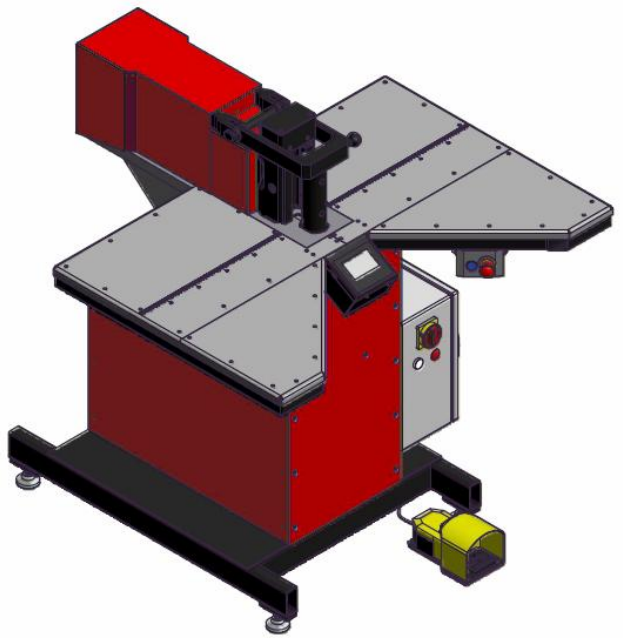
OPERATIONAL MANUAL



BUSBAR BENDING STATION
HG200

Producent / Producer / Производитель

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#VHG200020614

Thank you for purchasing our station.

Please read this operation manual and operation recommendations carefully.

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* Due to continuous product improvement, ERKO sp.j. reserves the right to make design changes.

AIO 89 007

ISO 9001
ISO 14001

Please read the operation manual and health and safety at work regulations before using the station.
The station is only used for operation with Al and Cu busbars.

1. APPLICATION

HG200 is the busbar processing station with electronic angle measurement, equipped with a touch panel. The basic functional features ensuring efficient and precise operation are:

- Possibility to adjust a bending angle within the range of 5-90° (bending accuracy ±0.5°);
- Engraved measuring ruler that enables a processed busbar to be positioned with accuracy of 1 mm;
- Control of processes with the foot switch;
- Built-in reliable hydraulic power pack.

2. TECHNICAL DATA

Station weight	460 kg
Max. dimensions (L x W x H)	1226 x 1200 x 1240
Operating pressure	400 bar
Power supply	3x400/230 V 50 Hz, 1.68 kW
Control	24V DC
Power plug	16A 400V 3P N+E IP44(PCE 015-6v)
Protection degree	IP40
Range of processed busbars (Cu, Al) (TH x W)	Thickness: 5÷15; width: 50÷200 mm
Bending range	5÷90°
Operating temperature	5÷40 °C

3. STATION INSTALLATION

- The station should be positioned on the hard and even surface and levelled. The adjustable levelling feet make the station levelling easy. When the station is positioned, please pay attention that the station rests securely on all 4 feet.

Use of the station on an inadequate surface may result in the station frame deformation and problems during processing of busbars (in achieving the accuracy offered by the manufacturer). In extreme cases, failure to follow the above may result in the station damage.

- Connect the station to the power supply system. The power supply system parameters should be in accordance with the applied standards. A five conductor power cable (L1, L2, L3, N, PE) is required for correct operation. The phase sequence does not matter when the station is connected. When a four conductor power cable is used, it is required to connect a jumper between the PE and N conductor in the supply socket.

4. CONTROL PANEL

The control panel consists of the following elements:

- Q1 Main switch used to start the station.
- Q2 Emergency stop button.
- Q3 Foot switch fulfils the function of the operating switch.
- Q4 "RESET" button is used to start the safety system.
- L1 White indicator lamp informs of correct power supply.
- L2 Red indicator lamp informs of reaching the maximum oil operating temperature.
- LED Operator panel with the touch screen enables the station operation.

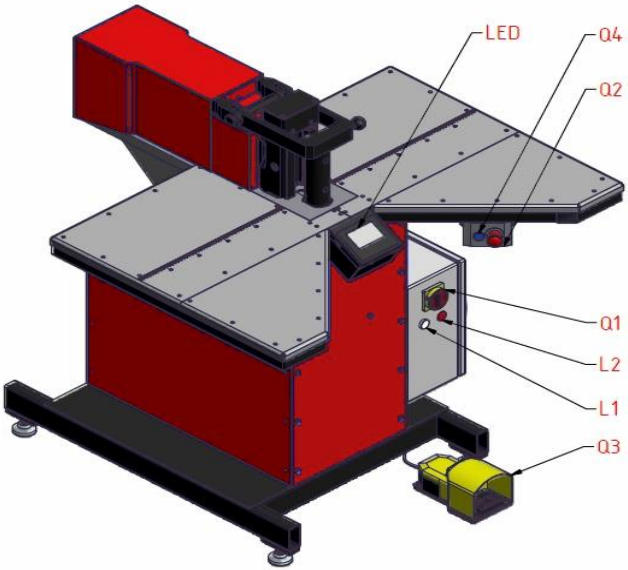


Fig. 1.

5. OPERATION

NOTE: The manufacturer reserves the right to change the operator panel graphics depending on the software version.

5.1 START

To start the station, set the main switch (Q1) to position I. After setting the main switch (Q1), the software loading and the station testing process is started. The operator panel will show the screen with the login button (fig. 2) which, when touched, will show the login window (fig. 3). To login, touch the white field with asterisks. Pressing the field will show the numeric keypad (fig. 4). Using the keypad, enter the operator password and confirm with the “ENTER” key. When an incorrect password is entered, the window with the error message will be displayed (fig. 5). In such a situation, when this message disappears, press the field with asterisks on the operator panel again (fig. 3) and enter the correct password and confirm with the “ENTER” key. After correct login, the message informing about the necessity of checking the safety system with the “RESET” button will be shown (fig.6). After pressing the “RESET” button, the station is ready for operation and the station enters the screen with the operation selection (fig.7).

