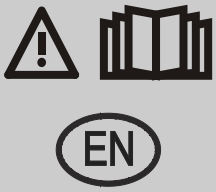
Operating instructions



EN

Welding machine

Phoenix 351-551 Progress puls MM FDW

099-005325-EW501 | Observe additional system documents! | 05.12.2014

General instructions

CAUTION

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

- Read the operating instructions for all system components!
- Observe accident prevention regulations!
- Observe all local regulations!
- Confirm with a signature where appropriate.

NOTE

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.

1 Contents

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.

CAUTION

Working and operating procedures which must be followed precisely to avoid damaging or destroying the product.

- The safety information includes the "CAUTION" keyword in its heading without a general warning symbol.
- The hazard is explained using a symbol at the edge of the page.

NOTE

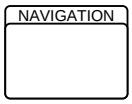
Special technical points which users must observe.

- Notes include the "NOTE" keyword in the heading without a general warning symbol.

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
	**Correct**
	**Wrong**
	**Press**
	**Do not press**
	**Turn**
	**Switch**
	**Switch off machine**
	**Switch on machine**
	**ENTER (enter the menu)**
	**NAVIGATION (Navigating in the menu)**
	**EXIT (Exit the menu)**
	**Time display (example: wait 4s/press)**
	**Interruption in the menu display (other setting options possible)**
	**Tool not required/do not use**
	**Tool required/use**

2.3 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!

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 Maintenance, care and disposal 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).

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 if these safety instructions are not observed!
Non-observance of these safety instructions is potentially fatal!

- Carefully read the safety information in this manual!
- Observe the accident prevention regulations in your country.
- Inform persons in the working area that they must observe 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!

⚠ WARNING

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!

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!

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

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

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.

Damage due to the use of non-genuine parts!

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.

Damage to the machine due to stray welding currents!

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!

Mains connection

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.

CAUTION

EMC Machine Classification

In accordance with IEC 60974-10, welding machines are grouped in two electromagnetic compatibility classes - See 8 Technical data 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

2.4 Transport and installation

WARNING

Incorrect handling of shielding gas cylinders!
Incorrect handling of shielding gas cylinders can result in serious and even fatal injury.

- Observe the instructions from the gas manufacturer and in any relevant regulations concerning the use of compressed air!
- Place shielding gas cylinders in the holders provided for them and secure with fixing devices.
- 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!

CAUTION

Equipment damage when not operated in an upright position!
The units are designed for operation in an upright position!
Operation in non-permissible positions can cause equipment damage.

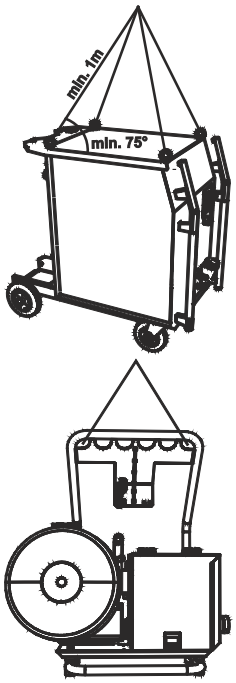
- Only transport and operate in an upright position!

2.4.1 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

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!

2.4.2 Ambient conditions

CAUTION

Installation site!
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.

CAUTION

Equipment damage due to dirt accumulation!
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)!

Non-permissible ambient conditions!
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!

2.4.2.1 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

2.4.2.2 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!
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 proper usage and by trained or expert staff!
- Do not modify or convert the equipment improperly!

3.1 Applications

3.1.1 MIG/MAG standard welding

Metal arc welding using a wire electrode whereby gas from an external source surrounds the arc and the molten pool to protect them from the atmosphere.

3.1.1.1 forceArc

Heat-reduced, directionally stable and powerful arc with deep penetration for the higher performance range. Non-alloyed, low-alloy and high-alloy steels and high-tensile fine-grained steels

3.1.1.2 rootArc

Short arc with perfect weld modelling capabilities for effortless gap bridging and positional welding

3.1.2 MIG/MAG pulse welding

Welding process for optimum welding results when joining stainless steel and aluminium thanks to controlled drop transfer and targeted, adapted heat input.

3.1.2.1 forceArc puls

Effective addition to the forceArc arc, perfect for welding final passes in all performance classes and all positions.

3.1.2.2 rootArc puls

The perfect enhancement for focused heat input for the higher performance range

3.1.3 TIG (Liftarc) welding

TIG welding process with arc ignition by means of workpiece contact.

3.1.4 MMA welding

Manual arc welding or, for short, MMA welding. It is characterised by the fact that the arc burns between a melting electrode and the molten pool. There is no external protection; any protection against the atmosphere comes from the electrode.

3.1.4.1 Air arc gouging

During air arc gouging, bad welding seams are heated with a carbon electrode and then removed with compressed air. Special electrode holders and carbon electrodes are required for air arc gouging.

3.1.5 Voltage reduction device – VRD machine version

To increase safety, particularly in hazardous environments (like shipbuilding, pipe construction or mining), the machine is equipped with the VRD (Voltage-reducing device) .

The VRD signal light is illuminated, when the voltage reducing device is operating without fault and the output voltage is reduced to a value specified in the relevant standard (see technical data).

3.2 Use and operation solely with the following machines

NOTE

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

Phoenix Progress					
	351-451	551	351-551 D	351-551 2DV	miniDrive
drive 200C	☑		☐	☐	☑
drive 300C	☑		☐	☐	☑
drive 4	☑		☐	☐	☑
drive 4 HS	☐	☑	☐	☐	☐
drive 4L	☑		☐	☑	☑
drive 4L RE	☑		☐	☑	☑
drive 4D	☐		☑	☐	☑
drive 4X	☑		☐	☑	☑
drive 4X LP	☑		☐	☑	☑

3.3 Documents which also apply

3.3.1 Warranty

NOTE

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 designated machine conforms to EC Directives and standards in terms of its design and construction:

- EC Low Voltage Directive (2006/95/EC),
- EC EMC Directive (2004/108/EC),

This declaration shall become null and void in the event of unauthorised modifications, improperly conducted repairs, non-observance of the deadlines for the repetition test and / or non-permitted conversion work not specifically authorised by the manufacturer.
The original copy of the declaration of conformity is enclosed with the unit.

