

Rittal – The System.

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Stationary busbar bending and hole-punching unit CW 120-S



4055.700

Operating instructions

ENCLOSURES

POWER DISTRIBUTION

CLIMATE CONTROL

IT INFRASTRUCTURE

SOFTWARE & SERVICES

FRIEDHELM LOH GROUP



Foreword

Dear Customer,

We thank you for choosing our Rittal product. Read these operating instructions carefully before using your new unit for the first time and retain them together with the supplied Product Control Card so they can be consulted when required.

We wish you every success.

Kind regards
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We are always happy to answer any technical questions regarding our entire range of products.

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1 CE labelling

Rittal GmbH & Co. KG confirms the conformity of the "stationary busbar bending and hole-punching unit" with the machine directive 2006/42/EC and with the EMC directive 2014/30/EU. An appropriate declaration of conformity has been issued. It can be found at the end of this document, on the Rittal Homepage or accompanies the unit as separate document.

2 Safety instructions

2.1 Symbols in these operating instructions

The following symbols are used in this documentation:



Warning!

A hazardous situation which may lead to death or serious injury if the instructions are not followed.



Caution!

Hazardous situation which may lead to (minor) injuries if the instructions are not followed.



Note:

Important notices and indication of situations which may result in material damage.

- This symbol indicates an "action point" and shows that you should perform an operation or work step.

2.2 Symbols on the unit

The following symbols are attached to the unit.



Warning of laser radiation.



Risk of small particles being ejected.



Risk of being crushed or cut by swinging workpieces.



Risk of being crushed or cut by moving unit components.



Observe the operating instructions.



Wear safety goggles.



Maximum dimensions of workpieces.

2.3 General safety instructions

When working with high-pressure hydraulic units, improper handling and/or poor maintenance can damage the unit and cause severe injuries. Consequently, observe all the following safety instructions and contact our service team should you have any questions.

Caution...

- ... when handling hydraulic oil. The oil can become very hot after longer operation. There is a risk of injury!
- Long busbars can swing backwards quickly and unexpectedly when being bent. Ensure that nobody is present in the work area. Risk of injury!
- To extend the service life of the unit, the hydraulic cylinder should not travel to the limit stop under full pressure.
- Risk of environmental contamination! Collect any escaped hydraulic oil and prevent it from entering the sewer system or the surface and ground water.

Always...

- ... machine busbars made of copper or aluminium.
- ... position busbars centred and perpendicular in the unit.
- ... remove objects and foreign bodies from the work area.
- ... position busbars centred to the load piston so that the bending die does not skew.
- ... observe the maximum permitted dimensions of the workpieces.
- ... support long busbars appropriately to prevent them from tilting.
- ... inspect electrical and hydraulic connection lines for damage before deploying the unit.
- ... use the prescribed hydraulic pump.
- ... ensure the secure footing of the unit.
- ... observe the information contained in the operating instructions.
- ... instruct new users in the safe use of the unit.
- ... wear safety goggles when working with the unit.
- ... observe the local, country-specific regulations.
- ... store and deploy the unit in dry and well ventilated spaces.

Never...

- ... deploy the unit when parts are damaged or missing.
- ... make any changes to the unit or remove the warning signs.
- ... intervene in the work area of the tools or the swivel area of the workpieces.
- ... look intentionally and directly at the laser light.
- ... open couplings under pressure.
- ... apply pressure to unconnected hose couplings.
- ... exceed the maximum operating pressure.
- ... operate the unit unattended.
- ... subject the unit to corrosive materials.
- ... deploy the unit unless the operating instructions have been read and understood completely.

- ... store or operate the unit at temperatures above 45 °C (113 °F).
- ... deploy the unit in an explosion risk area.

2.4 Personal protective equipment

The operating and maintenance personnel must always wear personal protective equipment when working on the unit. The personal protective equipment comprises at least the following components:

- Safety work shoes: for all work on the unit
- Safety goggles: for all work on the unit
- Gloves: for loading and unloading the unit

2.5 Residual risks when using the unit

There is danger that during operation a hydraulic hose bursts or a screw fastening leaks. This means oil can escape at high pressure.

- Always wear your personal protective equipment for all work performed on the unit (see section 2.4 "Personal protective equipment").

There is the risk that small particles escape at high speed from the machining area (e.g. the shattering of the rubber wiper when punching holes, the breakage of tools or an incorrect tool combination when punching holes).

- Wear your personal protective equipment for all work performed on the unit (see section 2.4 "Personal protective equipment").

