Profi Bend	PB 40-3 / PB 50-3 / PB 50-3H
	Reference
Instruction Manual	

Profile Bending Machine

PB 40-3 / PB 50-3 / PB 50-3H

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Introduction

This instruction manual is an inseparable part of the machine it describes, which cannot be used without the manual. Any modifications of this manual are prohibited without the manufacturer's prior consent.

The operator of the profile bending machine and the person performing maintenance and repair must read this instruction manual. So, before starting the machine, read this instruction manual carefully and become familiar with the operation of the machine, its design and the principles of the operation.

The machine's identification data is found on the rating plate on the housing of the profile bending machine (fig. 1).

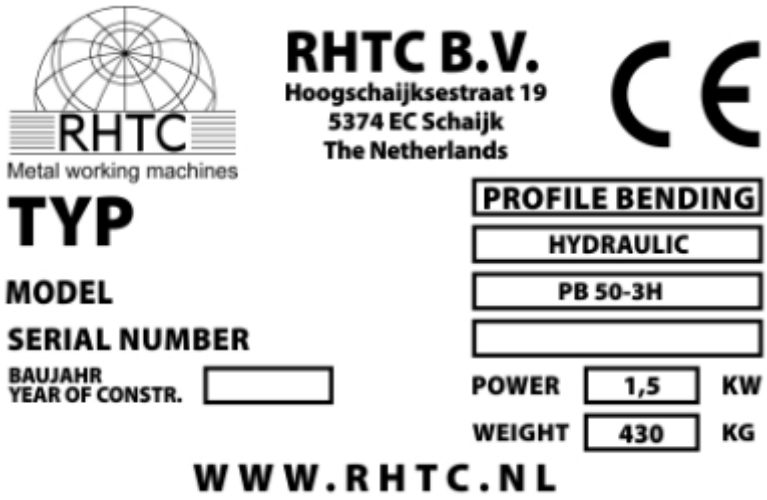

Fig. 1. Profile bending machine rating plate

Only a legal adult, with the proper qualifications and training adequate to the operation of such machinery, may operate the hydraulic press. Following the recommendations and guidelines in the instruction manual ensures easy maintenance and safety for the personnel operating the machine.

RHTC reserves the right to make modifications and changes without giving prior notice and accepts the obligation to update this manual according to the policy of continuous product improvement and modernization that we have adopted.

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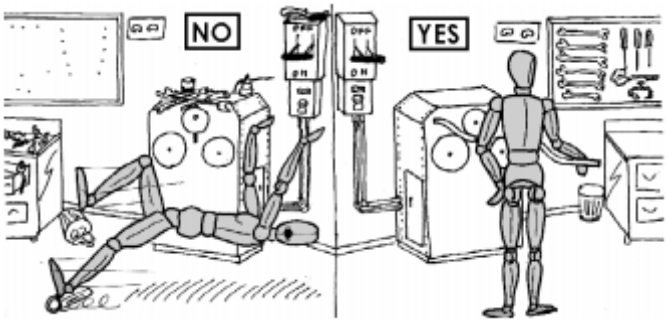
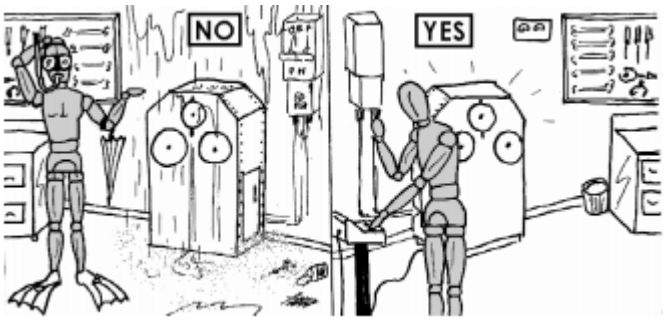
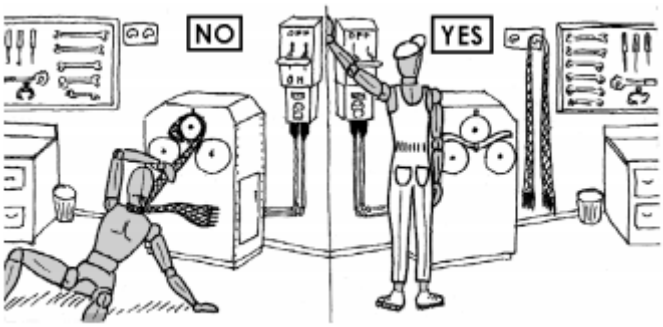
Hazard warning symbol

If you see this symbol: take caution against the hazard, read the relevant information carefully and inform other operators.

1. Guidelines concerning a safe use

	Maintain cleanliness and order. Objects scattered in a disorderly way in the work area may pose a hazard.
	Provide the machine with an appropriate work environment by: • Avoiding exposure of the machine to rain, • Avoiding machine operation in a humid environment, • Removing stains of oil and other lubricants on the machine and on the floor in its vicinity, • Working on the machine in a well-lit environment
	Abiding by rules wearing the proper clothing during work on the machine: • Sleeves must be elastic. • Not wearing belts, rings or chains. • Wearing protective footwear. • Long hair must be covered (helmet, cap, mesh or similar). • During work, wear protective gloves.

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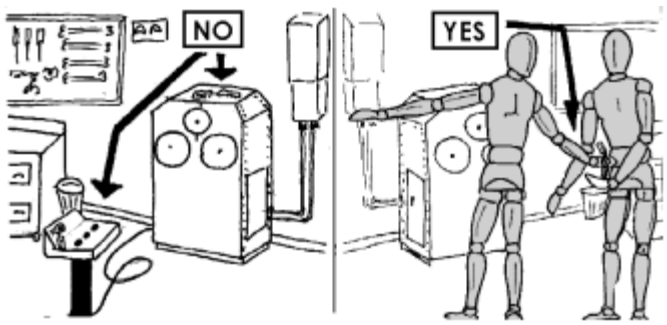
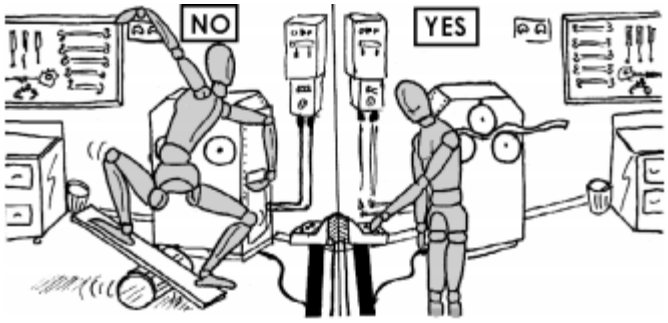
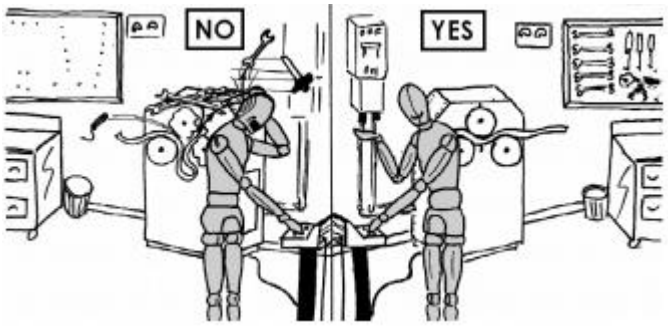
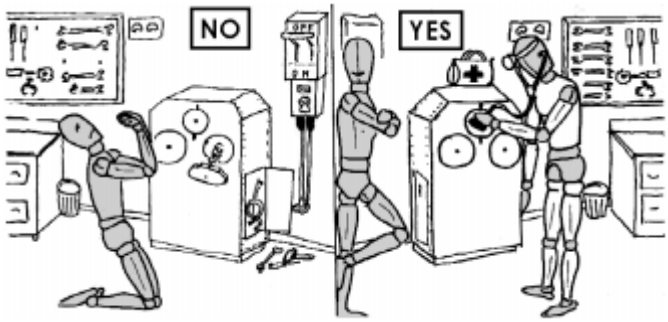
	Keys to the machine's electrical cabinet and other machine subassemblies are to be provided to personnel authorized to maintain it. Avoid leaving the door of the electrical cabinet or other machine subassemblies open. Avoid leaving keys to the electrical cabinet or maintenance tools in the machine’s vicinity, so that they are not accessible to anyone passing by the machine.
	Ensure a stable work position near the machine, minimizing the risk of tripping and/or falling down in the profile bending machine’s vicinity
	Make sure that tools and other equipment used for regulation and maintenance of the machine have been removed prior to its startup.
	Machine repairs must be performed solely by personnel authorized to do so, using original spare parts supplied by the machine's supplier. Failure to abide by the instructions given above may pose a risk of injury to the operator and/or unserviceability of the machine.

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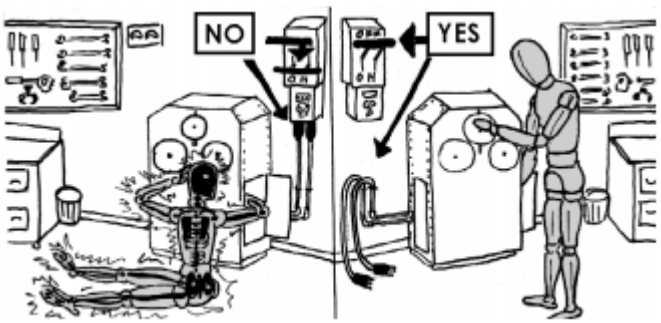
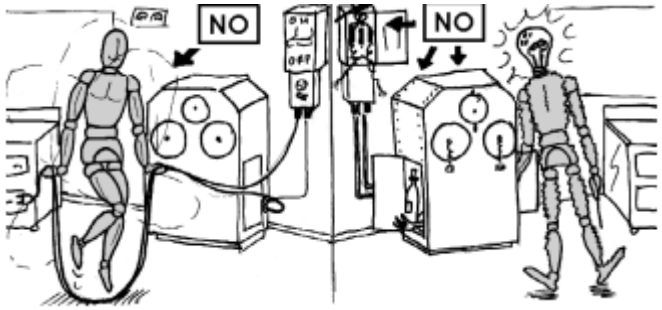
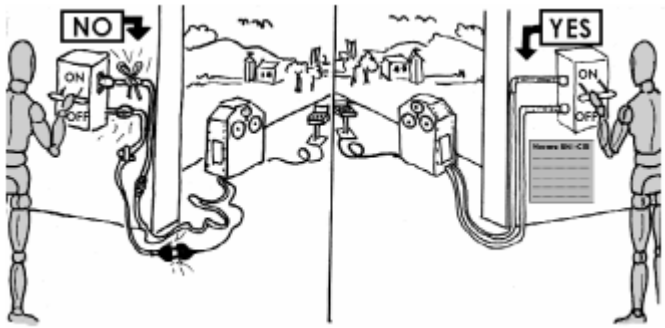
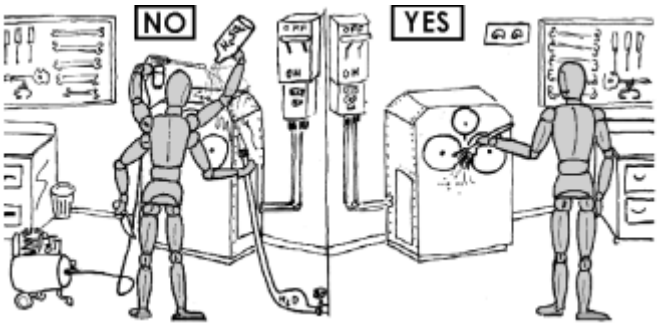
	Disconnect the machine from its power supply when changing tools on the machine or during any work on the machine's electrical equipment.
	Connect the power cord to a socket and wind it to the optimal length, not obstructing operation of the machine. Protect the cord against high temperature, aggressive fluids and sharp edges.
	Outdoor operation of the machine: use extension cords meeting safety requirements to power the machine.
	It is prohibited to use pressurized water to clean the machine. Avoid using compressed air and aggressive chemicals (e.g. solvents) to clean the machine.

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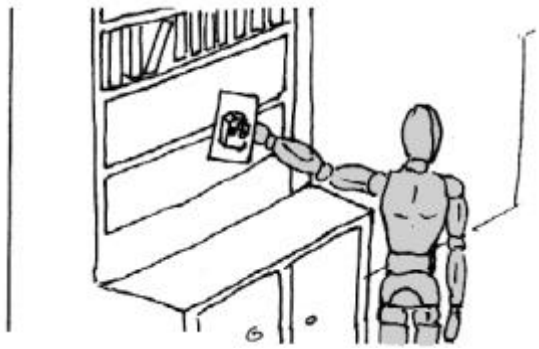

Keep this instruction manual in a safe place, since it must be available throughout all the years of the machine's operation.

Furthermore:

1. This instruction manual must be read carefully before commencing any work.
2. The machine must be used solely for the purposes for which it was manufactured and designed.
3. Only a legal adult can operate the profile bending machines. The operator needs to be trained in OHS (Occupational Health and Safety) regulations and in the scope of working with machines serving for cold metalworking.
4. Unauthorized persons, particularly children, are prohibited near the machine while it is in operation.
5. It is prohibited to use a machine that bears signs of mechanical damage or electrical damage.
6. The operator of the profile bending machine is obligated to keep the workstation clean and orderly and to not allow bystanders to operate the machine.
7. Before using the machine, inspect its technical condition, the fastenings of individual mechanisms, the power cord, socket and plug, and the power switch.
8. Repair and maintenance of the electrical installation needs to be entrusted to persons holding the relevant licenses.
9. It is prohibited to connect the profile bending machine to a faulty electrical installation.
10. It is prohibited to connect power cords bypassing the socket - plug system.
11. In the case of a break in electrical supply, disconnect the machine from the power immediately.
12. If sparking is observed in the electrical installation, shut the profile bending machine down immediately. The machine may only be restarted after the failure is resolved.
13. In the case of fire in the electrical installation, powder extinguishers are to be used. Do not use any other types of extinguishers or water.
14. It is prohibited to leave the machine unattended while it is running.