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

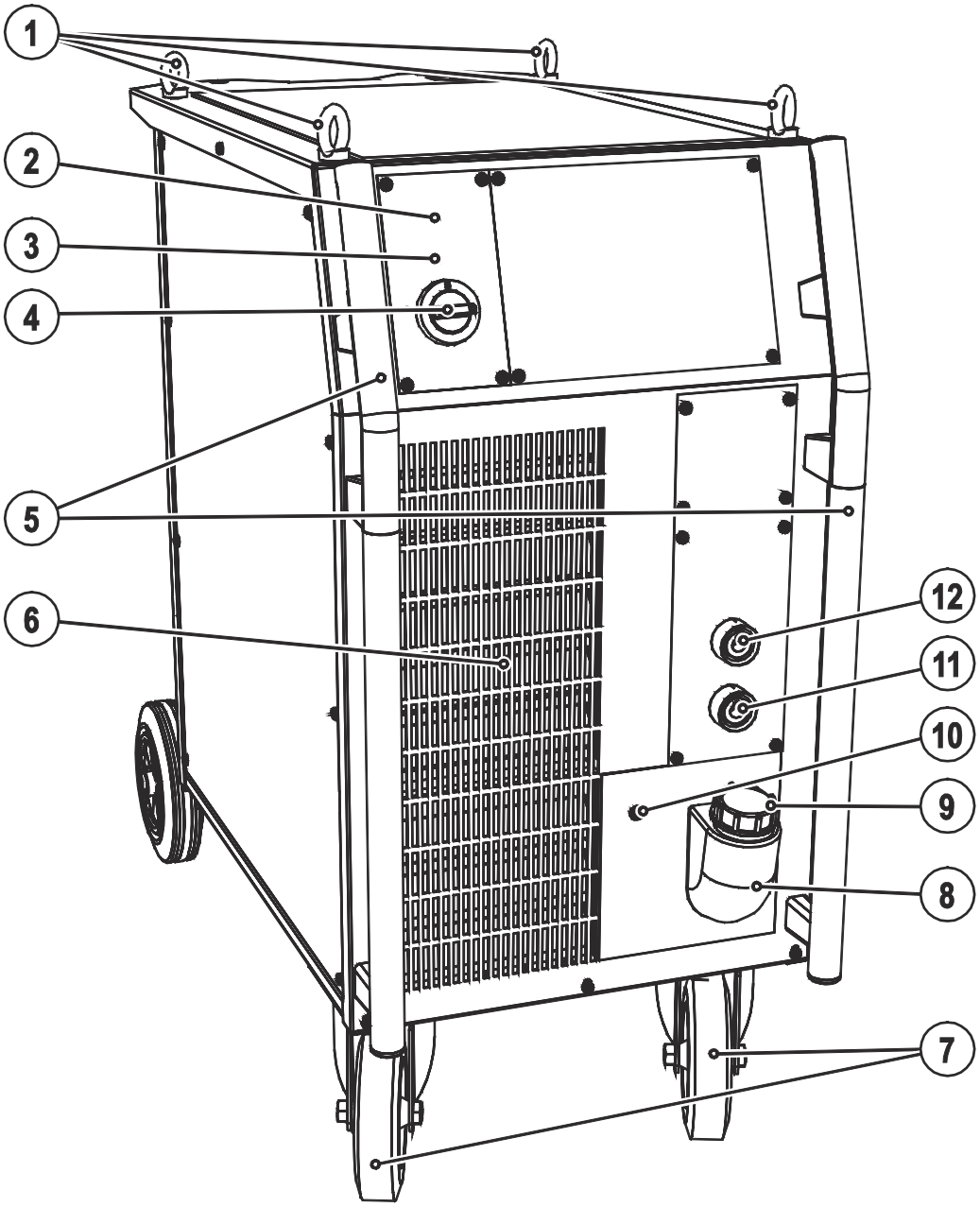


Figure 4-1

Item	Symbol	Description
1		**Lifting lug**
2	VRD	**Voltage reduction device (VRD)** The VRD signal light is illuminated, when the voltage reduction device is operating without fault and the output voltage is reduced to a value specified in the relevant standard- See 8 Technical data chapter. The voltage reduction device is only active on VRD machine versions.
3		**Ready for operation signal light** Signal light on when the machine is switched on and ready for operation
4		**Main switch, machine on/off**
5		**Carrying handle**
6		**Cooling air inlet**
7		**Wheels, guide castors**
8		**Coolant tank**
9		**Coolant tank cap**
10		**Automatic cut-out of coolant pump key button** press to reset a triggered fuse
11		**Connection socket, “-” welding current**
12		**Connection socket, “+” welding current**

4.2 Rear view

NOTE

The maximum possible machine configuration is given in the text description.
If necessary, the optional connection may need to be retrofitted- See 9 Accessories chapter.

4.3 Rear view

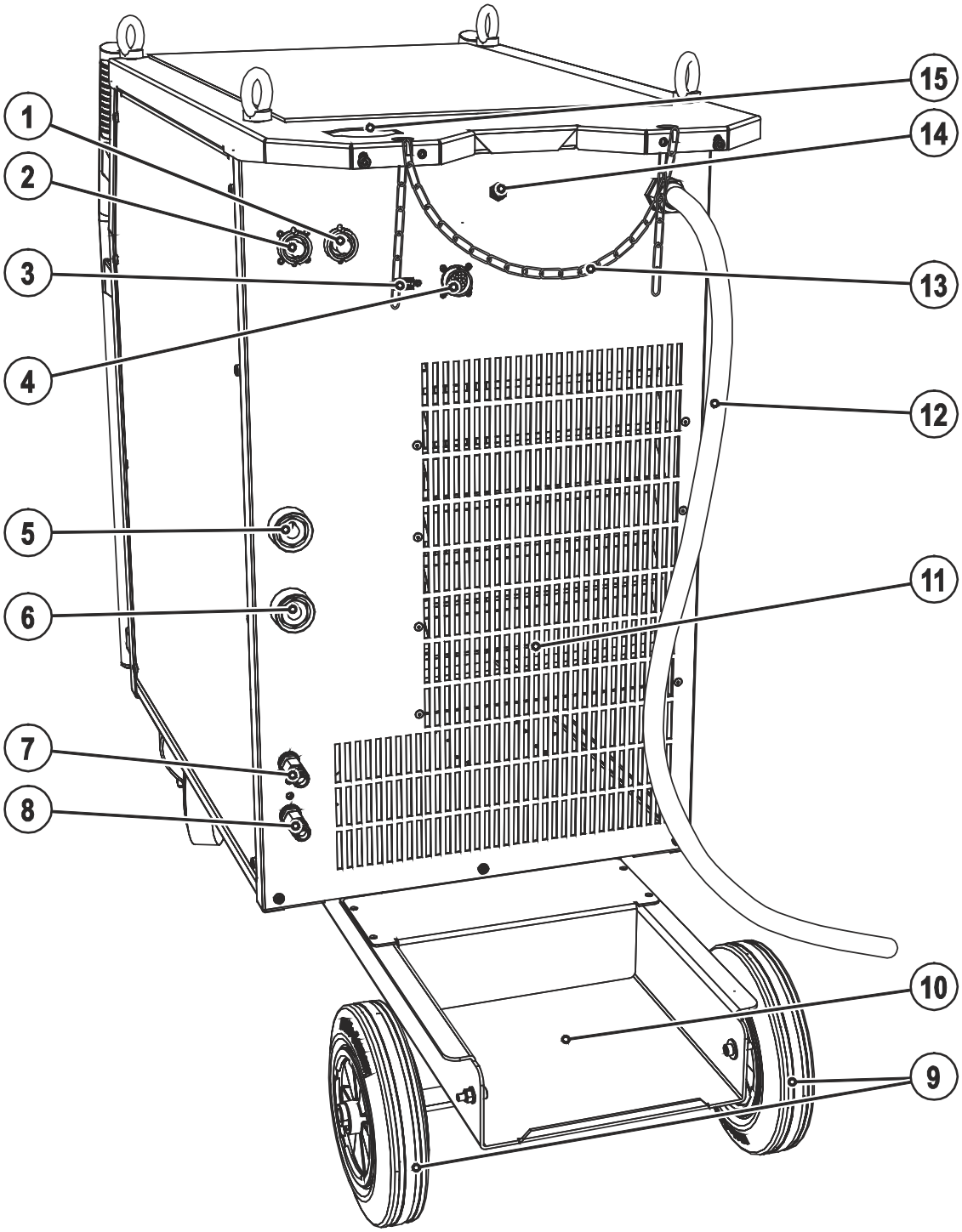
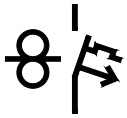


Figure 4-2

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		**19-pole mechanised welding interface (analogue)** - See 7.4.1 Interface for automated welding 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 5.7 Mains connection 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 of injury due to moving parts!
The wire feeders are equipped with moving parts, which can trap hands, hair, clothing or tools and thus injure persons!

