OPERATOR'S MANUAL AND PARTS LIST

MUBEA Hydraulically Powered Punch

MODEL: KLH

Size: 500/610
Serial Number:
Motor Type:
Motor Rating:
Operating Voltage:

OPERATOR'S MANUAL

PARTS LIST

	Assembly
Machine body, complete	01570 001 00
Punch slide and punch cylinder, complete	01560 034 00
Electric foot engagement, punch, complete	01560 047 00
Punch tool, complete	01560 059 00
Stripper, complete	01561 065 00
Electric system, complete	01570 071 00
Switch cabinet, complete	01570 071 01
Hydraulic station, complete	01570 083 00
Hose pipes, complete	01570 084 00
Guard, complete	01570 091 00
Accessories, complete	01570 102 00

Muhr und Bender Attendorn

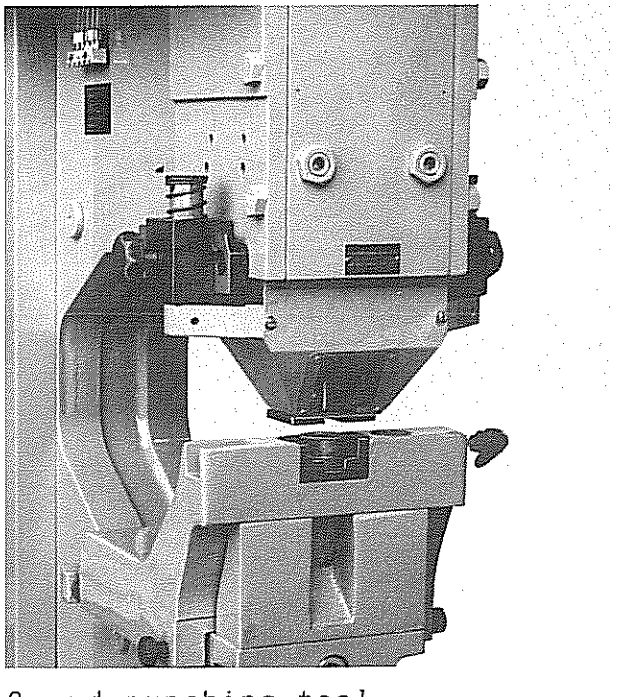
D-5952 Attendorn – Telephone: (02722) 62-1 – Cables: muhr attendorn – Telex: 876706-0 mu d

Your MUBEA machine is in accordance with the rules for prevention of accidents and the machine protection law.

To ensure safe operation the punching tool has been provided with suitable guard.

To avoid detraction from their very functions this guard is not shown on the illustrations of the punching tool and the various tools.

USE ONLY THOSE PUNCHING DEVICES AND TOOLS WHICH ARE SUFFICIENTLY GUARDED TO AVOID FINGER INFURY.



Guard-punching tool

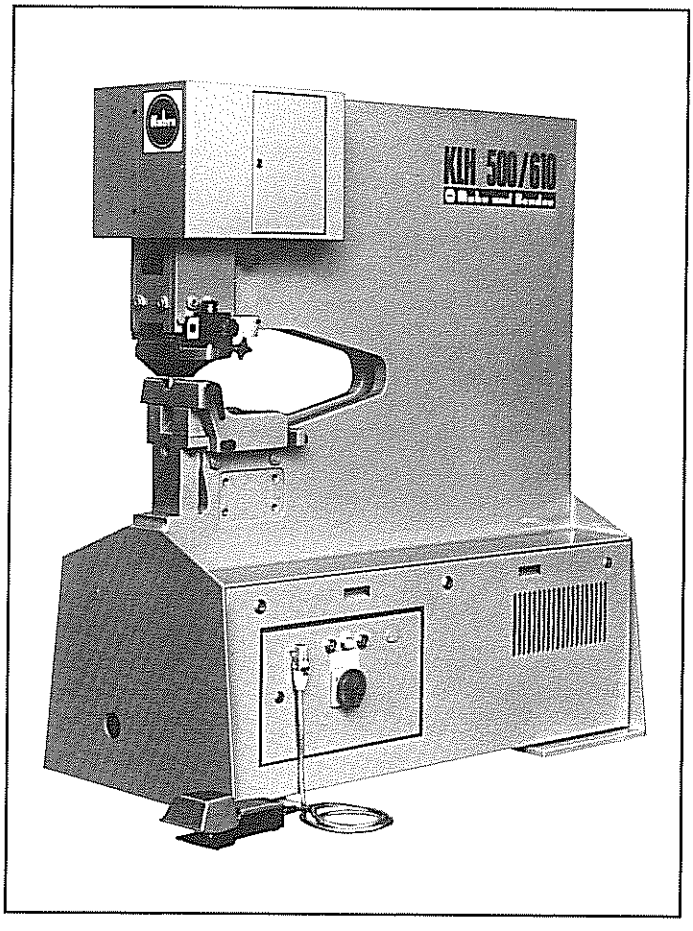
GENERAL

As you will soon confirm, you have made a good choice. Decades of experience and latest findings and trends in punch and shear construction have been considered in developing this MUBEA machine. As many satisfied customers have been confirming, it is just the daily handling of this machine which shows its outstanding advantages.

To make optimum use of this machine, please study and thoroughly mind the following operating instructions.

Experience has shown that the machine is of very long service life. Parts being subject to normal wear can be replaced at any time. It is very important that you order original MUBEA spare parts only, for thus the required service life and the steady first-class working quality will be reached. This also applies, if you intend extending the application range of your machine by using additional tools.