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15. It is prohibited to move the profile bending machine while it is running / connected to the electrical grid and / or a section to be bend is mounted.
16. It is prohibited to perform work involving the replacement of bending rolls or repair and maintenance work on the machine while it is connected to the electrical grid.
17. Check and tighten threaded joints regularly.
18. It is prohibited to place hands or other body parts into the workspace of the bending rolls while the machine is running.
19. It is prohibited to use bending rolls other than those manufactured by RHTC.
20. Contamination may only be removed from the profile bending machine using a brush after removing the rolled section from the workspace first.
21. It is prohibited to start the machine while the cover of the gear is not mounted.
22. Persons who are in an intoxicated state, under the influence of drugs, or have a health condition disqualifying them from the operation of such machinery, unauthorized persons and bystanders, particularly children, are prohibited from operating this machine.
23. It is prohibited to wear jewelry (watches, rings), loose clothing, i.e. scarves, ties, unzipped jackets, that may get caught or pulled in by the machine's moving elements. Wear protective clothing and goggles.
24. Always use personal protection equipment meeting the requirements of directive 89/686/EEC in order to eliminate the risk of injury due to scraping, cutting, crushing, etc. hazards. Use the appropriate tools and gloves when replacing parts.
25. It is prohibited to use the machine in the vicinity of flammable or explosive substances
26. It is prohibited to expose the electrical parts to water, rain or moisture. Wet machines pose a hazard and may lead to electric shock.
27. Take special caution when changing the working position of the profile bending machine, please make sure you perform this action with two persons.
28. The profile bending machine must always operate on a stable base, ensuring safe and convenient access.

The machine's manufacturer is not liable for cases where the above instructions are not followed.

Failure to comply with the guidelines given above poses the risk of an accident and disability !

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1.1 Personal protection equipment

It is prescribed for the machine's operators and maintenance personnel to use the following personal protection equipment (PPE), compliant with directive 89/686/EEC:

1. Gloves: cut- and tear-resistant during work and maintenance on the machine.
2. Protective goggles: Use particularly during cleaning of the machine and during maintenance work on the hydraulic unit.
3. Footwear: With steel toecaps and anti-skid soles.

1.2 Informational symbols and warning signs

The profile bending machine has a rating plate (fig. 1) containing the following information:

- Model
- Year of production
- Serial number
- Weight

Warning signs and informational symbols located on the machine, are explained in table 1.

The condition and readability of pictograms needs to be checked regularly. When they are damaged, the pictograms must be replaced.

Table 1. *List of pictograms and their locations*

Item no.	Warning sign or informational symbol	Meaning	Position on machine
1		Do not place any limbs in moving parts of the machinery	Gear cover

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2		Read the instruction manual	Body of the profile bending machine
3		Prescription to use head protection	Body of the profile bending machine
4		Prescription to use eye protection	Body of the profile bending machine
5		Prescription to use hand protection	Body of the profile bending machine
6		Prescription to use foot protection	Body of the profile bending machine
7		24V voltage	Foot pedal switch
8		Prescription to use protective clothing	Body of the profile bending machine

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9		Warning against moving rolls	Body of the profile bending machine, near bending rolls
10		Attention! under voltage	Electrical cabinet's door
11		Direction of forklift access	Base of the profile bending machine

2. Machine characteristics and purpose

This section describes the main characteristics and the purpose of the machine.

2.1 Machine specifications

Table 2. *Technical specifications of the profile bending machines*

	PB 40-3	**PB 50-3**	**PB 50-3H**
Shaft diameter [mm]	40	50	50
Roll diameter [mm]	150	150	150
Rotational speed of rollers [rpm]	10	10	10
Motor power [kW]	1.5	1.5	1.5
Motor rotational speed [rpm]	1400	1400	1400
Adjusting way [mm]	72	120	120
Rated voltage [V]	230/400/50Hz	230/400/50Hz	230/400/50Hz
Rated current [A]	6.1 / 3.5	6.1 / 3.5	6.1 / 3.5
Total length [mm]	870	1100	1200
Total width [mm]	800	800	800
Total height [mm]	1350	1400	1750
Weight [kg]	290	355	430

2.2 Purpose of the profile bending machine

The profile bending machine performs a cold rolling process, based on deformation of the material. The process is effected by the static compression via the bending rolls of the machine, which is found between one active bending top roll (effecting the static compression) and two bottom rolls putting the 'to be' rolled section into motion.

The profile bending machine is intended for bending rods, pipes and constructional sections. The range of dimensions, depending on the shape and material, is given in tables 3 and 4.

Table 3. Range of dimensions of rolled constructional sections & pipes for PB40-3

Shape of cross-section	Dimensions
	20x6 ø200 50x10 ø400
	30x6 ø200 80x15 ø350
	10 ø100 30 ø600
	40x40x2,9 ø1000
	20x20x3 ø250 50x50x8 ø400
	20x20x3 ø250 50x50x6 ø500
	50x25x5 Ø300
	50x25x5 Ø400
	40x40x5 ø400
	30 ø600
	30x15 ø600 60x1.5 ø1000

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Table 4. Range of dimensions of rolled constructional sections & pipes for PB50-3(H)

Shape of cross-section	Dimensions
	20x6 ø300 60x10 ø500
	50x10 ø300 100x15 ø400
	15 ø250 35 ø600
	20x20x2 ø250 50x50x3 ø1400
	30x30x4 ø350 60x60x6 ø800
	30x30x4 ø350 60x60x6 ø800
	30x15x4 ø300 80x45x6 ø600
	30x15x4 ø350 80x45x6 ø800
	25x25x4 ø350 50x50x6 ø500
	10 ø250 35 ø500
	30x15 ø600 70x1.5 ø1500

As a result of working with the profile bending machine, we receive a product in the form of a bent section. It should be noted that unbent segments remain at the end of the bent section after the rolling process. These segments are equal to half of the length of the bottom rolls' spacing. Figure 2 illustrates the effects of the work.

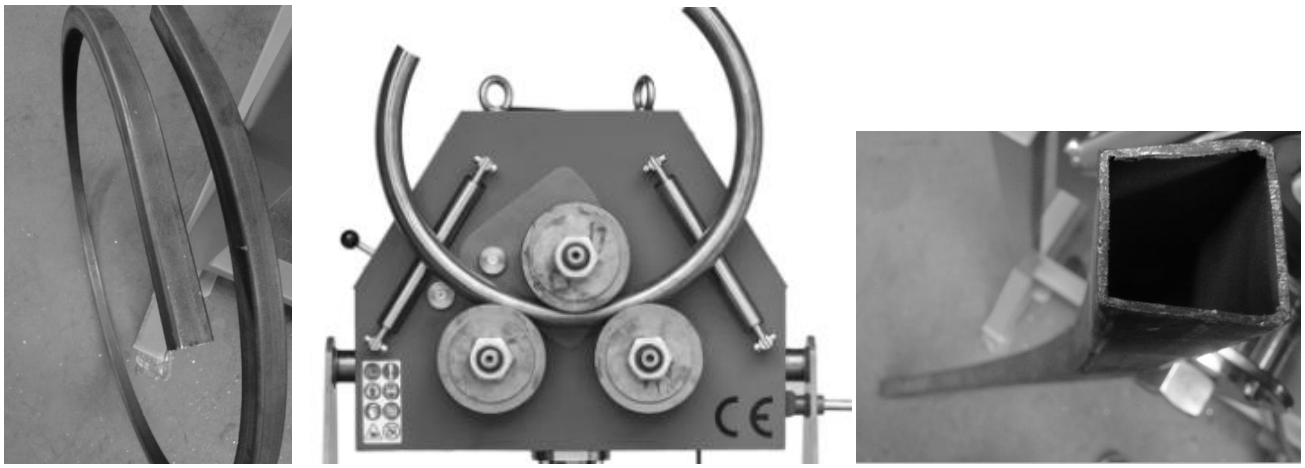

Fig. 2. Example details bent on the PB50-3

2.3 Description of the design of the machine

The working (rolling) system of the profile bending machine (fig. 3) consists of two guide rolls (1, fig. 3) and one top, active bending roll (2, fig. 3) whose working position can be adjusted by means of a rotating handle / arm (3, fig. 3). The PB40-3 and PB50-3 are both equipped with this handle for adjusting the upper roll position and the PB50-3H is equipped with an hydraulic system / handpump for adjusting the position of the upper roll. This will be explained later in this manual.

All 3 rolls are driven by a motor reducer (4, fig. 4). It is possible to disconnect the upper bending roll from the drive by means of changing the position of the lever on the side of the machine (5, fig. 4). The movement of the rolls is initiated by pressing and holding one of the two foot pedal switches on the foot-operation controller (6, fig. 4). Each foot pedal switch corresponds to a direction of roll rotation (clockwise or counterclockwise).

The body (7, fig. 3) which is fastened to the base frame (8, fig. 3) is protected against damage by the section thanks to adjustable guide rollers (9, fig. 3). It is possible to adjust their distance from the body by means of adjusting the nuts found in the rear part of the body.

The body is fastened to the frame by means of two pins rotating in sleeves. The working position of the profile bending machine can be changed to a horizontal position by pulling the securing pin (10, fig. 3), rotating the body by an angle of 90° with the motor reducer facing downwards, and pushing back the pin into the body.

The profile bending machine is equipped with 2 emergency stop buttons. One is found near the electrical cabinet (11, fig. 3) and the other on the foot controller (12, fig. 4).

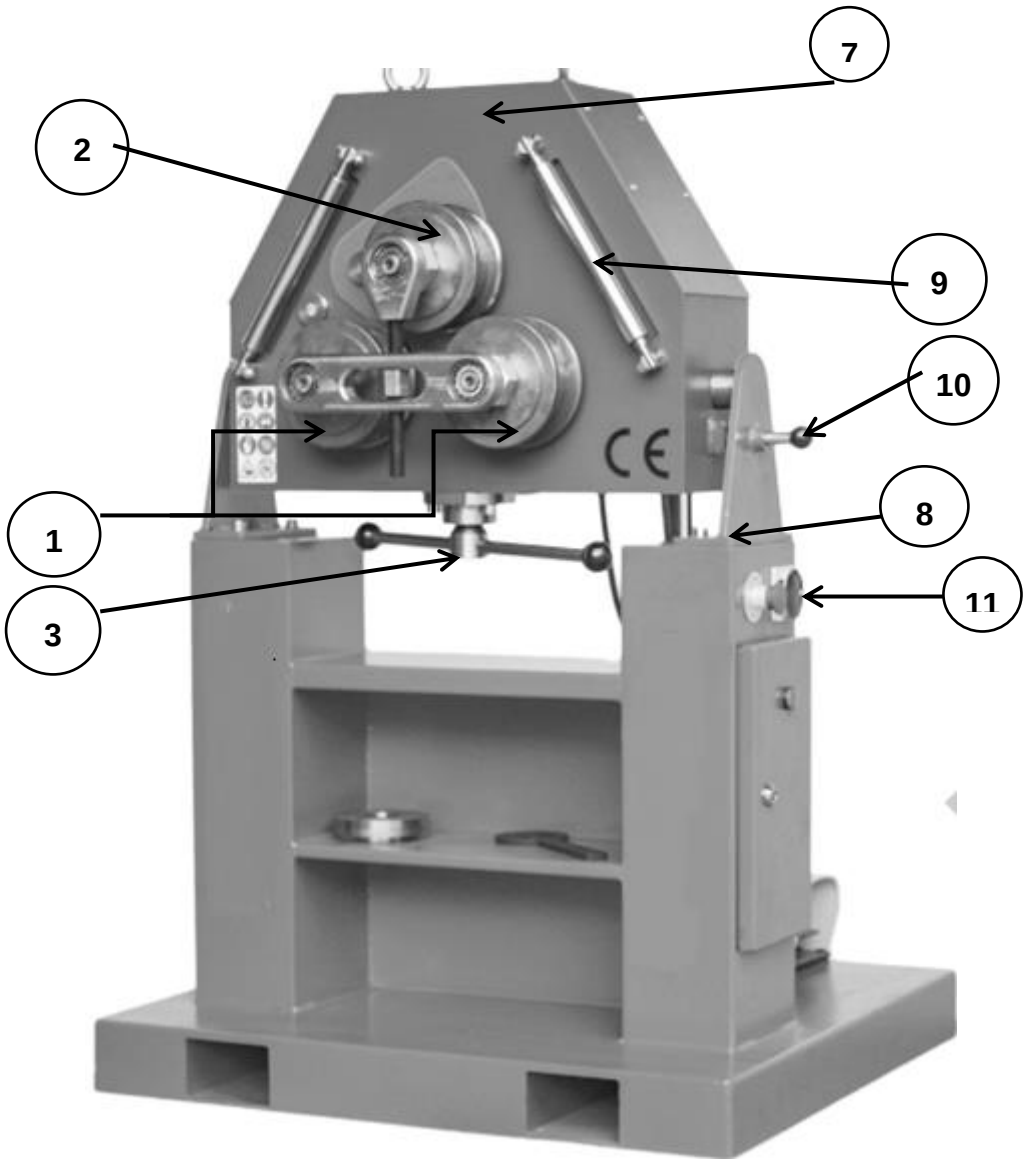

Fig. 3. Profile Bending Machine (PB40-3 & PB50-3): 1 – guide / lower rolls, 2 – active bending / upper roll, 3 – rotating arm for adjusting position upper roll, 7 – body, 8 – frame, 9 – section guides, 10 – pin for changing the working position, 11 – emergency stop button.

