Operating instructions

EN

Power source

Tetrix 451 AC/DC Smart 2.0 FW
Tetrix 551 AC/DC Smart 2.0 FW
Tetrix 451 AC/DC Comfort 2.0 FW
Tetrix 551 AC/DC Comfort 2.0 FW

099-000251-EW501 | Observe additional system documents! | 27.10.2017

General instructions

⚠ WARNING

Read the operating instructions!
The operating instructions provide an introduction to the safe use of the products.

- Read and observe the operating instructions for all system components, especially the safety instructions and warning notices!
- Observe the accident prevention regulations and any regional regulations!
- The operating instructions must be kept at the location where the machine is operated.
- Safety and warning labels on the machine indicate any possible risks.
  Keep these labels clean and legible at all times.
- The machine has been constructed to state-of-the-art standards in line with any applicable regulations and industrial standards. Only trained personnel may operate, service and repair the machine.
- Technical changes due to further development in machine technology may lead to a differing welding behaviour.

☞ ***In the event of queries on installation, commissioning, operation or special conditions at the installation site, or on usage, please contact your sales partner or our customer service department on +49 2680 181-0.***

A list of authorised sales partners can be found at www.ewm-group.com.

Liability relating to the operation of this equipment is restricted solely to the function of the equipment. No other form of liability, regardless of type, shall be accepted. This exclusion of liability shall be deemed accepted by the user on commissioning the equipment.
The manufacturer is unable to monitor whether or not these instructions or the conditions and methods are observed during installation, operation, usage and maintenance of the equipment.

An incorrectly performed installation can result in material damage and injure persons as a result. For this reason, we do not accept any responsibility or liability for losses, damages or costs arising from incorrect installation, improper operation or incorrect usage and maintenance or any actions connected to this in any way.

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Germany

1 Contents

2 For your safety

2.1 Notes on the use of these operating instructions

⚠ DANGER

Working or operating procedures which must be closely observed to prevent imminent serious and even fatal injuries.

- Safety notes include the "DANGER" keyword in the heading with a general warning symbol.
- The hazard is also highlighted using a symbol on the edge of the page.

⚠ WARNING

Working or operating procedures which must be closely observed to prevent serious and even fatal injuries.

- Safety notes include the "WARNING" keyword in the heading with a general warning symbol.
- The hazard is also highlighted using a symbol in the page margin.

⚠ CAUTION

Working or operating procedures which must be closely observed to prevent possible minor personal injury.

- The safety information includes the "CAUTION" keyword in its heading with a general warning symbol.
- The risk is explained using a symbol on the edge of the page.

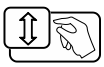
☞ ***Special technical points which users must observe.***

Instructions and lists detailing step-by-step actions for given situations can be recognised via bullet points, e.g.:

- Insert the welding current lead socket into the relevant socket and lock.

2.2 Explanation of icons

Symbol	Description
	Indicates technical aspects which the user must observe.
	Switch off machine
	Switch on machine
	Wrong
	Correct
	Menu entry
	Navigating the menu
	Exit menu
	Time representation (e.g.: wait 4 s/activate)
	Interruption in the menu display (other setting options possible)
	Tool not required/do not use
	Tool required/use

Symbol	Description
	Activate and release/tap/tip
	Release
	Press and keep pressed
	Switch
	Turn
	Numerical value – adjustable
	Signal light lights up in green
	Signal light flashes green
	Signal light lights up in red
	Signal light flashes red

2.3 Part of the complete documentation

☞ ***These operating instructions are part of the complete documentation and valid only in combination with all other parts of these instructions! Read and observe the operating instructions for all system components, especially the safety instructions!***

The illustration shows a general example of a welding system.

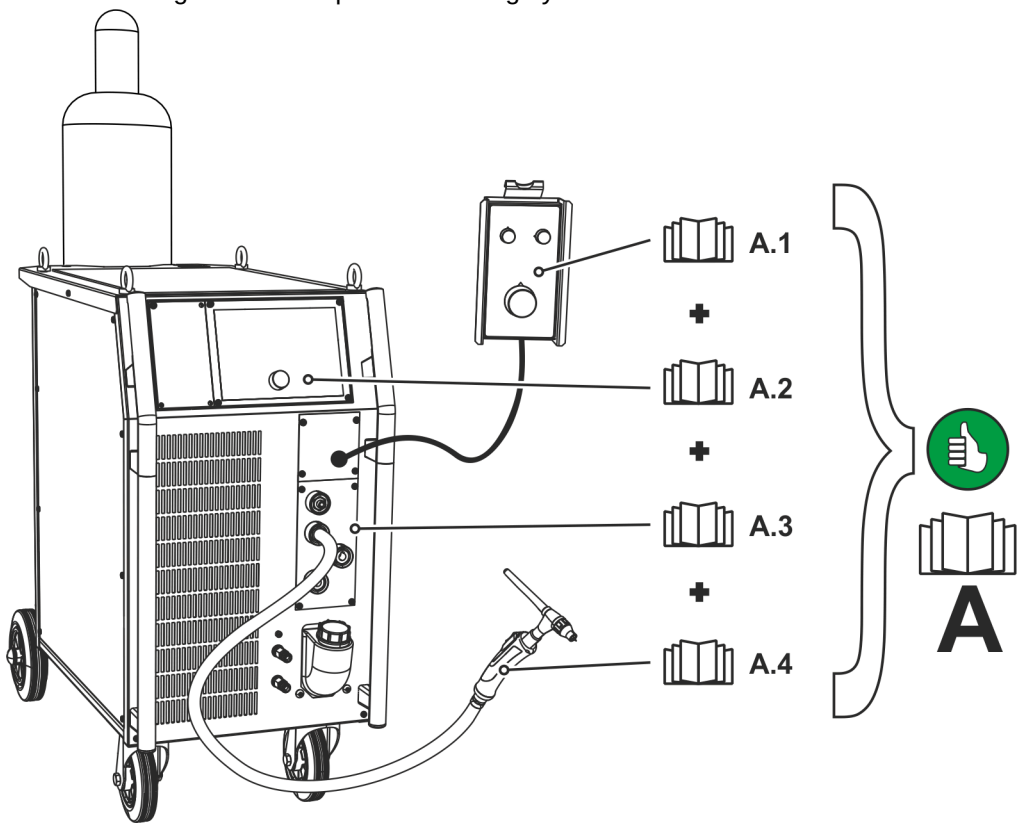


Figure 2-1

Item	Documentation
A.1	Remote control
A.2	Control
A.3	Power source
A.4	Welding torch
A	Complete documentation

2.4 Safety instructions

⚠ WARNING

Risk of accidents due to non-compliance with the safety instructions!
Non-compliance with the safety instructions can be fatal!

- Carefully read the safety instructions in this manual!
- Observe the accident prevention regulations and any regional regulations!
- Inform persons in the working area that they must comply with the regulations!

⚠ WARNING

Risk of injury from electrical voltage!
Voltages can cause potentially fatal electric shocks and burns on contact. Even low voltages can cause a shock and lead to accidents.

- Never touch live components such as welding current sockets or stick, tungsten or wire electrodes!
- Always place torches and electrode holders on an insulated surface!
- Wear the full personal protective equipment (depending on the application)!
- The machine may only be opened by qualified personnel!

Hazard when interconnecting multiple power sources!
If a number of power sources are to be connected in parallel or in series, only a technical specialist may interconnect the sources as per standard *IEC 60974-9:2010: Installation and use* and German Accident Prevention Regulation BVG D1 (formerly VBG 15) or country-specific regulations.
Before commencing arc welding, a test must verify that the equipment cannot exceed the maximum permitted open circuit voltage.

- Only qualified personnel may connect the machine.
- When taking individual power sources out of operation, all mains and welding current leads must be safely disconnected from the welding system as a whole. (Hazard due to reverse polarity voltage!)
- Do not interconnect welding machines with pole reversing switch (PWS series) or machines for AC welding since a minor error in operation can cause the welding voltages to be combined, which is not permitted.

Risk of injury due to improper clothing!
During arc welding, radiation, heat and voltage are sources of risk that cannot be avoided. The user has to be equipped with the complete personal protective equipment at all times. The protective equipment has to include:

- Respiratory protection against hazardous substances and mixtures (fumes and vapours); otherwise implement suitable measures such as extraction facilities.
- Welding helmet with proper protection against ionizing radiation (IR and UV radiation) and heat.
- Dry welding clothing (shoes, gloves and body protection) to protect against warm environments with conditions comparable to ambient temperatures of 100 °C or higher and arcing and work on live components.
- Hearing protection against harming noise.

Risk of injury due to radiation or heat!
Arc radiation can lead to skin and eye injuries.
Contact with hot workpieces and sparks can lead to burns.

- Use hand shield or welding helmet with the appropriate safety level (depends on the application).
- Wear dry protective clothing (e.g. hand shield, gloves, etc.) in accordance with the applicable regulations of your country.
- Persons who are not directly involved should be protected with a welding curtain or suitable safety screen against radiation and the risk of blinding!

Explosion risk!
Apparently harmless substances in closed containers may generate excessive pressure when heated.

- Move containers with inflammable or explosive liquids away from the working area!
- Never heat explosive liquids, dusts or gases by welding or cutting!

⚠ WARNING

Fire hazard!

Due to the high temperatures, sparks, glowing parts and hot slag that occur during welding, there is a risk of flames.

- Be watchful of potential sources of fire in the working area!
- Do not carry any easily inflammable objects, e.g. matches or lighters.
- Ensure suitable fire extinguishers are available in the working area!
- Thoroughly remove any residue of flammable materials from the workpiece prior to starting to weld.
- Only further process workpieces after they have cooled down. Do not allow them to contact any flammable materials!

⚠ CAUTION

Smoke and gases!

Smoke and gases can lead to breathing difficulties and poisoning. In addition, solvent vapour (chlorinated hydrocarbon) may be converted into poisonous phosgene due to the ultraviolet radiation of the arc!

- Ensure that there is sufficient fresh air!
- Keep solvent vapour away from the arc beam field!
- Wear suitable breathing apparatus if appropriate!

Noise exposure!

Noise exceeding 70 dBA can cause permanent hearing damage!

- Wear suitable ear protection!
- Persons located within the working area must wear suitable ear protection!

According to IEC 60974-10, welding machines are divided into two classes of electromagnetic compatibility (the EMC class can be found in the Technical data) > *see 8 chapter*:

Class A machines are not intended for use in residential areas where the power supply comes from the low-voltage public mains network. When ensuring the electromagnetic compatibility of class A machines, difficulties can arise in these areas due to interference not only in the supply lines but also in the form of radiated interference.

Class B machines fulfil the EMC requirements in industrial as well as residential areas, including residential areas connected to the low-voltage public mains network.

Setting up and operating

When operating arc welding systems, in some cases, electro-magnetic interference can occur although all of the welding machines comply with the emission limits specified in the standard. The user is responsible for any interference caused by welding.

In order to **evaluate** any possible problems with electromagnetic compatibility in the surrounding area, the user must consider the following: (see also EN 60974-10 Appendix A)

- Mains, control, signal and telecommunication lines
- Radios and televisions
- Computers and other control systems
- Safety equipment
- The health of neighbouring persons, especially if they have a pacemaker or wear a hearing aid
- Calibration and measuring equipment
- The immunity to interference of other equipment in the surrounding area
- The time of day at which the welding work must be carried out

Recommendations for **reducing interference emission**

- Mains connection, e.g. additional mains filter or shielding with a metal tube
- Maintenance of the arc welding system
- Welding leads should be as short as possible and run closely together along the ground
- Potential equalization
- Earthing of the workpiece. In cases where it is not possible to earth the workpiece directly, it should be connected by means of suitable capacitors.
- Shielding from other equipment in the surrounding area or the entire welding system

⚠ CAUTION

Electromagnetic fields!

