



Operating Manual

MULTISPOT MI-100control T

Resistance welder



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Be sure you have read and understood this operating manual before you carry out any works on and/or with this equipment.

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General information

1 General information

1.1 Information concerning the operating manual

This operating manual will enable you to work efficiently and safely with this equipment.

The manual is an essential part of this product and must be stored ready at hand not far from the equipment so that people can use it at any time without any problems. Operators must read and understand the manual before they carry out any works.

Compliance with any and all information contained herein concerning health, safety and safe behaviour and procedures is a prerequisite for safe work.

Shall apply in addition: any and all local accident prevention regulations, any and all general safety regulations that may apply to the scope of application of this equipment.

Pictures, drawings etc. contained in this operating manual are supposed to convey a general understanding of facts. In details, they may deviate from the reality you encounter.

Besides this operating manual, there may be specific instructions for units, components etc. They shall apply accordingly.

1.2 Copyright

This operating manual is protected by copyright. It may be used for internal purposes, exclusively.

The manual and/or its contents may not be relinquished to third parties and/or communicated, processed, used and/or reproduced in any way or form whatsoever (not even in excerpts and/or for internal purposes) without the prior written consent of the manufacturer.

Contravention shall entail damage claims.

All other rights reserved.

1.3 Symbols

Safety information

This manual uses symbols to highlight important safety information. In addition, there is always a signal word heading the information indicating the severity of the danger or hazard that may be encountered.

Be sure to comply with any and all safety information. Proceed with care and circumspection. Prevent accidents and damage to people and property.



DANGER

... indicates a situation that is imminently dangerous and will entail the death of people and severe injuries unless it is properly avoided and prevented.



WARNING

... indicates a situation that may become dangerous and may entail the death of people and severe injuries unless it is properly avoided and prevented.



CAUTION

... indicates a situation that may become dangerous and may entail medium and small injuries unless it is properly avoided and prevented.



CAUTION

... indicates a situation that may become critical and may entail damage to property unless properly avoided and prevented.

Tips, tricks and recommendations



NOTE

... highlights information that may be helpful to maintain efficient and troublefree operation.

General information

1.4 Disclaimer

Any and all information contained in this operating manual has been written on the basis of pertinent standards and regulations, the state of the art, and the long-standing insights and experience of our staff.

The manufacturer cannot be made liable for damage due to:

- non-compliance with this operating manual
- non-compliance with the purpose and intent of this equipment
- deployment of unskilled personnel
- unauthorised constructional changes, alterations etc.
- unauthorised changes, modifications etc. to design and engineering etc.
- use of unauthorised spare and wear parts

The scope of the delivery you actually receive may deviate from explanations and/or representations in this manual - if and when you ordered special options, your equipment is a special design and/or technical progress facilitates improvements.

Shall apply: any and all obligations and stipulations of the Delivery Contract, the General Terms of Business and Terms of Supply and Delivery of the manufacturer as well as any and all legal stipulations and regulations in force on the day the Contract was concluded.

We constantly strive to further develop and improve our products and their functionality. We, therefore, reserve the right to implement technical changes without notice.

1.5 Warranty and guarantee

The guarantee conditions shall be as stipulated in the General Terms of Business of the manufacturer.

1.6 Customer service

Our customer service will be happy to provide technical support. For contact information, → see page 2 of this manual or the service menu on the control panel.

Please note: Our staff is always eager to learn about new information, insights and/or experience our customers may derive from the work with our products that may be helpful for their future improvement.

2 Health and safety

This section contains an overview of the most important health and safety at work aspects in order to protect employees and to guarantee safe and troublefree operation.

Non-compliance with any and all of the information, safe behaviour and procedures etc. contained herein may entail severe health and safety risks.

2.1 Intended purpose

This equipment has been designed and built for the following purpose(s), exclusively, and shall be used accordingly:

The **MULTISPOT MI-100control T** resistance welder serves the sole purpose of spot welding during maintenance work on car bodies, for stock of up to 3 mm sheet gauge and combinations of up to three sheets within its specifications and limits of use (→ see "Specifications").

"Intended use" and "intended purpose" shall include proper compliance with any and all information contained in this operating manual.

Any and all use diverting from and/or going beyond the limits as set by the equipment's intended purpose and use shall be deemed misusive and may entail dangerous situations.



WARNING

Misuse may entail danger

Misuse of this equipment may entail dangerous situations.

Therefore:

- Do not operate this equipment unless clearly within its specs and limits of use (→ see "Specifications").
- Be sure to use this equipment for welding sheet metal up to 3 mm, galvanised stock and sheets made of high strength steel (HSS), exclusively.
- Do not misuse this equipment for heating, thawing or perhaps even igniting objects.
- Do not use this equipment in explosive atmospheres.
- Do not open, alter, modify and/or manipulate etc. this equipment.

The manufacturer shall not be held liable for any and all damage due to misuse of this equipment.

2.2 Responsibilities of the operating company

2.2.1 General responsibilities

This equipment has been designed for professional use. The owner/operator or operating company therefore being a businessman or commercial company, they are subject to any and all legal obligations concerning health and safety at work. That means, in addition to this operating manual, any and all accident prevention, health and safety at work and environmental regulations pertaining to this equipment's scope of application shall apply as well. This means in particular:



- The operating company must be informed about any and all pertinent health and safety at work regulations and must carry out a risk assessment in order to determine additional hazards existing under the specific conditions in the specific work environment at the place of operation. Any and all findings from such a risk assessment must then be used to draw up additional operating instructions for the operation of this equipment.
- During the entire lifetime of this equipment, the operating company must check in regular intervals whether such additional operating instructions are still up to date and must update them when necessary.
- The operating company must unambiguously determine and communicate responsibilities concerning the installation, operation, maintenance and cleaning of this equipment.
- The operating company must make sure that any person handling this equipment has read and understood this operating manual. Operating personnel, in addition, must be trained in regular intervals and must be informed about the dangers existing in connection with this equipment. (For a draft of a training report form, see "Appendix".)
- The operating company must equip operating personnel with suitable personal protective equipment (PPE) and check it for proper working condition in regular intervals. Defective PPE must be replaced with new ones.
- The operating company must take appropriate and suitable fire protection measures and make available fire extinguishers and first aid kits.

The operating company is responsible that the equipment is in proper working order at all times. Therefore:


- The operating company must make sure that any and all maintenance jobs described in this manual are really carried out.
- The operating company must have any and all safety labels, markings etc. on the equipment checked for integrity and readability in regular intervals.

Health and safety

Symbols the operating company must install on access ways and doors

Symbol	Meaning
	Electromagnetic fields – hazard to persons with pacemakers. Persons who may suffer health risks due to the influence of electromagnetic fields must not approach this equipment.
	Electromagnetic fields – hazard to persons with magnetisable implants. Persons who may suffer health risks due to the influence of electromagnetic fields must not approach this equipment.

Symbols the operating company must install in the immediate vicinity of the equipment

Symbol	Meaning
	Electromagnetic fields – hazard to magnetisable objects Magnetisable data carriers and similar objects that may suffer from magnetism must not be brought close to this equipment.

Health and safety

2.2.2 Requirements to personnel

**WARNING**

People with insufficient skills may suffer injuries.

Inexpert handling may entail severe damage to persons and property.

Therefore:

- Make sure that any and all activities are carried out by skilled personnel, only.

- This equipment may be operated only by persons who can be relied on to do their work properly.
- Persons whose capability of reaction is impaired, e.g. by drugs, alcohol or medication, must not be allowed to handle this equipment.
- When selecting suitable operating personnel, be sure to respect occupational regulations and legislation concerning skills, age etc.

This operating manual specifically names the following types of personnel who must have the following skills:

- **Operator / welder**

has extensive skills and experience in the field of resistance welding and with the corresponding preliminary and finishing jobs. The welder / operator has been coached / trained by employees of Elektron and/or an authorised representative / dealer of Elektron concerning his tasks and duties and possible hazards in connection with inappropriate behaviour and confirms this with his signature (see draft of training report form, "Appendix").

- **Service personnel**

refers to manufacturer's own service personnel and/or that of his representative / dealer. Such service personnel have the professional training, skills and experience as well as knowledge of pertinent regulations to carry out the jobs they accept and to identify, avoid and prevent hazards on their own and without additional support.

- **Skilled electrician**

has the professional training, skills and experience as well as knowledge of pertinent regulations to carry out jobs on electrical equipment and to identify, avoid and prevent hazards on his own and without additional support. A skilled electrician is needed, for instance, if the conductor cross-section and fuse protection of the operating company's power grid must be adapted to the special requirements of resistance welding.

2.2.3 Personal protective equipment (PPE)

**CAUTION****Insufficient protection against injuries**

Defective safety clothing may not constitute a proper protection against injuries.

Therefore:

- Be sure to check PPE for integrity and good working condition before you start any works.
- Replace defective PPE.
- Consider manufacturer's instructions and expiration dates, when and where applicable.

Wearing PPE during work is essential to minimise health and safety risks.

- Be sure to be always wearing the appropriate PPE for the job at hand.
- Be sure to take note of and comply with warning signs concerning PPE that may be installed at the workplace.

**Non-flammable safety clothing**

is a tight-fitting sort of special clothing that is not inflammable, covers arms and legs completely and tears easily (instead of getting pulled in). Its main purpose is to protect against burns.

**Face screen**

protects the face and eyes against splashes, flying sparks and other hot particles.

**Welder's gloves**

protect the hands against splashes, flying sparks and other hot particles, and prevent contact with hot surfaces.
Never use wet welder's gloves.

**Safety shoes**

protect the wearer's feet against falling objects, slippery surfaces and being run over by vehicles.

Furthermore:

no long hair, rings, necklaces, watches and/or other sorts of jewellery. Do not carry easily inflammable objects in your pockets (matches, lighters etc.).

Health and safety

2.3 Particular dangers

2.3.1 Dangers due to the equipment

Electricity



DANGER

Electricity constitutes a danger to life and limb.

Touching live components can result in a fatal electrical shock.

Therefore:

- As soon as you notice any damage to insulation, disconnect the power supply and have the damage repaired.
- Do not open this equipment yourself. Have all repairs carried out by service personnel, exclusively. Have works on electrical equipment carried out by skilled electricians, exclusively.
- Before any and all electrical works: disconnect power, earth and short. Check whether equipment is really dead.
- Keep live components away from liquids and humidity. They may cause short circuits.
- Protect cables against running over, contact with oils, aggressive substances, tools, pointed and/or hot objects.
- When pulling from a socket: Never pull on the cable. Pull on the plug.
- Do not use the cable to trail or drag equipment over the floor. Always grab equipment by the handles provided for that purpose.
- Use strain relief clamps to protect cables.
- Make sure protective ground conductors have been connected properly.
- After disconnecting the welder from the mains the welder still contains residual current for approx. 15 minutes.

Electromagnetic fields**DANGER**

Electromagnetic fields pose a potentially fatal hazard to people with pacemakers or other magnetisable implants.

Electromagnetic fields affect the functionality of pacemakers and other magnetisable implants. Electromagnetic fields can irritate human sense organs, nerve and muscle cells.

Therefore:

- Persons with pacemakers or other magnetisable implants must not approach the work area.
- Be sure to put up suitable warning signs.
- Be sure to put warning signs on access ways and doors leading to the work area.
- Do not guide welding cables along people's heads or spines. (To comply safely with permissible exposure limits, keep distances ≥ 20 cm. Keep a distance of at least 1 cm between cable assemblies and people's heads / spines.)

Splashes, flying sparks**WARNING**

Splashes and flying sparks constitute a danger of fire and explosion. Splashes and flying sparks pose a risk of injuries.

Welding generates sparks and -hot spatter. They can ignite combustible materials and generate explosions. Contact with body parts may entail injuries.

Therefore:

- Before you tackle any welding jobs, make sure there are no combustible and/or explosive materials in the work area.
- Do not carry out welding jobs in the vicinity of pressure vessels, tanks, oil barrels, paint cans and/or in a work area with an explosive atmosphere.
- Have fire extinguishing gear ready at hand.
- Make sure access and escape routes are not blocked.
- During any and all welding jobs: be sure to be wearing a face screen, non-flammable safety clothing and welder's gloves.
- Do not carry easily inflammable objects in your pockets (matches, lighters etc.).

Health and safety

Hot surfaces



CAUTION

Hot surfaces pose a risk of burns.

Electrodes may heat up to 80 degrees centigrade (176°F) approx. Stock may have up to 100 degrees centigrade (212°F) right after welding. So there is an acute risk of burning yourself.

Therefore:

- Never work without proper safety clothes and gloves near hot components.
- Let freshly welded parts cool down to ambient temperature before you go on to work with them.

Scald hazard



DANGER! Scalding may occur due to hot water coming out!

While pulling out the cooling water hoses hot water may come out. Therefore:

- Wear gloves.
- Pull out water hoses carefully.

Slip hazard



DANGER! Slip hazard due to water coming out!

While pulling out the cooling water hoses water may come out. Therefore:

- Remove water from the floor.

2.3.2 Dangers due to the work environment

Vapours



WARNING

Vapours may constitute a danger to your health.

Stock that has not been properly ground and cleaned before welding may be contaminated with residues of glues, paints, undercoating products etc. that may generate harmful or even toxic vapours during welding.

Therefore:

- Before you tackle any welding jobs, make sure the sheets you want to weld have been properly ground and cleaned and are free of residues.
- Be sure to be wearing a face screen.
Respiratory equipment may be recommendable in case of doubt.

Stumbling hazards**WARNING****Possibility of injuries due to stumbling and falling.**

The work environment may pose stumbling risks. Stumbling and falling may lead to severe injuries.

Therefore:

- Before you tackle any welding jobs, make sure the work area is tidy and free of clutter and offers enough freedom to move.
- Install cables and supply lines in such a way that they do not constitute a stumbling trap.
- When welding, assume a safe and stable working position.