Shop practice will soon convince you that just MUBEA machines can effectively be completed and are universally usable and efficient.



To give you a general idea of the single components of the machine and their interactions, please study the detailed survey of all parts and their article numbers given at the end of these instructions.

And just another important thing: Keep the machine always in the good condition it deserves. Adequate hints can be learned from the following operating instructions.

TRANSPORT

For transport by truck, stabilize and screw the machine to solid planks.

For transport by crane, hook the machine into the ring bolt provided.

As to the weight of your machine, please confer the leaflet enclosed.

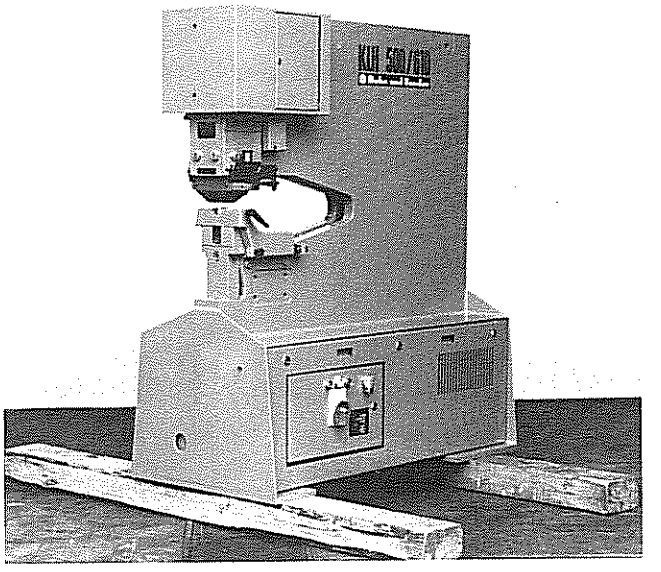


Fig. 1: Transport by truck

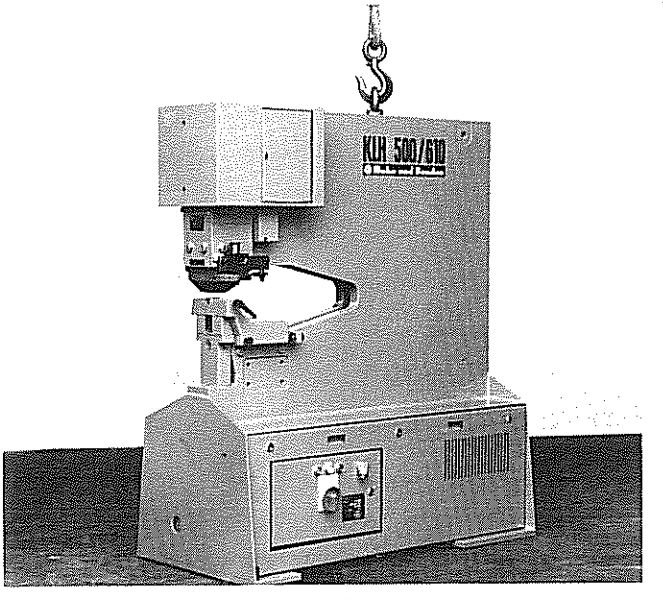


Fig. 2: Transport by crane

INSTALLATION

The working stations of the machine have normal working height. Height adjustment by means of platforms or foundations is superfluous.

All instructions required to provide a foundation at ground level for stationary installation can be learned from the foundation plan enclosed. Firmly tighten the foundation screws as soon as the filling compound has set. Instead of foundation screws, plugs can be used as well.

Check, whether the machine has been positioned vertically.

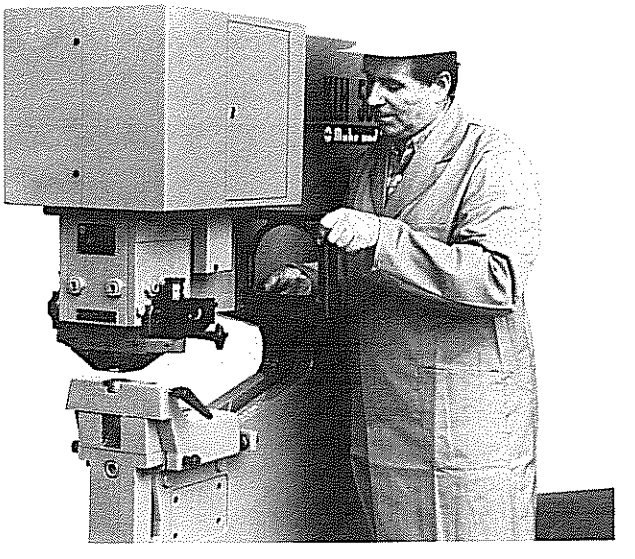


Fig. 3: Position check

CONNECTION AND STARTING

The drive and the appertaining oil reservoir are located in the machine base. See that the reservoir has been filled up to approx. 3 cm below its cover. Check by way of the charging inlet.

When refilling oil, mind the maintenance instructions!

The machine has been installed ready for operation. The switch cabinet with the main switch, to which the cables must be connected, is located in the machine base. Connection must be done by an electric expert according to the wiring diagramme. (Make sure that the voltages are identical).

Start motor briefly: in case motor will not run according to arrow direction, change two phases. For check of correct direction of rotation, briefly start motor only in tip mode.

Prior to starting, check whether the working slide moves properly and the tool has been precisely adjusted. To do so, turn the selector switch to "INCHING", and move the slides stepwise to their lower dead positions. (Confer section "Engagement").