The power source may cause electrical or electromagnetic fields to be produced which could affect the correct functioning of electronic equipment such as IT or CNC devices, telecommunication lines, power cables, signal lines and pacemakers.

- Observe the maintenance instructions > *see 6.3 chapter*!
- Unwind welding leads completely!
- Shield devices or equipment sensitive to radiation accordingly!
- The correct functioning of pacemakers may be affected (obtain advice from a doctor if necessary).

☞ ***Obligations of the operator!***

The respective national directives and laws must be complied with when operating the machine!

- ***Implementation of national legislation relating to framework directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work and associated individual guidelines.***
- ***In particular, directive 89/655/EEC concerning the minimum safety and health requirements for the use of work equipment by workers at work.***
- ***The regulations applicable to occupational safety and accident prevention in the country concerned.***
- ***Setting up and operating the machine as per IEC 60974.-9.***
- ***Brief the user on safety-conscious work practices on a regular basis.***
- ***Regularly inspect the machine as per IEC 60974.-4.***

☞ ***The manufacturer's warranty becomes void if non-genuine parts are used!***

- ***Only use system components and options (power sources, welding torches, electrode holders, remote controls, spare parts and replacement parts, etc.) from our range of products!***
- ***Only insert and lock accessory components into the relevant connection socket when the machine is switched off.***

☞ ***Requirements for connection to the public mains network***

High-performance machines can influence the mains quality by taking current from the mains network. For some types of machines, connection restrictions or requirements relating to the maximum possible line impedance or the necessary minimum supply capacity at the interface with the public network (Point of Common Coupling, PCC) can therefore apply. In this respect, attention is also drawn to the machines' technical data. In this case, it is the responsibility of the operator, where necessary in consultation with the mains network operator, to ensure that the machine can be connected.

2.5 Transport and installation

⚠ WARNING

Risk of injury due to improper handling of shielding gas cylinders!
Improper handling and insufficient securing of shielding gas cylinders can cause serious injuries!

- Observe the instructions from the gas manufacturer and any relevant regulations concerning the use of compressed air!
- Do not attach any element to the shielding gas cylinder valve!
- Prevent the shielding gas cylinder from heating up.

⚠ CAUTION

Risk of accidents due to supply lines!
During transport, attached supply lines (mains leads, control cables, etc.) can cause risks, e.g. by causing connected machines to tip over and injure persons!

- Disconnect all supply lines before transport!

Risk of tipping!
There is a risk of the machine tipping over and injuring persons or being damaged itself during movement and set up. Tilt resistance is guaranteed up to an angle of 10° (according to IEC 60974-1).

- Set up and transport the machine on level, solid ground.
- Secure add-on parts using suitable equipment.

Risk of accidents due to incorrectly installed leads!
Incorrectly installed leads (mains, control and welding leads or intermediate hose packages) can present a tripping hazard.

- Lay the supply lines flat on the floor (avoid loops).
- Avoid laying the leads on passage ways.

☞ ***The units are designed for operation in an upright position!***
Operation in non-permissible positions can cause equipment damage.

- ***Only transport and operate in an upright position!***

☞ ***Accessory components and the power source itself can be damaged by incorrect connection!***

- ***Only insert and lock accessory components into the relevant connection socket when the machine is switched off.***
- ***Comprehensive descriptions can be found in the operating instructions for the relevant accessory components.***
- ***Accessory components are detected automatically after the power source is switched on.***

☞ ***Protective dust caps protect the connection sockets and therefore the machine against dirt and damage.***

- ***The protective dust cap must be fitted if there is no accessory component being operated on that connection.***
- ***The cap must be replaced if faulty or if lost!***

3 Intended use

⚠ WARNING

§ **Hazards due to improper usage!**

The machine has been constructed to the state of the art and any regulations and standards applicable for use in industry and trade. It may only be used for the welding procedures indicated at the rating plate. Hazards may arise for persons, animals and material objects if the equipment is not used correctly. No liability is accepted for any damages arising from improper usage!

- The equipment must only be used in line with its designated purpose and by trained or expert personnel!
- Do not improperly modify or convert the equipment!

3.1 Applications

Arc welding machine for TIG DC and AC welding with lift arc (touch starting) or HF ignition (contactless) and MMA welding as secondary process. It may be possible to expand the functionality by using accessories (see the documentation in the relevant chapter).

3.2 Documents which also apply

3.2.1 Warranty

☞ ***For more information refer to the "Warranty registration" brochure supplied and our information regarding warranty, maintenance and testing at www.ewm-group.com!***

3.2.2 Declaration of Conformity

CE **The labelled machine complies with the following EC directives in terms of its design and construction:**

- Low Voltage Directive (LVD)
- Electromagnetic Compatibility Directive (EMC)
- Restriction of Hazardous Substance (RoHS)

In case of unauthorised changes, improper repairs, non-compliance with specified deadlines for "Arc Welding Equipment – Inspection and Testing during Operation," and/or prohibited modifications which have not been explicitly authorised by the manufacturer, this declaration shall be voided. An original document of the specific declaration of conformity is included with every product.

3.2.3 Welding in environments with increased electrical hazards

S **In compliance with IEC / DIN EN 60974, VDE 0544 the machines can be used in environments with an increased electrical hazard.**

3.2.4 Service documents (spare parts and circuit diagrams)

⚠ WARNING

Do not carry out any unauthorised repairs or modifications!

To avoid injury and equipment damage, the unit must only be repaired or modified by specialist, skilled persons!

The warranty becomes null and void in the event of unauthorised interference.

- Appoint only skilled persons for repair work (trained service personnel)!

Original copies of the circuit diagrams are enclosed with the unit.

Spare parts can be obtained from the relevant authorised dealer.

3.2.5 Calibration/Validation

We hereby confirm that this machine has been tested using calibrated measuring equipment, as stipulated in IEC/EN 60974, ISO/EN 17662, EN 50504, and complies with the admissible tolerances. Recommended calibration interval: 12 months

4 Machine description – quick overview

4.1 Front view

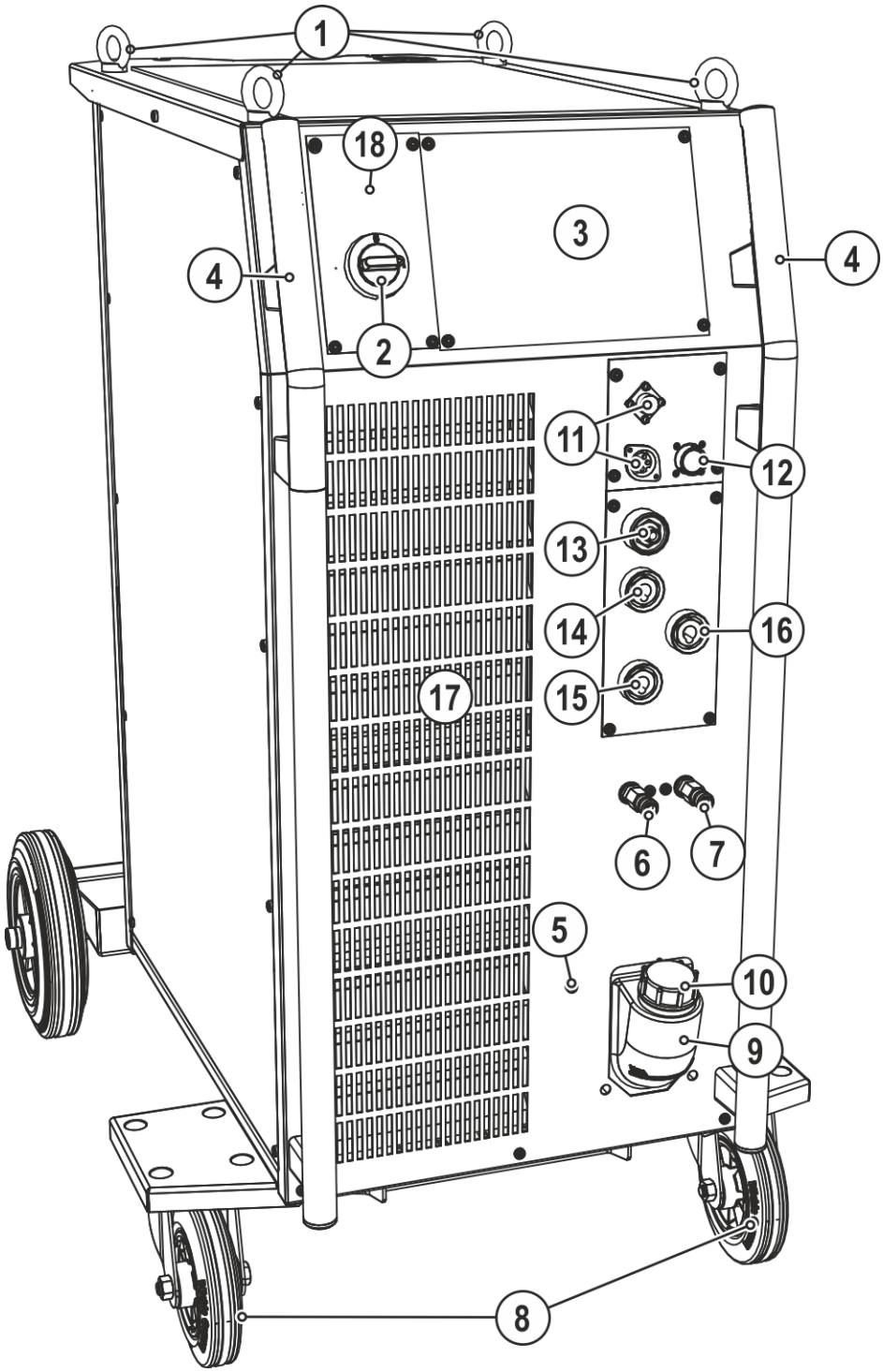


Figure 4-1

Item	Symbol	Description
1		**Lifting lug**
2		**Main switch, machine on/off**
3		**Machine control, see the relevant control operating instructions**
4		**Carrying handle**
5		**Automatic cut-out of coolant pump key button** press to reset a triggered fuse
6		**Quick connect coupling (red)** coolant return
7		**Quick connect coupling (blue)** coolant supply
8		**Wheels, guide castors**
9		**Coolant tank**
10		**Coolant tank cap**
11		**Connection socket, welding torch control cable** > ***see 5.2.1.1 chapter***
12		**Connection socket, 19-pole** Remote control connection
13		**G¼“ connecting nipple, welding current "-" (with DC- polarity)** Shielding gas connection (with yellow insulating cap) for TIG welding torch
14		**Connection socket, welding current “-” (with DC- polarity)** connection TIG welding torch
15		**Connection socket, welding current “+” (with DC- polarity)** Connection for workpiece lead
16		**Connection socket, welding current “-” (with DC- polarity)** connection for Electrode holder
17		**Cooling air inlet**
18		**Operating state signal lamp** Lights up when the machine is ready for use.