THE PASSWORDS PROGRAMMED FOR THE OPERATING PERSONNEL:

The factory set password for an operator is 159 and cannot be changed. The factory set password for resetting the station measuring system is 1231 and cannot be changed.

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6.

Fig. 7.

When other messages are displayed or the above-mentioned messages are not displayed, switch off the station with the main switch (Q1), wait for about 15 seconds and proceed with the station start procedure again. If you failure to start the station again, please contact the service personnel.

5.2 WARRANTY PERIOD START

When the station is started for the first time, the station warranty period start menu appears after pressing the LOGIN button. After pressing the button, the window that enables the warranty period start to be accepted will appear.

When you press the “NO” button, you will return to a previous window. When you press the “YES” button and enter the password (**159**), the station switches to cyclic operation mode. Counting the time interval to the technical inspection is started.

5.3 BENDING

To proceed with the bending process:

- Start the station in accordance with the procedure set out in item 5.1.
- Go to the bending mode (fig. 7) or during normal operation press the BENDING button at the bottom of the screen (fig. 8).
- Find the reference point of the measuring system ("REF" is displayed in the "CURRENT ANGLE" field (fig. 8)). To find the reference point of the encoder, bend the rollers of the angle measuring insert (the insert must be connected to the installation socket). The operation should be completed with the appearance of an angle value (fig. 9). Values in the manual are represented by the “**#**” sign.
- To specify the bending angle, enter the value edition using the button located next to the yellow field entitled “SET BENDING ANGLE” (the default value displayed is a dimension that was used during the last bending). Using the displayed numeric keypad enter a bending angle value. Confirm the edition with the “ENTER” button (fig. 10).
- Specify the material type to be bent (fig. 12, AL - aluminium, CU - copper).
- Insert a busbar into the working space.
- Determine the distance from the bending edge to the punch axis with the scale engraved on the table top.
- Press and hold the foot switch (Q3) to start the bending cycle. When the operation is finished, the piston rod returns automatically to the initial position. To repeat the operation, release the foot switch and press it again.
- Releasing the foot switch during the cycle results in the operation interruption and return movement of the piston rod to the start position (performance of the next bending is only possible after the piston rod returns to the start position).

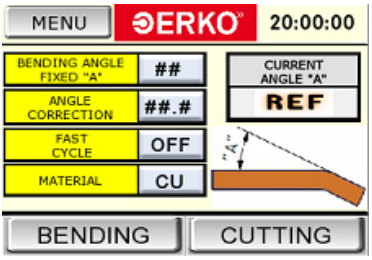


Fig. 8.

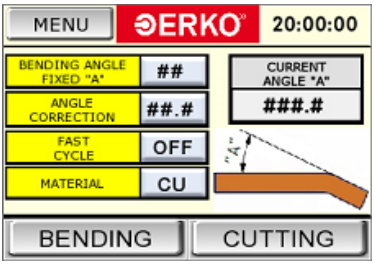


Fig. 9.

Fig. 10.

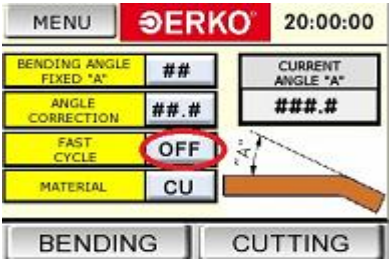


Fig. 11.

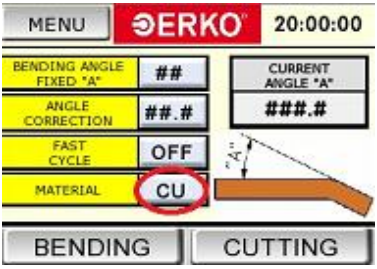


Fig. 12.

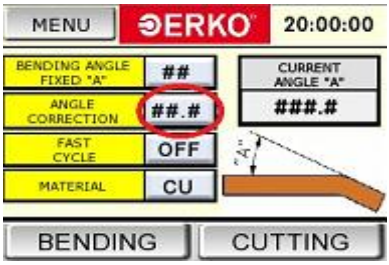


Fig. 13.

To accelerate and improve working comfort, the station is equipped with two additional functions. The first function is the possibility of entering one's own bending angle correction, where a user may enter a correction value using the numeric keypad after pressing the grey field next to the "ANGLE CORRECTION" field (fig. 12).
The second function entitled "FAST CYCLE" (fig. 11) enables a busbar bending in a shorter time, but without overbending. Bending with overbending is performed during the first bending to determine a springback value of a busbar being bent. Then, activate the "FAST CYCLE" function by pressing the button (fig. 11). Thereafter, the program memorizes the overbending value and it bends to an angle considering a correction during the next bending. This function significantly accelerates operation. When an angle value or material is changed, the correction is cancelled and determined again during the first bending.

Note: Connection and disconnection of the communication cable of the bending insert is only permitted when the station power supply is switched off.
The insert delivered with the station is calibrated with the program. In case it is necessary to replace the insert, a new one must be calibrated. To do this, contact the authorized service.

5.3.1 MEASURING SYSTEM RESET

The purpose of the measuring system reset is to calibrate measuring elements of the station.
Only the bending insert can be calibrated.

To reset the measuring system:

- Start the station in accordance with the procedure set out in item 5.1.
- Press the “MENU” button located in the left upper corner of the panel (fig. 3).
- Press the “RESET MODE” button (fig. 14).
- The numeric keypad will appear (fig. 15) where the reset password must be entered (the reset password is **1231)**, and then confirmed with the “ENTER” button.
- The station enters the reset mode (fig. 16).

Fig. 14.

Fig. 15.

