Operating Instructions

for Hydraulically Powered MUBEA Punch

Model: HP 1000 / 760

Type No.:
Serial No.:
Motor type:
Motor rating:
Operating voltage:

Please be sure to indicate the above serial No. in all orders and enquiries.

MUBEA
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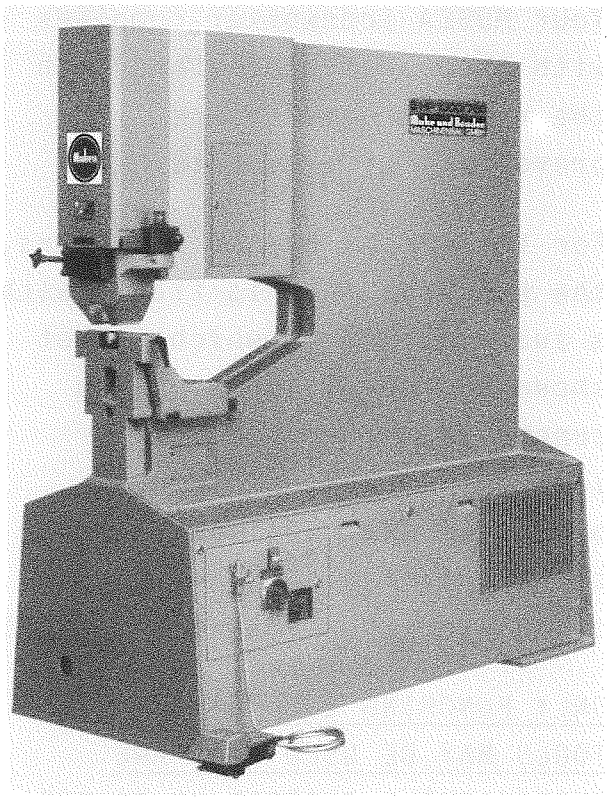
1. GENERAL



You will soon realize that you have made a very good choice. Your new MUBEA ironworker is a state-of-the-art machine that incorporates decades of experience in punch and shear construction. Many satisfied customers confirm again and again that the superiority of MUBEA ironworkers becomes particularly evident in everyday use.

Please read these operating instructions carefully and observe them closely so that you can be sure to benefit from all advantages offered.

MUBEA ironworkers have exceptionally long service lives. All parts subject to ordinary wear can be replaced quickly and easily. It is important to exclusively use original MUBEA parts for replacement purposes, as otherwise the service life of the machine and the reliability and quality of its performance might be affected. This also applies when you plan to expand the operative range of your ironworker by installing additional tools.

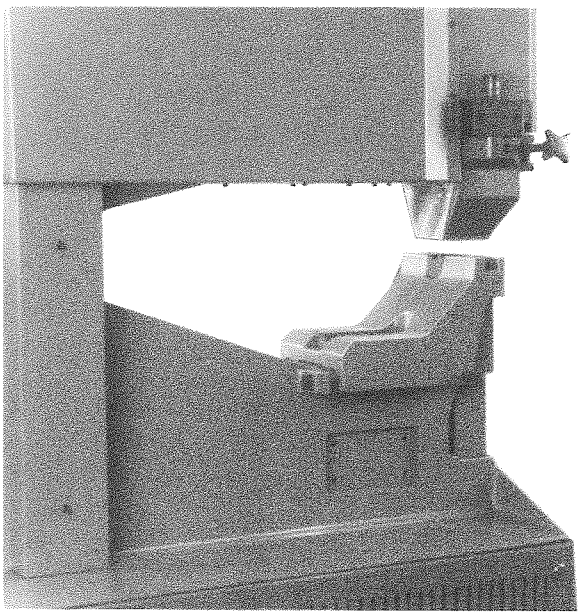
It is indeed one of the special merits of MUBEA ironworkers - as practical experience will convince you, too - that their operative range can be expanded effectively, thus even increasing their versatility and efficiency.

Your MUBEA ironworker complies with the safety rules and with the regulations for the prevention of accidents.

For the safety of the operators, the punching tool is fitted with a suitable guard, which is not shown in the pictures of the punching station and the individual tools in these operating instructions in order to demonstrate the functioning of machine and tools more clearly.

ONLY PUNCHING EQUIPMENT AND TOOLS MAY BE USED THAT ARE SUFFICIENTLY GUARDED UP TO THE CUTTING POINTS TO AVOID INJURIES.

IMPORTANT:
During any servicing, retrofitting, or repair jobs the ironworker must without exception be switched off and disconnected from the electric power supply.



Punching tool guard

1.1 Handling the ironworker

For trucking, bolt the machine securely onto heavy planks.

When the ironworker is to be moved by means of a crane, suspend it by the lifting lug provided for that purpose.

For the weight of your ironworker, please see the attached brochure.

INSTALLATION

The ironworker is arranged at normal operating height so that height adjustment by means of a pedestal or a baseplate is not required.

The attached foundation drawing contains all data needed to prepare a level foundation for the stationary installation of your ironworker. Tighten the foundation bolts carefully after the grouting compound has set. Instead of foundation bolts, dowel pins can also be used.

Make sure the machine is in a perfectly vertical position.

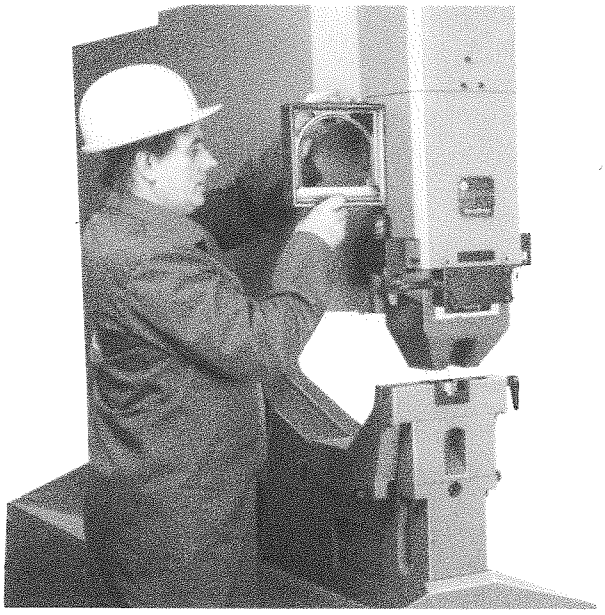
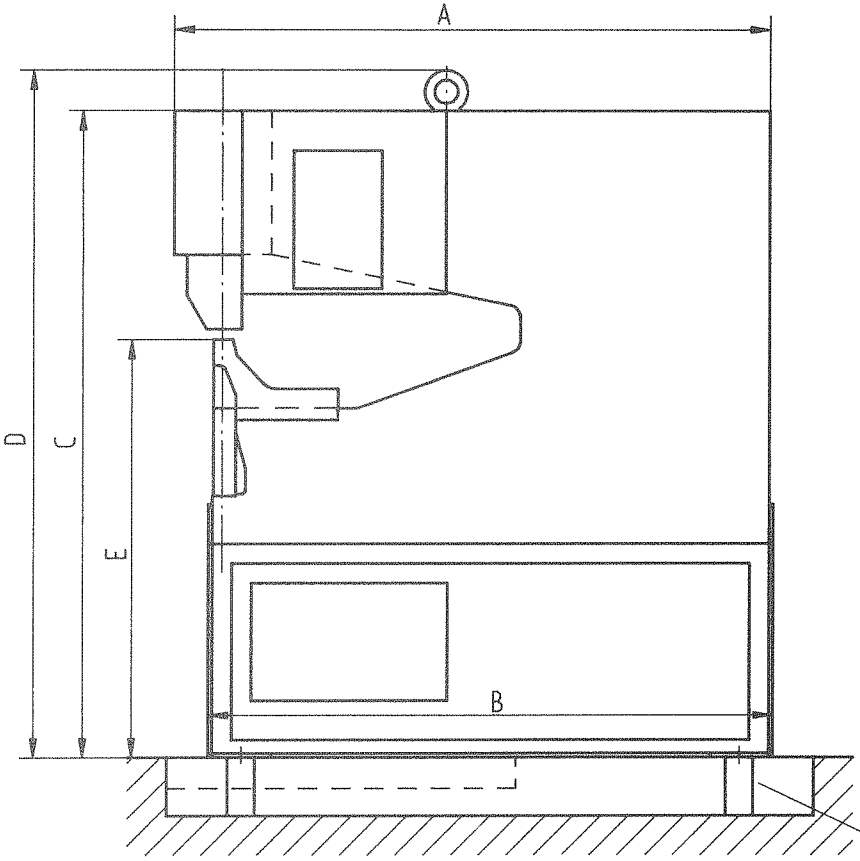