2.3.3 Dangers to this equipment and other property

Tipping and toppling hazards due to high centre of gravity and obstacles during travel

**CAUTION****Tipping and toppling may cause damage to property.**

This equipment's centre of gravity is relatively high. In the event the wheels jam and/or block (due to an obstacle or transverse pull, for instance), there is a danger the equipment tips over.

Therefore:

- Move this equipment always using the handles.
- Keep potential obstacles out of the work area.
- Install cables and supply lines in such a way that they do not constitute a stumbling trap.

There is a danger the equipment rolls away because the wheels must not be blocked due to the tipping and toppling hazard.

**CAUTION****Equipment rolling away may cause damage to property.**

The wheels of the equipment must not be blocked because this would cause a tipping and toppling hazard.

On the other side, though, this detail causes and increases the danger the equipment rolls away.

Therefore:

- Be sure to operate this equipment only on a flat and even floor.
- Proceed with care when moving this equipment.

Health and safety

Danger to display and control panel



CAUTION

Display and control panel may sustain damage.

The display and control panel may sustain damage when being closed if negligent employees leave objects lingering on the accessory box beneath.

Therefore:

- Never put objects on the accessory box beneath the display and control panel.
- Proceed with care when closing the flap cover with integrated display and control panel.

2.4 Correct behaviour in accidents and dangerous situations

Preventive measures

- Be prepared to confront accidents and fires.
- Be sure to have first aid equipment (kits, blankets etc.) and fire extinguishers ready at hand.
- All personnel must know about accident signalling systems, first aid, rescue and escape equipment.
- Keep access ways for ambulances clear and open.

Measures to be taken in case of accidents

- Actuate emergency stop. (→ See "2.6".)
- Initiate first aid.
- Evacuate people from danger zone.
- Alert persons in charge.
- Alert fire brigade and ambulance service.
- Keep access ways for ambulances clear and open.

2.5 Measures to be taken in case of work at the device

- De-energise.
- Secure against restarting (e. g. pull out mains plug).
- Unstressedness determine.
- Ground and short circuit.
- Neighbouring energized parts cover or provide with gates.

2.6 Safety devices



WARNING! Danger! Due to insufficient protection against residual current!

Connection to electrical socket: the device may only be plugged into a socket with a residual current device and an operable earthing device.



Fig. 1: Emergency stop pushbutton

Emergency stop pushbutton

Hitting the emergency stop pushbutton will shut down the equipment immediately. After the emergency stop has been actuated, it must be turned clockwise (cw) to unlock before the equipment can be switched on again.



WARNING

Danger! Equipment may still be under voltage.

The emergency stop will shut down the equipment, but will not disconnect the power supply. To accomplish that, push the power switch on the backside of the equipment. Even then, there may still be components inside that are still under voltage.

Therefore:

- In order to disconnect this equipment from the power supply, switch off using the power switch. Secure against unintentional restart. Earth components, short circuit and check for residual electricity.
- Do not unlock the emergency stop pushbutton before danger has been completely removed.



Fig. 2: Power switch on the backside

Power switch

Turning the power switch to position "0" will disconnect the power supply immediately (which, basically, has the same effect as an emergency stop).

Health and safety

2.7 Safety labels and markings on this equipment

2.7.1 On the flap cover



Fig. 3: Warning sign "Electromagnetic fields" on the flap cover

Meaning

Welding generates electromagnetic fields. Electromagnetic fields pose a potentially fatal hazard to people with pacemakers or other magnetisable implants.

Electromagnetic fields also affect magnetisable objects, like e.g. watches, smart cards etc.



DANGER

Electromagnetic fields pose a mortal danger to persons with pacemakers.

Electromagnetic fields affect the functionality of pacemakers and other magnetisable implants. Electromagnetic fields can irritate human sense organs, nerve and muscle cells.

Therefore:

- Persons with pacemakers or other magnetisable implants must not approach the working area.
- Be sure to put up suitable warning signs.
- Be sure to put warning signs on access ways and doors leading to the work area.
- Do not guide welding cables along people's heads or spines. Keep a distance of at least 1 cm.

2.7.2 Signs on the backside

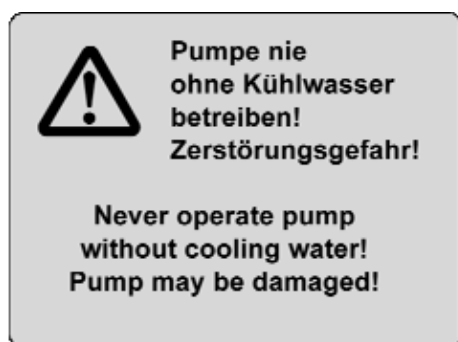


Fig. 4: Warning sign on the backside

Meaning

Do not operate pump without cooling water.

Pump running dry may sustain damage.



CAUTION

Pump may sustain damage when running dry.

Pump running dry may sustain damage.

Therefore:

- Before starting up, check cooling water level at the level gauge.
- If necessary (i.e. if you can't see water in the level gauge), fill up. (→ See "6.1.2".)

2.7.3 On the balancer

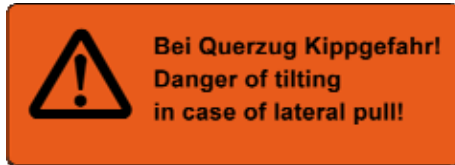


Fig. 5: Warning sign on balancer

Meaning

Always pull in the direction the guiding wheels are pointing.
In the event of lateral and/or transverse pull, there is a danger the wheels jam/block and the equipment tips over.



CAUTION

Tipping and toppling may cause damage to property.

This equipment's centre of gravity is relatively high. In the event the wheels jam and/or block (due to an obstacle or transverse pull, for instance), there is a danger the equipment tips over. Therefore:

- Move this equipment always using the handles.
- Keep potential obstacles out of the work area.
- Install cables and supply lines in such a way that they do not constitute a stumbling trap.

2.7.4 On the control board

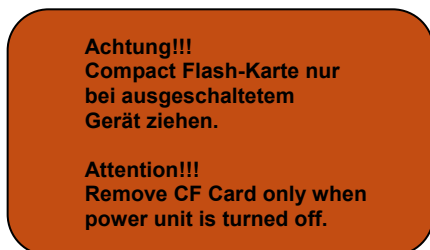


Fig. 6: Warning sign on the control board

Meaning

Do not pull compact flash card unless equipment has been properly switched off.

Compact flash card might be destroyed otherwise.

2.8 Spare and wear parts



WARNING

Wrong spare and wear parts constitute a hazard.

Wrong and/or defective spare and wear parts may constitute a safety hazard and may entail errors, damage and even total destruction. Therefore:

- Always use genuine spare and wear parts made by the manufacturer.

Be sure to buy your spare and wear parts directly from the manufacturer or an authorised dealer. For contact information →, see page 2 of this manual or the service menu on the control panel.

2.9 Waste management and environmental protection



CAUTION

Inexpert handling may constitute an environmental hazard.

Inexpert handling of environmentally harmful substances, especially wrong disposal, may constitute a hazard to the environment.

Therefore:

- Be sure to take appropriate measures whenever harmful substances get (or threaten to get) into the environment. In case of doubt, inform competent local authorities about the hazard or damage.
- Local authorities and specialised waste management companies will be happy to advise you with your disposal issues.
- Please also consider the following information.

Batteries

Batteries contain toxic heavy metals. Batteries are subject to hazardous waste management and must be collected by specialised companies or taken to special collection centres.

Electronic components

Electronic components and scrap are subject to hazardous waste management and must be collected by authorised companies.

Other components

Unless you have concluded a return and/or disposal agreement with the manufacturer, please disassemble and recycle components.

- Scrap metals.
- Recycle plastic parts.
- Other components must be sorted by materials and disposed of accordingly.

3 Specifications

3.1 Dimensions and weights

Item	Value	Unit
Height	925 / 36	mm / in
Width	650 / 26	mm / in
Depth	645 / 25	mm / in
Weight (w/o accessories)	60 / 132	Kg /lb

3.2 Power requirements

Power supply

Item	Value	Unit	Value	Unit
Mains voltage	400 / 3 ~ / 50/60	V / Ph / Hz	230 / 3 ~ / 50/60	V / Ph / Hz
Admissible voltage range	380 – 415	V (AC)	208 - 240	V (AC)
Power cord	6 mm ² / 10 m #10 / 33 ft		16 mm ² / 10 m #6 / 33 ft	
Mains fuse, min.	32	A träge	63	A träge
Installed power	21	kVA	21	kVA
Rated output at 50% duty cycle	30	kVA	30	kVA
No load voltage, max.	16	V (DC)	16	V (DC)
weld current regulated, max.	13000	A (DC)	13000	A (DC)
Enclosure	IP21		IP21	

Compressed-air supply

Item	Value	Unit
Operating pressure, min. – max.	6 – 10 87 – 145	Bar Psi
Quality	clean, dry, free of oil	

Specifications

3.3 Supplies

Item	Value	Unit
Cooling water - tank capacity	33 / 9	l / gal approx.
Chlorine-free disinfectant	accor.	dosing instructions

3.4 Working conditions

Ambient conditions

Item	Value	Unit
Ambient temperature, max.	40 / 104	°C / °F
Rel. humidity, max. (no dew)	85	%

3.5 Exposure limit values

Transformer pliers

Item	Compliance
Exposure limit values accor. EU directive 2004/40/EC	<p>Safe compliance with distances ≥ 20 cm perpendicular to pliers opening</p> <p>Safe compliance with distances ≥ 1 cm to welding cable</p>

3.6 Type plates

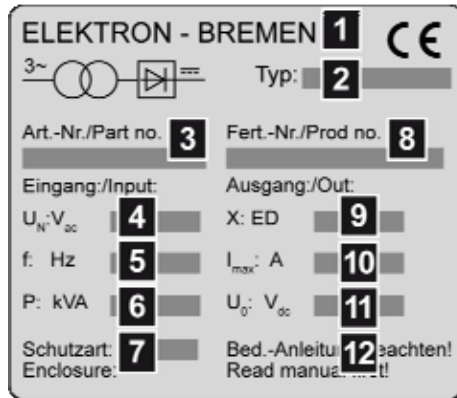


Fig. 7: Type plate on the backside

- 1 Manufacturer
- 2 Inverter type
- 3 Item no.
- 4 Input voltage (in VAC)
- 5 Frequency (in Hz)
- 6 Power consumption (in kVA)
- 7 Enclosure
- 8 Production no.
- 9 Duty cycle (in %)
- 10 Max. current (in A)
- 11 Output voltage (in VDC)
- 12 Appeal: Read operating manual. Comply with operating manual.

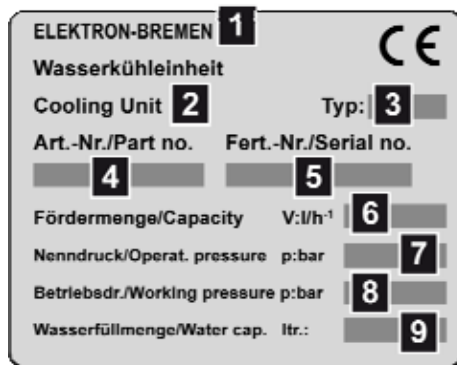


Fig. 8: Type plate on water cooling unit

- 1 Manufacturer
- 2 Designation
- 3 Type
- 4 Item no.
- 5 Production no.
- 6 Flow rate in l/h⁻¹
- 7 Rated pressure in bar
- 8 Operating pressure in bar
- 9 Volume in l

Design and functionality

4 Design and functionality

4.1 Overview

- 1 Inverter control unit
- 2 Welding pliers support
- 3 Display and control panel
- 4 Balancer support
- 5 Balancer
- 6 Welding pliers
- 7 Handle
- 8 Welding pliers supply lines
- 9 Support for tools or electrode arms, for instance
- 10 Running gear



Fig. 9: Multispot system (standard)

4.2 Description

The **MULTISPOT MI-100control T** resistance welder has been designed and built with the special requirements of body makers and maintenance in mind.

The inverter, which provides the power for welding, is controlled by a microprocessor. That way, weld current and weld time will be adjusted automatically on the basis of the selected operating mode, sheet gauge and welding job.

The automatic current adjustment facilitates a perfect reproducibility of welding results. The additional power needed for adjustment is taken from the mains.

