



Welding machine

- Phoenix 351 Expert 2.0 puls MM FDW
- Phoenix 401 Expert 2.0 puls MM FDW
- Phoenix 451 Expert 2.0 puls MM FDW
- Phoenix 551 Expert 2.0 puls MM FDW

099-005329-EW501

Observe additional system documents!

13.06.2016

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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 site of operation.
- Safety and warning labels at the machine indicate any possible risks. Keep these labels clean and legible at all times.
- The machine has been constructed to the state of the art and any regulations and standards applicable. It may be operated, serviced and repaired by trained personnel only.



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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The content of this document has been prepared and reviewed with all reasonable care. The information provided is subject to change, errors excepted.

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2 Safety instructions

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 Complete documentation



*This document is part of the complete documentation and valid only in combination with the "Control" operating instructions for the product being used!
Read and observe the operating instructions for all system components, especially the safety instructions!*

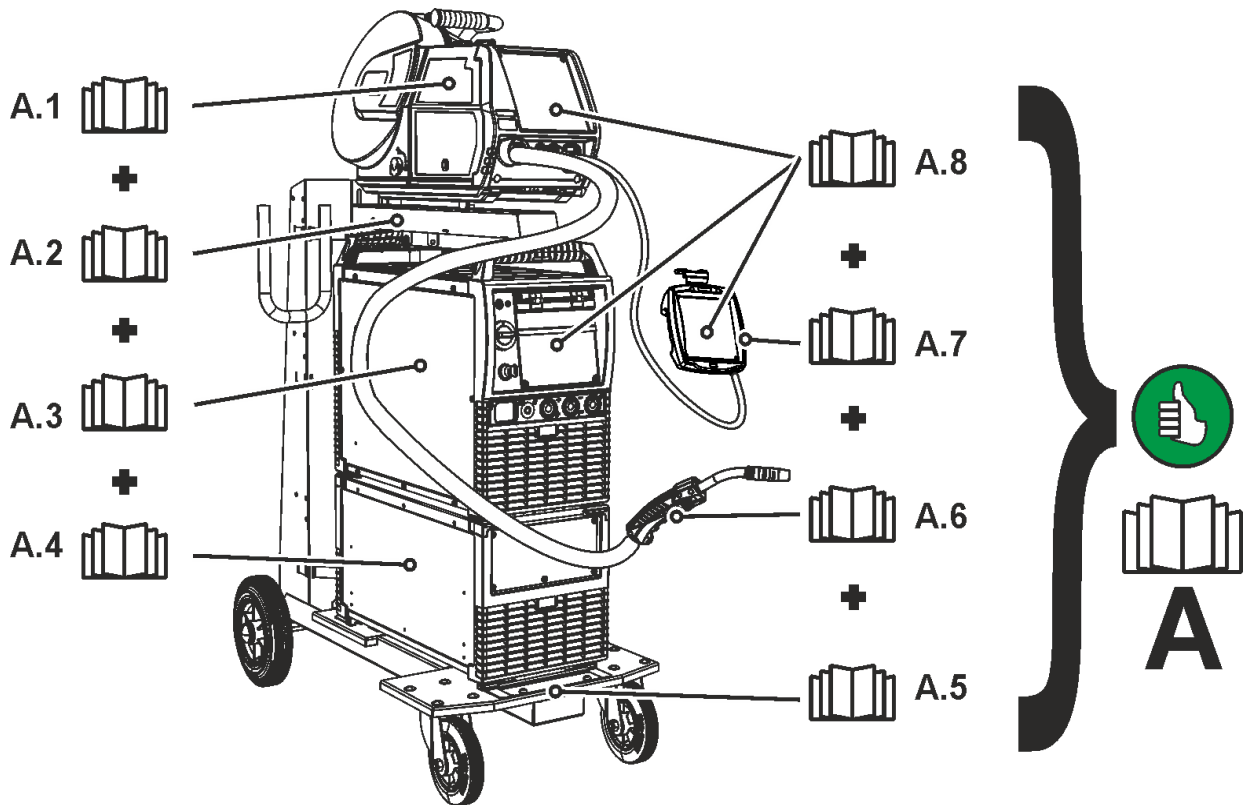


Figure 2-1

The illustration shows a general example of a welding system.

Item	Documentation
A.1	Wire feeder
A.2	Conversion instructions
A.3	Power source
A.4	Cooling unit, voltage converter, tool box etc.
A.5	Trolley
A.6	Welding torch
A.7	Remote control
A.8	Control
A	Complete documentation

2.3 Explanation of icons

Symbol	Description	Symbol	Description
	Indicates technical aspects which the user must observe.		Activate and release/tap/tip
	Switch off machine		Release/do not activate
	Switch on machine		Press and hold
			switch
	Wrong		Turn
	Correct		Numerical value – adjustable
	Menu entry		Signal light lights up in green
	Navigating the menu		Signal light flashes green
	Exit menu		Signal light lights up in red
	Time representation (e.g.: wait 4 s/activate)		Signal light flashes red
	Interruption in the menu display (other setting options possible)		
	Tool not required/do not use		
	Tool required/use		

2.4 General

DANGER



Electric shock!

Welding machines use high voltages which can result in potentially fatal electric shocks and burns on contact. Even low voltages can cause you to get a shock and lead to accidents.

- Do not touch any live parts in or on the machine!
- Connection cables and leads must be free of faults!
- Switching off alone is not sufficient!
- Place welding torch and stick electrode holder on an insulated surface!
- The unit should only be opened by specialist staff after the mains plug has been unplugged!
- Only wear dry protective clothing!
- Wait for 4 minutes until the capacitors have discharged!



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)!

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!



Risk of injury due to radiation or heat!

Arc radiation results in injury to skin and eyes.

Contact with hot workpieces and sparks results in burns.

- Use welding shield or welding helmet with the appropriate safety level (depending on the application)!
- Wear dry protective clothing (e.g. welding shield, gloves, etc.) according to the relevant regulations in the country in question!
- Protect persons not involved in the work against arc beams and the risk of glare using safety curtains!



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!

Flames may arise as a result of the high temperatures, stray sparks, glowing-hot parts and hot slag produced during the welding process.

Stray welding currents can also result in flames forming!

- Check for fire hazards in the working area!
- Do not carry any easily flammable objects such as matches or lighters.
- Keep appropriate fire extinguishing equipment to hand in the working area!
- Thoroughly remove any residue of flammable substances from the workpiece before starting welding.
- Only continue work on welded workpieces once they have cooled down.
Do not allow to come into contact with flammable material!
- Connect welding leads correctly!

Danger when coupling multiple power sources!

Coupling multiple power sources in parallel or in series has to be carried out by qualified personnel and in accordance with the manufacturer's guidelines. Before bringing the power sources into service for arc welding operations, a test has to verify that they cannot exceed the maximum allowed open circuit voltage.

- Connection of the machine may be carried out by qualified personnel only!
- When decommissioning individual power sources, all mains and welding current leads have to be safely disconnected from the welding system as a whole. (Danger due to inverse voltages!)
- Do not couple welding machines with pole reversing switch (PWS series) or machines for AC welding, as a minor error in operation can cause the welding voltages to be combined.

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 6.2 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).



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!

 **CAUTION****EMC Machine Classification**

In accordance with IEC 60974-10, welding machines are grouped in two electromagnetic compatibility classes > 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 equipment
- 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



Obligations of the operator!

The respective national directives and laws must be observed for operation of the machine!

- **National implementation of the framework directive (89/391/EWG), as well as the associated individual directives.**
- **In particular, directive (89/655/EWG), on the minimum regulations for safety and health protection when staff members use equipment during work.**
- **The regulations regarding work safety and accident prevention for the respective country.**
- **Setting up and operating the machine according to IEC 60974-9.**
- **Check at regular intervals that users are working in a safety-conscious way.**
- **Regular checks of the machine according to 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.**



Stray welding currents can destroy protective earth conductors, damage equipment and electronic devices and cause overheating of components leading to fire.

- **Make sure all welding leads are securely connected and check regularly.**
- **Always ensure a proper and secure electrical connection to the workpiece!**
- **Set up, attach or suspend all conductive power source components like casing, transport vehicle and crane frames so they are insulated!**
- **Do not place any other electronic devices such as drillers or angle grinders, etc., 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!**



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.

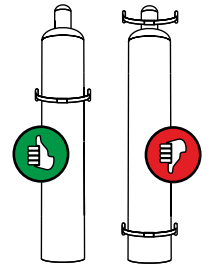
2.5 Transport and installation

⚠ 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!
- Place shielding gas cylinders in the holders provided for them and secure with fixing devices.
- Attach the fastening elements within the upper half of the shielding gas cylinder!
- The fastening elements must tightly enclose the shielding gas cylinder!
- Do not attach any element to the shielding gas cylinder valve!
- Avoid heating the shielding gas cylinder!



⚠ CAUTION



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 EN 60974-A2).

