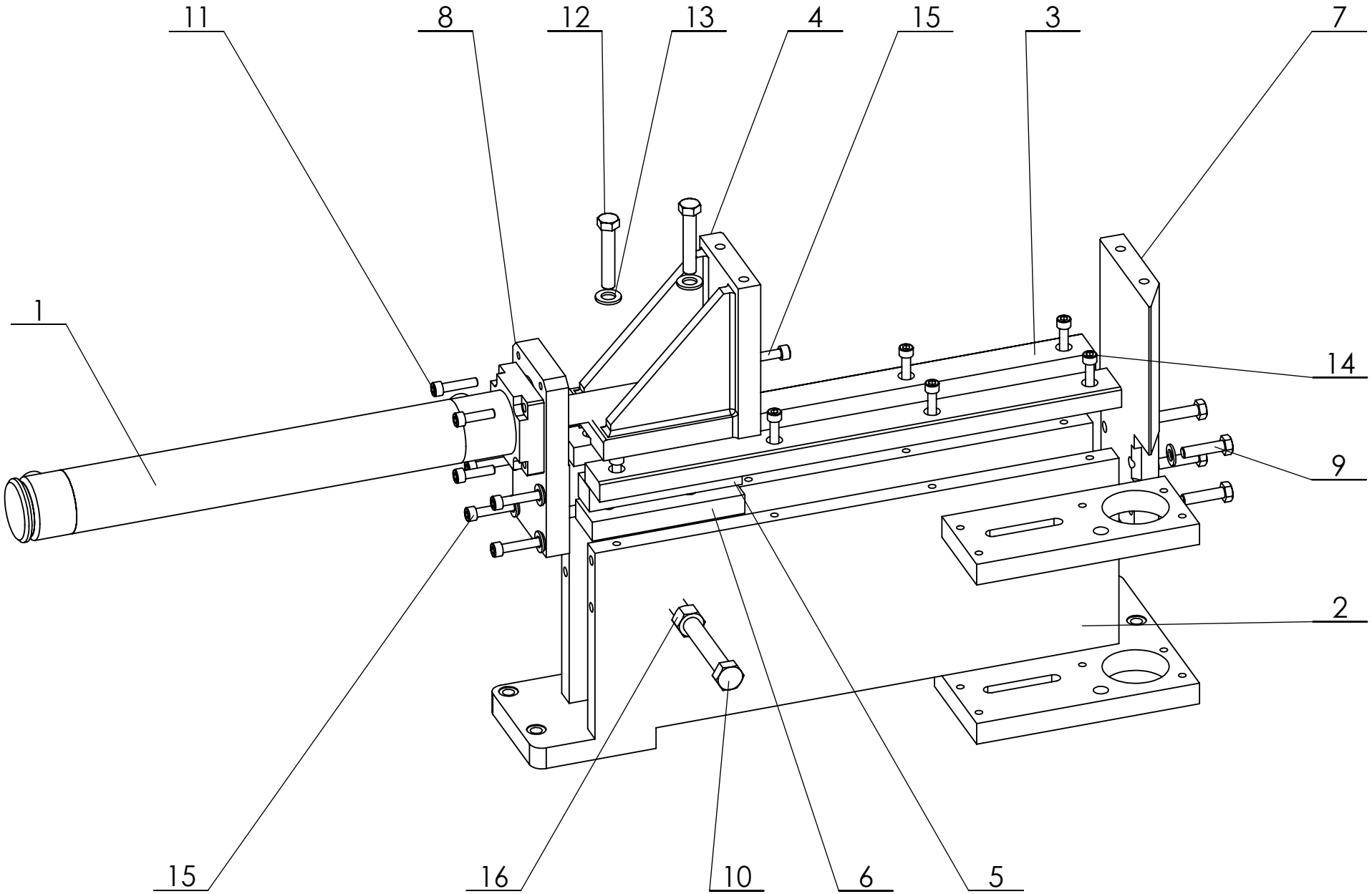
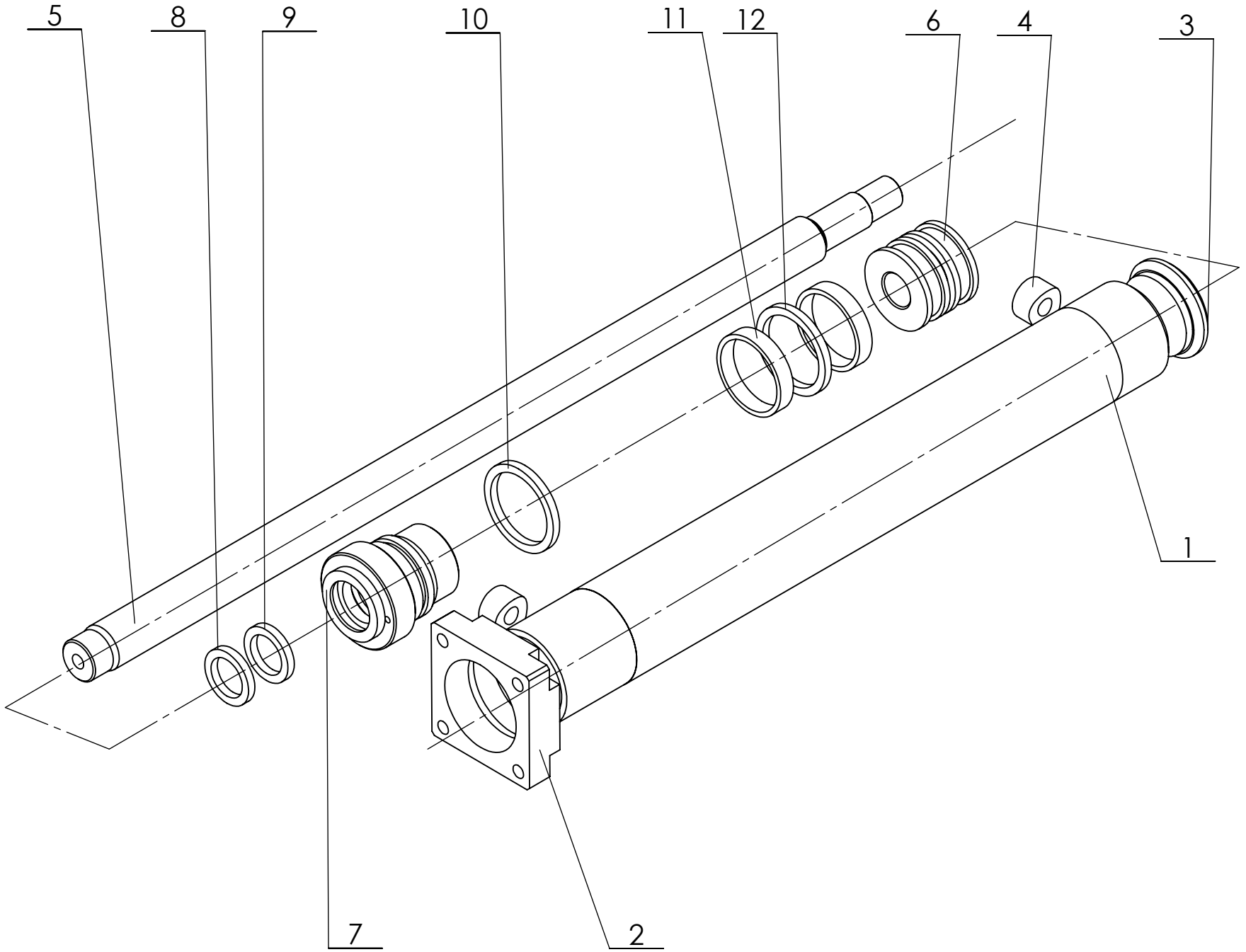
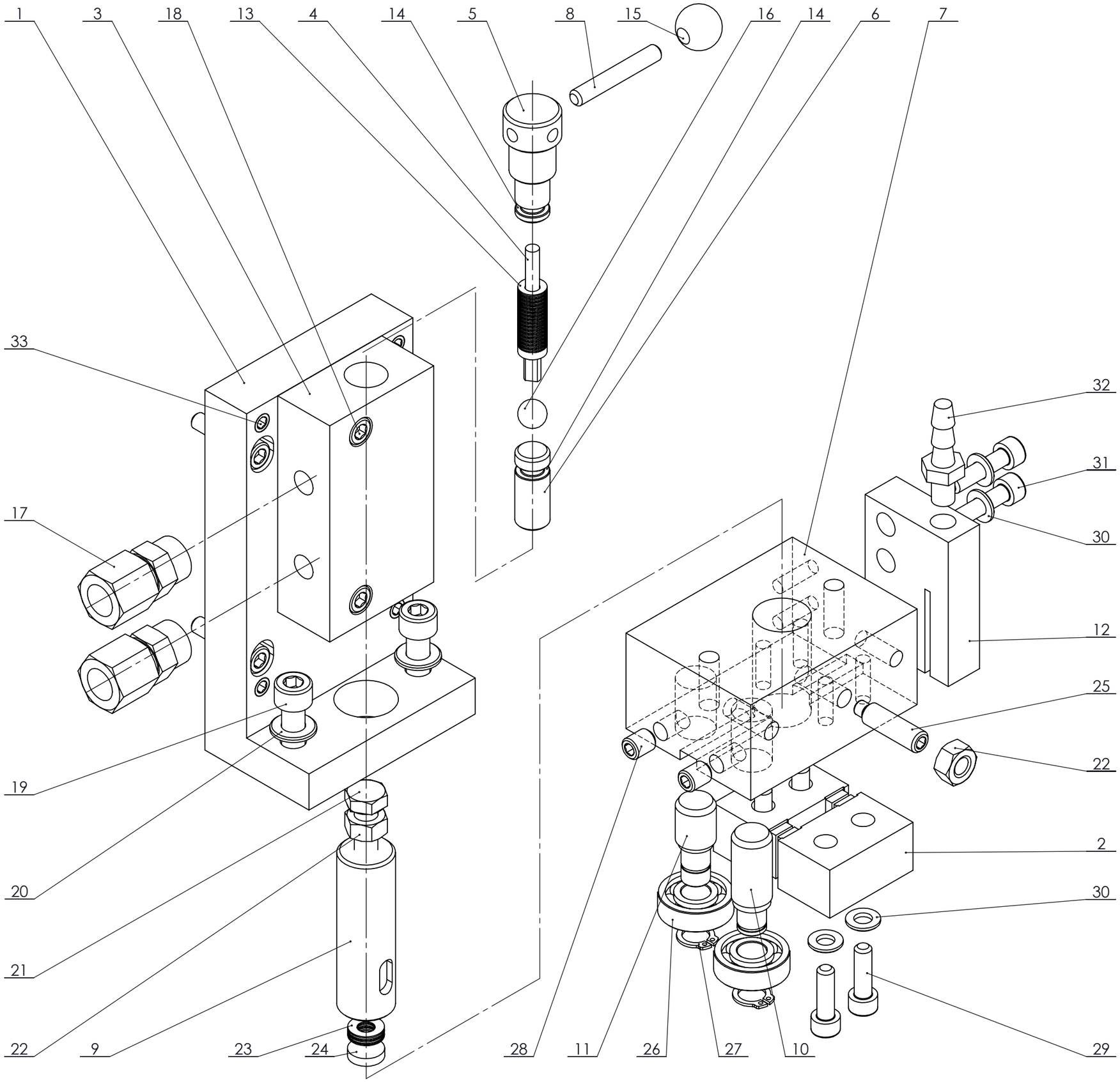