4.2 Rear view

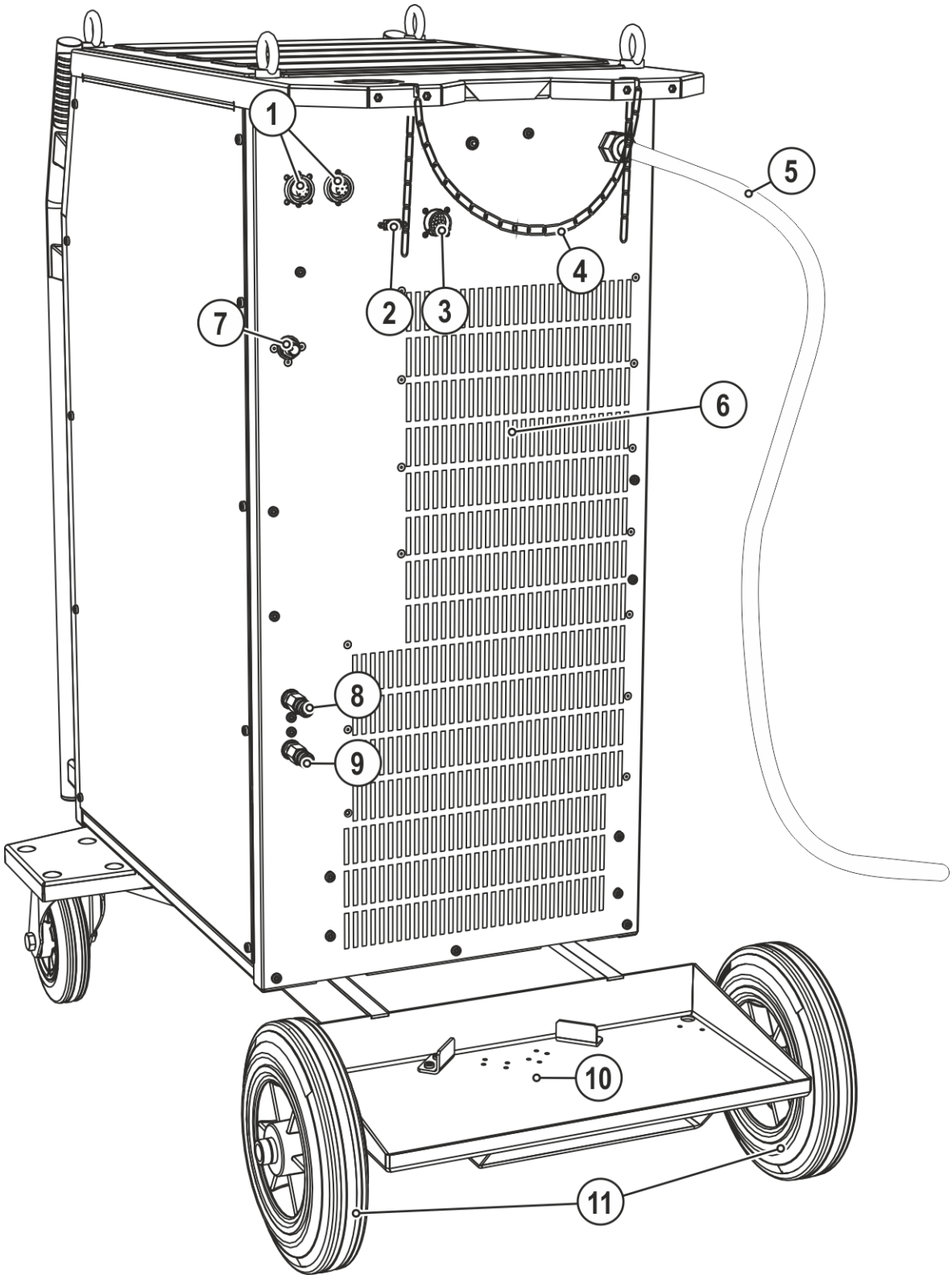


Figure 4-2

Item	Symbol	Description
1		**Connection socket, 7-pole (digital)** To connect digital accessories Retrofitting option > *see 9 chapter*
2		**PC interface, serial (D-Sub connection socket, 9-pole)**
3		**Automation interface 19-pin (analogue)** Option for retrofitting > *see 5.5 chapter*
4		**Securing elements for shielding gas cylinder (strap/chain)**
5		**Mains connection cable > *see 5.1.7 chapter***
6		**Cooling air outlet**
7		**G¼" connecting nipple** Shielding gas connection on the pressure regulator.
8		**Quick connect coupling (red)** coolant return
9		**Quick connect coupling (blue)** coolant supply
10		**Bracket for shielding gas cylinder**
11		**Wheels, fixed castors**

5 Design and function

⚠ WARNING

Risk of injury from electrical voltage!
Contact with live parts, e.g. power connections, can be fatal!

- Observe the safety information on the first pages of the operating instructions!
- Commissioning must be carried out by persons who are specifically trained in handling power sources!
- Connect connection or power cables while the machine is switched off!

⚠ CAUTION

Risk from electrical current!
If welding is carried out alternately using different methods and if a welding torch and an electrode holder remain connected to the machine, the open-circuit/welding voltage is applied simultaneously on all cables.

- The torch and the electrode holder should therefore always be placed on an insulated surface before starting work and during breaks.

☞ ***Read and observe the documentation to all system and accessory components!***

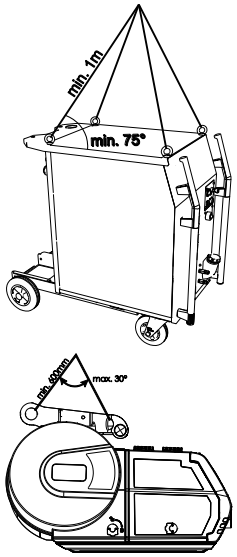
5.1 Transport and installation

5.1.1 Lifting by crane

⚠ WARNING

Risk of injury during lifting by crane!
When lifting the machine by crane, persons may be severely injured by falling machines or mount-on components.

- Simultaneous lifting of system components such as power source, wire feeder or cooling unit without suitable crane components is not allowed. Each system component has to be lifted separately!
- Remove any supply leads and accessories before lifting by crane (e.g. hose package, wire spool, shielding gas cylinder, toolbox, wire feeder, remote control,etc.)!)
- Properly close and lock all casing covers and protective caps before lifting by crane!
- Use the correct number of hoisting equipment of the right size in the correct position! Observe craning principle (see figure)!
- For machines with lifting eyes: always lift all lifting eyes simultaneously!
- When using retrofitted craning frames etc.: always use at least two lifting points positioned as far apart as possible – observe option description.
- Avoid any jerky movements!
- Ensure that the load is distributed evenly! • Use chain hoists and chain slings of the same length only!
- Stay outside the danger zone underneath the machine!
- Observe the regulations regarding occupational safety and accident prevention for the respective country.



Craning principle

5.1.2 Ambient conditions

☞ ***T he machine must not be operated in the open air and must only be set up and operated on a suitable, stable and level base!***

- ***The operator must ensure that the ground is non-slip and level, and provide sufficient lighting for the place of work.***
- ***Safe operation of the machine must be guaranteed at all times.***

☞ ***Unusually high quantities of dust, acid, corrosive gases or substances may damage the equipment.***

- ***Avoid high volumes of smoke, vapour, oil vapour and grinding dust!***
- ***Avoid ambient air containing salt (sea air)!***

5.1.2.1 In operation

Temperature range of the ambient air:

- -25 °C to +40 °C

Relative air humidity:

- Up to 50% at 40 °C
- Up to 90% at 20 °C

5.1.2.2 Transport and storage

Storage in an enclosed space, temperature range of the ambient air:

- -30 °C to +70 °C

Relative air humidity

- Up to 90% at 20 °C

5.1.3 Machine cooling

☞ ***Insufficient ventilation results in a reduction in performance and equipment damage.***

- ***Observe the ambient conditions!***
- ***Keep the cooling air inlet and outlet clear!***
- ***Observe the minimum distance of 0.5 m from obstacles!***

5.1.4 Workpiece lead, general

⚠ CAUTION

Risk of burning due to incorrect welding current connection!
If the welding current plugs (machine connections) are not locked or if the workpiece connection is contaminated (paint, corrosion), these connections and leads can heat up and cause burns when touched!

- Check welding current connections on a daily basis and lock by turning to the right when necessary.
- Clean workpiece connection thoroughly and secure properly. Do not use structural parts of the workpiece as welding current return lead!

5.1.5 Welding torch cooling system

☞ ***Insufficient frost protection in the welding torch coolant!***
Depending on the ambient conditions, different liquids are used for cooling the welding torch > see 5.1.5.1 chapter.
Coolants with frost protection (KF 37E or KF 23E) must be checked regularly to ensure that the frost protection is adequate to prevent damage to the machine or the accessory components.

- ***The coolant must be checked for adequate frost protection with the TYP 1 frost protection tester .***
- ***Replace coolant as necessary if frost protection is inadequate!***

☞ ***Coolant mixtures!***
Mixtures with other liquids or the use of unsuitable coolants result in material damage and renders the manufacturer's warranty void!

- ***Only use the coolant described in this manual (overview of coolants).***
- ***Do not mix different coolants.***
- ***When changing the coolant, the entire volume of liquid must be changed.***

☞ ***Dispose of the coolant in accordance with local regulations and the material safety data sheets (German waste code number: 70104).***
May not be disposed of in household waste.
Prevent entry into sewers.
Absorb with liquid-binding material (sand, gravel, acid-binding agents, universal binding agents, sawdust).

5.1.5.1 Approved coolants overview

Coolant	Temperature range
KF 23E (Standard)	-10 °C to +40 °C
KF 37E	-20 °C to +10 °C

5.1.5.2 Maximal hose package length

	Pump 3.5 bar	Pump 4.5 bar
Machines with or without separate wire feeder	30 m	60 m
Compact machines with additional intermediate drive (example. miniDrive)	20 m	30 m
Machines with separate wire feeder and additional intermediate drive (example: miniDrive)	20 m	60 m

Data as a rule refer to the entire hose package length including welding torch. The pump output is shown on the type plate (parameter: Pmax).

Pump 3.5 bar: Pmax = 0.35 MPa (3.5 bar)

Pump 4.5 bar: Pmax = 0.45 MPa (4.5 bar)

5.1.5.3 Adding coolant

The unit is supplied ex works with a minimum level of coolant.

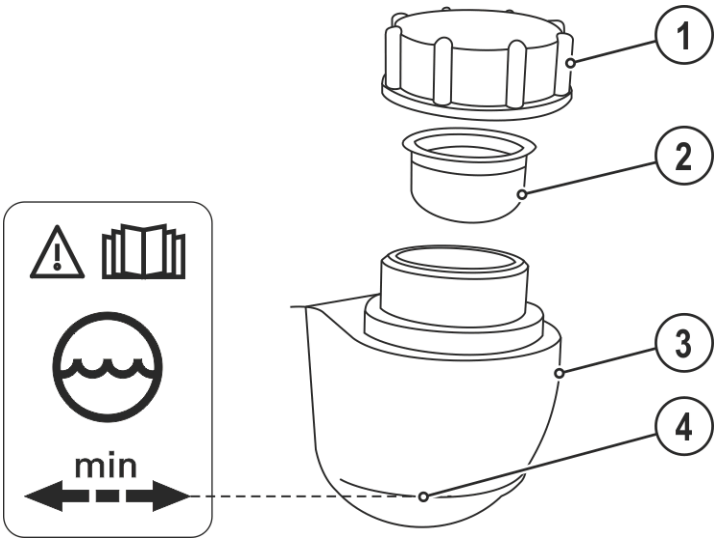


Figure 5-1

Item	Symbol	Description
1		**Coolant tank cap**
2		**Coolant filter sieve**
3		**Coolant tank**
4		**"Min" mark** Minimum coolant level

- Unscrew and remove the coolant tank sealing cover.
- Check filter sieve insert for dirt, clean if necessary and reinsert into position.
- Top up coolant to the filter sieve insert, close sealing cover again.

☞ ***If the cooling system is empty or only insufficiently filled with coolant, the coolant pump is automatically switched off after approx. one minute (protection against destruction). At the same time, the welding data display signals the lack of coolant or low coolant level.***

- ***Reset the coolant error, fill coolant and repeat the operation.***

☞ ***The level of coolant must never fall below the “min” mark.***

☞ ***If there is less coolant in the coolant tank than the minimum required you may need to vent the coolant circuit. In this case the welding machine will automatically shut down the coolant pump and signal an error, > see 7.2 chapter.***

5.1.6 Notes on the installation of welding current leads

☞ ***Incorrectly installed welding current leads can cause faults in the arc (flickering).***

Lay the workpiece lead and hose package of power sources without HF igniter (MIG/MAG) for as long and as close as possible in parallel.