- Do not reach into rotating or moving parts or drive components!
- Keep casing covers or protective caps closed during operation!

Risk of injury due to welding wire escaping in an unpredictable manner!
Welding wire can be conveyed at very high speeds and, if conveyed incorrectly, may escape in an uncontrolled manner and injure persons!

- Before mains connection, set up the complete wire guide system from the wire spool to the welding torch!
- Remove the pressure rollers from the wire feeder if no welding torch is fitted!
- Check wire guide at regular intervals!
- Keep all casing covers or protective caps closed during operation!

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.

CAUTION

Damage due to incorrect connection!
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.

Using protective dust caps!
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!

NOTE

Observe documentation of other system components when connecting!

5.2 Installation

CAUTION

Installation site!
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

To obtain an optimal duty cycle from the power components, the following precautions should be observed:

- Ensure that the working area is adequately ventilated.
- Do not obstruct the air inlets and outlets of the machine.
- Do not allow metal parts, dust or other objects to get into the machine.

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 Notes on the installation of welding current leads

NOTE

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.

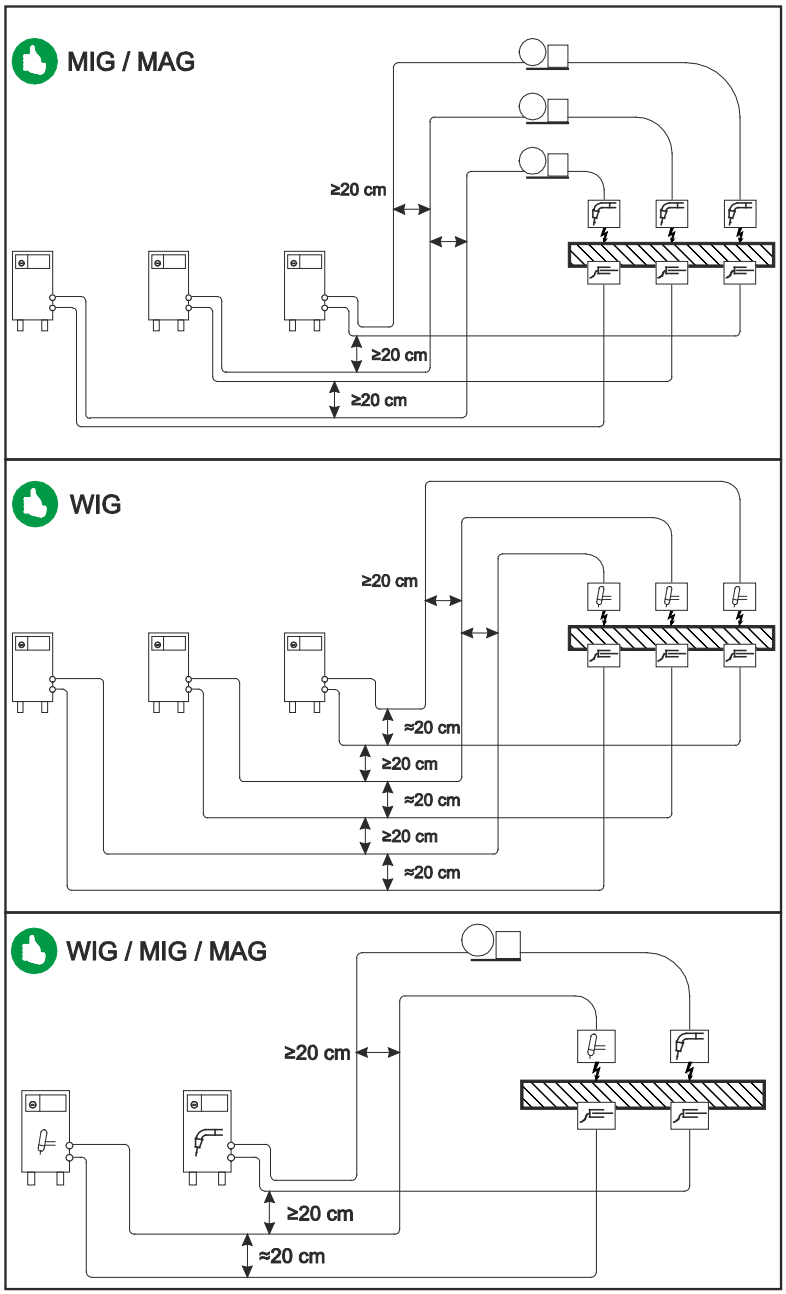


Figure 5-1

NOTE

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

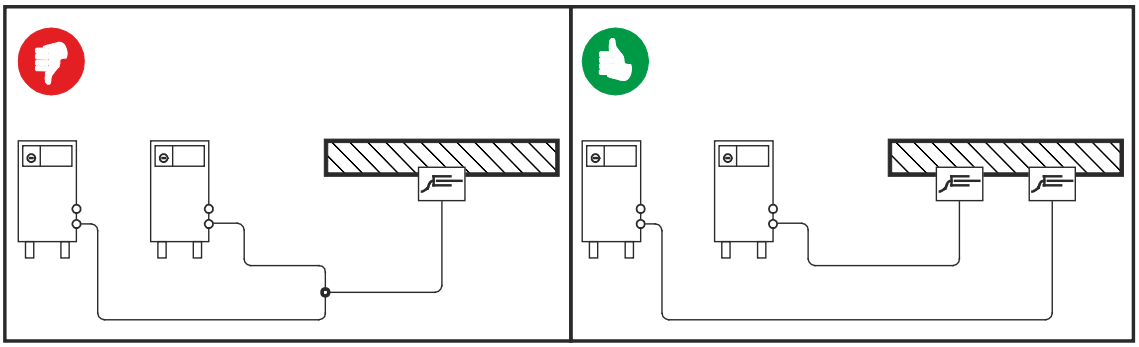


Figure 5-2

NOTE

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.

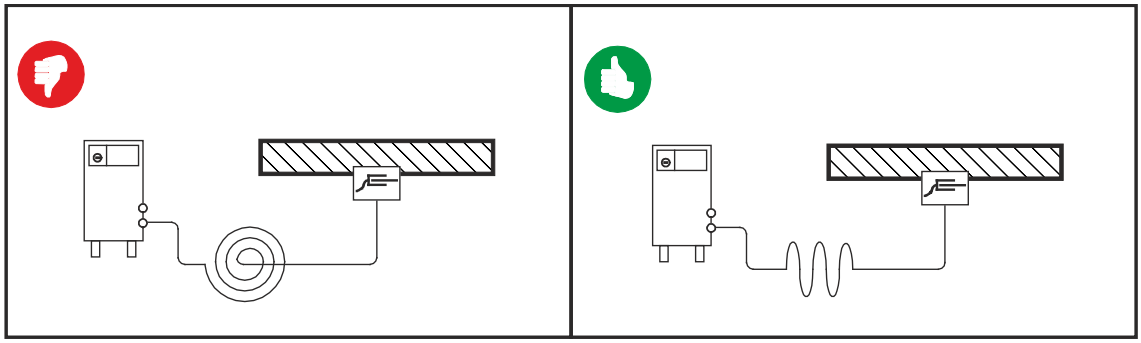


Figure 5-3

5.6 Welding torch cooling system

CAUTION

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.