T05

TM Jesenice



T06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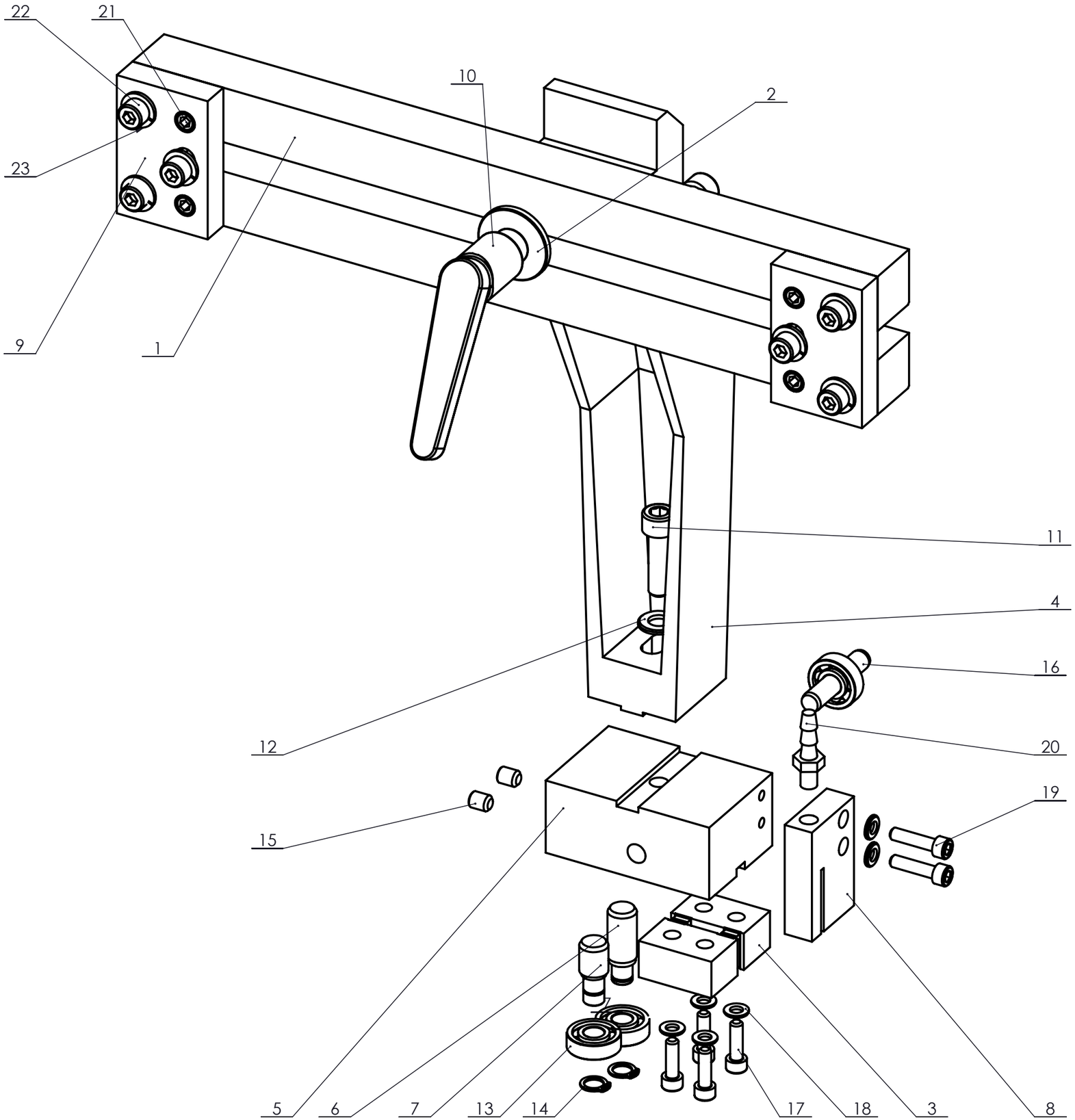
T07