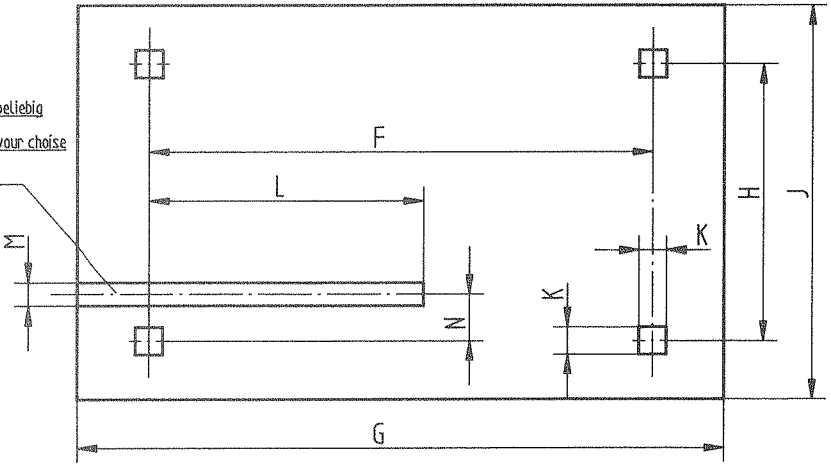
Fig. 1: Checking the position of the ironworker



Tiefe je nach Bodenbeschaffenheit

Depth according to the condition of the ground

Profondeur de la fondation d'apres L'etat du sol



Kanal fuer Kabeleinfuehrung Richtung beliebig

Channel for feeding cable direction to your choise

Canal pour cables d'alimentation

HP 1000/760		
	01615	01616
	mm	inch
A	1935	76 3/16
B	1870	73 5/8
C	1980	77 15/16
D	2110	83 1/16
E	1135	44 3/4
F	1535	60 7/16
G	2100	82 11/16
H	740	29 1/8
J	1000	39 3/8
K	70	2 3/4
L	700	27 9/16
M	60	2 3/8
N	200	7 7/8

Pos.	Menge	Einheit	Benennung	Sachnummer	Bl. Cr.	Bemerkung
			Freimasse-toleranz nach DIN 7168 mittel			Maßstab
						Werkstoff Rohteil-Nr. Modell-Nr.

	1988	Datum	Name
	Bearb	28.12.	Melcher
	Gepr		
	Freig	16.1.89	Rongé

Benennung: Fundamentplan / Foundation drawing / Plan de fondation

Muhr und Bender MASCHINENBAU GMBH

Zeichnungs-Nr. 0161510303 3 Bl.

A.B. | Zahl | Mittlg | Name | Dat. | Urspr. | Ers.f. | Ers.d.

2. COMMISSIONING

2.1 Description of the Machine

The MUBEA HP is a punching machine with a powerful hydraulic drive. The standard machine is equipped with a punching tool for punching sheet metal, flat and angle steel, U-steel (web and flange) I-steel (web and flange) and T-steel (web and flange).

Corresponding dies, see Section 4.3 "MUBEA standard punches and dies".

2.2 Mechanical Control Elements

① Stroke adjustment

② Stripper height adjustment

③ Quick-change device for punches

④ Quick-change device for dies

⑤ Saddle adjustment

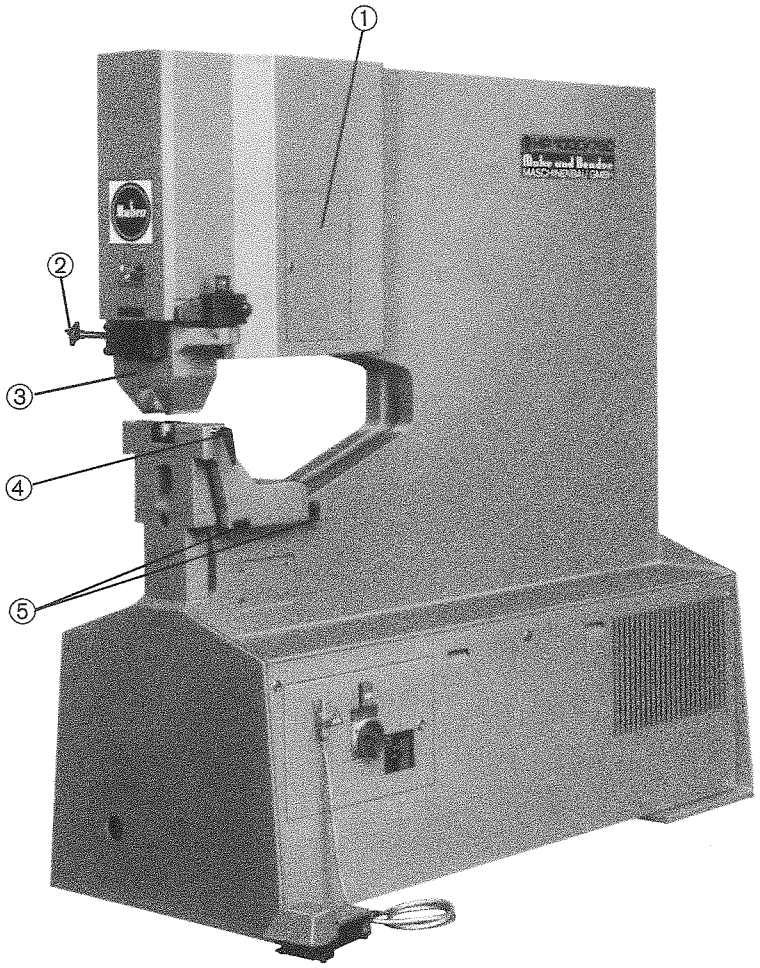


Fig. 2: Mechanical Control Elements

2.2.1 Stroke adjustment

The control for adjustment of the stroke position and length is located below the casing door. In some cases, the complete working stroke is unnecessary.

In order to save time, only the necessary working stroke should be used.

For this purpose, a set screw is screwed into the control rod for the punch cylinder in such a way that the maximum stroke of the cylinder is limited to the stroke for normal punching work.