Lay the workpiece lead and hose package of power sources with HF igniter (TIG) for as long as possible in parallel with a distance of 20 cm to avoid HF sparkover.

Always keep a distance of at least 20 cm to leads of other power sources to avoid interferences

Always keep leads as short as possible! For optimum welding results max. 30 m (welding lead + intermediate hose package + torch lead).

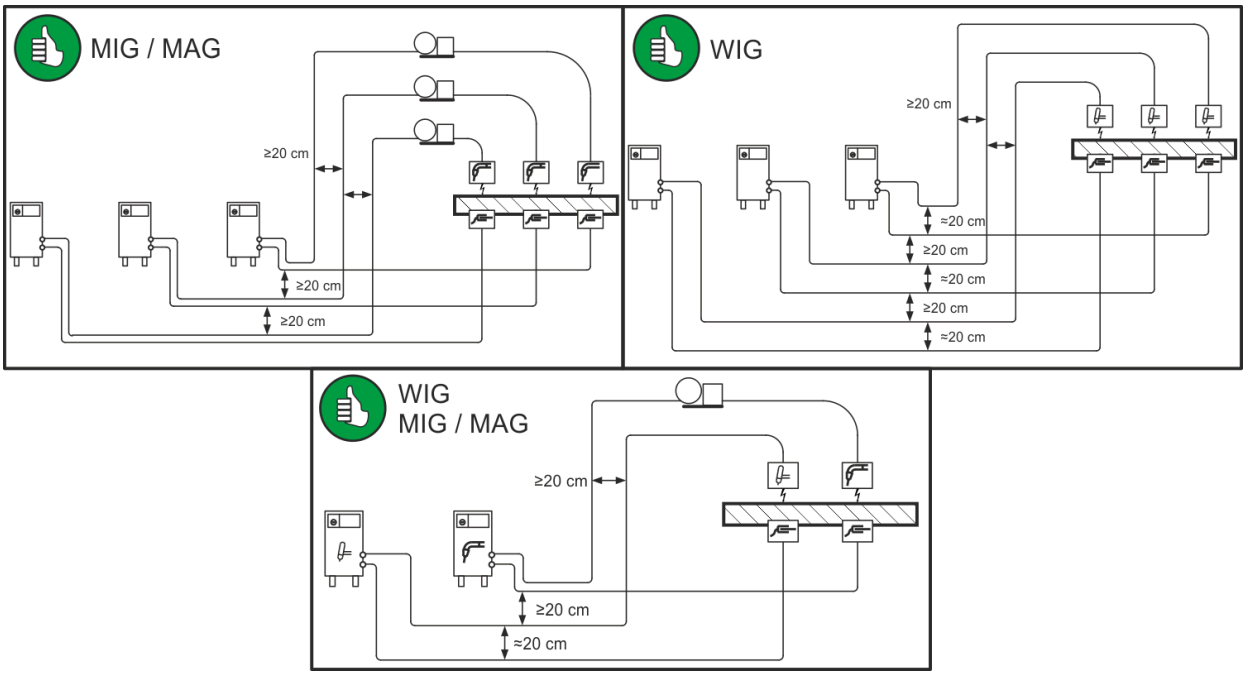


Figure 5-2

☞ ***Use an individual welding lead to the workpiece for each welding machine!***

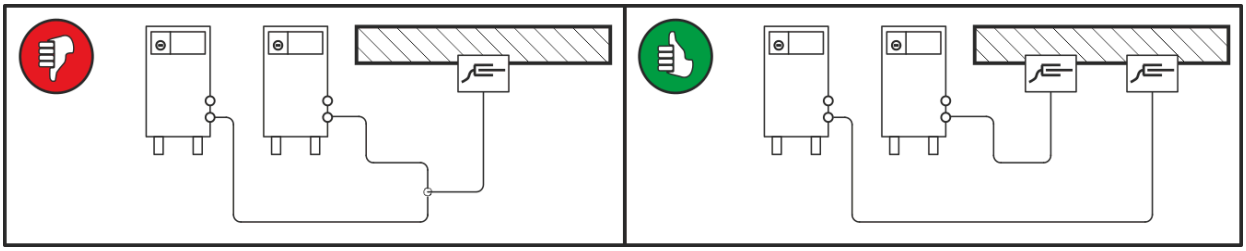


Figure 5-3

☞ ***Fully unroll welding current leads, torch hose packages and intermediate hose packages. Avoid loops!***

☞ ***Always keep leads as short as possible!***

☞ ***Lay any excess cable lengths in meanders.***

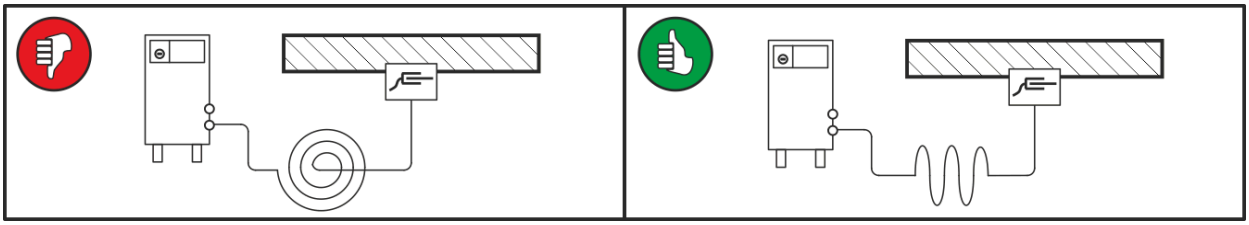


Figure 5-4

5.1.6.1 Stray welding currents

⚠ WARNING

Risk of injury due to stray welding currents!
Stray welding currents can destroy protective earth conductors, damage machines and electronic devices and cause overheating of components, leading to fire.

- Check that all welding current connections are firmly secured and electrical connections are in perfect condition.
- Set up, attach or suspend all conductive power source components such as casing, transport vehicles and crane frames so they are insulated.
- Do not place any other electronic devices such as drills or angle grinders on the power source, transport vehicle or crane frames unless they are insulated.
- Always put welding torches and electrode holders on an insulated surface when they are not in use.

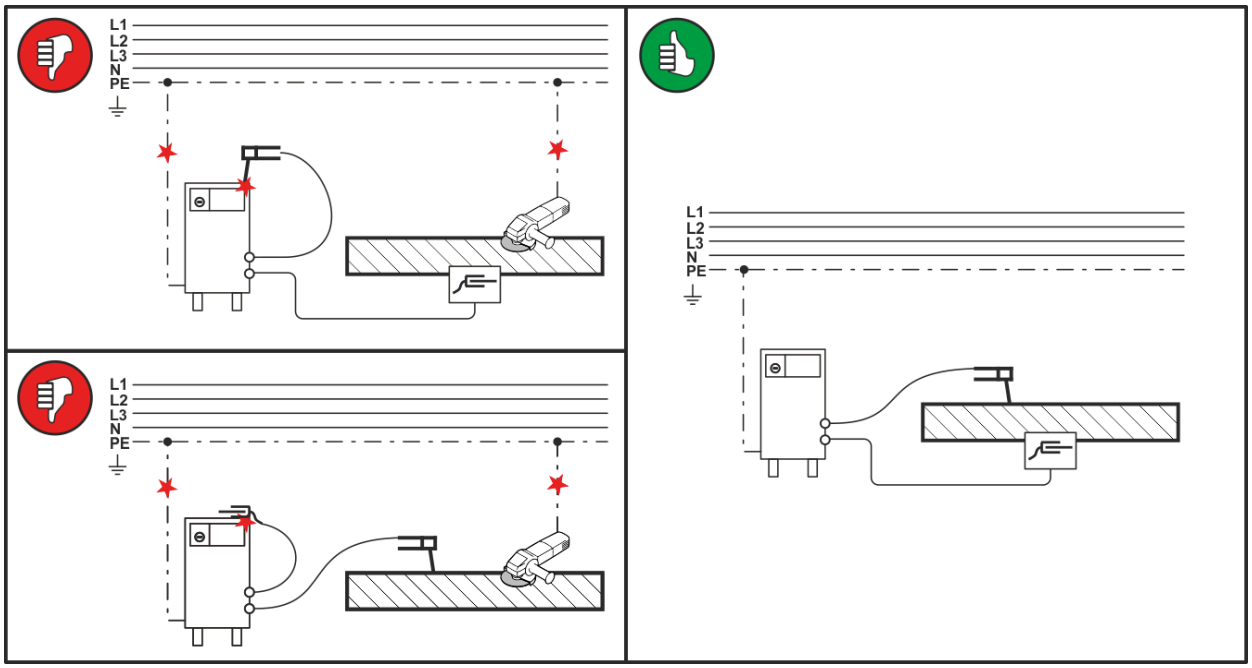


Figure 5-5

5.1.7 Mains connection

⚠ DANGER

Hazards caused by improper mains connection!
An improper mains connection can cause injuries or damage property!

- Only operate machine using a socket that has correctly fitted protective earth.
- The mains voltage indicated on the rating plate must match the supply voltage.
- If a new mains plug must be fitted, only an electrician may do so as per the relevant national legislation or regulations.
- Mains plug, socket and lead must be checked by an electrician on a regular basis.
- When operating the generator, always ensure it is earthed as stipulated in the operating instructions. The network created must be suitable for operating machines according to protection class I.

5.1.7.1 Mains configuration

☞ ***The machine may be connected to:***

- ***a three-phase system with four conductors and an earthed neutral conductor***
- ***a three-phase system with three conductors of which any one can be earthed,***

e.g. the outer conductor

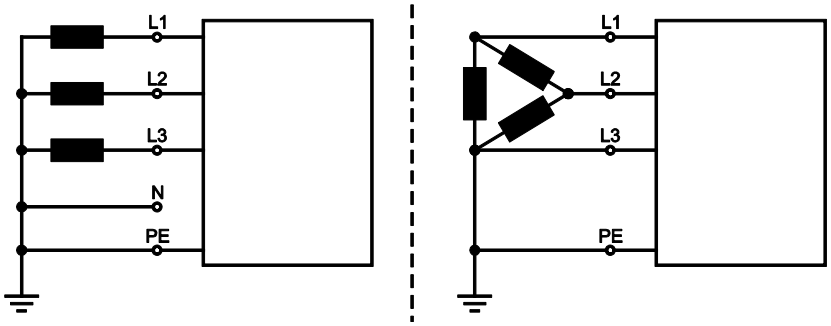


Figure 5-6

Legend

Item	Designation	Colour code
L1	Outer conductor 1	brown
L2	Outer conductor 2	black
L3	Outer conductor 3	grey
N	Neutral conductor	blue
PE	Protective conductor	green-yellow

- Insert mains plug of the switched-off machine into the appropriate socket.

5.2 TIG welding

5.2.1 Welding torch and workpiece line connection

Prepare welding torch according to the welding task in hand (see operating instructions for the torch).

☞ ***Equipment damage due to improperly connected coolant pipes!***
If the coolant pipes are not properly connected or a gas-cooled welding torch is used, the coolant circuit is interrupted and equipment damage can occur.