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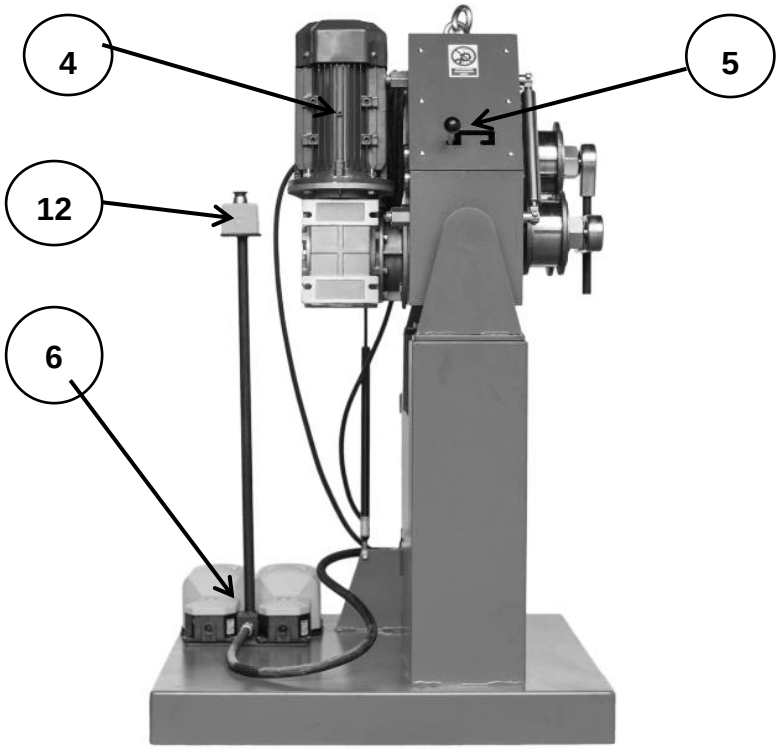

Fig. 4. Profile Bending Machine (PB40-3 & PB50-3): 4 – motoreducer, 5 – handle for activating / deactivating the drive of the top bending roll, 6 – foot controller, 12 – emergency stop button.

2.4 Extra explanation PB50-3H

The profile bending machine is also available in a version with a hydraulic adjustment of the upper roll (fig. 5). The upper roll will be pressed down by a hydraulic actuator (13, fig. 5), which performs its motion when a hand pump is used in the manual hydraulic pump (15, fig. 5) that is connected to the oil tank (17, fig. 5). The direction of the movement (up / down) of the upper / top roll can selected by changing the position of the lever on the pump (16, fig. 5). Repeatability during a serial of the same bending is achieved by closing the 2-way valve (14, fig. 5) found on top of the hydraulic actuator.

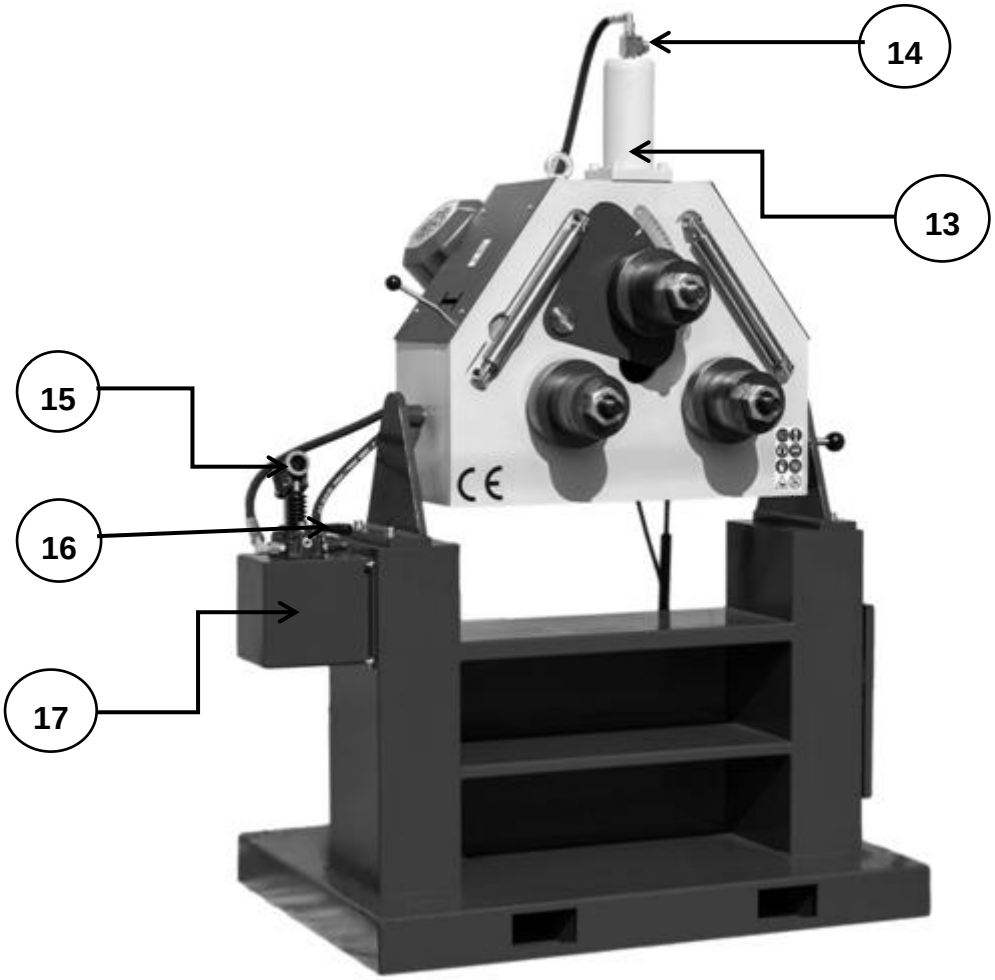

Fig. 5. Profile Bending Machine (PB50-3 H): 13 – hydraulic actuator, 14 – 2-way valve, 15 – hydraulic pump for the adjustment of the upper roll, 16 – lever for changing the direction of the movement of the upper roll, 17 – oil tank.

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3. Preparing the machine for operation and the principles of the operation

This section describes a proper positioning of the machine as well as its first start-up.

3.1 Preparing the workplace

The profile bending machine needs to be installed on a level and hardened surface in order to ensure its stability. The electrical installation / power supply must be connected by means of a 5 x 2.5 mm^2 Cu-cable, with a voltage of 3 x 400 V, protected by fuses with a delayed characteristic (type C-fuses) and a load capacity of 20A. The electrical installation needs to be equipped with a residual current device. A 32A/5-pin power socket is required to connect the machine to the power grid. Before connecting the machine to the grid, a qualified electrician needs to control the installation.

The location of the machine should ensure easy access to all elements of the machine and enable a safe and easy insertion of machined sections into the profile bending machine. Figure 6 presents the work area of the operator. The room in which the machine is being operated needs to be equipped with enough light and ventilation providing the appropriate amount of fresh air.

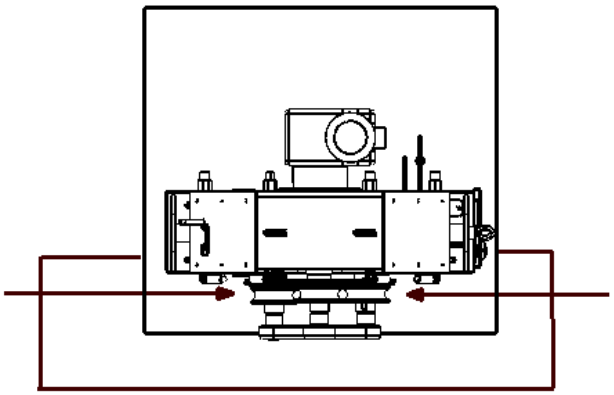


Fig. 6. Presentation of the work area & feeding direction of sections to be rolled

The manufacturer is not in any way liable for damage inflicted during the performance and later exploitation of electrical connections in a manner that is not compliant with applicable regulations!

3.2 Before starting work

Before starting the machine:

1. Read this instruction manual carefully
2. Check whether all hazards have been eliminated from the machine's work area.
3. Check if unauthorized persons are present near the machine.
4. Check whether the pictograms on the machine are readable.
5. Check the condition of threaded joints, tighten any loose bolts.
6. Check the condition of the bending rolls.
7. Check the condition of the top roll (roll should move without any grinding).

	**During first start-up, the profile bending machine should run for about 2 minutes with no material being rolled – the bending rolls are to be put into motion by means of foot controller (6, fig. 4). During this time, it should be checked whether the machine is running evenly and without shocks and that no grinding or scraping noises are observed. In the case where the machine is vibrating excessively or noise of rotating elements grinding against fixed parts can clearly be heard, the machine must be shut down immediately and its power plug removed from the power socket. If possible and permitted according to licenses, check and remove the cause of the failure or contact the manufacturer.**

After every machine start-up, its work should be started without a section placed between the rolls in order to check that it is working properly. After making sure that the machine is running according to the specifications given in the instruction manual and the directions corresponding to the foot pedal, the metalworking on the machine may begin.

3.3 Starting the machine, preparing it for operation

In order to start the motor of the profile bending machine, follow the below steps:

1. Insert the plug into the power socket
2. Unlock the emergency buttons
3. Switch on the master switch from position ‘0’ to position ‘1’

To shut down the motor, set the master switch to the “0” position and wait until you have made sure that the machine has come to a complete stop.

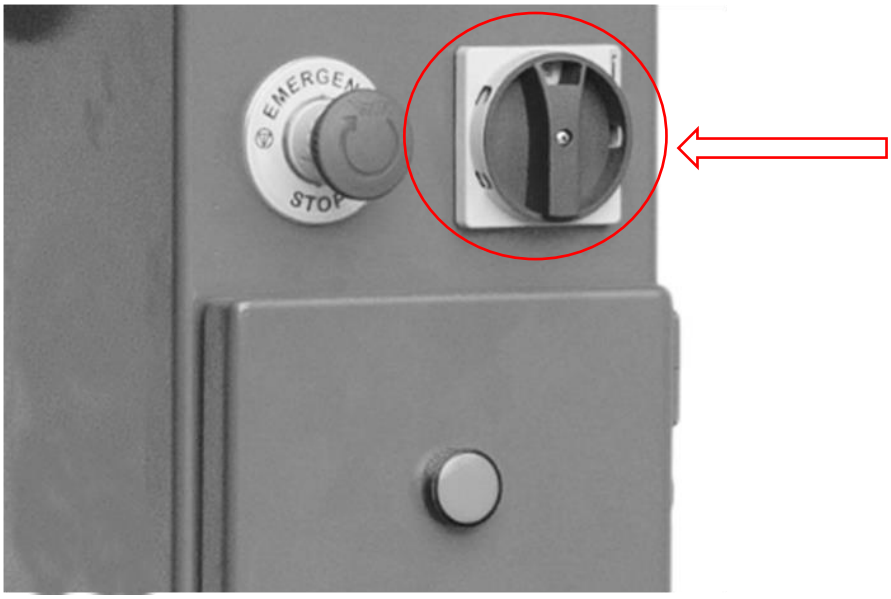


Fig. 7. Master switch in position "0"

	**Due to significant electricity consumption during start-up, it is recommended that the number of start-ups per hour does not exceed 60 times, with intervals of at least one minute. More frequent starting of the machine is harmful to the motor and may cause the automatic disconnector (thermal trigger) to activate. If this occurs, it will be possible to restart the motor after 15 minutes.**

During work with the profile bending machine, particularly during bending of sections/pipes of large dimensions and thicknesses, attention should be paid to whether the motor is running evenly. In the case of excessive pressing force applied to a section and failure to disengage the drive of the active bending roll, the motor may be overloaded, damaged or shut down automatically.

ATTENTION !!!	**In the event of machine failure, always press the emergency stop button (on the foot control or on the body of the machine).** **If the cable connecting the footswitch is damaged or broken, it does not pose a hazard as the voltage supplying the system is 24V.**

3.4 Working positions of the profile bending machine

The body of the profile bending machine is fastened to the frame by means of two pins rotating in sleeves. The working position of the machine can be changed from vertical to horizontal by rotating the machine's body and placing the securing pin in the proper hole (fig. 8).

To change the working position:

1. Disconnect the machine from the power socket.
2. Secure the body against rotation and pull out the securing pin (10, fig. 3).
3. Carefully rotate the body with the motoreducer facing downwards.
4. Place the securing pin back in the body.