Because of its heavy weight, there is the risk of being crushed between the tools and the unit main body when mounting the bending die or the bending mandrel.

- Set up the unit with the necessary care and observe the maximum permitted lifting weights for persons.

If the unit machines busbars made of an impermissible material or from an excessively thick material, there is the risk of the tools becoming damaged and tool parts splitting off.

- Perform machining on materials only in accordance with the proper usage (see section 3 "Proper usage") and the technical specifications (see section 5 "Technical specifications").

If long busbars are machined with the unit, there is the risk that they fall off the machining table.

- Support long busbars with a suitable, stable support to prevent unwanted tilting and so prevent the risk of injury.

3 Proper usage

The "stationary busbar bending and hole-punching unit" (Model No. 4055.700) is a table unit with a single-acting high-pressure hydraulic cylinder for bending and punching copper or aluminium rails with a maximum width of 120 mm and a maximum thickness of 12 mm. The unit is not suitable for machining construction steel or tool steel. The electro-hydraulic pump (Model No. 4055.720) with the associated foot-operated switch (Model No. 4055.712) must be used as the drive for the "stationary busbar bending and hole-punching unit".

4 Scope of supply

Scope of supply

Stationary busbar bending and hole-punching unit CW 120-S



Bending tool

Length stop

Operating instructions

Tab. 1: Scope of supply

5 Technical specifications

Technical specifications	
Model No. and designation	4055.700 Stationary busbar bending and hole-punching unit CW 120-S
Max. pressure	700 bar (10150 psi)
Max. compressive force	230 kN (52200 lbs)
Max. delivery rate	1.95 l/min (0.5 gal/min)
Permissible materials	Copper, aluminium
Max. busbar width	120 mm (4.72")
Max. busbar height	12 mm (0.47")
Min. hole diameter (punching)	<ul style="list-style-type: none"> – Ø 6.6 mm for 0... 5 mm material thickness – Ø 9.0 mm for 0... 6 mm material thickness – Ø 11 mm for 0... 12 mm material thickness
Max. hole diameter (punching)	Ø 21.5 mm for 0... 12 mm material thickness
	Min. 50 mm (2")
	Min. 100 mm (4")
Laser	0.4 mW, Class 1 laser; MTBF>10,000 h
Weight	63 kg (138 lbs)
Permissible hydraulic pump	Electro-hydraulic pump (Model No. 4055.720)

Tab. 2: Technical specifications

6 Available accessories

Available accessories	Model No.
Electro-hydraulic pump	4055.720
Foot-operated switch	4055.712
Male die, round	4055.740 – 4055.750
Female dies, round	4055.770 – 4055.780
Male and female dies for slots and special accessories	4055.791

Tab. 3: Available accessories

7 Unit description

The "stationary busbar bending and hole-punching unit" is a high-performance table unit equipped with a single-acting hydraulic cylinder (1). With a maximum pressure of 700 bar, a work force of approximately 23 tons is achieved.