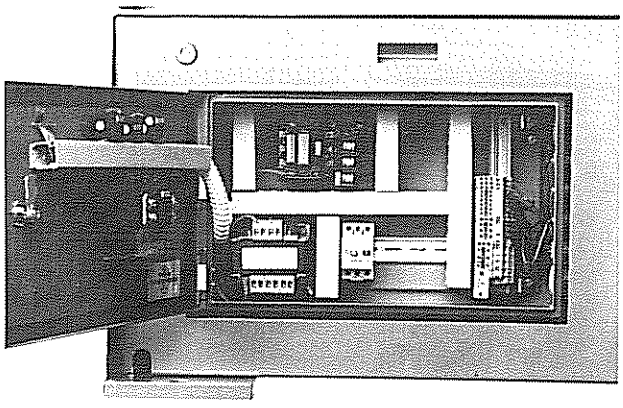


Fig. 4: Connection of power supply

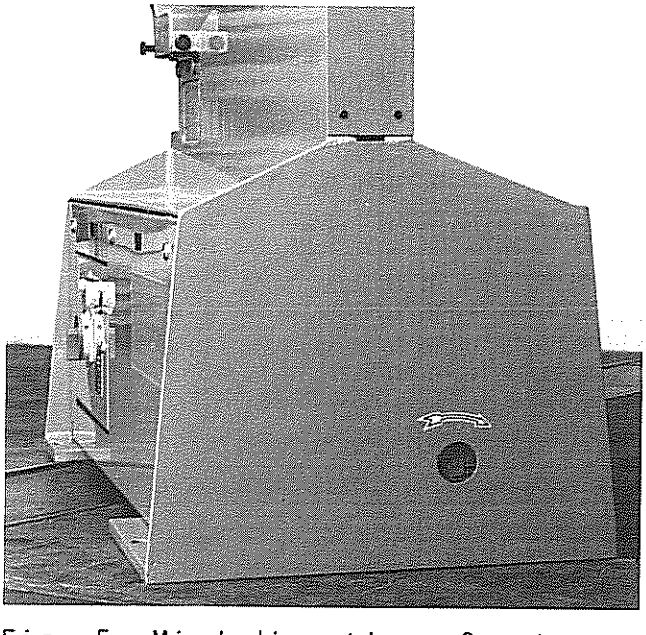


Fig. 5: Mind direction of motor rotation

LUBRICATING THE MACHINE

All sliding and guiding surfaces of the machine are made of special sliding material and they must not be lubricated.

ENGAGEMENT

The working slide is engaged by the removable foot pedal. It can be stopped and returned from any position.

1. "Setting" and "Operation" Switch

The selector switch for tool setting and engagement is located under the cover, within the safety hood. When the switch is set to "INCHING", the working slide can stepwise be moved to its working position.

In this position, tools can be set, mounted or dismounted.

When the selector switch is turned to "OPERATION", the corresponding working slide will automatically move to its upper start position.

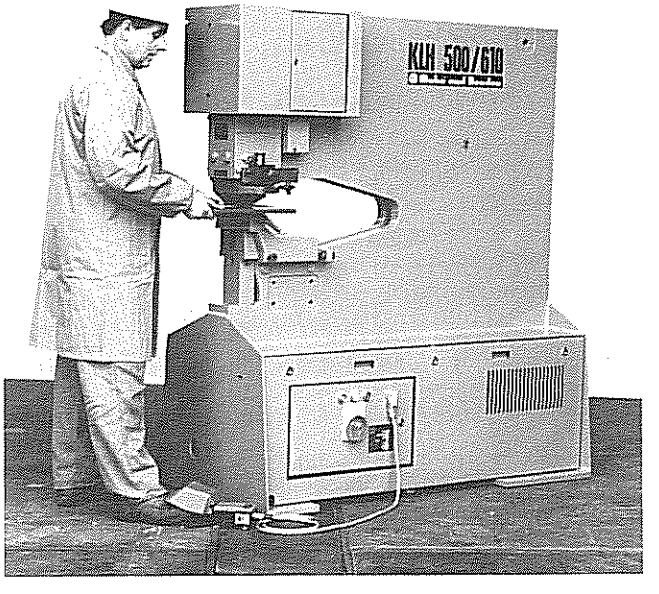


Fig. 6: Foot engagement punch

2. FUNCTIONS OF THE FOOT SWITCHES

When the switch has been set to "OPERATION", three functions can be actuated by means of the foot switches:

a) Actuating the foot switch over the action point: - the slide will execute a down stroke.

b) Disengaging the foot switch just below its action point: - the slide is stopped.

c) Releasing the foot switch completely: - the slide will move to its upper dead position.

3. STROKE ADJUSTMENT

The control elements for adjusting position and length of stroke are located behind the casing flaps. Certain working operations do not require a full working stroke.

To save time, merely the working stroke required should be executed.

For this purpose a thread pin is screwed in the control rod, so that the max. length of stroke of the cylinder is limited to the stroke of normal punching works.

Should the full cylinder stroke be required for special tools, thread pin "A" (picture 7) can be dismantled from the control rod. The tension pins B should not be changed.

Thus the cylinder can be moved to its maximal upper dead position.

Adjust the position or length of stroke by means of the variable control rings installed on the control rods: the lower control ring sets the upper, the upper ring the lower stroke limit.