- ***Connect all coolant pipes correctly!***
- ***Completely unroll the hose package and the torch hose package!***
- ***Observe maximal hose package length > see 5.1.5.2 chapter.***
- ***When using a gas-cooled welding torch, use a hose bridge to establish the coolant circuit > see 9 chapter.***

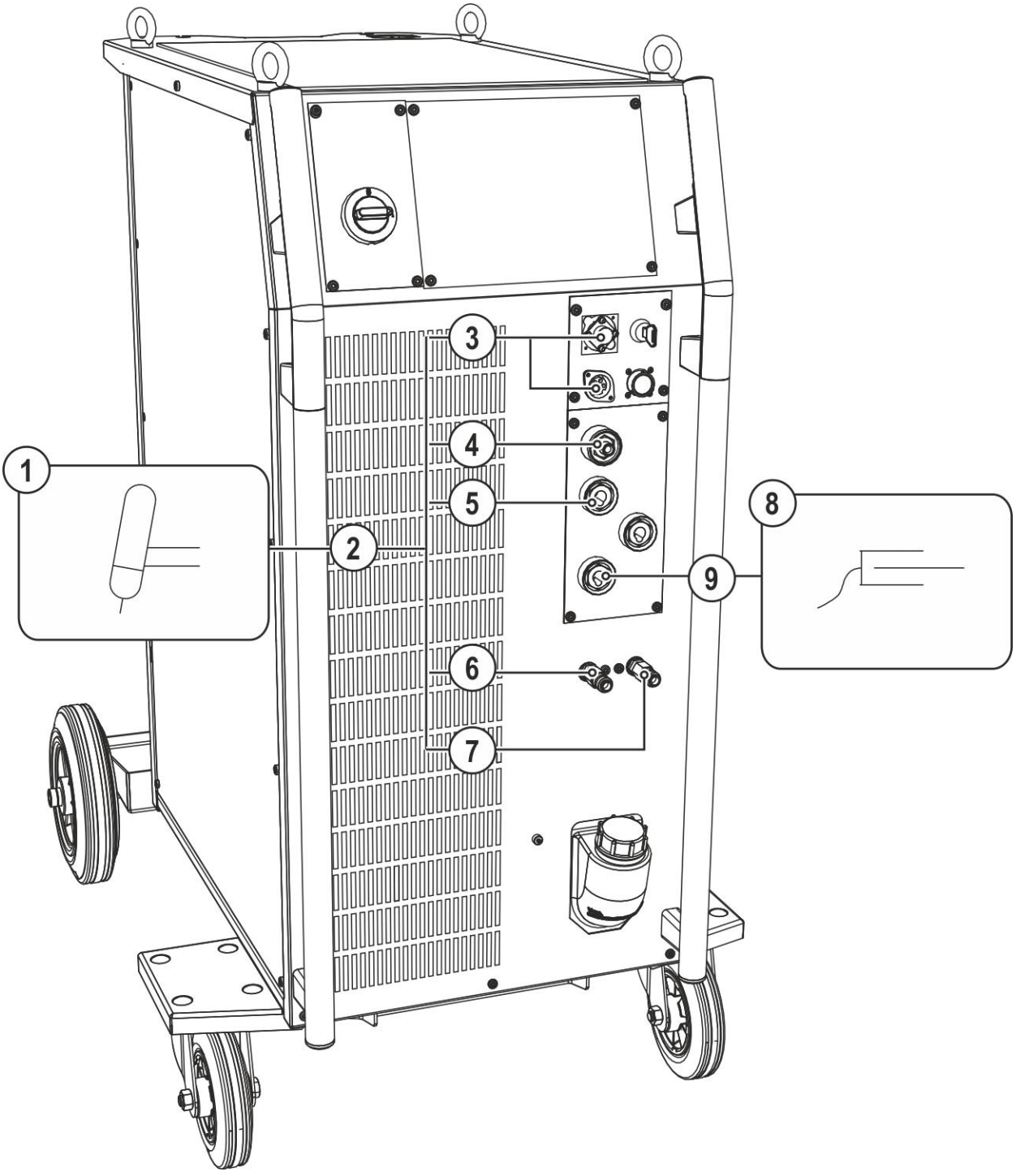


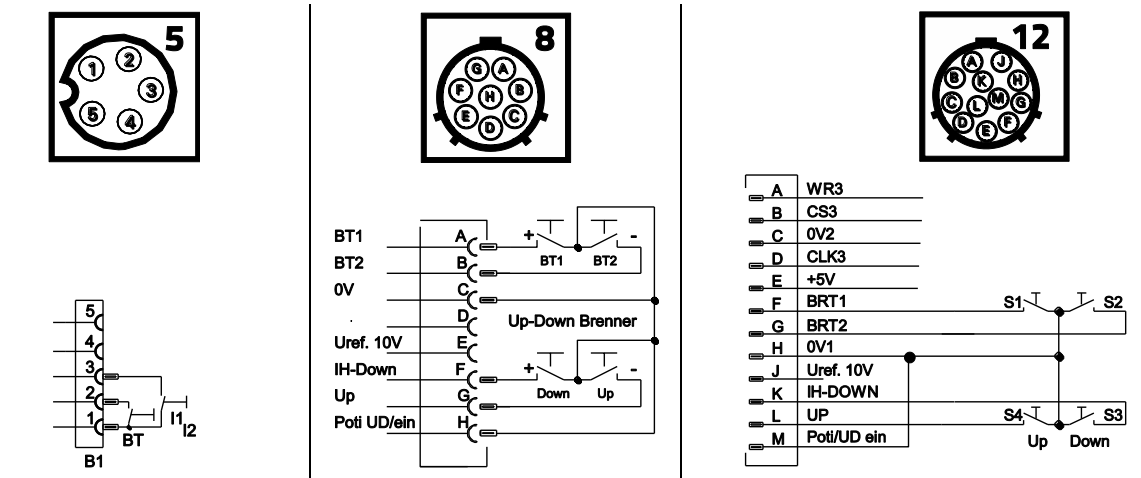
Figure 5-7

Item	Symbol	Description
1		**Welding torch**
2		**Welding torch hose package**
3		**Connection socket, welding torch control cable > *see 5.2.1.1 chapter***
4		**G¼" connecting nipple, "-" welding current** Shielding gas connection (with yellow insulating cap) for TIG welding torch
5		**Connection socket, "-" welding current** TIG welding torch connection
6		**Quick connect coupling (red)** coolant return
7		**Quick connect coupling (blue)** coolant supply
8		**Workpiece**
9		**Connection socket, "+" welding current** Connection for workpiece lead

- Insert the welding current plug on the welding torch into the welding current connection socket and lock by turning to the right.
- Screw welding torch shielding gas connection tightly onto the G¼" connection nipple, welding current "-".
- Plug the welding torch control cable plug into the welding torch control cable connection socket and secure.
- Lock connecting nipples of the cooling water tubes into the corresponding quick connect couplings:
  Return line red to quick connect coupling, red (coolant return) and
  supply line blue to quick connect coupling, blue (coolant supply).
- Insert the cable plug on the work piece lead into the "+" welding current connection socket and lock by turning to the right.

5.2.1.1 Connection assignment, welding torch control cable

TIG welding machines are equipped ex works with a dedicated connection socket for the welding torch control cable (5- or 8-pole). As mobile machines offer more free space, they may even feature two control cable connection sockets. The functionality increases with the number of poles. One of these connection sockets may be converted or retrofitted > *see 9 chapter*.



TIG standard torch | **TIG up/down or potentiometer torch** | **TIG up/down torch with display**

Figure 5-8

☞ ***The ON 12pol Retox Tetrix option can only be used in conjunction with the specified options and machine versions!***

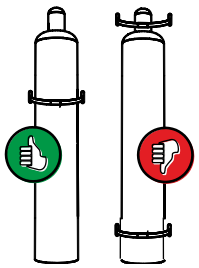
- Comfort 2.0

5.2.2 Shielding gas supply (shielding gas cylinder for welding machine)

⚠ WARNING

Risk of injury due to improper handling of shielding gas cylinders!
Improper handling and insufficient securing of shielding gas cylinders can cause serious injuries!

- Place shielding gas cylinder into the designated holder and secure with fastening elements (chain/belt)!
- Attach the fastening elements within the upper half of the shielding gas cylinder!
- The fastening elements must tightly enclose the shielding gas cylinder!



☞ ***An unhindered shielding gas supply from the shielding gas cylinder to the welding torch is a fundamental requirement for optimum welding results. In addition, a blocked shielding gas supply may result in the welding torch being destroyed.***

- ***Always re-fit the yellow protective cap when not using the shielding gas connection.***
- ***All shielding gas connections must be gas tight.***

5.2.2.1 Connecting the shielding gas supply

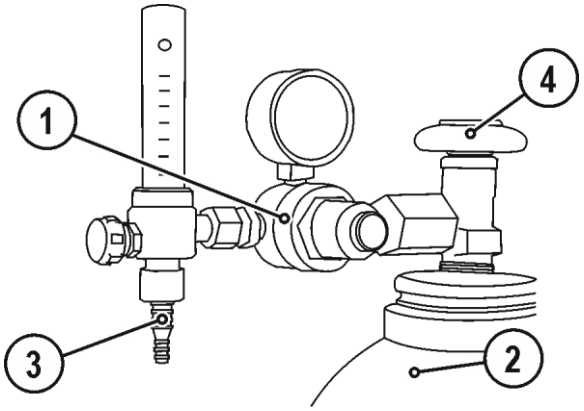


Figure 5-9

Item	Symbol	Description
1		**Pressure regulator**
2		**Shielding gas cylinder**
3		**Output side of the pressure regulator**
4		**Cylinder valve**

- Before connecting the pressure regulator to the gas cylinder, open the cylinder valve briefly to blow out any dirt.
- Tighten the pressure regulator screw connection on the gas bottle valve to be gas-tight.
- Screw gas hose connection crown nut onto the output side of the pressure regulator.
- Install gas hose with G1/4" crown nut at the correct welding machine connection so that it is gas-tight.

5.3 MMA welding

5.3.1 Connecting the electrode holder and workpiece lead

⚠ CAUTION

Risk of crushing and burns!

When changing stick electrodes there is a risk of crushing and burns!

- Wear appropriate and dry protective gloves.
- Use an insulated pair of tongs to remove the used stick electrode or to move welded workpieces.

Shielding gas connection!

During MMA welding open circuit voltage is applied at the shielding gas connection (G¼" connecting nipple).

- Place yellow insulating cap on the G¼" connection nipple (protects against electrical voltage and dirt).

