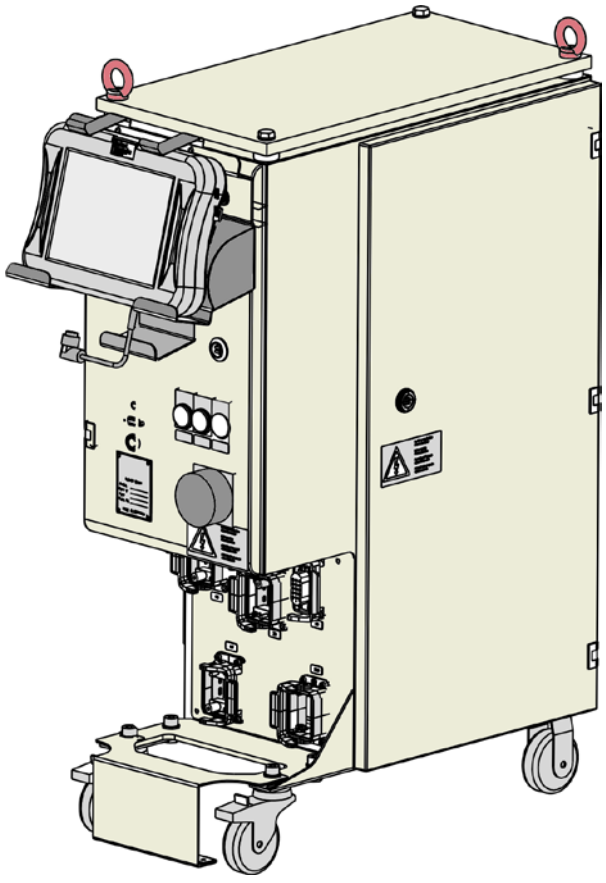
STANLEY
Engineered Fastening

EN

Operating manual

Control unit

ERC-compact



Please read the operating manual before any operation!

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1 General information

1.1 Information regarding the operating manual

This operating manual contains important information regarding the handling of this device. Compliance with all safety and operation instructions is a precondition for safe operation.

Furthermore the local accident prevention regulations and the general safety regulations effective for the application area of the device have to be observed.

Please read the operating manual carefully before each time of operating! It is part of the product and has to be stored in an accessible location in the direct vicinity of the device for use by the appropriate personnel.

NOTE!
Images in this manual serve to aid basic understanding and may differ from the actual design of the equipment.

1.2 Limitation of liability

All instructions and information in this operating manual have been compiled in consideration of the valid standards and regulations, the state of the art as well as our many years of experience.

The manufacturer assumes no liability for damages due to:

- Non-observance of the operating manual.
- Unintended use.
- Employment of unskilled personnel.
- Arbitrary rebuilding.
- Technical modifications.
- Use of non-licensed replacement parts.

The actual shipment may differ from the explanations and stipulations described here in the case of a special design, with the demand for additional order options or due to latest technical modifications.

The obligations agreed upon in the supply contract, the general terms and conditions as well as the delivery conditions of the supplier and the legal regulations valid at the time of conclusion of the contract are effective.

Technical modifications within the scope of improvement of the usage properties and further development are reserved.

1.3 Symbol legend

Warning notices

The warning notices in this operation manual are indicated by symbols. The notes commence with a signal word which expresses the extent of the danger.

Observe the notes and act with caution to avoid accidents and damage to persons and property.

DANGER!
… points to a directly dangerous situation which can lead to death or severe injuries if not avoided.

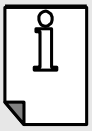
WARNING!
… points to a possibly dangerous situation which can lead to death or severe injuries if not avoided.

CAUTION!
… points to a possibly dangerous situation which can lead to slight injuries if not avoided.

CAUTION!
… points to a possibly dangerous situation which can lead to damage of property if not avoided.

Tips and recommendations

NOTE!
… highlights useful tips and recommendations as well as information for efficient and failure-free operation.



REFERENCE!
refers to separate manuals or instructions for components of the equipment

Special safety instructions

In order to draw attention to special dangers, the following symbols are used in connection with safety instructions:

DANGER!
Danger to life due to electric current!
… indicates perilous situations due to electric current. Non-compliance with the safety instructions can lead to severe injuries or death.
The operations which need to be carried out may only be done so by electronic technicians.

WARNING! RISK OF INJURY TO THE HAND!
... indicates locations or situations where there is a danger that your hands may get bruised, trapped or injured in any other way.

CAUTION!
Danger of burning on hot surfaces!
.. indicates locations or situations where there is a danger of burning due to contact with hot components.

1.4 Copyright protection

These instructions are protected by copyright and only intended for internal purposes.

The forwarding of the instructions to a third party, the duplicating in any way or form - also in extracts - as well as the utilisation and/or the communicating of the content are, aside for internal purposes, is not permitted without the written authorization of the manufacturer.

Non-compliance obligates to damages. More far-reaching claims remain reserved.

1.5 Replacement parts

WARNING!
Safety risk due to incorrect replacement parts!
Incorrect or defective replacement parts can affect the safety as well as lead to damages, malfunctions or total breakdown.
Therefore:
– Use original TUCKER replacement parts.

Purchase replacement parts from a licensed dealer or directly from the manufacturer. Address see page 2.

1.6 Warranty

The warranty is determined by the applicable provisions of the law of the Federal Republic of Germany (§438BGB).

1.7 After sales service

Our after sales service department is available with technical support. Contact data see page 2.

Furthermore, our employees are constantly interested in new information and experiences that result from the individual applications and could be helpful in enhancing our products.

2 Safety

This paragraph provides a review of all important safety aspects for the optimal protection of the personnel as well as for safe and failure-free operation.

Disregard for the operating instructions and safety messages mentioned in this manual could lead to serious dangers.

2.1 Responsibility of the operating company

The unit is used industrially. Therefore the company operating the unit is liable for the legal obligations of operational safety.

In addition to the operational safety messages in this manual the safety-, accident prevention- and environmental regulations in force for the area of application need to be observed.

Please consider particularly the following:

- The operating company is obliged to inform itself of all the valid industrial safety regulations and determine any additional dangers in a hazard assessment which may occur due to the special working conditions on the site of the unit. The operating company has to implement these in the form of operating instructions in order to operate the unit.
- The operating company has to verify that the operating instructions correspond to the very latest technical developments during the unit's entire period of operation. If necessary, the operating company is to adjust the operating instructions to the valid rules and regulations.
- The operating company has to explicitly manage and determine the responsibilities regarding installation, operation, maintenance and cleaning.
- The operating company has to ensure that all employees dealing with the unit have read and understood this manual.
- Moreover, the operating company has to provide the operating personnel with regular training and provide information on possible dangers.
- The operating company has to provide the personnel with the necessary protective equipment.
- The operating company has to ensure the unhindered access to the emergency-stop switch on the system.
- The operating company has to place all symbols and labels mentioned in chapter “Labels at the place of installation”.

2.2 Personnel requisition

2.2.1 Qualification

WARNING!
Risk of injury due to insufficient qualification!
Improper handling can lead to serious damage to persons and property. Therefore:
– All tasks are therefore to be carried out by skilled personnel only!

The following qualifications required for the different areas of operations are named in the operating manual:

Instructed person

- Has been instructed regarding the tasks assigned and the possible dangers of improper execution of an instruction on behalf of the operating company.

Qualified personnel

- Qualified personnel are able to carry out the tasks assigned to them due to their qualified training, knowledge and job experience. In addition, the personnel are independently able to recognize and avoid possible dangers.

Electrician

- The electrician is able to carry out tasks on electric units due to his qualified training, knowledge and job experience. In addition, he is independently able to recognize and avoid possible dangers.
- The electrician has been trained regarding the specifics of the special site he is working on and is aware of the relevant rules and regulations.

Personnel trained by the manufacturer

- Trained personnel have participated in training by the manufacturer/plant engineer, in which the necessary knowledge and methods to carry out the required work were taught.
- Furthermore, as a result of their professional training, knowledge and experience as well as knowledge of the relevant provisions, they are able to carry out the work assigned to them and recognise and prevent potential risks independently.

Manufacturer's service personnel

- Certain work may only be carried out by service personnel. Other personnel are not authorised to carry out this work. Please contact our service department to carry out the work, see address on page 2.

Only those persons of whom it can be expected that they carry out their work in a reliable manner can be accepted as personnel. Persons whose ability to react is influenced, e.g. by drugs, alcohol or medicaments, are not to be admitted.

- Please consider the regulations at site specific to age and profession when choosing personnel!

2.2.2 Trespassers

WARNING!
Danger for trespassers!
Trespassers who do not fulfil the requirements mentioned in this document are not aware of the dangers of this working area.
Therefore:

- Keep trespassers away from the working area.
- When in doubt, approach persons and instruct them to immediately vacate the working area.
- Interrupt your work as long as there are trespassers within the working area.

2.2.3 Instruction

The personnel have to be instructed regularly by the operating company. For a better traceability the carrying out of the instruction should be recorded.

Date	Name	Kind of instruction	Instruction carried out by	Signature

2.3 Intended use

The unit was exclusively designed for the intended purpose as detailed in this manual.

The control unit ERC-compact is exclusively designed for use in self-piercing riveting systems in industrial and commercial areas to mount self-piercing rivets and only for application in premises. It has been designed for automatic operation in robots, semiautomatic operation and manual operation.

Intended use also includes observing all the symbols and information in the operating manual.

Any excess of the intended use or different use of the device is considered as misuse and can lead to dangerous situations.

WARNING!
Risks of deviations from intended use!
Every deviation from the intended use and/or different use can lead to dangerous situations.
In particular refrain from using the device as follows:

- Operation with other than Tucker system components which are not indicated in this manual.
- Use in explosive areas.
- Use in damp locations.

Claims of any kind arising from damages caused by incorrect use are excluded.

An electro-magnetically interference-free operation of the unit can be guaranteed by complying with the specifications in this manual!

2.4 Personal protective equipment

The wearing of personal protective equipment is essential in order to minimize the risks to health.

- Always wear the required protective equipment for the respective task when working.
- Pay due attention to the signs regarding the personal protective equipment which are displayed in the working area.

Must be worn

Protective glasses
For the protection of the eyes from foreign bodies.