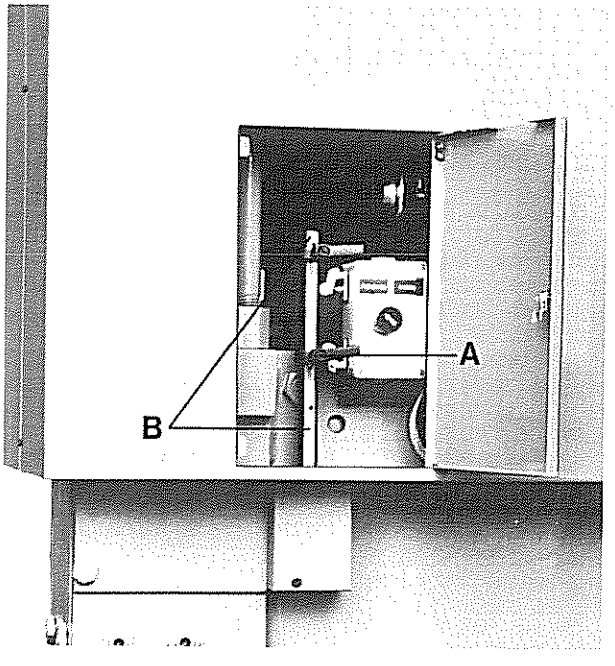


Fig. 7: Setting and operation switch, stroke adjustment

PUNCH

USE ONLY PUNCHING DEVICES AND TOOLS WHICH ARE UP TO THE CUTTING AREA SUFFICIENTLY GUARDED AGAINST FINGER INJURY.

In case of using unprotected tools for insert operations, mind the safety rules reg. bending operations on powered press brakes, published in ZH 1/387, 4th edition, 1981.

1. General

Owing to its advantageous construction, the MUBEA punch is much more than a simple hole punching unit, for it can perform many tasks which previously required use of an eccentric press.

The clamping surface of the very long punch slide is of very large and nearly square cross section. Thus, large and projecting tools can be used without difficulty, for due to the length of the slide, tilting forces can easily be compensated.

Even most complicated punchings and copings can precisely be performed by using various special tools, such as multiple-punch, follow-on, and guided die tools etc., all manufactured by the MUBEA Tool Manufacturing Department.

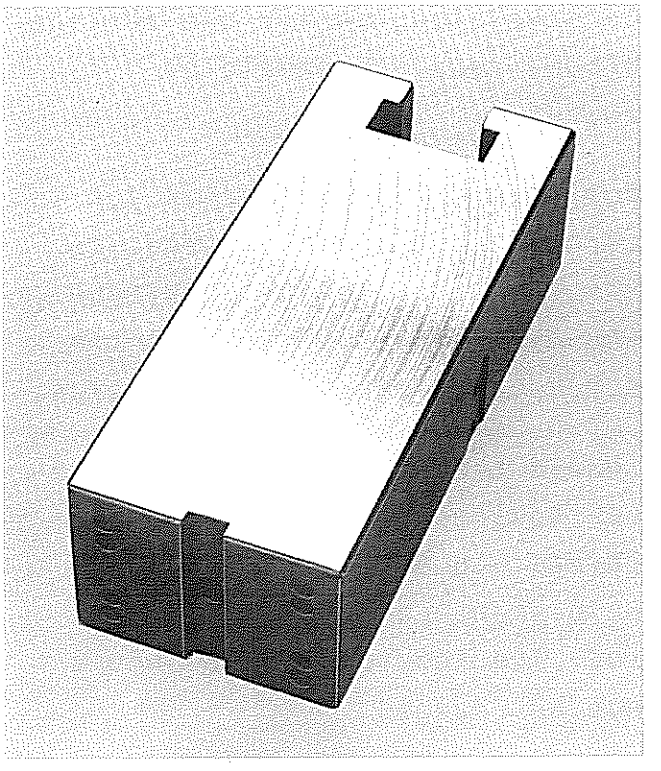


Fig. 8: Punch slide

2. Adjusting the Slide Guide

The guides of special sliding material, on which the long slide runs, are universally adjustable. Thus clearance-free guide even after long service is ensured.

Adjust as follows:
(See fig. 9 and 10)

First, loosen locking nuts "A" by lefthand rotation. Tighten pressure screws "B" up to resistance, by means of a screw driver. Then lift pressure screw "B" by approx. 1/16 rotation, and tighten locking nut "A". This must be done to ensure proper guide of the slide.

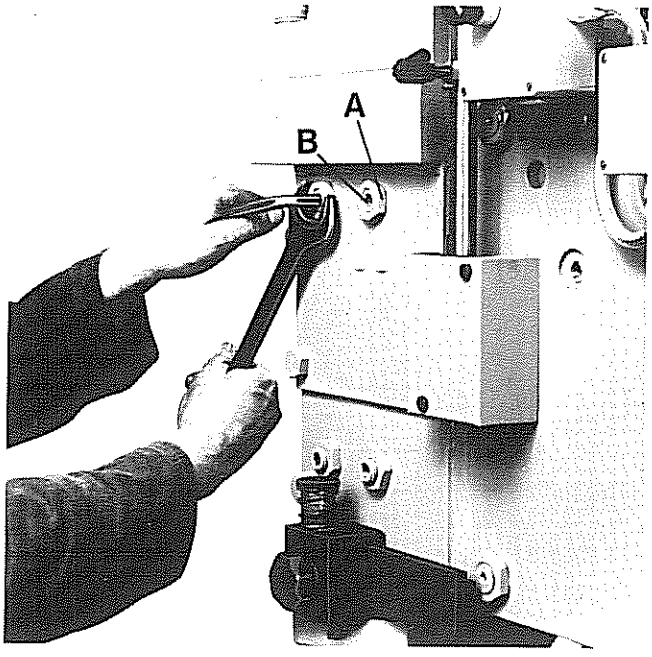


Fig. 9: Re-adjusting the slide guide laterally

3. Saddle and Saddle Support

The construction of MUBEA punches intentionally provides a special saddle support "B/C" to support punch saddle "A". Advantage of this design is that thus the saddle cannot spring or tilt, and the punching pressure is vertically led into the machine body.