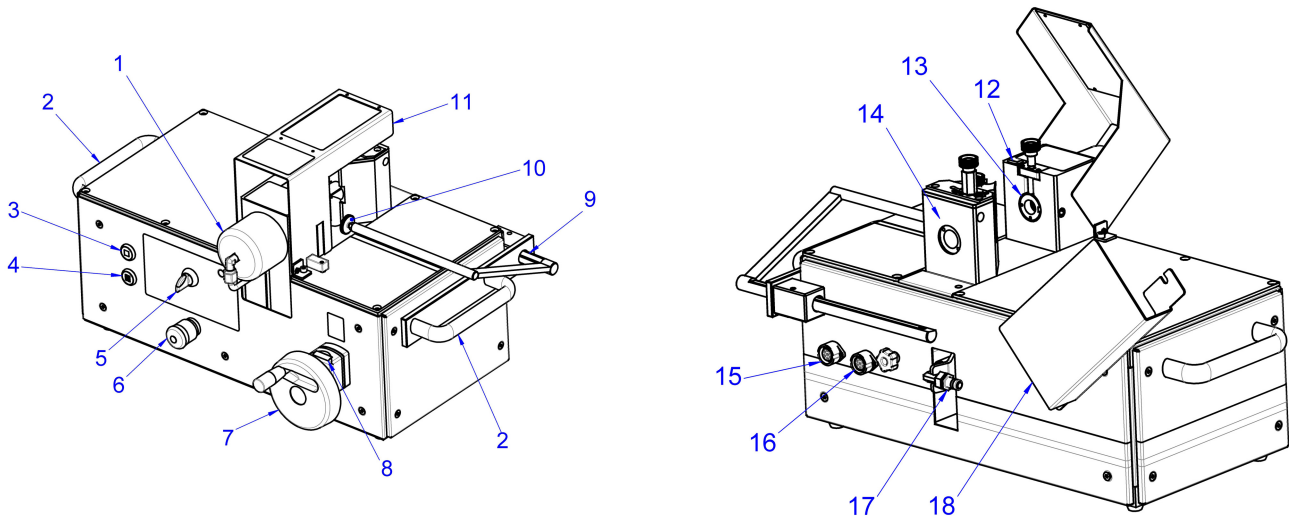


Fig. 1: Front and rear view

Key

- 1 High-pressure hydraulic cylinder
- 2 Carrying handle
- 3 Stop push-button
- 4 Pause push-button
- 5 Selector switch
- 6 Emergency stop switch
- 7 Rotary knob
- 8 Display for height setting
- 9 Read-out scale
- 10 Length stop
- 11 Protective hood
- 12 Laser ON/OFF switch
- 13 Load piston
- 14 Body
- 15 Connection socket (4-pin) for foot-operated switch
- 16 Socket (7-pin) for control cable
- 17 Hydraulic connection
- 18 Cover for hydraulic hose

A load piston (13) with a universal receptacle in the body (14) of the table unit transfers the work force to the deployed tools. The centrally mounted laser integrated in the load piston is controlled via an ON/OFF switch (12).

The hydraulic connection (17) and the electrical connection (16) for the electro-hydraulic pump are located at the rear of the unit. The single-pedal safety foot-operated switch is connected to the table unit (15) via a 4-pin socket. An emergency stop switch (6) can stop the hydraulic pump immediately in dangerous situations to allow the tool to be returned to its initial position. The body (14) is protected with a stable safety protection hood (11).

A selector switch (5) for setting the desired operating mode (bending/punching) is located above the emergency stop switch. The unit is also equipped with a Pause push-button (4) and a Stop push-button (3).

The rotary knob (7) allows the height of the body to be adjusted easily in accordance with the height setting display (8). A side-mounted length stop (10) with read-out scale (9) can be used alternatively or in addition to the laser for setting up and positioning the workpieces.