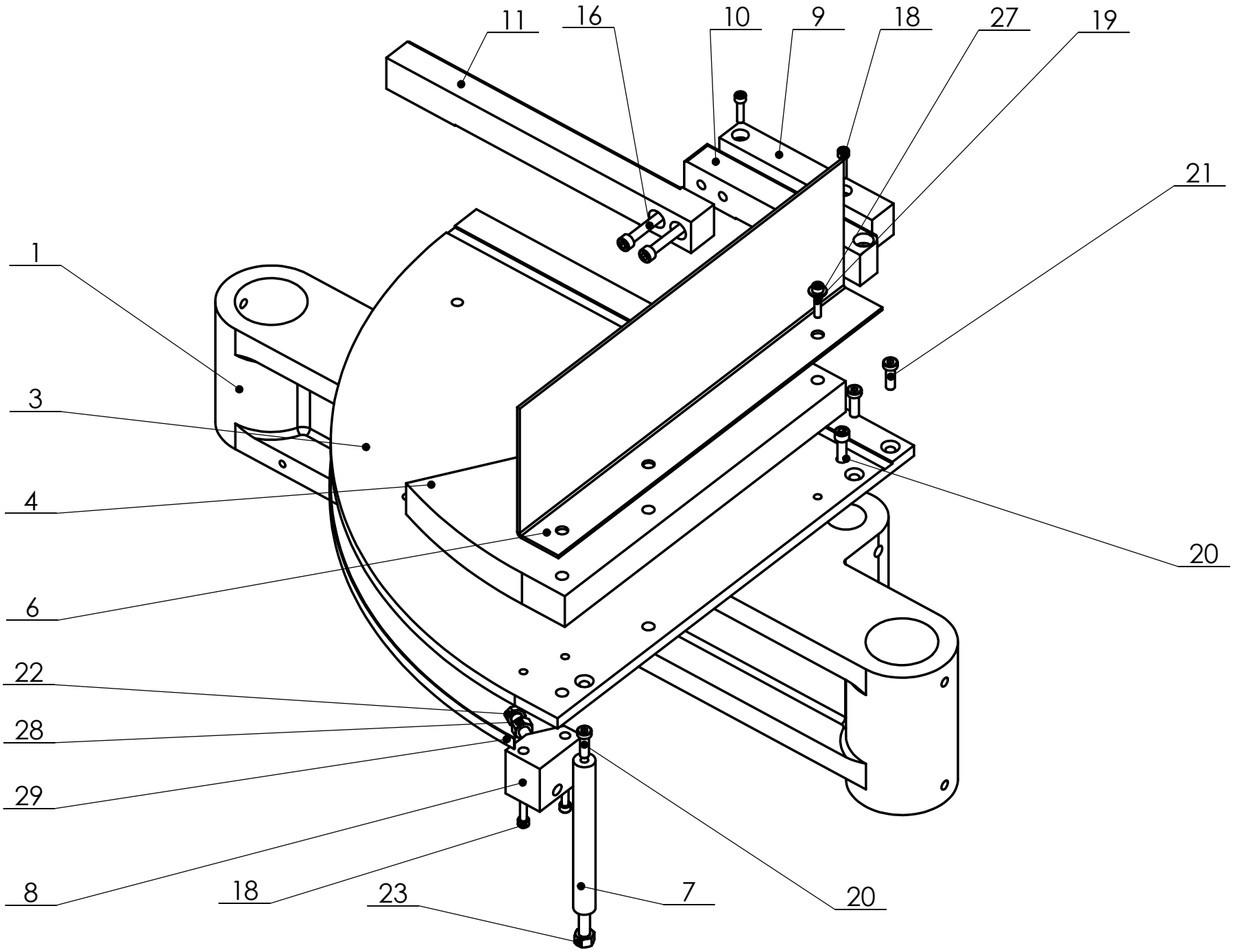
T08



TM Jesenice

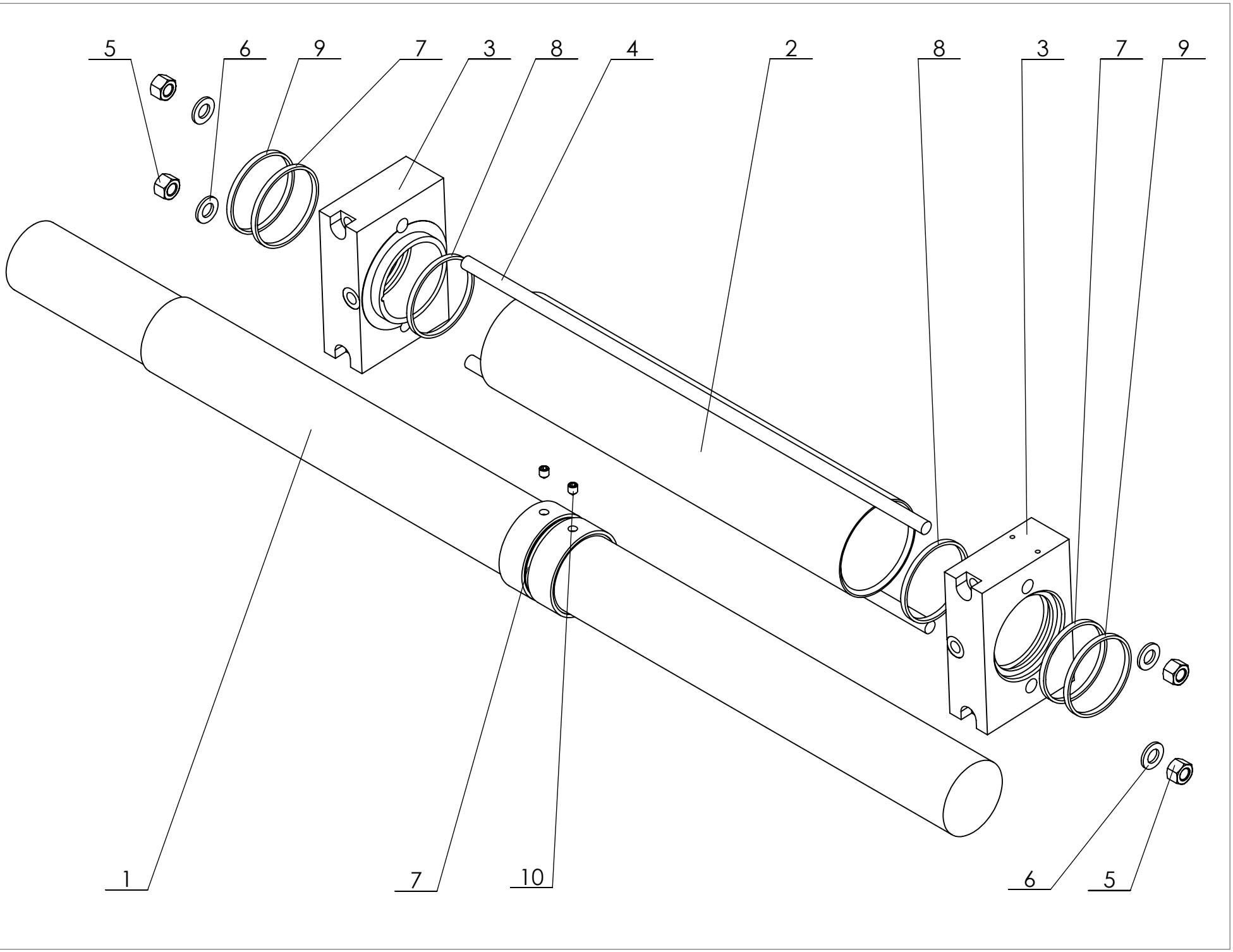
ROTATION ARM

T9

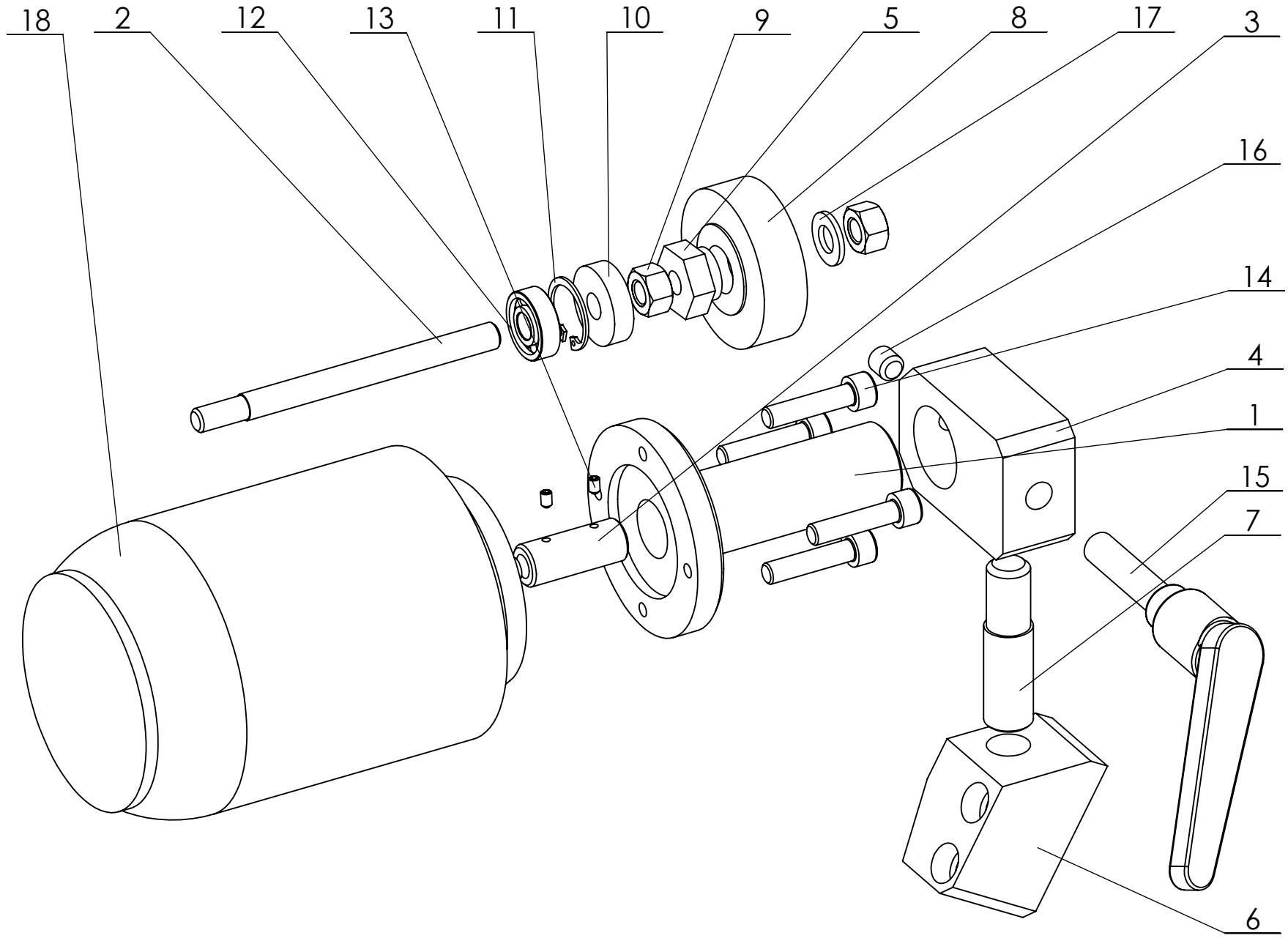


TM Jesenice