Insufficient frost protection in the welding torch coolant!
Depending on the ambient conditions, different liquids are used for cooling the welding torch - See 5.6.1 List of coolants 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!

NOTE

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.

5.6.1 List of coolants

The following coolants may be used - See 9 Accessories chapter:

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

5.6.2 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)

5.6.3 Adding coolant

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

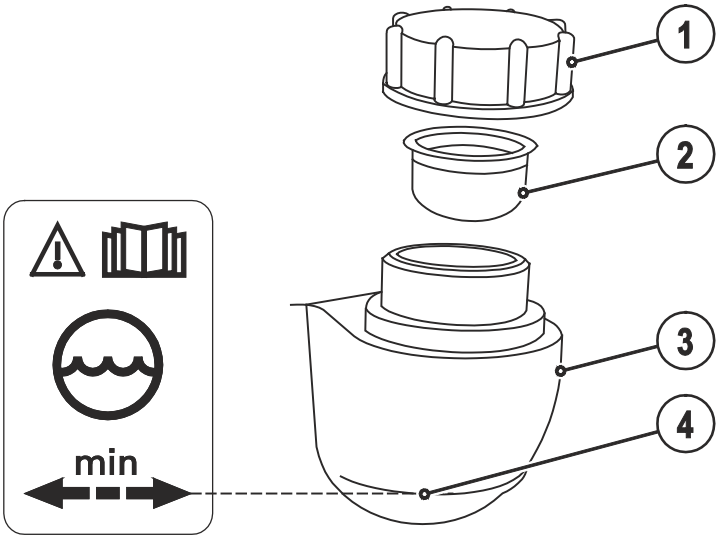


Figure 5-4

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.

NOTE

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 Rectifying faults chapter".

5.7 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.

5.7.1 Mains configuration

NOTE

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**

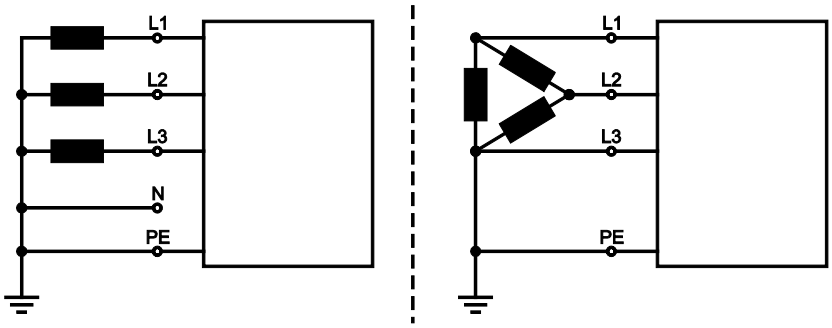


Figure 5-5

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

CAUTION

Operating voltage - mains voltage!
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 Technical data chapter!

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

5.8 Intermediate hose package connection

NOTE

Note the polarity of the welding current!
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!

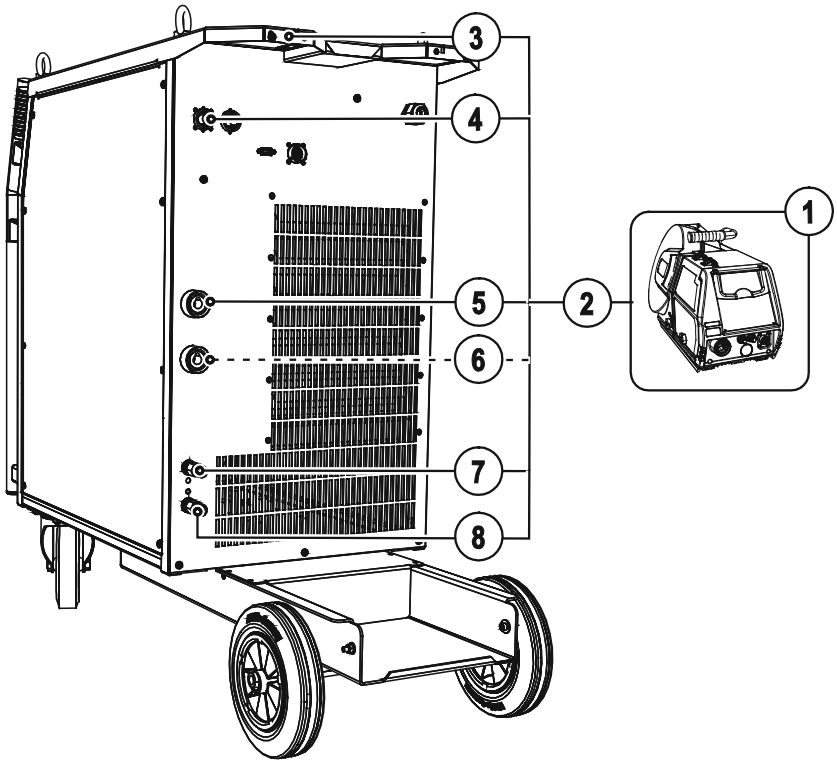


Figure 5-6

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).

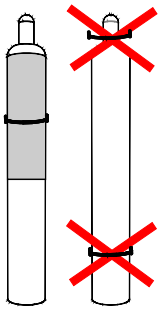
5.9 Shielding gas supply (shielding gas cylinder for welding machine)

5.9.1 Connection

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!

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



CAUTION

Faults in the shielding gas supply.
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.

NOTE

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

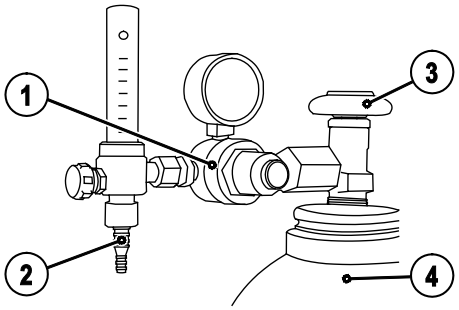


Figure 5-7

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.
- Tighten gas hose on pressure regulator to be gas tight.

5.10 Adjusting the cable resistance

The resistance value of cables can either be set directly or it can be matched using the power source. The factory setting of the power sources is 8 m-ohm. This value correponds to a 5 m earth cable, a 1.5 m intermediate hose package and a 3 m water-cooled welding torch. With other hose package lengths, it is necessary to carry out a +/- voltage correction to optimise welding properties. The voltage correction value can be set close to zero by means of re-adjusting the cable resistance. It is recommended to match the electric cable resistance after replacing accessories such as torches or intermediate hose packages.

In case a second wire feeder is used the (rL2) parameter has to be adjusted. For all other configurations it is sufficient to match the (rL1) parameter.