	**When changing the working position, make sure that the body is held in a manner that makes any twisting, breaking, torsion, crushing or other bodily injury impossible.**

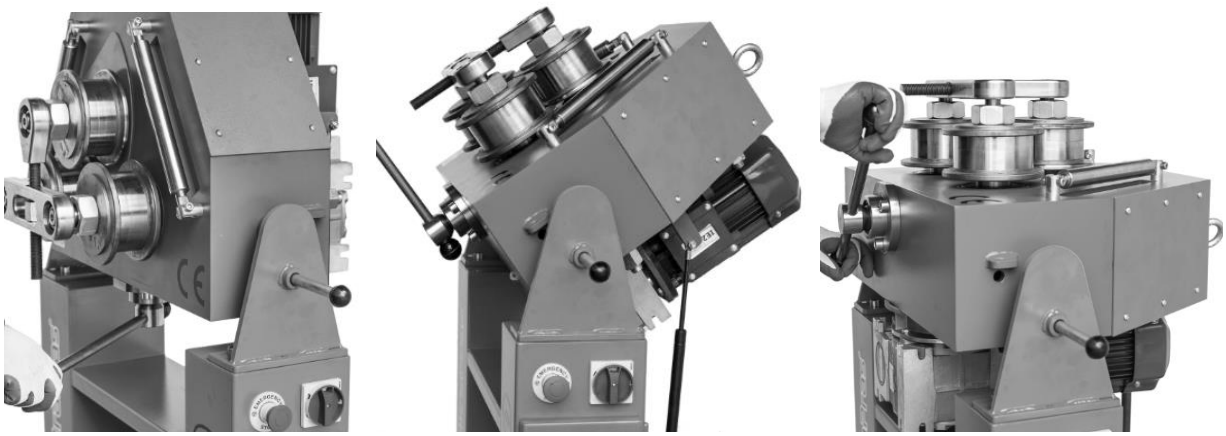


Fig. 8. Presentation of changing the working position

3.5 Positioning the section to be bent

Place the section to be bent between the bending rolls as presented in figure 9 with a red line, then perform the bending by using the active bending roll as explained in this manual.

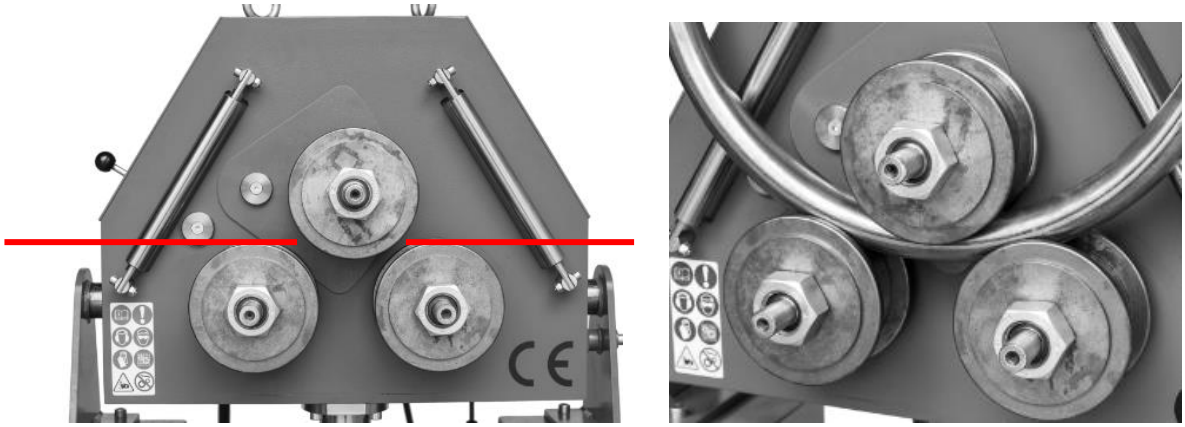


Fig. 9. Position of section between bending rolls

The operator can set the distance between the bent section and the profile bending machine by extending/retracting guides (9, fig. 3), which is done by turning the guide adjustment nuts (fig. 10). Make sure that the guide is at an equal distance from the body at both of ends.

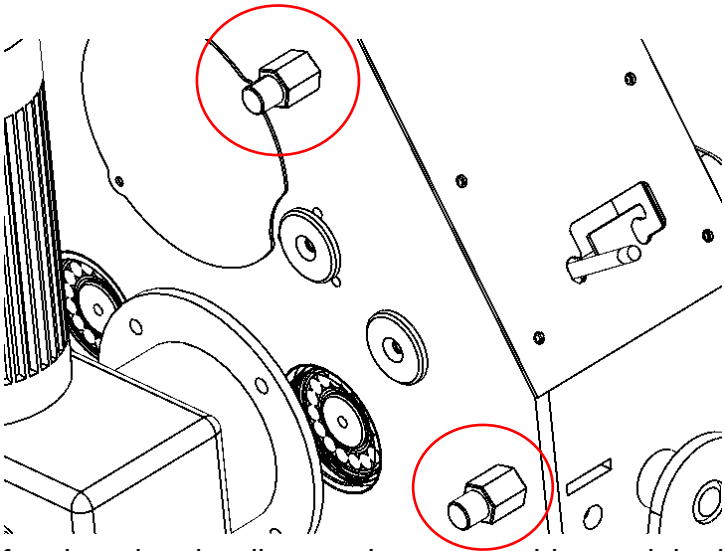


Fig. 10. Nuts for changing the distance between guides and the housing of the machine, located on the rear of the body close to the motor reducer.

3.6 Positioning the roller sets on the shafts

The standard roller set, that is included with the machine, consists of rolls and distance pieces (spacers). The dimensional range of the aforementioned rolls is given in figure 11.1 and 11.2.

The set of rolls and spacers with different dimensions has been designed to allow bending sections within a wide spectrum of shapes and sizes.

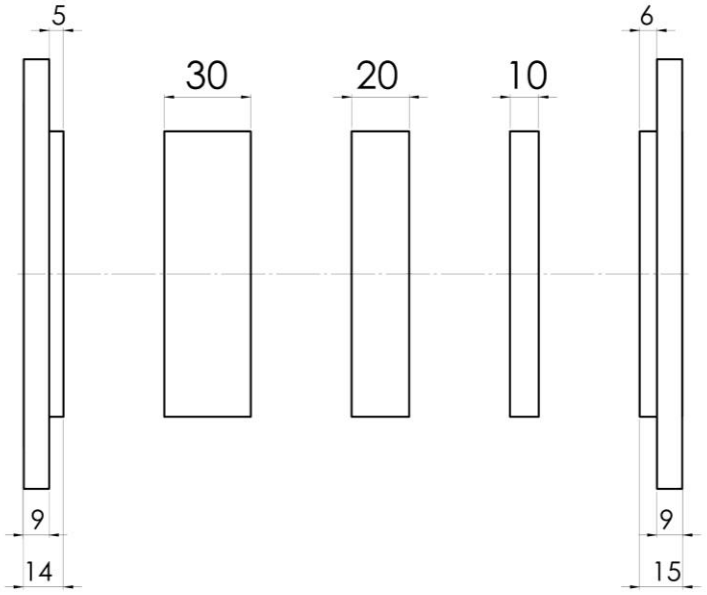


Figure 11.1. Set of rolls and spacers included in the standard equipment of the PB40-3.

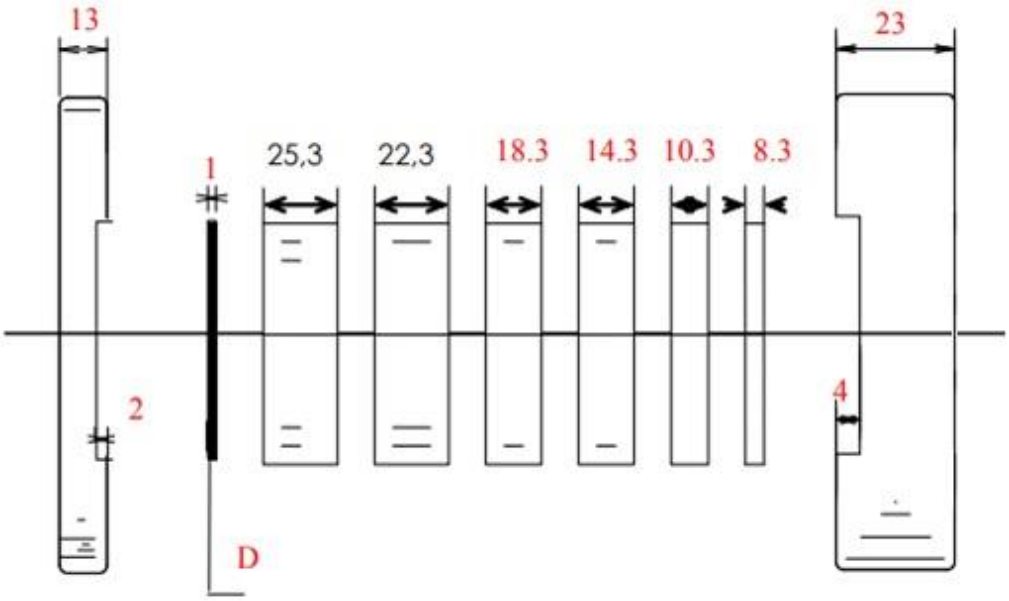


Fig. 11.2. Set of rolls and spacers included in the standard equipment of the PB50-3 (H).

As shown in figure 11.1 and 11.2, the rolls can be fastened in two ways.

After mounting the appropriate number and type of bending rolls for the section chosen by the operator on the machine, make sure that the locknuts on the bending rolls have been fastened properly.

Figure 11.3 presents an example roll and spacer system intended for bending a section with a width of 10mm.

Section width	Roll from side of machine	Spacer roll	Roll from side of operator
10 mm	R2	18.3 mm	R6

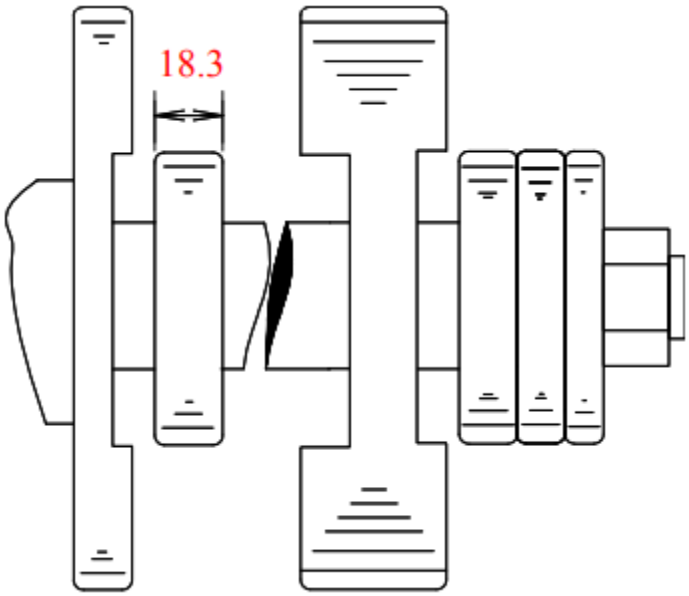


Fig. 11.3. Example roll and spacer system for bent section with a width of 10 mm.

In the case when the bent section is deformed by excessive friction on rolls during work – the solution to the problem is the proper number of spacers with a thickness of 1 mm, which are part of the machine's standard equipment.

In the case when additional rolls are ordered from the supplier or manufacturer of the machine, it must be noted, in particular, that rolls do not have universal dimensions for all types of profile bending machines. Figure 11.3 shows differences in the diameters of bending roll shafts depending on the type of machine. Always mention the model / serial number of the machine before ordering additional rolls.

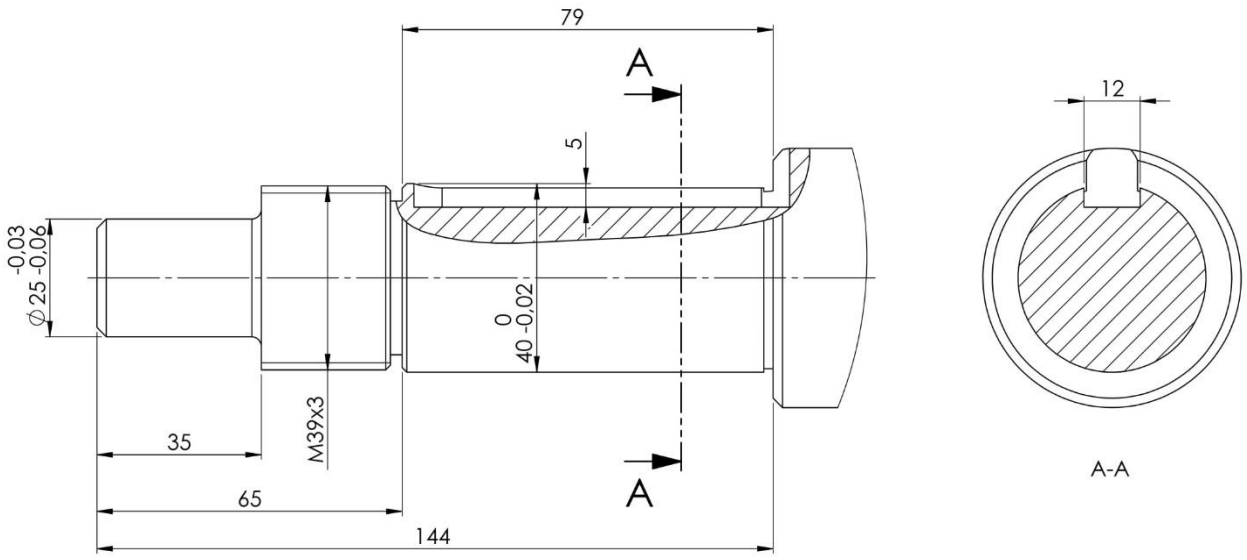


Fig. 11.4. Shaft of the PB40-3

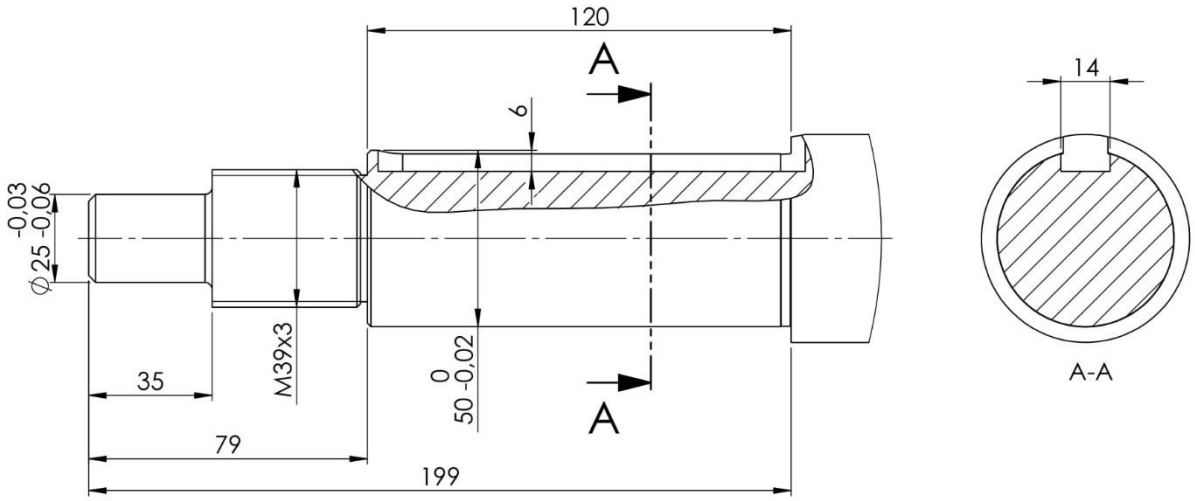
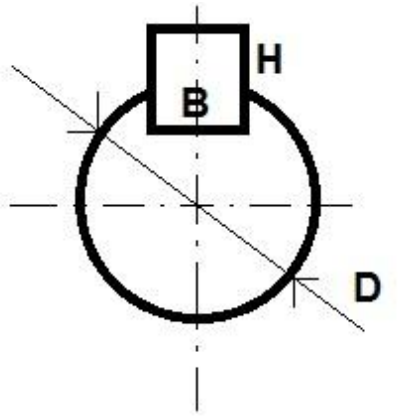