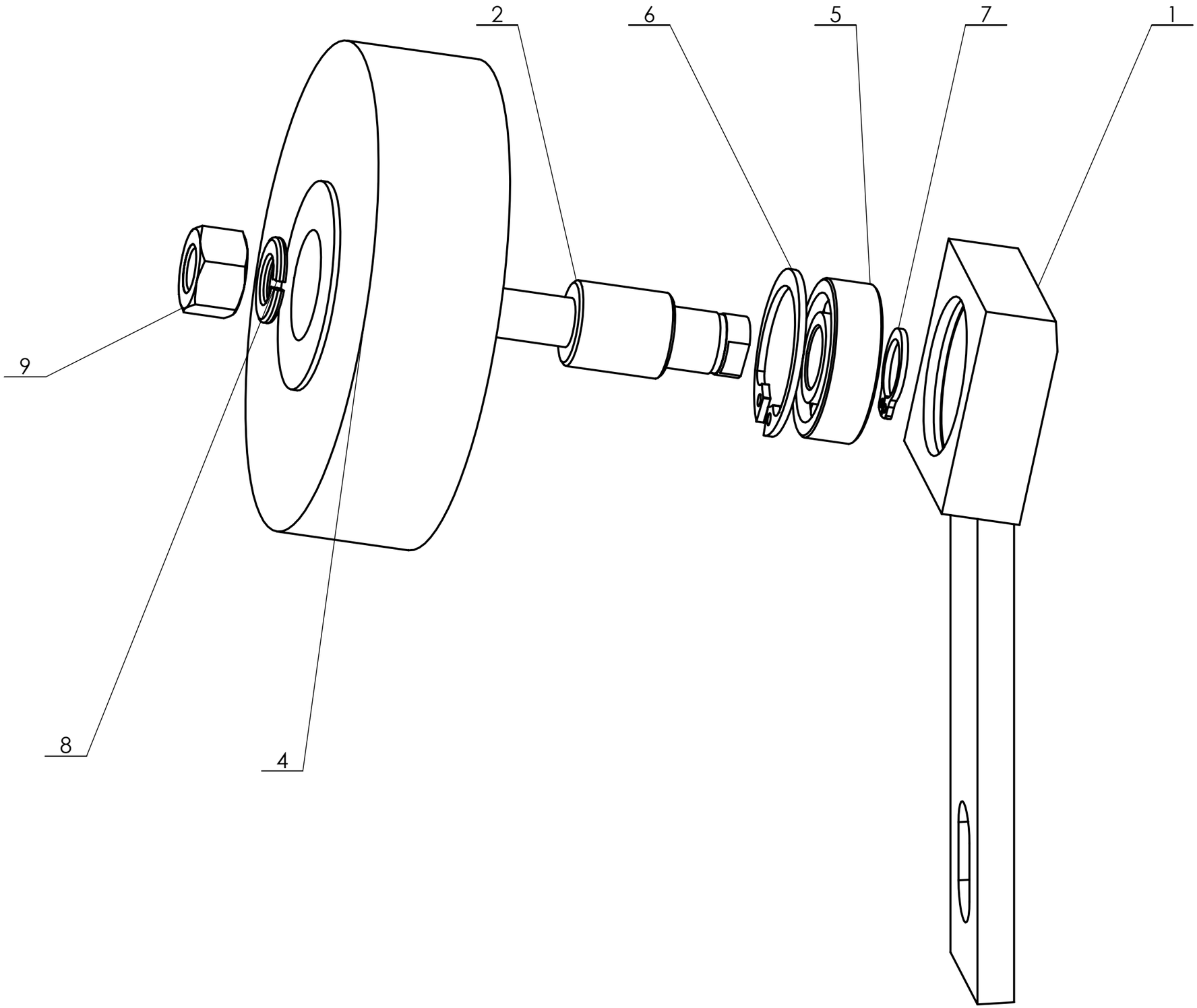
T10



TM Jesenice



T11



T11a

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270 33 Jesenice u Rakovníka
Česká republika