4.3 Display and control elements

4.3.1 On the display and control panel

- 1 Display
→ see also Fig. 11
- 2 Selection elements
→ see also Fig. 12
- 3 Touch key for power selection
- 4 Touch key for selecting welding jobs (from top to bottom):
 - high strength steel (HSS)
 - 3 layer sheets
 - galvanised sheets
- 5 Touch key for selecting sheet gauges
- 6 Touch key for selecting a welding gun (not active)

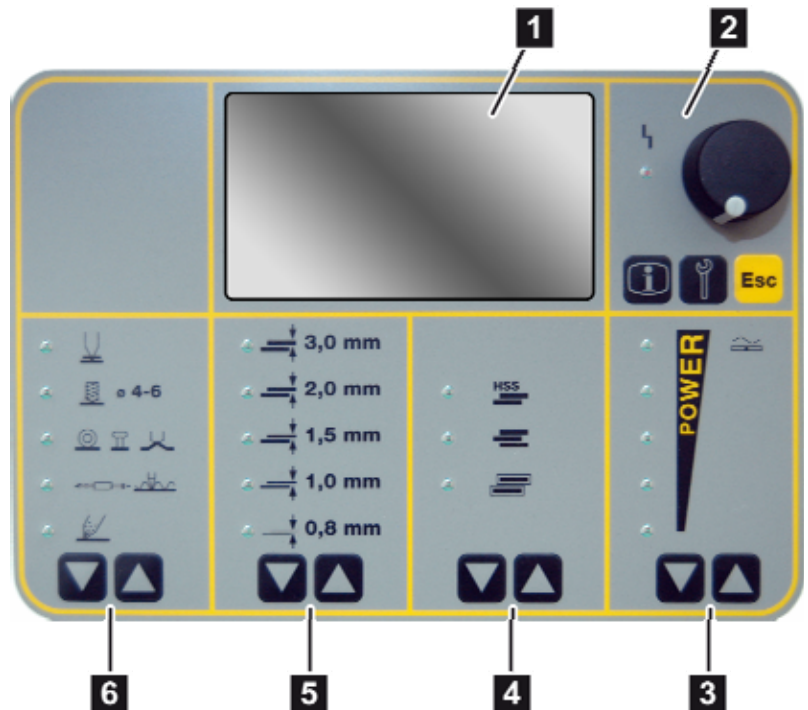


Fig. 10: Display and control panel

- 1 Tools detected automatically
- 2 Electrode caps required for welding program
- 3 No. of pulses (1 – 36)
- 4 Weld current set
- 5 Weld time set (Total of all current times)
- 6 Contact pressure set
- 7 Program name
- 8 Operating mode
- 9 Projection of electrodes (i.e. actual length minus engaging area)

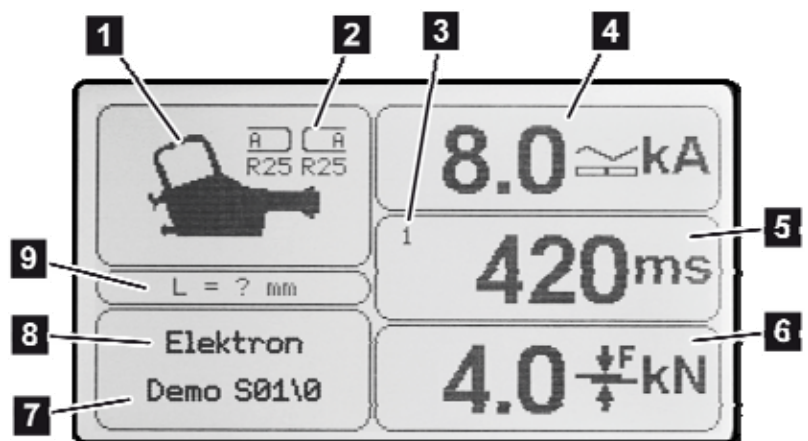


Fig. 11: Detail from Fig. 10

Design and functionality



- 1 LED "Malfunction", → see "8.2.2",
Work cannot continue as long as the LED is on.
- 2 Control knob,
for selecting and confirming menu items.
- 3 "ESC" can have different functions: "Cancel" or "Pump OFF",
depending on menu.
- 4 "Service",
for selecting the service menu.
→ See "7.7.1" and "7.7.2".
- 5 "Info",
calls up welding parameters; → see "7.6".

Fig. 12: Detail from Fig. 10

4.3.2 On the inverter control unit



- 1 Emergency stop pushbutton
shuts down equipment immediately.
- 2 Pressure gauge
displays input pressure.
- 3 Pressure reducer
continuous adjustment of input pressure

Fig. 13: Control elements (front)



The power switch (Fig. 14) is for switching the power supply on and off.

Fig. 14: Power switch (in "OFF" position)

4.4 Connections

4.4.1 Connections on the front side



- 1 Central connection point for weld current, compressed air and control voltage of the welding pliers
- 2 Coolant return
- 3 Coolant outlet
- 4 Connection for sensors

Fig. 15: Connections on the front side

Design and functionality

4.4.2 Connections on the backside

- 1 Compressed-air filter unit
- 2 Coolant-pump air supply
- 3 Power cord
- 4 Power switch
- 5 Coolant outlet towards pump
- 6 Coolant return



Fig. 16: Connections on the backside

- 7 Water filter
- 8 Cooling-water tank cap

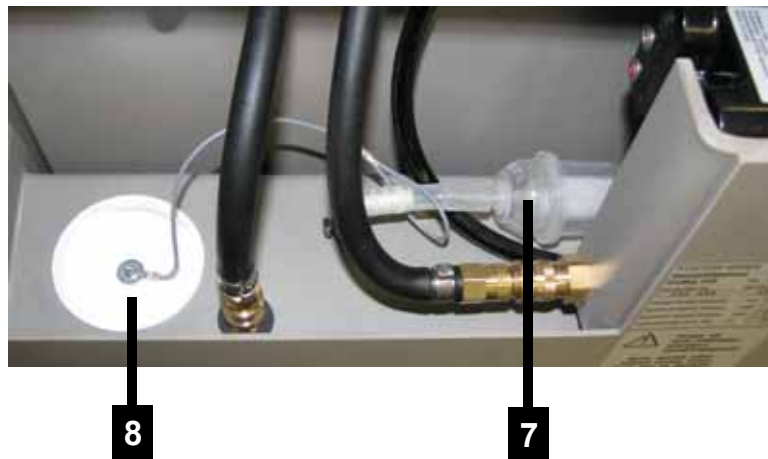


Fig. 16/1: Connections on the backside

4.5 Accessories

4.5.1 Scope-of-delivery accessories



Fig. 17: Water outlet hose

- Water outlet hose (Fig. 17)
- Accessory box
(complete with a cutter for dressing electrodes and Allen key for taking off electrode arms)
- C pliers
(complete with set of electrodes and C-arm)
or
- X pliers
(complete with set of electrodes and arms)

4.5.2 Optional accessories



Fig. 18: Optional cooler

- Additional cooler (Fig. 18), to increase service life of welder
- Electrode arms
- Electrode caps



NOTE

Find our complete range of products and order information at www.elektron-bremen.de.

4.5.3 Tools required



Fig. 19: Key for electrode caps

- Key for electrode caps (Fig. 19)



NOTE

Find our complete range of products and order information at www.elektron-bremen.de.

5 Transport, packaging, storage

5.1 Safety during transport

Inexpert transport

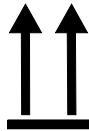


CAUTION

Improper transport may cause damage to property. Improper transport may cause damage to property. Therefore:

- When you unload packing units and move them across your premises, proceed with care. Consider symbols and information on packaging.
- Be sure to transport equipment as described hereinafter. (→ See "5.5".)

5.2 Symbols on packaging



Top

The arrows point towards the 'roof' of the packing unit. This side up. The arrows must always point up, otherwise the contents of the packing unit could be damaged.



Do not stack

Fragile goods. Do not stack, otherwise the contents of the packing unit could be damaged.

Fig. 20: Do not stack

5.3 Unpacking

Unpacking

1. Do not remove packaging until immediately before installation. During unpacking, do not use pointed tools.
2. Keep the original pallet (Fig. 21) in case of any further transport needs (return of goods, further transport).
3. Recycle packing materials.

What to do with packing materials



CAUTION

Improper waste disposal may cause environmental hazards. Packing materials are valuable raw materials. In many cases, they can be recycled, i.e. used again for packaging or in some other way or they can be further processed or treated in some way. Therefore:

- Be sure to dispose of packing materials in sustainable manner and/or according to local laws and regulations.
- Observe local waste management legislation. In case of doubt, contact a specialised company.

5.4 Acceptance after shipping

Check packing units immediately after delivery. Check for integrity, missing pieces and damage.

If you detect any external shipping damage, proceed as follows:

- Do not accept delivery. Or accept under reserve.
- Report damage on carrier's shipping papers or delivery ticket.
- Initiate complaint procedure.



NOTE

Be sure to register a complaint as soon as a defect has been detected. Claims for damages may be brought forward only within the deadlines set for complaints.

5.5 Handling

5.5.1 Forklift



Fig. 21: Using a forklift

Packing units on pallets may be handled with a forklift, as long as the following conditions are fulfilled:

- The forklift must be certified for the weight of the packing unit at hand.
- The operator must have a licence to drive forklift.
- Packing units may have very high centres of gravity. Make absolutely sure they cannot tip over.



NOTE

Keep the original pallet in case of any further transport needs (return of goods, further transport).

5.5.2 Transport with belts



Abb. 1: Transport with belts

To unload and transport use suitable device and belts.

The belts must be fixed at the handles in a way that the device cannot tip over and the belts cannot get out of place.

Transport, packaging, storage

5.5.3 Moving equipment to the site

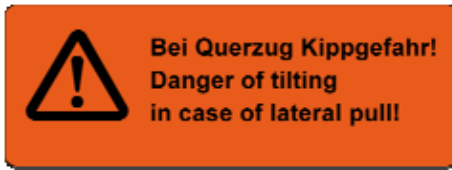


Fig. 22: Warning sign on balancer

1. When moving around, always grip equipment by the handle provided for that purpose.



CAUTION

Tipping and toppling may cause damage to property.

This equipment's centre of gravity is relatively high. In the event the wheels jam and/or block (due to an obstacle or transverse pull, for instance), there is a danger the equipment tips over. Therefore:

- Move this equipment always using the handles.
- Keep potential obstacles out of the work area.

There is a danger the equipment rolls away because the wheels must not be blocked due to the tipping and toppling hazard.



CAUTION

Equipment rolling away may cause damage to property. The wheels of the equipment must not be blocked because this would cause a tipping and toppling hazard. On the other side, though, this detail causes and increases the danger the equipment rolls away. Therefore:

- Be sure to operate this equipment only on a flat and even floor.
- Proceed with care when moving this equipment.

5.6 In case of return of goods / further transport needs

1. Drain cooling water tank completely. → See "9.2.4".
2. Use original transport pallet. (See Fig. 21.)
3. Use packing materials that correspond to original packing materials.
4. Mark packing materials with symbols as shown in "5.2".



CAUTION

Improper transport conditions may cause damage to property. Packaging with inappropriate dimensions, quality or weight, or cooling water left in coolant tank may cause damage during transport. Therefore:

- Be sure to completely drain coolant tank before transport.
- Use packaging of appropriate size and quality.

5.7 Storage

Storage conditions:

- Do not store packing units outdoors.
- Provide for dry and dust-free storage.
- Protect against aggressive media.
- Protect against direct sun exposure.
- Protect against mechanical shocks and vibrations.
- Storage temperature: -10 to 50 degrees centigrade.
-50 to 122 degrees fahrenheit.
- Rel. humidity: 85 % max.; no dew.
- When storing equipment longer than three months, check general conditions of all parts and packaging in regular intervals. If and when necessary, refresh or renew corrosion protection.

Installation

6 Installation

6.1 Before installation

6.1.1 Preliminary works

- Check operating conditions according to specifications.(→ See "3.4".)
- If necessary, allow equipment time to adapt to ambient temperature SLOWLY.
- Make sure that operating company's supply systems comply with specifications. (→ See "3".)
- Before you start any works, make sure the work area is tidy, clean and free of clutter and offers enough room to move.
- Make sure your tools are complete and in good working order.
- Do wear safety shoes.

6.1.2 Filling up cooling water tank

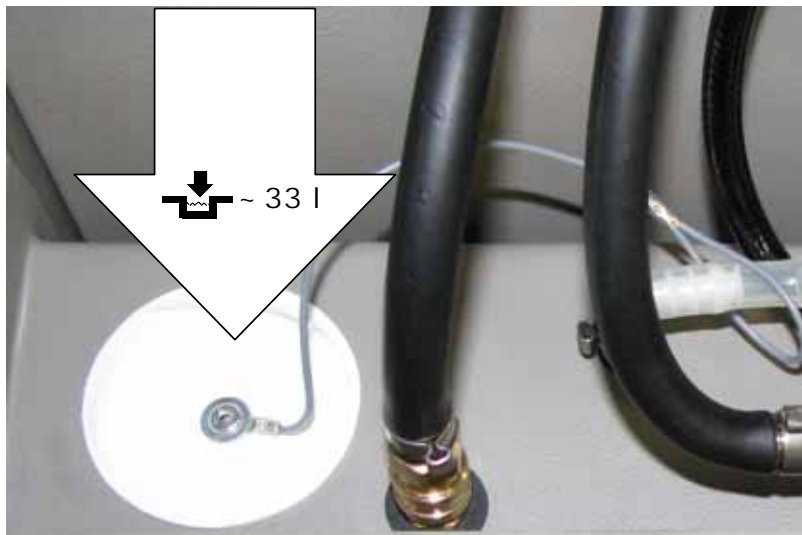


Fig. 23: Filling opening

1. Twist off cap.
2. Fill about 33 litres / 9 gallons of cold, clean drinking water into the tank.
3. Add chlorine-free disinfectant to prevent growth of algae and bacteria.
4. Replace cap properly. Check for tightness.
5. Before you switch on the welder, be sure to check the level gauge beneath the filling hole.
6. Fill up, when necessary. Make sure the level is always visible in the level gauge.



NOTE

For draining the tank, → see "9.2.4".