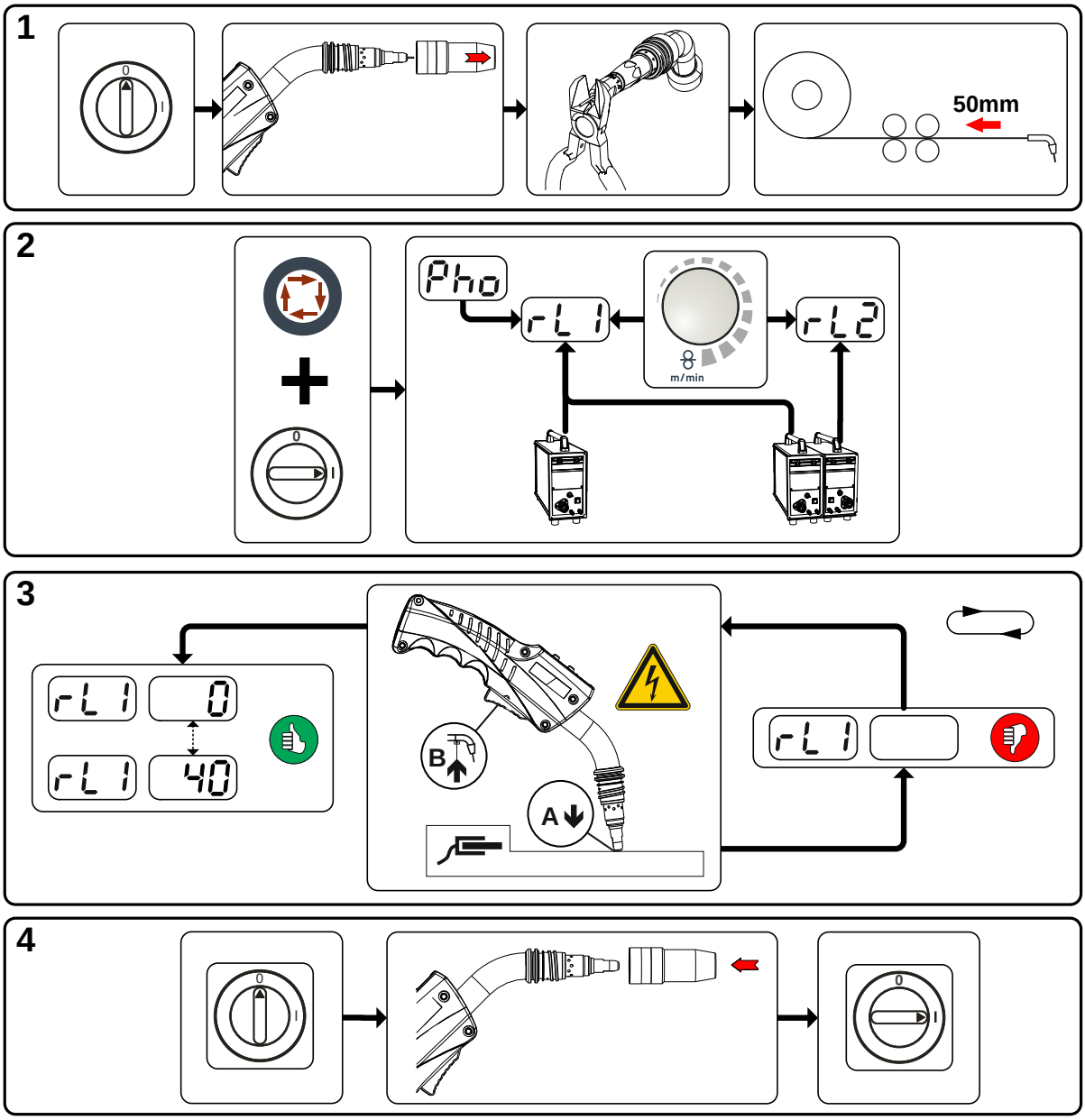


Figure 5-8

1 Preparation

- Switch off the welding machine.
- Unscrew the gas nozzle from the welding torch.
- Trim the welding wire, so that it is flush with the contact tip.
- Retract the welding wire a little (approx. 50 mm) on the wire feeder. There should now be no more welding wire in the contact tip.

2 Configuration

- Press the "Welding parameter" push-button while simultaneously switching on the welding machine. Release the "Welding parameter" push-button ("Choke effect" push-button with drive 4X LP).
- The required parameter can now be selected using the 'Welding parameter setting' rotary knob. Parameter rL1 must be adjusted for all machine combinations.
  In case of welding systems with a second power circuit – if two wire feeders are to be operated from a single power source, for example – a second adjustment with parameter rL2 must be performed.

3 Adjustment/measurement

- Applying slight pressure, put the welding torch in place with the contact tip on a clean, purged location on the workpiece and then press the torch trigger for approx. 2 seconds. A short-circuit current will flow briefly, which is used to determine and display the cable resistance. The value can be between 0 mΩ and 40 mΩ. The new value is immediately saved without requiring further confirmation. If no value is shown in the right-hand display, then measurement failed. The measurement must be repeated.

4 Restoring welding standby mode

- Switch off the welding machine.
- Screw the gas nozzle onto the welding torch.
- Switch on the welding machine
- Insert the welding wire.

5.11 MIG/MAG welding

5.11.1 Connection for workpiece lead

NOTE

Note the polarity of the welding current!
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!

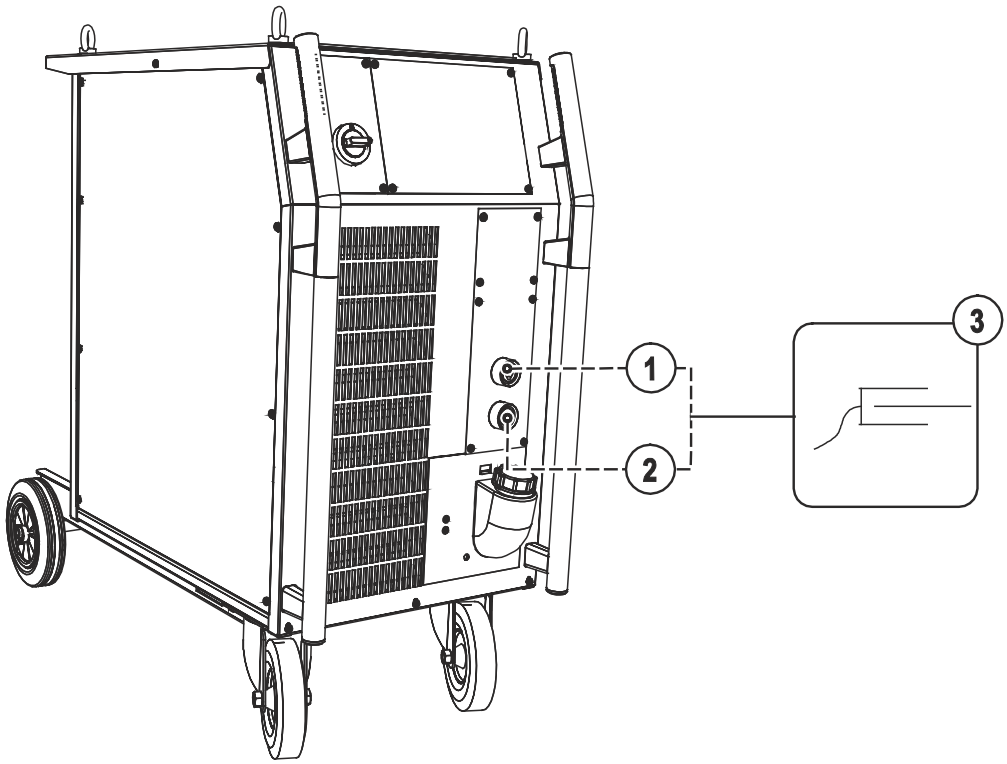


Figure 5-9

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.