The saddle support can remain mounted for all punching operations. Only when punching flanges of channels and I-beams, it must be removed. To do so, merely loosen mounting screw "D" (See fig. 11).

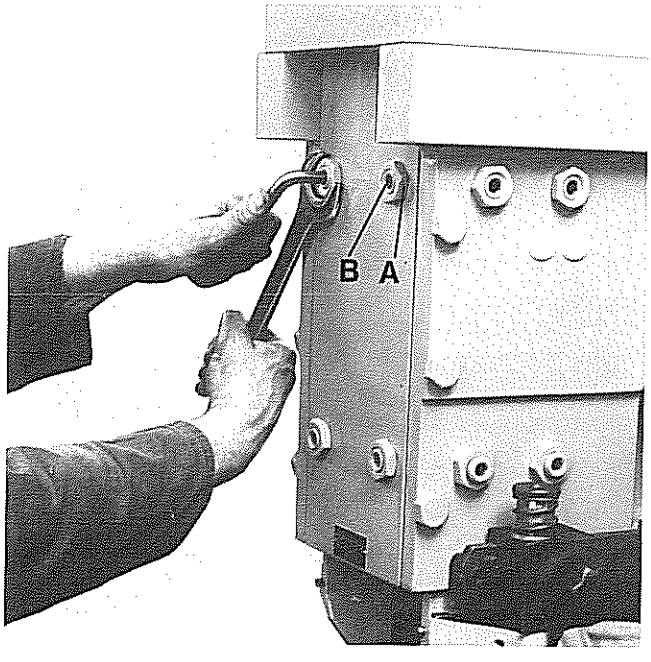


Fig. 10: Re-adjusting the slide guide on the front

This construction is especially advantageous when using big and projecting tools, for thus they can safely and universally be supported which means the best possible protection.

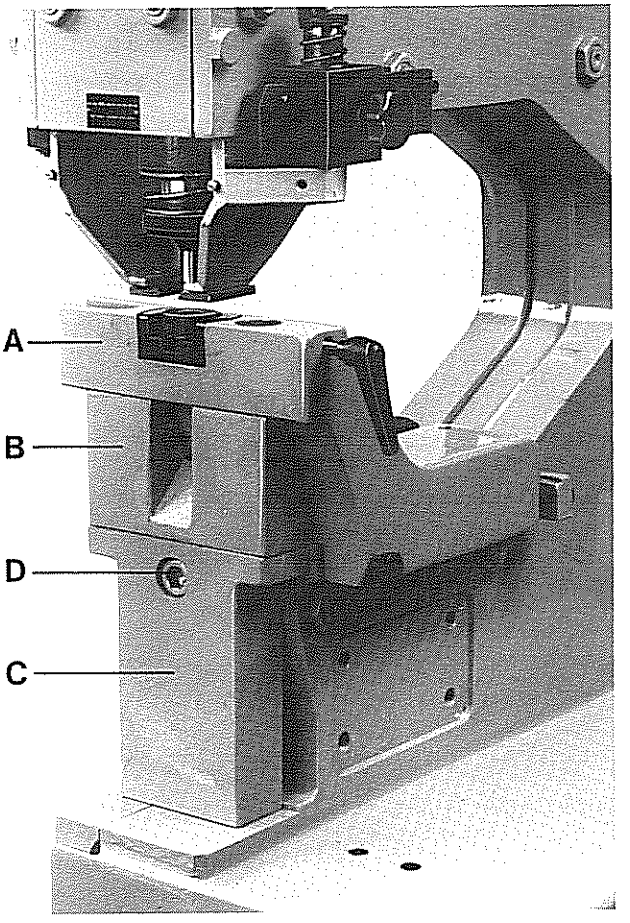


Fig. 11: Saddle with saddle support

4. MUBEA Standard Punches and Dies

MUBEA punches and dies are available in 4 standardized sizes, and will fit all machines:

Size I up to 15 mm dia.
Size II over 15mm up to 30mm dia.
Size III over 30mm up to 40mm dia.
Size IV over 40mm up to 50mm dia.

The standard machine equipment allows use of punches and dies up to size II.

For punches and dies exceeding this standard range, see section 10, "Special Tools".

For punching flanges of channels or I-beams, we supply flange punching dies with inclined surface matching the inclination of the steel section to be processed. To punch small angles, tees, channels or I-beams according to gauge line near the web, flange or leg, eccentric dies are required, having the bore near their edges. When mounting the eccentric dies, push the punch saddle backwards until the punch and the bore of the die lie on one axis.