- Set up and transport the machine on level, solid ground!
- Secure add-on parts using suitable equipment!
- Replace damaged wheels and their fixing elements!
- Fix external wire feed units during transport (avoid uncontrolled rotation)!



Damage due to supply lines not being disconnected!

During transport, supply lines which have not been disconnected (mains supply leads, control leads, etc.) may cause hazards such as connected equipment tipping over and injuring persons!

- Disconnect supply lines!



***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!***

2.5.1 Lifting by crane

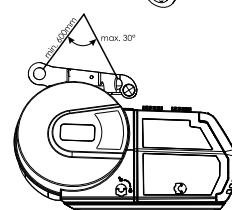
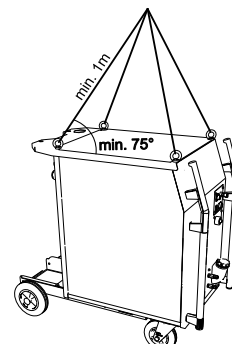
WARNING

3

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

3

Risk of injury due to unsuitable lifting eye!

In case of improper use of lifting eyes or the use of unsuitable lifting eyes, persons can be seriously damaged by falling equipment or add-on components!

- The lifting eye must be completely screwed in!
- The lifting eye must be positioned flat onto and in full contact with the supporting surfaces!
- Check that the lifting eyes are securely fastened before use and check for any damage (corrosion, deformation)!
- Do not use or screw in damaged lifting eyes!
- Avoid lateral loading of the lifting eyes!

2.5.2 Ambient conditions



The 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)!**



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!**

2.5.2.1 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

2.5.2.2 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

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!

Arc welding machine for standard and pulsed gas-shielded metal-arc welding with TIG welding and lift arc (touch starting) or MMA welding as secondary process. It may be possible to expand the functionality by using accessories (see the documentation in the relevant chapter).

3.1 Use and operation solely with the following machines



A suitable wire feed unit (system component) is required in order to operate the welding machine!

Phoenix	351-551	miniDrive
drive 4X LP	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
drive 4X LP MMA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
drive 4X HP	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
drive 4X HP MMA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
drive 4X IC LP	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
drive 4X IC HP	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

3.2 Applications


Machine series	Main process							Secondary process		
	Standard MIG/MAG welding				Pulsed MIG/MAG welding			TIG welding (lift arc)	MMA welding	Gouging
	forceArc	rootArc	coldArc	pipeSolution	forceArc puls	rootArc puls	coldArc puls			
alpha Q puls MM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Phoenix puls MM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Taurus Synergic S MM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

possible

not possible

3.3 Documents which also apply

3.3.1 Warranty

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

3.3.2 Declaration of Conformity

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

- Low Voltage Directive (LVD) 2014/35/EC
- Electromagnetic Compatibility Directive (EMC) 2014/30/EC
- Restriction of Hazardous Substance (RoHS) 2011/65/EC

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 EWM, this declaration shall be voided. An original document of the specific declaration of conformity is included with every product.

3.3.3 Welding in environments with increased electrical hazards



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

3.3.4 Service documents (spare parts and circuit diagrams)

DANGER



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.

3.3.5 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

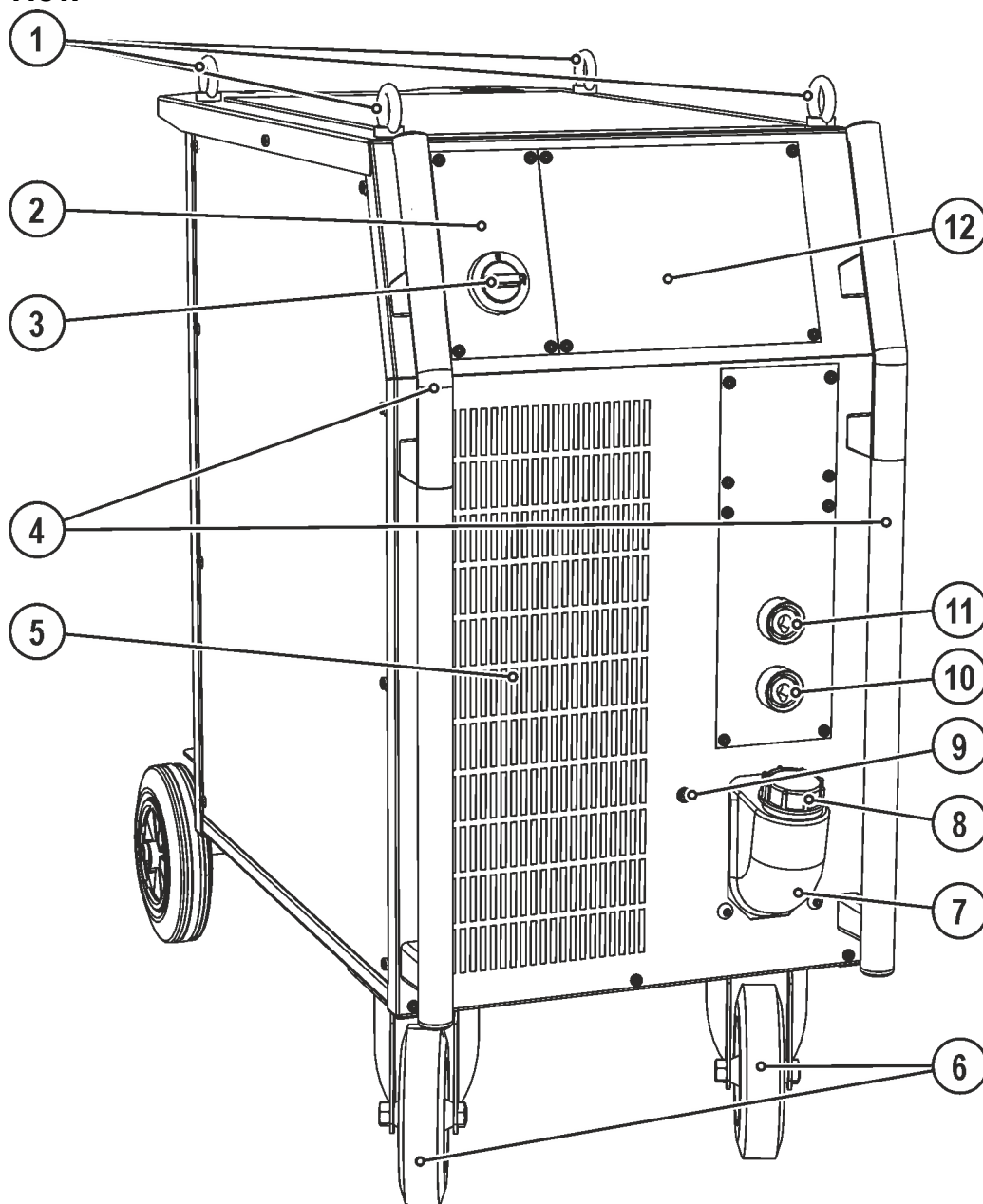







Figure 4-1

Item	Symbol	Description
1		Lifting lug
2		Ready for operation signal light Signal light on when the machine is switched on and ready for operation
3		Main switch, machine on/off
4		Carrying handle
5		Cooling air inlet
6		Wheels, guide castors
7		Coolant tank
8		Coolant tank cap
9		Automatic cut-out of coolant pump key button press to reset a triggered fuse
10		Connection socket, “-” welding current <ul style="list-style-type: none"> •-----MIG/MAG welding: workpiece connection •-----MIG/MAG cored wire welding: welding current connection for the welding torch •-----MMA welding: electrode holder connection
11		Connection socket, “+” welding current <ul style="list-style-type: none"> •-----MIG/MAG welding: welding current connection for the welding torch •-----MIG/MAG cored wire welding: workpiece connection •-----MMA welding: workpiece connection
12		Machine control, see the relevant control operating instructions