Fig. 11.5. Shaft of the PB50-3/ PB50-3H



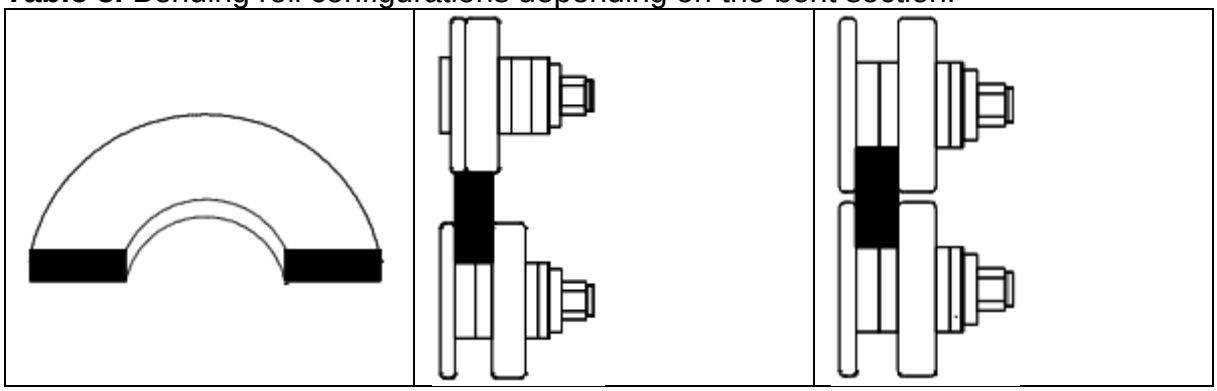
	PB40-3	PB50-3 (H)
SHAFT DIAMETER “D”	40 mm	50 mm
KEY DIMENSIONS “B x H”	12 x 8 mm	14 x 9 mm

Fig. 11.6. Diameter of bending roll shafts depending on model.

3.7 Roll configurations depending on the section type

The bending roller sets described in section 3.6 make it possible to perform bending operations for a wide range of sections. Maximum section sizes are given in table 3 and 4. In table 5 below, roll sets configured for specific types of sections are presented.

Table 5. Bending roll configurations depending on the bent section.



Profi Bend

PB 40-3 / PB 50-3 / PB 50-3H

Reference

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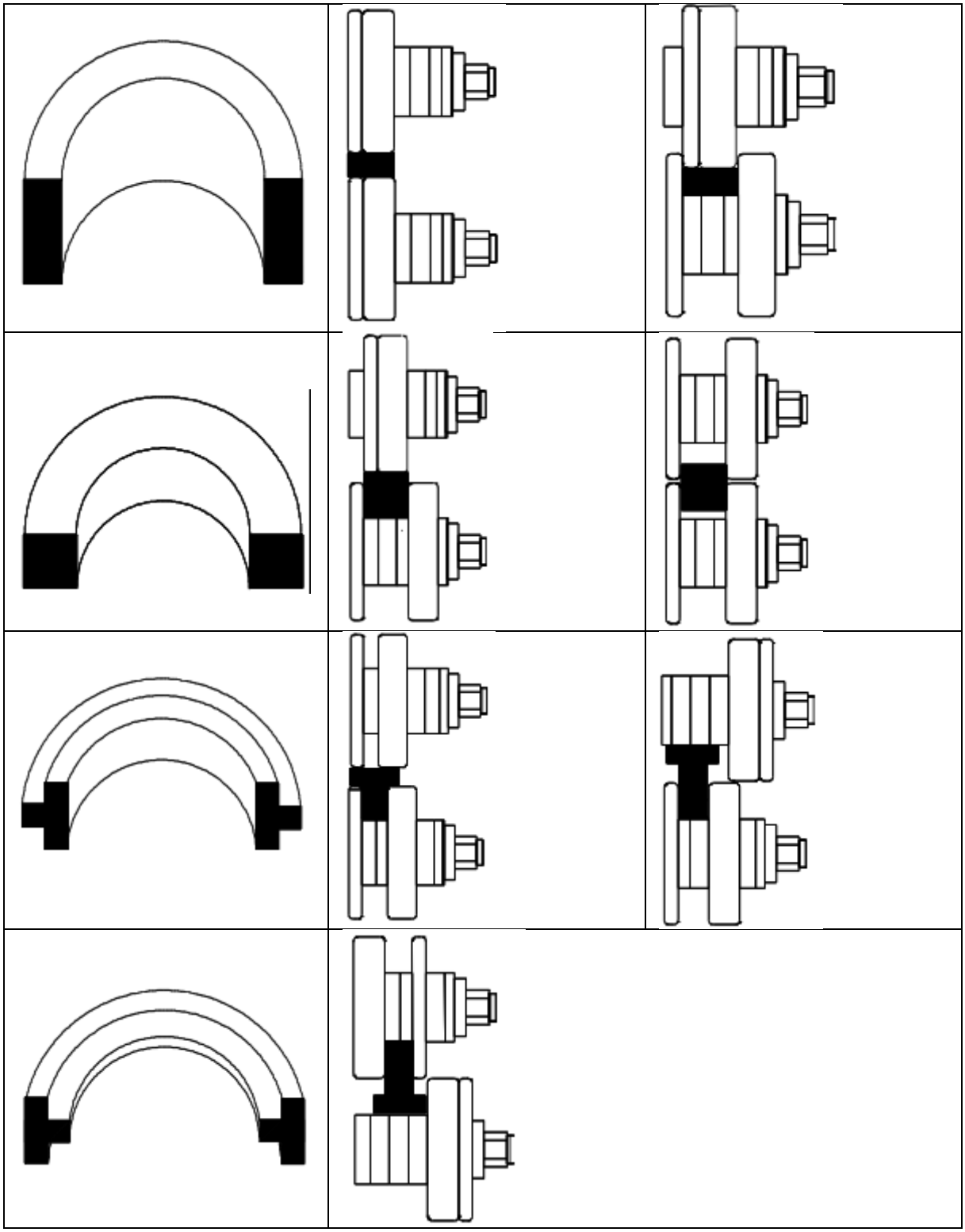

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Profi Bend

PB 40-3 / PB 50-3 / PB 50-3H

Reference

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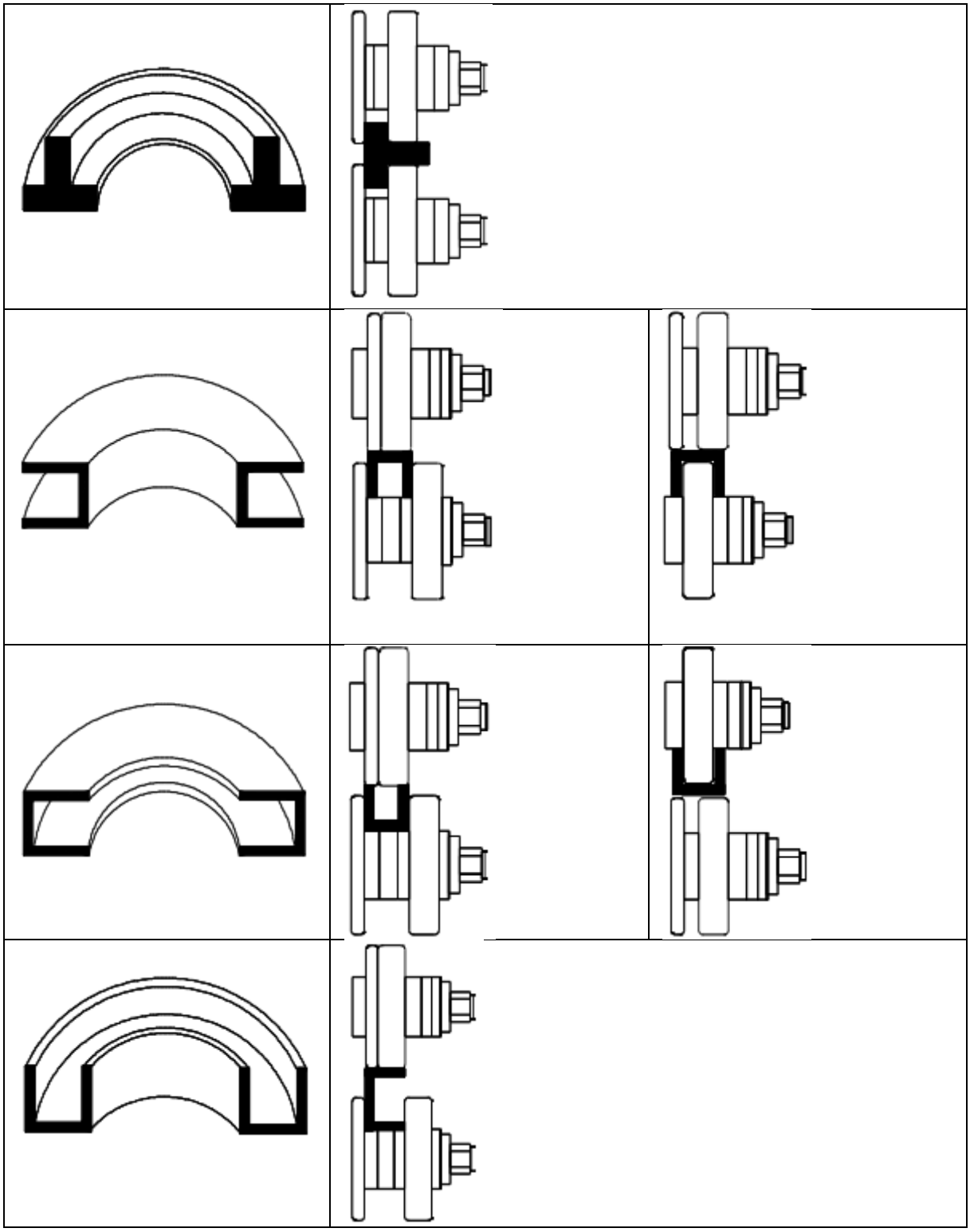

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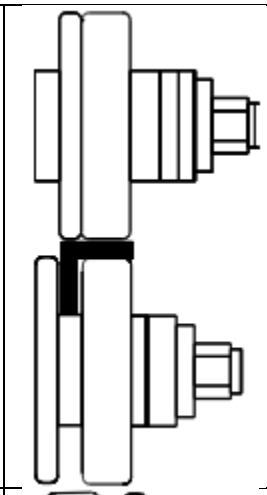

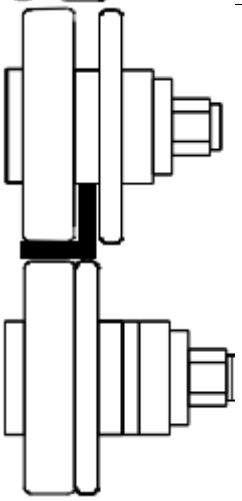

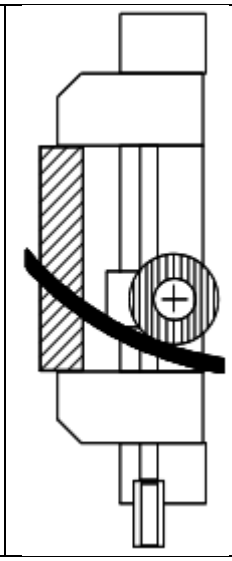

A dedicated straightener, presented schematically next to the bending configuration, is necessary for this type of bending.