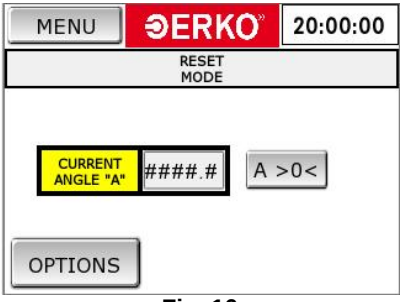
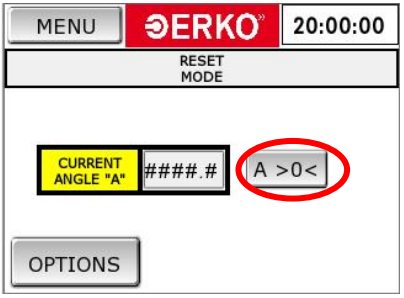


Fig. 16.

- Using a flat element, adjust the levers in the parallel position to the measuring insert body (fig. 18). Holding the immovable levers, press the "Reset" button on the panel (fig. 17).



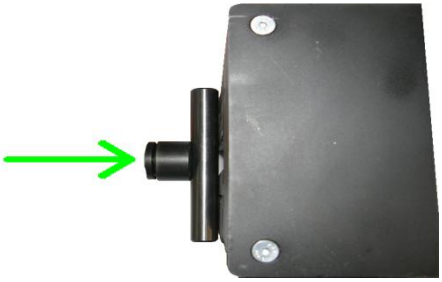


Fig. 17. **Fig. 18.**

- When calibration is finished and a flat element is taken away from the measuring levers, a value displayed on the operator panel takes a negative value different from zero.
- To check for correct calibration of the measuring insert, put the flat element again and check if a value displayed on the operator panel is 0.

Note: The "TECHNICAL INSPECTION RESET" button is active when the station has been operating for the period after which the manufacturer recommends a technical inspection.

5.3.2 OPERATING PARAMETERS AND INSERT CALIBRATION

Depending on the range of bent busbars and bending parameters, i.e. bending radius, busbar thickness etc., it is required to use different bending inserts. The HG200 station offers this possibility. As standard, it is equipped with the insert suitable for a bar with maximum height of 200 [mm] and thickness of 15 [mm]. At the customer's request, it is possible to make a special insert according to the instructions if there are no design limitations.
To use the settings:

- Start the station in accordance with the procedure set out in item 5.1.
- Press the "MENU" button located in the left upper corner of the panel (fig. 3).
- Press the "SETTING" button (fig. 14).
- Select the insert number (fig. 19).
- Enter the insert calibration (fig. 20). The password to change the insert parameters will be provided by the manufacturer if required.

Fig. 19.

Fig. 20.

Note: When the bending insert is replaced with a different one, it is to be parameterised with the station software ("INSERT CALIBRATION" fig. 20). To do this, please contact the ERKO authorized service.

5.3 CUTTING

To proceed with the cutting process:

- Start the station in accordance with the procedure set out in item 5.1.
- Go to the cutting mode (fig. 7) or during normal operation press the CUTTING button at the bottom of the screen (fig.8). The cutting mode screen is shown in figure 21.
- Insert a busbar into the working space.
- Determine the distance from the cutting edge to the knife axis with the scale engraved on the table top.
- Press and hold the foot switch (Q3) to start the cutting cycle. When the operation is finished, the piston rod returns automatically to the initial position. To repeat the operation, release the foot switch and press it again.
- Releasing the foot switch during the cycle results in the operation interruption and return movement of the piston rod to the start position (performance of the next cutting is only possible after the piston rod returns to the start position).

Fig. 21.

5.4 CHANGE OF INTERFACE LANGUAGE

To change a user interface language:

- Switch on the station power supply and follow in accordance with item 5.1.
- Press the “MENU” button located in the left upper corner of the panel (fig. 8).
- Press the “LANGUAGE” button (fig. 22).
- Select a language by touching the suitable flag on the screen (fig. 23).

Fig. 22.

Fig. 23.

5.5 COUNTER OF THE STATION RUNNING TIME AND DATE OF THE NEXT INSPECTION

To read the station running time and a date of the next technical inspection:

- Press the “MENU” button located in the left upper corner of the panel (fig. 8).
- Press the “RESET MODE” button (fig. 22).
- After entering the reset password in the dialogue window, press the “OPTION” button.

- After pressing the button the dialogue window with the counter of the station running time and a date of the next technical inspection will show.

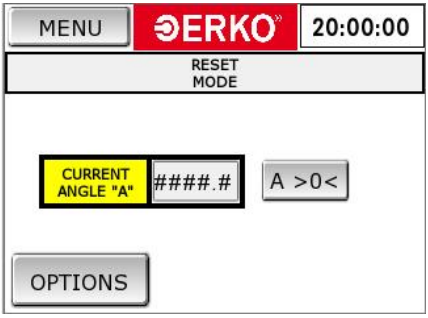


Fig. 24.

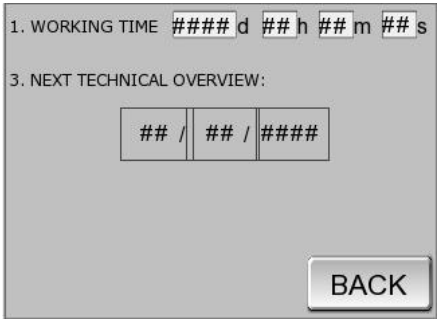


Fig. 25.

5.6 DATE AND TIME SETTING

To set time:

- Press the “MENU” button located in the left upper corner of the panel (fig. 8).
- Press the “RESET MODE” button (fig. 22).
- Click the clock in the right upper corner to start the clock setting panel.

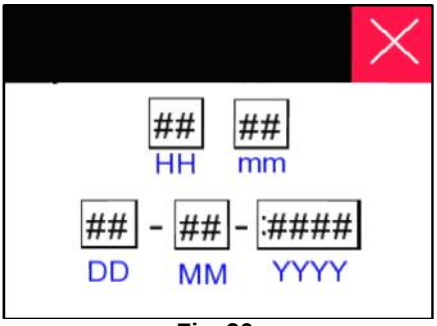


Fig. 26.