telefon : +420313599000
telefax : +420313599357
e-mail : tmj@tmj.cz

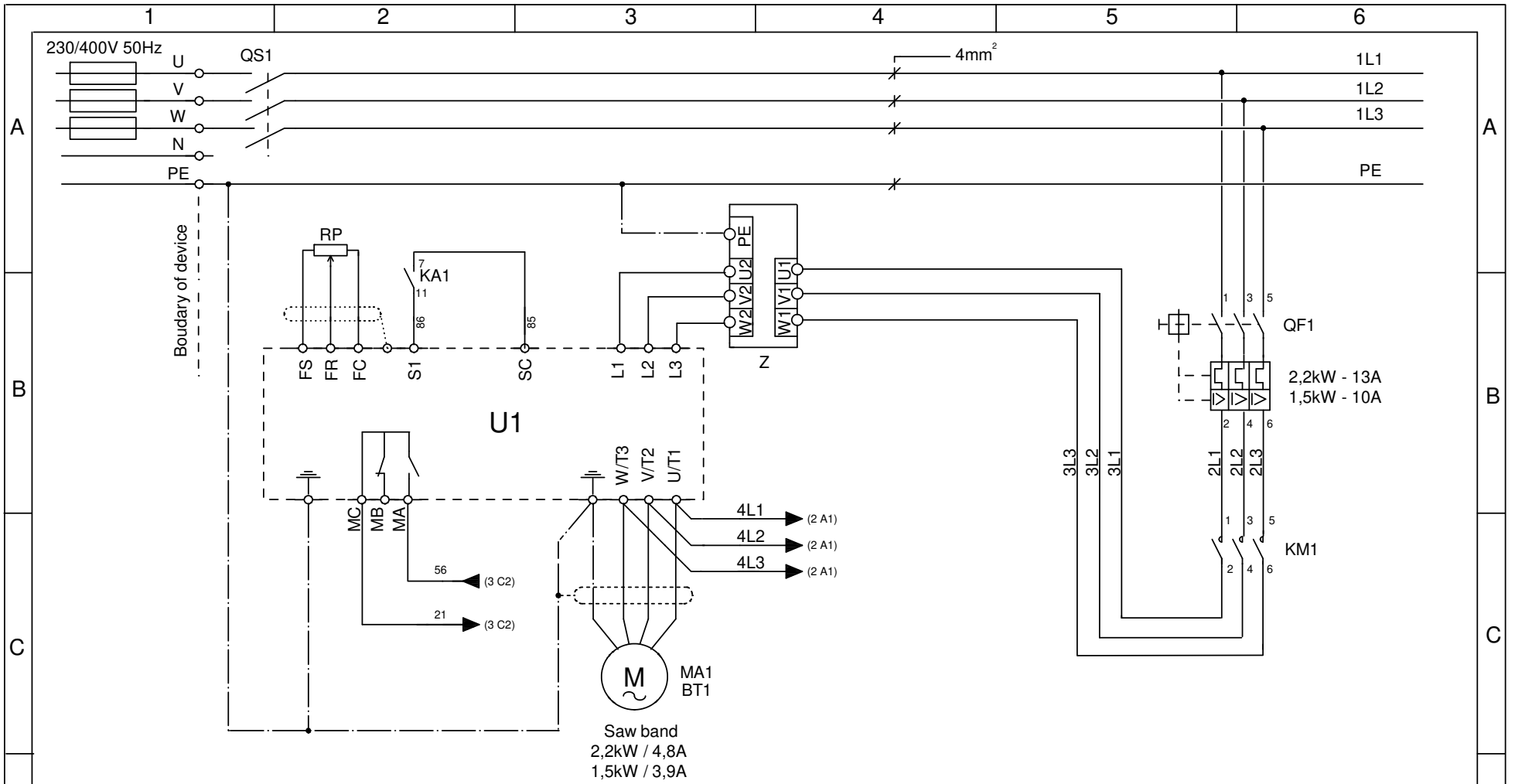
PROJECT : PP 301 - 2G / PP 361 - 2G

Drawing number : SE - 078 - 12

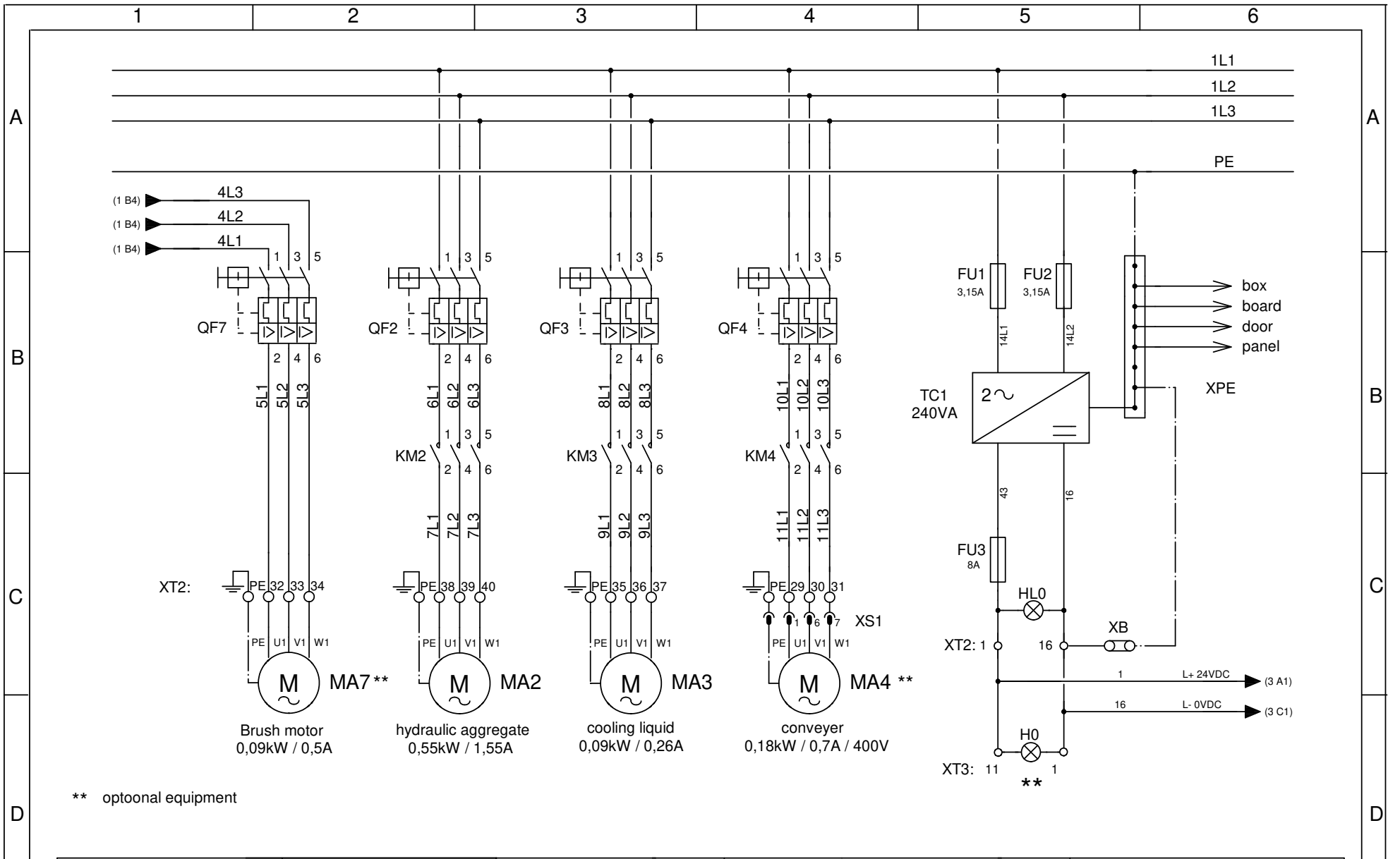
Main circuit		:	black
Control circuit	AC	:	red
	DC	:	blue
Protective bonding circuit		:	siskin - green

Technical characteristics

Net	:	3PEN
Tension nets	:	400V
Frequence	:	50Hz
Achievemest machinery Pn	:	2,3 / 3,2kVA
Flow machinery In	:	Max 7,1 / 8A
Control voltage	:	24VDC
Min. front-end protection	:	16A
Short-circuit current	:	110kA