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Profi Bend

PB 40-3 / PB 50-3 / PB 50-3H

Reference

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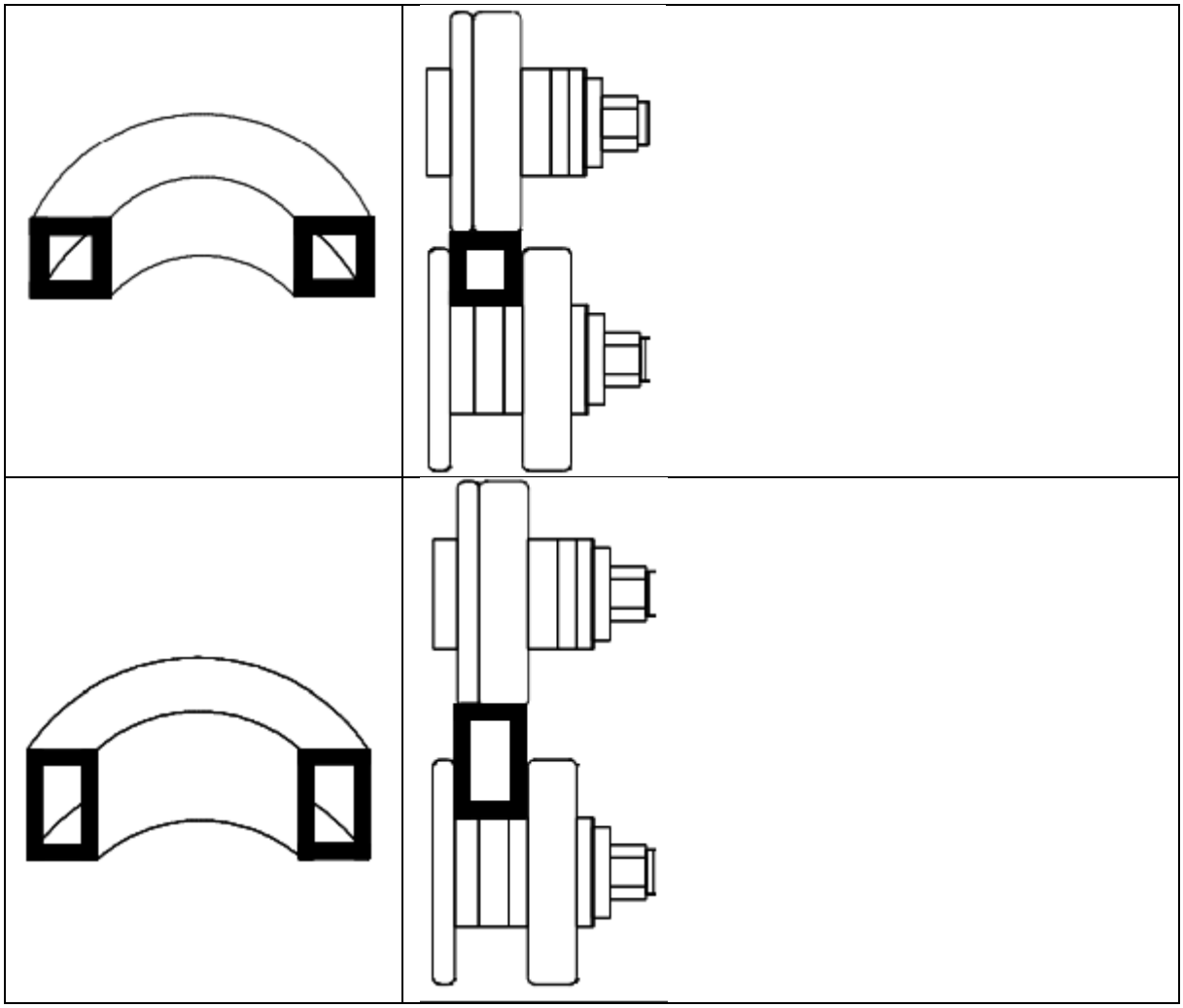

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4. Control of the profile bending machine

This section describes the control of the profile bending machine.

4.1 Activating / Deactivating the top roll drive

In order to activate or deactivate the drive of the top (active) roll in the profile bending machine, switch the position of the handle on the housing.

It is recommended for the top roll's drive to be disengaged when rolling sections with large diameters

In order to **activate** the drive of the top roll:

1. Stop the process of rolling a section.
2. Press the emergency stop button.
3. Switch the handle of the top roll drive to the position indicated in fig. 12. If this goes difficult – rotate the top roll slowly by hand while attempting to switch the handle.
4. Deactivate the emergency stop button.
5. Work with the profile bending machine with three driven rolls can be performed

Fig. 12. Handle activating the drive of the top roll: position for engaged top roll drive

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In order to **deactivate** the drive of the top roll:

1. Stop the process of rolling a section.
2. Press the emergency stop button.
3. Switch the handle of the top roll drive to the position indicated in figure 13.
4. Rotate the top roll by hand – free rotation of the roll means that the drive has been disengaged.
5. Deactivate the emergency stop button.
6. Work with the profile bending machine with only two driven rolls can be performed.

Fig. 13. Handle deactivating the drive of the top roll: position for disengaged top roll drive

4.2 Moving the active bending top roll

In order to perform preliminary bending of a section before starting the rolling process or in order to perform an additional bending on a section during the process, one can move the active bending top roll.

The top roll of the PB 40-3 and PB 50-3 can be moved upwards or downwards with the rotating arm (3, fig. 3). The top roll of the PB 50-3H can be moved upwards or downwards with the hand pump (15, fig. 5).

4.3 Bending measurement

For the PB 40-3 and PB 50-3 a scale of a goniometer (fig. 14) is found near the rotating arm, indicating the displacement of the upper bending roll in mm. Turning the rotating arm by one unit on the goniometer scale corresponds to 0.2 mm displacement of the upper bending roll.

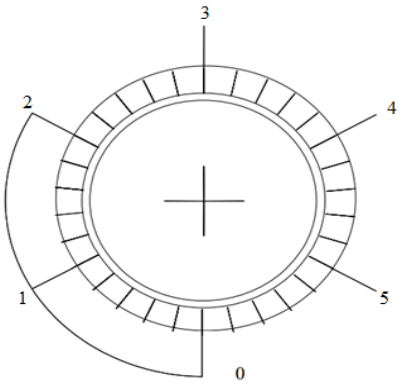

Fig. 14. Goniometer scale

All profile bending machines have a scale next to the upper bending roll to read-out the bending measurement in mm.

Fig. 15. Scale next to the upper bending roll

4.4 Changing the turning direction of the rolls

The turning directions of the rolls is controlled via the foot pedal. Pushing the left foot pedal will cause the rolls to rotate to the left and pushing the right foot pedal will cause the rolls to rotate to the right (turning direction when standing in front of the machine). The machine will stop working when the foot pedal is released.

4.5 Extra explanation PB 50-3H

Working with the profile bending machine with the hydraulic adjustment of the upper roll (PB 50-3H) is very similar to working with the other two profile bending machines (PB 40-3 & PB 50-3). Only the hydraulic pump and the lever for changing the working direction have taken the place of the rotating arm. Please see below figures for a better explanation.

After setting the bending parameters on the PB 50-3 H, the hydraulic actuator two-way valve (fig. 17.5) must be closed in order to maintain repeatability of the same dimensions over the course of performing a series of section bending operations.

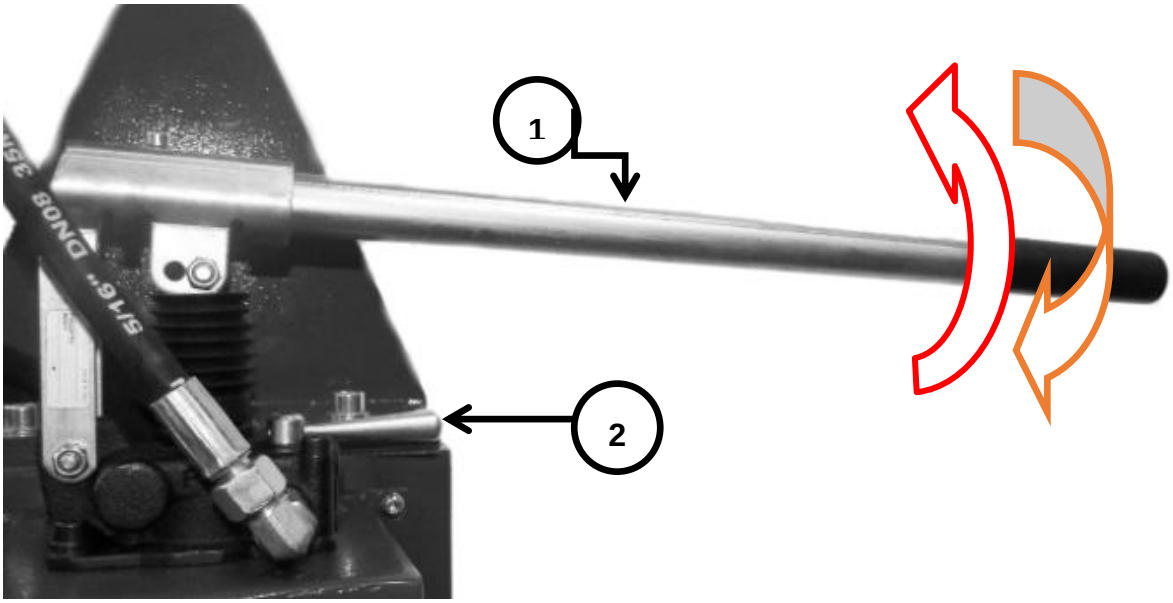

Fig. 16. Levers of the pump for work with the hydraulic actuator: 1 – lever responsible for the movement of the hydraulic actuator; 2 – direction change lever for the upper roll

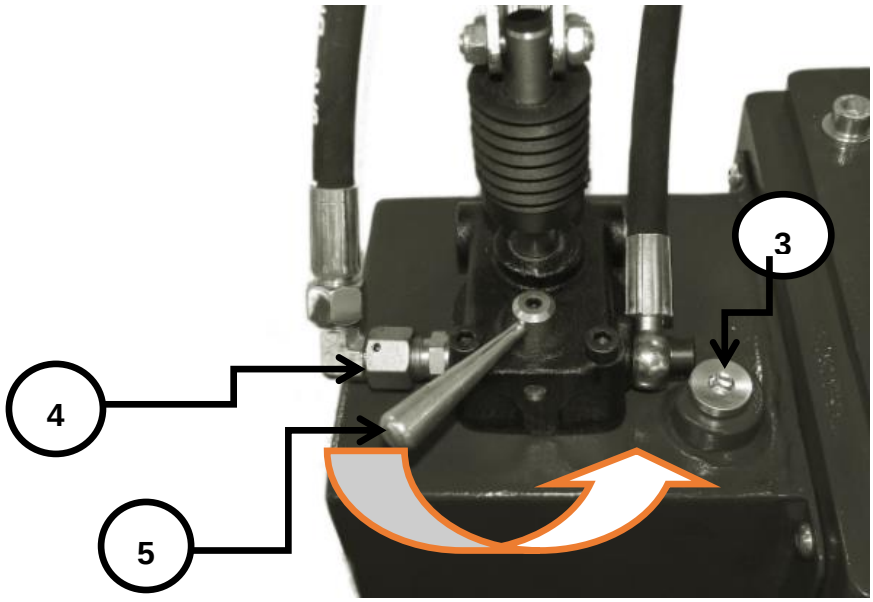

Fig. 17. 3 – cap for pouring in hydraulic oil; 4 – coupler for performing the deaeration of the machine; 5 – direction change lever for the upper roll (up or down movement)

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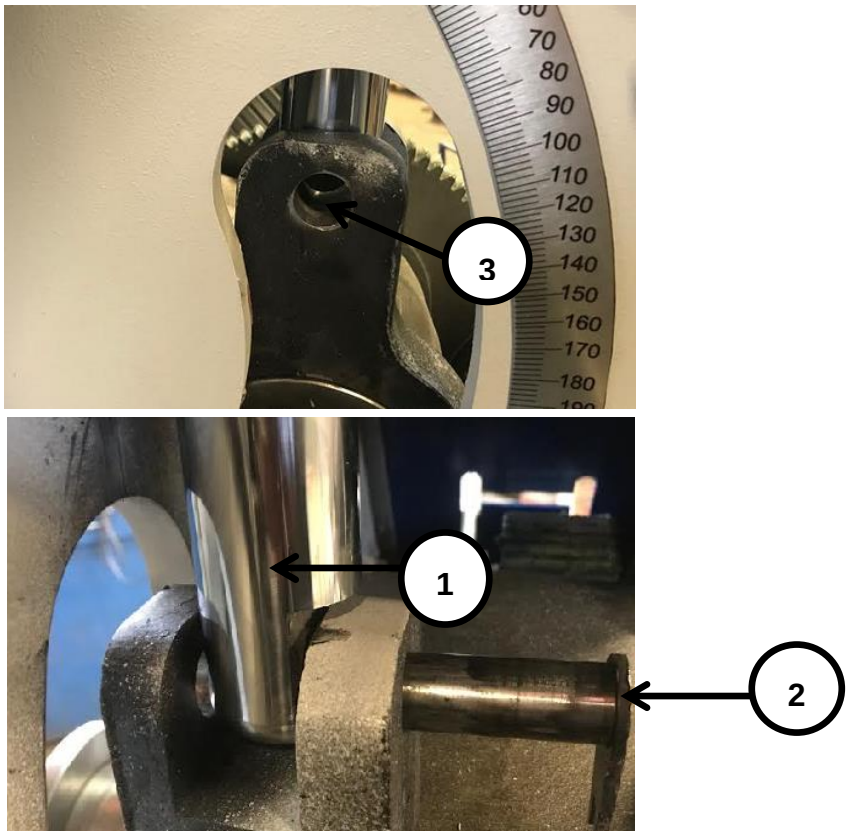

Fig. 18. Connection of actuator's piston rod with body of upper roll shaft: 1 – piston rod; 2 – pin, 3 – holes of the piston rod and cast iron body, for putting a pin through.