If the full cylinder stroke should be required for special tools, the set screw "A" (Fig. 4) can be removed from the control rod. The braces B must not be altered.

This measure enables the cylinder to be moved to its maximum upper dead point.

Adjustment of the stroke position or stroke length takes place with the adjustable control rings mounted on the control rod. The lower control ring is used for upper stroke limitation, whilst the upper control is used for lower stroke limitation.

2.2.2 Stripper height adjustment

See Section 4.7 "Stripper".

2.2.3 Quick-change device for punches

See Section 4.8 "Quick-change device for punches and dies".

2.2.4 Quick-change device for dies

See Section 4.8 "Quick-change device for punches and dies".

2.2.5 Saddle adjustment

See Section 4.5 "Adjustment of punches and dies".

2.3 Electrical Control Elements

① Main switch

② Start button

③ Off switch

④ Control lamp

⑤ Setting and operating switch

⑥ Detector

⑦ Foot switch

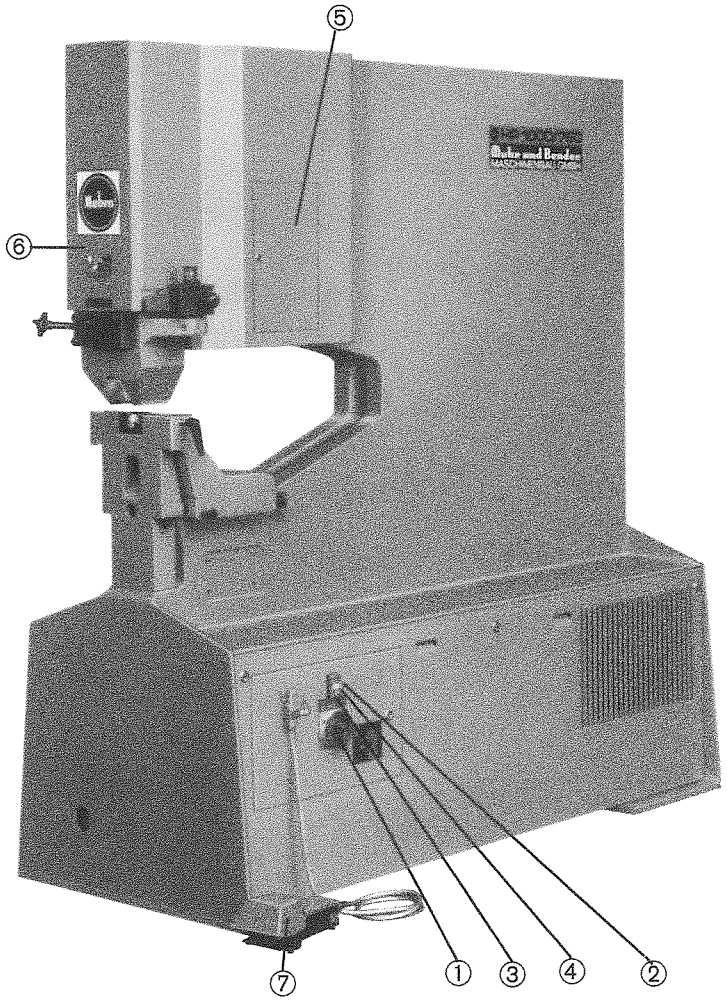


Fig. 3: Electrical Control Elements

2.3.1 Main switch

The machine is switched on and off by turning the main switch.

Unauthorized use of the ironworker can be prevented by locking the main switch by means of a padlock.

2.3.2 Start key

This key is depressed to start the motor. After a power failure etc. the motor must be restarted.

2.3.3 "Off" key

When this key is actuated, the motor stops. Caution: As long as the main switch has not been actuated, the machine still carries current.

2.3.4 Pilot lamp

The pilot lamp lights up as soon as the motor has been switched to full capacity.

2.3.5 Mode selector switch

This switch is installed behind the upper machine cover. When it is turned to "Inching", the tool can be lowered step by step by actuating the foot pedal until it has reached its operative position.

This operating mode is intended for installing or taking off tools and for tool set-up.

CAUTION: The ironworker must be switched off and disconnected from the power supply prior to any tool change or set-up.

When, after switching the machine on again, the selector switch is turned to "Full stroke", the tool automatically returns to its upper starting position.

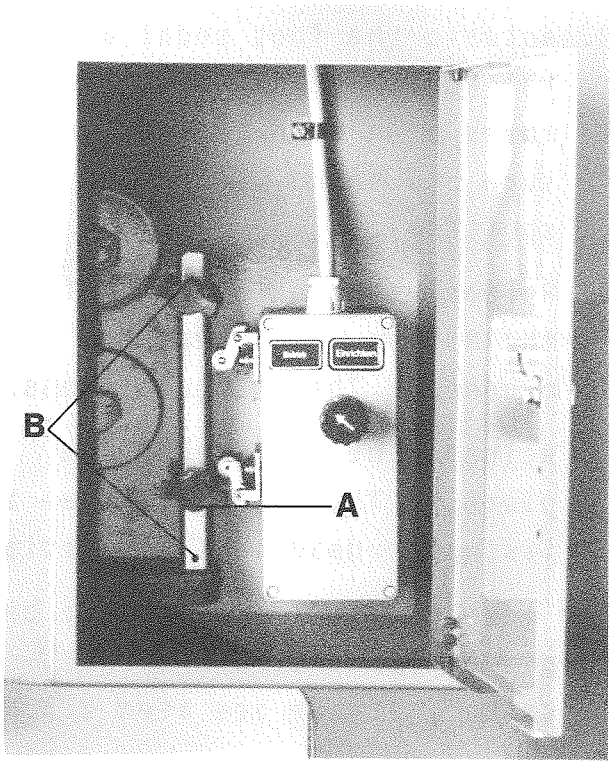


Fig. 4: Mode selector switch

2.3.6 Center spotter

The machine is equipped with a hydraulic center spotting device that enables the cylinder to be lowered with considerably reduced pressure at low speed, controlled by the foot pedal. (Please see item 2.3.7 regarding actuation of the foot pedal.)

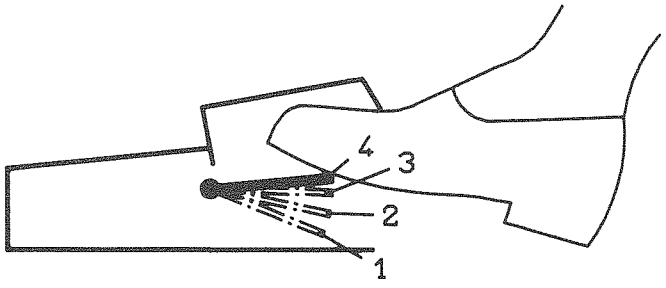
Foot pedal actuation, combined with reduced pressure and speed, permits precise positioning of the workpiece. Faulty punching is thus eliminated.

2.3.7 Foot pedal

The foot pedal controls four functions:

1. Actuate the foot pedal until the action point has been exceeded: The cylinder performs a working stroke (downward).
2. Actuate the foot pedal up to the action point: The cylinder moves down with reduced pressure and speed (center spotting).
3. Release the foot pedal until the action point has been exceeded: The cylinder stops.
4. Release the foot pedal completely: The cylinder moves to its upper dead-center position.