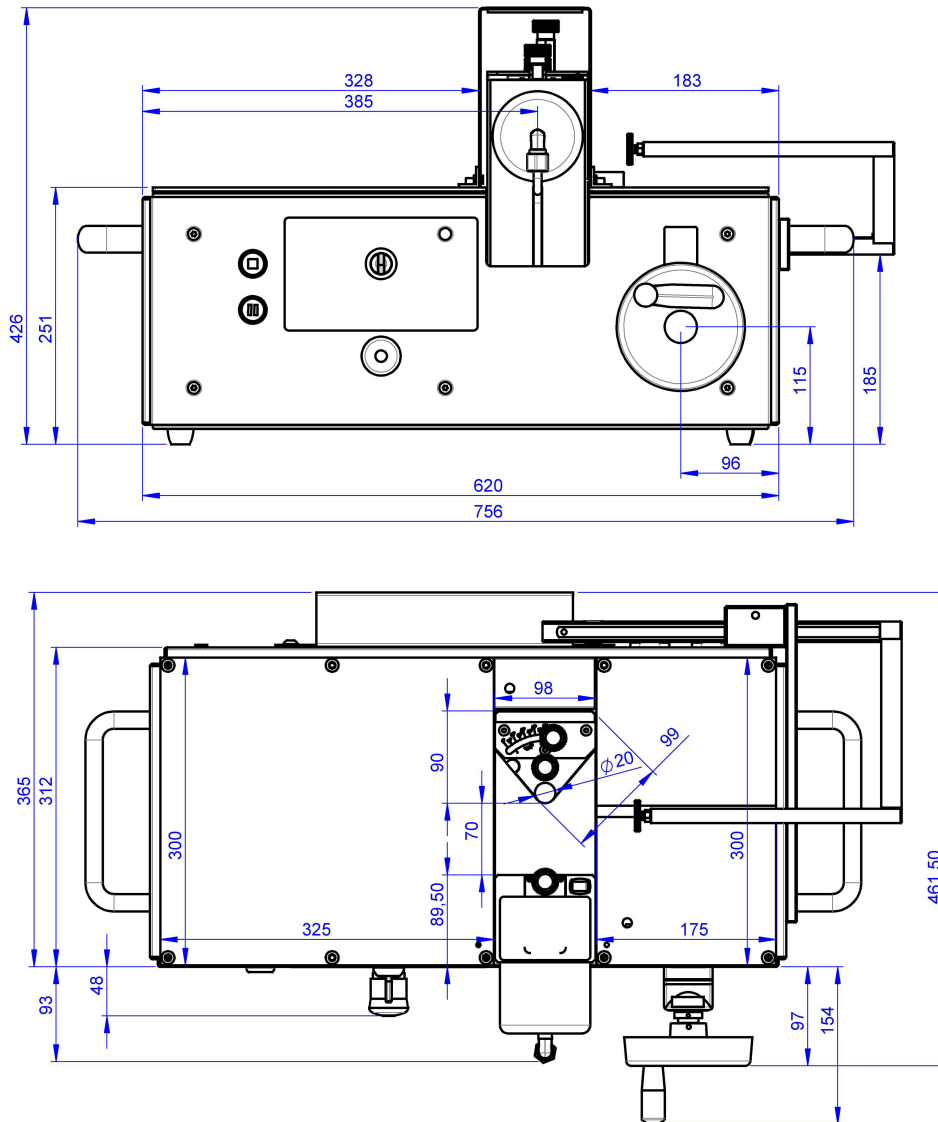


Fig. 2: Dimensions

8 Commissioning

You receive a fully assembled "stationary busbar bending and hole-punching unit" as well as detailed operating instructions.

- On receiving the goods, check them for possible transport damage and the delivery for completeness.
- In the event of problems, contact the manufacturer or your vendor without delay.
- In any case, read the complete operating instructions as well as all supplied documents before commissioning.



Caution!

There is a risk of injury when lifting the unit in its packaging or if the lifted unit falls (total weight approx. 60 kg).

- Please note the maximum weights that may be lifted by persons. It may be necessary to use lifting gear.
- Do not stand below the lifted unit.



Caution!

When recommissioning the unit, there is the risk that incorrect storage or missing corrosion protection can block unit components and so cause dangers.

- **Before recommissioning, ensure the smooth running of all components and the correct function of all safety equipment (see section 11 "Maintenance and inspection").**

- Wear your personal protective equipment, in particular gloves and safety work shoes, also for the transport and installation of the unit (see section 2.4 "Personal protective equipment").
- Ensure that the surface on which the unit is placed is flat and sufficiently stable.
- Inspect the hydraulic hose and the control cable for crushing and any other damage. Never use damaged hydraulic supply lines or electrical supply cables.



Note:

The hydraulic hose and the electrical control cable for the table unit are supplied as set in a stable safety protection tube. As supplied, the hydraulic hose is filled with hydraulic oil HLP46.

- Inspect the mains cable and plug of the hydraulic pump for damage. Do not use the electro-hydraulic pump should there be any damage!
- Place the unit secure and stable to ensure a safe positioning of the unit.
- Connect the hydraulic hose to the hydraulic connection (17) and the electrical control cable to the electrical connection (16) of the unit.



Caution!

If the unit is operated with a non-approved pump, there is risk of injury caused by bursting components of the hydraulic circuit.

- **Ensure that only the electro-hydraulic pump, in conjunction with the unit, as specified in the technical specifications is deployed.**



Note:

There is risk of hydraulic oil escaping in the event of a defective valve or when the hydraulic hose is disconnected under pressure.

- Ensure that the hydraulic system is pressure-free before disconnecting or reinserting the hydraulic hose.

- Then insert the supply cable of the foot-operated switch in the 4-pin connection (15).
- Before the first use, the sealing screw plug (black) at the tank opening must be replaced with the air permeable ventilation screw (orange) so that air can flow into the oil tank during work.



Fig. 3: Replacing the screw plug or ventilation screw (example illustration)



Note:

To prevent hydraulic oil from escaping, the sealing screw plug must be reinserted in the tank opening for subsequent transport of the unit.

- Screw the sealing screw plug into the thread at the front of the electro-hydraulic pump to ensure quick and safe access when required.



Note:

Observe the details in the operating instructions of the electro-hydraulic pump.

- Turn the mains switch of the hydraulic pump to the "I" position to place the pump in ready mode.



Warning!

If a dangerous situation occurs when working with the unit, stop all dangerous movements of the unit without delay.

- **In a dangerous situation, press the red emergency stop switch (1) on the unit to stop the operation!**
- **As an alternative, press the foot-operated switch beyond the first pressure point. This also causes the work operation to stop immediately.**

After triggering an emergency stop:

- Turn the emergency stop switch slightly so that it returns to its initial position. The pump is returned to ready mode. It can then be reactivated by actuating the foot pedal.
- If the emergency stop was activated via the foot-operated switch: release the foot-operated switch by pressing the blue silicone cover at the side (see fig. 4).



