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ISO 9001
ISO 14001



SH/400



Technical and Operational Documentation
Conductor-rail machining station

DECLARATION OF CONFORMITY

of machines and equipment with all binding work safety and hygiene norms and regulations

Based on the PN-EN 45014 norm and after an analysis of the Technical and Operational Documentation, the construction and operation of the machine and the examination results:

Zakłady Metalowe ERKO R. Pętlak

Spółka Jawna Bracia Pętlak

11-042 Jonkowo

ul. Ks. Jana Hanowskiego 7

with full responsibility declares that the machine:

***Conductor-rail machining station,
type SH-400***

SWW 0792 Polish Classification of Goods and Services (PKWiU) 29.56.25-90.90,

being the subject of herein statement, conforms with the following norms:

PN-74/E-06401 Electrical power cable lines. Cable fittings. General requirements and analyses.

PN-90/M-68050/05 Machines for plastics machining, hydraulic presses. Construction safety requirements.

PN-83/Z-08200 Work protection. Production machines and equipment. General safety requirements.

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**Please read the operational and work safety
and hygiene manuals prior to operation!**

1. Technical specification

- working pressure	680 bar
- working pressure at die outlet	680 bar
- power supply	3 x 380V, 1.1 kW
- operation	24V
- busway machining (Cu, Al) (thickness x width)	max. 12 x 125 mm

2. Operation

2.1 Elements

A workshop table is a complete working station for conducting the operations of cutting, punching holes and profiling copper and aluminium bars.

A standard table includes the following elements:

1. Cutter for cutting bars HC-120 (1)	1 pc
2. Punching and profiling segment (2)	1 pc
- punching holes for screws from M6 to M20	6 sets (dies and punches)
- punching oval holes for screws from M6 to M16	5 sets (dies and punches)
- Profiling – range from 0 to 90°	1 set (pins and profiling insertion)
3. External die terminal (3)	1 pc (terminate in a fast terminal PM type)

Equipment that could be additionally connected:

- Die GU 120 – terminal clamps at conductors 10-120 mm², reshaping sector wires
- Die GU 300 – terminal clamps at conductors 150 – 300 mm², reshaping sector wires
- Die GO 300 – terminal clamps at conductors 6 – 300 mm², reshaping sector wires
- Die GU 625 – terminal clamps at conductors 300 – 625 mm²
- Die GW – punching holes in cubicles walls
- Die GC 50 N, GC 100 – cutting wires and conductors
- Trimmer GL-6 – cutting assembly bars
- Conductor-rail type GP horizontal bending machine

3. Operation manual

Note:

1. White diode (L₅) indicates that the engine has been switched on.
2. Green diodes (L₁, L₂, L₃, L₄) indicate selected mode of machining.

Cutting

1. Position the horizontal rulers [4] with the use of the hand wheel [15] so the cutters knife axis is positioned in the centre of the material;
2. Start the machine [W₁];
3. Select machining mode with the selector [W₃] to cutting;
4. Press pedal [W₂] to start cutting;
5. After the material has been cut, depress pedal [W₂] and the cutter knife will return to its initial position.

Fig.1 illustrates the particular elements.

Note: Prevent knife fittings pressing action on the material or cutting knives. Do not manipulate with the extreme position switch.

Punching circles

1. Select a required whole punch [9] and die [10];
2. Set the punching and profiling segment [2] at a required height with the use of the crank [6] according to the ruler [7];
3. With the vertical ruler [8] set the hole distance from the bar end [8];
4. Start the machine [W₁];
5. **Select machining mode with the selector [W₃] to punching; punching is not allowed in the profiling position;**
6. Press pedal [W₂] to initiate punching holes;
7. Continue the punching process until the sensor [W₆] lights – (erratic running);
8. After the hole has been punched, depress pedal [W₂] and the punch will return to its initial position.

Fig. 1 and Fig. 2 illustrate particular elements.