Protective clothing
Is close-fitting work wear with low tear strength, with tight-fitting sleeves and without flared elements. It is principally used to protect against snagging by moving machinery parts. Do not wear rings, necklaces or other jewellery.

Safety boots
For the protection from heavy, falling parts and from slipping on slippery surfaces.

2.5 Special risks

The residual risks which arise from the risk assessment are described in the following chapter.

Please take time to consider the below mentioned security instructions and warnings in the following chapters of this manual to reduce health hazards and to avoid dangerous situations.

Electric current

DANGER!
Danger to life by electric current!
Contact with components under current is perilous. Damage of the electrical isolation or of several components can be perilous.
Therefore:

- Check the intactness of all electrical and pneumatic lines before use.
- On damages of the electrical isolation cut-off immediately the power supply and induce repairing.
- Work on the electric installation may only be executed by qualified electricians/electronic technicians.
- During all work on the electric installation you have to switch it death and test if it is zero-potential.
- Do not connect or disconnect the live plug connector.
- Never reach into open, non-utilised sockets.
- Pay attention to the minimum bending radius of the electrical connecting cables.
- On adjustments and repairing switch off the main switch of the unit and disconnect the unit from the power system.
- Pull out the power plug only when the control is switched off.
- Keep away moisture from current conducting parts. This way leads to short circuit.

Servo amplifier

DANGER!
Danger of life by electric current!

Contact with components under current is perilous. Therefore:

- Never disconnect any electrical connections to the servo amplifier while it is live.
- Wait at least five minutes after disconnecting the servo amplifier from the main supply power before touching potentially live sections of the equipment (e.g. contacts) or undoing any connections. Capacitors can still have dangerous voltages present up to five minutes after switching off the supply power. To be sure, measure the voltage in the DC Bus link and wait until it has fallen below 40V.
- Control and power connections may be live, even though the motor is not rotating.
- The servo amplifiers contain electrostatic sensitive components which may be damaged by incorrect handling. Ground yourself before touching the servo amplifier by touching any unpainted metal surface. Avoid contact with highly insulating materials (artificial fabrics, plastic film etc.) Place the servo amplifier on a conductive surface.

Hot surfaces

CAUTION!
Danger of burning on hot surfaces!

Servo amplifier may have hot surface during operation. Surface can reach temperatures above 80°C. Therefore:

- Do not touch the servo amplifier during operation.

2.6 Safety installations

DANGER!
Danger to life due to non-functional safety installations!
Safety is only ensured if the safety installations are intact. Therefore:

- Before starting work, make sure that all safety installations are functional and correctly installed.
- Never suspend safety installations.
- Ensure that safety installations such as emergency stop buttons, pull cords etc. are always accessible.

2.6.1 Emergency stop and protection circuit

The control unit has an emergency stop circuit and a protection circuit, which can be integrated into the customised emergency stop circuit and protection circuit by means of the interface X6 and X8 so as to be able to shut down the control unit, including any connected system components, in a safety-related situation.

If an emergency stop signal or a protection circuit signal is issued, the emergency stop unit disconnects from the control voltage the motor controller and the outputs, which can cause dangerous movements in the feeding area, e.g. rotating the drum, extending the separation, blast air. In addition, the movements of the linear slide and the self-piercing rivet tool will be stopped.

2.7 Securing against restarting

DANGER!
Mortal danger because of unauthorized restarting!
When working in the danger zone, there is the risk that the power supply will be restarted without authority. This means the persons within the danger zone are in a life-threatening situation.
Therefore:

– Please always observe the steps against unauthorised restarting displayed below.

Switch secured by lock

on: …….. at ….. hrs.

DO NOT START

The lock must only be removed by: ……

after it has been made certain that there are no persons within the danger zone.

Figure 1

SHUT DOWN

on: …….. at ….. hrs.

DO NOT START

Start up is only to be carried out by: ……

after it has been made certain that there are no persons within the danger zone.

Figure 2

Securing against restarting:

1. Cut off power supply.
2. If possible, secure the switch by means of a lock. Please display a sign similar to figure 1. The sign should be attached to the switch and easily visible to all.
3. The employee named on the sign should keep the key.
4. In case it is not possible to secure the switch by means of a lock, please set up a sign similar to that of figure 2.
5. After all work has been completed, please make sure that there are no persons within the danger zone anymore.
6. Ensure that all safety installations have been installed and are operational.
7. Only now you may remove the sign.

2.8 Labels at the place of installation

WARNING!
Risk of injury from illegible labels!
Adhesive labels and signs may get dirty or otherwise illegible in course of time. Therefore:

- Keep always all safety, warning and operating instruction signs clearly legible.
- Replace damaged signs or stickers immediately.

The following labels are to be attached to the system on which the unit is used. They apply for the vicinity of the place of use:

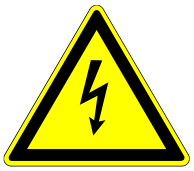
Entry for authorised persons only
The danger area may until be entered by those persons authorised to do so by the operating company.

CAUTION!
Risk of injury during installation on the system
Danger of slipping due to fallen parts.
Danger of tripping due to hoses and current supply cables.

Labels to personal protective equipment
acc. chapter 2.4

2.9 Safety instructions on equipment

The following labels could be attached on equipment:



Voltage
Only qualified electricians may work in the designated work room.
Unauthorised persons may not enter the designated work places or open the designated cabinet.

Disconnect mains.

2.10 Information signs on equipment

Details about the preset supply voltage.

3 Technical specifications

3.1 General specifications

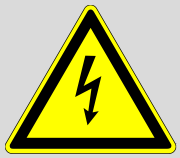
	Specification	Value	Unit
	Weight	approx. 55	kg
	Length	approx. 307	mm
	Width	approx. 944	mm
	Height	approx. 696	mm
	System of protection: Protected against solid objects >12,5 mm.	IP 23 according IEC60529	Protected against spray water
	Operating temperature	+15 - +40	°C
	Transport- and stocking temperature	-25 - +55	°C
	Relative humidity of air	0 - 95	%
	Operating mode	automatic	
	Working position	vertical	
	Display	8.4”	TFT

3.2 Connected loads

	Specification	Value	Unit
Electrical	Supply voltage	400	V AC
	Earthing system	TN-system with earthed (grounded) neutral point	
	Range of variation	± 10	%
	Power frequency ± 5 %	50/60	Hz
	Installed load	1300	VA at 400V AC
	Energy demand	455	VA

NOTE!
The supply voltage of the control unit ERC-compact should always be provided by a separately fused voltage network!

3.3 Equipment Fuses



DANGER!
Danger to life by electric current!

Contact with components under current is perilous. Therefore:

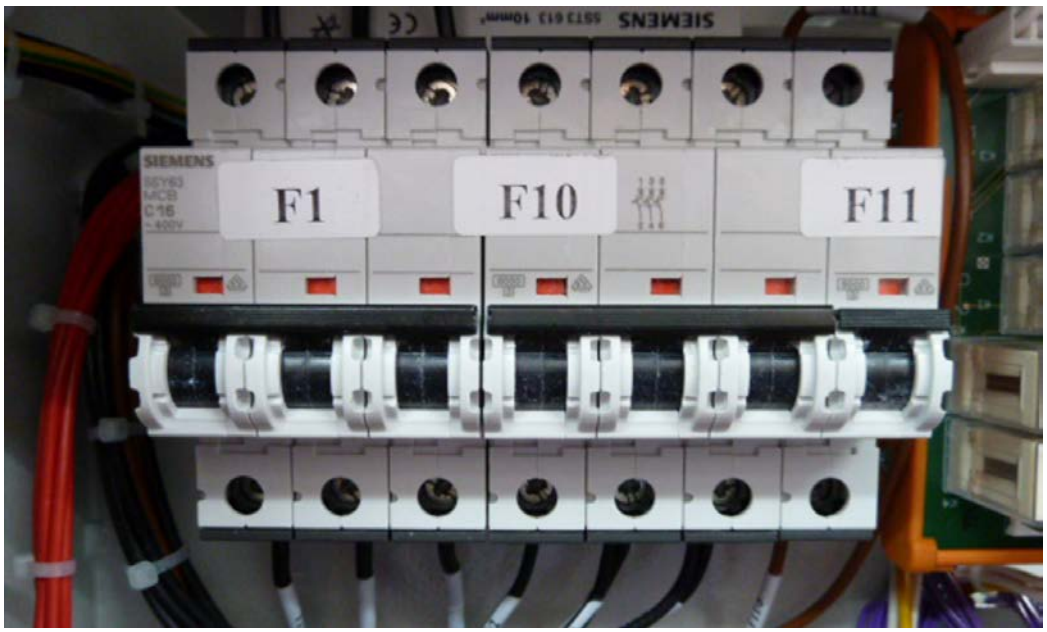
– Opening the control cabinet as well as the replacement of the fuses inside the equipment is to be carried out by electricians only!

In order to avoid an electrical accident caused by contact-hazardous components the below listed sequence is peremptory when exchanging defective fuse elements.

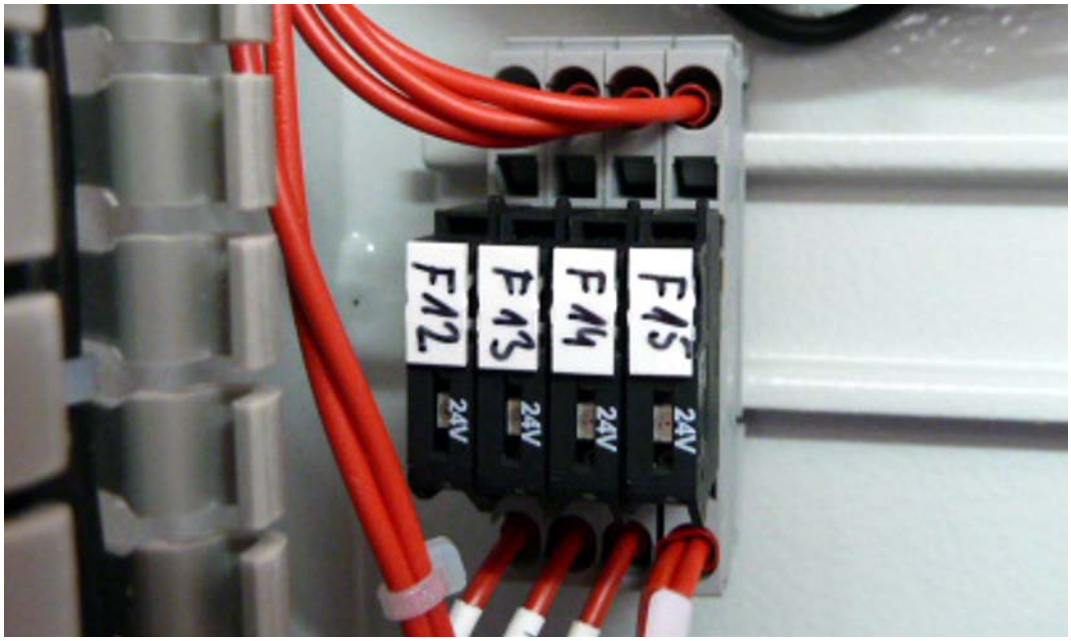
– **1.** Switch off the control unit at main switch.
– **2.** Disconnect the power plug.
– **3.** Open the appliance door with the special key.