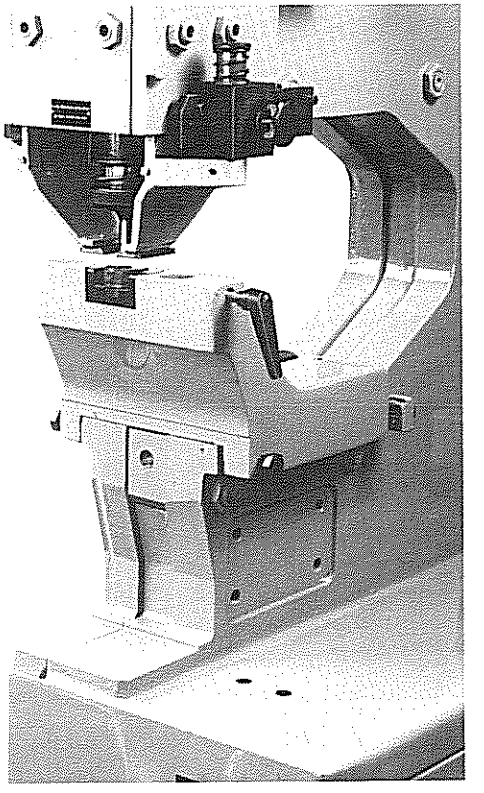


Fig. 12: Saddle without saddle support

Please ask for our detailed catalogue on MUBEA Standardized Punches and Dies.

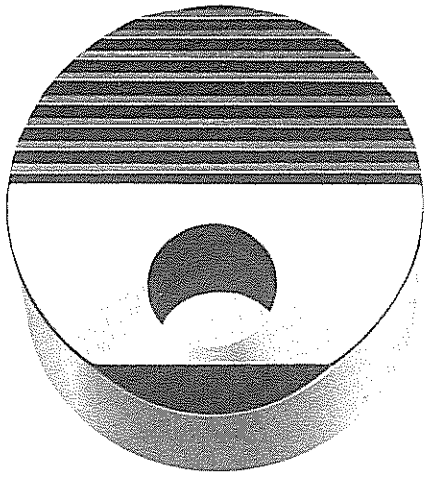


Fig. 13: Flange die for I-beams

5. Adjusting Punch and Die

Punches and dies must always be centric. The cutting clearance should be approx. 5 % of material thickness (i.e. for punching 10 mm thick material the diameter of the die bore is 1 mm larger than the diameter of the corresponding punch, and the cutting gap is 0.5 mm). Therefore, when ordering state thickness of material to be punched.

When the fastening screws "A" and the adjusting screws "B" have been loosened, the saddle can be pushed to the front or backwards. The adjusting screws "C" serve to fix the saddle laterally. When the punches and dies have accurately been adjusted, tighten the adjusting screws "C" and "B", as well as the saddle fastening screws "A". (Cf. fig.15)

During the punching operations, inspect the position of the tools now and again. To do so, inch the punch step by step to and into the die. Repeat this procedure after every tool change.

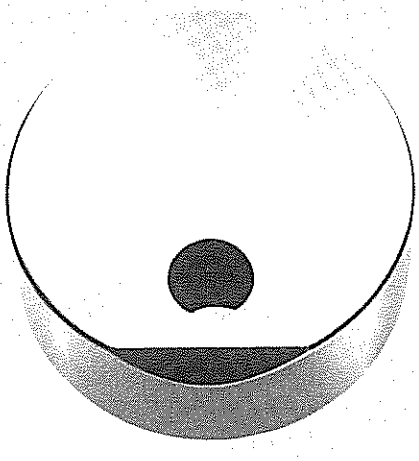


Fig. 14: Eccentric die for small angles

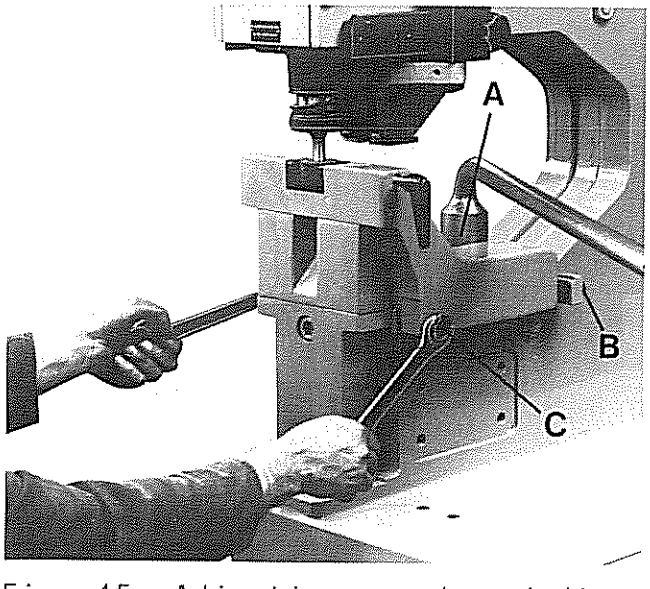


Fig. 15: Adjusting punch and die

Centred material can precisely be moved to in inching mode, by means of the built-in foot control, faulty punchings thus being avoided.

6. Safety device to avoid twisting of Shaped Punches

Square, oblong or punches of other shape must be protected from being twisted. For this purpose, there is a groove on each punch holder on the surface fitting the punch, and on the front surface of each shaped punch.

Insert a centering pin of 4.7 mm dia. into this groove.

7. Stripper

The solid stripper covers the whole punching tool, and can be adjusted to any material thickness.

Hight-adjustment is done by means of the star grip "A" in the throat area. To change the tool, loosen both star grips "B", and shift stripper "C" into the throat area (See fig. 16).

For processing smaller sections and punching holes up to 15 mm diameter into material of small thickness, use the stripper reducing plate supplied.