Note:

The electro-hydraulic pump is equipped with an emergency stop power circuit that is activated by the emergency stop switch of the connected unit to stop the motor immediately and to deactivate the integrated magnetic valve.

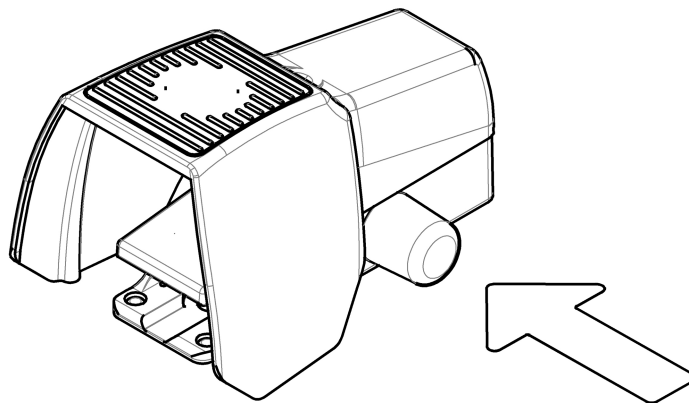


Fig. 4: Releasing the foot-operated switch

9 Bending busbars

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Note:

To extend the service life of the laser, it should be switched off for longer machining pauses (> 10-15 minutes).

- Set the operating mode on the selector switch to "Bend" or "Punch".

9 Bending busbars

The copper or aluminium busbars are bent with a bending die (23) that bends the workpiece with both sides over a bending mandrel.

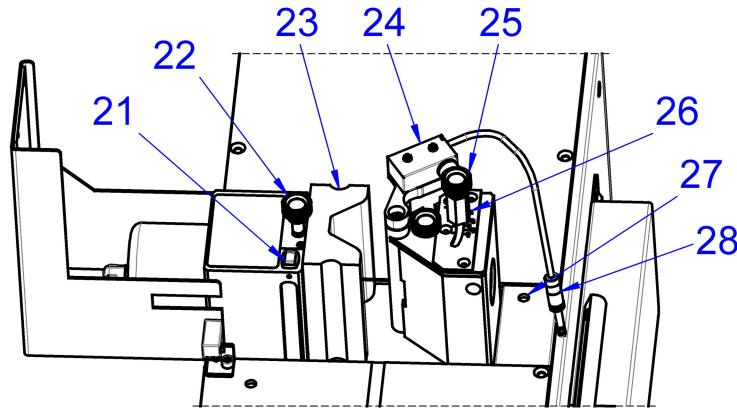


Fig. 5: Bending busbars

Key

- 21 Laser ON/OFF switch
- 22 Locking screw for tools in the load piston
- 23 Bending die
- 24 Electronic angle indicator
- 25 Setting screw for bending bracket
- 26 Angle scale
- 27 Socket
- 28 Plug



Warning!

When bending busbars, swinging parts can be a risk for cutting or crushing parts of the body.

- **Ensure that no persons or objects are present in the work area.**
- **In a dangerous situation, press the red emergency stop switch on the unit or alternatively the foot-operated switch beyond the first pressure point to stop the operation!**

- Set the selector switch of the unit to "Bend".
- Insert the bending die (23) in the tool holder of the load piston and tighten the locking screw (22).
- Insert the electronic angle indicator (24) in the half-open hole of the main body.
- Insert the plug (28) of the connection cable in the socket (27) behind the work block.
- Set the desired bending angle at the setting screw (25) using the angle scale (26).
- Hand-tighten the setting screw (25).



Note:

When bending busbars, a plastic (permanent) and an elastic (spring-back) deformation of the workpiece occurs. To compensate the elastic bending component and a spring-back of the material, the bending angle should always be set 1 – 3° greater than the desired angle.

- Mark the bending line on the workpiece.
Alternatively, the length stop can be set appropriately on the unit.
- Adjust the height of the main body with a rotary knob and align the bending die centred with the workpiece.

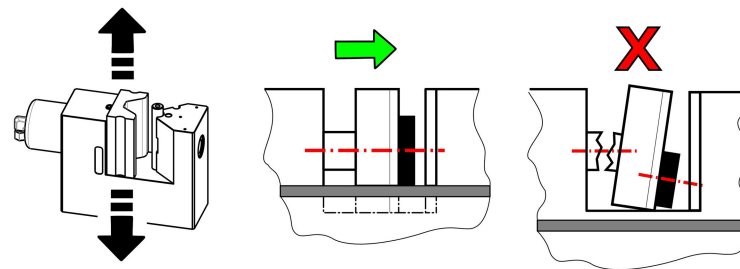


Fig. 6: Alignment of the workpiece



Note:

There is the risk with non-centred bending of the material that the bending die breaks, jams or the unit main body is damaged.