6.2 Assembling the balancer



Fig. 24: Balancer checklist

1. Unpack the balancer.
2. Check balancer components for damage. Use the checklist provided (Fig. 24) to check whether you have all the parts.
 - Balancer
 - Guide rollers with locking pin and ring
 - Vertical pipe and crossbar pipe
 - Replacement carabine hook
 - Four M8 bolts with two nuts and washers each
 - Mounting instructions

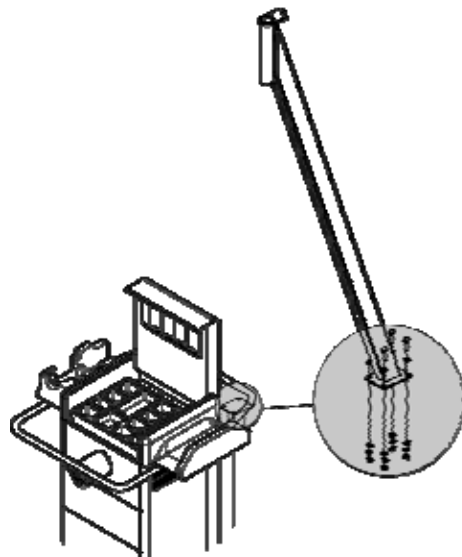


Fig. 25: Vertical pipe

3. Mount the vertical pipe using four M8 bolts (Fig. 25, → see separate operating- and mounting instructions).

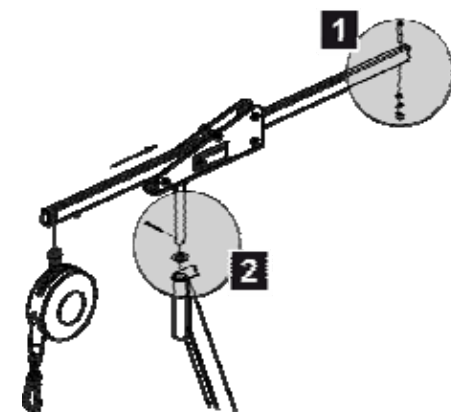
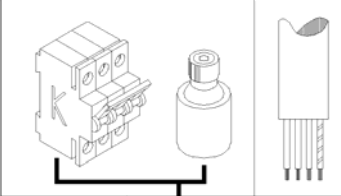


Fig. 26: Crossbar pipe

4. Mount the crossbar (Fig. 26, → see separate mounting instructions). Proceed as follows:
 - Mount and screw down stopper (Fig. 26/1).
 - Insert crossbar pipe into guiding element. Secure with locking pin (Fig. 26/2).
 - Hang up spring balancer and **secure** (see operating instructions for spring balancer).

Installation

6.3 Electrical connections



		mm ²
400 V	35A/50A	4 x 6
230 V	63A/80A	4 x 16

Fig. 27: Power grid specifications



CAUTION

Insufficient conductor cross-sections and fuse protection may make the grid collapse and/or trigger the fuses and make efficient welding impossible.

Therefore:

- Before you connect the welder to the mains, make sure conductor cross-sections are sufficient (at least 6 mm² per 10 metres / 0,009 in² per 33 ft of cable length).
- Before you connect the welder to the mains, make sure the grid is properly protected by fuses (at 32 A).



Fig. 28: Connecting welder to power supply

1. Take the power cord from its support.
2. Run the power cord along a safe route.



WARNING

Stumbling hazards

Power cords may constitute a stumbling hazard when improperly laid or installed and may cause people to fall and hurt themselves. In this particular case, the cable could block the wheels of the welder and make it tip over.

Therefore:

- Run the power cord along a safe route.

3. Connect the power cord to the mains.
4. Use strain relief clamps to protect cables.

6.4 Connecting the pneumatics



Fig. 29: Connecting compressed-air supply

1. Take the supply line from the pneumatic grid of the plant and plug it on to the welder (Fig. 29).
2. The plant's pneumatic mains must provide about 6 bar (87 Psi) input pressure to the welder.



NOTE

6 bar (87 Psi) input pressure generate a contact force of the electrodes of 3.5 kN (787 lb f) approx. To adjust the contact force of the electrodes, proceed as described below.



Fig. 30: Pressure gauge and pressure regulator

3. Check the pressure supplied at the pressure gauge (Fig. 30). If necessary, use the pressure regulator (Fig. 30) to set the pressure as required (depending on welding program and manufacturer's specs).
 - Turn the regulator in the "+" direction to increase the input pressure.
(**Max. admissible: 10 bar / 145 Psi**)
 - Turn the regulator in the "-" direction to decrease the input pressure.
(**Min. admissible: 6 bar / 57 Psi**)
4. When decreasing the input pressure, actuate the pliers from time to time to let the air escape.



CAUTION

Improper pressure of compressed air may damage property.

Low pressure reduces the contact force of the electrodes which, in turn, increases wear of the electrodes. High pressure, on the other hand, may damage the spot welding pliers.

Therefore:

- Check the pressure gauge before you switch on the welder. Compare to the parameters of the welding program selected.
- Maintain the pressure between 6 and 10 bar (87 and 145 Psi).

5. Push in the regulator to set and lock the selected value.

Installation

6.5 Connecting the pliers



Fig. 31: Connecting the pliers

1. Push the main plug of the welding pliers into the main socket of the equipment (Fig. 31/1.).
2. Push down the clamps (Fig. 31/2.) to lock the connection.



Fig. 32: Water cooling system for the pliers

3. Connect the water cooling system of the pliers.



Fig. 33: Connecting sensors of the pliers

4. Connect the sensors of the pliers.

7 Operation

7.1 Preliminary works before welding

7.1.1 Preparing the sheets

- When using insulating layers (e.g. spot welding primer), you must first establish an auxiliary connection (using a vise-grip wrench, for instance) in order to establish the electrical contact.
- Contact faces must be ground down to the bare metal on all sides.

**WARNING**

Do not hurt yourself during grinding.

Grinding sheets may constitute a hazard of injuries.

Therefore:

- Be sure to deploy employees who are experienced in this type of jobs.
- Strictly observe any manuals etc. that come with the grinding tools.

- Galvanised sheets should not be damaged, if possible.
- Make sure the sheets are always stacked with their faces parallel to each other.
Otherwise, it will not be possible to apply clean spot welds.

Operation

7.1.2 Preparing welding pliers

**WARNING**

Unintentional startup of welder may constitute a hazard of injuries.

If the new tool is switched on during retooling, the weld current and/or unintentional movements of the pliers may be actuated. There is a danger of pinching and crushing. Therefore:

- Be sure to tool up first, and only then switch on the welder.
- If retooling is unavoidable during the work, be sure to switch OFF before you do anything.

**NOTE**

*For more detailed information on preparing / tooling up the welding pliers,
→ see separate operating instructions.*

**CAUTION**

Switch off cooling first before changing electrodes !

Exchanging electrode arms



Fig. 34: Unbolting electrode arm

1. To unbolt the electrode arm, use the Allen key provided for that purpose (Fig. 34).



Fig. 35: Removing the electrode arm

2. Remove the electrode arm simply by pulling it out. (Fig. 35).
3. Insert the new electrode arm and bolt down.

Exchanging electrode caps



Fig. 36: Exchanging electrode caps

1. To loosen the electrode caps, use the special key provided for that purpose (or some equivalent tool) (Fig. 36).
2. Turn clockwise, otherwise the cone comes loose.
3. Put the new caps on the electrode head and press in position.



NOTE

The perfectly sound condition of the caps is essential for good welding results. Electrode caps must be milled (or replaced) after 50 welding jobs, especially when working with super speed and/or galvanised steel.

Deploying the electrode arm

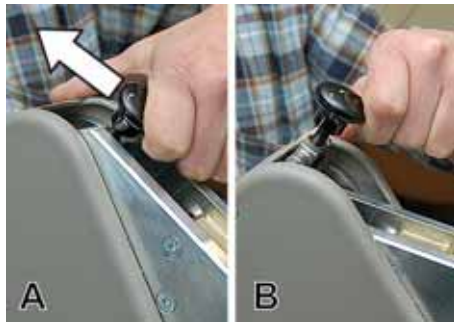


Fig. 37: Unlocking the arm

1. Switch the locking device of the electrode arm from position "locked" (Fig. 37/A) to position "open" (Fig. 37/B) as shown in the picture.

Locking the electrode arm



Fig. 38: Locking the arm

2. Push the electrode arm without much force into the locking device until you feel and hear it engage (Fig. 38).

Operation

Adjusting the distance between electrodes

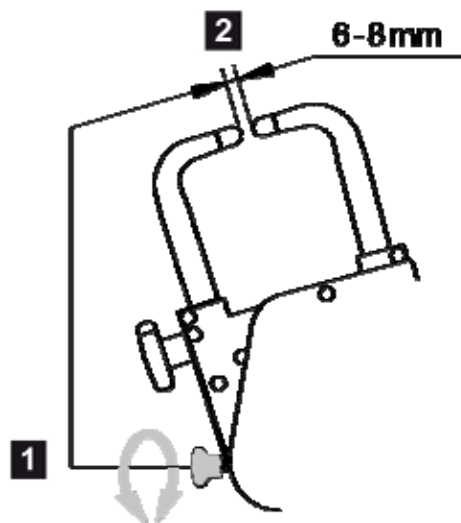


Fig. 39: Adjusting the distance between electrodes

Aligning electrodes

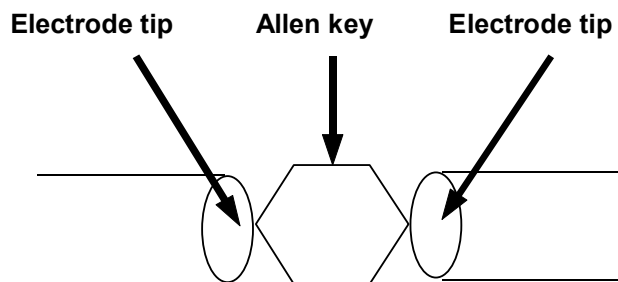


Fig. 40: "Electrode must be in true alignment"

- Make sure the distance between the electrodes is 6 to 8 mm.

Carry out the first welds, and then check the distance again. Re-adjust, if necessary.

Use an Allen key SW5 as gauge in between the tips:



- Be sure to look from different angles. Electrodes must align no matter how you look.

7.1.3 Checks before switching on

**WARNING**

Unskilled employees may hurt themselves and others. Inexpert operation constitutes a hazard of injuries.

Inexpert and/or negligent handling of this equipment and/or ignorance of hazards and dangers may entail the most severe injuries.

Therefore:

- Make sure this equipment is put to use by skilled welding operators with sufficient training and experience in spot welding, exclusively.
- Before operation, consult the manual and make sure any and all preconditions are fulfilled, any and all checks and preliminary works etc. have been carried out.
- Work place must be clean and tidy - no clutter. Make sure you have enough room to move.

- Be sure to be wearing adequate PPE. (→ See "2.2.3".)
- Check any and all connections. (→ See "6".)
- Check input pressure. (→ See "6.4".)
- Check cooling water level. (→ See "6.1.2".)
- Check your tools / welding pliers. Re-tool now, if necessary. (→ See "6.5" and/or separate operating instructions for welding pliers.)
- Check status of the emergency stop pushbutton. (→ See "2.6".)
If you find the emergency stop button locked, check the welder and make sure it is operational before you unlock the pushbutton. Turn clockwise (cw) to unlock.

Operation

7.2 Switching on



Fig. 41: Power switch

1. Once the welder has been installed and prepared according to instructions, you may switch it on by turning the power switch (Fig. 41).

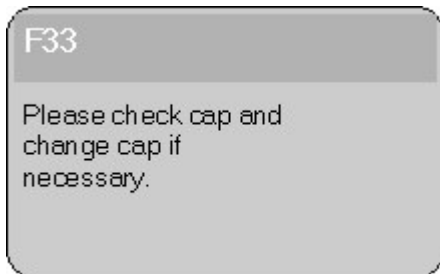


Fig. 42: Prompting operator to service caps

If switching on has been successful, the display will show the following message: **S07 "Powering up, please wait."**

This will be followed by the message shown here on the left (Fig. 42).

2. Visually check caps.
Clean, mill and/or replace the electrode caps, as required.



Fig. 43: Control knob

3. Turn the control knob (Fig. 43) clockwise (cw) to position **"OK"**. Confirm by pressing.

The display shows: **S 12 "Calibrate tool. (Please weld without sheets)"**.

4. Press the welding button on the welding pliers.

If calibration was successful, the display will show: **S13 "Calibration successful. > OK "**.

5. Acknowledge by pressing the control knob.

If calibration was not successful, the display will show:

S13 " Error at calibration > Repeat/Abort".

The reason may be that the electrode caps are dirty or worn.

If that should be the case, clean the electrode caps again. If necessary, mill or replace. (→ See "0".) Repeat calibration.

7.3 Basic settings

7.3.1 Set languages

To set the display language, proceed as follows:

1. Switch off the welder.
2. Pull the plug of the welding pliers.
3. Switch on again.
The display will show message **F 35**.
4. Acknowledge by pressing the control knob.
5. Press the service button (wrench icon).

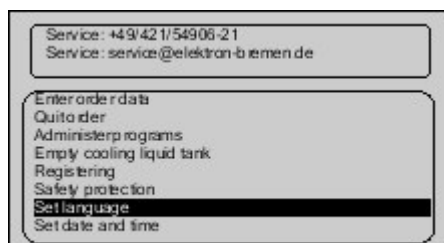


Fig. 44: Service menu (page 1)

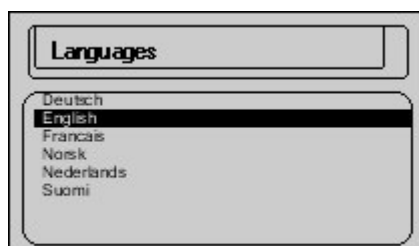


Fig. 45: Languages menu

6. Use the control knob to select menu item **"Set languages"** (Fig. 44). Confirm.

Next, the display will show a list of languages from which to choose (Fig. 45).

7. Use the control knob to select a language. Confirm.

Operation

7.3.2 Register welder

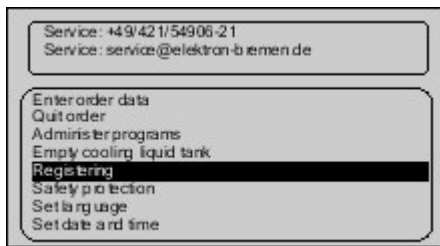


Fig. 46: Menu item "Registering"

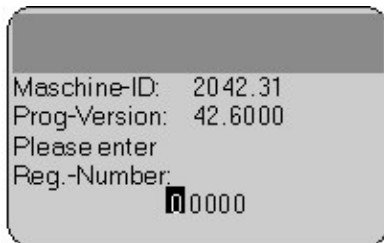


Fig. 47: Registering the welder

Menu item "**Registering**" displays the equipment info. The equipment may be registered.