5.12 TIG welding

5.12.1 Welding torch connection

NOTE

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!

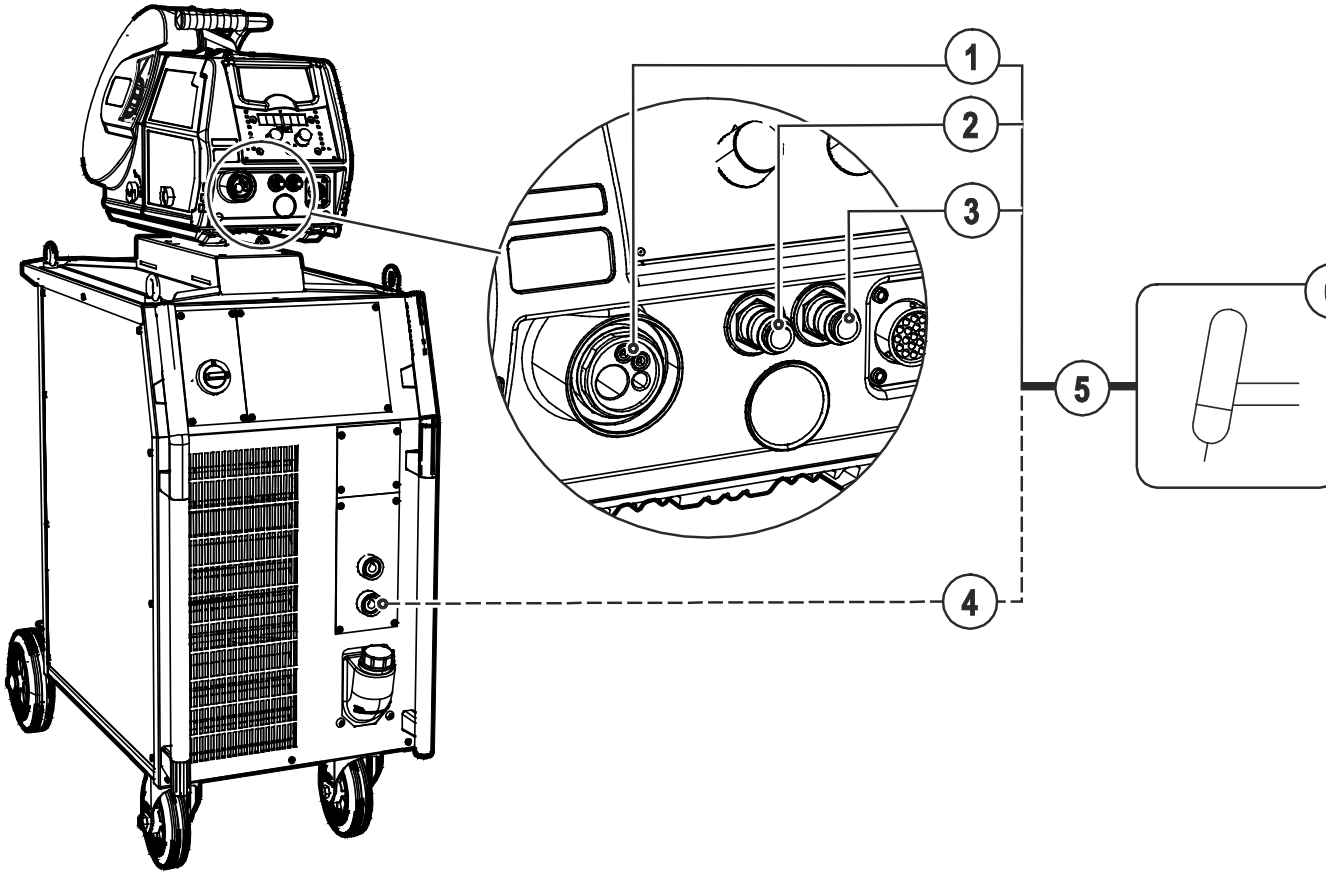


Figure 5-10

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).

5.12.2 Connection for workpiece lead

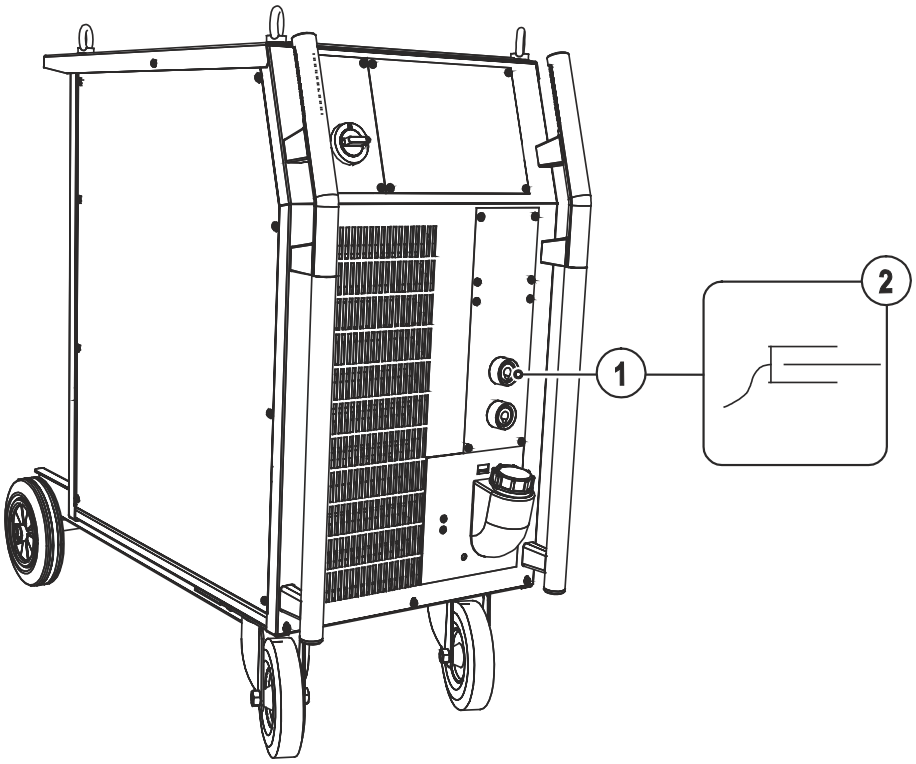


Figure 5-11

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.

5.13 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.