To protect the electrical components, the control unit is protected with a 16 A 3 poles automatic cut-out (Characteristic C).

Automatic cut-out	Fuse	Nominal voltage (V)	Nominal current (A)	Tripping characteristic
3 poles	F1.1	480	16	C
3 poles	F10	480	10	C
1 pole	F11	480	2	C

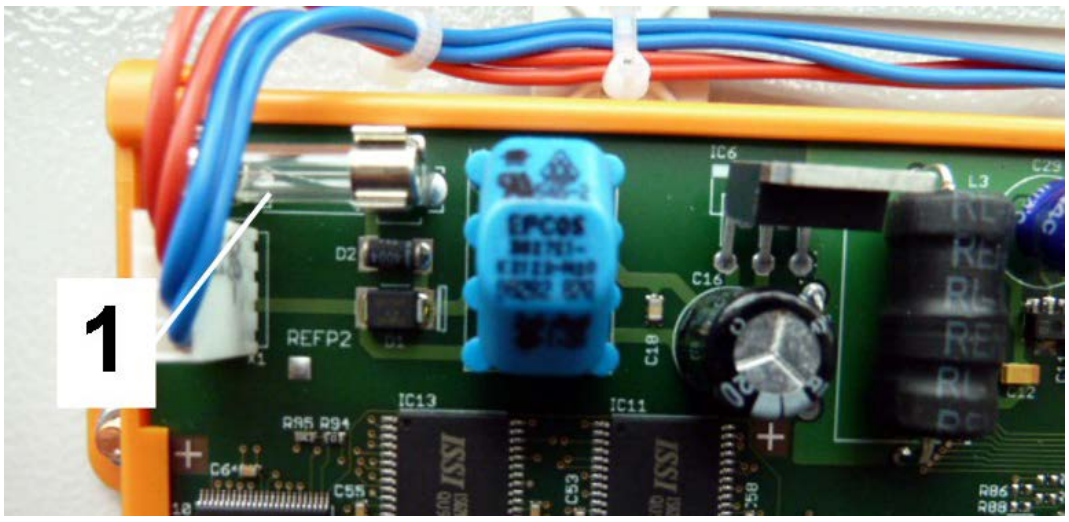


ERC Fuse terminals	Fuse	Nominal voltage (V)	Nominal current (A)	Tripping characteristic
5x20mm	F12	250	2	semi-time-lag
5x20mm	F13	250V	3,15	semi-time-lag
5x20mm	F14	250V	3,15	semi-time-lag
5x20mm	F15	250V	2	semi-time-lag



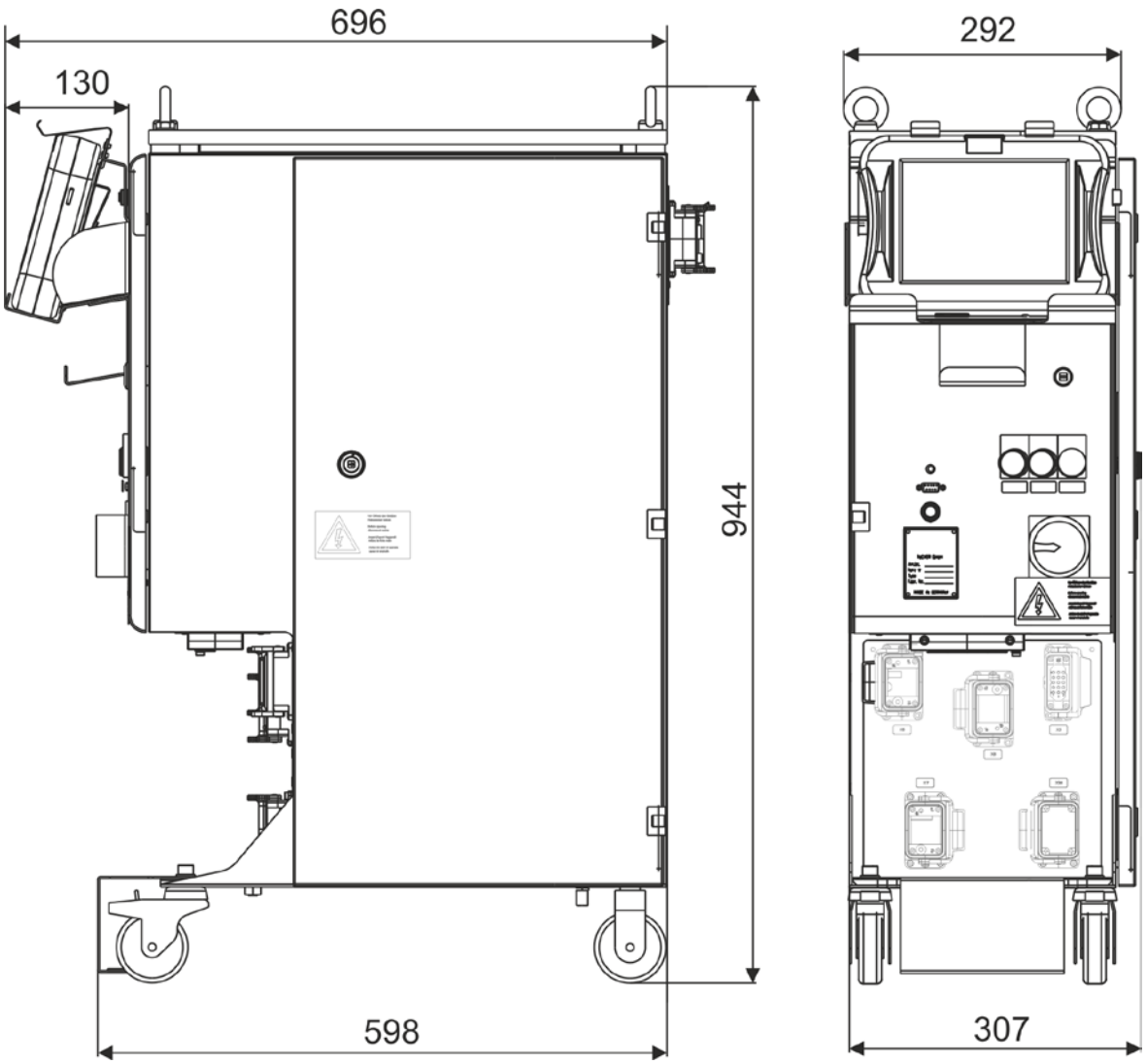
Optional

ERC PCB Ether-net E522C	Fuse	Nominal voltage (V)	Nominal current (A)	Tripping characteristic
5x20mm	F1	250	1	semi-time-lag

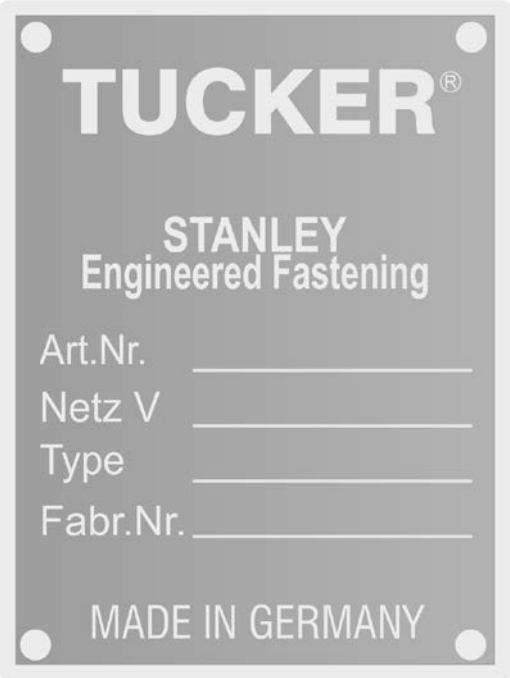


NOTE!
Defective fuse elements are always to be replaced by the same design of fuses with identical nominal values.

3.4 Dimensioned drawing



3.5 Type plate



The type plate contains the following information:

- Manufacturer
- Part number
- Power supply with frequency
- Type description
- Serial number

3.6 Accessories

Specification	Type	Order number
Filter insert		M070 448

4 General description

4.1 Description ERC-compact control unit

The control unit coordinates and monitors the riveting process.

Depending on the construction of the control unit, up to four self-piercing rivet feeders ERF Master Slave may be connected during standard operation, which in turn supply up to four self-piercing rivet tools with rivets.