Registering is required, if you want to use the "Free mode" and "Program mode".

1. Use the control knob to select menu item "Registering". Confirm.

The display shows the equipment info (Fig. 46).

2. Write down equipment ID and software version.

Go to the Elektron website: **www.elektron-bremen.de**.

3. Call up the "**Product registration**" page. Enter your data.
4. Fill in all the information in the online form in order to obtain the best possible service.

As soon as we have received your registration data, we send you an email with your registration number.

5. Enter the registration no. in menu item "**Registering**" of the service menu.



NOTE

Make sure your data is correct. Otherwise, your welder will not be cleared.

Registration must be carried out within 120 days after delivery.

7.4 Recurring settings

7.4.1 Maintaining electrode caps

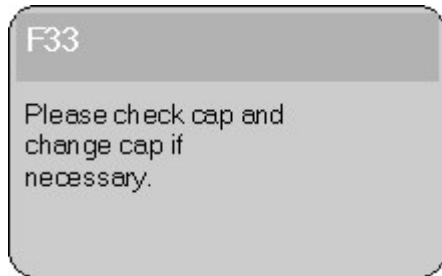


Fig. 48: Prompting operator to service caps

Whenever you switch on the welder and in regular intervals during operation, you will be reminded to take care of the electrode caps. (Fig. 48). What to do:

1. Check the caps. If necessary, clean, mill or replace the caps.
2. **Only then** confirm by switching control knob to "OK".

7.4.2 Selecting control mode



CAUTION
Improper settings may lead to improper welding.

Therefore:

- Welding parameters in the "Free mode" must be set by skilled welding operators, exclusively.

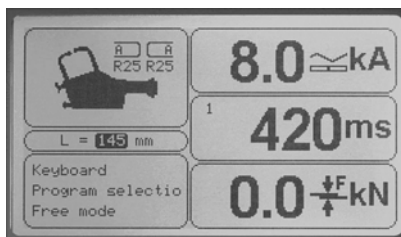


Fig. 49: Main menu

1. Press the control knob twice, quickly.
2. Use the control knob to select one of the three following control modes.
 - **"Keyboard operation"**,
For the welding job at hand, the following parameters may be set manually;
→ see "7.4.2.2".
 - **"OEM programs"**,
To select programs provided by the OEMs;
→ see "7.4.2.3".
 - **"Free mode"**,
This mode is suitable for skilled operators who have experience in setting welding program parameters and know exactly about their effects and consequences;
→ see "7.4.2.4".



NOTE

If the OEM provided a welding program, operate the welder in mode "Prg. selection".

Operation

7.4.2.1 Keyboard operation



Fig. 50: Selecting the control mode

For the welding job at hand, the following parameters may be set manually:

- Tool
- Sheet gauge
- Material, number of sheets , description
- Weld current

- 1 Selecting welding gun ,**
Not available for units with transformer pliers
- 2 Selecting sheet gauge ,**
Weld current and time will be calculated and displayed.
- 3 Selecting material combination,**
Weld current and time will be calculated and displayed.
- 4 Manual selection of weld current,**
If weld current is changed manually, the weld time will be adjusted automatically.

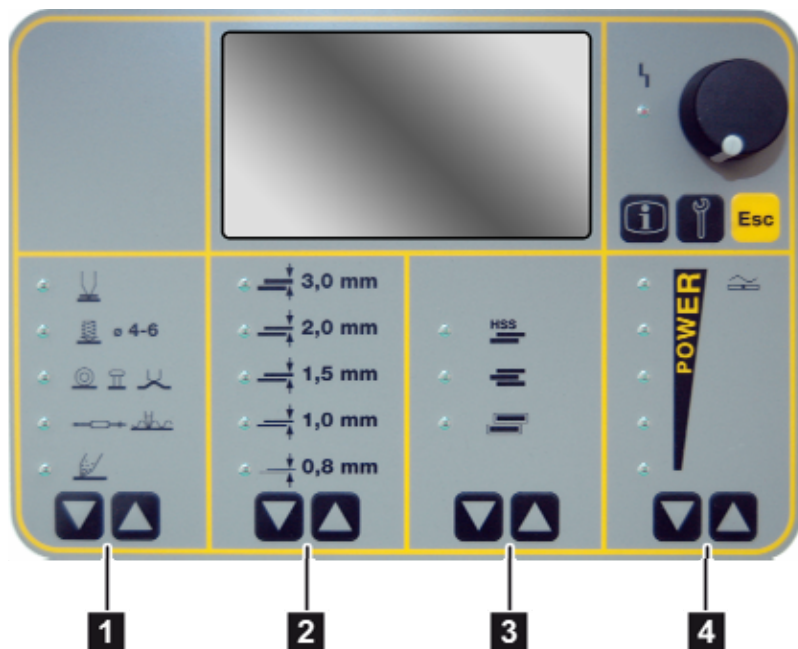


Fig. 51: Touch keys on control panel

7.4.2.2 Setting welder in mode "Keyboard operation"

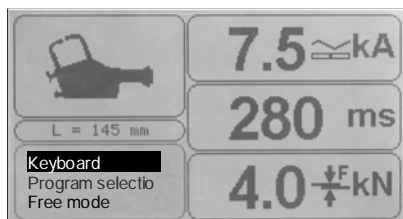


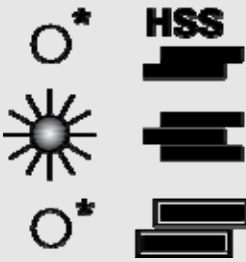










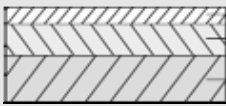



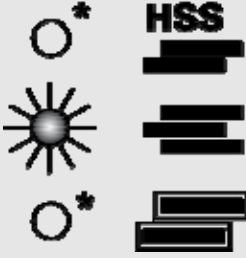


Fig. 52: Selecting the control mode

1. Use the control knob to select mode "Program selection". Confirm.
2. Use a calliper gauge to measure the sheet gauges for the welding job at hand.
3. Determine the pertinent gauges for the job using the following table.
4. Using the following table, determine the set value required. Use the touch keys (Fig. 51) to enter the set value.

Welding job	Ratio of sheets	Sheet gauges up to about	Set value	Selection
	$d1 = d2 = d3$	0,8 + 0,8 + 0,8	 0,8 mm	
		1,0 + 1,0 + 1,0	 1,0 mm	
		1,5 + 1,5 + 1,5	 1,5 mm	
		2,0 + 2,0 + 2,0	 2,0 mm	
	$d2 \approx d3$	2,0 + 0,8 + 0,8	 0,8 mm	
		0,8 + 1,0 + 1,0	 1,0 mm	
		0,8 + 1,5 + 1,5	 1,5 mm	
		0,8 + 2,0 + 2,0	 2,0 mm	
		0,8 + 3,0 + 3,0	 3,0 mm	
	$d1 < d2 < d3$	$\frac{d1 + d2 + d3}{3} \leq$ Select next higher set value.	 1,0 mm  1,5 mm  2,0 mm	

(*) optionally ON or OFF

(!) "3 sheets" OFF

Operation

7.4.2.3 "OEM programs"



Fig. 53: Selecting the control mode

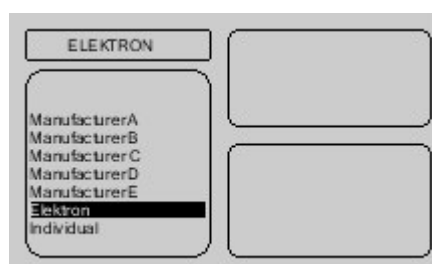


Fig. 54: Overview of OEM programs

This mode contains a number of pre-set programs provided by OEMs.

1. Use the control knob to select mode "Program selection". Confirm.

Next, the display will show a list of available welding programs (Fig. 54).

2. Use the control knob to select a program. Confirm. Next, you will see the parameters of the program selected (Fig. 55).

- 1 Tools required
- 2 Electrode caps required for welding program
- 3 No. of pulses (1 – 36)
- 4 Weld current required
- 5 Weld time required (Total of all current times)
- 6 Contact force required
- 7 Program name or
- 8 Control mode (depending on selection)
- 9 Required length of electrodes

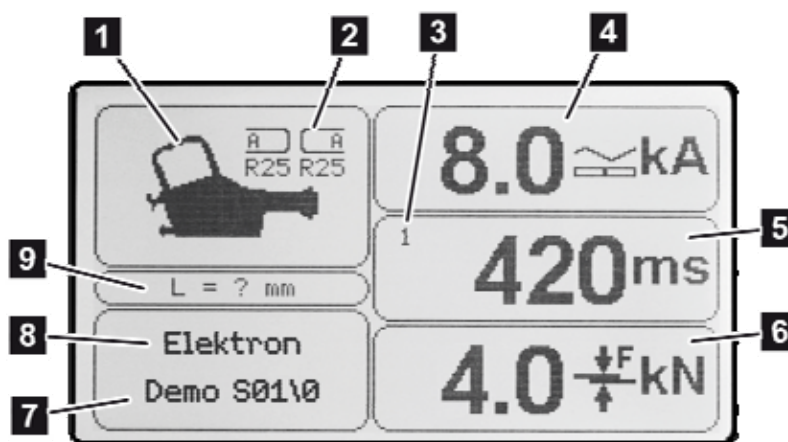


Fig. 55: Program parameters

7.4.2.4 Free mode



Fig. 56: Selecting the control mode



Fig. 57: Prompting for password



Fig. 58: Dialogue box

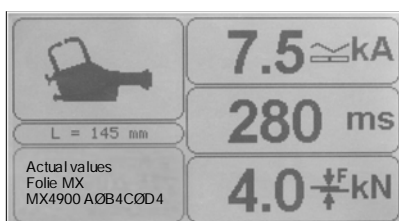


Fig. 59: Parameters



NOTE

The "Free mode" is suitable only for welding operators who have detailed knowledge of welding parameters and their effects and interactions. The "Free mode" entails a high risk of improper welding jobs.

This mode allows the welder to enter weld currents and times manually, and to store them as own programs.

1. Use the control knob to select the mode "Free mode". Confirm.

The display shows a prompt requiring a password (Fig. 57).



NOTE

It is incumbent upon the operating company to decide whether passwords should be used and who should have a password or not. Make passwords inaccessible to strangers.

2. Use the control knob to select "OK". Confirm.

You will see the following prompt (Fig. 58):

"Take over current parameters or load program"?

3. Use the control knob to select "Take over". Confirm.

or

4. To modify an existing own program, select "Load".

The display shows a list of all own programs that have been generated so far.

5. Use the control knob to select the program you want to modify.

Next, you will see a list of the current parameters in the display (Fig. 59).

Operation

Modifying weld current (kA)



Fig. 60: Parameters



1. Press control knob.
2. Use the control knob to select "**kA**". Confirm.
The current value (**kA**) will be highlighted in black.
3. Use the control knob to adjust the weld current value (**kA**):
 - Turn clockwise to increase the value.
 - Turn counter clockwise to decrease the value.
4. Press control knob to confirm.
5. Press "**Esc**" to cancel and go back to the main menu.

Modifying weld times (ms)

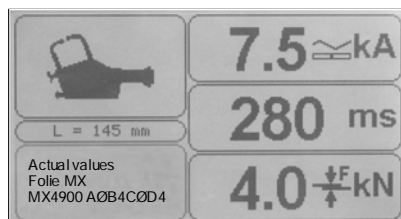


Fig. 61: Parameters



1. Press control knob.
2. Use the control knob to select "**ms**". Confirm.
The current value (**ms**) will be highlighted in black.
3. Use the control knob to adjust the weld time value (**ms**):
 - Turn clockwise to increase the value.
 - Turn counter clockwise to decrease the value.
4. Press control knob to confirm.
5. Press "**Esc**" to cancel and go back to the main menu.

Storing own programs generated in "Free mode"



Fig. 62: Selecting "Free mode"

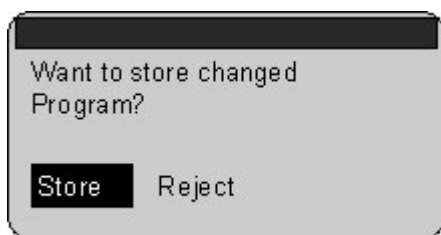


Fig. 63: Dialogue prompting to store or reject

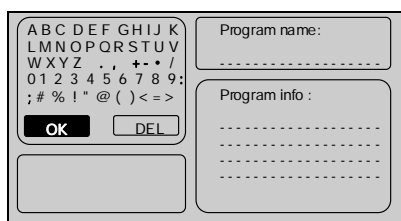


Fig. 64: Entering program name and info

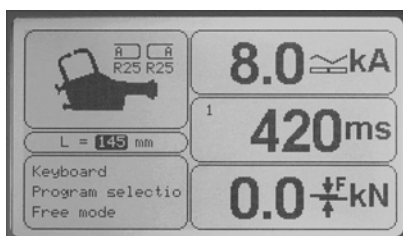


Fig. 65: Main menu

Own programs generated individually may be stored under any name, together with a short description.

Proceed as follows:

1. Press control knob.
The box **"Free mode"** will be highlighted in black (Fig. 62).

2. Press control knob again.
You will see the following prompt: **"Want to store changed program?"** (Fig. 63).
3. Use the control knob to select **"Store"**. Confirm.

In the following dialogue box, enter a **Program name** and **Program info**, if required.

4. Use the control knob to enter and confirm the characters you need to write the text.
5. When finished, select **"OK"**. Confirm.

The new program has now been stored in the folder *"Individual programs"*.