Punching ovals

1. **Insert the pin positioning the die [10a];**
2. Select a required punch [9] and die [10];
3. Fit the die and the punch;
4. Set the punching and profiling segment [2] at a required height with the use of the crank [6] according to the ruler [7];
5. With the vertical ruler [8] set the hole distance from the bar end [8];
6. Start the machine [W₁];

7. Select machining mode with the selector [W₃] to punching; punching is not allowed in the profiling position;
8. Press pedal [W₂] to initiate punching holes;
9. Continue the punching process until the sensor [W₆] lights – (erratic running);
10. After the hole has been punched, depress pedal [W₂] and the punch will return to its initial position.

Fig. 1 and Fig. 2 illustrate particular elements.

Profiling

1. Insert the pin [11] and the profiling insertion [12];
2. Set the punching and profiling segment [2] with the use of the crank [6] so the middle part of the profiling bar was positioned with the segment servo-motor axis [2];
3. Set a required profiling angle at the scale [13] by releasing and clamping [14];
4. Start the machine [W₁];
5. Select machining mode with the selector [W₃] to profiling;
6. Press pedal [W₂] to initiate profiling action;
7. Continue the profiling process until the extreme position selector [W₄] lights – (erratic running);
9. After the bar has been profiled, depress pedal [W₂] and the profiling insertion [12] will return to its initial position.

Fig. 1 and Fig. 3 illustrate particular elements.

Offsetting

1. Fit the offsetting insertion [17];
2. Set the punching and profiling segment [2] with the use of the crank [6] so the middle part of the profiling bar was positioned with the segment servo-motor axis [2];
3. Start the machine [W₁];
4. Select machining mode with the selector [W₃] to profiling;
5. Press pedal [W₂] to initiate profiling action;
6. Continue the profiling process until the bar has been profiled;
7. After the bar has been profiled, depress pedal [W₂] and the profiling insertion [12] will return to its initial position.

Note: the offsetting insertion is not equipped with a run cycle switch. Offsetting should be carried out only on the oval elements of the insertion. Prevent the bar from pressing the flat element of the insertion.

Fig. 1 and Fig. 4 illustrate particular elements.

Working with an external die

1. Fit the external conductor [3] with a required die and fittings;
2. Start the machine [W₁];
3. Select machining mode with the selector [W₃] to external die;

4. Prepare the die for work;
5. Press pedal [W₂] to activate the die;
6. After the work with the die has been completed, depress pedal [W₂] and the die piston will return to its initial position.

Fig. 1 illustrates particular elements.

4. Maintenance materials

1. Hydraulic unit – hydraulic oil L-HM 32 – (5 dm³);
2. Punching and profiling unit lifting bolt – lubricant ŁT – 46.

4.1 Hydraulic oil exchange and refill

1. Remove the side plate [21];
2. Oil exchange and refill should be carried out according to the instructions included in the Technical and Operational Documentation of the hydraulic unit.

4.2 Lubrication of lifting unit bolt

When required carry out according to the following steps:

1. Unfasten the crank [6];
2. Remove the front plate [11];
3. Lubricate the bolt.

5. Work Safety and hygiene manual

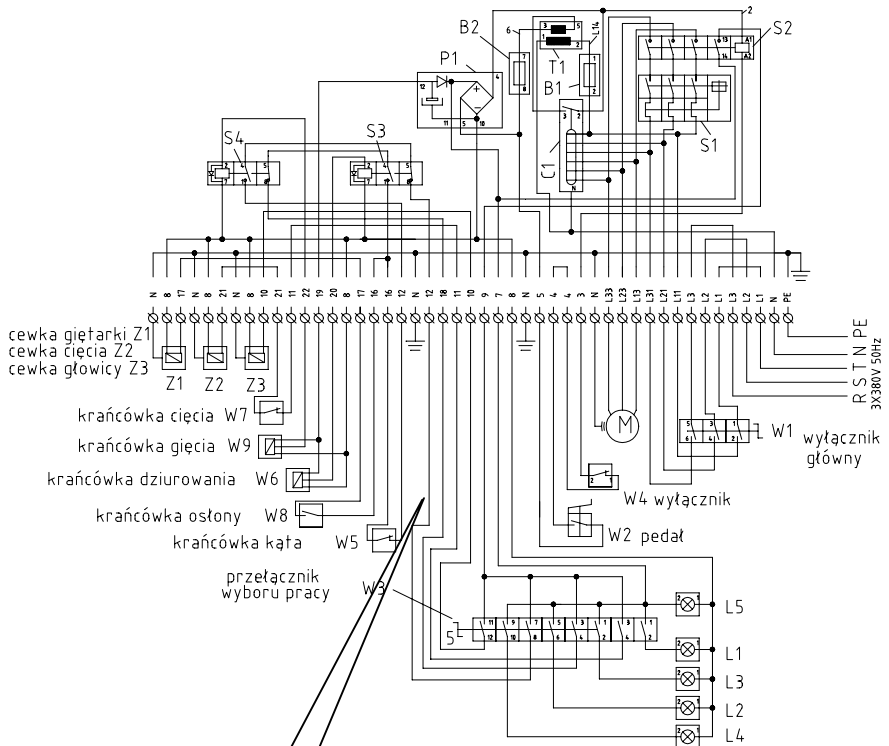
1. Only personnel familiar with the Technical and Operational Documentation are to operate the SH/400 machining station.
2. Proper positioning of the operating elements should be checked prior to starting the machining station SH/400.
3. The machine can be operated only when at full technical performance.
4. Prior to starting check the following:
 - electrical power installation
 - oil level in the hydraulic feeder tank
 - state of the mobile elements
 - hydraulic unit
5. Electrical power should be disconnected during daily checks and repairs in order to prevent accidental machine starting.
6. Personnel should wear adequate protective gear while operating the machine.
7. Use the SH/400 machining station only for its intended purpose.