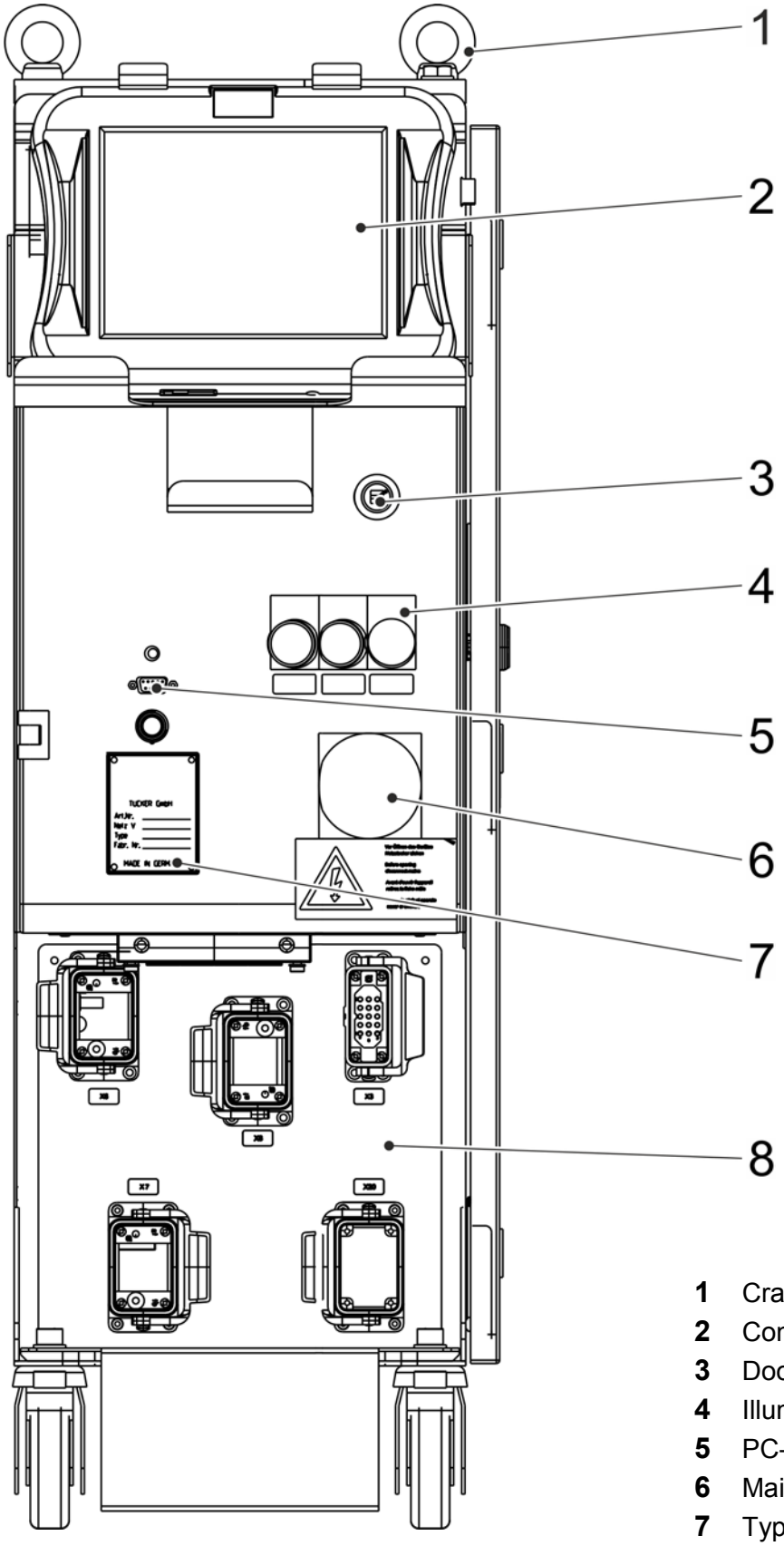
In a robot application, the self-piercing rivet unit is connected to an external customer control.

Signal transmission to the external robot control is realised in automatic assembly operation by means of the customer interface.

There are different versions of customer interfaces available:

The customer interface is to be supplied with 24 V DC. This can be optionally utilised via the internal or external supply (⇨ separate operating manual self-piercing rivet interfaces).

4.2 Components and arrangement



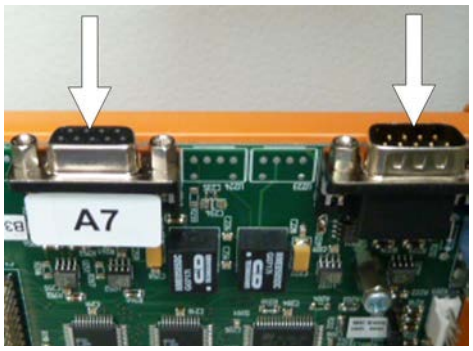
1 Crane eye
2 Control panel Touchpad
3 Door lock
4 Illuminated push button
5 PC-Interface RS232
6 Main switch
7 Type plate
8 Front plate with connections

4.3 Connections and interfaces

4.3.1 Connections front plate

Connection X6	Connection for the control cable to the external robot control for emergency stop and protection circuit. In manual mode connect the two-hand interface here.
Connection X8	Connection for the control cable to the external robot control for emergency stop, protection circuit and external power supply.
Connection X3	Connection for the control cable to the feeder.
Connection X7	Connection for the control cable to the self-piercing rivet tool.
Connection X20	Connection for the motor cable to the self-piercing rivet tool.

4.3.2 Connection A7 customer interface



Connection to the external robot control or to the external protection circuit.

4.3.3 Connection power supply

Connection for the mains supply.

Connector type:

Harting HAN6 Modular

C-module to pos. A:

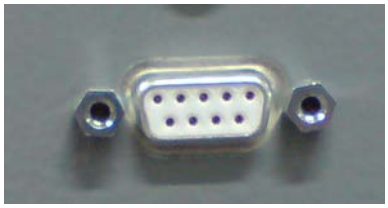
L1	PIN1
L2	PIN2
L3	PIN3
A/B	PE

4.3.4 Connection control panel Touchpad

On this connection the control panel can be connected to the self-piercing rivet control.

Thus the programming and error correction is possible.(⇨ separate operating manual ERC Software)

4.3.5 Connection PC / Laptop RS232



On this serial connection a personal computer or a laptop can be connected to the self-piercing rivet control, so that a flash programming is possible.

4.4 Display and functional elements

4.4.1 Main switch

Switch on / off the control unit by the main switch on the front appliance door.

4.4.2 Illuminated push button “Control On“

The white lamp lights up when the control is switched on. After an emergency stop the control can be switched on again by means of this push button.

4.4.3 Key switch “Release Programming” (option)

The programming release of the system with the control panel is effected by the key switch.

4.4.4 Key switch “Bypass Protection Circuit” (option)

The key-operated switch entitled "Bypass the protection circuit" deactivates the function of the protection circuit. This function should only be accessible for maintenance personnel (Option).
Closure customer-specific e.g. E2 VW

4.4.5 Control panel Touchpad (optional)

For manual operation of control unit using the control panel.
(⇨ separate operating manual ERC Soft-ware)

5 Transport, packaging and storage

5.1 Security advice for the transport

WARNING!
Danger to life due to floating loads!
On lifting of loads there is a danger to life due to falling or uncontrolled swivelling parts.
Therefore:

- Never step under floating loads.
- Regard the specifications to the intended attachment points.
- Do not attach something to overhanging machine parts or to ears of attached components. Pay attention to a tight fit of the load-securing devices.
- Only use licensed lifting tools and load-securing devices with sufficient load capacity.
- Do not use slightly ripped or abrased ropes and belts.
- Do not attach ropes and belts to sharp-edged flanges and edges, do not knot and do not twist.

Improper transport

CAUTION!
Damages caused by improper transportation.
Improper transport could cause serious damage to the transported item. Therefore:

- Necessary transport is to be executed in such a way as damage can be excluded.
- Avoid shocks and heavy vibrations.

5.2 Transport check

Upon delivery, the equipment, including accessories, should be checked for completeness and damage.

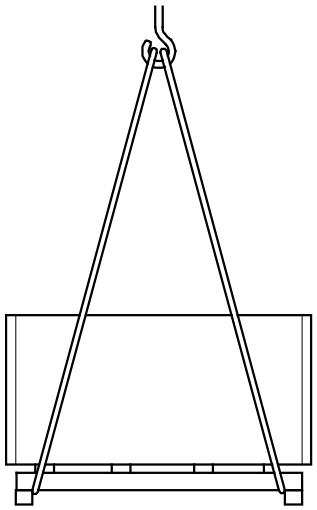
On externally visible transport damage, proceed as follows:

- Do not accept the delivery or only accept with reservation.
- Note the extent of damage on the transport documents or on the delivery note of the deliverer.
- Lodge a complaint.

NOTE!
Lodge a complaint for each defect as soon as it is recognized. Claims for damages can only be asserted within the effective time for complaints.

5.3 Transport

Transport of pallets with the crane



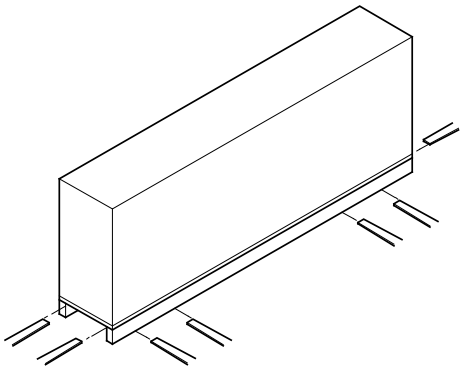
Packing pieces which are fixed on a pallet, can be transported with a crane under the following conditions:

- Crane and lifting tools must be designed for the weight of the packing pieces.
- The operator must be qualified for the operation of the crane.

Attaching:

1. Attach ropes or belts to the pallet according to the figure.
2. Check that the packing pieces will not be damaged by the load-securing devices. If necessary use other load-securing devices.
3. Start transport.

Transport of pallets with the forklift truck



Packing pieces which are fixed on a pallet, can be transported with a forklift truck under the following conditions:

- The forklift truck must be designed for the weight of the shipping units.
- The driver must be qualified for driving the forklift truck.

Attaching:

1. Drive the forklift truck with the forks between the wooden beams of the pallet.
2. Extend the forks so far that they stick out at the opposite of the pallet.
3. Ensure that the pallet cannot tilt on an excentric centre.
4. Hoist the packing piece and start the transport.

Attachment points

The following attachment point is intended:

Attachment

After unpacking attach the unit with suitable load-securing devices (1) as shown in the figure.

5.4 Terms and conditions for overseas transport

NOTE!
For onward transportation overseas use sea freight transport crate with the corresponding number of desiccant pouches for packing according to DIN 55473! The manufacturer bears no liability for damages caused by improper onward transportation.

The number of desiccant pouches depends on the size of the transport crate. Make sure that sufficient desiccant pouches are added to the transport crate.