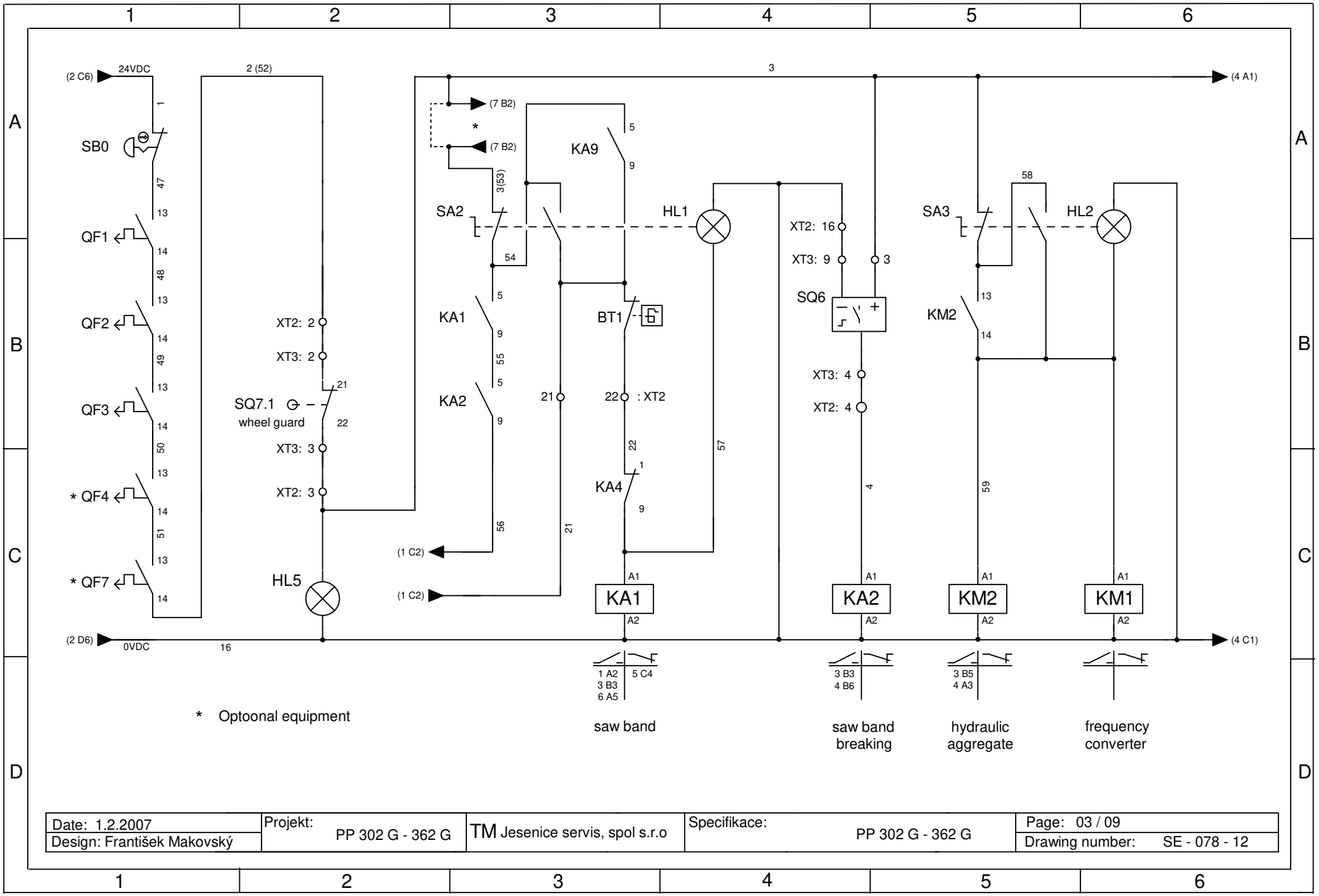


Date: 1.2.2007 Design: František Makovský	Projekt: PP 302 G - 362 G	TM Jesenice servis, spol s.r.o	Specifikace: PP 302 G - 362 G	Page: 01 / 09 Drawing number: SE - 078 - 12

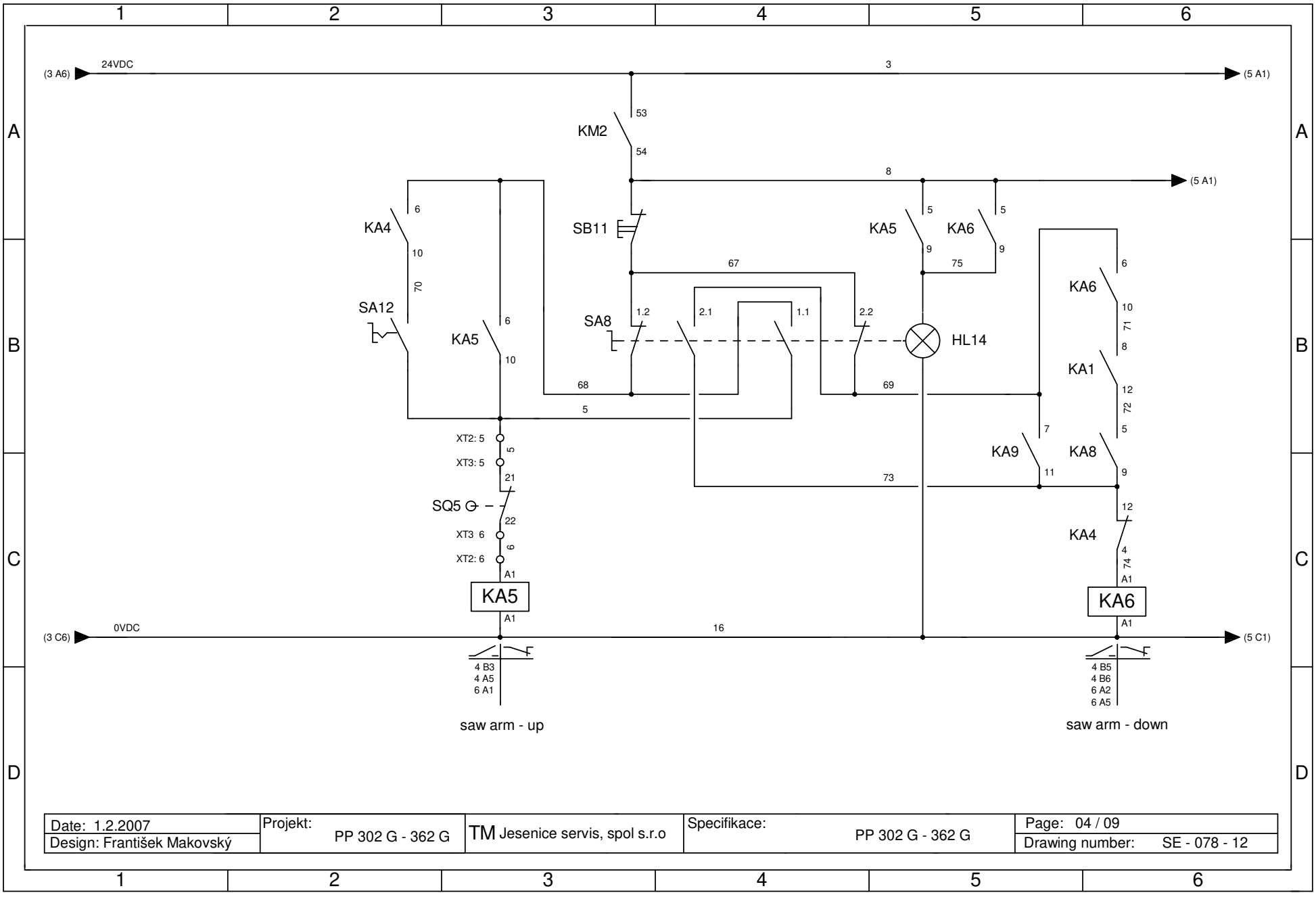


** optoonal equipment

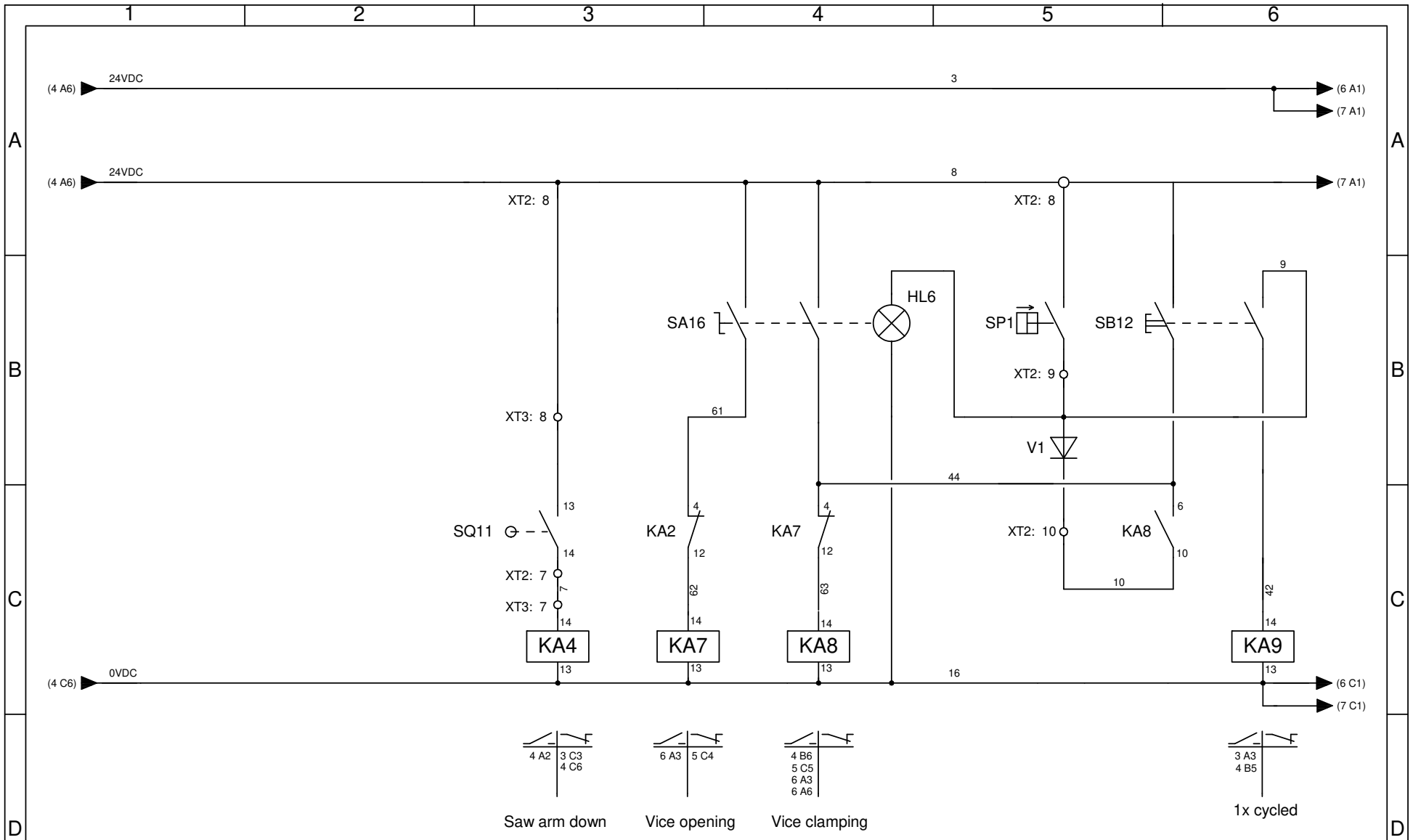
Date: 1.2.2007	Projekt: PP 302 G - 362 G	TM Jesenice servis, spol s.r.o	Specifikace: PP 302 G - 362 G	Page: 02 / 09
Design: František Makovský				Drawing number: SE - 078 - 12