8. Prevent debris collection around the machining station. In case of high dust concentration, cover the machine.
9. Working without a shield is forbidden.
10. Starting while manipulating the machine (fitting and unfastening elements, positioning the machining material) is forbidden.
11. Start the machine only after the preparation has been completed and when there is no danger of body or machine damage.

6. Troubleshooting

Problem	Cause	Solution
1. After starting the machine the power diode does not light	<ol style="list-style-type: none"> a. no power supply b. no 1 phase c. voltage fall to 175V/phase 	Check the power supply
2. The machine switches off while running	<ol style="list-style-type: none"> a. no phase at engine b. engine alarm went off c. no power supply 	Check power supply and engine alarm
3. Loud pump running with no servo-motor motion	<ol style="list-style-type: none"> d. cover not closed e. electrovalve has broken 	Close the cover correctly. Contact service.

7. Electrical diagram SH/400



Z1 – bending machine coil
 Z2 – cutting machine coil
 Z3 – die coil
 W7 – cutting extreme position
 W9 – profiling extreme position
 W6 – punching extreme position
 W8 – shield extreme position
 W5 – angle extreme position
 W3 – machining mode selector
 W1 – main power switch
 W4 – circuit-breaker

W3 – ŁK16R-4.858/PO3
 W4 – XB2-ES542
 W5 – TM1306
 W6 – PCID-1, 5RP-NC MB
 W7 – TM1701
 W8 – TM1306
 W9 – PCID-1, 5RP-NC MB
 L1-L5-24V/2W
 Z1-Z3-24V/0.75W
 S1-FA-M250 2.5-4A
 S2-KM-DILEM-10(24V50Hz)

W2 – pedal W1 – ŁK16R-2.821/PO3 W2 – XPER310	S3-R15-1012-23-1024-D B1-0.5A B2-1A T1-TR363 63VA
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8. Spare parts specification

No.	Part	No. of pcs	Manufacturer	Drwg. ref. no.
Hole punching unit				
1	Die M6	1	ERKO	SH-400/02.11
2	Die M8	1	ERKO	SH-400/02.11
3	Die M10	1	ERKO	SH-400/02.11
4	Die M12	1	ERKO	SH-400/02.11
5	Die M16	1	ERKO	SH-400/02.11
6	Die M20	1	ERKO	SH-400/02.11
7	Spring M16-M20	10	Pol Aston	SH-400/02.14
8	Punch M6	1	ERKO	SH-400/02.13
9	Punch M8	1	ERKO	SH-400/02.13
10	Punch M10	1	ERKO	SH-400/02.13
11	Punch M12	1	ERKO	SH-400/02.13
12	Punch M16	1	ERKO	SH-400/02.13
13	Punch M20	1	ERKO	SH-400/02.13
14	Die 8,5/12	1	ERKO	SH-404/01/02
15	Die 11/16	1	ERKO	SH-404/01/02
16	Die 13/18	1	ERKO	SH-404/01/02
17	Die 17/21	1	ERKO	SH-404/01/02
18	Punch 8,5/12	1	ERKO	SH-400/01/01
19	Punch 11/16	1	ERKO	SH-400/01/01
20	Punch 13/18	1	ERKO	SH-400/01/01
21	Punch 17/21	1	ERKO	SH-400/01/01
22	Cover of spring PUR	10	ERKO	SH-400/02/12
23	Pin	1	ERKO	SH-404/01/03
Offsetting				
24	Offsetting insertion pin	1	ERKO	SH-400/03/00
25	Offsetting insertion punch	1	ERKO	SH-400/03/00
Profiling unit				
26	Profiling insertion	1	ERKO	SH-400/02.02
27	Pin	1	ERKO	SH-400/02.03
28	Electrical unit		as in Diagram	
29	Hydraulic feeder		as in Annex 1	