Observe the humidity indicator of the desiccant pouch acc. to DIN 55473.

NOTE!
The desiccant pouch activity disintegration wrapping may only be removed directly before use. After removals from the packaging immediately seal tightly again.

- Pack the unit being shipped in a plastic shrink wrapping and weld.
- Place the device welded into the plastic into the transport crate and add sufficient desiccant pouches.
- Close transport crate.

Transport crate	Number of desiccant pouches
HZK 1, 2, 3, 4, 5, 6	6
HZK 7	4
HZK 8, 9, 10, 11	6
HZK 12, 13, 14	4

5.5 Packaging

The respective packaging pieces are packed according to the transport conditions which can be expected. Exclusively non-polluting materials were used for packaging. The packaging shall protect the respective components against transport damages, corrosion and other damages until assembly. Therefore do not destroy the packaging and remove just shortly before assembly.

Packaging materials handling

Dispose packaging material according to the respectively valid legal regulations and local directives.

CAUTION!
Damage caused to the environment due to incorrect disposal!

Packaging materials are valuable raw materials and can be reused in a lot of cases or can be sensibly processed and recycled. Therefore:

- Dispose packaging materials in an environmentally friendly way.
- Conform to the locally effective regulations for waste disposal. Charge a specialist with the disposal if applicable.

5.6 Storing

Storing of the packaging pieces

Store the packaging pieces under the following conditions:

- Do not store out of doors.
- Store dry and dust-free.
- Protect against insolation.
- Avoid mechanical vibrations.
- Stocking temperature: -25 to +55 °C.
- Relative humidity of air (not condensing): 5 to 95 %.
- With a storage period of longer than 3 months the general condition of all parts and the packaging has to be checked regularly. Refresh or exchange the conservation if necessary.

NOTE!

Notes regarding storage which exceed the requirements mentioned here are possibly on the packaging pieces. These are to be observed accordingly.

6 Installation and initial operation

Personnel	■ Installations may only be carried out by qualified personnel. ■ Initial operation is effected exclusively by personnel or by trained and authorized persons of the manufacturer. ■ All work on the electric installation is to be carried out exclusively by electronics specialists.

6.1 Safety

WARNING!
Risk of injury due to improper executed installation and initial operation!
Improper installation and initial operation can lead to severe damage to persons and property. Therefore:
- Observe the general safety instructions.
- Wear the required personal protective equipment.
- Before starting work arrange sufficient space for assembly.
- Shut off energy supplies and secure against restarting.
- Assembly works should only be carried out when the system is shut down.
- If components have been removed pay attention to a correct assembly and observe screw tightening torques.
- Check that all connections are firmly in place.
- Always ensure that all covers and safety devices are correctly installed and work properly before turning on the system.

CAUTION!
The operating voltage of the control unit has to correspond with the supply voltage of the mains power supply. Neglect of this rule can result in damages at the unit!
Therefore:
- Before start-up of the control unit compare the data on the type plate with the supply voltage of the customer.

6.2 Requirements of the place of installation

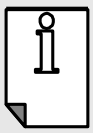
The unit can be installed as part of an industrial robot or a fixed system. The following requirements need to be observed:

- For the assembly and maintenance of the unit as well as for the operation of the system and freedom of movement, sufficient space needs to be made available.
- The system may not be operated in damp surroundings.
- The base of the system is to be encased and safeguarded through monitoring with a dividing distance protective system.
- Sufficient lighting needs to be made available.

6.3 Equipment installation

- Before connecting the electrical and pneumatic supply lines install all mechanical equipment.
- For a temperature exchange with the environment must be kept a minimum distance of 2 m to permanent heat sources.
- Pay attention that the control unit will be placed on a stable and level surface Ensure an unhindered opening of the appliance door.

CAUTION!
Always consult TUCKER when the unit is to be installed in an already existing system as well as when connecting foreign units.

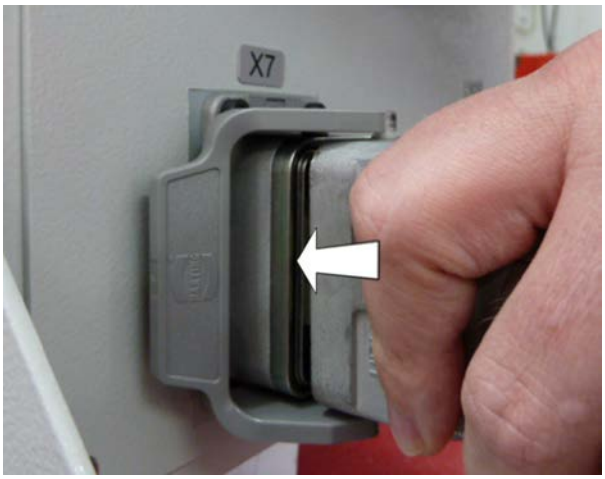


REFERENCE!
You will find the details regarding connection of individual system components among one another in the assembly instructions for each of the system components.

6.4 Connecting the control unit

NOTE!
Install the connecting cables according to the specific layout. The control cables are to be laid out in their whole length. This avoids inductive bypasses and line breaks!

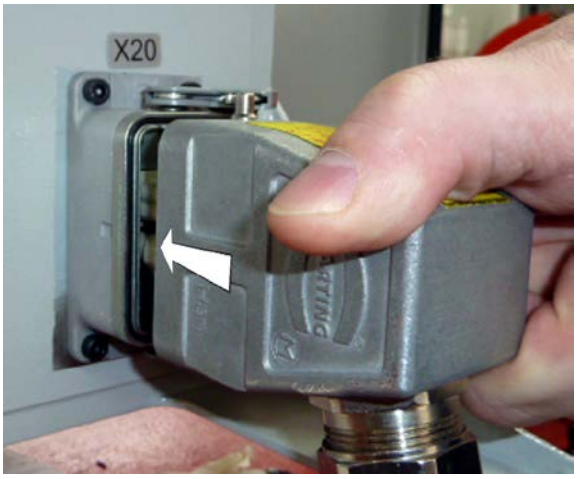
CAUTION!
Ensure that the control unit has been switched off before connecting and secured against restarting.



Connecting the self-piercing rivet tool

Connect the control cable to the control unit. (X7).

Connect the other cable end to the self-piercing rivet tool (X3).



Connect the motor cable to the control unit (X20).

Connect the other cable end to the self-piercing rivet tool (X1).

Connecting the feeder

Connect the control cable (1) to the control unit (X3).

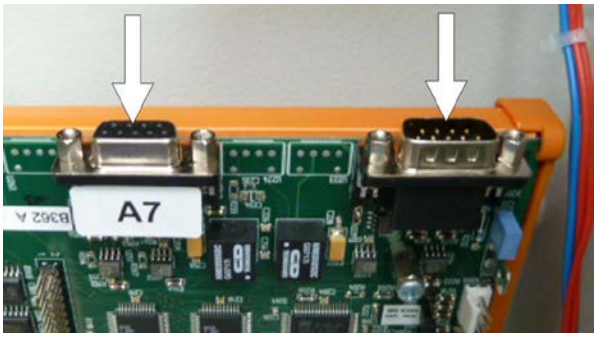
Connect the other cable end to the feeder (X1).

Connecting the control panel

Connect the plug (1) of the control panel Touchpad to the control unit.

6.4.1 Connecting in an automatic system (option)

CAUTION!
Ensure that the control unit has been switched off before connecting and secured against restarting.



Connecting the serial interface (option)

Connect the control cable for external robot control and external power supply to the control unit (X8) and (X6).

Connect the other cable end to the external robot control.

Connect the control cable for the customer interface to the PCB interface (A7) inside the unit.

Insert the control cable trough the cable duct into the housing.

Connect the other control cable end to the external robot control.

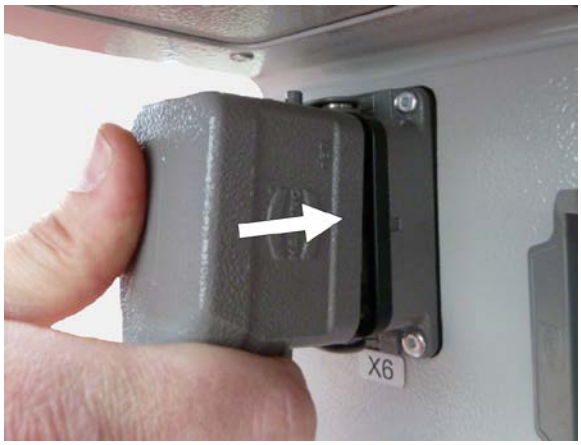
Connecting the parallel interface (option)

Connect the control cable for external robot control and external power supply to the control unit (X8).

Connect the other cable end to the external robot control.

6.4.2 Connecting in a manual system (option)

CAUTION!
Ensure that the control unit has been switched off before connecting and secured against restarting.



Connecting the two-hand interface

Connect the control cable to the control unit (X6).

Connect the other cable end to the two-hand interface (X1).

NOTE!
In systems with foot switch, the foot switch will be connected via connection X5 of the two-hand interface. The emergency stop circuit is closed via the foot switch.

Inserting jumpers on manual operation

CAUTION!
If the interface plug X8 is not utilised, this has to be bypassed, since the protection circuit is interrupted otherwise.

Plug X8	Socket module A			
Insert jumper	1 - 7	2 - 8	3 - 9	4 - 10

6.5 Cable laying at the ERC-compact

For the laying of the cables at the ERC-compact a respective opening is provided.

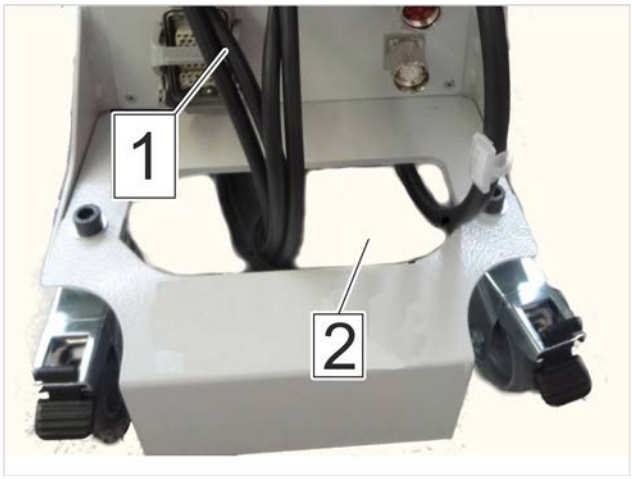


Fig. Cable opening in the bottom plate

Laying the cables

Insert the cables through the opening in the bottom plate and place them to the rear of the unit.