5.13.1 Connecting the electrode holder and workpiece lead

NOTE

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

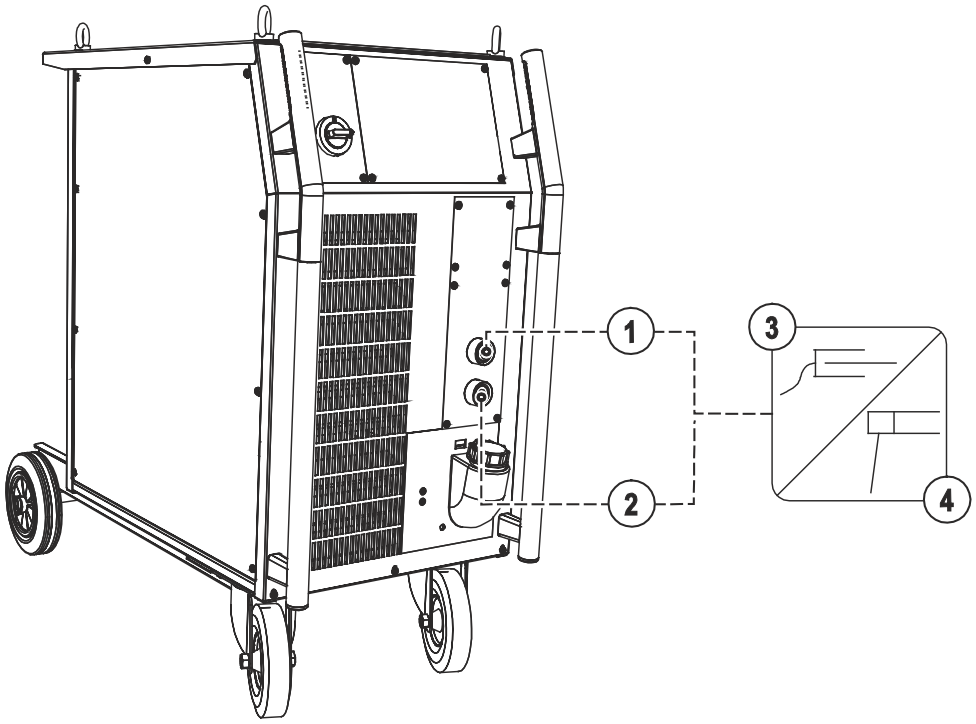


Figure 5-12

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.

5.14 Voltage reducing device (VRD)

To increase safety, particularly in hazardous environments (like shipbuilding, pipe construction or mining), the machine is equipped with the VRD (Voltage-reducing device) voltage reduction device.

The VRD signal light is illuminated, when the voltage reduction device is operating without fault and the output voltage is reduced to a value specified in the relevant standard (see technical data). The voltage reduction device is only active on VRD machine versions.

The voltage reducing device is a requirement in some countries and in many internal company safety guidelines for power sources.

5.15 Remote control

CAUTION

Damage due to the use of non-genuine parts!
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.

NOTE

The remote controls are operated on the 7-pole remote control connection socket (digital).

Please note the relevant documentation of the accessory components.

5.16 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)!

CAUTION

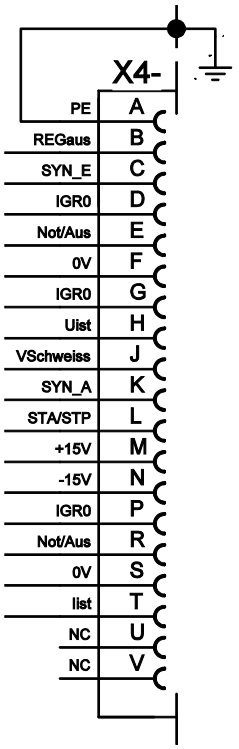
Damage due to incorrect connection!
Accessory components and the power source itself can be damaged by incorrect connection!

- 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.

5.16.1 Automation interface

NOTE

These accessory components can be retrofitted as an option .

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	Iist	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).

5.16.2 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.

5.16.3 BUSINT X11 Industrial bus interface

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

- Profinet/Profibus
- EnthernetIP/DeviceNet
- EtherCAT

etc.

5.17 PC Interfaces

CAUTION

Damage due to the use of non-genuine parts!
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)!

NOTE

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

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)!

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)

NOTE

The welding machine may only be tested by competent, capable personsl.
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

NOTE

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 Checklist for rectifying faults

NOTE

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

Functional errors

↯ Machine control without displaying the signal lights after switching on

🛠 Phase failure > check mains connection (fuses)

↯ No welding performance

🛠 Phase failure > check mains connection (fuses)

↯ 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

7.2 Error messages (power source)

NOTE

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 18 (Wf.Sl.)	x	-	-	Auxiliary drive/ speedometer error	Check auxiliary drive tachogenerator not issuing signals. M3.51 defective > 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

Legend for categories (error reset)

a) The error message will disappear once the error has been rectified.

b) The error message can be reset by pressing a key button:

Welding machine control	Key button
RC1 / RC2	
RC1 / RC2	
Expert	
CarExpert / Progress (M3.11)	not possible
alpha Q / Concept / Basic / Basic S / Synergic / Synergic S / Progress (M3.71) / Picomig 305	

c) The error message can only be reset by switching the machine off and on again.

The shielding gas error (Err 6) can be reset by pressing the "Welding parameters" key button.

7.3 Resetting JOBs (welding tasks) to the factory settings

7.3.1 Resetting a single JOB

NOTE

All customised welding parameters that are stored will be replaced by the factory settings.

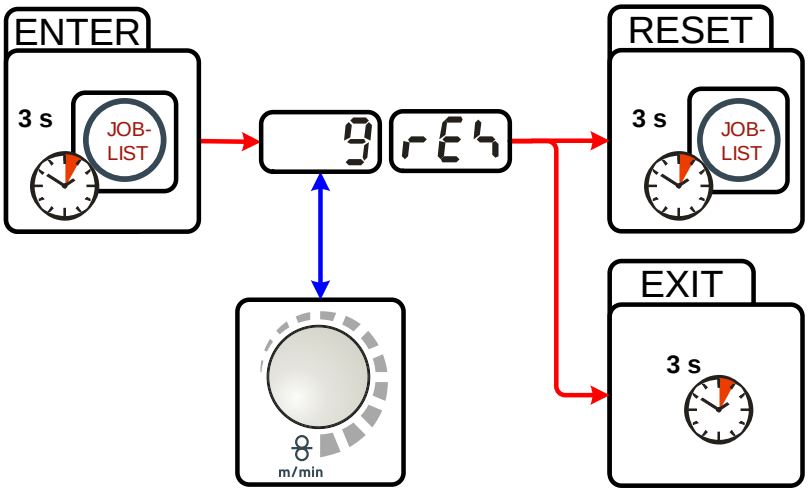


Figure 7-1

Display	Setting/selection
rE4	**Reset to factory settings** The RESET will be done after pressing the button. The menu will be ended when no changes are done after 3 sec.
9	**JOB-number (example)** The shown JOB will be set to ex works.

7.3.2 Resetting all JOBs

NOTE

JOBs 1–128 and 170–256 will be reset.
Custom JOBs 129–169 are maintained.

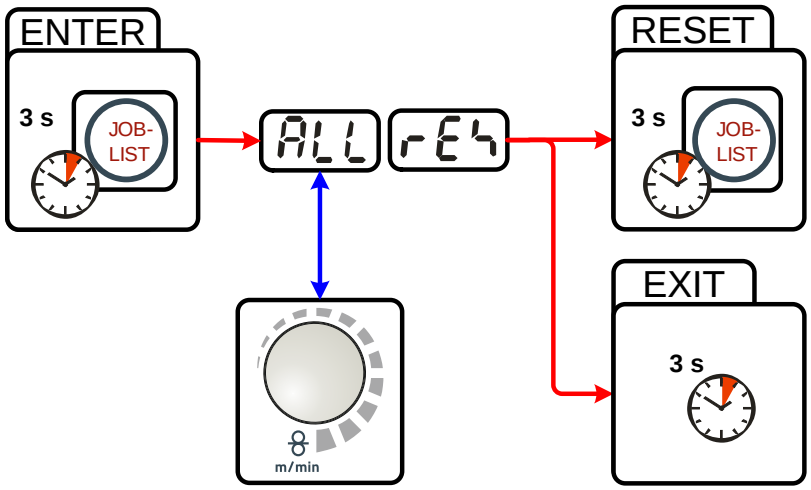


Figure 7-2

Display	Setting/selection
rES	**Reset to factory settings** The RESET will be done after pressing the button. The menu will be ended when no changes are done after 3 sec.