9. Figures

Conductor-rail machining station SH/400

Fig. 1 General view

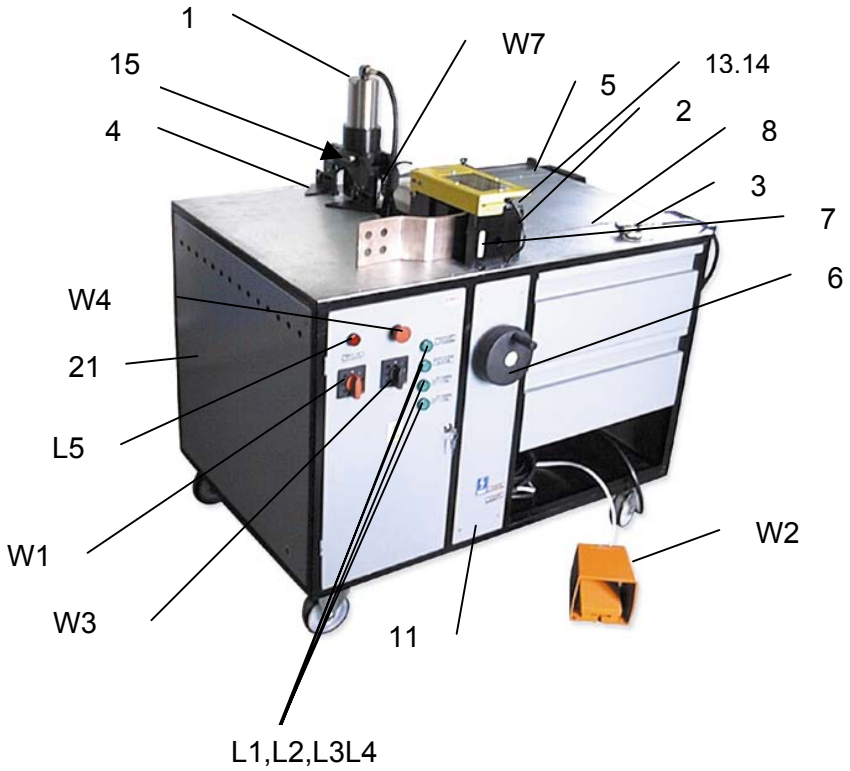


Fig. 2 Punching and profiling segment – punching holes

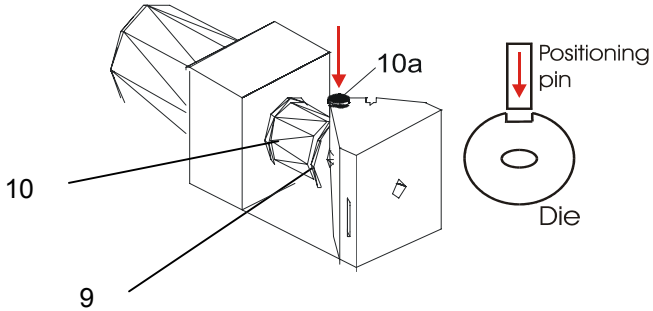


Fig. 3 Punching and profiling segment – profiling

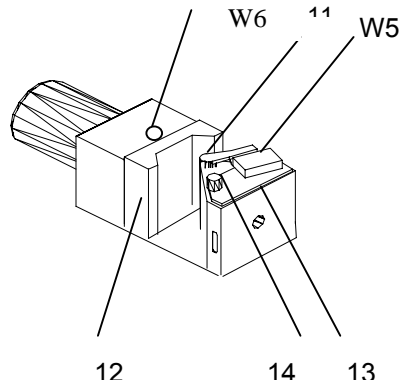


Fig. 4 Punching and profiling segment – offsetting

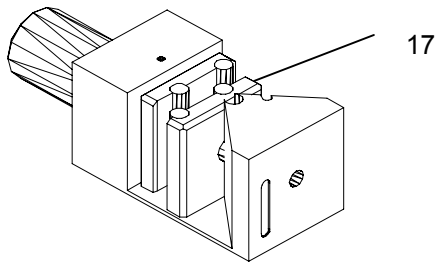