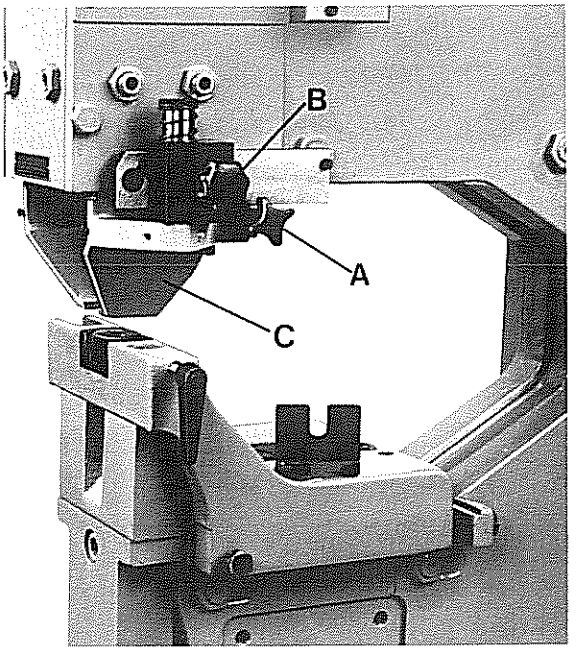


Fig. 16: Stripper

8. Regrinding Punching Tools

Regrind the punching tools on their front faces only, for otherwise the clearance between punch and die will be changed. To increase service life of the tools, grease the cutting edges now and again.

In many cases it is much easier and advisable to order new tools, for this will be more favourable, and guarantees correct grinding.

9. Quick-change Device for Punches and Dies

As standard, the machine is equipped with a quick-change device for round punches and dies. Both tool can easily and quickly be reset.

This device is most economical for small-lot production which requires frequent tool change.

Also shaped punches and dies can be used on this device, however, check the cutting clearance after every change, for often the saddle must be re-adjusted. In addition to this re-adjustment, as well as on installing the coupling nut, fasten the outer ring for the punch again after the first punching stroke, for the centering pin will have been pressed into the guide only after the first punching operation has been done.

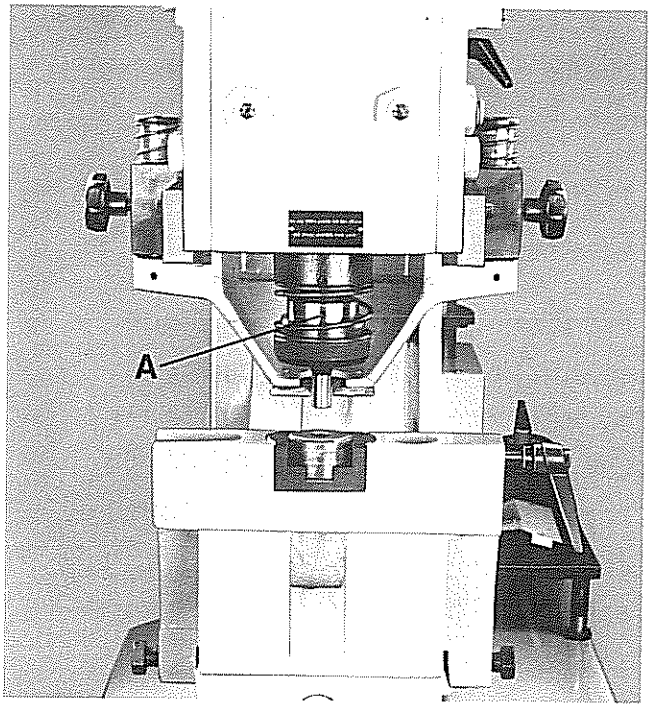


Fig.17: Quick-change device for punches and dies

In case of processing larger series, it is advisable to use the more rugged punch-fastening device with coupling nut.

Reset the quick-change device for the coupling nut by loosening setscrew "A" (Fig. 17). The centering ring will be unblocked, and can be removed. After these few manipulations, the punch is ready for use of the coupling nut.

Assemble the quick-change device in reverse order.

If, for any reason, a punch cannot precisely be clamped, correct the basic position of the centering ring. To do so, loosen setscrew "A", slightly re-adjust the centering ring, and lock by means of the setscrew again.