4.2 Rear view

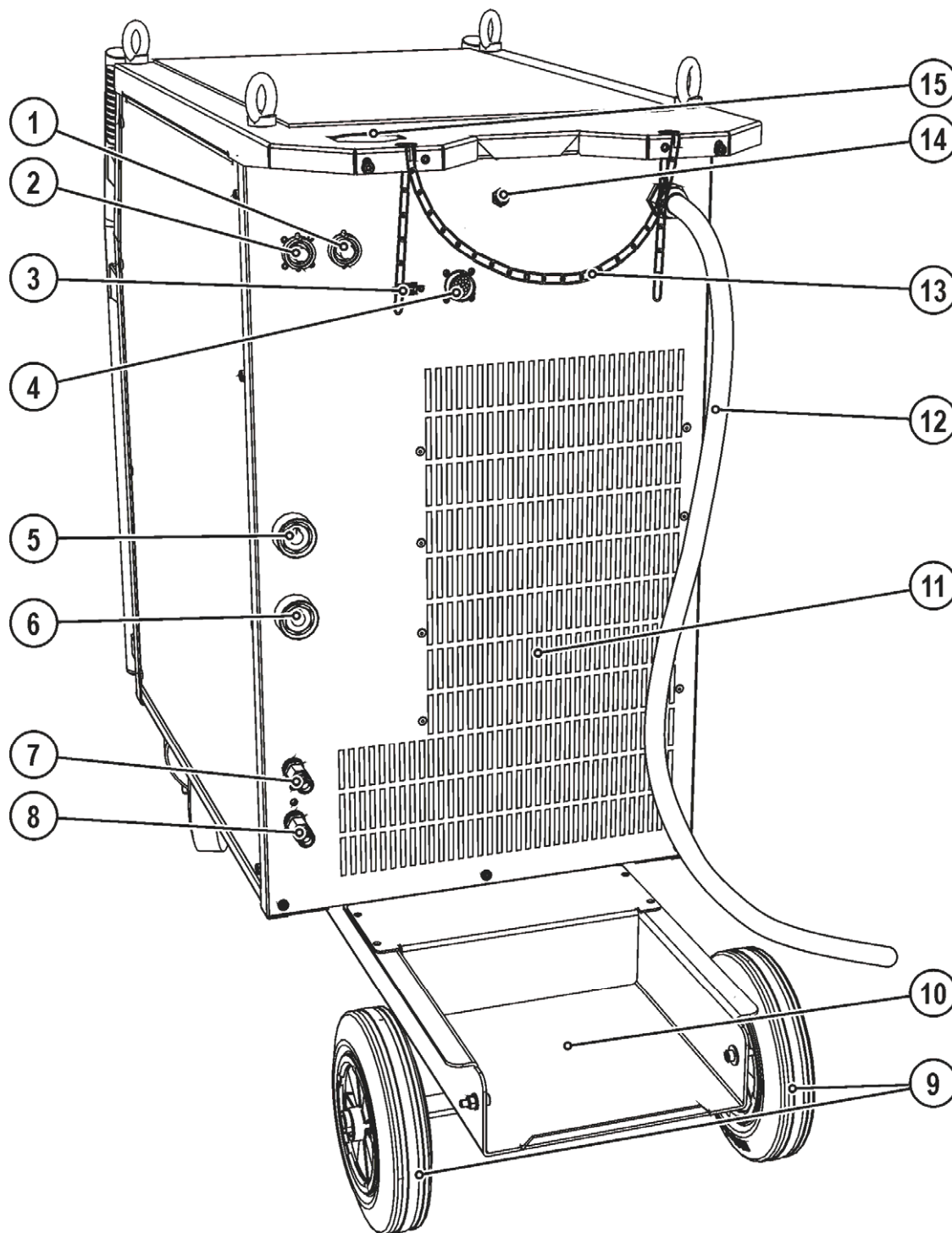











Figure 4-2

Item	Symbol	Description
1		7-pole connection socket (digital) For connecting digital accessory components
2		7-pole connection socket (digital) Wire feed unit connection
3		PC interface, serial (D-Sub connection socket, 9-pole)
4	 analog	19-pole mechanised welding interface (analogue) > see 5.14 chapter
5		Connection socket, "+" welding current • Standard MIG/MAG welding (intermediate hose package)
6		Connection socket, "-" welding current Connection for welding current plug from intermediate hose package • MIG/MAG flux cored wire welding • TIG welding
7		Quick connect coupling (red) coolant return
8		Quick connect coupling (blue) coolant supply
9		Wheels, fixed castors
10		Bracket for shielding gas cylinder
11		Cooling air outlet
12		Mains connection cable > see 5.6 chapter
13		Securing elements for shielding gas cylinder (strap/chain)
14		Key button, Automatic cutout Wire feed motor supply voltage fuse (press to reset a triggered fuse)
15		Intermediate hose package strain relief

5 Design and function

5.1 General

WARNING



Risk of injury from electric shock!

Contact with live parts, e.g. welding current sockets, is potentially fatal!

- Follow safety instructions on the opening pages of the operating instructions.
- Commissioning may only be carried out by persons who have the relevant expertise of working with arc welding machines!
- Connection and welding leads (e.g. electrode holder, welding torch, workpiece lead, interfaces) may only be connected when the machine is switched off!

CAUTION



Insulate the arc welder from welding voltage!

Not all active parts of the welding current circuit can be shielded from direct contact. To avoid any associated risks it is vital for the welder to adhere to the relevant safety regulations. Even low voltages can cause a shock and lead to accidents.

- Wear dry and undamaged protective clothing (shoes with rubber soles/welder's gloves made from leather without any studs or braces)!
- Avoid direct contact with non-insulated connection sockets or connectors!
- Always place torches and electrode holders on an insulated surface!



Risk of burns on the welding current connection!

If the welding current connections are not locked, connections and leads heat up and can cause burns, if touched!

- Check the welding current connections every day and lock by turning in clockwise direction, if necessary.



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.



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!**

5.2 Installation



The 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.*

5.3 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!*

5.4 Workpiece lead, general

CAUTION



Risk of burns due to incorrect connection of the workpiece lead!

Paint, rust and dirt on the connection restrict the power flow and may lead to stray welding currents.

Stray welding currents may cause fires and injuries!

- Clean the connections!
- Fix the workpiece lead securely!
- Do not use structural parts of the workpiece as a return lead for the welding current!
- Take care to ensure faultless power connections!

5.5 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 5.5.1 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.**



The disposal of coolant must be carried out according to official regulations and observing the relevant safety data sheets (German waste code number: 70104)!

Coolant must not be disposed of together with household waste.

Coolant must not be discharged into the sewerage system.

Recommended cleaning agent: water, if necessary with cleaning agent added.

5.5.1 List of coolants

The following coolants may be used > see 9 chapter

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

5.5.2 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)

5.5.3 Adding coolant

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

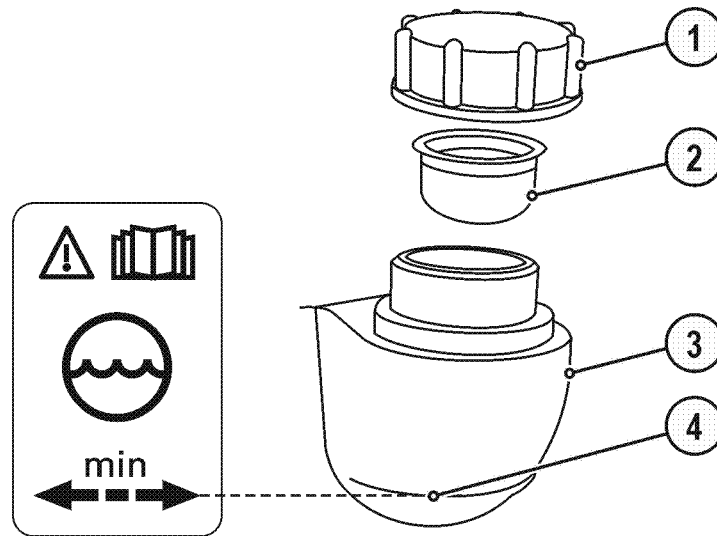




Figure 5-1

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.

 **After the initial filling, wait for at least one minute when the machine is switched on so that the hose package is filled with coolant completely and without bubbles. With frequent changes of torch and during the initial filling process, the cooling unit tank should be topped up as necessary.**

 **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 chapter".**

5.6 Mains connection

DANGER



Hazard caused by improper mains connection!

An improper mains connection can cause injuries or damage property!

- Only use machine with a plug socket that has a correctly fitted protective conductor.
- If a mains plug must be fitted, this may only be carried out by an electrician in accordance with the relevant national provisions or regulations!
- Mains plug, socket and lead must be checked regularly by an electrician!
- When operating the generator always ensure it is earthed as stated in the operating instructions. The resulting network has to be suitable for operating devices according to protection class 1.

5.6.1 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

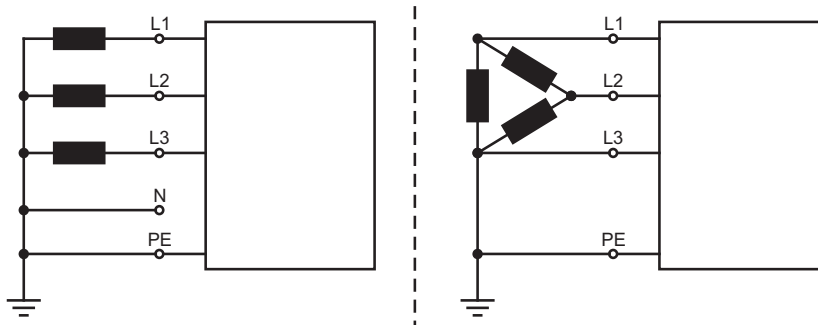


Figure 5-2

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



The operating voltage shown on the rating plate must be consistent with the mains voltage, in order to avoid damage to the machine > see 8 chapter!