- Ensure that the material is inserted correctly centred for the bending operation.

- Place the workpiece between the bending die and the bending mandrel.
The material must lie flat on both table tops. The busbar must be positioned so that the centre of the bending corresponds to the laser point or the side edge is aligned at the set limit stop.
- Close the protective hood.



Note:

The protective hood is connected with an internal safety switch. The work operation cannot be started when the protective hood is open. The operation can be stopped at any time by lifting the protective hood.



Warning!

When bending busbars, there is the risk that small particles are ejected with high speed from the machining area.

- **Wear your personal protective equipment for all work performed on the unit (see section 2.4 "Personal protective equipment").**

- Start the bending operation by pressing the foot-operated switch to the first pressure point (foot pedal pressed approximately half the distance, corresponds to a force of approx. 20 kg).
The hydraulic pump is activated and feeds oil to the tool.
- Keep the foot-operated switch pressed until the electronic angle shutdown switch ends the bending operation.
The pump is deactivated and the tool travels back to its initial position.
- To **interrupt** the bending operation: hold the Pause push-button down.

10 Punching holes in the busbars

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The bending operation is resumed when the Pause push-button is released.

- To **cancel** the bending operation: press the Stop push-button.

The machine returns to the initial position and the bending operation may need to be restarted with the foot-operated switch.



Note:

Depending on the material thickness and properties, the angle setting on the unit may need to be adjusted slightly to achieve the desired bending angle of the busbar. Once the angle has been set correctly, it does not need to be readjusted provided the same material is machined.

- To switch off the pump, turn the mains switch to the "0" position.

10 Punching holes in the busbars

Holes are punched in the copper or aluminium busbars with a male die (31) and the appropriate female die (33). Slot male and female dies have additional pins (37) or grooves (39) to simplify an exact angular positioning.



Note:

Observe the details for the minimum and maximum size of the holes to be punched in the technical specifications (see section 5 "Technical specifications").

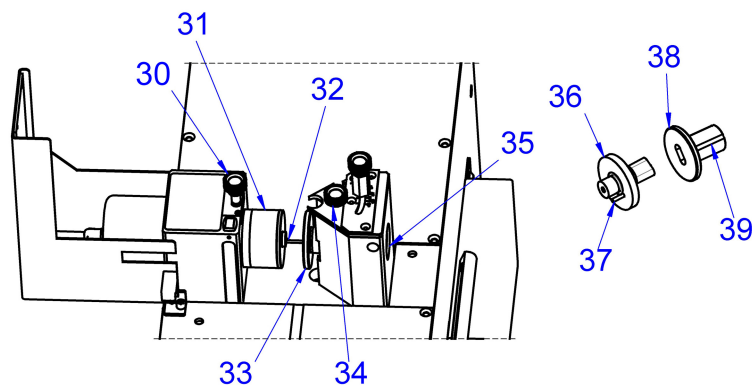


Fig. 7: Punching holes in the busbars

Key

- 30 Locking screw for tools in the load piston
- 31 Male die with neoprene wiper
- 32 Centring tip of the hole male die
- 33 Hole female die
- 34 Locking screw for the hole female die
- 35 Opening for punch waste
- 36 Male die for slots
- 37 Positioning pin
- 38 Female die for slots
- 39 Position groove for locking screw

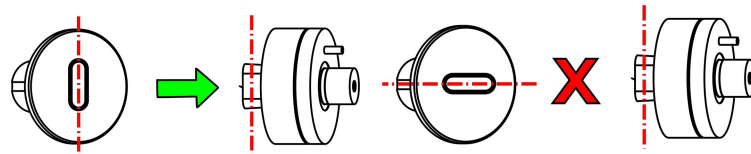


Note:

Use only sharp male and female dies. Oil the male die regularly to extend the service life of the tools and to simplify return travel to the initial position.

- Set the selector switch of the unit to "Punch".

- To punch holes, remove the bending die and the electronic angle indicator from the work block.
- Insert the hole female die (33) in the main body (fig. 1, 14) and tighten the locking screw (34). When a slot female die is used, the corresponding groove (39) must point upwards.
- Insert the male die (31) in the tool holder of the load piston and tighten the locking screw (30). For slot male dies (36), ensure that the positioning pin (37) sits correctly in the appropriate hole of the load piston (fig. 1, item 13) and the slot alignment matches the female die.