The new name can be seen beneath the tool symbol.

6. To continue, press the control knob.
The display takes you back to the main menu.

Operation

7.4.3 Electrode recognition

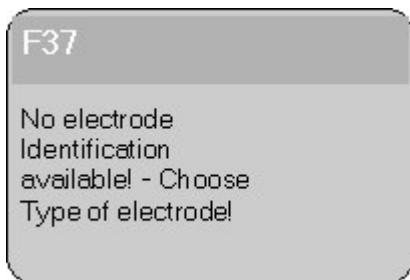


Fig. 66: No electrode recognition



Fig. 67: After acknowledgement

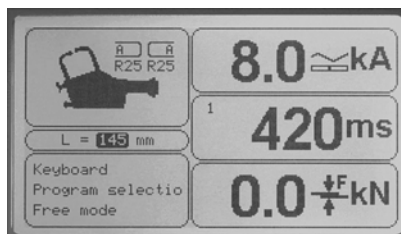


Fig. 68: Correct display of electrode length

The MI-100control and the electrode arms are equipped with an automatic electrode recognition system. Electrodes are being identified automatically, and the length is shown on the display.

If the automatic electrode recognition is off or does not work, (Fig. 66), the length of the electrodes must be entered manually. Proceed as follows:

1. There will be an error message. Acknowledge using the control knob.

The length of the electrodes will be displayed with a question mark. The contact force will be "0" (Fig. 67).

Setting the electrode length manually:

1. Press the control knob to get into the enter mode.
2. Now, turn the knob to select the length.
3. Press control knob to confirm.
The display shows the new value for the electrode length (Fig. 68).

7.4.4 Manual tool selection



Fig. 69: Control knob

In case of emergency and/or for service purposes, it is possible to switch off the automatic tool recognition system and select the tool installed manually on the control panel. Proceed as follows:

1. Switch off the welder.
2. Install the tool on the welder.
3. When you switch on the welder again, press the start button of the tool. The tool box of the display will contain a question mark now.
4. Press the control knob once.
5. Turn the control knob to select the tool box. The tool box will be highlighted in black.
6. Press control knob.
7. Use the control knob to select the desired tool. Confirm.

There will be a reset whenever you exchange tools and/or switch off the welder.

7.4.5 Switching off the cooling water pump

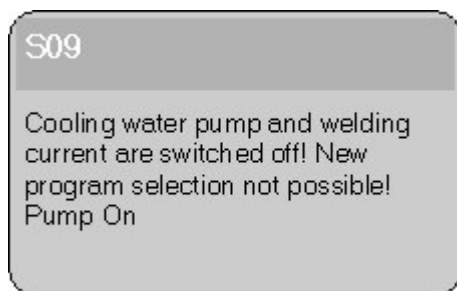
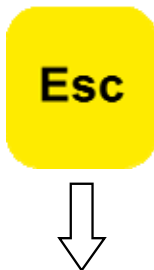


Fig. 70: Message S09

You may stop the cooling water pump and weld current at any time. Just press "**Esc**".

(E. g. to change the electrodes).

After the pump has stopped, the display will show the message **S09** (Fig. 70).



CAUTION

Buildup of heat may cause damage to property.

If the cooling water pump is switched off at the end of a welding job, heat may build up and entail damage to property.

Therefore:

- Allow the pump to go on for at least 10 mins. after you have finished a job.

Operation

7.5 Important information concerning welding

Electromagnetic fields



DANGER

Electromagnetic fields pose a potentially fatal hazard to people with pacemakers or other magnetisable implants.

Electromagnetic fields affect the functionality of pacemakers and other magnetisable implants. Electromagnetic fields can irritate human sense organs, nerve and muscle cells.

Therefore:

- Persons with pacemakers or other magnetisable implants must not approach the working area.
- Be sure to put up suitable warning signs.
- Be sure to put warning signs on access ways and doors leading to the work area.
- Do not guide welding cables along people's heads or spines. Keep a distance of at least 1 cm / 0.4".

Splashes, flying sparks



WARNING

Splashes and flying sparks constitute a danger of fire and explosion. Splashes and flying sparks pose a risk of injuries.

Welding generates sparks and -hot spatter. They can ignite combustible materials and generate explosions. Contact with body parts may entail injuries.

Therefore:

- Before you tackle any welding jobs, make sure there are no combustible and/or explosive materials in the work area.
- Do not carry out welding jobs in the vicinity of pressure vessels, tanks, oil barrels, paint cans and/or in a work area with an explosive atmosphere.
- Have fire extinguishing gear ready at hand.
- Make sure access and escape routes are not blocked.
- During any and all welding jobs: be sure to be wearing a face screen, non-inflammable safety clothing and welder's gloves.
- Do not carry easily inflammable objects in your pockets (matches, lighters etc.).

Vapours**WARNING**

Vapours may constitute a danger to your health.

Stock that has not been properly ground and cleaned before welding may be contaminated with residues of glues, paints, undercoating products etc. that may generate harmful or even toxic vapours during welding.

Therefore:

- Before you tackle any welding jobs, make sure the sheets you want to weld have been properly ground and cleaned and are free of residues.
- Be sure to be wearing a face screen.
Respiratory equipment may be recommendable in case of doubt.

Hot surfaces**CAUTION**

Hot surfaces pose a risk of burns.

Electrodes may heat up to 80 degrees centigrade (176°F) approx. Stock may have up to 100 degrees centigrade (212°F) right after welding. So there is an acute risk of burning yourself.

Therefore:

- Never work without proper safety clothes and gloves near hot components.
- Let freshly welded parts cool down to ambient temperature before you go on to work with them.

Tipping and toppling hazards due to high centre of gravity and obstacles during travel

**CAUTION**

Tipping and toppling may cause damage to property.

This equipment's centre of gravity is relatively high. In the event the wheels jam and/or block (due to an obstacle or transverse pull, for instance), there is a danger the equipment tips over.

Therefore:

- Move this equipment always using the handles.
- Keep potential obstacles out of the work area.
- Install cables and supply lines in such a way that they do not constitute a stumbling trap.

Operation

There is a danger the equipment rolls away because the wheels must not be blocked due to the tipping and toppling hazard.



CAUTION

Equipment rolling away may cause damage to property.

The wheels of the equipment must not be blocked because this would cause a tipping and toppling hazard.

On the other side, though, this detail causes and increases the danger the equipment rolls away.

Therefore:

- Be sure to operate this equipment only on a flat and even floor.
- Proceed with care when moving this equipment.

Personal protective equipment (PPE)



Non-inflammable safety clothing

is a tight-fitting sort of special clothing that is not inflammable, covers arms and legs completely and tears easily (instead of getting pulled in). Its main purpose is to protect against burns.



Face screen

protects the face and eyes against splashes, flying sparks and other hot particles.



Welder's gloves

protect the hands against splashes, flying sparks and other hot particles, and prevent contact with hot surfaces.



Safety shoes

protect the wearer's feet against falling objects, slippery surfaces and being run over by vehicles.

Furthermore:

no long hair, rings, necklaces, watches and/or other sorts of jewellery. Do not carry easily inflammable objects in your pockets (matches, lighters etc.).

- Be sure to be always wearing the appropriate PPE for the job at hand.
- Be sure to take note of and comply with warning signs concerning PPE that may be installed at the workplace.

Adjusting the contact force



Fig. 71: Contact force $\leq 1.8 \text{ kN}$



NOTE

Be sure to set the correct contact force with respect to the current welding / OEM program selected - because:

- If the contact force of the electrodes is too high, the electrical resistance will be too low which, in turn, will affect the welding job.
- If the contact force is too low, the welding spots may erode and leave holes in the sheets.



CAUTION

Danger to property.

When using the electrode arm configuration shown to the left, 12-mm electrodes will slightly bend if the contact force is set higher than 1.8 kN (405 lb f).

Therefore:

- Ask yourself, whether the job at hand could be handled just as well with a different configuration.
- When you have to use the configuration as shown here, make sure the contact force does not exceed 1.8 kN (405 lb f) / 6 bar (87 Psi).

Lifetimes of electrode caps



NOTE

The perfectly sound condition of the caps is essential for good welding results.

Electrode caps must be milled (or replaced) after 50 welding jobs, especially when working with high strength and/or galvanised steel (→ see "7.1.2").

Operation

7.6 Calling up welding parameters

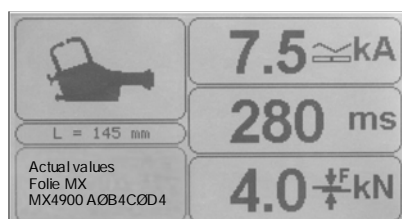


Fig. 72: Displaying main welding parameters

1. Press Info button once.

This will call up the current values of the most important welding parameters for the last welding job (Fig. 72):

- Weld current
- Weld time
- Contact force (electrodes)

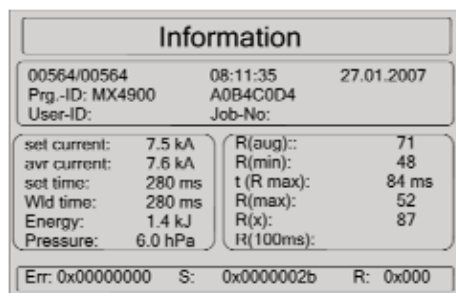


Fig. 73: Displaying all parameters

1. Press Info button twice.

This will call up *all* the welding parameters (Fig. 73).

7.7 Settings in the service menu



NOTE

The access and edit rights of some of the menus depend on the settings defined in Elektron's key file. If you should have any questions or need additional rights, please contact us.



NOTE

Any service settings not described in this manual must be handled by skilled service personnel, exclusively. They do not have any influence on the functionality of the welder.

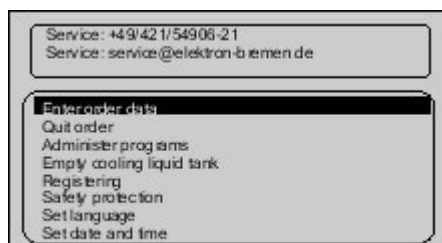
7.7.1 Service menu settings (page 1)



1. Press service button on the control panel - once.

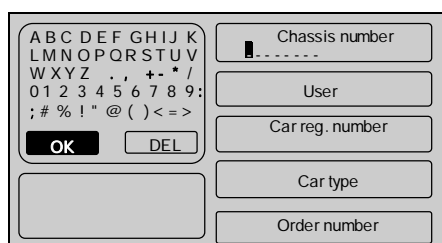
This will call up the "**Service**" menu (page 1).

7.7.1.1 Enter order data



Enter the order data under menu item "**Enter order data**":

1. Use the control knob to select "**Enter order data**". Press to confirm.



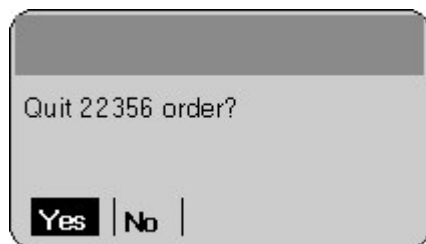
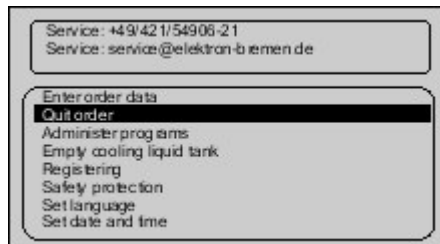
- Vehicle number
- User ID
- Vehicle licence number
- Type of vehicle
- Order number

If the control does not detect activities over 60 mins., the data must be either confirmed or modified.

Fig. 74: Categories of information

Operation

7.7.1.2 Concluding an order



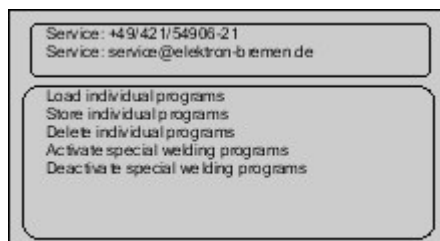
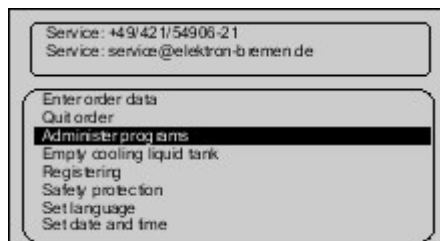
Menu item "**Quit order**" is for concluding an order.

1. Use the control knob to select "**Quit order**". Press to confirm.

As soon as "**Yes**" has been pressed, all welding data of the order are stored and can be read and/or printed with the program.

Fig. 75: Concluding an order

7.7.1.3 Administering programs



For organising and administering existing programs, use menu item "**Administer programs**". Proceed as follows:

1. Use the control knob to select "**Administer programs**". Press to confirm.

- Loading individual programs from the CF memory card.
- Storing individual programs for future transfer.
- Deleting individual programs.
- Activating special welding programs.
- Deactivating special welding programs.

Fig. 76: Administering programs

7.7.1.4 Emptying cooling system

→ see "9.2.4"

7.7.1.5 Registering welder

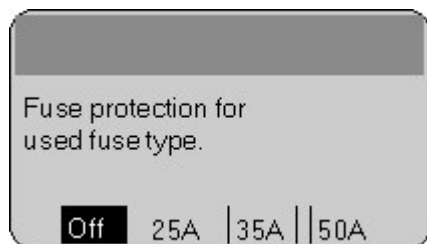
→ see 7.3.2"

7.7.1.6 Activating fuse protection



Menu item "**Fuse protection**" is for calling up a time delay after welding in order to protect the fuses against overheating. Fuse protection is off by default.