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

5.7 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).**

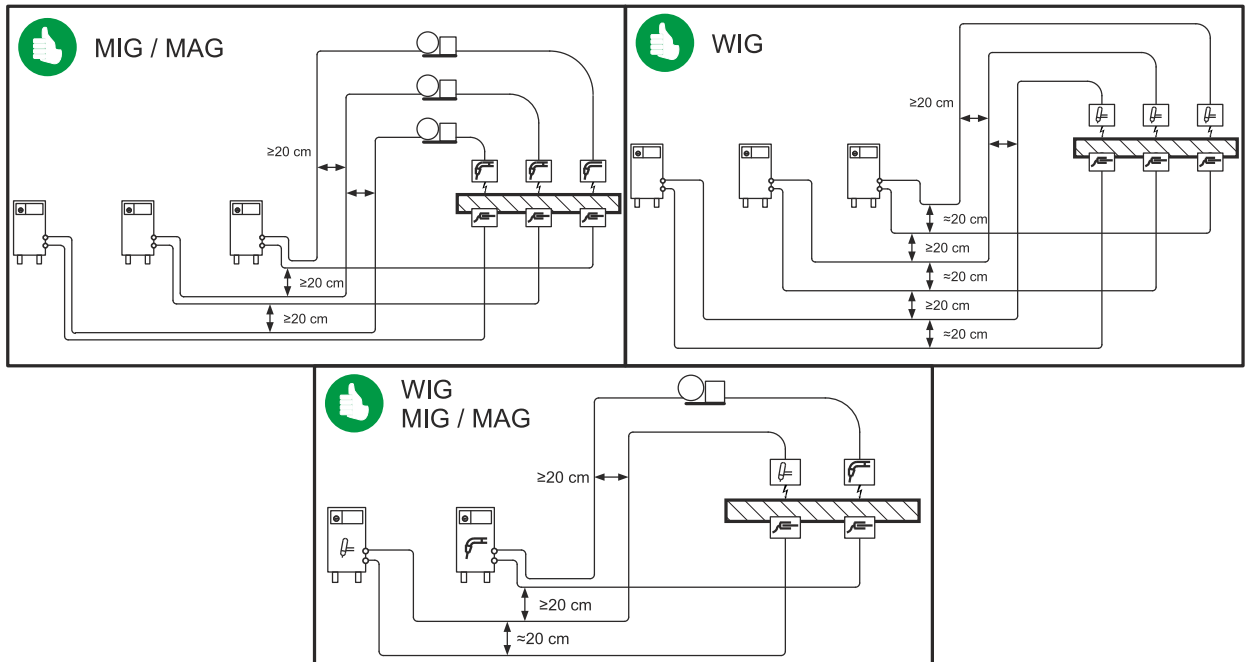


Figure 5-3

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

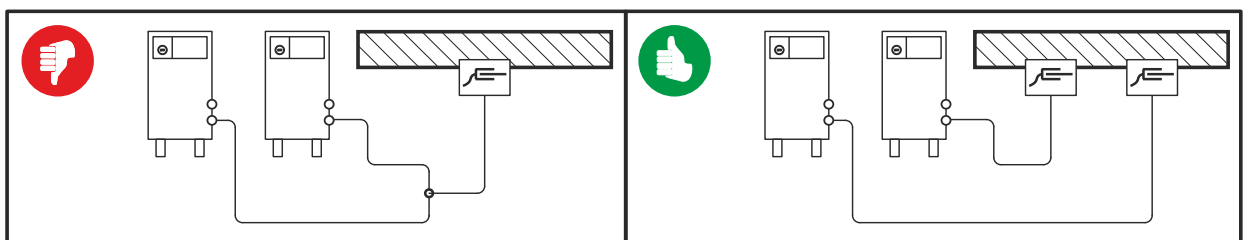


Figure 5-4

- 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.**

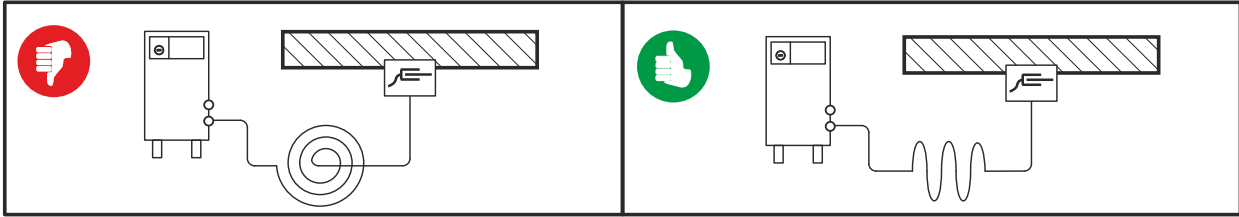


Figure 5-5

Stray welding currents can destroy protective earth conductors, damage equipment and electronic devices and cause overheating of components leading to fire.

- **Make sure all welding leads are securely connected and check regularly.**
- **Always ensure a proper and secure electrical connection to the workpiece!**
- **Set up, attach or suspend all conductive power source components like casing, transport vehicle and crane frames so they are insulated!**
- **Do not place any other electronic devices such as drillers or angle grinders, etc., 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!**

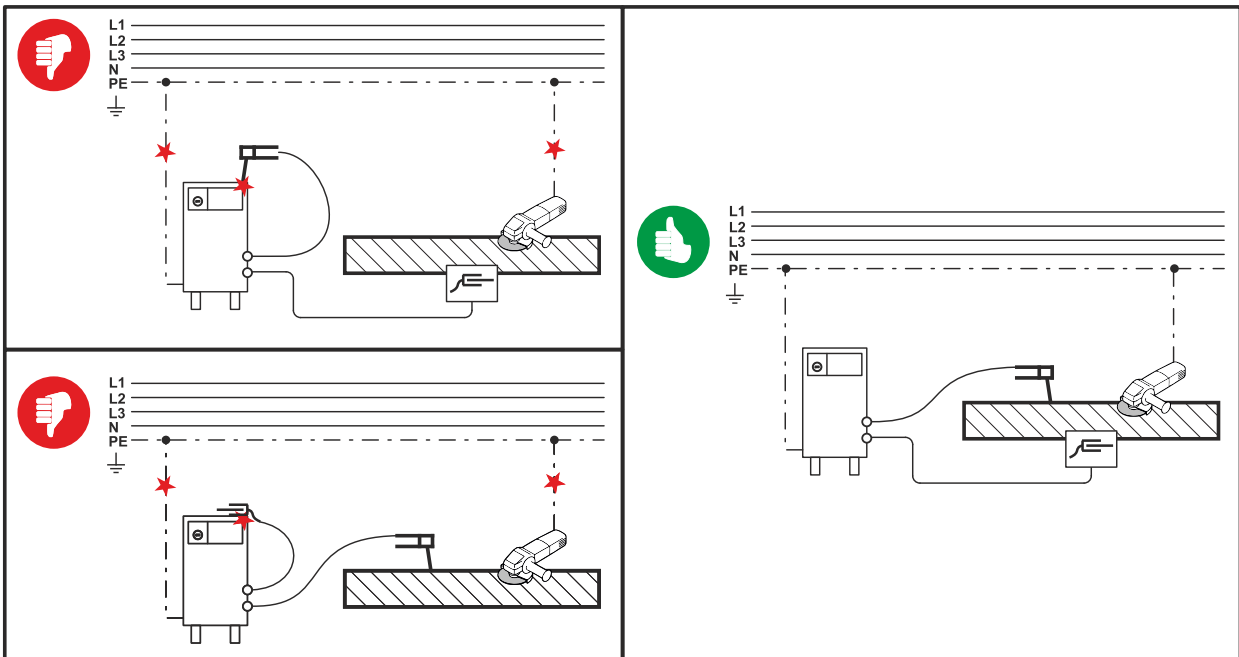


Figure 5-6

5.8 Intermediate hose package connection



Some wire electrodes (e.g. self-shielding cored wire) are welded using negative polarity. In this case, the welding current lead should be connected to the "-" welding current socket, and the workpiece lead should be connected to the "+" welding current socket. Observe the information from the electrode manufacturer!