The mode selector switch must be turned to "Full stroke". For "Inching", please see item 2.3.5.



1. Moving down
2. Moving down (center spotting)
3. Stopping
4. Moving up

Fig. 5: Foot pedal functions

2.4 Connecting and Commissioning

The drive with associated oil container is located in the base of the machine. Check to see that the container is filled about 3 cm below the container lid. This check is made through the filler cap. Observe the maintenance instructions when topping up.

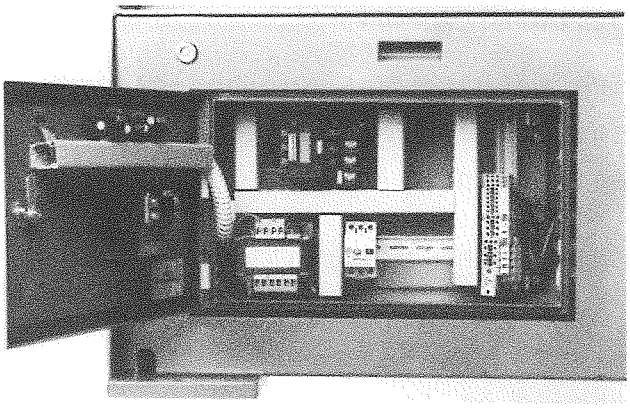


Fig. 6: Connection of power supply

The machine is installed ready for operation. The switch cabinet with the main switch, to which the connecting cable has to be routed, is located in the machine base. Connection must be made according to the supplied wiring diagram by a qualified electrician. (Check voltage correspondence!). Observe VDE specifications 0100 and special requirements of the EVU.

Briefly switch on the motor. If the motor fails to rotate in the arrowed direction, two phases must be interchanged. For checking purposes, the motor may only run briefly by inching. The arrow is located above the inspection opening in way of the machine base.

Before putting the machine into operation, check to see if the working cylinder is operating correctly and that the tool is correctly adjusted. For this, move the selector switch to "Setting" and move the cylinder step by step into the lower dead position (see Section "Setting and operating switch").

3. LUBRICATION

The machine has no lubrication points requiring regular maintenance.

Solely the adjusting elements on the stripper and the locking element surface on the piston rod should be inspected at regular intervals and greased with a suitable lubricating paste (e.g. Molykote) if necessary.

For servicing and maintenance of the hydraulic system, refer to Section 6 "Maintenance instructions for hydraulic system".

4. PUNCH

4.1 Operational safety

ONLY PUNCHING EQUIPMENT AND TOOLS MAY BE USED THAT ARE SUFFICIENTLY GUARDED UP TO THE CUTTING POINTS TO AVOID INJURIES.

When using unguarded tools for processing workpieces that have to be held by hand close to the punch, the applicable safety rules and regulations for the prevention of accidents have to be complied with.

4.2 General

The design of MUBEA punching stations offers many advantages. Their operative range is far beyond the ordinary scope of a simple punching machine. MUBEA punching stations can perform many jobs that used to require an eccentric press.

The clamping surface of the piston rod is amply dimensioned. Large and projecting tools can be installed without any difficulties, as the long guide permits handling of tilting forces.

With the various special tools manufactured in the MUBEA tool shop - multi-punch tools, tool combinations, guide tools, etc. - precise results are achieved even when intricate punching and coping jobs must be performed.

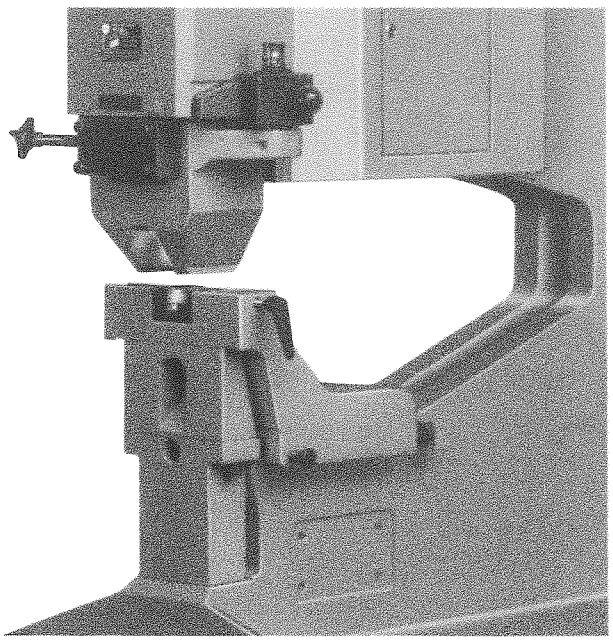


Fig. 7: The punching station, standard design

4.3 Standardized MUBEA punches and dies

MUBEA punches and dies are available in four standard sizes, which fit all machines:

Size I up to and incl.15 mm dia.
Size II from 15.5 to 30 mm dia.
Size III from 30.5 to 40 mm dia.
Size IV from 40.5 to 50 mm dia.

The standard tool holding fixture holds punches and dies up to size III.

For punches and dies larger than the above standardized sizes, please refer to section 4.9, "SPECIAL TOOLS".

If you need to punch holes in the flanges of channels or I beams, we can supply you with special flange dies with an inclined surface corresponding to the slope of the section flange.

For punching holes close to the web, flange, or leg of small channels, I beams, tees, or angles, eccentric dies with an off-center hole near the edge of the die are required. When fitting eccentric dies, slide the punch saddle backwards until punch and die hole are co-axial again.

Please ask for our detailed catalogue on standardized MUBEA punches and dies.

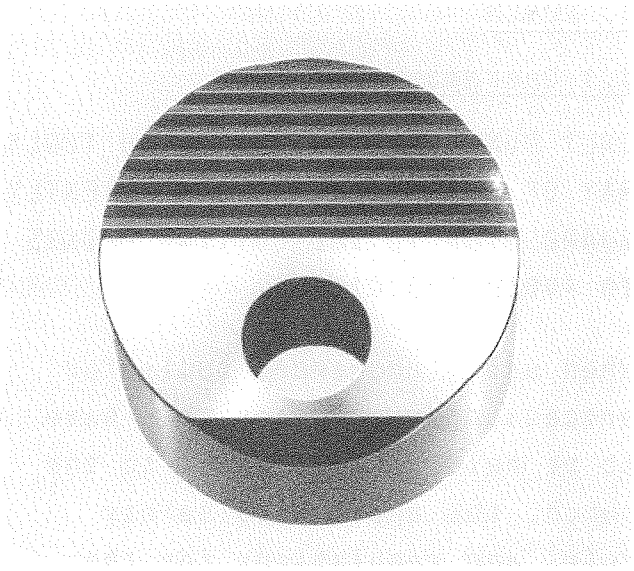


Fig. 8: Flange die for processing I beams

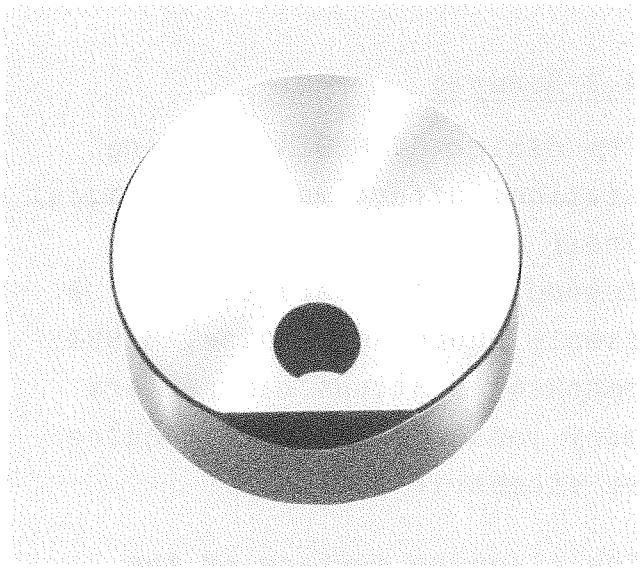


Fig. 9: Eccentric die for processing small angles

4.4 Anti-twist device for shaped punches

Square, oblong, and other shaped punches must be guarded against twisting. For that reason every punch holder has a groove at the contact surface of the punch, and every shaped punch at the head surface. Insert a centring pin (dia. 4.7 mm) into that groove.