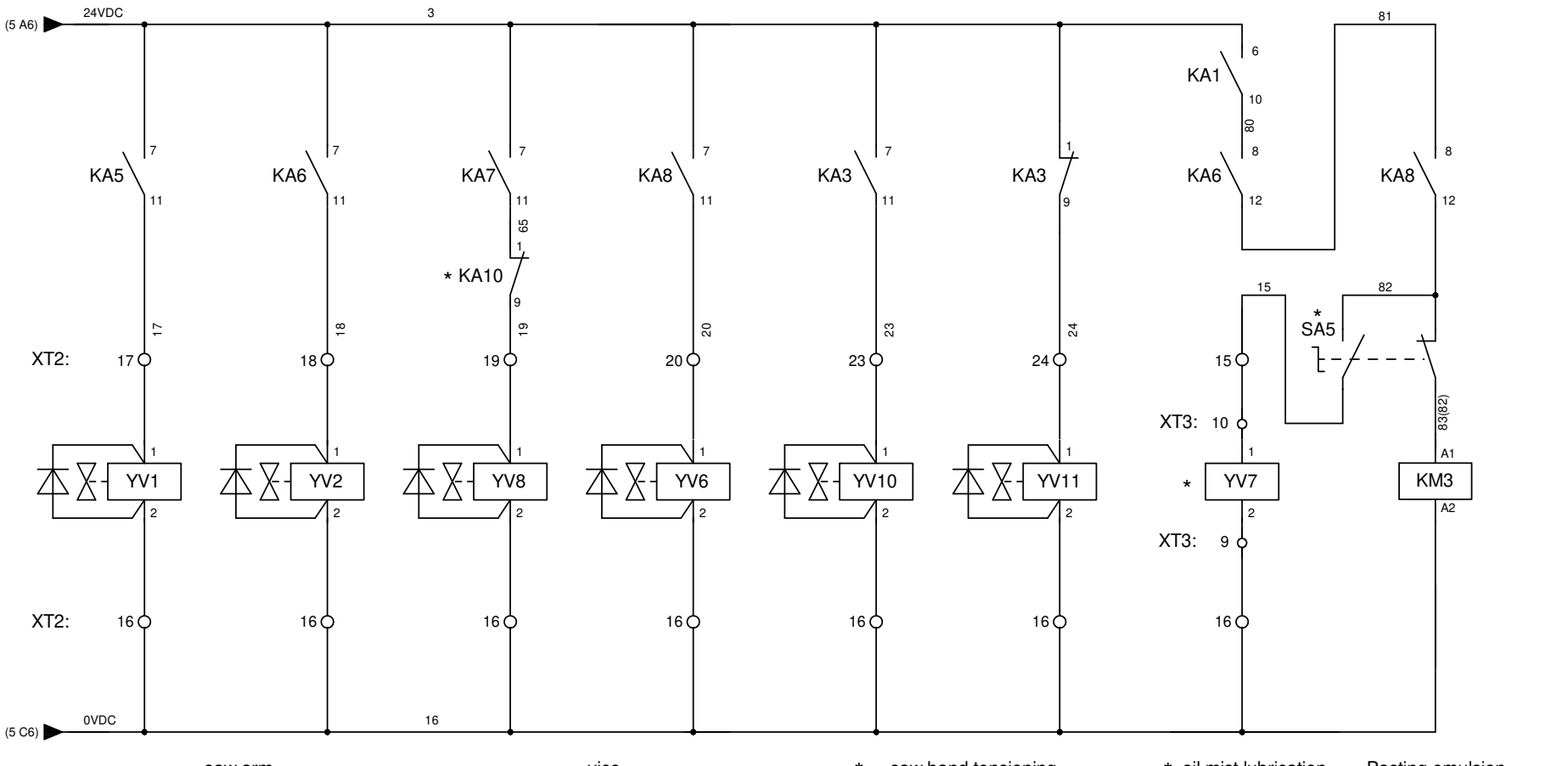
Date: 1.2.2007	Projekt: PP 302 G - 362 G	TM Jesenice servis, spol s.r.o	Specifikace: PP 302 G - 362 G	Page: 03 / 09
Design: František Makovský				Drawing number: SE - 078 - 12



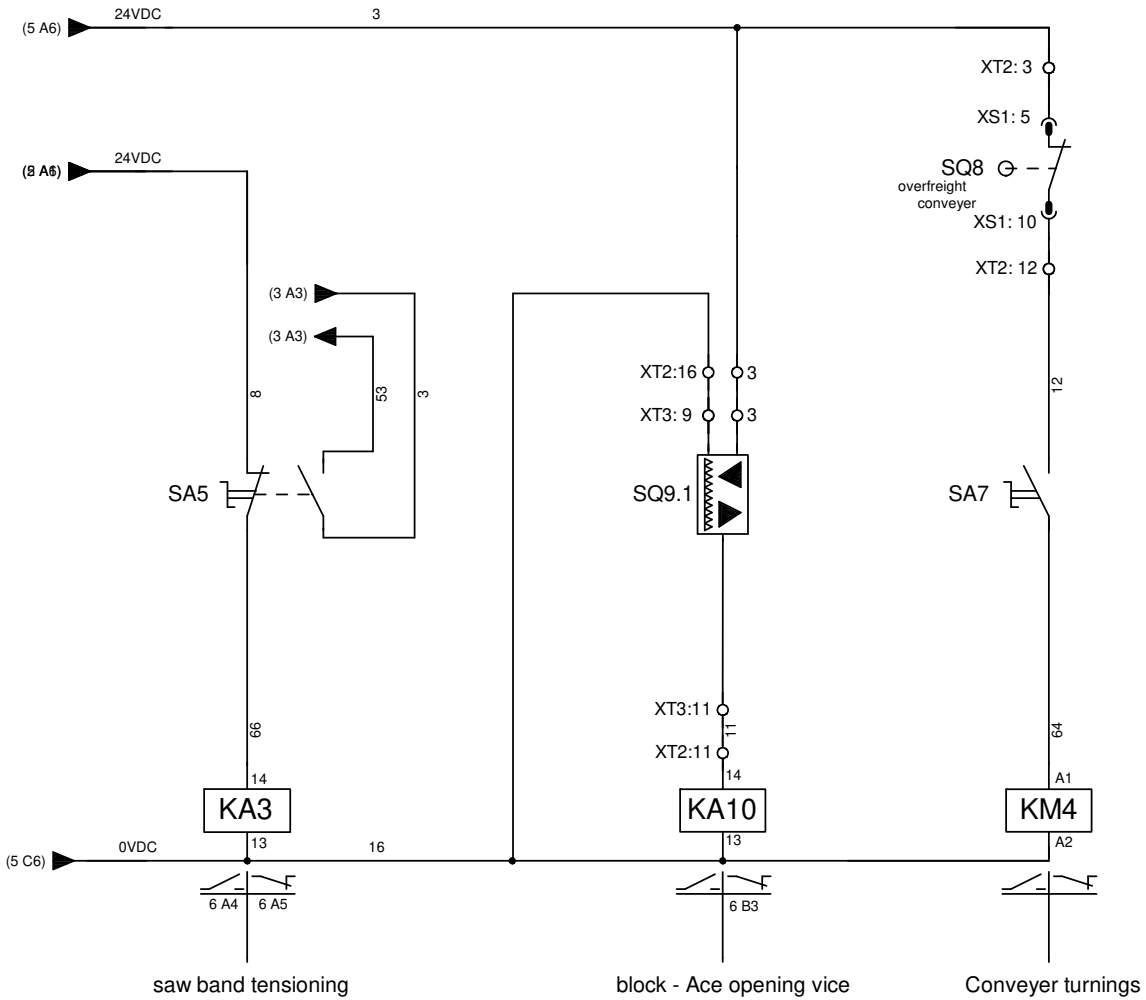
Date: 1.2.2007	Projekt: PP 302 G - 362 G	TM Jesenice servis, spol s.r.o	Specifikace: PP 302 G - 362 G	Page: 04 / 09
Design: František Makovský				Drawing number: SE - 078 - 12