6 TECHNOLOGY

6.1 BENDING

- When the station has just been started, carry out the operations according to item 5.1
- Equip the station with the bending mandrel and measuring insert according to item 6.1.1 and enter the settings according to item 5.2
- Slide a busbar in a space between the mandrel and measuring insert and slide a busbar close to the mandrel.
- Close the clamp (fig. 33).
- Press and hold the foot switch (Q3) to start the bending cycle. When the operation is finished, the piston rod returns automatically to the initial position. To repeat the operation, release the foot switch and press it again.
- Releasing the foot switch during the cycle results in the operation interruption and return movement of the piston rod to the start position.

6.1.1 EQUIPPING THE BENDING STATION

To equip the bending station:

- Mount the suitable bending radius in the bending mandrel and fasten it with two bolts (fig. 27). The mounted mandrel is shown in figure 28.

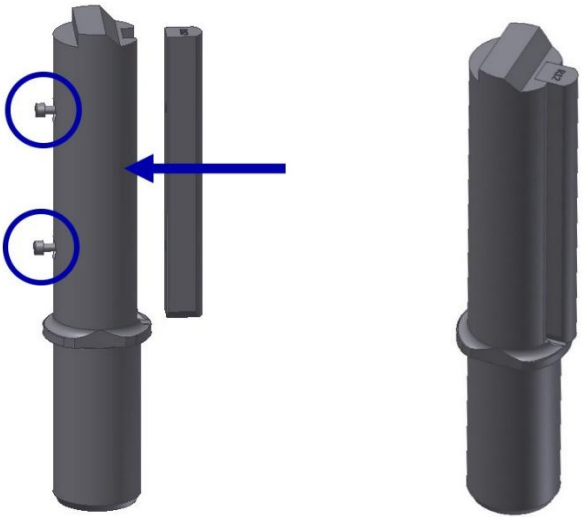


Fig. 27. **Fig. 28.**

- Slide the bending mandrel into the hole in the body (fig. 29) (fig. 30).

Fig. Bending mandrel

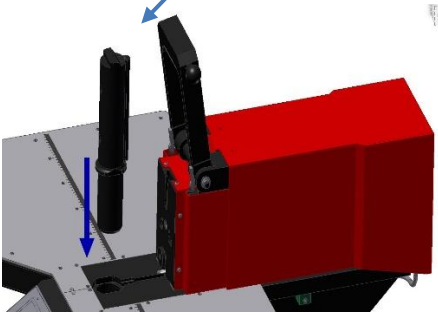


Fig. 29.

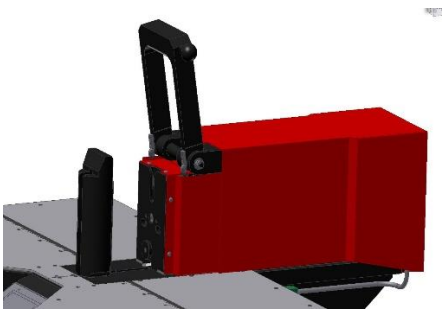


Fig. 30.

- Mount the bending insert using the guiding elements (fig. 31) (fig. 32).

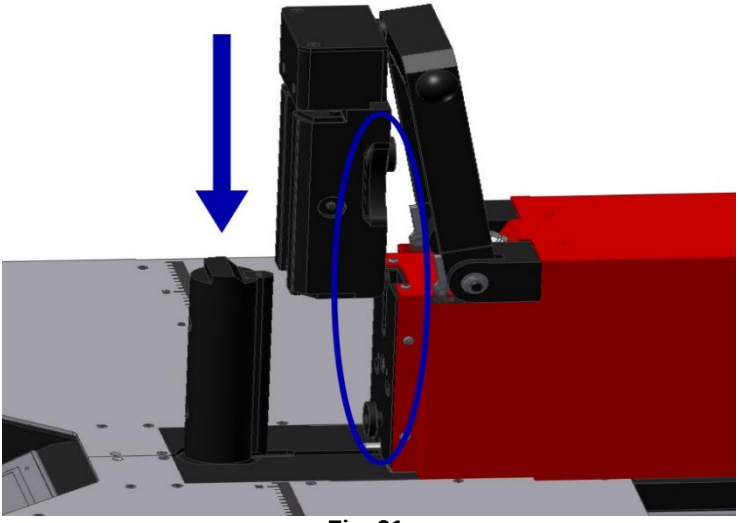


Fig. 31.

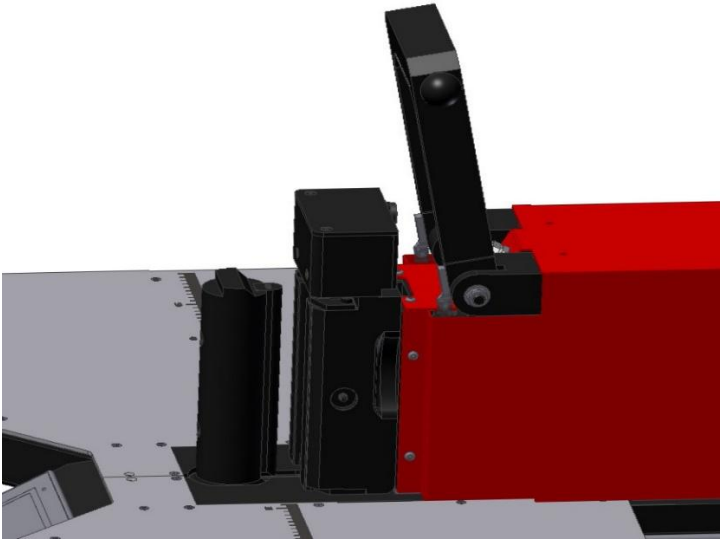


Fig. 32.

- Connect the bending insert.