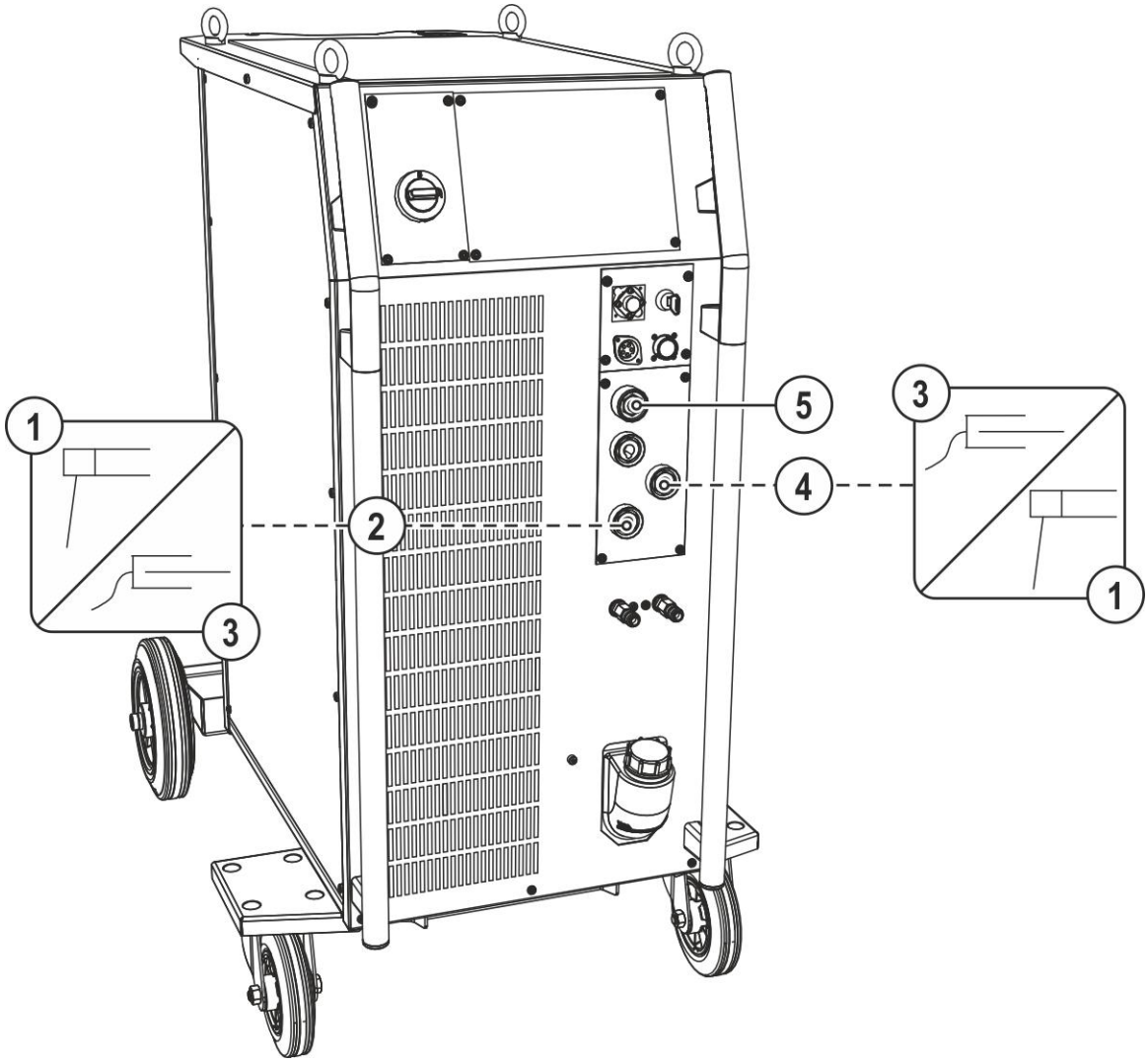


Figure 5-10

Item	Symbol	Description
1		**Workpiece**
2		**Connection socket, “+” welding current** Connection for workpiece lead
3		**Electrode holder**
4		**Connection socket, “-” welding current** Electrode holder connection
5		**G¼" connecting nipple** Shielding gas connection (with yellow insulating cap) for TIG welding torch

☞ ***Polarity depends on the instructions from the electrode manufacturer given on the electrode packaging.***

- Insert cable plug of the electrode holder into either the "+" or "-" welding current connection socket and lock by turning to the right.
- Insert cable plug of the workpiece lead into either the "+" or "-" welding current connection socket and lock by turning to the right.
- Fit yellow protective cap onto G¼" connecting nipple.

5.4 Remote control

☞ ***The remote controls are operated on the 19-pole remote control connection socket (analogue).***

5.4.1 RT1 19POL

Functions

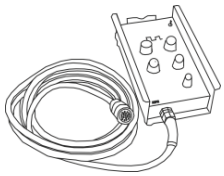
- Infinitely adjustable welding current (0% to 100%) depending on the preselected main current on the welding machine.

5.4.2 RTG1 19POL

Functions

- Infinite setting of the welding current (0% to 100%) depending on the main current preselected at the welding machine

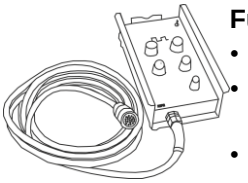
5.4.3 RTP1 19POL



Functions

- TIG/MMA
- Infinitely adjustable welding current (0% to 100%) depending on the preselected main current on the welding machine.
- Pulse/spot/normal
- Pulse, spot and break times are infinitely adjustable.

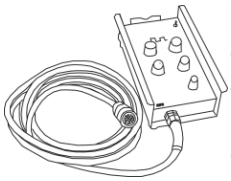
5.4.4 RTP2 19POL



Functions

- TIG/MMA.
- Infinitely adjustable welding current (0% to 100%) depending on the preselected main current on the welding machine.
- Pulse/spot/normal
- Frequency and spot times infinitely adjustable.
- Coarse adjustment of the cycle frequency.
- Pulse/pause ratio (balance) adjustable from 10% to 90%.

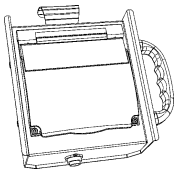
5.4.5 RTP3 spotArc 19POL



Functions

- TIG / MMA.
- Infinitely adjustable welding current (0% to 100%) depending on the preselected main current on the welding machine.
- Pulse / SpotArc spots / normal
- Frequency and spot time infinitely adjustable.
- Coarse adjustment of the pulse frequency.
- Pulse/pause ratio (balance) adjustable from 10% to 90%.

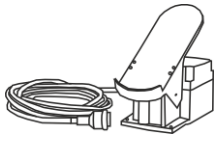
5.4.6 RT50 7POL



Functions

- Remote control for all welding machine and accessory functions.

5.4.7 RTF1 19POL



Functions

- Infinitely adjustable welding current (0% to 100%) depending on the preselected main current on the welding machine.
- Start/stop welding operation (TIG)

ActivArc welding is not possible in combination with the foot-operated remote control.

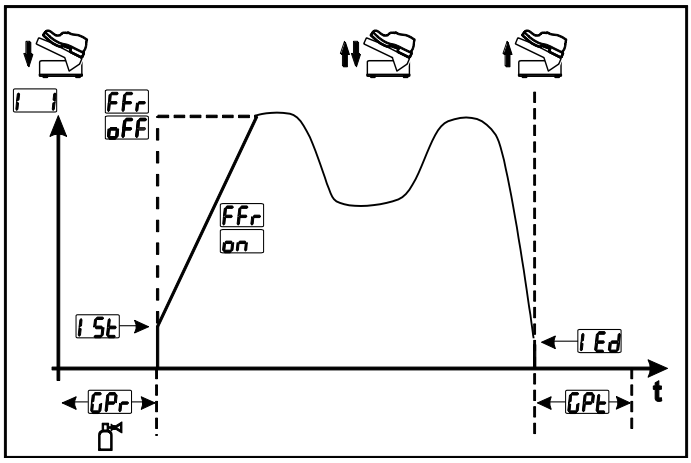
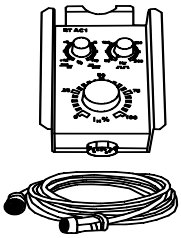


Figure 5-11

Symbol	Meaning
	**Actuate foot-operated remote control (start welding process)**
	**Operate foot-operated remote control (set welding current according to application)**
	**Release foot-operated remote control (end welding process)**
FFr	**Ramp function parameters (RTF)** on -------- Welding current rises to the specified main current level in a ramp function off -------- Welding current immediately jumps to the specified main current level Settings are made in the machine configuration menu on the machine control

5.4.8 RT AC 1 19POL

Suitable for machines with AC welding type only.

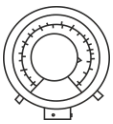


Functions

- Infinitely adjustable welding current (0% to 100%) depending on the preselected main current on the welding machine.
- AC frequency of welding current infinitely adjustable.
- AC balance (positive/negative half-wave ratio) can be set from +15% to -15%.

5.4.9 RT PWS 1 19POL

Suitable for machines with AC welding type only.



Functions

- Infinitely adjustable welding current (0% to 100%) depending on the preselected main current at the welding machine
- Pole reversing switch, suitable for machines with PWS function

5.5 Interfaces for automation

⚠ WARNING

Do not carry out any unauthorised repairs or modifications!
To avoid injury and equipment damage, the unit must only be repaired or modified by specialist, skilled persons!
The warranty becomes null and void in the event of unauthorised interference.

- Appoint only skilled persons for repair work (trained service personnel)!

☞ ***Damage to the machine due to improper connection!***

Unsuitable control leads or incorrect connection of input and output signals can cause damage to the machine.

- ***Only use shielded control leads!***
- ***If the machine is to be operated with control voltages connection via suitable isolation amplifiers is required!***
- ***To control the main or secondary current via control voltages, the relevant inputs must be enabled (see specification for activation of control voltage).***

5.5.1 Automation interface

⚠ WARNING

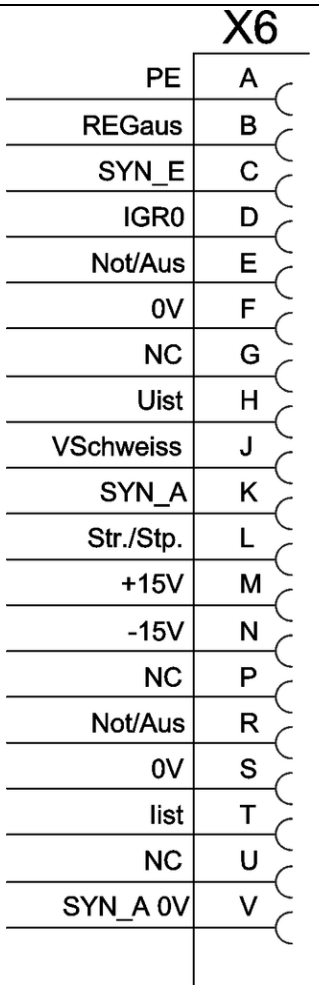
No function of the external interrupt equipment (emergency stop switch)!
If the emergency stop circuit has been set up using an external interrupt equipment connected to the interface for automated welding, the machine must be configured for this setup. If this is not observed, the power source will ignore the external interrupt equipment and will not shut down!

- Remove jumper 1 on the T320/1, M320/1 or M321 PCB!

☞ ***These accessory components can be retrofitted as an option > see 9 chapter.***

Pin	Signal shape	Designation
A	Output	PE Connection for cable screen
B	Output	REGaus For servicing purposes only
C	Input	SYN_E Synchronisation for master/slave operation
D	Input (no c.)	IGRO Current flows signal I>0 (maximum load 20mA / 15V) 0V = welding current flowing
E + R	Input Output	Not/Aus Emergency stop for higher level shut-down of the power source. To use this function, jumper 1 must be unplugged on PCB T320/1 in the welding machine. Contact open = welding current off
F	Output	0V Reference potential
G	-	NC Not assigned
H	Output	Uist Actual welding voltage, measured on pin F, 0-10V (0V = 0V, 10V = 100V)
J		Vschweiss Reserved for special purposes
K	Input	SYN_A Synchronisation for master/slave operation
L	Input	Str/Stp Start / stop welding current, same as torch trigger. Only available in non-latched operating mode. +15V = start, 0V = stop
M	Output	+15V Voltage supply +15V, max. 75mA
N	Output	-15V Voltage supply -15V, max. 25mA
P	-	NC Not assigned
S	Output	0V Reference potential
T	Output	Iist Actual welding current, measured on pin F; 0-10V (0V = 0A, 10V = 1000A)
U		NC
V	Output	SYN_A 0V Synchronisation for master/slave operation