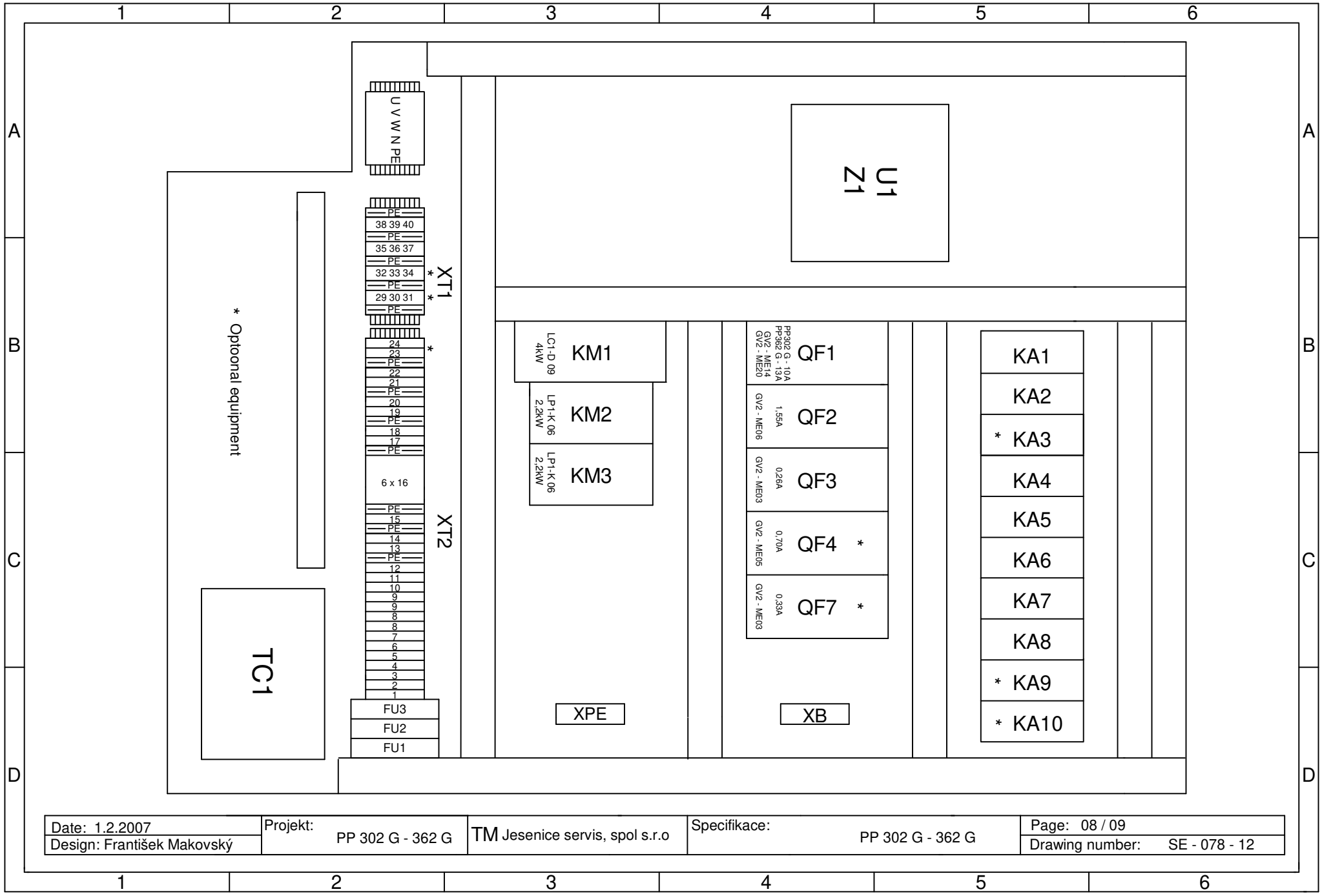
Date: 1.2.2007	Projekt: PP 302 G - 362 G	TM Jesenice servis, spol s.r.o	Specifikace: PP 302 G - 362 G	Page: 05 / 09
Design: František Makovský				Drawing number: SE - 078 - 12



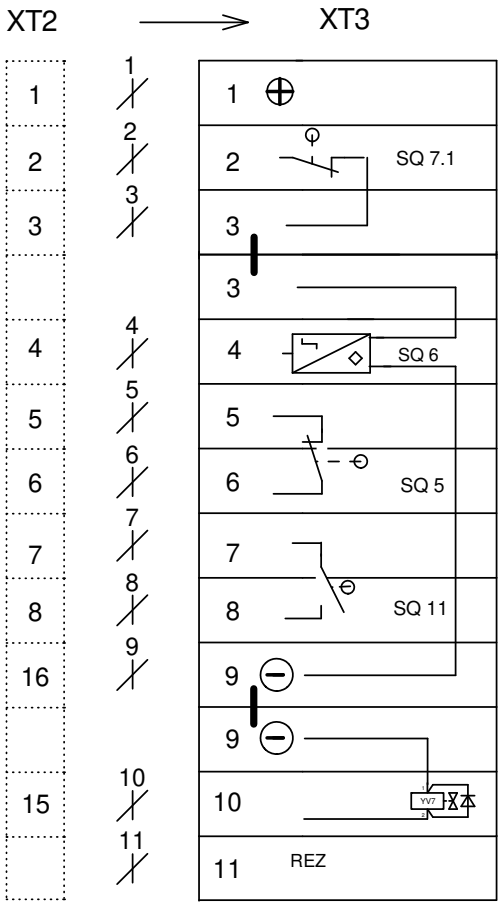
Date: 1.2.2007	Projekt: PP 302 G - 362 G	TM Jesenice servis, spol s.r.o	Specifikace: PP 302 G - 362 G	Page: 06 / 09
Design: František Makovský				Drawing number: SE - 078 - 12



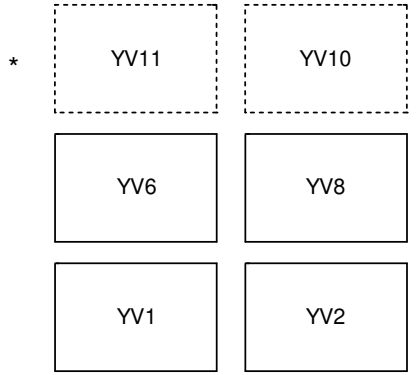
Date: 1.2.2007	Projekt: PP 302 G - 362 G	TM Jesenice servis, spol s.r.o	Specifikace: PP 302 G - 362 G	Page: 07 / 09
Design: František Makovský				Drawing number: SE - 078 - 12

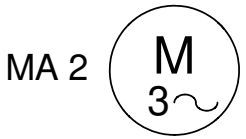


Date: 1.2.2007	Projekt: PP 302 G - 362 G	TM Jesenice servis, spol s.r.o	Specifikace: PP 302 G - 362 G	Page: 08 / 09
Design: František Makovský				Drawing number: SE - 078 - 12



* Optoonal equipment





Hydraulic aggregate protection

Date: 1.2.2007	Projekt: PP 302 G - 362 G	TM Jesenice servis, spol s.r.o	Specifikace: PP 302 G - 362 G	Page: 09 / 09
Design: František Makovský				Drawing number: SE - 078 - 12