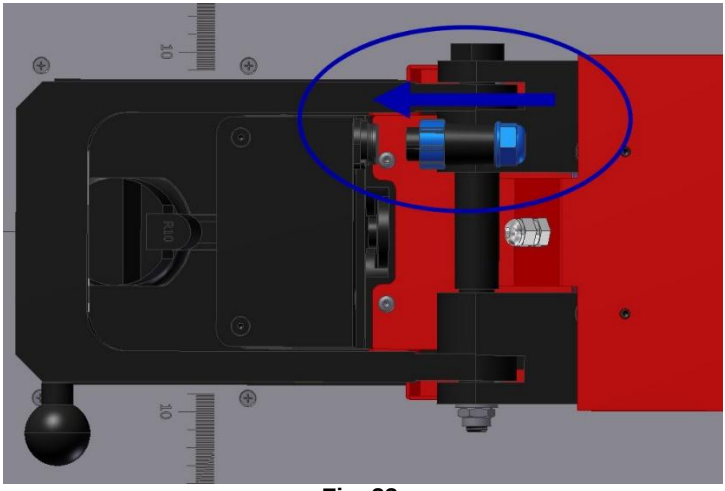


Fig. 33.

- Close the safety clamp (fig. 34).

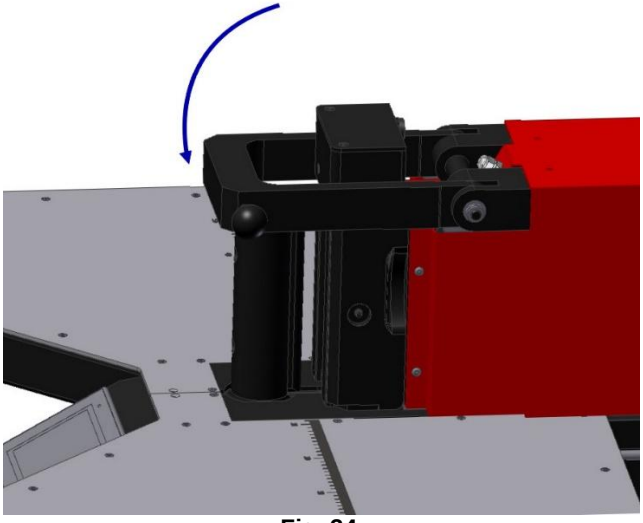


Fig. 34.

6.2 CUTTING

- In case the station has just been started, carry out the operations according to item 5.1

- Equip the station with the cutting mandrel and cutting insert according to item 6.2.1.
- Slide a busbar in a space between the mandrel and cutting insert and slide a busbar close to the mandrel.
- Close the clamp (fig. 34).
- Press and hold the foot switch (Q3) to start the cutting cycle. When the operation is finished, the piston rod returns automatically to the initial position. To repeat the operation, release the foot switch and press it again.
- Releasing the foot switch during the cycle results in the operation interruption and return movement of the piston rod to the start position.

6.2.1 EQUIPPING THE CUTTING STATION

To equip the cutting station:

- Slide the cutting mandrel into the hole in the body (fig. 35) (fig. 36).

Fig. Cutting mandrel.

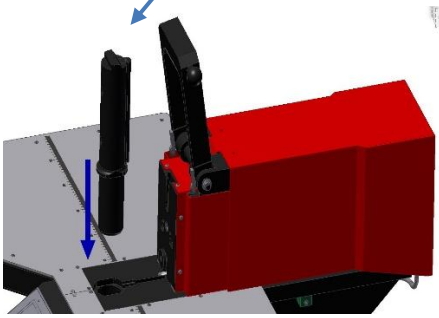


Fig. 35.

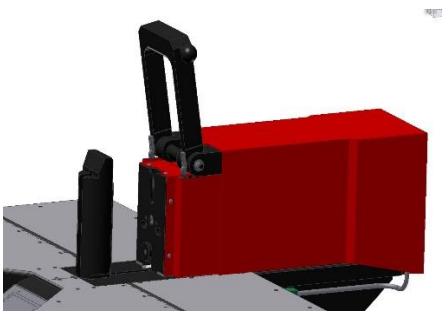


Fig. 36.

- Mount the bending insert using the guiding elements (fig. 37) (fig. 38).

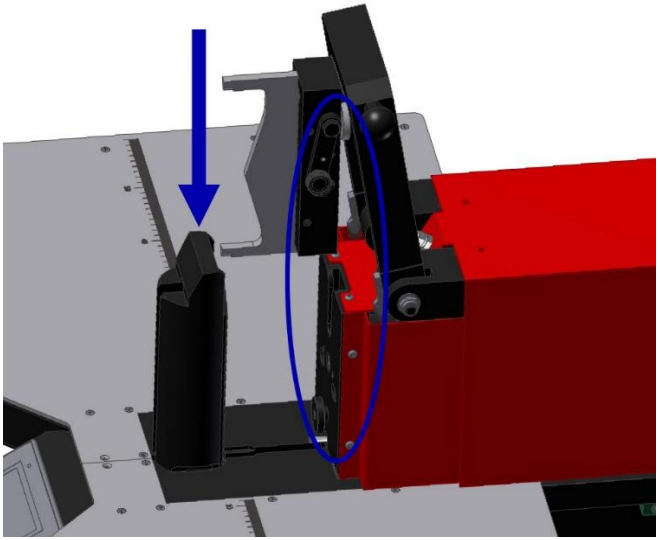


Fig. 37.