Diagram



5.5.2 Remote control connection socket, 19-pole

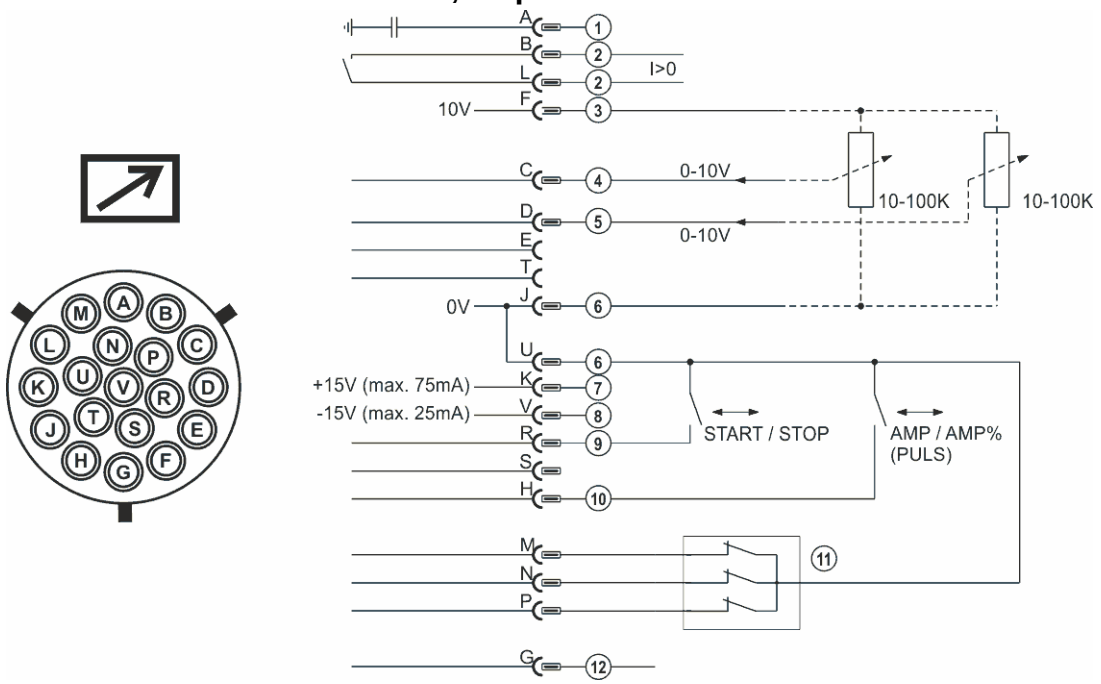


Figure 5-12

Pos.	Pin	Signal shape	Designation
1	A	Output	Connection for cable screen (PE)
2	B/L	Output	Current flows signal I>0, galvanically isolated (max. +- 15V/100mA)
3	F	Output	Reference voltage for potentiometer 10V (max. 10mA)
4	C	Input	Control value specification for main current, 0-10V (0V = I_{min}, 10V = I_{max})
5	D	Input	Control value specification for secondary current, 0-10V (0V = I_{min}, 10V = I_{max})
6	J/U	Output	Reference 0V
7	K	Output	Power supply +15V, max. 75mA
8	V	Output	Power supply -15V, max. 25mA
9	R	Input	Start/Stop welding current
10	H	Input	Switching between main and secondary welding currents (pulses)
11	M/N/P	Input	Activation of control voltage specification Set all 3 signals to reference potential 0V to activate external control voltage specification for main and secondary currents
12	G	Output	Measured value $I_{SETPOINT}$ (1V = 100A)

5.5.3 RINT X12 robot interface

The standard digital interface for mechanised applications
(optional, retrofitting on the machine or external fitting by the customer)

Functions and signals:

- Digital inputs: start/stop, operating modes, JOB and program selection, inching, gas test
- Analogue inputs: control voltages, e.g. for welding performance, welding current, etc.
- Relay outputs: process signal, ready for welding, system composite fault, etc.

5.5.4 BUSINT X11 Industrial bus interface

The solution for easy integration with automated production with e.g.

- Profinet/Profibus
- EnthernetIP/DeviceNet
- EtherCAT

etc.

5.6 PC interface

PC 300 welding parameter software

Set all welding parameters on the PC and simply transfer to one or more welding machines (accessory, set consisting of software, interface, connection leads)

- Manage up to 510 JOBs
- Exchange JOBs with the welding machine
- Online data communication
- Default settings for welding data monitoring
- Always up-to-date thanks to standard update function for new welding parameters
- Data backup by easy communication between power source and PC

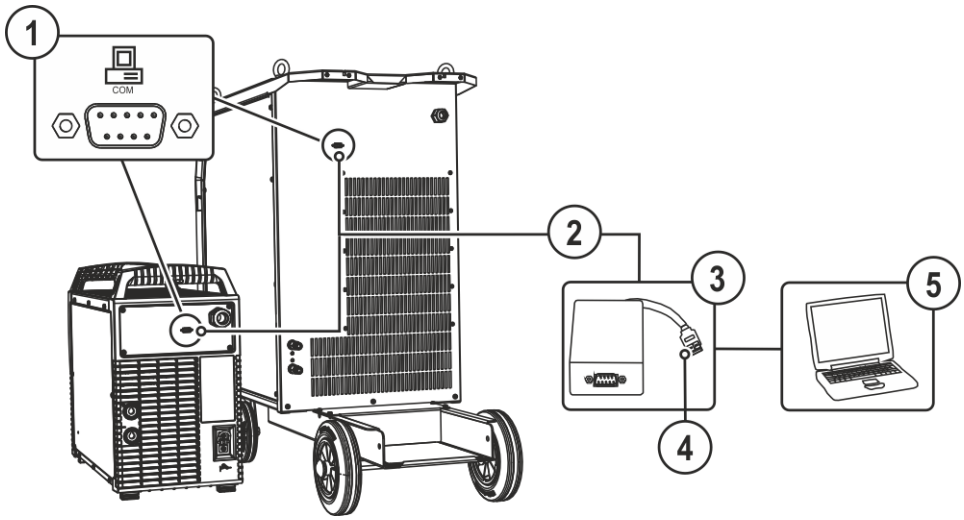


Figure 5-13

Item	Symbol	Description
1	COM	**PC interface, serial (D-Sub connection socket, 9-pole)**
2		**SECINT X10 USB**
3		**USB connection**
4		**Windows PC**

☞ ***Equipment damage or faults may occur if the PC is connected incorrectly!***

Not using the SECINT X10USB interface results in equipment damage or faults in signal transmission. The PC may be destroyed due to high frequency ignition pulses.

- ***Interface SECINT X10USB must be connected between the PC and the welding machine!***
- ***The connection must only be made using the cables supplied (do not use any additional extension cables)!***

6 Maintenance, care and disposal

6.1 General

⚠ DANGER

Risk of injury due to electrical voltage after switching off!
Working on an open machine can lead to fatal injuries!
Capacitors are loaded with electrical voltage during operation. Voltage remains present for up to four minutes after the mains plug is removed.

1. Switch off machine.
2. Remove the mains plug.
3. Wait for at last 4 minutes until the capacitors have discharged!

⚠ WARNING

Incorrect maintenance, testing and repair!
Maintenance, testing and repair of the machine may only be carried out by skilled and qualified personnel. A qualified person is one who, because of his or her training, knowledge and experience, is able to recognise the dangers that can occur while testing welding power sources as well as possible subsequent damage, and who is able to implement the required safety procedures.

Observe the maintenance instructions > *see 6.3 chapter*.

- In the event that the provisions of one of the below-stated tests are not met, the machine must not be operated again until it has been repaired and a new test has been carried out!

Repair and maintenance work may only be performed by qualified authorised personnel; otherwise the right to claim under warranty is void. In all service matters, always consult the dealer who supplied the machine. Return deliveries of defective equipment subject to warranty may only be made through your dealer. When replacing parts, use only original spare parts. When ordering spare parts, please quote the machine type, serial number and item number of the machine, as well as the type designation and item number of the spare part.

Under the specified ambient conditions and normal working conditions this machine is essentially maintenance-free and requires just a minimum of care.

Contamination of the machine may impair service life and duty cycle. The cleaning intervals depend on the ambient conditions and the resulting contamination of the machine. The minimum interval is every six months.

6.2 Cleaning

- Clean the outer surfaces with a moist cloth (no aggressive cleaning agents).
- Purge the machine venting channel and cooling fins (if present) with oil- and water-free compressed air. Compressed air may overspeed and destroy the machine fans. Never direct the compressed air directly at the machine fans. Mechanically block the fans, if required.
- Check the coolant for contaminants and replace, if necessary.

6.2.1 Dirt filter

The duty cycle of the welding machine decreases as an effect of the reduced cooling air volume. Depending on the amount of dirt building up (at least every two months), the dirt filter has to be uninstalled and cleaned regularly (e.g. by purging with compressed air).

6.3 Maintenance work, intervals

6.3.1 Daily maintenance tasks

Visual inspection

- Mains supply lead and its strain relief
- Gas cylinder securing elements
- Check hose package and power connections for exterior damage and replace or have repaired by specialist staff as necessary!
- Gas tubes and their switching equipment (solenoid valve)
- Check that all connections and wearing parts are hand-tight and tighten if necessary.
- Check correct mounting of the wire spool.
- Wheels and their securing elements
- Transport elements (strap, lifting lugs, handle)
- Other, general condition

Functional test

- Operating, message, safety and adjustment devices (Functional test)
- Welding current cables (check that they are fitted correctly and secured)
- Gas tubes and their switching equipment (solenoid valve)
- Gas cylinder securing elements
- Check correct mounting of the wire spool.
- Check that all screw and plug connections and replaceable parts are secured correctly, tighten if necessary.
- Remove any spatter.
- Clean the wire feed rollers on a regular basis (depending on the degree of soiling).

6.3.2 Monthly maintenance tasks

Visual inspection

- Casing damage (front, rear and side walls)
- Wheels and their securing elements
- Transport elements (strap, lifting lugs, handle)
- Check coolant tubes and their connections for impurities

Functional test

- Selector switches, command devices, emergency stop devices, voltage reducing devices, message and control lamps
- Check that the wire guide elements (inlet nipple, wire guide tube) are fitted securely.
- Check coolant tubes and their connections for impurities
- Check and clean the welding torch. Deposits in the torch can cause short circuits and have a negative impact on the welding result, ultimately causing damage to the torch.

6.3.3 Annual test (inspection and testing during operation)

A periodic test according to IEC 60974-4 "Periodic inspection and test" has to be carried out. In addition to the regulations on testing given here, the relevant local laws and regulations must also be observed.

☞ ***For more information refer to the "Warranty registration" brochure supplied and our information regarding warranty, maintenance and testing at www.ewm-group.com!***

6.4 Disposing of equipment

☞ ***Proper disposal!***

The machine contains valuable raw materials, which should be recycled, and electronic components, which must be disposed of.

- ***Do not dispose of in household waste!***
- ***Observe the local regulations regarding disposal!***

- According to European provisions (Directive 2012/19/EU on Waste of Electrical and Electronic Equipment), used electric and electronic equipment may no longer be placed in unsorted municipal waste. It must be collected separately. The symbol depicting a waste container on wheels indicates that the equipment must be collected separately.
  This machine has to be disposed of, or recycled, in accordance with the waste separation systems in use.
- According to German law (law governing the distribution, taking back and environmentally correct disposal of electric and electronic equipment (ElektroG)), used machines are to be placed in a collection system separate from unsorted municipal waste. The public waste management utilities (communities) have created collection points at which used equipment from private households can be disposed of free of charge.
- Information about returning used equipment or about collections can be obtained from the respective municipal administration office.
- In addition to this, returns are also possible throughout Europe via EWM sales partners.

7 Rectifying faults

All products are subject to rigorous production checks and final checks. If, despite this, something fails to work at any time, please check the product using the following flowchart. If none of the fault rectification procedures described leads to the correct functioning of the product, please inform your authorised dealer.

7.1 Checklist for rectifying faults

☞ ***The correct machine equipment for the material and process gas in use is a fundamental requirement for perfect operation!***

Legend	Symbol	Description
	🗲	Fault/Cause
	🛠	Remedy

Mains fuse triggers

- 🗲 Unsuitable mains fuse
  - 🛠 Set up recommended mains fuse > *see 8 chapter*.

Functional errors

- 🗲 Insufficient coolant flow
  - 🛠 Check coolant level and refill if necessary
  - 🛠 Eliminate kinks in conduit system (hose packages)
  - 🛠 Reset automatic cutout of the coolant pump by activating
- 🗲 Air in the coolant circuit
  - 🛠 Vent coolant circuit > *see 7.2 chapter*
- 🗲 Several parameters cannot be set (machines with access block)
  - 🛠 Entry level is blocked, disable access lock
- 🗲 All machine control signal lights are illuminated after switching on
- 🗲 No machine control signal light is illuminated after switching on
- 🗲 No welding power
  - 🛠 Phase failure > check mains connection (fuses)
- 🗲 Connection problems
  - 🛠 Make control lead connections and check that they are fitted correctly.