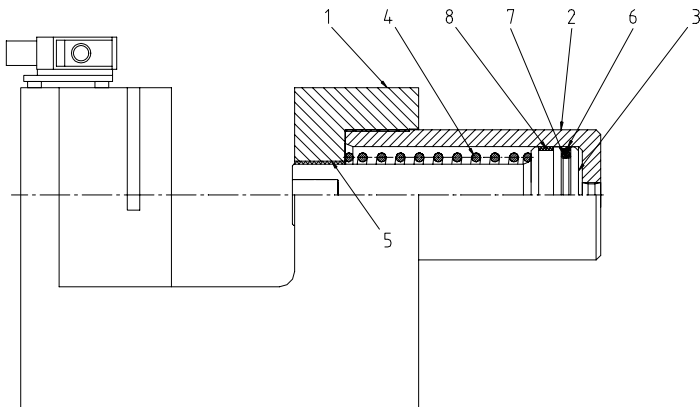
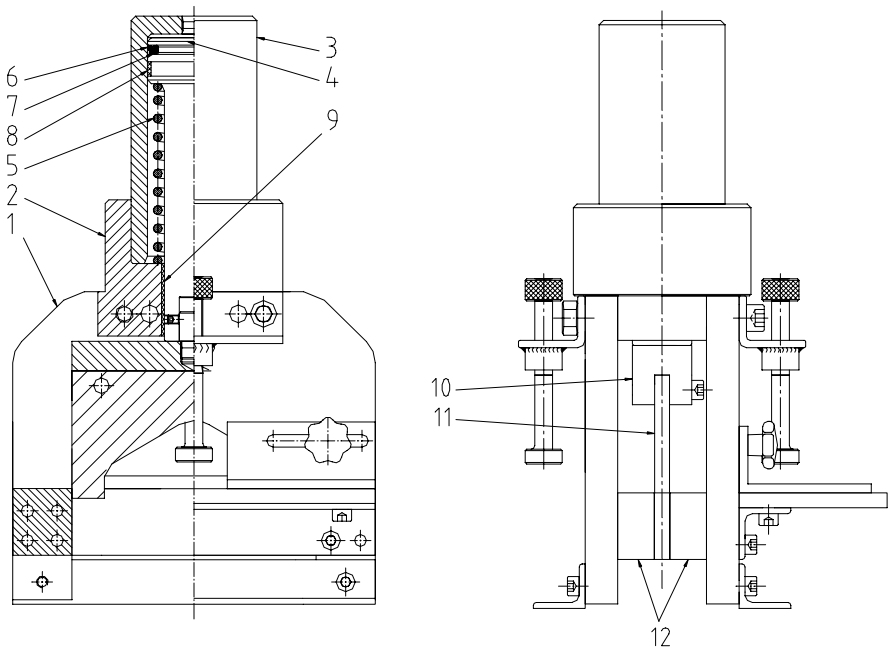


Fig. 5 Punching and profiling segment – cross-section



No.	Element	Drwg. ref. no.
1	Body	SH-400/02.01
2	Cylinder	HGD-100/01.06-A
3	Piston	SIH-63/01.02
4	Spring	SIH-63/01.03
5	Guiding barrel (Iigus)	GSM-4044
6	Insulation (Busak&Schamban)	PS1400630-T46N
7	O-ring (Busak&Schamban)	ORID04750
8	Guiding ring (Busak&Schamban)	GP6900630-C380