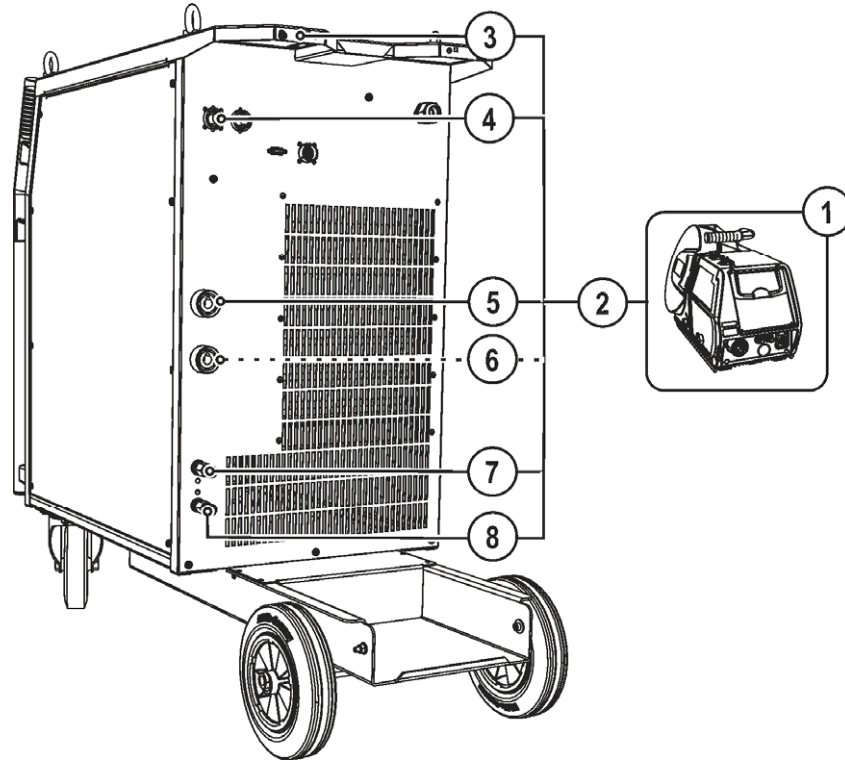



Figure 5-7

Item	Symbol	Description
1		Wire feed unit
2		Intermediate hose package
3		Intermediate hose package strain relief
4		7-pole connection socket (digital) Wire feed unit connection
5		Connection socket, "+" welding current • Standard MIG/MAG welding (intermediate hose package)
6		Connection socket, "-" welding current • MIG/MAG cored wire welding: Welding current to wire feed/torch
7		Quick connect coupling (red) coolant return
8		Quick connect coupling (blue) coolant supply

- Insert the end of the hose package through the strain relief of the hose package and lock by turning to the right.
- Insert the plug on the welding current lead into the welding current connection socket "+" and lock.
- Insert cable plug on the control lead into the 7-pole connection socket and secure with crown nut (the plug can only be inserted into the connection socket in one position).
- 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).

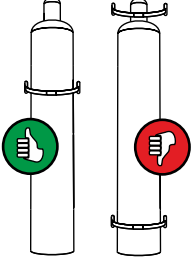
5.9 Shielding gas supply (shielding gas cylinder for welding machine)

⚠ 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!**

- Observe the instructions from the gas manufacturer and any relevant regulations concerning the use of compressed air!
- Place shielding gas cylinders in the holders provided for them and secure with fixing devices.
- Attach the fastening elements within the upper half of the shielding gas cylinder!
- The fastening elements must tightly enclose the shielding gas cylinder!
- Do not attach any element to the shielding gas cylinder valve!
- Avoid heating the shielding gas cylinder!
- When using shielding gas cylinders smaller than 50 litres, the ON HOLDER GAS BOTTLE option must be retrofitted






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.**

5.9.1 Connection

-  **Before connecting the pressure regulator to the gas cylinder, open the cylinder valve briefly to expel any dirt.**

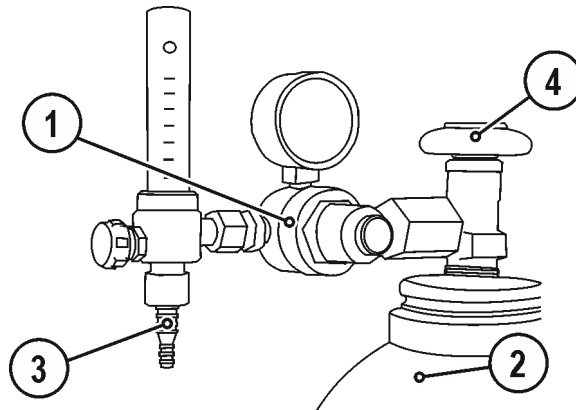



Figure 5-8

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

- Place the shielding gas cylinder into the relevant cylinder bracket.
- Secure the shielding gas cylinder using a securing chain.
- Tighten the pressure regulator screw connection on the gas bottle valve to be gas-tight.
- Screw the gas hose (intermediate hose package) to the pressure regulator ensuring that it is gas tight.

5.9.2 Setting the shielding gas volume (gas test)/rinse hose package

- Slowly open the gas cylinder valve.
- Open the pressure regulator.
- Switch on the power source at the main switch.
- Set the relevant gas quantity for the application on the pressure regulator.
- The gas test can be triggered by briefly pressing the Gas test/Rinse hose package push-button  either at the control or underneath the protective cap next to wire feeder (welding voltage and wire feed motor remain switched off, no unintentional arc ignition).

Shielding gas flows for around 25 seconds or until the button is pressed again.



Incorrect shielding gas setting!

- **If the shielding gas setting is too low or too high, this can introduce air to the weld pool and may cause pores to form.**
- **Adjust the shielding gas quantity to suit the welding task!**

Welding process	Recommended shielding gas quantity
MAG welding	Wire diameter x 11.5 = l/min
MIG brazing	Wire diameter x 11.5 = l/min
MIG welding (aluminium)	Wire diameter x 13.5 = l/min (100 % argon)

Helium-rich gas mixtures require a higher gas volume!

The table below can be used to correct the gas volume calculated where necessary:

Shielding gas	Factor
75% Ar/25% He	1.14
50% Ar/50% He	1.35
25% Ar/75% He	1.75
100% He	3.16

5.10 MIG/MAG welding

5.10.1 Connection for workpiece lead



Some wire electrodes (e.g. self-shielding cored wire) are welded using negative polarity. In this case, the welding current lead should be connected to the "-" welding current socket, and the workpiece lead should be connected to the "+" welding current socket. Observe the information from the electrode manufacturer!

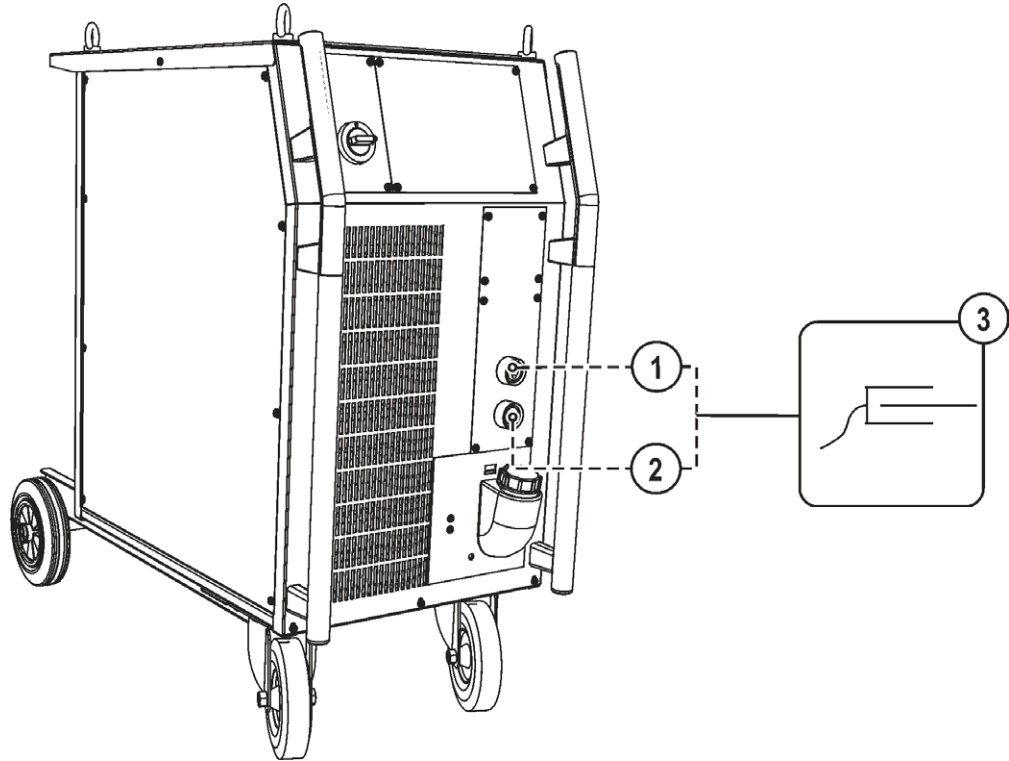


Figure 5-9

Item	Symbol	Description
1		Connection socket, "+" welding current •-----MIG/MAG cored wire welding: Workpiece connection
2		"-" welding current connection socket •-----MIG/MAG welding: Workpiece connection
3		Workpiece

- Insert the plug on the workpiece lead into the "-" welding current connection socket and lock.

5.10.2 Welding task selection



For selection of the welding task and for general operation see the relevant Control operating instructions.