4.5 Adjusting punch and die

Punch and die must always be arranged concentrically. The die clearance should be approximately 5 percent of the material thickness to be processed. (E.g., when holes are punched into material with a thickness of 10 mm, the die hole diameter must exceed the punch diameter by 1 mm. The resulting die clearance is 0.5 mm.) For that reason it is important to indicate the thickness of the material to be punched in your orders and enquiries.

After loosening the fastening bolts A and the adjusting screws B, the saddle can be pushed to the front and to the rear to adjust its position. Lateral adjustments are made by means of the adjusting screws C. After punches and dies have been properly adjusted, retighten the adjusting screws C and B and the fastening bolts A carefully (see Fig. 10).

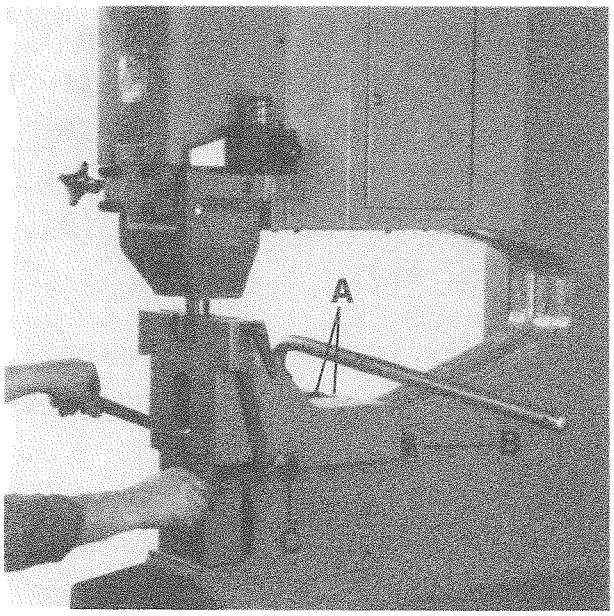


Fig. 10: Adjusting punch and die

Check the position of the tools from time to time during punching by inching the punch into the die step by step. This check must be repeated every time tools are changed.

Punch marks in the material are hit precisely by means of the center spotter controlled by the foot pedal. Faulty punching is thus eliminated.

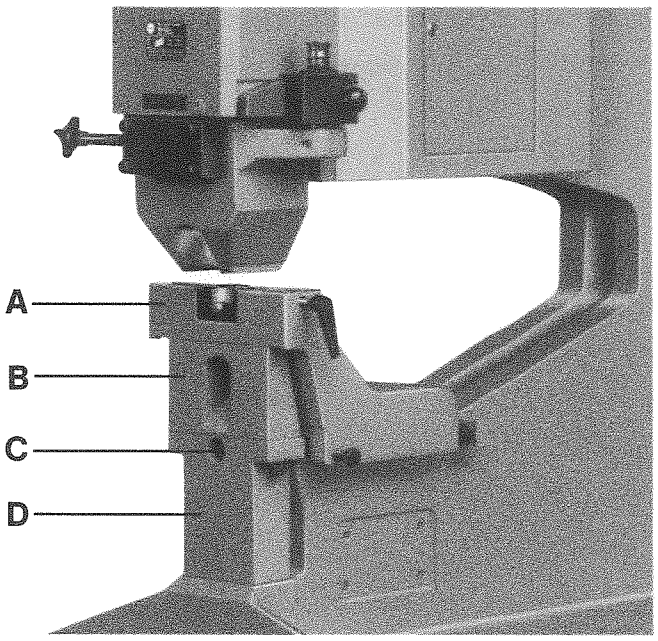


Fig. 11: Saddle with saddle support

4.6 Punch saddle and saddle support

The punch saddle (A) of MUBEA punching stations has a very effective special support (B/C). The saddle can neither move horizontally nor tilt, and the punching pressure is directed vertically into the machine body.

The saddle support has to be taken down only when channels or beams are to be punched in the flanges. All you have to do is loosen the retaining screw (D). (See Fig. 45).

The saddle support is of particular advantage when large, projecting tools are to be installed; the secure support these tools have at all sides offers considerable protection from premature wear.