Fig. 6 Cutter – cross-section



No.	Element	Drwg. ref. no.
1	Body	SH-400/01.01(02)
2	Connector	SH-400/01.03
3	Cylinder	HGD-100/01.06-A
4	Piston	SIH-63/01.02
5	Spring	SIH-63/01.03
6	Insulation (Busak&Schamban)	PS1400630-T46N
7	O-ring (Busak&Schamban)	ORID04750

8	Guiding ring (Busak&Schamban)	GP6900630-C380
9	Guiding barrel	GSM-4044
10	Knife fitting	SH-400/01.05
11	Mobile knife	SH-400/01.04
12	Permanent knives (2pcs)	SH-400/01.07

10. Hydraulic unit

Technical and Operational Documentation

10.1. Introduction

Read the following Technical Description before operating the hydraulic feeder. The hydraulic unit can only be operated by personnel trained in work safety and hygiene as well as in the construction and the operation of the unit.

10.2. Technical description

Technical specifications

- power output (electric engine)	1.1 kW
- max. pressure	700 bar
- nominal efficiency	1.25 l/min
- power supply voltage	380 V, 50 Hz
- operation	24 V DC
- working medium	L-HM-32 (Gdańsk Refinery)
- tank capacity	~ 5 dm ³

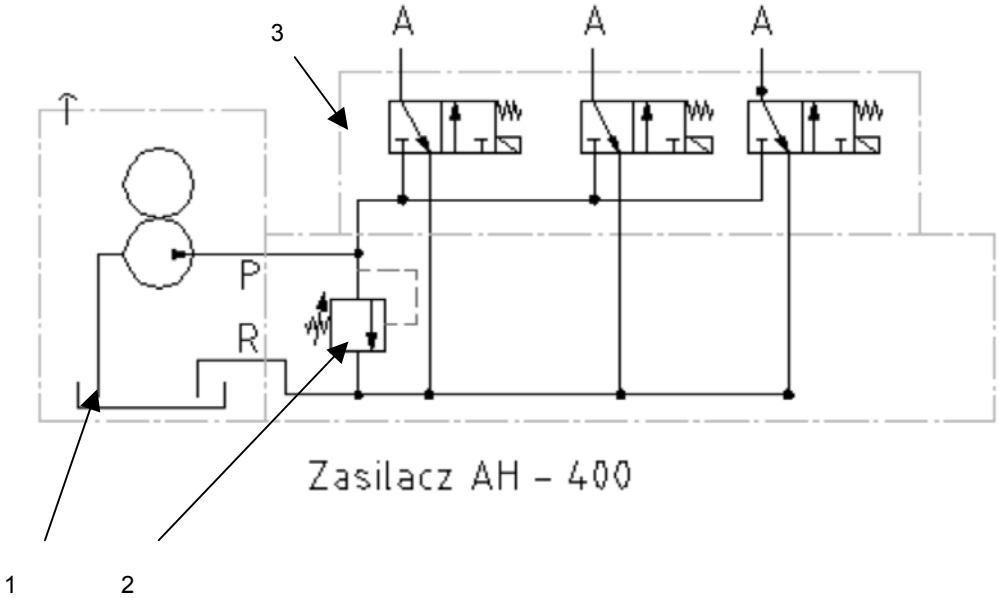
Unit construction

This compact feeder consists of an oil tank and built-in hydraulic elements.

The main elements of the feeder are: a pump system V1 (pump and engine submerged in oil), a press-return filter and a distributor. The tank construction enables attachment. The hydraulic system of the unit is terminated with outputs G1/4 type. The feeder is equipped with an oil level indicator.

10.3. Hydraulic diagram

Feeder AH-400



10.4. Main parts specification

No.	Part		Pcs
1	Hydraulic system HC-31	HAWE	1 set
2	Emergency valve A2/700 (700 bar)	HAWE	1 pc.
3	Emergency valve MVG 13 HR (400 bar)	HAWE	1 pc.

10.5. Operation manual

Operation according to the Technical and Operational Documentation SH/400

The manufacturer set the maximum working pressure at the emergency valve at 400 bar or 680 bar (depending on the order) for the external die and at 680 bar for the machining station unit. These values cannot be changed (safety leaden seals).