6.6 Cable reserve for the ERC-compact

When laying the cables, a cables reserve of approximately 600 mm must be considered behind the control unit ERC-compact. Thus, the unit can be moved out of the frame in case of failure, without the cables must be solved.

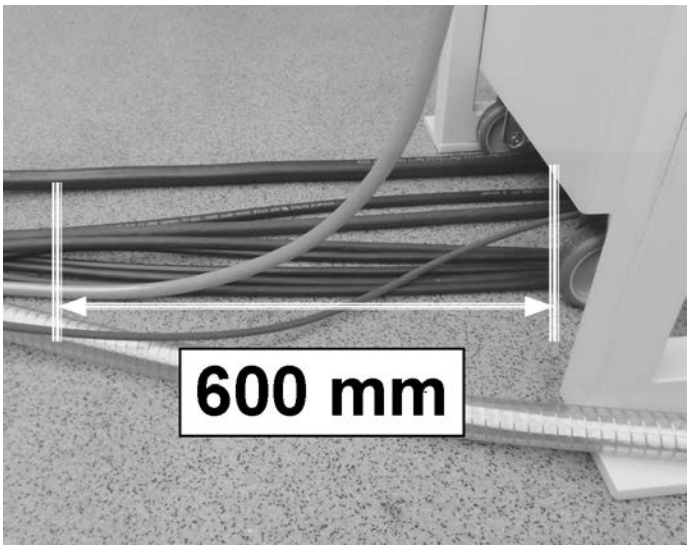


Fig. Cable reserve at the ERC-compact

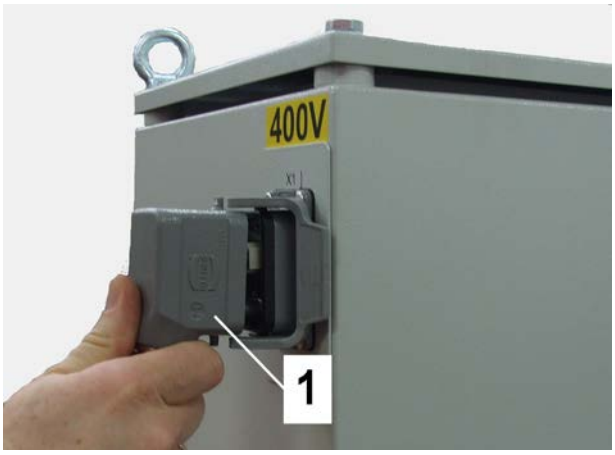
6.7 Connection to the energy supply

6.7.1 Connecting the power supply

DANGER!
Danger to life by electric current!

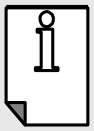
– Close housing, door and all safety devices of the unit before connecting it to the power supply system.

Power supply must always be supplied by the user of the system.



Connect the power plug (1).
Connect the other cable end to the socket of the operator.

6.8 Installing and configuring the unit



REFERENCE!
A programming manual for control unit ERC ”Software” is available and can be requested anytime via our after sales service. Please see manufacturer address page 2.

For start-up observe the following sequence:

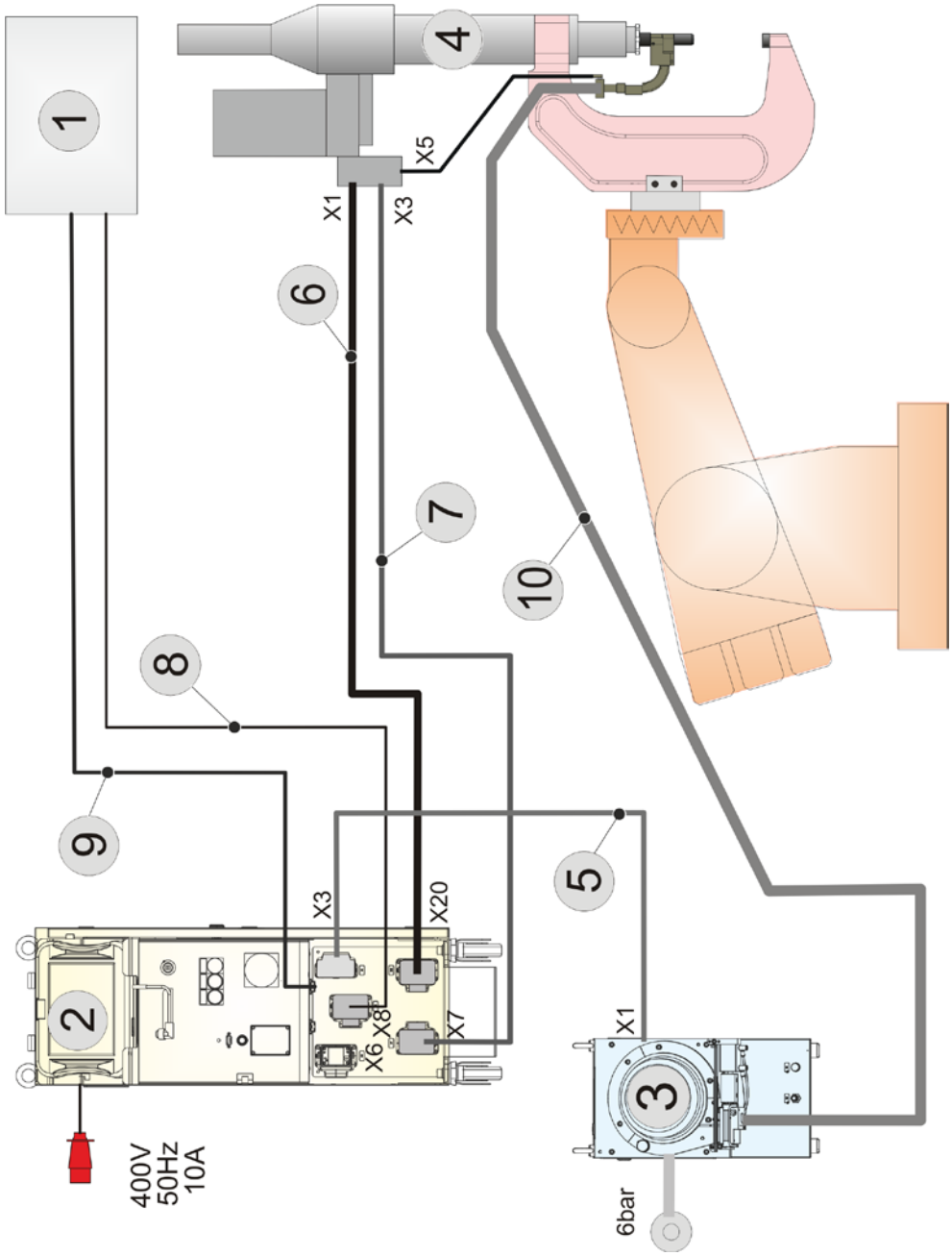
1. Install the specific connectors of the control unit according this manual.
2. Install the system components in consideration of the device-specific manuals.
3. Switch on the control unit: The type and the configuration of the unit will be displayed.
4. Check the configuration of the devices displayed with the connected devices.
5. In case the data does not match, devices must be reconfigured.
6. Program the output related parameters in the submenu PROGRAMMING RIVET TOOL and the riveting parameters in the submenu PROGRAMMING PROCESS.
7. Check the programmed parameters by several riveting tests.

WARNING! RISK OF INJURY TO THE HAND!
There is a risk of injury by bruising at the rivet tool and at the riveting point during manual operation. Therefore:

- Ensure that there are no persons within the danger zone of the self-piercing rivet tool during manual operation.
- Do not touch into the danger zone.
- Please consider the valid accident prevention regulations.

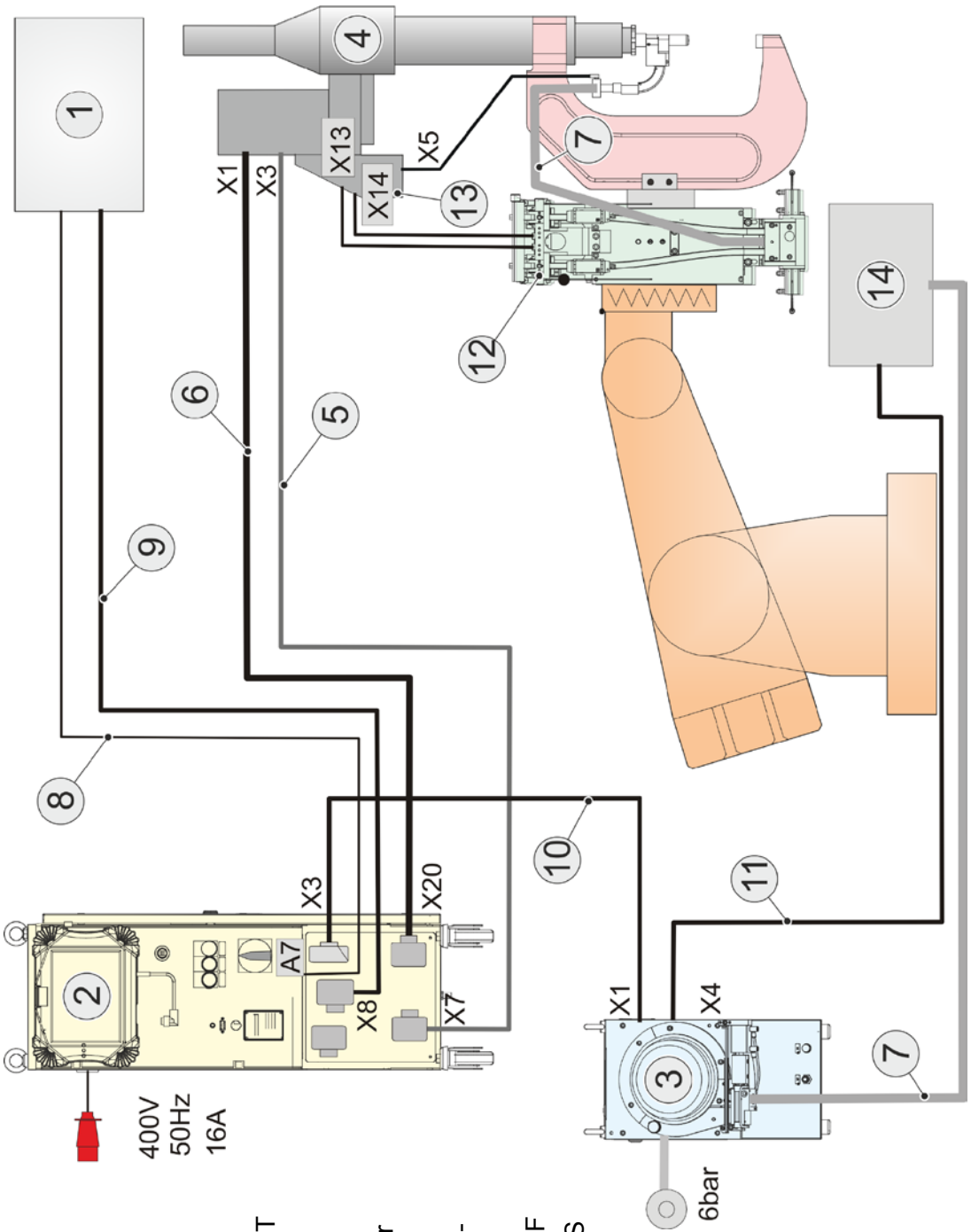
6.9 Layouts self-piercing riveting system