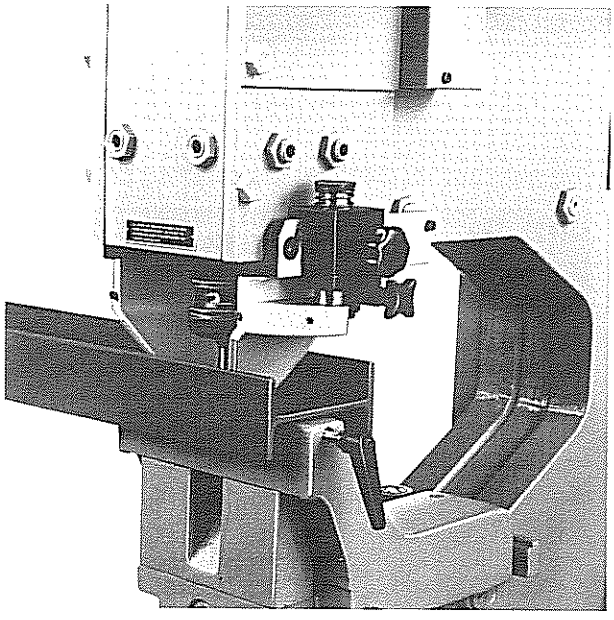


Fig. 18: Punching the web of I-beam

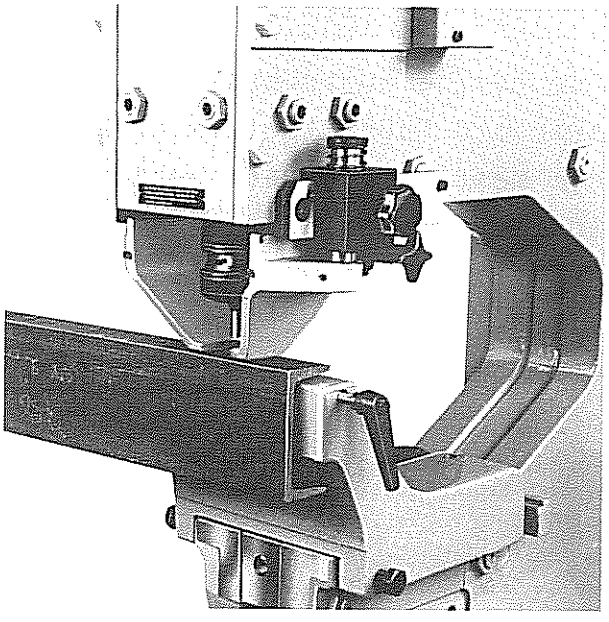
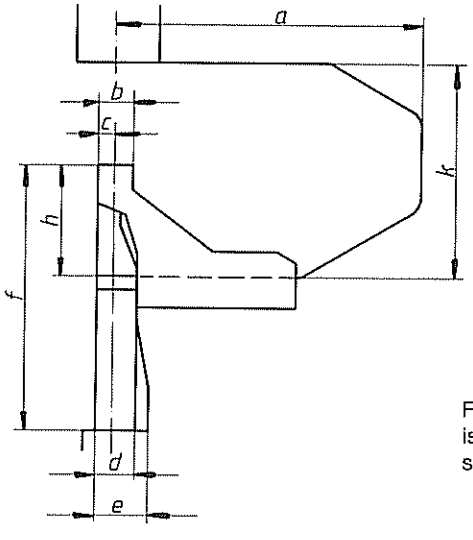
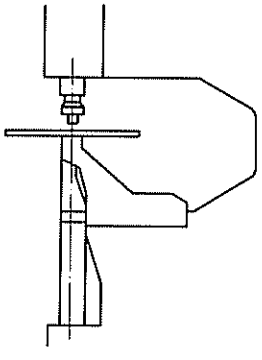
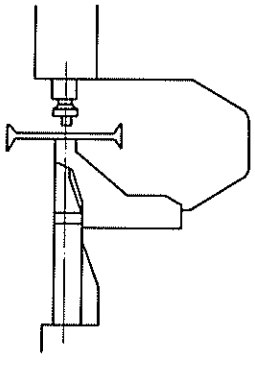


Fig. 19: Punching the flange of a channel

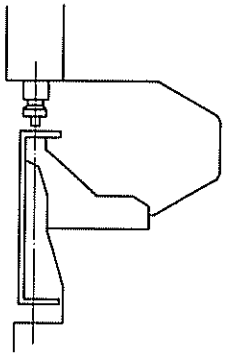




Flat, angel and tee material is being punched with saddle support always.



Channels and beams in the web are being punched with saddle support always.



Channels and beams are being punched in the flange without saddle support.

KLH	300/610		500/610		700/760	
	mm	inch	mm	inch	mm	inch
a	610	24	610	24	760	30
b	47,5	1 7/8	47,5	1 7/8	47,5	1 7/8
c	22,5	7/8	22,5	7/8	22,5	7/8
d	55,5	2 3/16	55,5	2 3/16	57,5	2 1/4
e	74,5	2 15/16	74,5	2 15/16	82,5	3 1/4
f	280	11	310	12 3/16	403	15 7/8
h	130	5 1/8	130	5 1/8	178	7
k	240	9 7/16	240	9 7/16	322	12 11/16

Fig. 20: Dimensions of punch saddle Model KLH

10. Special Tools

Due to the comprehensive standard MUBEA tool programme, all mostly required special tools are available at short notice. Furthermore, the special design of the MUBEA punch enables versatile application of special tools which, however, cannot be described as short summary.

a) Stationary Triple-Punch Tool

In case holes of different diameters are to be punched in short alternation, it will be advisable to use a triple-punch tool enabling punching holes of 3 different diameters in one stroke and without the need of removing tools. By pulling the adequate bar, the punch wanted will be set to its working position.

b) Adjustable Two-Punch-Tool

This tool enables simultaneous punching of 2 holes of equal or different diameters, at different spacings. The distance desired can be learned from a scale, and is set by means of a handle, simultaneously for punches and dies.
When these adjusting manipulations have been done, any further setting operation is superfluous.

c) Special punching equipment for punches and dies of up to 50 mm diameter

This tool enables use of all punching tools, such as round, square, rectangular, and oblong tools.

The complete equipment comprises: M 64 punch holder, M 64 Union nut with 50 mm opening, insert with 40 mm opening, stripper, saddle 80 mm receptacle, 80/60 die holder, and saddle support.

The punches are clamped by means of a union nut. In priciple, the shaped punches have a groove so that the tools can be used lengthwise or at right angle to the machine. When ordering tools, please specify thickness and tensile strength of the material to be processed.

d) Special punching equipment for punches and dies from 50.5 to 100 mm diameter (KLH 300/610 and KLH 500/610), and 50.5 to 150 mm diameter (KLH 700/760) respectively

This tool, consisting of punch holder, stripper, saddle cap, saddle, and saddle support, enables installation of all kinds of punching tools, such as tools for punching round, square, rectangular and oblong holes.

When ordering shaped punches (oblong and rectangular) please state whether the tools will be used lengthwise or at right angle to the machine. Furthermore, generally state both thickness and tensile strength of the material to be punched. Fasten punches by means of a key.

MAINTENANCE PRESCRIPTIONS
for HYDRAULIC PLANT

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")