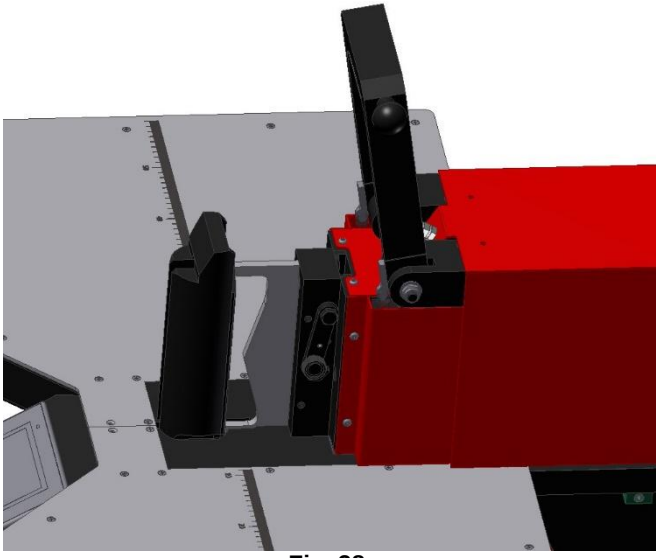


Fig. 38.

- Catch the lock (fig. 39) and fasten (fig. 40).

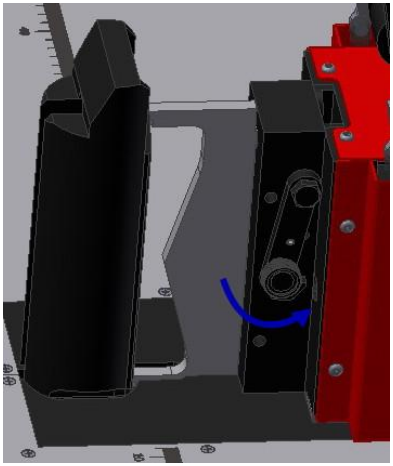


Fig. 39.

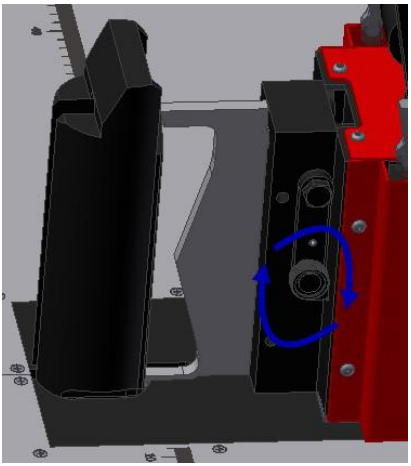


Fig. 40.

- Close the safety clamp (fig. 41).

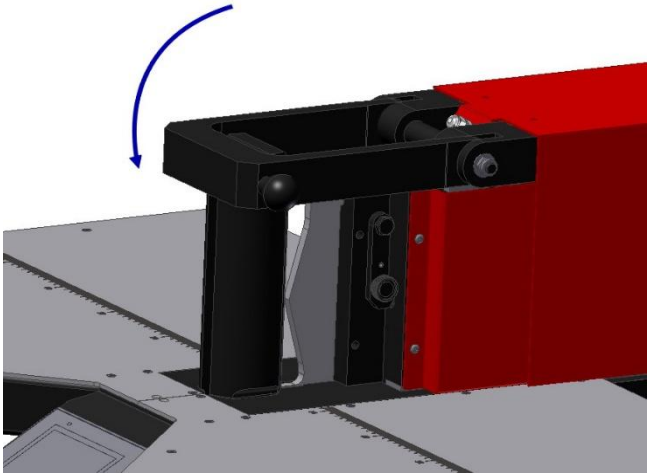


Fig. 41.

7 MAINTENANCE AND OPERATION RECOMMENDATIONS

The station must be kept clean, as it considerably affects its service life. Keep the station clean and tidy during operation. It limits accidental mechanical damage.

Oil change should be carried out at the intervals specified in item 6.2 by qualified personnel. Incorrect oil change may result in problems with accuracy during bending operation.

Hydraulic oil topping up should be carried out by an operator as necessary. If no leaks are found, an oil level check should be carried out every half a month. The correct oil level and fill plug are shown in fig. 42.

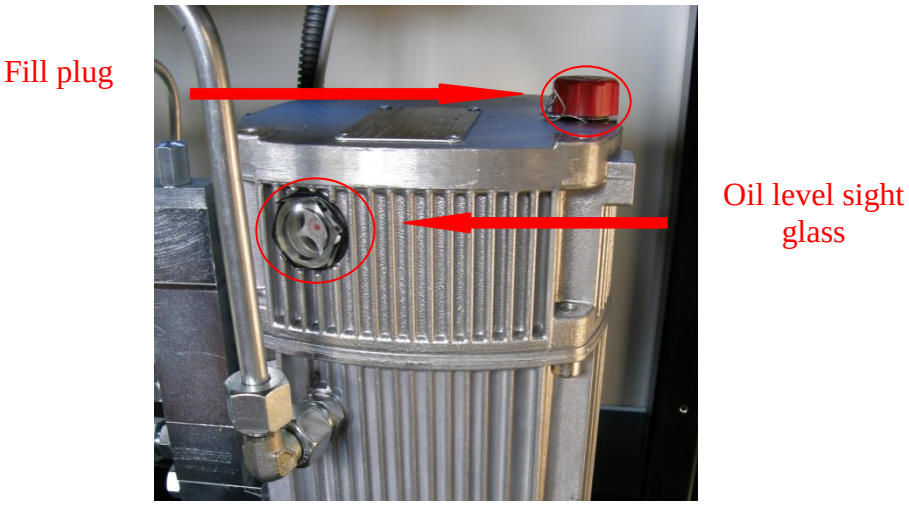


Fig. 42.

Lubrication of the bending insert rollers. The bending insert rollers should be lubricated approx. every 60 bending cycles. Use grease CPSM_805 (ERKO marking) for this purpose. The lubrication points are shown in the figure below. Use a grease gun to lubricate.

Fig. 43.

7.1 HYDRAULIC POWER PACK

Before starting the hydraulic power pack, an operator should get familiar with this TECHNICAL DESCRIPTION. The hydraulic power pack can only be operated by the persons trained in health and safety at work regulations and familiar with the power pack principle of operation.