Warning!

If an incorrect tool combination is used, there is the risk that tool parts split off and are ejected from the machining area.

- Ensure that the correct tool combination is deployed.
- Wear your personal protective equipment for all work performed on the unit (see section 2.4 "Personal protective equipment").

- Now mark and scratch the desired hole positions on the busbar.
- Adjust the height of the main body with a rotary knob (fig. 1, item 7) to the punch centre.

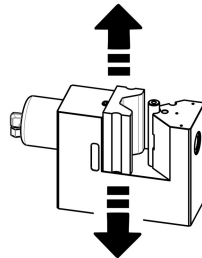


Fig. 8: Setting the punch centre

- Set the centring tip of the male die (32) directly at the centre mark. This allows the hole pattern to be punched exactly.
- Close the protective hood.



Note:

The protective hood is connected with an internal safety switch. The work operation cannot be started when the protective hood is open. The operation can be stopped at any time by lifting the protective hood.



Warning!

When punching holes, there is the risk that small particles are ejected with high speed from the machining area.

- Wear your personal protective equipment for all work performed on the unit (see section 2.4 "Personal protective equipment").

- Start the punching operation by pressing the foot-operated switch to the first pressure point (foot pedal pressed approximately half the distance, corresponds to a force of approx. 20 kg).
The hydraulic pump is activated and feeds oil to the tool.
- Keep the foot-operated switch pressed until the electronic end position switch in the main body deactivates the hydraulic pump and the tool travels back to its initial position.



Note:

The neoprene wiper presses the busbar against the female die until the male die has travelled out of the material and the workpiece can be removed.

- To switch off the pump, turn the mains switch to the "0" position.

11 Maintenance and inspection

The user is obliged to maintain and service the "busbar bending and hole-punching unit" in accordance with the details in the operating instructions, and in accordance with country-specific standards and regulations.

The maintenance intervals are classified in accordance with the recommended frequency.



Caution!

When a unit has been switched on, there is the risk of it starting, such as for inadvertent actuation of the foot-operated switch with the associated risk of injury in the area of unit components.

- **Before any servicing and repair work, ensure that the unit mains plug of the connected hydraulic pump has been disconnected to prevent inadvertent starting.**

Before every use...

- ... Visually inspect the complete unit, hydraulic pump and hoses as well as the foot-operated switch for damage.
- ... Check all electrical and hydraulic connection lines for damage.
- ... Check the correct, secure attachment of the hydraulic couplings.
- ... Check the correct functioning of the foot-operated switch.

Weekly...

- ... Clean the complete unit. To prevent damage to the safety instructions on the unit, do not use any aggressive cleaning agents.
- ... Oil lightly the male and female dies.



Note:

An inadequate protective film or an excessively long downtime of the unit can lead to corrosion and so impair the function of the components.

- ... Check the correct functioning of the safety shutdown on the protective hood and the foot-operated switch.
- ... Check the correct functioning of the emergency stop switch of the unit for the activated pump.



Warning!

There is risk of injury with defective safety equipment.

- **If the inspection of the safety shutdown equipment determined that they do not stop the unit, bring the unit to standstill immediately.**
- **Repair the safety shutdown equipment without delay.**
- **Operate the unit again only after the repair work has been completed.**

Monthly...

- ... Visually inspect tools and the main body for defects or breakouts, and replace if necessary.
- ... Check the markings and warning signs on the unit for readability and damage, and replace if necessary (see section 2.2 "Symbols on the unit").

Every 6 years...

- ... Replace the hydraulic hose.

Maintenance, inspections and repairs must be performed by qualified electricians in accordance with the regulations valid in the associated country.

12 Dismantling and disposal



Caution!

There is a risk of injury when lifting the unit in its packaging or if the lifted unit falls (total weight approx. 60 kg).