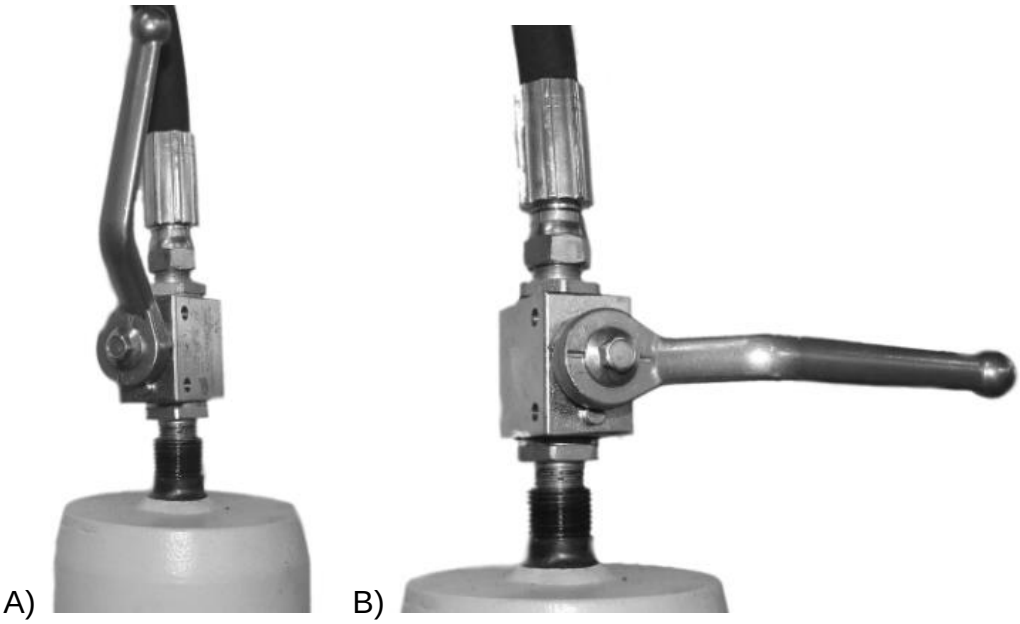

Fig. 19 A) open 2-way valve; B) closed 2-way valve

4.6 Working with the optional stabilizing set (yoke)

The stabilizing set (yoke) can be used when your work with the profile bending machine approaches the maximum dimension that can be supported by the machine.

The stabilizing set should be used in every situation where the rolled / bended section does not maintain a single rolling plane (warps into a so-called helix). This may result from the type of material, overall dimensions or small bending radius of the section.

In order to use this tool, follow the steps below:

1. Mount the set according to figure 16 onto the shafts.
2. Tighten the set with the tightening nut (1, fig. 16) by turning it into the direction of the top bending roll with a max. torque of 90 Nm.
3. Continue bending.
4. In order to bend a section with a smaller radius, remove the yoke.

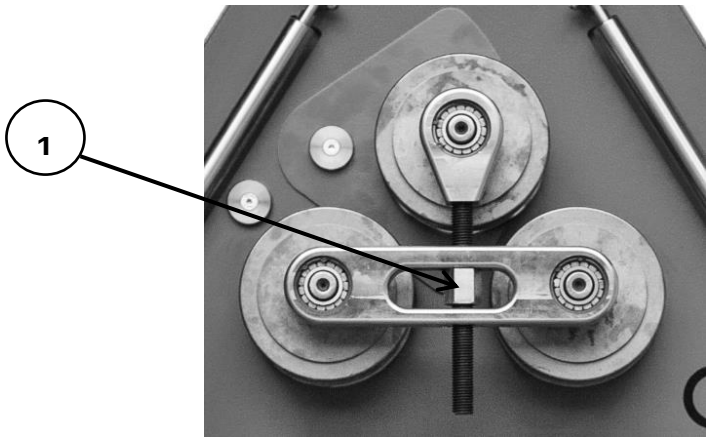

Fig. 20. Properly mounted and tightened stabilizing set: 1 - tightening nut

5. Storage and transport

	**Treat the area around the machine as a hazard zone during transport.** **The personnel responsible for loading/unloading must have licenses permitting performance of operations of this type.** **The manufacturer is in no way liable for damage to the machine outside the factory**

5.1 Transport

The profile bending machine can be transported in horizontal position by any means of transportation under the condition that OHS and road traffic regulations are followed. During transport, the machine needs to be secured against movement or damage e.g. by means of fastening belts.

During transport by forklift, make sure that the forklift's load capacity is at least 30% above the machine's weight and do not lift it to a height greater than 300 mm.

The procedure of preparing the profile bending machine for transport is to follow these steps:

- Shut down the machine and disconnect it from the power source.
- Wind up the machine's power cable and hang it on the hook of the frame of onto the motor reducer.
- Wind up the foot pedal switch's power cable and fasten it together with the foot pedal itself to the machine's body.
- Lift the machine using a forklift and transport it to the desired location. Figure 21 presents forklift channels (designed for the purpose of transport).

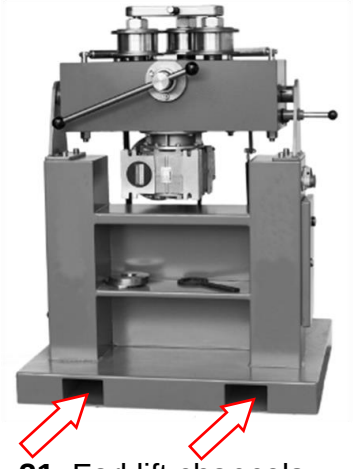

Fig. 21. Forklift channels

5.2 Long standstills

In the case of a long break in operation, the machine has to be stored in a dry room on a levelled surface. The power cable needs to be disconnected from the power socket, wound up and securely stored together with the machine. Check the protective paint coat, clean damaged spots and coat them with a new layer. No other equipment and machinery can be stored on top of the profile bending machine.

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6. Maintenance and service

Efficient and long-term operation of the profile bending machine is largely dependent on proper operation, as well as proper maintenance and repair. The frequency of technical inspections and maintenance operations suggested in this instruction manual is for informational purposes only, and should not be considered as a minimum maintenance requirement.

After every use:

- Clean the bending rolls after every operation.
- Repair or replace damaged or worn parts.
- Check, and if necessary, tighten loose threaded joints, and replace damaged bolts or nuts with new ones.

Periodical inspections:

- After every 80 hours of work, unfasten the cover from the rear of the machine's body, then apply lubricant to the gear found inside the machine (fig. 23) using a brush.
- After every year, inspect the motor and electrical apparatus; this inspection is to be conducted by an electrician and is based on removing dust, dirt and checking terminals, motor terminals, control circuits, grounding and insulation, as well as the condition of plugs, the socket and cables.
- Inspect the condition of the surface of the bending roll's channel regularly and in the case of significant material loss, replace the part with one that is new and undamaged.

Take special caution during maintenance.

During machine maintenance, the machine needs to be disconnected from power and the emergency button needs to be activated.

Use tools to apply lubricants, do not apply them with your hands.

Any service work needs to be performed by qualified personnel.

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6.1 Maintenance of the multi-step gear transmission

To perform this type of maintenance, remove the cover found on the rear of the housing of the machine by unfastening 2 socket head screws (fig. 22). Make sure that a layer of solid lubricant is always present between interoperating gears. Figure 23 indicates the location where lubricant is to be applied into the transmission. After applying lubricant to the gear and closing the cover, engage drive to the top roll and start the machine so that lubricant can spread through the entire transmission.

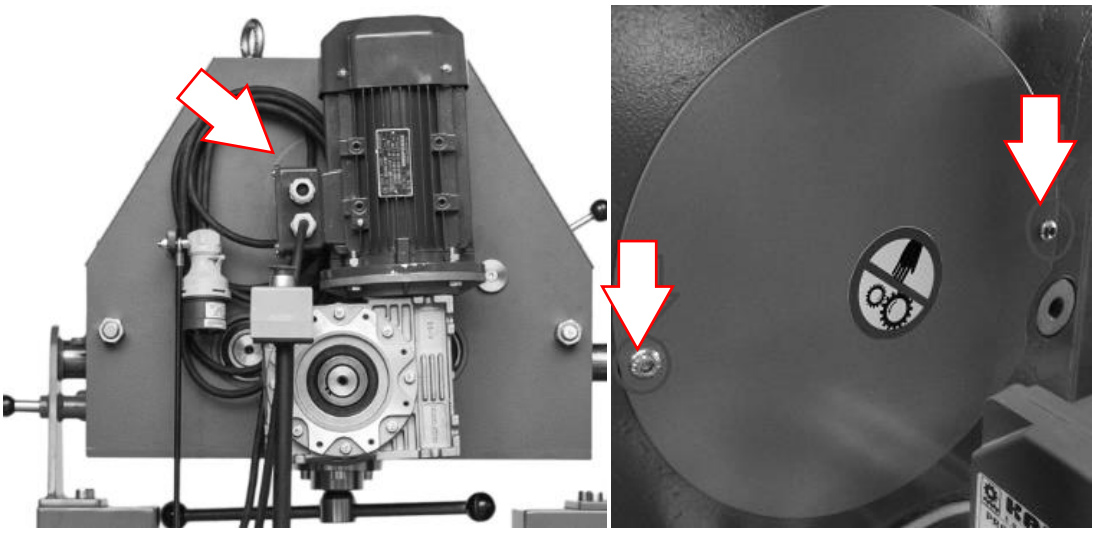


Fig. 22. Gear transmission cover

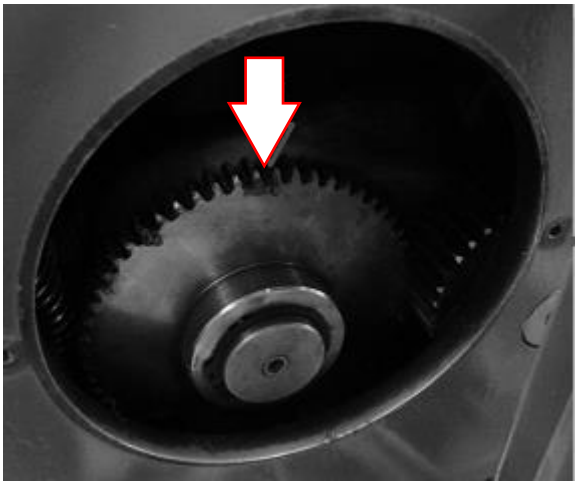


Fig. 23. Gear transmission inside the profile bending machine The arrow indicates the gear to which lubricant needs to be applied (on its teeth).

6.2 Replacement and proper application of the bending roll assemblies

ATTENTION !!!	**RHTC is not liable for failure and accidents resulting from the use of bending rolls from other manufacturers.** **The machine is equipped with a set of universal rolls for bending of closed or open sections. Rollersets for pipes according to the given pipe or rod diameter can be made on custom order.** **During replacements, it is prohibited to assemble bending rolls from different sets with one another.**

Rolls serving for rolling rectangular pipes and flat bars are included in the basic set. To replace them, unfasten the nuts that fasten the rolls (fig. 24) and then slide them of their shafts. Next, mount new rolls onto the shafts, making sure that the keys are found on the shafts. After mounting the rolls, fasten the nuts with a torque of 90 [Nm].

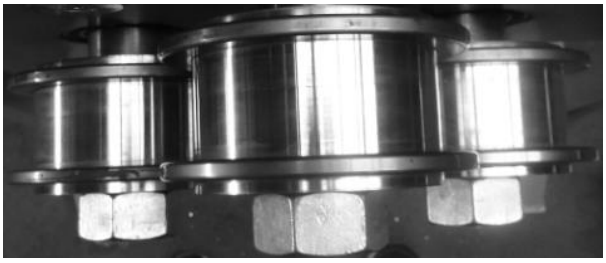


Fig. 24. Bending rolls secured by nuts

7. Errors and failures (troubleshooting)

Table 6 presents a list of problems that may occur during operation of the machine, as well as procedures that should solve most problems.

Table 6. *Errors and failures that may occur as well as suggested solutions*

Problem	Cause	Solution
The motor shuts down automatically during work	Exceeded rated current consumed by motor during work	Check whether section size has not been exceeded . Disengage the drive to the top roll
Problem	**Cause**	**Solution**
Bending rolls do not rotate or rotate unevenly	There are no keys on the shafts of the bending rolls or they have been damaged	Dismount the bending roll, check the condition of the shafts, keys and key seats on the rolls
	Gear transmission is damaged	Replace the damaged gear with a new one
Problem	**Cause**	**Solution**
Unsatisfactory surface quality of the bent elements	Damaged surface of the bending rolls, e.g. scratches, furrows	Replace bending rolls with new ones
Problem	**Cause**	**Solution**
Excessive noise from the inside of the rolling mill's body	No lubrication	Inspect the condition of gears. If necessary, lubricate the gear transmission
	Rolling bearings are worn out	Replace rolling bearings with new ones
Problem	**Cause**	**Solution**
Significant vibrations of the entire machine during operation	Improper placement of rolling mill on the floor	Check whether the machine is placed on an even, level and hard surface

8. Residual risk

Despite the fact that the manufacturer is liable for the design and markings of the profile bending machine in order to eliminate hazards during work, maintenance and repair, certain elements of risk cannot be avoided. Residual risk arises from incorrect or improper behavior of the user of the machine.