TECHNICAL DATA

- Supply voltage 3x400/230 V, 50 Hz
- Power 1.68 kW
- Operation type S3 40%
- Maximum pressure 400 bar
- Nominal capacity 1.61 l/min
- Control 24 V DC
- Operating medium L-HM-22
- Tank volume approx. 5 dm^3

HYDRAULIC POWER PACK CONSTRUCTION

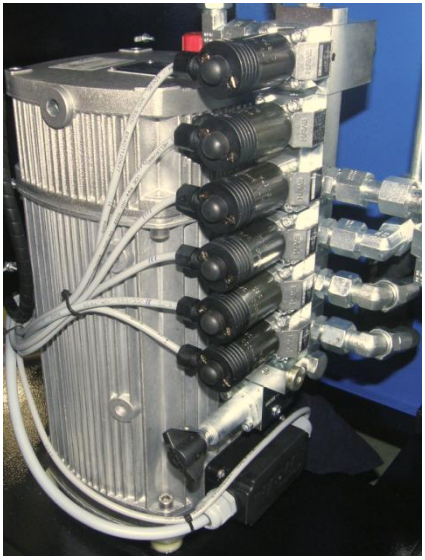


Fig. 44.

Inside the compact housing of the power pack the oil tank, hydraulic pump and electric motor are located. The overflow valve and distribution valves are installed on the power pack housing. The oil level sight glass is placed in the housing and the fill plug with vent on the top cover.

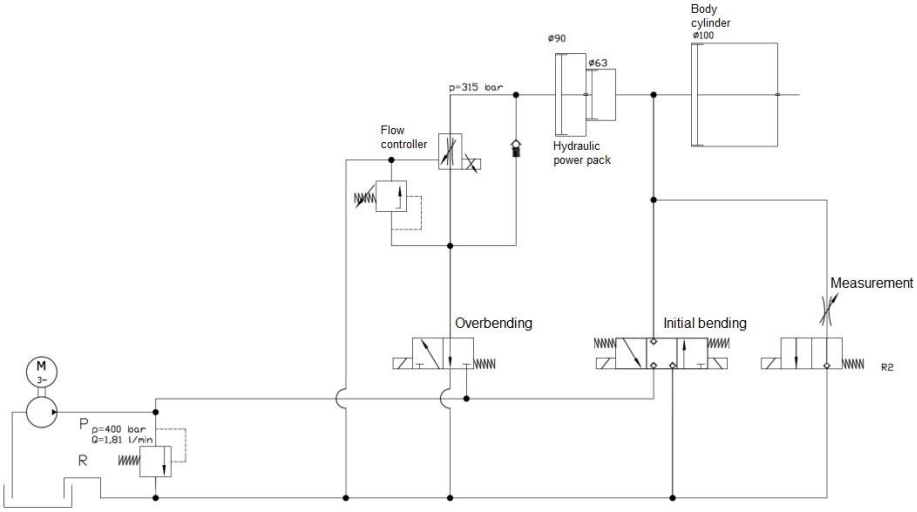


Fig. 45.

7.2 OPERATION AND MAINTENANCE

- Check the oil level before the first start and after each transport of the station. The oil level sight glass should be half full.
- When operation is finished, switch off power supply with the main switch (Q1) and disconnect power supply of the entire station.
- Any maintenance and repair work should be carried out when power supply is disconnected and the hydraulic system is off-loaded.
- The hydraulic power pack is a high pressure unit and the system leak may result in consequences that are difficult to predict. The unit should be operated with great care.
- **Breaking the seals will void the warranty for the entire hydraulic system.**
- The maximum operating pressure set by the manufacturer on the overflow valve is 400 bar and cannot be changed during the station operation (seal).
- Special attention should be paid to oil leaks. Any oil leaks should be immediately repaired.
- Oil should be changed every 12 months. Use oils compliant with DIN 51524 part 1 to 4, of HLP class or ISO 6743/4 of HM class, and ISO VG 22,32 viscosity.
  Recommended oil: Hydrol® L-HM/HLP-22.
  Oil available at ERKO: 1 dm^3 container – order code is OLEJ_HYDR_1, 5 dm^3 container – order code is OLEJ_HYDR_5.
- It is recommended to inspect the tank for cleanliness, rinse the tank, change oil and inspect the hydraulic system every 12 months.
- Keeping oil clean and its periodic replacements are essential for component parts of the hydraulic system and considerably extend their service life and

reliability. The required oil cleanliness: class 9 (recommended 8) according to NAS 1638 standard.

- After filling with new oil, bleed the hydraulic power pack. To do this, start the pump for short cycles (2 s) until the unit cylinder is maximally extended. At first, the system should be off-load. Gradually increase load until the maximum operating pressure is achieved (oil flows through the overflow valve) and the pump operation is smooth and quiet. In the case of loud and irregular operation of the hydraulic power pack and no force, repeat the bleeding. Failure to bleed will make it impossible to achieve the operating pressure, and in extreme case, it may lead to the pump seizure.
- During the station operation, as part of the daily maintenance it is required to check the system for tightness and repair any oil leaks immediately and check oil level in the tank.
- In case of a failure, switch off power supply and contact the service personnel. Warranty repairs can only be carried out by the manufacturer service personnel or its authorised representatives.
- Protect the station against adverse weather conditions, corrosion, impurities and mechanical damage. When the station gets wet, dry it. When the station gets dirty, clean it (with a dry cloth). When the station is not operated for a long time, provide clean and dry storage conditions. Correct maintenance and operation considerably extends the station service life.

After one year or when a number of the hydraulic power pack operating cycles achieves the number set by the manufacturer from the first start of the station, the message informing about the necessity of carrying out the technical inspection (Fig. 16) will be displayed for 10 seconds after each following start of the station. When the information window disappears, work on the station can be continued.