1. Use the control knob to select "**Fuse protection**". Press to confirm.



2. Select the fuse protection setting you need. Press to confirm.

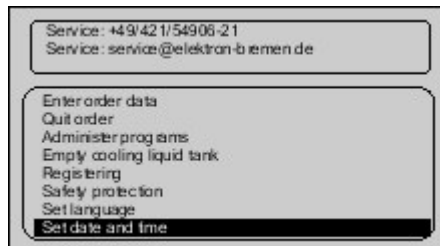
Fig. 77: Menu "Fuse protection"

7.7.1.7 Setting languages

→ see "7.3.1"

Operation

7.7.1.8 Setting time and date



Use menu item "**Set date and time**" to set the time and date.

1. Use the control button to select "**Set date and time**". Press to confirm.
2. Use the control button to set the **date** and/or **time** . Press to confirm.

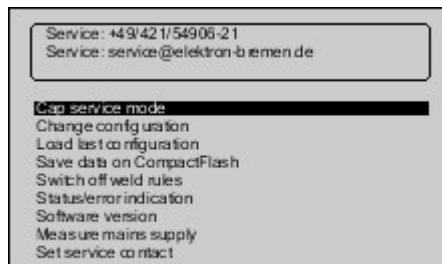
Fig. 78: Setting time and date

7.7.2 Service menu:settings (page 2)



1. Press service button on the control panel - twice.
This will call up the "**Service**" menu (page 2).

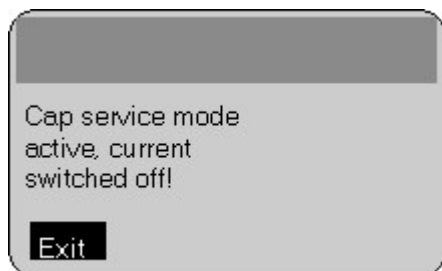
7.7.2.1 Calling up electrode-cap service mode



Use the menu item "**Cap service mode**" to manually call up electrode cap cleaning.

In this mode, the power supply is cut off. Only the electrode clamp system works.

1. Use the control knob to select "**Cap service mode**". Press to confirm.

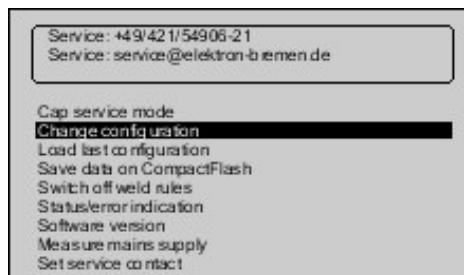


You will see the message shown here on the left.

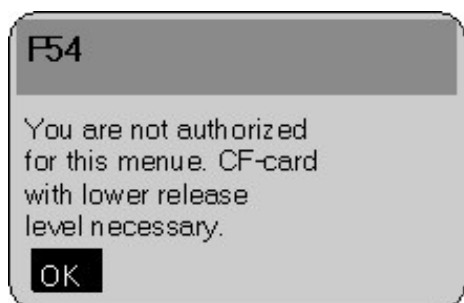
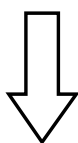
Fig. 79: Cap service activated

Operation

7.7.2.2 Changing configuration



Use the menu item "**Change configuration**" to carry out changes to the configuration. You need appropriate access rights. In addition, you need an "Expert" CF memory card.



If no "Expert" CF memory card has been slotted, you will see the message shown here on the left.

Fig. 80: Changing the configuration

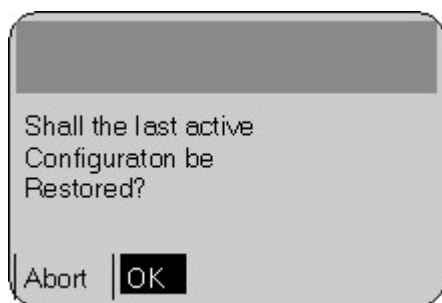
7.7.2.3 Loading most recent configuration



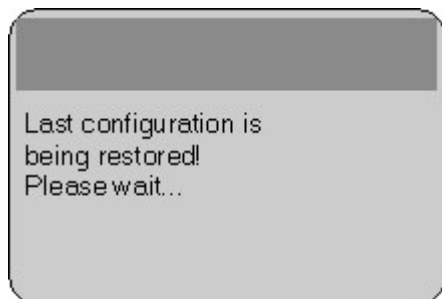
With the menu item **"Load last configuration"**, you can restore the most recent configuration used.

If the new configuration fails, the system will automatically revert to the previous version.

1. Use the control knob to select **"Load last configuration"**. Press to confirm.



You can simply acknowledge the next prompt by selecting **"OK"**.

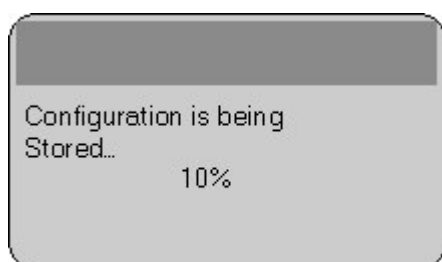
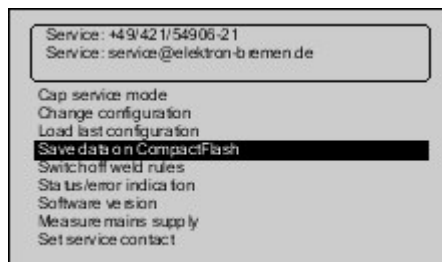


You will see the message shown here on the left.

Fig. 81: Loading last configuration

Operation

7.7.2.4 Storing all welding jobs



Use the menu item **"Save data on compact flash"** to store data on the internal CF memory card.

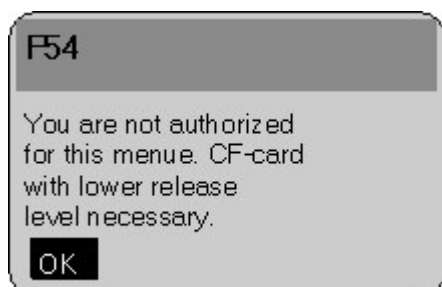
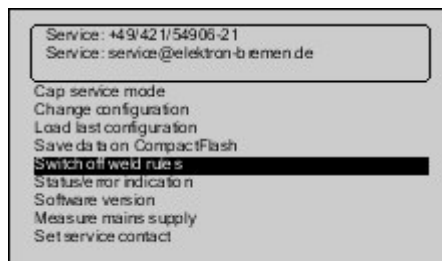
The data can be later read and printed with a special software (traceability program).

1. Use the control knob to select **"Save data on compact flash"**. Press to confirm.

You will see the message shown here on the left.

Fig. 82: Storing all welding jobs

7.7.2.5 Switching off weld rules



Use the menu item **"Switch off weld rules"** to switch off the weld rules that have been pre-defined and stored in the system.

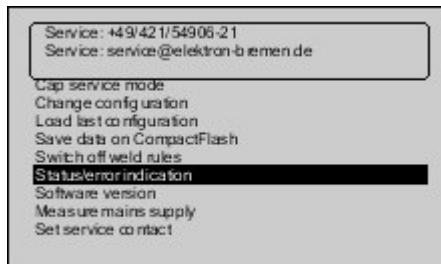
However, you need the "Expert" CF memory card to accomplish this.

1. Use the control knob to select **"Switch off weld rules"**. Press to confirm.

Depending on your access rights, you may receive, for instance, the status message shown on the left.

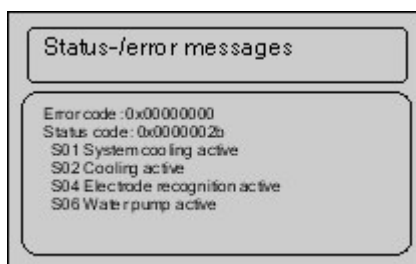
Fig. 83: Switching off weld rules

7.7.2.6 Calling up status and error messages



Use the menu item "**Status / error messages**" to display the current software version(s) installed on the welder.

1. Use the control knob to select "**Status / error messages**". Press to confirm.



You will see the status and error message shown here on the left.

Fig. 84: Calling up status and error messages

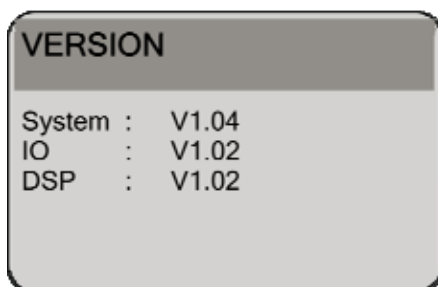
7.7.2.7 Calling up the software version



Use the menu item "**Software version**" to display the current version of the operating system.

You need the data for troubleshooting and for ordering wear and spare parts.

1. Use the control knob to select "**Software version**". Press to confirm.

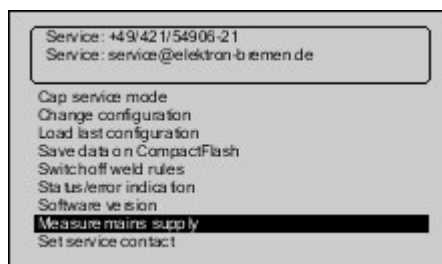


You will see the message shown here on the left.

Fig. 85: Software version

Operation

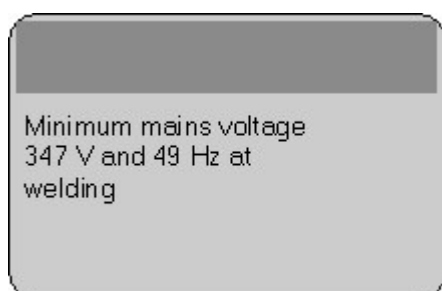
7.7.2.8 Calling up current and voltage values



Use the menu item **"Measure mains supply"** to display the voltage drop.

You need the data for troubleshooting.

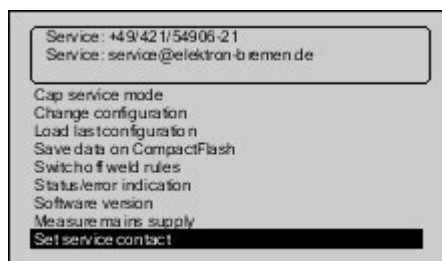
1. Use the control knob to select **"Measure mains supply"**. Press to confirm.



You will see the data shown here on the left.

Fig. 86: Current and voltage

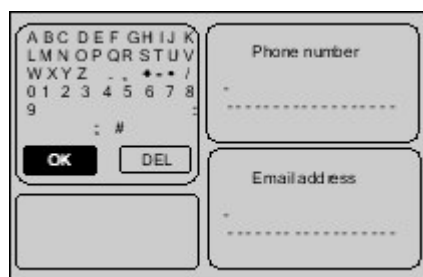
7.7.2.9 Modifying service address



Use the menu item **"Set service contact"** to modify the service phone and email data displayed at the top of the menu. Instead of the pre-set data, you may also set the address of your local dealer.

1. Use the control knob to select **"Set service contact"**. Press to confirm.

You will see the dialogue box shown here on the left.



2. If necessary, use the control knob to modify and confirm contact data.

Fig. 87: Modifying service address

7.8 Updating software

Elektron software option for spot welding equipment

- CD-ROM + compact-flash memory card (CF memory card)
or
- Update by email (You will need a compact flash memory card reader.)

Option: CD-ROM + CF card

- The CD-ROM contains the documentation explaining the use of the OEM weld programs.
The documentation refers only to OEM weld programs and contains information on programs to be used, electrode arms, welding positions and number of spots to be applied on certain bodies. (Depends on OEM and may vary from type to type). The documentation is in PDF format and can be read and printed using Adobe's Acrobat Reader.
- The compact flash memory card contains all the program data concerning the X (MTX-4900) and the C pliers (MTC-5000) you will need for an update.

Option: Update by email

- We send you the update file by email. Before you start, you must copy and backup the ".elk" file located on the CF memory card of the welder.

Operation

Updating - proceed as follows



Fig. 88: Position of screws



Fig. 89: Exchanging the CF memory card

1. Switch off the welder.
2. Remove the four screws (Fig. 88), holding the control unit on the flap cover.
Be sure to hold and support the control unit, so it does not suddenly drop and get damaged.
3. Take the control unit out of the flap.

4. Press the eject button to remove the CF memory card (Fig. 89).
5. Insert the new (or updated) CF memory card into the card reader slot.
6. Close the control unit, and re-tighten the four fixing screws.
7. Switch the welder back on.
The welder will boot up and automatically download the update data to the control unit.
8. You can simply acknowledge the next message by setting the control knob to "OK".

You can now call up the programs using the menu "Program selection".



NOTE

Please check, if new registering is necessary (→ see "7.3.2"). If it is not necessary, a message will be shown after entering the menu item "Registering".

8 Troubleshooting

8.1 Health and safety during troubleshooting

**WARNING**

People with insufficient skills may suffer injuries.

If you carry out troubleshooting and repairs yourself, you may encounter certain risks and hazards that may entail severe injuries.

Therefore:

- Do not open the welder. Do not modify the welder. Do not try to carry out repairs yourself.
- For any and all troubleshooting measures not explicitly mentioned and/or described in this manual, you should call service personnel and/or contact the manufacturer.
- Be sure to adhere strictly to the hierarchy of responsibilities defined in the table.
- When you're in doubt: do contact service personnel / manufacturer.
- If a damage does occur: minimise, contain and avert consequential damage.

**NOTE**

In the event that problems occur more frequently due to above-average workloads, you must adapt the inspection and maintenance intervals accordingly.