5.11 TIG welding

5.11.1 Welding torch connection

TIG welding torches to be connected to a Euro torch connector are available in two versions:

- **TIG combi welding torches are connected to the Euro torch connector of the wire feeder and to the (-) welding current plug of the power source.**
- **TIG welding torches of the EZA version are connected to the Euro torch connector of the wire feeder only. To do so, the welding current lead of the intermediate hose package must be connected to the (-) welding current connection at the rear of the unit!**

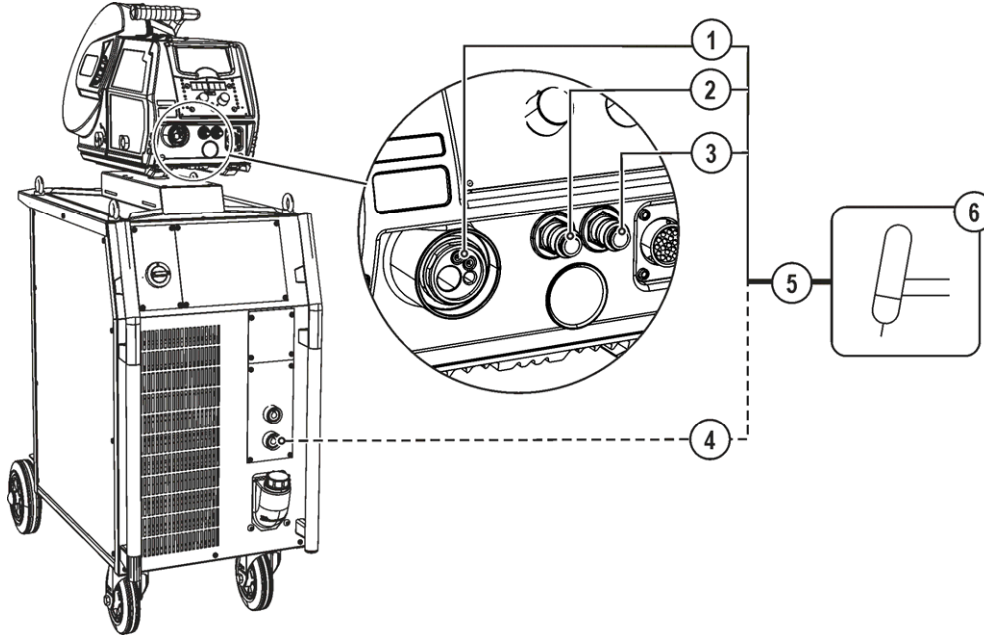


Figure 5-10

Item	Symbol	Description
1		Welding torch connection (Euro or Dinse torch connector) Welding current, shielding gas and torch trigger integrated
2		Quick connect coupling (red) coolant return
3		Quick connect coupling (blue) coolant supply
4		"-" welding current connection socket • TIG welding: Welding current connection for welding torch
5		Welding torch hose package
6		Welding torch

- Insert the central plug for the welding torch into the central connector and screw together with crown nut.
- Insert the welding current plug of the combi welding torch into the (-) welding current connection socket and lock into place by turning to the right (only in case of a separate welding current connection).

If fitted:

- 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).

5.11.2 Connection for workpiece lead

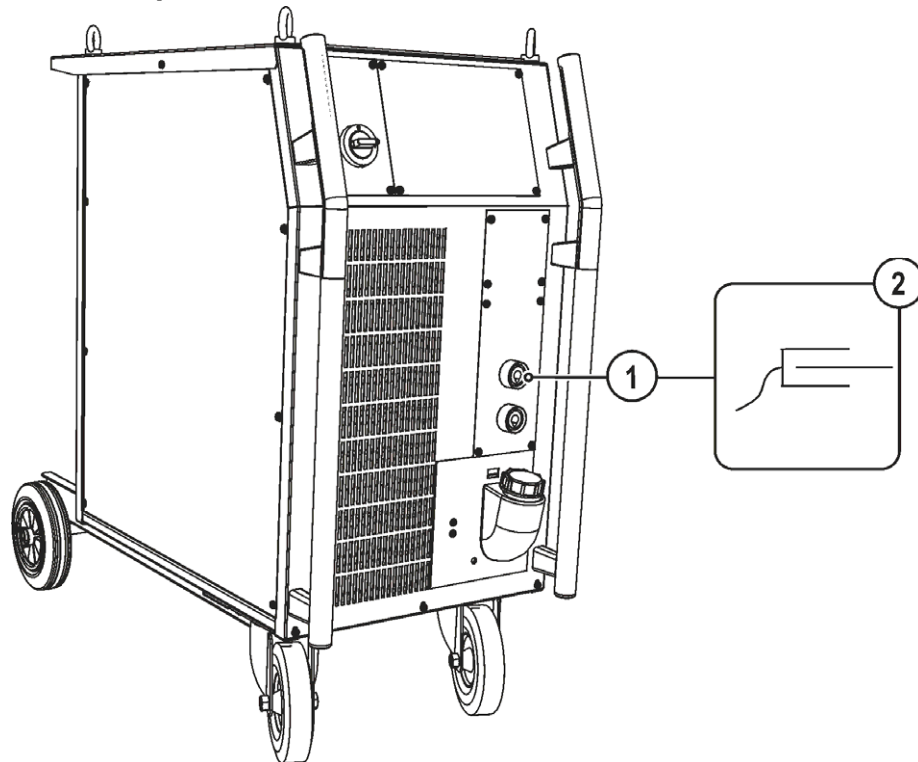


Figure 5-11

Item	Symbol	Description
1	+	Connection socket, "+" welding current • TIG welding: Workpiece connection
2		Workpiece

- Insert the cable plug on the work piece lead into the "+" welding current connection socket and lock by turning to the right.

5.11.3 Welding task selection



For selection of the welding task and for general operation see the relevant Control operating instructions.

5.12 MMA welding

⚠ CAUTION



Risk of being crushed or burnt.

When replacing spent or new stick electrodes

- Switch off machine at the main switch
- Wear appropriate safety gloves
- Use insulated tongs to remove spent stick electrodes or to move welded workpieces and
- Always put the electrode holder down on an insulated surface.

5.12.1 Connecting the electrode holder and workpiece lead



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

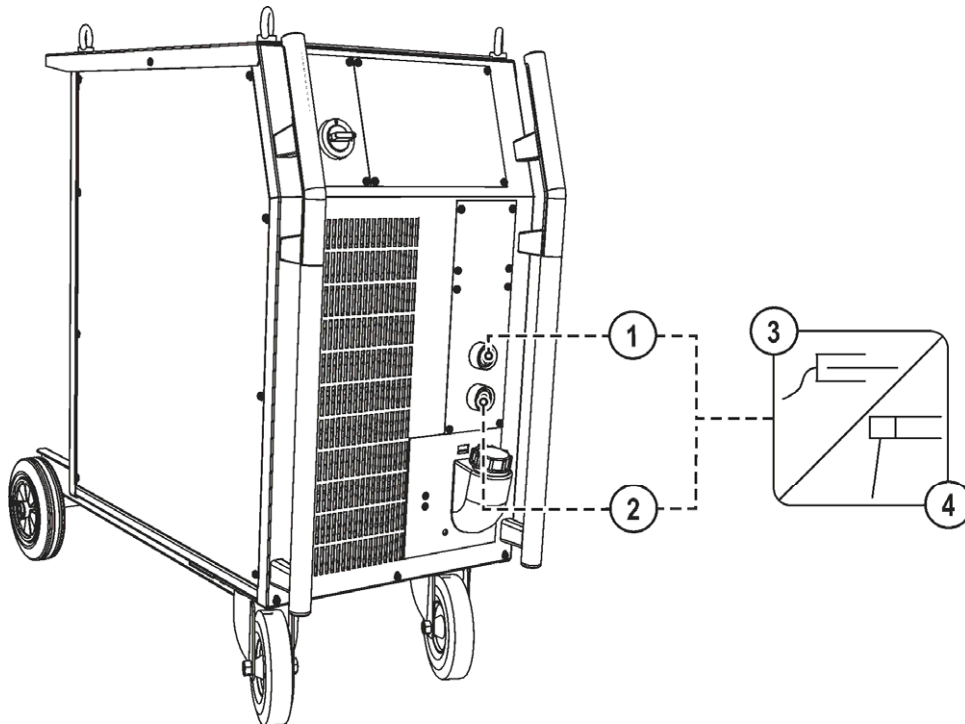


Figure 5-12




Item	Symbol	Description
1		Connection socket, "+" welding current
2		Connection socket, "-" welding current
3		Workpiece
4		Electrode holder

- 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.

5.12.2 Welding task selection

-  *For selection of the welding task and for general operation see the relevant Control operating instructions.*

5.13 Remote control

-  *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.*
-  *The remote controls are operated on the 7-pole remote control connection socket (digital).*
-  *Please note the relevant documentation of the accessory components.*

5.14 Interfaces for automation

⚠ DANGER



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)!



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.