The greatest danger is present when the following prohibited activities are performed:

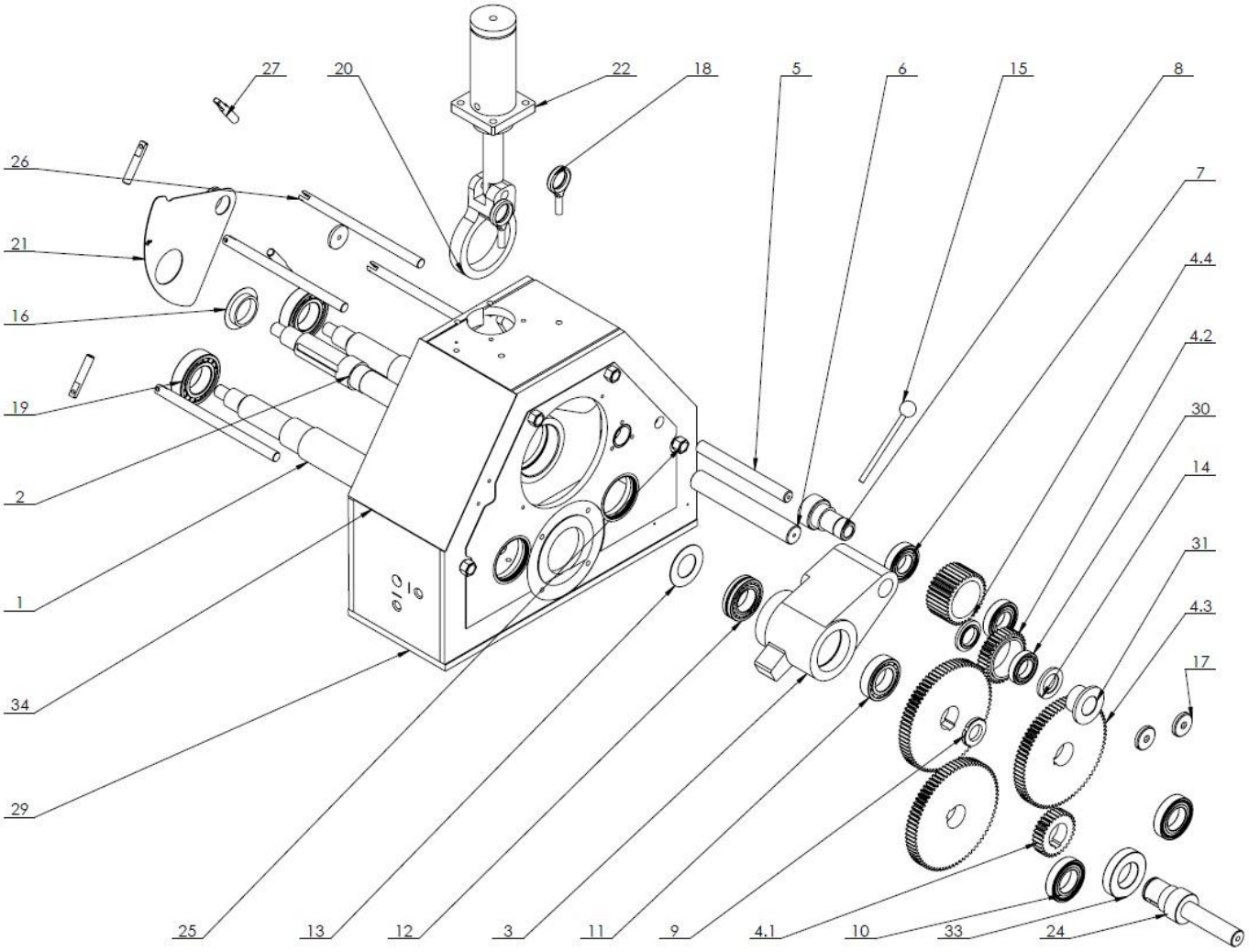
- using the machine for purposes other than those designated in the instruction manual;
- independent modifications and repairs of the electrical and hydraulic installation;
- removal of the power plug from its socket before switching off the power switch;
- moving the machine while it is in operation or connected to power;
- connecting the machine to the power grid when the terminal or socket is damaged;
- inspecting technical condition or performing maintenance or repair while the machine is in operation.

Other recommendations and guidelines for the use of the profile bending machine to keep the remaining risks as small as possible:

- Read this manual carefully.
- Do not insert any limbs into the working area of the machine.
- Do not modify or repair the electrical and hydraulic installation without consulting the manufacturer and always employ qualified personnel.
- Inspect the entire electrical installation before the machine is commissioned and after every electrical repair.
- Do not allow children to come near the machine.
- Do not modify the design of the tooling.
- Never bend flexible and narrow elements that may deflect toward the machine or behave unpredictably.

There is residual risk in the event of failure to comply with the set-out recommendations and guidelines.

9. Exploded view



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10. Electrical installation

To protect the operator against electrical shock, the profile bending machine is earthed according to the protection system accepted in the power grid. The power cord is terminated by a 32A/5-pin plug. Elements of the electrical installation of this machine are presented in table 7, and fig. 25 contains the schematic of the electrical installation.

Table. 7. List of basic elements of the electrical installation

Item no.	Name
1	Engine circuit breaker 3P GZ1E10
2	Overcurrent circuit breaker GZ1E10
3	Power contactor LC1D09
4	Power contactor LC1D09
5	Switch-disconnector GA016C
6	Emergency stop button
7	Foot switch engaging motor for “right” direction of revolutions
8	Foot switch engaging motor for “left” direction of revolutions
9	3-phase motor 1.5kW
10	Transformer STM63
11	Light module ZBV-B3

The electrical motor is protected by an automatic disconnector equipped with a thermal and fault trigger. The thermal trigger is set to the motor's rated current. If rated current is exceeded when the machine is in operation, the automatic disconnector may be triggered (release of thermal trigger). The motor may be restarted after 15 minutes.

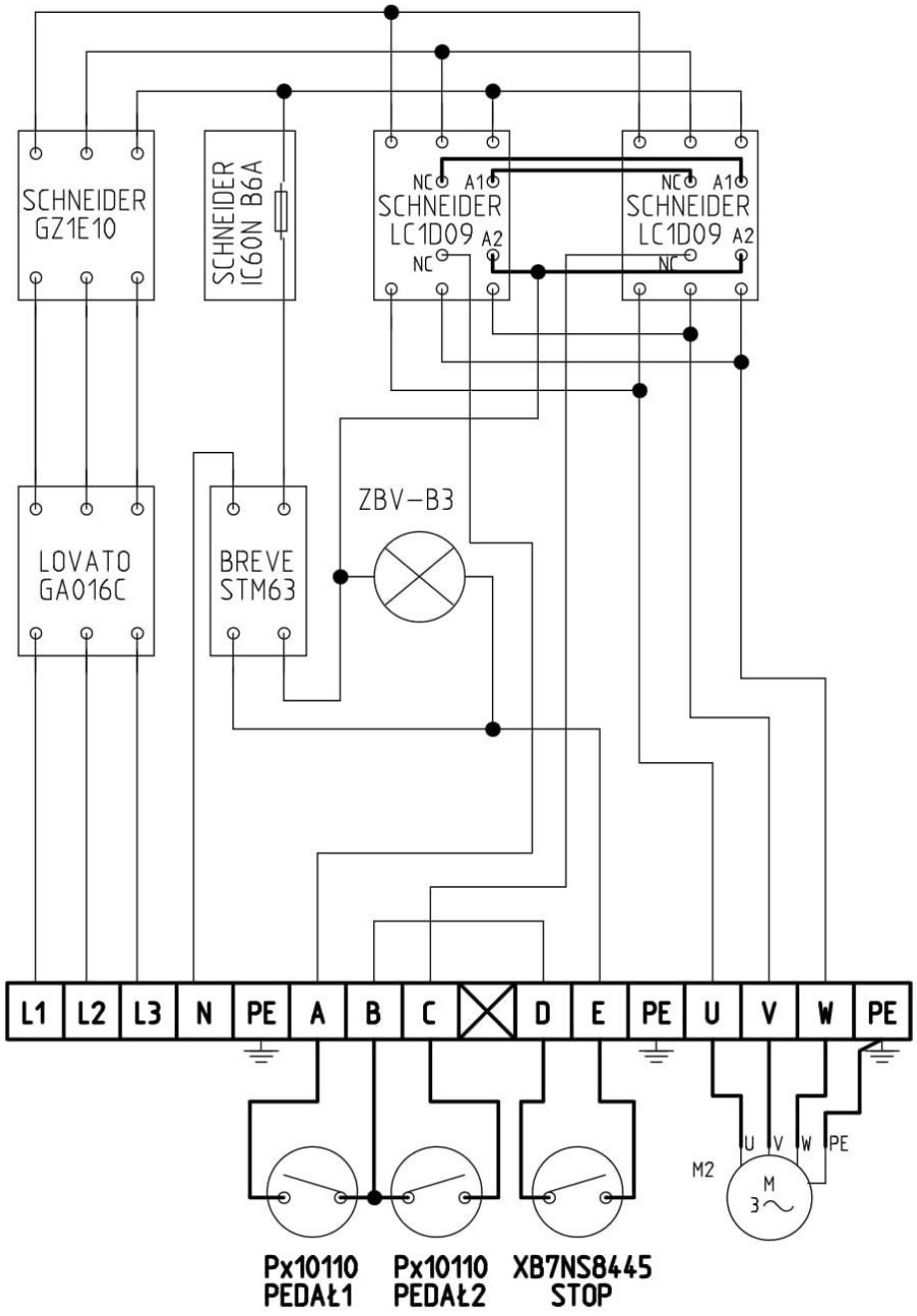
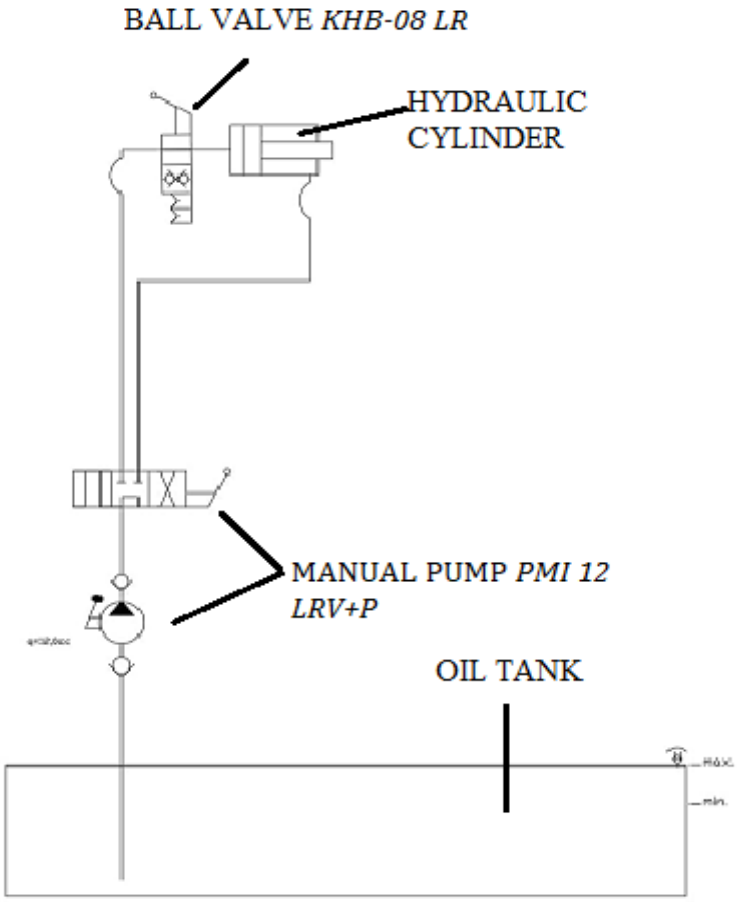


Fig. 25. Schematic of the profile bending machine electrical installation

11. Hydraulics (for PB 50-3H)



PARTS NAME	SYMBOL
HYDRAULIC CYLINDER	-
MANUAL PUMP	PMI 12 LRV+P
BALL VALVE	KHB-08 LR
HYDRAULIC HOSES	-
OIL TANK	HV 46

12. Warranty terms for the Profi Bend, Profile Bending Machines

1. The manufacturer guarantees proper operation of the machine according to the technical and functional conditions described in the instruction manual.
2. This warranty is granted for a period of 12 months from the date of receipt of the machine. This warranty is for parts only, it does not cover transport, labor, journeys, penalization costs. This guarantee does not cover consumables that must be replaced regularly over the course of the machine's operation.
3. The manufacturer accepts the obligation to replace any parts that are demonstrated to have a factory defect that makes further operation impossible, at no additional charge. However, our service technicians will make the final decision, whether it's a warranty case or not.
4. Acknowledged warranty repairs shall be performed free of charge (this will be discussed on beforehand). The time until repair should not exceed 10 workdays, unless repair requires spare parts to be obtained from another supplier. The warranty period is extended by the time until repair.
5. The warranty does not cover direct and indirect damage caused by improper operation and maintenance of the machine, in a manner that is not compliant with the instruction manual.
6. The warranty does not cover mechanical damage occurring due to the fault of the operator/user of the machine.
7. The warranty does not cover damage occurring due to improper transport.
8. The costs of machine service arising from improper operation and maintenance are covered by the buyer.
9. The following results in loss of the warranty:
    - Failure to adhere to deadlines and absence of documentation confirming performance of maintenance and service work.
    - Improper connection of the machine to the electrical grid.
    - Use of non-original spare parts, components or non-original software.
    - Any interference in the machine's design by persons other than the manufacturer's service personnel.
    - Failure to adhere to operating guidelines provided by our service and contained in the instruction manual.
    - Use of the machine not according to its purpose.
    - Improper installation at the workstation.
    - Electrical shocks or machine damage due to improper connection of the machine to the electrical grid or connection with parameters not compliant with the machine's rated parameters.

10. The warranty covers damage arising from production or material defects, under the condition that:
    - the accessories recommended by the manufacturer were used.
    - the machine was not disassembled nor modified.
    - the machine was used according to the instruction manual.
    - inspections and repairs were performed only by an authorized service.