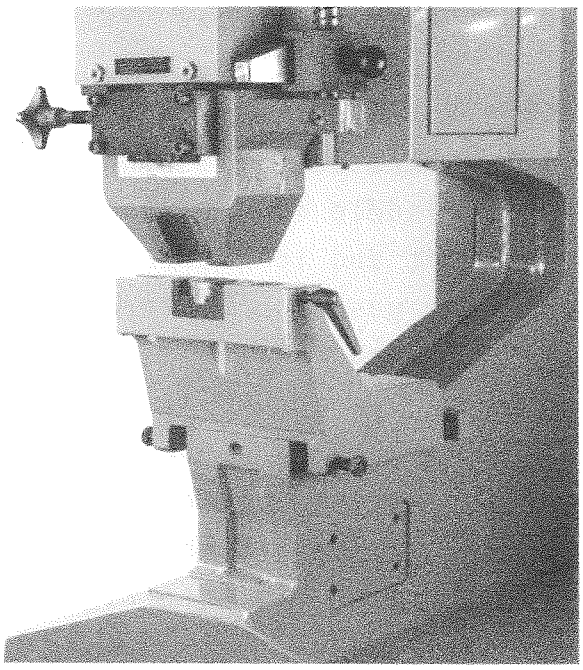


Fig. 12: Saddle without support

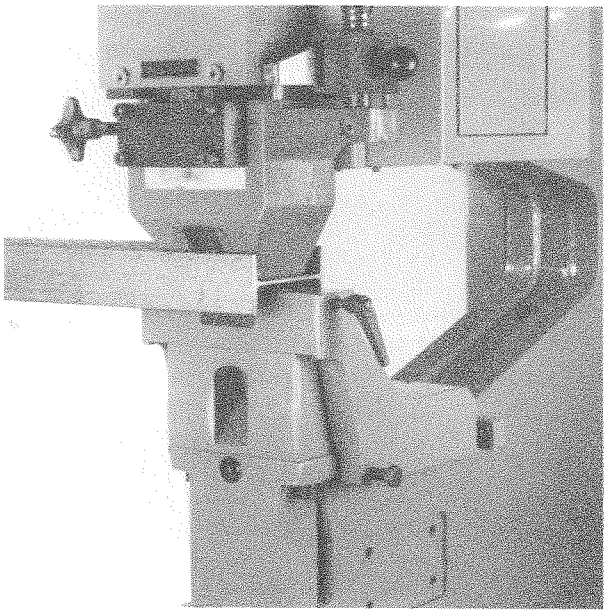


Fig. 13: Punching I beams in the web

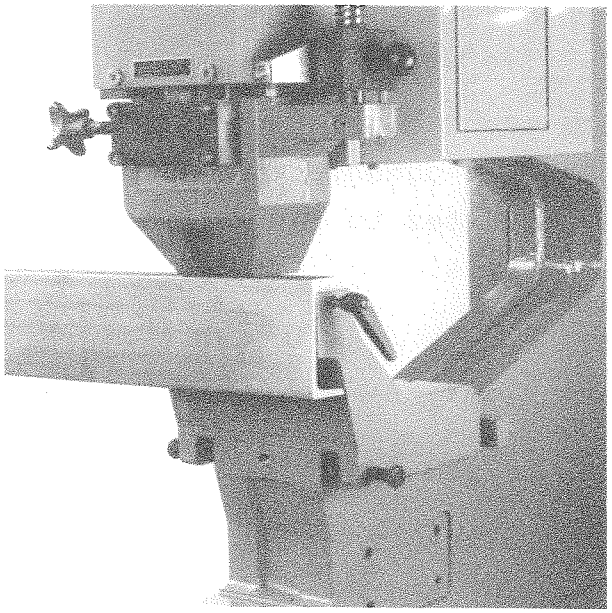
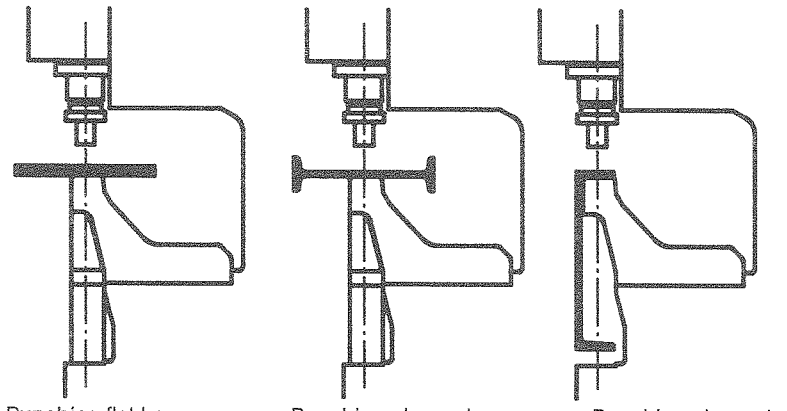


Fig. 14: Punching channels in the flanges



Punching flat bars, angles, and tees – always with support

Punching channels and I beams in the web – always with support

Punching channels and I beams in the flanges – without support

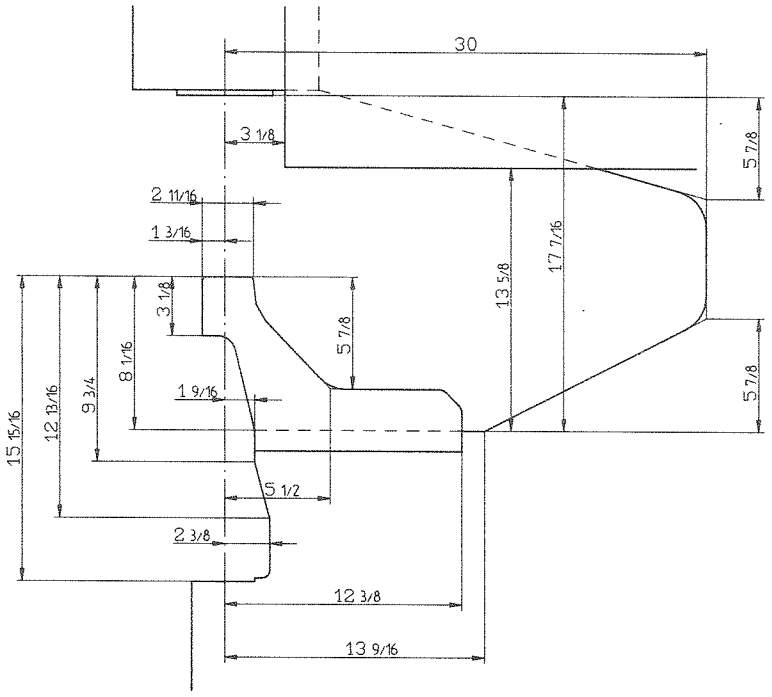


Fig. 15: Punch saddle dimensions of the HP 1000/760 models

4.7 The Stripper

The sturdy stripper envelopes the complete punching tool, and can be adjusted to any material thickness.

The height can be adjusted with the palm grip A. Stripper B must be swung away for tool changing. For this, pull the stripper on the spherical handle C outwards from its spring lock. The punch must be located in the upper position whilst doing this.

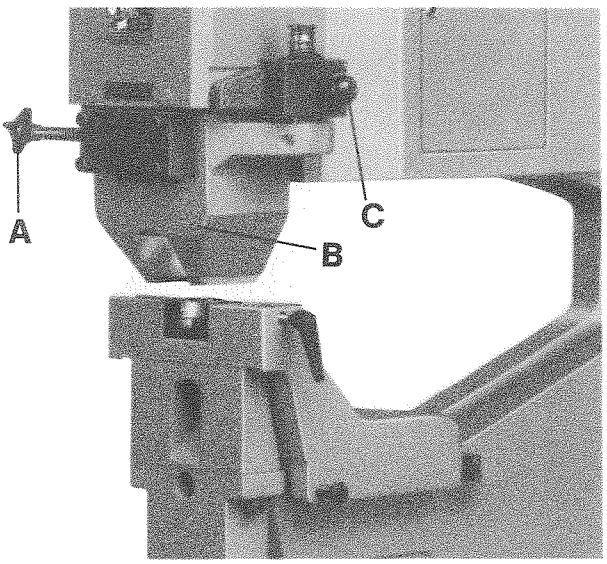


Fig. 16: The Stripper

For small profiles and punching holes up to 15 mm in diameter in thin materials, the supplied reducing plate for the stripper can be used.

4.8 Quick-change device for punches and dies

The machine is equipped with a quick-change device for punches and dies as standard. Both tool parts can be changed quickly and easily.

This device is particularly useful for processing small batches requiring frequent tool changing.

When fitting punches and dies in this device, the clearance between the punch and die must be checked after each tool change, and the saddle must be realigned if necessary.

In addition to realignment, the outer ring for the punch must be retightened as for the sleeve nut fastening after initial punching, as a precaution.

Where larger batches are processed, the use of a more robust punch fastening using a sleeve nut is recommended. Resetting the quick-change device for the sleeve nut takes place by loosening the set screws A (Fig. 17), which releases the centering ring which can be unscrewed. The punch is now ready for the sleeve nut fastening, whereby the clearance between the punch and die must be checked after each tool change. Fitting the quick-change device takes place in reverse order.

If a punch cannot be securely clamped for any reason, the initial position of the centering ring must be corrected. For this, the set screw A must be loosened and the centering ring slightly adjusted and secured again with the set screw.