5.14.1 Automation interface

Pin	Input / output	Description	Diagram
A	Output	PE Connection for cable shielding	
D	Output (open collector)	IGRO Current flows signal I>0 (maximum load 20 mA / 15 V) 0 V = welding current flows	
E + R	Input	Not/Aus Emergency stop for higher level shut-down of the power source. To use this function, jumper 1 must be unplugged on PCB M320/1 in the welding machine. Contact open = welding current off	
F	Output	0 V Reference potential	
G/P	Output	I>0 Power relay contact, galvanically isolated (max. +/-15 V / 100 mA)	
H	Output	Uist Welding voltage, measured against pin F, 0-10 V (0 V = 0 V; 10 V = 100 V)	
L	Input	Str/Stp Start = 15 V / Stop = 0 V ¹⁾	
M	Output	+15 V Voltage supply (max. 75 mA)	
N	Output	-15 V Voltage supply (max. 25 mA)	
S	Output	0 V Reference potential	
T	Output	list Welding current, measured on pin F; 0-10 V (0 V = 0 A, 10 V = 1000 A)	

¹⁾ The operating mode is given by the wire feed unit (the start / stop function equates to pressing the torch trigger and is used in mechanised applications, for example).

5.14.2 RINT X12 robot interface

The standard digital interface for mechanised applications □

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.

5.14.3 BUSINT X11 Industrial bus interface

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

- Profinet/Profibus
- EnthernetIP/DeviceNet
- EtherCAT

etc.

5.15 PC Interfaces



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.***



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)!***



Please note the relevant documentation of the accessory components.

PC 300 welding parameter software

Create all welding parameters quickly on the PC and easily transfer them to one or more welding machines (accessories: set consisting of software, interface, connection leads).

Q-DOC 9000 welding data documentation software

(Accessories: set consisting of software, interface, connection leads)

The ideal tool for welding data documentation of, for example: welding voltage and current, wire speed and motor current.

WELDQAS welding data monitoring and documentation system

Network-compatible welding data monitoring and documentation system for digital machines

6 Maintenance, care and disposal

DANGER



Incorrect maintenance and testing!

The machine may be cleaned, repaired and tested by skilled and qualified personnel only. A qualified person is one who, due to their training, knowledge and experience, can detect any hazards and possible consequential damage when checking the machine, and can take the necessary safety measures.

- Observe the required testing measures in the "Rectifying faults" chapter in the operating instructions.
- The machine may only be put into operation again once the testing has been successful.



Risk of injury from electric shock!

Cleaning machines that are not disconnected from the mains can lead to serious injuries!

- Disconnect the machine completely from the mains.
- Remove the mains plug!
- Wait for 4 minutes until the capacitors have discharged!

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.

6.1 General

When used in the specified environmental conditions and under normal operating conditions, this machine is largely maintenance-free and requires a minimum of care.

There are some points, which should be observed, to guarantee fault-free operation of your welding machine. Among these are regular cleaning and checking as described below, depending on the pollution level of the environment and the length of time the unit is in use.

6.2 Maintenance work, intervals

6.2.1 Daily maintenance tasks

- Check that all connections and wearing parts are hand-tight and tighten if necessary.
- 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).

6.2.1.1 Visual inspection

- Check hose package and power connections for exterior damage and replace or have repaired by specialist staff as necessary!
- Mains supply lead and its strain relief
- Gas tubes and their switching equipment (solenoid valve)
- Other, general condition

6.2.1.2 Functional test

- Check correct mounting of the wire spool.
- Welding current cables (check that they are fitted correctly and secured)
- Gas cylinder securing elements
- Operating, message, safety and adjustment devices (Functional test)

6.2.2 Monthly maintenance tasks

6.2.2.1 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

6.2.2.2 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.

6.2.3 Annual test (inspection and testing during operation)



The welding machine may only be tested by competent, capable persons! A capable person is one who, because of his 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.



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

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.

6.3 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!**



6.3.1 Manufacturer's declaration to the end user

- According to European provisions (guideline 2002/96/EG of the European Parliament and the Council of January, 27th 2003), 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 is to be placed for disposal or recycling in the waste separation systems provided for this purpose.
- According to German law (law governing the distribution, taking back and environmentally correct disposal of electric and electronic equipment (ElektroG) from 16.03.2005), 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 giving back used equipment or about collections can be obtained from the respective municipal administration office.
- EWM participates in an approved waste disposal and recycling system and is registered in the Used Electrical Equipment Register (EAR) under number WEEE DE 57686922.
- In addition to this, returns are also possible throughout Europe via EWM sales partners.


6.4 Meeting the requirements of RoHS

We, EWM AG Mündersbach, hereby confirm that all products supplied by us which are affected by the RoHS Directive, meet the requirements of the RoHS (Directive 2011/65/EU).

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 Error messages

 **A welding machine error is indicated by an error code being displayed (see table) on the display on the machine control.**

In the event of a machine error, the power unit is shut down.


 **The display of possible error numbers depends on the machine version (interfaces/functions).**

- Document machine errors and inform service staff as necessary.
- If multiple errors occur, these are displayed in succession.


Error	Category			Possible cause	Remedy
	a)	b)	c)		
Error 1 (Ov.Vol)	-	-	x	Mains overvoltage	Check the mains voltages and compare with the connection voltages of the welding machine
Error 2 (Un.Vol)	-	-	x	Mains undervoltage	
Error 3 (Temp)	x	-	-	Welding machine excess temperature	Allow the machine to cool down (mains switch to "1")
Error 4 (Water)	x	x	-	Low coolant level	Top off the coolant Leak in the coolant circuit > rectify the leak and top off the coolant Coolant pump is not working > check excess current trigger on air cooling unit
Error 5 (Wi.Spe)	x	-	-	Wire feeder/speedometer error	Check the wire feeder speedometer is not issuing a signal, M3.51 defective > inform Service
Error 6 (gas)	x	-	-	Shielding gas error	Check shielding gas supply (for machines with shielding gas monitoring)
Error 7 (Se.Vol)	-	-	x	Secondary excess voltage	Inverter error > inform Service
Error 8 (no PE)	-	-	x	Earth fault between welding wire and earth line	Separate the connection between the welding wire and casing or an earthed object
Error 9 (fast stop)	x	-	-	Fast cut-out triggered by BUSINT X11 or RINT X12	Rectify error on robot
Error 10 (no arc)	-	x	-	Arc break triggered by BUSINT X11 or RINT X12	Check wire feeding
Error 11 (no ign)	-	x	-	Ignition fault after 5 s triggered by BUSINT X11 or RINT X12	Check wire feeding
Error 14 (no DV)	-	x	-	Wire feeder not detected. Control cable not connected.	Check cable connection
				Incorrect ID numbers assigned during operation with multiple wire feeders.	Check assignment of ID numbers
Error 15 (DV2?)	-	x	-	Wire feeder 2 not detected. Control cable not connected.	Check cable connection
Error 16 (VRD)	-	-	x	VRD (open circuit voltage reduction error)	Inform Service

Error	Category			Possible cause	Remedy
	a)	b)	c)		
Error 17 (WF. Ov.)	-	x	x	Wire feed mechanism overcurrent detection	Check the wire feeding
Error 18 (WF. Sl.)	-	x	x	No speedometer signal from second wire feeder (slave drive)	Check the connection and particularly the speedometer of the second wire feeder (slave drive).
Error 56 (no Pha)	-	-	x	Mains phase failure	Check mains voltages
Error 59 (Unit?)	-	-	x	Machine incompatible	Check machine used > see 3.1 chapter

Legend for categories (reset error)

- a) The error message will disappear once the error has been rectified.
- b) The error message can be reset by pressing a context-dependent push-button with the  icon.
- c) The error message can only be reset by switching the machine off and on again.

7.2 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

Coolant error/no coolant flowing

- ↘ Insufficient coolant flow
 - ✘ Check coolant level and refill if necessary
- ↘ Air in the coolant circuit
 - ✘ Vent coolant circuit > see 7.3 chapter

Functional errors

- ↘ 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)
- ↘ Various parameters cannot be set
 - ✘ Entry level is blocked, disable access lock
- ↘ Connection problems
 - ✘ Make control lead connections and check that they are fitted correctly.
- ↘ Loose welding current connections
 - ✘ Tighten power connections on the torch and/or on the workpiece
 - ✘ Tighten contact tip correctly

7.3 Vent coolant circuit

 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)!