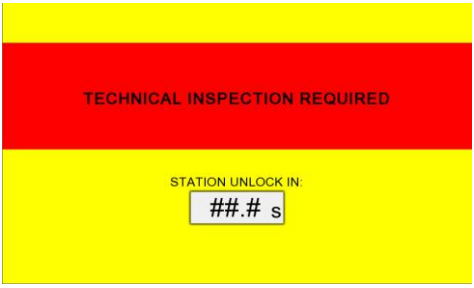


Fig. 16

Note: The station can only be operated at temperatures specified by the manufacturer (according to item 2). Operation at other temperatures may, in extreme cases, result in damage to the hydraulic power pack.

7.3 MESSAGES

I. “EMERGENCY STOP BUTTON PRESSED” MESSAGE

This message informs an operator of the Q2 button being pressed. To return to the menu, the Q2 button must be reset to the normal position. Then the window informing about the necessity of controlling the safety system with the “RESET” button will be shown. After pressing the “RESET” button, the station is ready for operation.

II. “HIGH OIL TEMPERATURE” MESSAGE

If this message is displayed, immediately stop working on the station and wait until oil temperature decreases (depending on ambient temperature, this time may vary).
Note: When this message is frequently shown, please contact the manufacturer service.

III. “NO CORRECT POWER SUPPLY” MESSAGE

When this message is displayed, switch off the station with the main switch (Q1) and then check if:

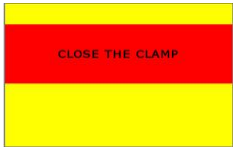
- The station plug is correctly connected.
- The supply socket is correctly connected to the power supply system.
- The power supply system parameters are compliant with the applicable standards.

Note: The requirements concerning the station power supply are described in item 2.

IV. “PRESS THE RESET BUTTON" MESSAGE

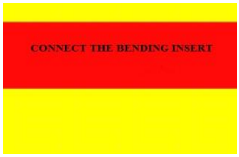
This message informs about the necessity of controlling the safety system with the “RESET” button. After pressing the “RESET” button, the station is ready for operation.

V. “CLOSE THE CLAMP" MESSAGE



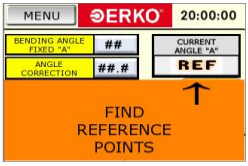
If this message is displayed, close the clamp until it rests on the punch retainer.

VI. “CONNECT THE BENDING INSERT" MESSAGE



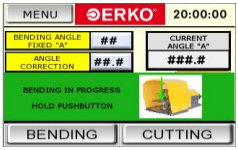
This message informs about no connection between the insert and the station. Insert the plug into the insert socket mounted on the station and check if the cable is not damaged. When the message is still displayed, please contact the manufacturer service.

VII. “FIND REFERENCE POINTS” MESSAGE



This message informs the station operator about the necessity of finding the reference point of the CUTTING ENCODER. Reference point searching processes are described in detail in item 2.3.

VIII. “BENDING/CUTTING PROCESS IN PROGRESS” MESSAGE



This message is a prompt and informs the station operator about the necessity of keeping the foot switch pressed (until the message is changed to the “BENDING/CUTTING PROCESS COMPLETED” message).

IX. “BENDING/CUTTING PROCESS COMPLETED” MESSAGE

This message is a prompt and informs the station operator about the necessity of releasing the foot switch being pressed.

X. “INSERT LUBRICATION IS REQUIRED” MESSAGE

This message informs the station operator about the necessity of carrying out the insert lubrication. This message is displayed regularly, i.e. every approx. 60 bending cycles.

Troubleshooting of the station

Problem	Cause	Problem solution
1. After switching on the station, the power supply indicator lamp is not illuminated	a. No power supply b. No 1 phase c. Voltage drop to 175 V/ phase	Check the power supply source.
2. The station switches off during operation	a. Phase failure at the motor b. Motor protection tripping c. Power supply failure	Check the power supply source and motor protection.
3. Noisy pump operation without the cylinder extension	a. Solenoid valve failure	Contact the manufacturer service.
4. No reference points	Permanent or temporary loss of communication between the encoders and controller	Restart the station and search the reference points. Contact the manufacturer service.
5. Incorrect indications on the control panel	Incorrect communication between the actuators and control panel	Restart the station. Contact the manufacturer service.

8 HEALTH AND SAFETY AT WORK INSTRUCTION

1. The HG200 can be operated by an employee who is of age, who has read the operation manual and has been trained in safety procedures for the station.
2. Proper positioning of the operating elements should be checked prior to starting the HG200 machining station.
3. The equipment can be operated only when at full technical performance.
4. Prior to starting up check the following:
   - Condition of the electrical system
   - oil level in the hydraulic supply
   - condition of mobile elements
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 equipment
7. HG200 station should only be used for its intended use.
8. Prevent debris collection around the machining station. In case of high dust concentration, cover the equipment.
9. **Starting the equipment while performing any maintenance (assembly, disassembly, positioning the machined materials is forbidden).**
10. **Switch the generator on only after making sure that the preparation has been finished and there is no danger of damaging the equipment or wounding any body parts.**
11. In case of emergency, follow company instructions about emergency.

9 SERVICING

ERKO provides full service both during and after the guarantee period.

10 DISPOSAL

After the end of the exploitation period, utilize or recycle the particular elements of this equipment according to the regulations in force:

"Zgodnie z przepisami Ustawy z dnia 29 lipca 2005r. o ZSEiE zabronione jest umieszczanie łącznie z innymi odpadami zużytego sprzętu oznakowanego symbolem przekreślonego kosza. Użytkownik, chcąc pozbyć się sprzętu elektronicznego lub elektrycznego, jest obowiązany do oddania go do punktu zbierania zużytego sprzętu.
Powyższe obowiązki ustawowe zostały wprowadzone w celu ograniczenia ilości odpadów powstałych ze zużytego sprzętu elektrycznego i elektronicznego oraz zapewnienia odpowiedniego poziomu zbierania, odzysku i recyklingu. W sprzęcie nie znajdują się składniki niebezpieczne, które mają szczególnie negatywny wpływ na środowisko i zdrowie ludzi."