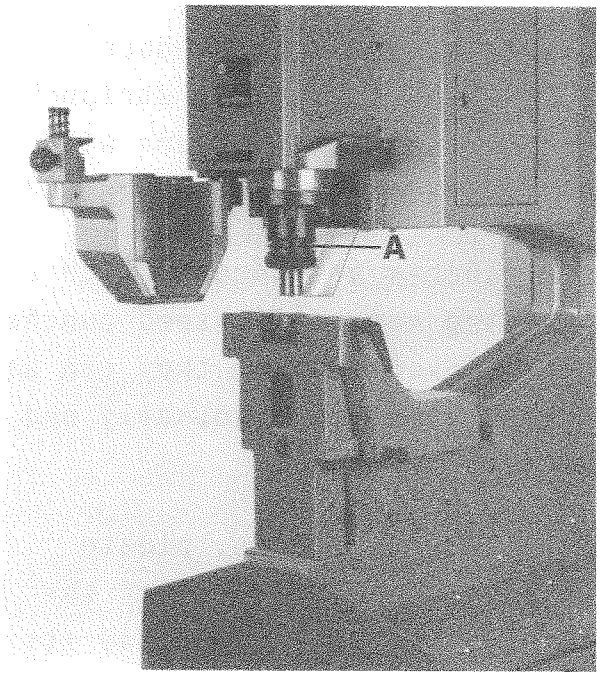


Fig. 17: Quick-change device for punches and dies

4.9 Special tools

The special design of MUBEA punching stations offers numerous possibilities for the use of special tools, which cannot be described in these operating instructions.
Please let us know your specific requirements so that we can suggest solutions from the wide range of special MUBEA tools, a large number of which are readily available.

a) Special tool holding fixture for punches and dies with cutting diameters up to 50 mm

All punching tools, e.g. round, square, rectangular, and oblong tools, can be installed.

The fixture includes punch holder M 64, coupling nut M 64 with a 50 mm through hole, reducer with a 40 mm through hole, stripper, saddle plate, die holder with an 80 mm seat, and die holder 80/60.

The punches are secured with a coupling nut. All shaped punches are grooved so that they can be fitted both longitudinally and laterally.

When ordering tools, please indicate the thickness of the material to be punched and its tensile strength.

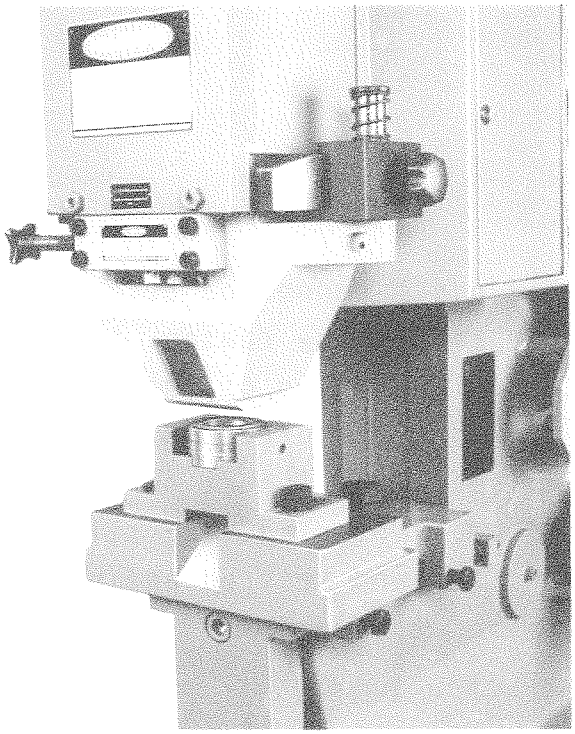


Fig. 18: Special tool holding fixture for punches and dies with cutting diameters up to 50 mm

b) Special tool holding fixture for punches and dies with cutting diameters from 50.5 to 150 mm

Here, too, all punching tools - round, square, rectangular, and oblong - can be installed.

The fixture includes punch holder, stripper, saddle, plate, die holder, and saddle support.

When ordering shaped punches (oblong and rectangular), please indicate if the tools are to be fitted longitudinally or laterally. In addition, the thickness of the material to be punched and its tensile strength must always be indicated. The punches are fixed with a wedge.

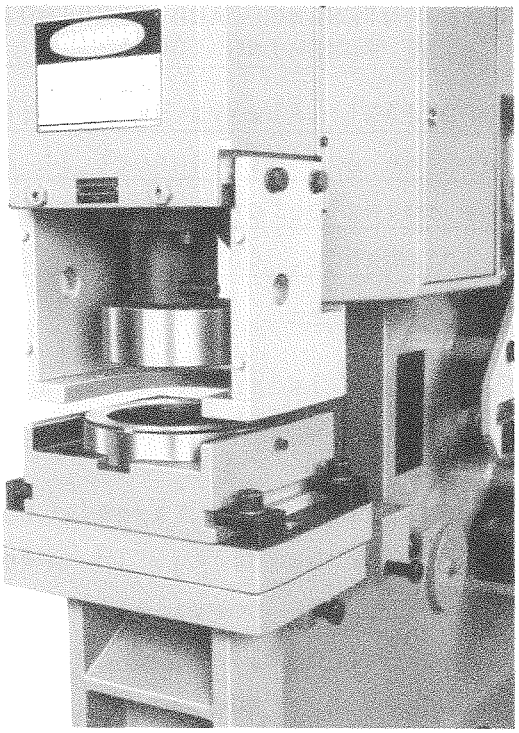


Fig. 19: Special tool holding fixture for punches and dies with cutting diameters larger than 50 mm

c) The pipe notching tool

This tool is used for notching pipes to be welded together at right angles without requiring any reworking. Pipes up to a maximum outer diameter of 60 mm (2.36 in.) and up to a maximum thickness of 6 mm (0.24 in.) can be notched.
For processing different pipe diameters, only the cutting inserts for the movable and for the fixed blade have to be changed. Please include the following information in your enquiries and orders:

a) Pipe diameter to be notched
b) Outer diameter of the pipe to which the notched pipe is to be welded
c) Material to be notched.

5. MAINTENANCE AND REGRINDING OF THE PUNCHING TOOLS:

IMPORTANT: Always switch off the machine and disconnect it from the mains before undertaking any maintenance, conversion or repair work.

Each tool is subject to a certain amount of wear.

The service life largely depends on proper handling. In order to increase the service life, the cutting edges should be coated with oil at regular intervals.

Welded material particles must be removed with an oil stone.

Blunt cutting edges produce rough punching holes and increase the load on the machine. The punching tools must therefore be reground in good time.

Tools should only be ground on the face, since the clearance between the punch and die changes. Grinding should take place with a fine-grained grinding wheel and sufficient cooling must be ensured.

Excessive local heating produces grinding cracks and results in later breakage of the tool.

After grinding, the burr on the cutting edge must be removed with an oil stone.

Regrinding of the punching tool is limited by the punching stroke of the machine. If tools have been reground to the extent that the material to be processed can no longer be punched with optimum results, the tools can no longer be used and must be changed. For this reason, a reusable cutting edge should be produced with minimum removal of material.

In the majority of cases, it is easier to order new tools; this is more cost-effective and the grind is perfect.

It must be ensured when fitting punching tools that these are aligned exactly centric with the die.

6. MAINTENANCE INSTRUCTIONS FOR THE HYDRAULIC SYSTEM

A. General

For functioning and service life of the hydraulic plant it is extremely important to observe the following maintenance prescriptions.