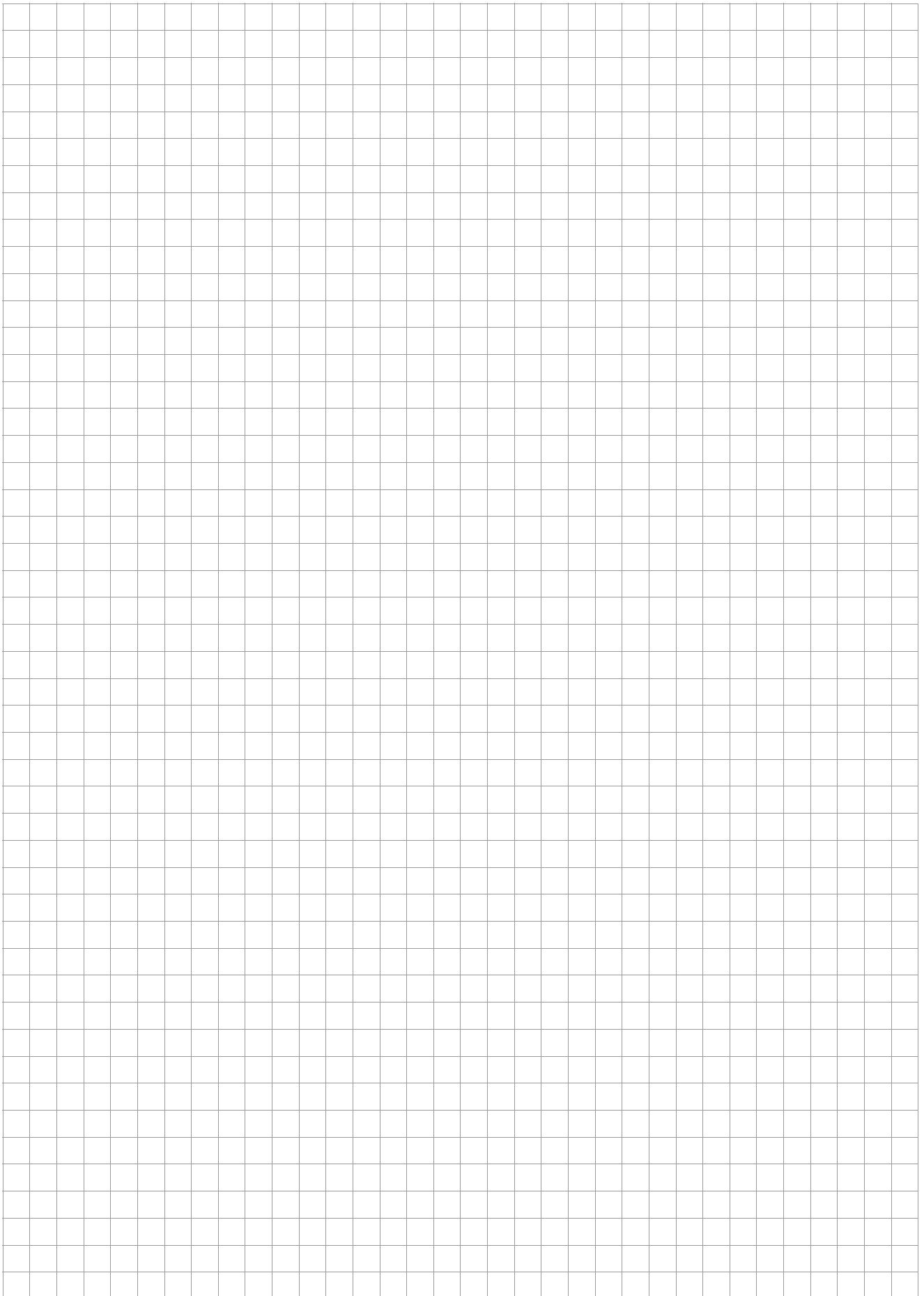
- **Please note the maximum weights that may be lifted by persons. It may be necessary to use lifting gear.**
- **Do not stand below the lifted unit.**

- Wear your personal protective equipment, in particular gloves and safety work shoes, also for the dismantling and disposal of the unit (see section 2.4 "Personal protective equipment").
- To switch off the hydraulic pump, turn the mains switch to the "0" position.
- Remove the ventilation screw and close the tank opening with the screw plug to prevent hydraulic fluid from escaping.
- Disconnect the supply cable of the foot-operated switch from the 4-pin connection.
- Disconnect the hydraulic hose from the hydraulic connection and the electrical control cable from the electrical connection of the unit.
When the hydraulic pump is switched off or the hydraulic system is pressure-free, the hydraulic hose can be disconnected safely without any hydraulic fluid escaping.

The "busbar bending and hole-punching unit" must be disposed of or recycled appropriately in accordance with the country-specific regulations.

13 Contacts

- For technical queries, please contact:
 - Phone: +49(0)2772 505-9052
 - E-mail: info@rittal.com
 - Homepage: www.rittal.com
- For sales or service requests, please contact your local Rittal organisation which can be found at www.rittal.com/contact.



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