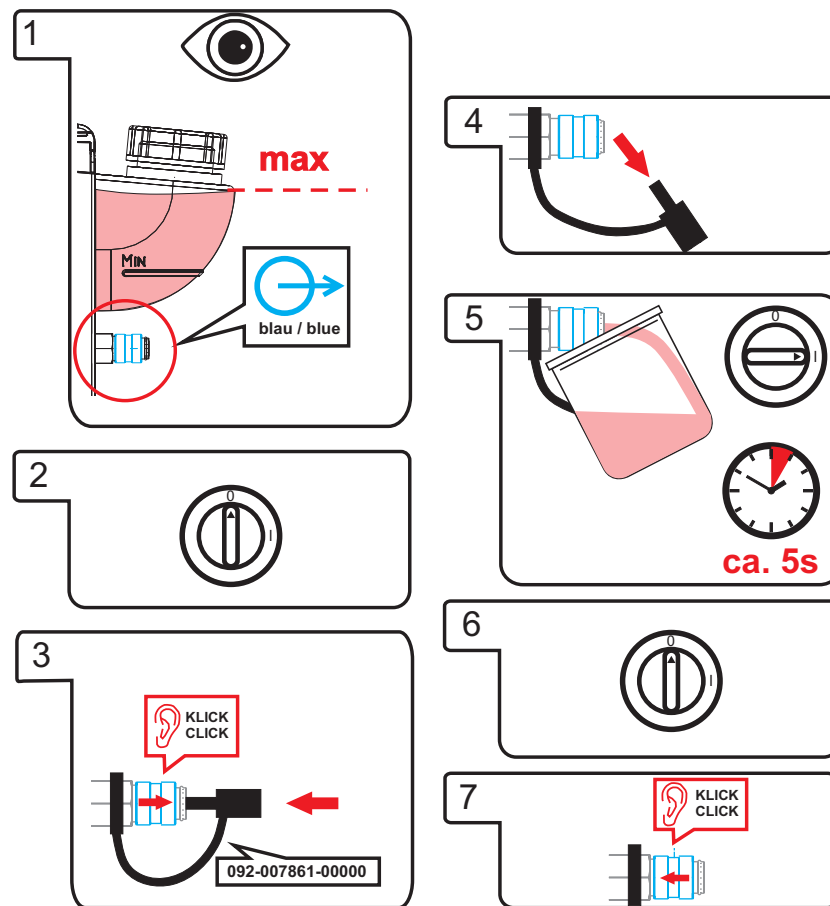


Figure 7-1

7.3.1 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!

8 Technical data

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

8.1 Phoenix 351 FDW

	TIG	MMA	MIG/MAG
Setting range for welding current	5 A–350 A		
Setting range for welding voltage	10.2 V–24.0 V	20.2 V–34.0 V	14.3 V–31.5 V
Duty cycle at 40 °C (100% DC)	350 A		
Load cycle	10 min. (60% DC \wedge 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		
Mains connection lead	H07RN-F4G6		
Maximum connected load	10.9 kVA	15.4 kVA	14.3 kVA
Recommended generator rating	20.8 kVA		
cos ϕ /efficiency	0.99/90%		
Insulation class/protection classification	H/IP 23		
Ambient temperature*	-25 °C to +40 °C		
Machine/torch cooling	Fan/water		
Cooling capacity at 1 l/min	1500 W		
Maximum flow rate	5 l/min		
Maximum coolant outlet pressure	3.5 bar		
Maximum tank capacity	12 l		
Workpiece lead	70 mm ²		
Dimensions L x W x H	1085 x 450 x 1003 mm		
	42.7 x 17.7 x 39.5 inch		
Weight	118 kg		
	260.1 lb		
EMC class	A		
Constructed to standard	IEC 60974-1, -2, -10  / 		

 ***Ambient temperature depends on coolant! Observe the coolant temperature range for the welding torch cooling!**

8.2 Phoenix 401 FDW

	TIG	MMA	MIG/MAG
Setting range for welding current	5 A–400 A		
Setting range for welding voltage	10.2 V–26.0 V	20.2 V–36.0 V	14.3 V–34.0 V
Duty cycle at 40 °C (100% DC)	400 A		
Load cycle	10 min. (60% DC \wedge 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 32 A		
Mains connection lead	H07RN-F4G6		
Maximum connected load	13.5 kVA	18.5 kVA	17.5 kVA
Recommended generator rating	25 kVA		
cos ϕ /efficiency	0.99/90%		
Insulation class/protection classification	H/IP 23		
Ambient temperature*	-25 °C to +40 °C		
Machine/torch cooling	Fan/water		
Cooling capacity at 1 l/min	1500 W		
Maximum flow rate	5 l/min		
Maximum coolant outlet pressure	3.5 bar		
Maximum tank capacity	12 l		
Workpiece lead	70 mm ²		
Dimensions L x W x H	1085 x 450 x 1003 mm		
	42.7 x 17.7 x 39.5 inch		
Weight	118 kg		
	260.1 lb		
EMC class	A		
Constructed to standard	IEC 60974-1, -2, -10 [] / CE		



***Ambient temperature depends on coolant! Observe the coolant temperature range for the welding torch cooling!**


8.3 Phoenix 451, 551 FDW

	451	551
Setting range of welding current/voltage:		
TIG	5 A/10.2 V to 450 A/28.0 V	5 A/10.2 V to 550 A/32.0 V
MMA	5 A/20.2 V to 450 A/38.0 V	5 A/20.2 V to 550 A/42.0 V
MIG/MAG	5 A/14.3 V to 450 A/36.5 V	5 A/14.3 V to 550 A/41.5 V
Duty cycle at 25 °C		
60%	-	550 A
80%	-	520 A
100%	450 A	450 A
Duty cycle at 40 °C		
60%	-	550 A
80%	450 A	-
100%	420 A	420 A
Load cycle	10 min. (60% DC \wedge 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 32 A	
Mains connection lead	H07RN-F4G6	
Maximum connected load MIG/MAG	21.1 kVA	29.2 kVA
Maximum connected load TIG	16.3 kVA	22.6 kVA
Maximum connected load MMA	22.0 kVA	29.5 kVA
Recommended generator rating	29.7 kVA	39.8 kVA
cosϕ/efficiency	0.99/90%	
Insulation class/protection classification	H/IP 23	
Ambient temperature*	-25 °C to +40 °C	
Machine/torch cooling	Fan/water	
Cooling capacity at 1 l/min	1500 W	
Maximum flow rate	5 l/min	
Maximum coolant outlet pressure	3.5 bar	
Maximum tank capacity	12 l	
Workpiece lead	70 mm ²	95 mm ²
Dimensions L x W x H	1085 x 450 x 1003 mm 42.7 x 17.7 x 39.5 inch	
Weight	129 kg 284.4 lb	
EMC class	A	
Constructed to standard	IEC 60974-1, -2, -10 S/CE	



***Ambient temperature depends on coolant! Observe the coolant temperature range for the welding 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 System components

Type	Designation	Item no.
drive 4X HP	Wire feeder, water-cooled, Euro torch connector	090-005392-00502
drive 4X LP	Wire feeder, water-cooled, Euro torch connector	090-005412-00502
drive 4X HP MMA	Wire feeder, water-cooled, Euro torch connector with connection capability for electrode holder or gouging torch	090-005392-51502
drive 4X LP MMA	Wire feeder, water-cooled, Euro torch connector with connection capability for electrode holder or gouging torch	090-005412-51502
drive 4X IC HP	Wire feeder, water-cooled, Euro torch connector	090-005414-00502
drive 4X IC LP	Wire feeder, water-cooled, Euro torch connector	090-005415-00502

9.2 General accessories

Type	Designation	Item no.
TYP 1	Frost protection tester	094-014499-00000
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
DM 842 Ar/CO2 230bar 30l D	Pressure regulator with manometer	394-002910-00030
5POLE/CEE/32A/M	Machine plug	094-000207-00000
HOSE BRIDGE UNI	Tube bridge	092-007843-00000

9.3 Options

Type	Designation	Item no.
5POLE/CEE/32A/M	Machine plug	094-000207-00000
ON Filter T/P	Retrofit option contamination filter for air inlet	092-002092-00000
ON LB Wheels 160x40MM	Retrofit option for locking brake for machine wheels	092-002110-00000
ON PS drive 4L T/P	Pivot support	092-002112-00000
ON Tool Box	Retrofit option tool box	092-002138-00000
ON Holder Gas Bottle <50L	Holding plate for gas cylinders smaller than 50 litres	092-002151-00000
ON Shock Protect	Ram protection retrofit option	092-002154-00000
ON HS XX1	Mount for hose packages and remote control	092-002910-00000

9.4 Remote control/connecting and extension cable

9.4.1 7-pole connection

Type	Designation	Item no.
R40 7POL	Remote control, 10 programs	090-008088-00000
R50 7POL	Remote control, all welding machine functions can be set directly at the workplace	090-008776-00000
FRV 7POL 0.5 m	Extension/connecting cable	092-000201-00004
FRV 7POL 1 m	Extension/connecting cable	092-000201-00002
FRV 7POL 5 m	Extension/connecting cable	092-000201-00003
FRV 7POL 10 m	Extension/connecting cable	092-000201-00000
FRV 7POL 20 m	Extension/connecting cable	092-000201-00001
FRV 7POL 25M	Extension/connecting cable	092-000201-00007

9.5 Computer communication

Type	Designation	Item no.
PC300.Net	PC300.Net welding parameter software kit incl. cable and SECINT X10 USB interface	090-008777-00000
FRV 7POL 5 m	Extension/connecting cable	092-000201-00003
FRV 7POL 10 m	Extension/connecting cable	092-000201-00000
FRV 7POL 20 m	Extension/connecting cable	092-000201-00001
QDOC9000 V2.0	Set consisting of interface, documentation software, connection lead	090-008713-00000

10 Appendix A

10.1 Overview of EWM branches

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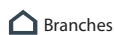
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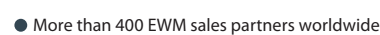
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