Caution:

- After finishing operation of the station switch off the power supply with the main switch and cut-off from the main power supply by unplugging from power outlet.
- Switch off electrical power supply and release the hydraulic system while carrying out any maintenance or repairs.
- The feeder generates high pressure. Operate the unit with great caution. Unit unsealing may bring unexpected results. Entire system including the working elements should be shielded for operator's safety.
- **Breaking leaden seals will void guarantee for the entire hydraulic system of the machining station SH-400.**

10.6. Maintenance manual

Switch off the power supply when carrying out any maintenance jobs (by turning the main power supply switch to "0" position and unplugging from the power supply outlet). Electrical power installation should be maintained regularly.

Particular attention should be paid to possible oil leaks. If any, remove them immediately.

Check the oil level in the tank with the indicator under the electrical plate. Oil should fill the capillary vessel located at the side of the hydraulic oil tank. Oil should be exchanged every 12 months (if operated intensively – every 6 months). A tank cleanliness check after removing old oil and before refilling new oil is recommended. The suction filter cleanliness should be checked as well. If required, it should be washed or replaced with a new one. After a refill, oil should fill the capillary vessel of the oil indicator. Use HLP class oils of ZS-32 viscosity (e.g. AZOLLA ZS-32-TOTAL, ELFOLNA DS 32 – ELF, TELLUS OIL 32 – SHELL, HYSPIIN 32 – CASTROL, ENERGOL HLP 32 – BP, NUTO H 32 – ESSO). The manufacturer recommends LHM32 - Gdańsk Refinery oil.

Remove air from the pump after an oil refill. To do so, set the cutting mode and initiate the pump with short cycles (2 sec.) until the die servo-motor reaches the extreme position. Repeat this procedure in case of loud and non-uniform unit operation and lack of force. Skipping this procedure will prevent obtaining high pressures and in extreme situations will result in pump seizure.

Maintaining oil purity and periodical oil exchanges has a great effect on the durability of the hydraulic unit elements and considerably prolongs their performance and reliability. Required oil purity: class 9 (recommended class 8) according to the NAS 1638 norm.

System tightness, removal of any oil leaks and oil level checks should be carried out daily when operating the unit.

In case of a unit break-down, switch off electrical power supply and consult a specialist service representative. Repairs within the guarantee period can only be carried out by the manufacturer or authorised representatives.

11. The warranty

1. This warranty covers product repairs on condition that it is operated in compliance with its instructions' manual.
2. The guarantee period is 12 months from the purchase date.
3. The manufacturer guarantees full technical support in Poland.
4. Parts and materials which are to be exchanged during the correct usage of the product (oil, filter inputs etc.) are not under the guarantee. Parts and materials provided by cooperating companies are guaranteed on their conditions.
Other repairs will be performed at least 3 days after the date of complaint.
5. This warranty does not concern damages caused by improper usage, maintenance, transportation and storage of the product.
6. The guarantee will become void if any unauthorised modification is performed on the product.
7. This guarantee will also be void if the manufacturer's leaden seals of unit safety valve are broken.
8. Operational requirements also concern the purity of oil and its adequate hydraulic level. It always has to be class 9 according to the NAS 1638 norm, otherwise the guarantee is void.
9. In order to make a complaint it is necessary to deliver the product with the guarantee card and detailed damage description to the manufacturer or to the point of sales.
10. The manufacturer is not responsible for damages caused by product's defects. Neither these damages repairs nor expenses and lost income return is under the guarantee.

Purchasing date:
signature:

Invoice no.:

Sales representative

Dear User,

***Thank you for selecting this product and welcome you to the growing family of our satisfied product owners.
Any remarks or suggestions to our products will be greatly appreciated.
ERKO®, manufacturer***

ERKO® has the right to make improvements to the machine construction.

12. Guarantee certificate

Name/type: Conductor-rail Machining Station SH-400

Manufacture no.

Signature and stamp KJ:

Invoice no.:

Date sold:

Date purchased:

Sales Representative signature:

Sales Representative signature:

13. REPAIR LIST

No.	Date of receipt for repair	Date of repair (return)	Repair remarks	Signature of serviceman