7.4 General operating problems

7.4.1 Interface for automated welding

⚠ WARNING

No function of the external interrupt equipment (emergency stop switch)!
If the emergency stop circuit has been realised using an external interrupt equipment via 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!

- Disconnect jumper 1 on PCB T320/1 (Tetrix / forceTig) or M320/1 (Phoenix / alpha Q)!

7.5 Vent coolant circuit

NOTE

- **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)!**

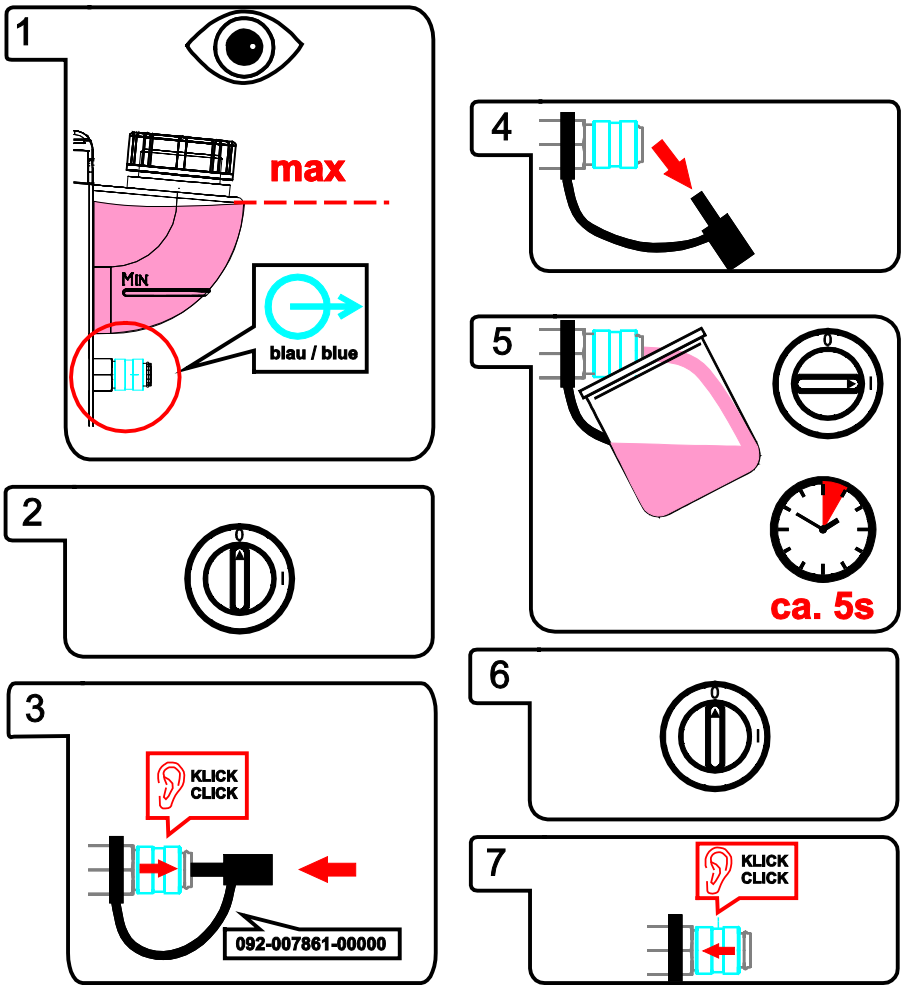


Figure 7-3

8 Technical data

NOTE

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 alternation	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		
Mains connection lead	H07RN-F4G6		
Maximum connected load	10.9 kVA	15.4 kVA	14.3 kVA
Recommended generator rating	20,8 kVA		
cosφ / Efficiency	0.99 / 88 %		
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		
Welding lead	70 mm²		
Dimensions L x W x H in mm	1100 x 455 x 1000		
Weight in kg	118		
EMC class	A		
Constructed to standard	IEC 60974-1, -2, -10 S/CE		

NOTE

*** 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 alternation	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 32 A		
Mains connection lead	H07RN-F4G6		
Maximum connected load	13.5 kVA	18.5 kVA	17.5 kVA
Recommended generator rating	25 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		
Welding lead	70 mm²		
Dimensions L x W x H in mm	1100 x 455 x 1000		
Weight in kg	118		
EMC class	A		
Constructed to standard	IEC 60974-1, -2, -10 S/CE		

NOTE

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

8.3 Phoenix 501 FDW

	TIG	MMA	MIG/MAG
Setting range for welding current	5 A–500 A		
Setting range for welding voltage	10.2 V–30.0 V	20.2 V–40.0 V	14.3 V–39.0 V
Duty cycle at 40 °C (100% DC)	500 A (60% DC)		
	430 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 32 A		
Mains connection lead	H07RN-F4G6		
Maximum connected load	19.3 kVA	25.6 kVA	24.9 kVA
Recommended generator rating	34.6 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	95 mm²		
Dimensions L x W x H in mm	1100 x 455 x 1000		
Weight in kg	118		
EMC class	A		
Constructed to standard	IEC 60974-1, -2, -10 S / CE		

NOTE

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

8.4 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 alternation	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 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	
Welding lead	70 mm²	95 mm²
Dimensions L x W x H in mm	1100 x 455 x 1000	
Weight	129 kg	
EMC class	A	
Constructed to standard	IEC 60974-1, -2, -10/ S/CE	

NOTE

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

9 Accessories

NOTE

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.
Phoenix Progress drive 4L WE	Wire feed unit, water, Euro central connector	090-004844-00502
Phoenix Progress drive 4L RE	Wire feeder, water-cooled, Euro torch connector, opens on right	090-008602-00502
Phoenix Progress drive 4 WE	Wire feed unit, water, Euro central connector	090-004843-00502
Phoenix Progress drive 300C WE	Wire feed unit, water, Euro central connector	090-005103-00502
Phoenix Progress drive 200C WE	Wire feed unit, water, Euro central connector	090-005102-00502
Phoenix Progress drive 4 HS	Wire feed unit for high performance welding	090-005141-00502

9.2 General accessories

Type	Designation	Item no.
AK300	Wire spool adapter K300	094-001803-00001
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
DMDIN TN 200B AR/MIX 35L	Manometer pressure regulator	094-000009-00000
5POLE/CEE/32A/M	Machine plug	094-000207-00000
HOSE BRIDGE UNI	Tube bridge	092-007843-00000

9.3 Options

Type	Designation	Item no.
ON A INTERFACE	Option retrofit for analog mech. welding interface Phoenix Progress	092-001779-00000
ON LB Wheels 160x40MM	Retrofit option for locking brake for machine wheels	092-002110-00000
ON Hose/FR Mount DK 4L	Mounting for hoses and remote controls for machines with 4L pivot support (092-002112-00000 and 092-002113-00000)	092-002117-00000
ON Hose/FR Mount	Optional holder for tubes and remote control for machines without pivot support	092-002116-00000
ON Filter T/P	Retrofit option contamination filter for air inlet	092-002092-00000
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

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 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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