Welding torch overheated

- 🗲 Loose welding current connections
  - 🛠 Tighten power connections on the torch and/or on the workpiece
  - 🛠 Tighten contact tip correctly
- 🗲 Overload
  - 🛠 Check and correct welding current setting
  - 🛠 Use a more powerful welding torch

No arc ignition

- 🗲 Incorrect ignition type setting.
  - 🛠 Ignition type: Select “HF start”. Depending on the machine, the setting is defined by the changeover switch for ignition types or the hF parameter in one of the machine menus (see the “Control operating instructions”, if applicable).

Bad arc ignition

- 🗲 Material inclusions in the tungsten electrode due to contact with filler material or workpiece
  - 🛠 Regrind or replace the tungsten electrode
- 🗲 Bad current transfer on ignition
  - 🛠 Check the setting on the "Tungsten electrode diameter/Ignition optimisation" rotary dial and increase if necessary (higher ignition energy).

Unstable arc

- Material inclusions in the tungsten electrode due to contact with filler material or workpiece
  - 🛠 Regrind or replace the tungsten electrode
- Incompatible parameter settings
  - 🛠 Check settings and correct if necessary

Pore formation

- Inadequate or missing gas shielding
  - 🛠 Check shielding gas setting and replace shielding gas cylinder if necessary
  - 🛠 Shield welding site with protective screens (draughts affect the welding result)
  - 🛠 Use gas lens for aluminium applications and high-alloy steels
- Unsuitable or worn welding torch equipment
  - 🛠 Check size of gas nozzle and replace if necessary
- Condensation (hydrogen) in the gas tube
  - 🛠 Purge hose package with gas or replace

7.2 Vent coolant circuit

☞ ***Coolant tank and quick connect coupling of coolant supply and return are only fitted in machines with water cooling.***

☞ ***To vent the cooling system always use the blue coolant connection, which is located as deep as possible inside the system (close to the coolant tank)!***

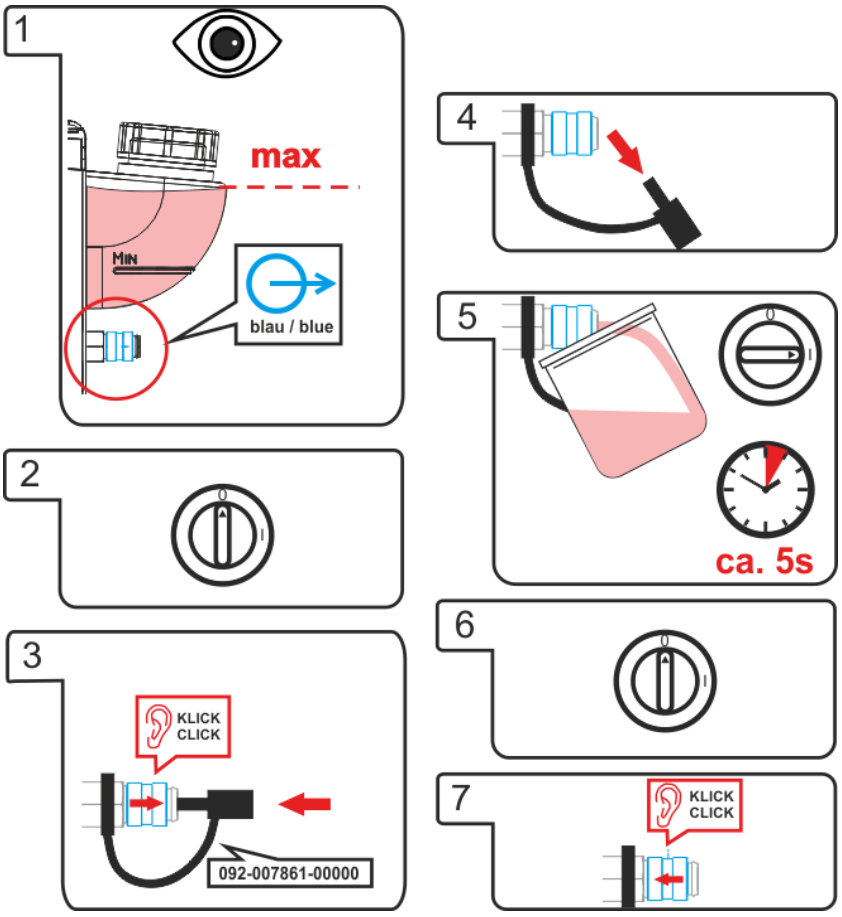


Figure 7-1

8 Technical data

☞ ***Performance specifications and guarantee only in connection with original spare and replacement parts!***

8.1 Tetrix 451 AC/DC

	TIG	MMA
Welding current	5 A–450 A	
Welding voltage	10.2 V–28.0 V	20.2 V–38.0 V
Duty cycle at 40 °C	450 A (80% DC) 420 A (100% DC)	
Load cycle	10 min. (60% DC ≙ 6 min. welding, 4 min. pause)	
Open circuit voltage	79 V	
Mains voltage (tolerances)	3 x 400 V (–25% to +20%)	
Frequency	50/60 Hz	
Mains fuse (safety fuse, slow-blow)	3 x 25 A	3 x 32 A
Mains connection lead	H07RN-F4G6	
Max. connected load	16.3 kVA	22 kVA
Recommended generator rating	29.7 kVA	
cosφ/efficiency	0.99/85%	
Insulation class/protection classification	H/IP 23	
Ambient temperature	–25 °C to +40 °C [1]	
Machine cooling/torch cooling	Fan/gas or water	
Noise level	< 70 dB(A)	
Cooling capacity at 1 l/min.	1500 W	
Max. flow rate	5 l/min.	
Coolant outlet pressure	Max. 3.5 bar	
Max. tank capacity	12 l	
Workpiece lead	70 mm^2	
Dimensions L/W/H	1085 mm x 680 mm x 1204 mm 42.7 inch x 26.8 inch x 47.4 inch	
Weight	181.5 kg 400.1 lb	
EMC class	A	
Safety identification	EAC / S / CE	
Harmonised standards used	siehe Konformitätserklärung (Geräteunterlagen)	

[1] Ambient temperature dependent on coolant! Observe the coolant temperature range of the torch cooling

8.2 Tetrix 551 AC/DC

	TIG	MMA
Welding current	5 A–550 A	
Welding voltage	10.2 V–32.0 V	20.2 V–42.0 V
Duty cycle at 40 °C	550 A (60% DC) 420 A (100% DC)	
Load cycle	10 min. (60% DC ≙ 6 min. welding, 4 min. pause)	
Open circuit voltage	79 V	
Mains voltage (tolerances)	3 x 400 V (–25% to +20%)	
Frequency	50/60 Hz	
Mains fuse (safety fuse, slow-blow)	3 x 25 A	3 x 32 A
Mains connection lead	H07RN-F4G6	
Max. connected load	22.6 kVA	29.5 kVA
Recommended generator rating	39.8 kVA	
cosφ/efficiency	0.99/85%	
Insulation class/protection classification	H/IP 23	
Ambient temperature	–25 °C to +40 °C [1]	
Machine cooling/torch cooling	Fan/gas or water	
Noise level	< 70 dB(A)	
Cooling capacity at 1 l/min.	1500 W	
Max. flow rate	5 l/min.	
Coolant outlet pressure	Max. 3.5 bar	
Max. tank capacity	12 l	
Workpiece lead	95 mm^2	
Dimensions L/W/H	1085 mm x 680 mm x 1204 mm 42.7 inch x 26.8 inch x 47.4 inch	
Weight	181.5 kg 400.1 lb	
EMC class	A	
Safety identification	EAC / S / CE	
Harmonised standards used	siehe Konformitätserklärung (Geräteunterlagen)	

[1] Ambient temperature dependent on coolant! Observe the coolant temperature range of the torch cooling

9 Accessories

☞ ***Performance-dependent accessories like torches, workpiece leads, electrode holders or intermediate hose packages are available from your authorised dealer.***

9.1 Remote controls and accessories

Type	Designation	Item no.
RTF1 19POL 5 M	Foot-operated remote control current with connection cable	094-006680-00000
RT1 19POL	Remote control current	090-008097-00000
RTG1 19POL 5m	Remote control, current	090-008106-00000
RTAC1 19POL	Remote control for current/balance/frequency Suitable for machines with AC welding type only.	090-008197-00000
RT PWS1 19POL	Remote control, vertical-down weld current, pole reversal Suitable for machines with AC welding type only.	090-008199-00000
RTP1 19POL	Remote control spot welding / pulses	090-008098-00000
RTP2 19POL	Remote control spot welding / pulses	090-008099-00000
RTP3 spotArc 19POL	spotArc remote control for spot welding / pulses	090-008211-00000
RT50 7POL	Remote control, full functionality	090-008793-00000
RA5 19POL 5M	Remote control e.g. connection cable	092-001470-00005
RA10 19POL 10M	Remote control e.g. connection cable	092-001470-00010
RA20 19POL 20M	Remote control e.g. connection cable	092-001470-00020
RV5M19 19POLE 5M	Extension cable	092-000857-00000

9.2 Welding torch cooling system

Type	Designation	Item no.
KF 23E-10	Coolant (-10 °C), 9.3 l	094-000530-00000
KF 23E-200	Coolant (-10 °C), 200 litres	094-000530-00001
KF 37E-10	Coolant (-20 °C), 9.3 l	094-006256-00000
KF 37E-200	Coolant (-20 °C), 200 l	094-006256-00001
TYP 1	Frost protection tester	094-014499-00000
HOSE BRIDGE UNI	Tube bridge	092-007843-00000

9.3 Options

☞ ***The ON 12pol Retox Tetrix option can only be used in conjunction with the specified options and machine versions!***

- Comfort 2.0

Type	Designation	Item no.
ON 7pol	Optional 7-pole retrofit connection socket Accessory components and digital interfaces	092-001826-00000
ON 12pol Retox Tetrix 300/400/401/351/451/551	Optional 12-pole retrofit connection socket	092-001807-00000
ON 19pol 351/451/551	Optional 19-pole retrofit connection socket Accessory components and analogue A interface	092-001951-00000
ON HS XX1	Mount for hose packages and remote control	092-002910-00000
ON LB Wheels 160x40MM	Retrofit option for locking brake for machine wheels	092-002110-00000
ON Tool Box	Retrofit option tool box	092-002138-00000
ON Filter Tetrix XL	Retrofit option, dirt filter for air inlet	092-004999-00000
ON Holder Gas Bottle <50L TETRIX XL	Optional retrofit holding plate for gas cylinder <50l	092-002345-00000

9.4 General accessories

Type	Designation	Item no.
DM 842 Ar/CO2 230bar 30l D	Pressure regulator with manometer	394-002910-00030
GH 2X1/4" 2M	Gas hose	094-000010-00001
32A 5POLE/CEE	Machine plug	094-000207-00000
ADAP 8-5 POL	8 to 5-pole adapter	092-000940-00000

9.5 Simultaneous welding on both sides, synchronisation types

9.5.1 Synchronisation via cable (frequency 50Hz to 200Hz)

☞ ***For simultaneous, two-sided welding according to the master/slave principle, both welding machines must be fitted with the 19-pole connection socket (ON 19POL) (Note different retrofitting options depending on the machine type).***

Type	Designation	Item no.
SYNINT X10 19POL	Synchronisation set incl. interface and connector cable	090-008189-00000
RA10 19POL 10M	Remote control e.g. connection cable	092-001470-00010

9.5.2 Synchronisation via mains voltage (50Hz / 60Hz)

Type	Designation	Item no.
ON Netsynchron 351/451/551	Optional retrofit set for phase sequence changeover for synchronous welding	090-008212-00000

9.6 Computer communication

Type	Designation	Item no.
PC300.Net	PC300.Net welding parameter software kit incl. cable and SECINT X10 USB interface	090-008777-00000

10 Appendix A

10.1 Overview of EWM branches

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EWM AG - Siegen branch
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