6.9.1 Automatic system with ERC-compact



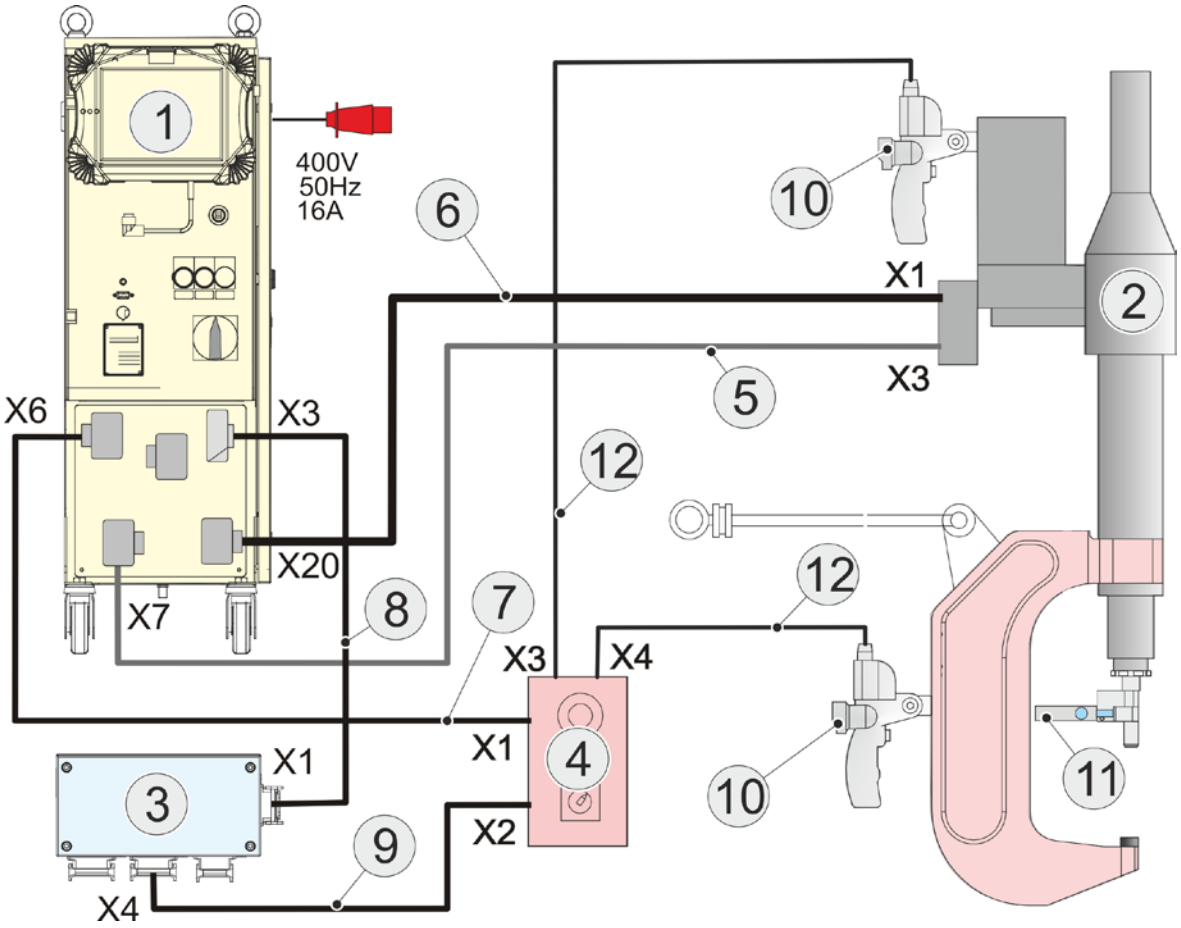
1 Robot control
2 Control unit ERC
3 Feeder ERF
4 Self-piercing rivet tool ERT
5 hybrid cable
6 Motor cable
7 Control cable ERC-ERT
8 Control cable to the external robot control
9 Control cable customer interface
10 Feed tube

6.9.2 Automatic system with ERC-compact and EMS magazine



1 Robot control
2 Control unit ERC-compact
3 Feeder ERF23
4 Self-piecing rivet tool ERT
5 Control cable ERC-ERT
6 Motor cable
7 Feed tube
8 Control cable customer interface
9 Control cable to the external robot control
10 Control cable ERC-ERF
11 Control cable ERF-EFS
12 EMS-magazine
13 DCC-box
14 Filling station EFS

6.9.3 Manual system with ERC-compact and two-hand triggering



1	Control unit ERC	**7**	Control cable ERC- Interface
2	Self-piercing rivet tool ERT	**8**	Control cable ERC-ERF
3	Control box ERS	**9**	Control cable ERS-Interface
4	Two hand interface	**10**	Two-hand switch
5	Control cable ERC-ERT	**11**	Manual assembly
6	Motor cable	**12**	Control cable

7 Operation and service inside the system

Personnel	■ Operation of the system must only be performed by fully-trained qualified personnel. ■ All work on the electric installation is to be carried out exclusively by electronics specialists.

7.1 Safety

Personal protective equipment

The following protective equipment must be worn at all operation works:

- Safety boots
- Protective glasses
- Protective gloves

WARNING!
Risk of injury due to improper commissioning and operation!

Improper operation can lead to heavy damage to persons and property. Therefore:

- Observe the general safety instructions!
- Wear the required personal protective equipment.
- Check that all connections are firmly in place.
- Before operating the system, always make sure that all covers and safety devices and functions are correctly installed and work properly.
- Never turn off safety functions during operation.
- No person may enter the working and danger area of the system during operation.
- All operating steps must be performed by the operator as instructed during the training.
- Keep the working area clean and in order.

7.2 Starting up and shutting down the system

The unit is switched on and off by the main switch.

7.3 Action to take after a malfunction

CAUTION!
If there is a malfunction, operation of the system must be stopped immediately. Corrective action must be performed by qualified service personnel only.

7.4 Emergency stop

In dangerous situations machine movements must be stopped and the power supply switched off as quickly as possible.

Emergency Stop	In dangerous situations proceed as follow: **1.** Initiate an emergency stop at once. **2.** Remove people from the hazard zone, start first-aid measures. **3.** Call emergency services. **4.** Inform the supervisor in charge of the operating site. **5.** Switch of the main switch and secure against switching on again. **6.** Clear access routes for emergency service vehicles. **7.** Deploy expert personnel to rectify the fault.

DANGER!
Danger to life caused by too early switching on again!
Danger to life for all persons in the danger zone when switching the machine back on. Therefore:
- Before switching on again, make sure that no person is inside the danger zone.
- Check the machine and ensure that all safety features have been installed and are fully functional before restarting the machine.

8 Fault and warning reports

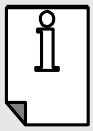
8.1 Safety

Personnel	■ The troubleshooting steps described here can be carried out by the operator, unless otherwise indicated. ■ Some work may only be carried out by qualified personnel, in which case special notice is given in the description of the individual faults. ■ All work on the electric installation is to be carried out exclusively by electronics specialists.

8.2 Rectify faults

If a malfunction (fault) or maintenance warning is encountered, an appropriate trouble or warning signal is displayed on the control panel Touchpad.

If several malfunctions occur on the unit at the same time, the appropriate fault reports are displayed in sequence. One fault can also cause several error codes to be displayed.



REFERENCE!

For explanation, cause and remedy for warning and fault messages, see manual “Fault reports ERC-system“.

Detailed information concerning troubleshooting can be found in the service manual.

9 Maintenance and cleaning

Personnel	■ The maintenance work described can be carried out by the operator, unless otherwise indicated. ■ Some maintenance work may only be carried out by qualified personnel. ■ All work on the electric installation is to be carried out exclusively by electronics specialists.

9.1 Safety

WARNING!
Risk of injury due to improperly carried out maintenance work!

Improper maintenance can lead to heavy damage to persons and property. Therefore:

– Observe the general safety instructions.
– Wear the required personal protective equipment.
– Turn off all current supplies and secure against restarting. Relieve compressed air system.
– Before starting work arrange for sufficient space for assembly.
– If components have been removed pay attention to a correct reassembly, install all fastening elements again and observe screw tightening torques.

9.2 Fastening torques for screws and nuts

CAUTION!
Risk of damage of the unit!
Improper handling can cause severe damage to the unit. Therefore:

- The specified fastening torques shall be observed for any mounting, repair or maintenance works.
- Use torque wrenches and respect the given tensile direction.