Troubleshooting

8.2 Error messages and troubleshooting tables

8.2.1 Problems displayed on the control panel

Message	What's the problem?	What should be done?	WHO should do it?
F01 Welding job has been successfully re-adjusted	There has been some problem, and the welder has re-adjusted the weld parameters accordingly.	Nothing, the control unit has solved the problem.	---
F02 Welding not sufficient. - Urgently repeat. - Check contacts and/or mains.	Sheets may have been insufficiently prepared.	Hunt down the problem by elimination and solve it.	Operator
	Power supply too weak.		
	Problem with pliers and/or caps.		
	Problem with line-up.		
F04 Automatic tool recognition not possible. Please select a tool.	The ID code of the tool installed is unknown or defective.	Check the tool. Replace, if necessary. Set the tool manually. (→ "7.4.4").	Operator
F05 At least 1 mains phase is missing. - Please check power supply.	A mains phase is missing.	Check the supply from the mains of the operating company.	Skilled electrician
	A mains fuse has been triggered.		
	An internal fuse has been triggered.		
F06 Pliers control not connected. Please connect plug.	The plug for measuring the impedance at the front sheet has not been connected.	Replace plug.	Operator
	The impedance measuring cable is defective.	Check the cable. If the cable must be replaced, call service.	
	The IO board is defective.	Call service.	
F07 Work pressure too low.	Compressed air has not been connected. Pressure too low.	Check compressed-air connection and -pressure→ "6.4".	Operator

Troubleshooting

Message	What's the problem?	What should be done?	WHO should do it?
F09 Timeout occurred on CAN bus	The CAN bus between the control unit and IO board detected too many errors.	Check the cables installed.	Service
F33 Please check cap and change cap, if necessary.	Message appears at startup and after 50 welding spots.	Check the caps. Mill them / replace them, if necessary. → "7.1.2".	Operator
F34 Central connection overheated.	The central connection is overheated.	Interrupt current welding job. Let the pump run.	Operator
	Central connection is not tight.	Re-tighten.	
	The plug of the temperature sensor has gone loose.	Re-tighten.	
F35 No tool recognised. Please insert a tool.	A tool has not been connected.	Connect a tool.	Operator
	Otherwise, the tool must be defective.	Replace the tool.	
F36 Wrong tool for selected program - Please connect tool as per indication.	The tool connected is not right for the welding program that has been selected. (Message can occur only with OEM and own programs.)	Check selected program.	Operator
		Connect the required tool.	
		Check the programming.	
F37 No electrode identification available. - Select type of electrode.	You're using uncoded electrodes.	Set the type of electrode manually → "7.4.3".	Operator
	Electrode ID of the tool is defective.		
	The impedance measuring cable is defective.		
F38 Tool is overheated. - Welder remains locked until cooled off.	The tool is overheated.	Have the throughput of the cooling water pump checked.	Service
	Temperature sensor of the tool is defective.	Have the temperature sensor of the tool checked.	
	The throughput of water inside the tool is too low.	Have the throughput of the cooling water pump checked.	

Troubleshooting

Message	What's the problem?	What should be done?	WHO should do it?
F39 Power section is overheated. - Welder remains locked until cooled off.	The power section is overheated.	Service personnel only.	Service
	The fan is defective.		
	The plug of the temperature sensor has no contact.		
F41 Power section is faulty. - Call service.	The power section is faulty.	Service personnel only.	Service
F42 Invalid date and time. - Set date and time again.	The clock of the control unit has not been set yet.	Set the clock → "7.7.1.8".	Operator
	The buffer battery of the control unit is empty.	Service personnel only.	Service
F43 Wrong date or time. - Please enter current date and time.	You have entered a date or time that is already in the past. This is impossible. You can only enter a date and time of the future.	Set the clock → "7.7.1.8".	Operator
F44 Software error. - Please copy software a second time.	The system has detected an error in the software.	Carry out an update with .elk files (→ "7.8").	Operator
F46 Days until registration of the control becomes necessary.	This shows the number of days until menu item "Program selection" will be blocked. If the display runs down to zero days, you can only use the keyboard programs. However, the welder can be released at any time.	→ "7.3.2"	Operator
F47 Invalid release key (expired or copy). Please remove the card.	The key file on the CF memory card is invalid.	Order a new key file from Elektron.	Operator

Message	What's the problem?	What should be done?	WHO should do it?
F48 Control lead / IO interface faulty. Call service.	No communication between control unit and IO board.	Service personnel only.	Service
	IO board defective.		
	CAN bus cable has not been connected to control and/or IO board.		
F49 CF card missing.	The CF memory card has not been inserted into the control unit.	Check the status of the CF memory card. (→ See "7.8".)	Operator
F51 Storage error.	Welding spots could not be saved to CF memory card. Card defective.	Check CF memory card. Replace, if necessary. (→ See "7.8".)	Operator
F52 Active fuse protection. Please wait.	Fuse protection has been switched on and is active.	→ see "7.7.1.6"	Operator
F53 Reduce current by 5 %?	The system has detected that a fuse was triggered. It is now possible to reduce the weld current by 5 %.	However, you must determine yourself whether the results will be satisfactory or not. If yes, confirm.	Operator
F54 You are not authorised for this menu. You need a CF card with lower release level.	The access rights stored on the current CF memory card do not allow you to modify these settings.	If you absolute require the rights, call Elektron for a new key file.	Operator
F55 Entry of user identifier absolutely necessary.	During the configuration of the welder, it was decided that a user name must be entered.	→ "7.7.1"	
F56 Entry of order number absolutely necessary.	During the configuration of the welder, it was decided that an order number must be entered.	→ "7.7.1.1"	Operator
F57 Current order data?	This message appears after one hour, if order data has been entered and the order has not been concluded yet.	Acknowledge the dialogue. If necessary, enter data a second time.	Operator



Troubleshooting

Message	What's the problem?	What should be done?	WHO should do it?
F59 Faulty welding cannot be recognised by deactivated safety routines.	One or several safety rules have been switched off. If a problem should occur during welding, the system cannot adjust.	You must determine yourself whether the results will be satisfactory or not. If yes, confirm.	Operator
F62 Internal flash error.	The internal memory is damaged and/or does not contain any data. An error occurred while trying to write data into memory during an update.	Service personnel only.	Service
F63 File header faulty. Delete data.	The .elk files of an update are not compatible with the welder's current software. Update will be aborted.	Contact Elektron and ask for new .elk files. Be sure to state correct software version.	Operator
F64 Conflict of versions IO board / system controller	The softwares of the control unit and IO board are not compatible with each other. This can occur, for instance, after electronic components have been replaced.	Service personnel only.	Service
F66 Different setting data in I/O and system board. Restore data from I/O System Abort.	Comparison of IO board data and control unit data not successful. The control unit has a backup file of this very important data package. So, the message will always occur after one of the two components has been replaced.	Press button "IO" or "System" to select which component should be used to restore the data. Be sure to select the component that has NOT been replaced.	Service

8.2.2 Problems NOT displayed on the control panel

Message	What's the problem?	What should be done?	WHO should do it?
Welder does not boot up.	Emergency stop pushbutton has been pushed and is now locked.	Unlock pushbutton.	Operator
	Power cord not plugged in.	Plug in power cord.	
	If the power cord is, indeed, connected, a mains fuse may have been triggered.	Reset fuse.	
Display freezes. LEDs not plausible.	System error.	Reboot.	Operator
The red LED to the left of the control knob lights up.	Thermal overload.	Let the welder cool off. Let the cooling system run at least 10 mins. after you finish.	Operator
	Tool error.	Let the tool cool off. If necessary, replace.	
	Mains disturbance	Check fuses and input values (→ "7.7.2.8").	

Troubleshooting

8.2.3 Possible causes and remedies in case of unsatisfactory welding results

Symptom	Possible cause	Remedy	WHO should do it?
Weld spot too small	Weld current too weak.	Adapt welding parameters. If that doesn't do it, fall back on pre-defined programs and/or keyboard mode.	Operator
	Weld time too short.		
	Wrong welding program.	Select correct welding program. If in doubt, talk to the manufacturer and/or OEM.	Operator
Welding spot burns up, excessive spattering, sheets not strong enough.	Weld current too high.	Adapt welding parameters. If that doesn't do it, fall back on pre-defined programs and/or keyboard mode.	Operator
	Weld time too long.		
	Wrong welding program.	Select correct welding program. If in doubt, talk to the manufacturer and/or OEM.	Operator
Welding job flawed	Welding parameters not set correctly according to requirements.	Use the "Info" button to call up the values set. Compare to your specs.	Operator
	Sheets may have been insufficiently prepared.	→ "7.1.1"	Operator
	Setting / operating error(s) within the operating mode set.	→ "7.4.2" If in doubt, contact manufacturer.	Operator

9 Maintenance

9.1 Maintenance schedule

Intervals	What must be done?	WHO should do it?
Before ANY maintenance job	Visually check the welder and its periphery for damage, dirt, contamination etc. Clean, if necessary (→ see "9.2").	Operator
	Check connections for tight fit. (→ See "6.3" – "6.5").	
	Check compressed-air supply. (→ see "6.4")	
	Check level gauge. Cooling water level okay? Fill up, if necessary. (→ See "6.1.2".)	
	Visually check electrode caps. If necessary, clean, mill and/or replace. (→ See "0".)	
	Check distance and -alignment of electrodes. (→ See "7.1.2".)	
	Check PPE for functionality. Replace, if and as soon as necessary.	
Every 6 months	Check purity and quality of operating company's compressed-air supply.	Operator
	Check the work environment. Does it still fulfil all the operating requirements? (→ See "3.4".)	
	Check actual input current and voltage. Take your own measurements.	Skilled electrician
Whenever necessary	Use the CF memory card to make data backups. Store externally.	Operator
	Visually check the water separator and air filter of the pneumatic unit. Carry out jobs as required. (→ See "9.2.2".)	
	Visually check the water filter. Replace, if necessary. (→ See "9.2.3".)	
	Empty cooling water tank (→ see "9.2.4"). Refill (→ see "6.1.2").	

Maintenance

9.2 Carrying out maintenance jobs

Personnel

- The maintenance jobs described here may be carried out by operators, if not explicitly stated otherwise.
- Have works on electrical equipment carried out by skilled electricians, exclusively.

9.2.1 Cleaning



CAUTION

Failure to carry out and/or negligent or improper cleaning jobs may entail damage to property. If you do not clean the welder at all or use aggressive cleaning agents or -methods, there is a danger of damage to property.

Therefore:

- Do not use aggressive cleaning agents and/or -methods.
- Do not use steam cleaners and/or pressure washers.
- Be particularly careful with the display.
- Be sure to clean the welder on a regular schedule, especially around air vents. Adequate dissipation of heat must be ensured.

- Clean the welder with a dry, lint-free cloth. For persistent dirt, use a textile cloth that has been slightly dampened with a mild detergent.
- As for the display: just dust. Be careful not to scratch the display.

9.2.2 Maintaining the pneumatic unit



Fig. 90: Pneumatic unit

1. Visually check the compressed-air filter (Fig. 90/1).
Replace, when you see any accumulation of dirt.
2. Visually check the water separator (Fig. 90/2) under the compressed-air filter for residues of water.
If you find any accumulations of water, pull of the cap in the direction indicated by the arrow and empty water from the separator.

9.2.3 Replacing water filter

Scald hazard



DANGER! Scalding may occur due to hot water coming out!

While pulling out the cooling water hoses hot water may come out. Therefore:

- Wear gloves.
- Pull out water hoses carefully.

Slip hazard



DANGER! Slip hazard due to water coming out!

While pulling out the cooling water hoses water may come out. Therefore:

- Remove water from the floor.

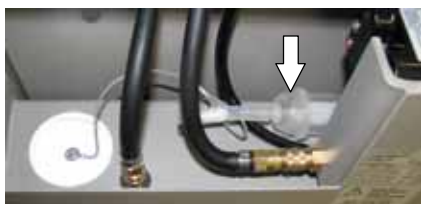


Fig. 91: Water filter

1. Visually check the water filter (Fig. 90).



Fig. 89 Unlocking supply



Fig. 90 Unlocking supply



Fig. 91: Water filter loosened

If you detect clear signs of dirt:

1. Switch off the welder. Wait, until the pump stops pumping.
2. Separate the cooling water supply from the pump (Fig. 90/91).
3. Pull the water filter unit from the hoses to the left and right. However, do not loosen the hose clips.
4. Replace the old filter with a new one.
5. Insert the new water filter between the hoses.
6. Re-connect the cooling water supply to the pump.

Maintenance

9.2.4 Empty cooling water tank



Fig. 92: Draining cooling water.

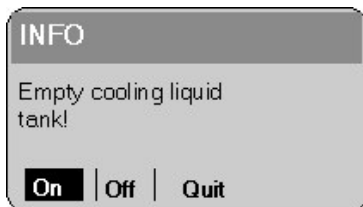
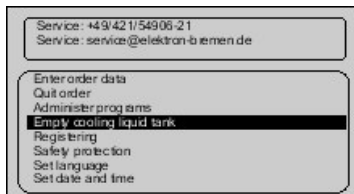


Fig. 93: Draining the cooling system

1. Connect the drain hose to the cooling outlet (Fig. 92)
2. Have four 10-litre buckets ready at hand to catch the cooling water.

3. Press service button on the control panel - once.

This will call up the "**Service**" menu (page 1).

4. Use the control knob to select "**Empty cooling water tank**". Press to confirm.

5. Select "**ON**" and confirm.

- To stop, select "**Off**" and confirm.
- To go back to the menu, select "**Cancel**" and confirm.

6. Catch the cooling water using the four buckets you provided for that purpose. Recycle or dispose of according to environmental laws.

9.3 Measures to be taken after maintenance

When you finish maintenance and before you switch the welder back on, carry out the following:

1. Re-establish any and all connections you loosened and/or removed before. Check for tight fit.
2. Make sure any and all safety devices, covers etc. you may have removed are properly back in place.
3. Make sure you have properly removed and taken away from the work area any and all tools, materials etc. you may have used.
4. Clean the work area. If there have been any leaks, spills etc., clean up.

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Appendix

Training Report

**NOTE***Master copy. Do not fill in. Make copies.*

Date	Name	Type of training	Trainer	Signature