B. Filling up the Oil Reservoir

Before starting oil level of the oil reservoir should be checked. The oil level shall be about 3 cm below the reservoir cover. Checking is performed by means of the gauge stick at the filling filter. Filling should be carried out only via the filter element. After filling, the filler has to be perfectly closed.

For filling the plant there has to be used only highgrade branded hydraulic oil. At medium ambient temperatures (5°C to 35°C) there should be employed H y d r a u l i c O i l H L P 46 (Viscosity classification: ISO VG 46 DIN 51 519). At extreme low or high temperature, the manufacturer should be consulted.

All reputable oil manufacturers supply suitable oils. As mixing of the hydraulic oil of various manufacturers is not advisable, there should be always refilled the same type. The oil type of machines filled in the factory is stated on the oil reservoir.

C. Starting

At setting plant into operation there has by all means to be observed the correct direction of rotation of the motor. To avoid damages of the pump, the motor must start up in inching operation. The engagements should then not be actuated. When having ascertained the correct direction of rotation, the motor must be kept running for about 3 to 4 min. without actuating the engagements. To ensure escaping of the air eventually existing in the system, each cylinder has afterwards to be moved out and in repeatedly without loading over the whole stroke. After perfect venting the plant can be started up under load.

The max. operating pressure adjusted in the factory is specified on the reference plate at the oil reservoir. Checking of the pressure can be carried out by means of a manometer at the measuring connection above the oil reservoir.

The stated max. operating pressure should not be exceeded.

D. Maintenance

Current checking of the oil level in the oil reservoir is necessary in order to avoid greater damages.

After approx. 10 operating hours the return filter fixed on the oil reservoir has to be cleaned for the first time. Cleaning should be done in rinsing oil or petroleum.

Throw-away filter cartridges have to be replaced. After having fitted the clean resp. new filter element the plant is again ready for work. Further filter cleaning should be done at normal fouling about every 600 operating hours.

The first oil change should be carried out after approx. 600 operating hours. Afterwards the oil has to be renewed every 1 200 to 1 500 operating hours. After draining of the waste oil, the oil reservoir and the whole system have to be cleaned with rinsing oil. Water, leaches and petroleum are not suitable as purifying agents. After complete cleaning the plant has to be closed and to be filled up with new, unused hydraulic oil. All filters have to be cleaned at every oil change. Of course, there has to be taken care of greatest cleanliness when refilling.

During operation there have to be permanently controlled the oil level, the leakage of the plant, the fastening of the units and pipes as well as state of the hydraulic oil and the filters.

E. Eliminating troubles

Fault 1: Excessive noise in the plant

Cause	Reason	Elimination
1.1 Cavitation in the pump	1.1.1 Hydraulic oil too cold (below + 5°C)	Heat the hydraulic oil to the temperature of + 5°C
	1.1.2 Viscosity of the hydraulic oil is too high	Replace the hydraulic oil by a suitable one (see section "Filling up the Oil Reservoir")
	1.1.3 Steam generation	The max. oil temperature of + 70°C is exceeded. Refill hydraulic oil or replace it by prescribed one
	1.1.4 Failure of the pump	Exchange the pump
	1.1.5 Sealed reservoir	Clean vent-filter in the cover of the filler
1.2 Foam formation or air pockets in the pressure fluid	1.2.1 Pressure fluid level in the reservoir is too low	Fill up on the correct level
	1.2.2 Wrong hydraulic oil	Replace by suitable oil
	1.2.3 Entering of air caused by the screwed joints in the suction pipe	Retighten or replace the screwed joints
1.3 Mechanical vibrations	1.3.1 Vibrations of the pipings	Retighten the attachments
1.3.1 Pump	1.3.1.1 Used up or damaged	Replace
1.3.2 Drive motor	1.3.2.1 Used up or damaged	Repair or replace
1.3.3 Safety or pressure limiting valve	1.3.3.1 Flatters	Adjust correctly or replace

Fault 2: No pressure or unsufficient pressure

Cause	Reason	Elimination
2.1 Pump does not feed correctly	2.1.1 Air enters into the suction pipe	See 1.2.3
2.2 High pump temperature	2.2.1 Used up or damaged pump	Replace the pump
	2.2.2 Unsufficient viscosity of the hydraulic oil	See 1.1.3
2.3 Leakage losses of the pressure side in the return motion	2.3.1 Mechanic control valve not connected through	Reset limitations of the engaging path
	2.3.2 Wrong adjustment of the pressure	Correct the adjustment
	2.3.3 Safety valve does not shut as there are dirt and defective parts	Clean, ascertain the damage, replace or renew
	2.3.4 Way valve open as there are dirt or defective parts electric fault	Clean the damaged unit, repair or replace
	2.3.5 Damaged cylinder bore, piston rod or piston seal	Renew the damaged parts
2.4 Failure of the pump	2.4.1 Damaged pump, defective drive, unsuitable viscosity of the liquid, etc.	See faults 1.3.1.1, 1.1.2

Fault 3: Anomalous pressure or flow fluctuations and vibrations

Cause	Reason	Elimination
3.1 Cavitation in the pump	3.1.1 See faults 1.1.1 to 1.1.5	See faults 1.1.1 to 1.1.5
3.2 Foam formation or air pockets in the liquid	3.2.1 See faults 1.2.1 to 1.2.3	See faults 1.2.1 to 1.2.3
3.3 Mechanic vibrations	3.3.1 See faults 1.3.1	See faults 1.3.1
3.4 Flattering pressure limitating or safety valves	3.4.1 See faults 1.3.3.1	See faults 1.3.3.1
	3.4.2 Damaged valve seat	Repair or renew
3.5 Valves seize	3.5.1 Fouling	Drain the hydraulic oil, clean plant and parts, fill up with clean oil
	3.5.2 Defective or distorted	Replace the unit, eliminate distortion
3.6 Air pockets in the plant which cause irregular or yielding motion	3.6.1 Plant is not completely vented	Vent the plant (see section "Starting")
	3.6.2 Electric equipment defective	Trace and eliminate the error

Fault 4: Unsufficient or no feed current

Cause	Reason	Elimination
4.1 Cavitation in the pump	4.1.1 See faults 1.1.1 to 1.1.5	See faults 1.1.1 to 1.1.5
4.2 Foam formation or air pockets in the pressure liquid	4.2.1 See faults 1.2.1 to 1.2.3	See faults 1.2.1 to 1.2.3
4.3 Used up pump	4.3.1 See faults 1.1.4	See faults 1.1.4
4.4 Leak losses from the pressure side in the return motion	4.4.1 See faults 2.3.1 to 2.3.5	See faults 2.3.1 to 2.3.5
4.5 Pump rotates in the wrong direction	4.5.1 Wrong direction of rotation of the motor	Reverse polarity of the electric connections

Fault 5: Too high temperature of the pressure fluid

Cause	Reason	Elimination
5.1 Overflow losses	5.1.1 Pressure adjustment too high	Correct the adjustment
5.2 Leak losses from the pressure side in the return motion	5.2.1 Bad functioning of the valves and defective seals	See faults 2.3.1 to 2.3.5
	5.2.2 Wrong viscosity of the hydraulic oil (too low, too high)	Drain the hydraulic oil and use the prescribed oil
5.3 Overheated pump	5.3.1 Wear of the pump	Replace the pump
5.4 Too quick circulation of the pressure fluid	5.4.1 Pressure fluid level has become too low in the plant	Filling up of the plant on the prescribed level (see section "Filling up the Oil Reservoir")