Values according VDI 2230 under utilization of the minimum yield stress of 75%

Fastening torques		
Thread size	**Property class 8.8**	**Property class 10.9**
M3	1.1 Nm	1.65 Nm
M4	2.5 Nm	3.65 Nm
M5	4.9 Nm	7.25 Nm
M6	8.3 Nm	12.50 Nm
M8	20.8 Nm	30.00 Nm
M10	40.8 Nm	60.00 Nm

The chart contains no more factors of safety. Knowledge of the appropriate guidelines and layout criteria are required.

9.3 Maintenance schedule

The maintenance work essential for an optimal and failure-free operation is described in the following chapters.

In the case of detection of an increased abrasion during regular checks, shorten the required maintenance intervals accordingly to the actual signs of abrasion.

If you have questions concerning maintenance work and intervals contact the manufacturer, see service address on page 2.

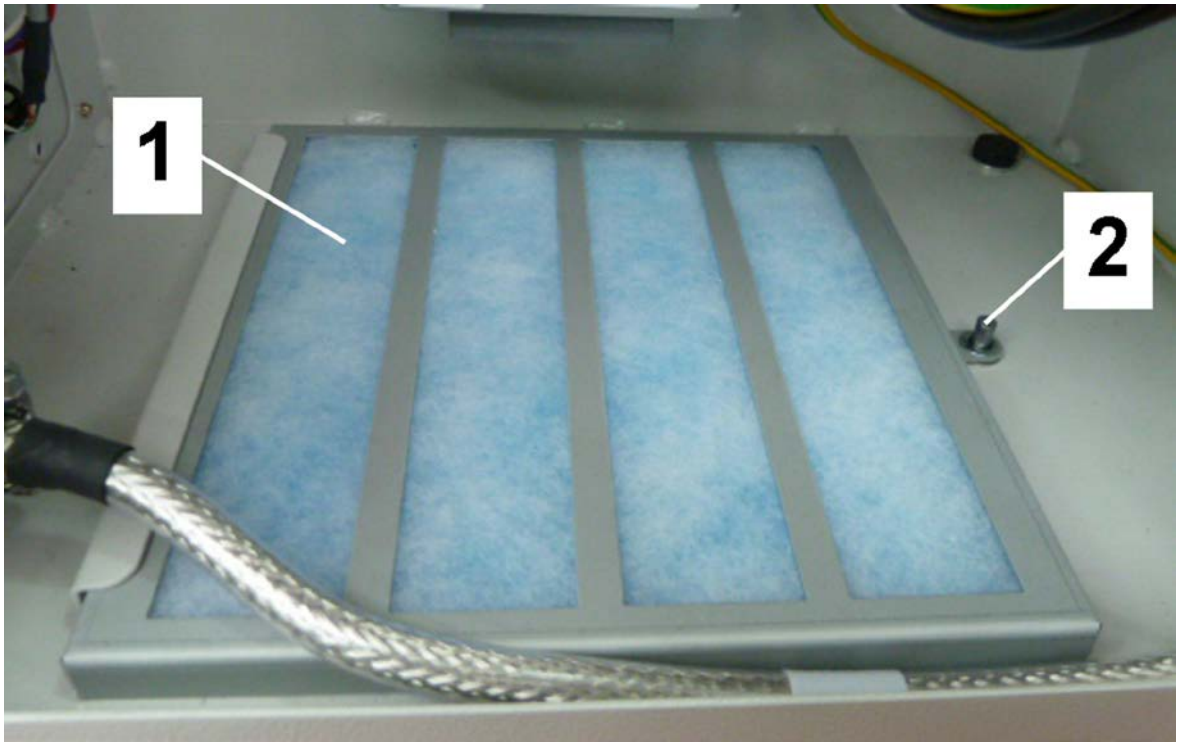
Interval	Wearing work	To be carried out by
daily	Check connection cables, pneumatic lines and plug connectors for mechanical damage and tight fit.	Operator
semi-annually	Check the filter insert for contamination and replace if necessary.	Qualified personnel

9.4 Cleaning the filter insert

The contamination of the filter insert is depending on the prevalent environmental conditions.

For inspection proceed as follows:

1. Switch off the main switch and disconnect the unit from the power system.
2. Press the push button (2); afterwards pull out the frame with the filter insert (1).
3. On a light contamination clean the filter insert with compressed air. On a heavy contamination replace the filter insert.



- Order number filter insert: M 070 448

10 Dismantling

Personnel	■ The dismantling may only be carried out by qualified personnel. ■ All work on the electric installation is to be carried out exclusively by electronics specialists.

10.1 Safety

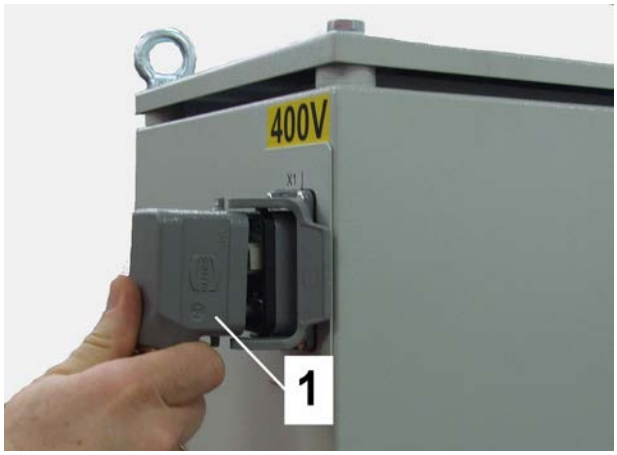
WARNING!
Risk of injury due to improper executed dismantling!
Stored up rest energy, edged components, sharp points and corners on or in the unit or on the required tools can cause injuries. Therefore:

– Observe the general safety instructions.
– Wear the required personal protective equipment.
– Pay due care when working with components with sharp edges.
– Dismantle components correctly so that they can not fall down or over.

DANGER!
Danger to life due to electric current!
Contact with components under current is perilous. Specific switched on electronic components move in an uncontrolled manner and cause serious injury. Therefore:

– Before beginning with the dismantling cut off the current supply absolutely and completely.

10.2 Disconnecting the power supply



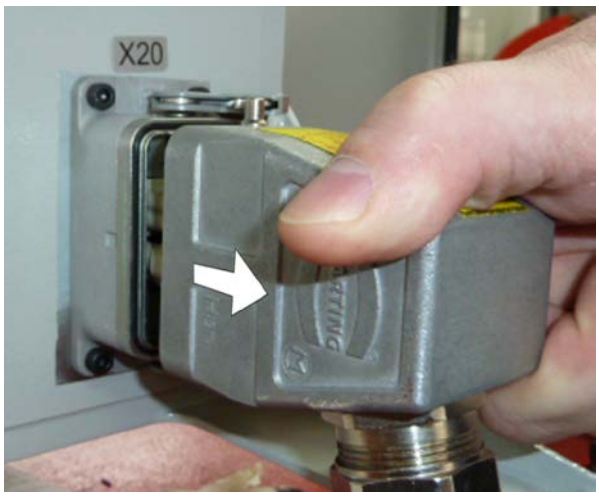
Disconnect the power supply of the system at the control unit: First unplug the plug at the socket of the operator, then the power plug at the control unit.

10.3 Disconnecting the control unit from the system

Disconnecting the control unit from self-piercing rivet tool

Unlock and remove the control cable from the control unit (X7).

Remove the other cable end from the self-piercing rivet tool (X3).



Unlock and remove the motor cable from the control and power unit (X20).

Remove the other cable end from the self-piercing rivet tool (X1).

Disconnecting the control unit from feeder

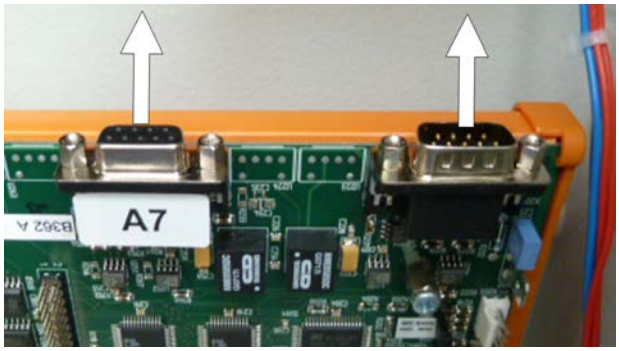
Unlock and remove the control cable (1) from the control unit (X3).

Remove the other cable end from the feeder (X1).

Disconnecting the control unit from robot control (option)

Unlock and remove the control cable from the control unit (X8).

Remove the other cable end from the external robot control.

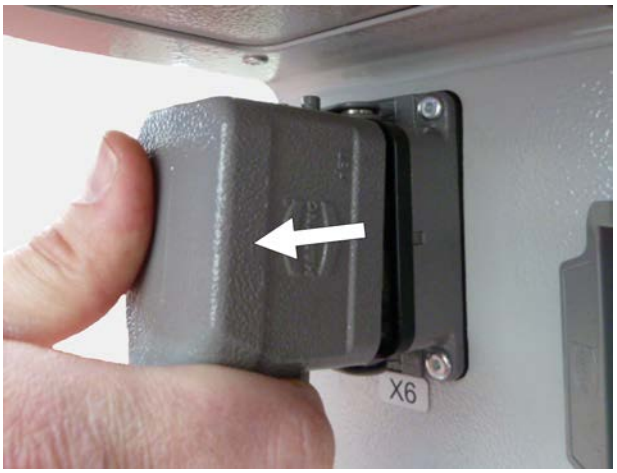


Remove the control cable to the customer interface from the PCB-interface (A7) inside the control unit.

Remove the other cable end from the external robot control (depending on execution).

Disconnecting the control panel

Disconnect the plug of the control panel Touchpad from the control unit.



Disconnecting the control unit from two-hand interface (Option)

Unlock and remove the control cable from the control unit (X6).

Remove the other cable end from the two-hand interface (X1).

11 Disposal

Unless no recovery- or disposal arrangement was made, disassembled parts have to be recycled:

- Scrap metals.
- Recycle plastic elements.
- Sort the rest of the components according material properties and dispose of accordingly.

CAUTION!
Damage caused to the environment due to incorrect disposal!
Electronic waste, electronic components, lubricants and other additives are subject to treatment of hazardous waste and may be disposed only by licensed certified specialists!

The local authority or special disposal specialists can provide information regarding environmentally friendly disposal.

12 Index

Notizen/Notes: