

Welding machine

Phoenix 351-551 Progress puls MM FDW

099-005325-EW501

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01.02.2017

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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 location where the machine is operated.
- Safety and warning labels on the machine indicate any possible risks. Keep these labels clean and legible at all times.
- The machine has been constructed to state-of-the-art standards in line with any applicable regulations and industrial standards. Only trained personnel may operate, service and repair the machine.
- Technical changes due to further development in machine technology may lead to a differing welding behaviour.



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

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

Liability relating to the operation of this equipment is restricted solely to the function of the equipment. No other form of liability, regardless of type, shall be accepted. This exclusion of liability shall be deemed accepted by the user on commissioning the equipment.

The manufacturer is unable to monitor whether or not these instructions or the conditions and methods are observed during installation, operation, usage and maintenance of the equipment.

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

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

1 Contents

1	Contents	3
2	For your safety	5
2.1	Notes on the use of these operating instructions	5
2.2	Explanation of icons	6
2.3	Part of the complete documentation	7
2.4	Safety instructions	8
2.5	Transport and installation	11
3	Intended use	12
3.1	Applications	12
3.1.1	Use and operation solely with the following machines	12
3.2	Documents which also apply	12
3.2.1	Warranty	12
3.2.2	Declaration of Conformity	12
3.2.3	Welding in environments with increased electrical hazards	12
3.2.4	Service documents (spare parts and circuit diagrams)	13
3.2.5	Calibration/Validation	13
4	Machine description – quick overview	14
4.1	Front view	14
4.2	Rear view	16
5	Design and function	18
5.1	Transport and installation	18
5.1.1	Lifting by crane	18
5.1.2	Ambient conditions	19
5.1.2.1	In operation	19
5.1.2.2	Transport and storage	19
5.1.3	Machine cooling	19
5.1.4	Workpiece lead, general	19
5.1.5	Intermediate hose package connection	20
5.1.6	Welding torch cooling system	21
5.1.6.1	Approved coolants overview	21
5.1.6.2	Maximal hose package length	21
5.1.6.3	Adding coolant	22
5.1.7	Notes on the installation of welding current leads	23
5.1.7.1	Stray welding currents	24
5.1.8	Mains connection	24
5.1.8.1	Mains configuration	25
5.1.9	Aligning the cable resistance	26
5.1.10	Shielding gas supply (shielding gas cylinder for welding machine)	27
5.1.10.1	Pressure regulator connection	28
5.1.10.2	Gas test – setting the shielding gas volume	28
5.2	MIG/MAG welding	29
5.2.1	Connection for workpiece lead	29
5.2.2	Welding task selection	29
5.3	TIG welding	30
5.3.1	Welding torch connection	30
5.3.2	Connection for workpiece lead	31
5.3.3	Welding task selection	31
5.4	MMA welding	32
5.4.1	Connecting the electrode holder and workpiece lead	32
5.4.2	Welding task selection	32
5.5	Remote control	33
5.6	Interfaces for automation	33
5.6.1	Automation interface	33
5.6.2	RINT X12 robot interface	34
5.6.3	BUSINT X11 Industrial bus interface	34
5.7	PC interface	34

6	Maintenance, care and disposal	35
6.1	General	35
6.2	Cleaning	35
6.3	Maintenance work, intervals	35
6.3.1	Daily maintenance tasks	36
6.3.1.1	Visual inspection	36
6.3.1.2	Functional test	36
6.3.2	Monthly maintenance tasks	36
6.3.2.1	Visual inspection	36
6.3.2.2	Functional test	36
6.3.3	Annual test (inspection and testing during operation)	36
6.4	Disposing of equipment	37
6.4.1	Manufacturer's declaration to the end user	37
6.5	Meeting the requirements of RoHS	37
7	Rectifying faults	38
7.1	Checklist for rectifying faults	38
7.2	Error messages (power source)	39
7.3	Resetting JOBS (welding tasks) to the factory settings	41
7.3.1	Resetting a single JOB	41
7.3.2	Resetting all JOBS	41
7.4	General operating problems	42
7.4.1	Automation interface	42
7.5	Vent coolant circuit	42
8	Technical data	43
8.1	Phoenix 351 FDW	43
8.2	Phoenix 401 FDW	44
8.3	Phoenix 451 FDW	45
8.4	Phoenix 501 FDW	46
8.5	Phoenix 551 FDW	47
9	Accessories	48
9.1	System components	48
9.2	General accessories	48
9.3	Options	48
9.4	Remote control/connecting and extension cable	48
9.4.1	7-pole connection	48
9.5	Computer communication	49
10	Appendix A	50
10.1	Overview of EWM branches	50

2 For your safety

2.1 Notes on the use of these operating instructions

DANGER

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

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

WARNING

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

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

CAUTION

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

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



Special technical points which users must observe.

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

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

2.2 Explanation of icons

Symbol	Description	Symbol	Description
	Indicates technical aspects which the user must observe.		Activate and release/tap/tip
	Switch off machine		Release
	Switch on machine		Press and keep pressed
			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		

2.3 Part of the complete documentation

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

The illustration shows a general example of a welding system.

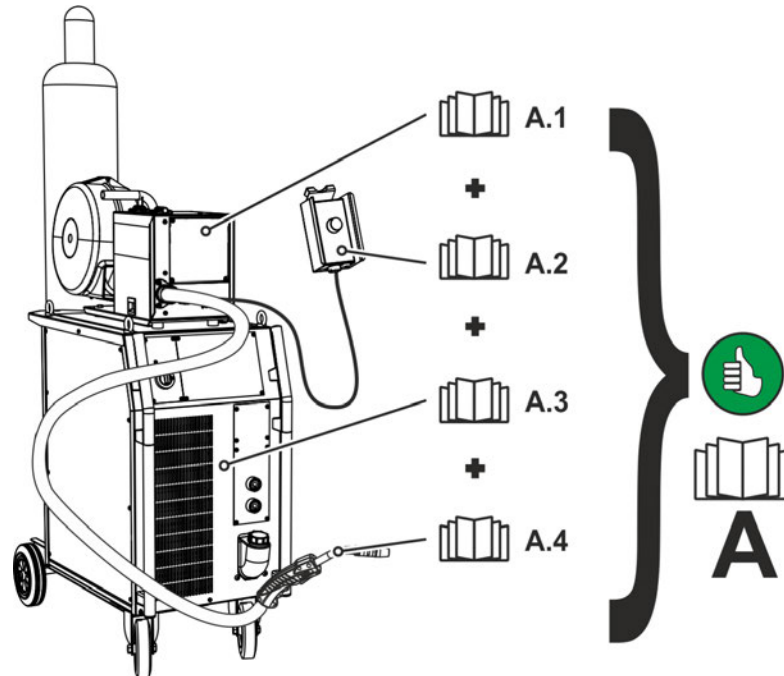


Figure 2-1

The illustration shows a general example of a welding system.

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

2.4 Safety instructions

WARNING



Risk of accidents due to non-compliance with the safety instructions!

Non-compliance with the safety instructions can be fatal!

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



Risk of injury from electrical voltage!

Voltages can cause potentially fatal electric shocks and burns on contact. Even low voltages can cause a shock and lead to accidents.

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



Hazard when interconnecting multiple power sources!

If a number of power sources are to be connected in parallel or in series, only a technical specialist may interconnect the sources as per standard *IEC 60974-9:2010: Installation and use* and German Accident Prevention Regulation *BVG D1 (formerly VBG 15)* or country-specific regulations.

Before commencing arc welding, a test must verify that the equipment cannot exceed the maximum permitted open circuit voltage.

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



Risk of injury due to improper clothing!

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

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



Risk of injury due to radiation or heat!

Arc radiation 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!**

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

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

⚠ CAUTION**Smoke and gases!**

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

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

**Noise exposure!**

Noise exceeding 70 dBA can cause permanent hearing damage!

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

**Obligations of the operator!**

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

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

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

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

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

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

CAUTION



Electromagnetic fields!

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



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

CAUTION



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



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



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

Setting up and operating

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

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

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

Recommendations for **reducing interference emission**

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

2.5 Transport and installation

⚠ WARNING



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

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

⚠ CAUTION



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

- Disconnect all supply lines before transport!



Risk of tipping!

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

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



The units are designed for operation in an upright position!

Operation in non-permissible positions can cause equipment damage.

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



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

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



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

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

3 Intended use

WARNING



Hazards due to improper usage!

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

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

3.1 Applications

Arc welding machine for 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).

3.1.1 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 Documents which also apply

3.2.1 Warranty



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

3.2.2 Declaration of Conformity



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

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

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

3.2.3 Welding in environments with increased electrical hazards



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

3.2.4 Service documents (spare parts and circuit diagrams)

⚠ WARNING

Do not carry out any unauthorised repairs or modifications!

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

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

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

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

Spare parts can be obtained from the relevant authorised dealer.

3.2.5 Calibration/Validation

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

Recommended calibration interval: 12 months

4 Machine description – quick overview

4.1 Front view

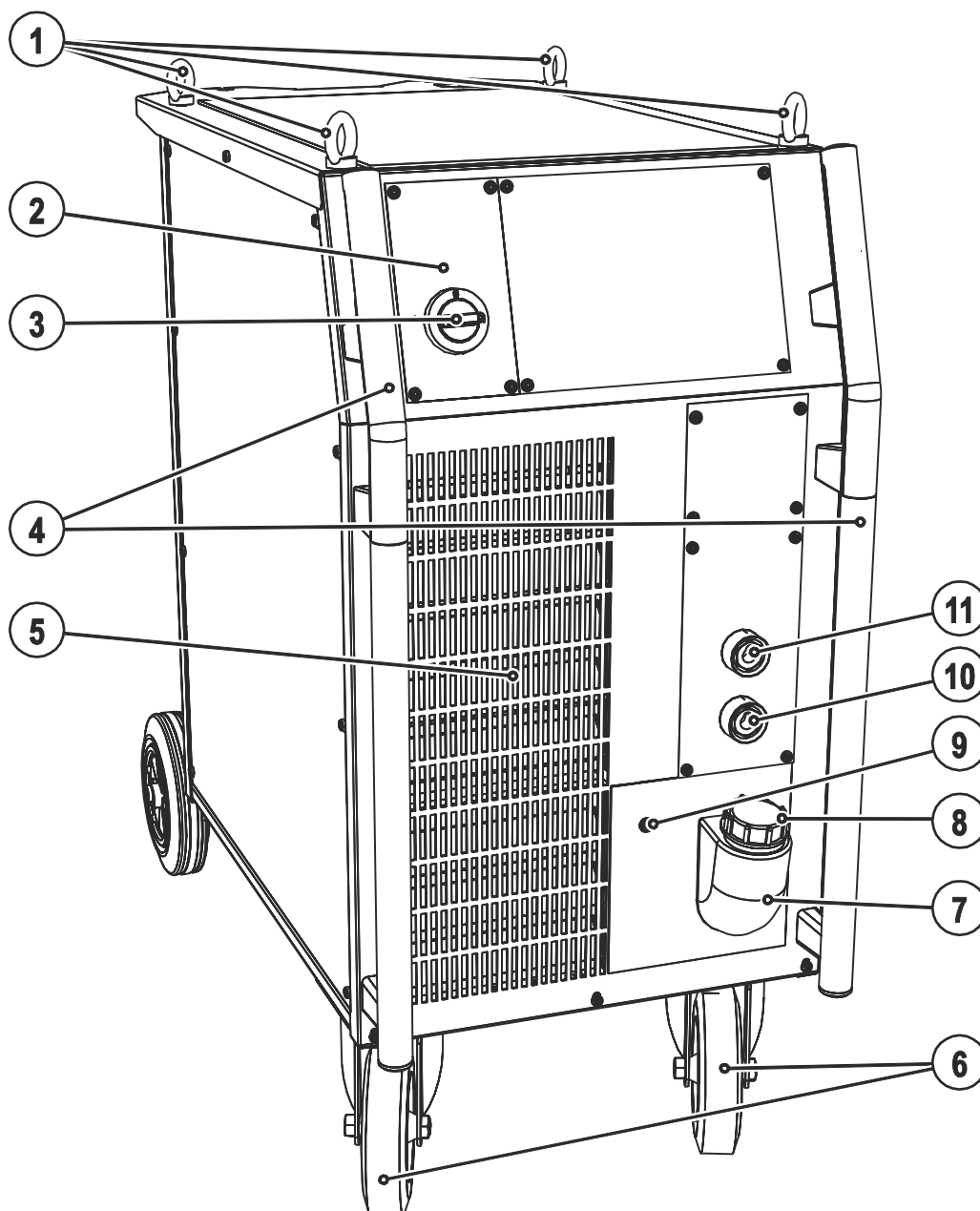







Figure 4-1

Item	Symbol	Description
1		Lifting lug
2		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
11		Connection socket, “+” welding current

4.2 Rear view

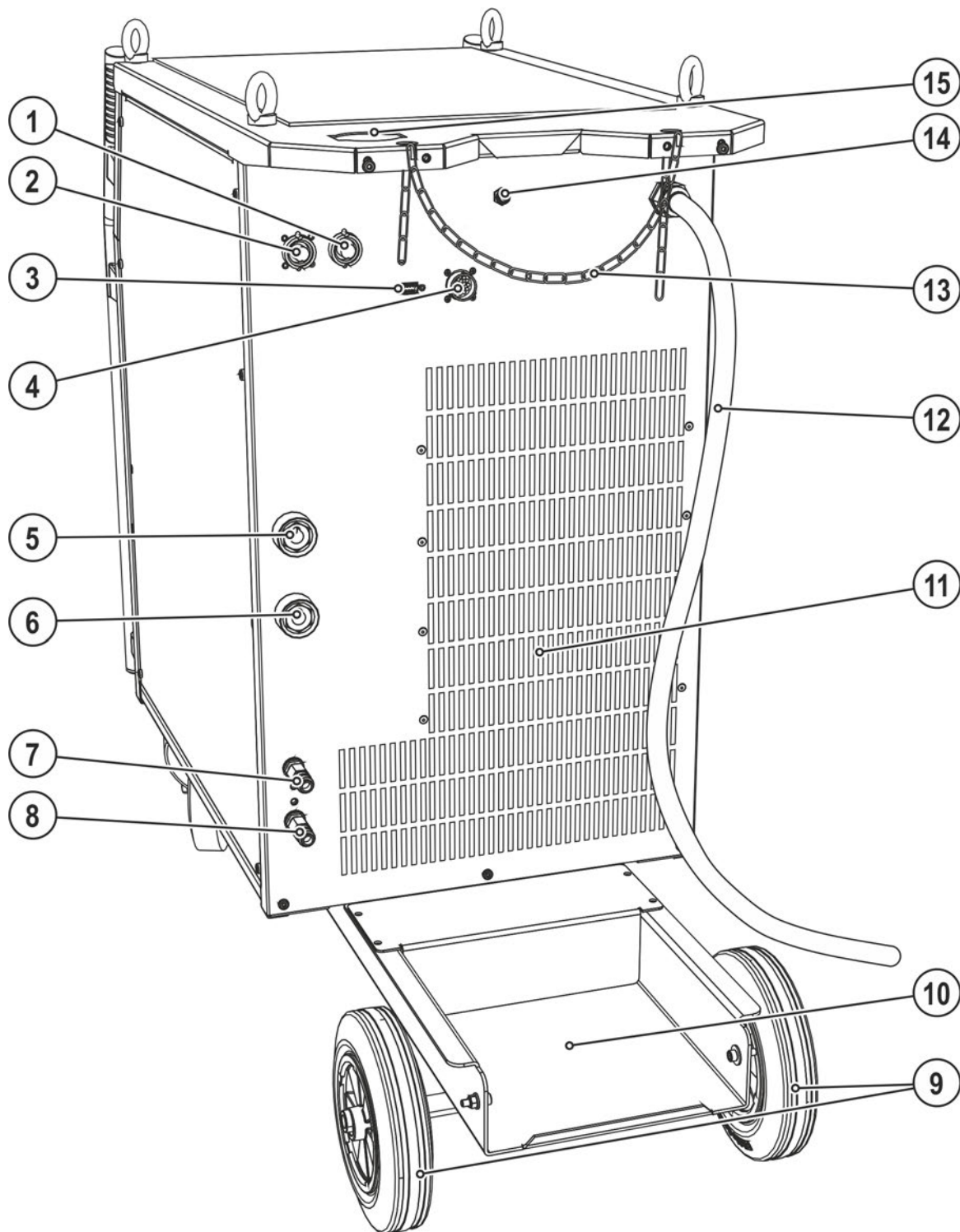








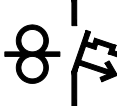


Figure 4-2

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)
▼ Retrofitting option ▼		
4	 analog	19-pole mechanised welding interface (analogue) > see 5.6 chapter
▲ Retrofitting option ▲		
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 5.1.8 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

⚠ 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



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.

5.1 Transport and installation

5.1.1 Lifting by crane

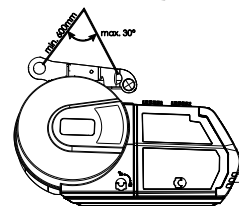
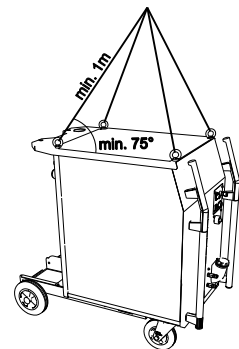
⚠ WARNING



Risk of injury during lifting by crane!

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

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



Craning principle



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!

5.1.2 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)!*

5.1.2.1 In operation

Temperature range of the ambient air:

- -25 °C to +40 °C

Relative air humidity:

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

5.1.2.2 Transport and storage

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

- -30 °C to +70 °C

Relative air humidity

- Up to 90% at 20 °C

5.1.3 Machine cooling



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

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

5.1.4 Workpiece lead, general

CAUTION



Risk of burning due to incorrect welding current connection!

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

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

5.1.5 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!

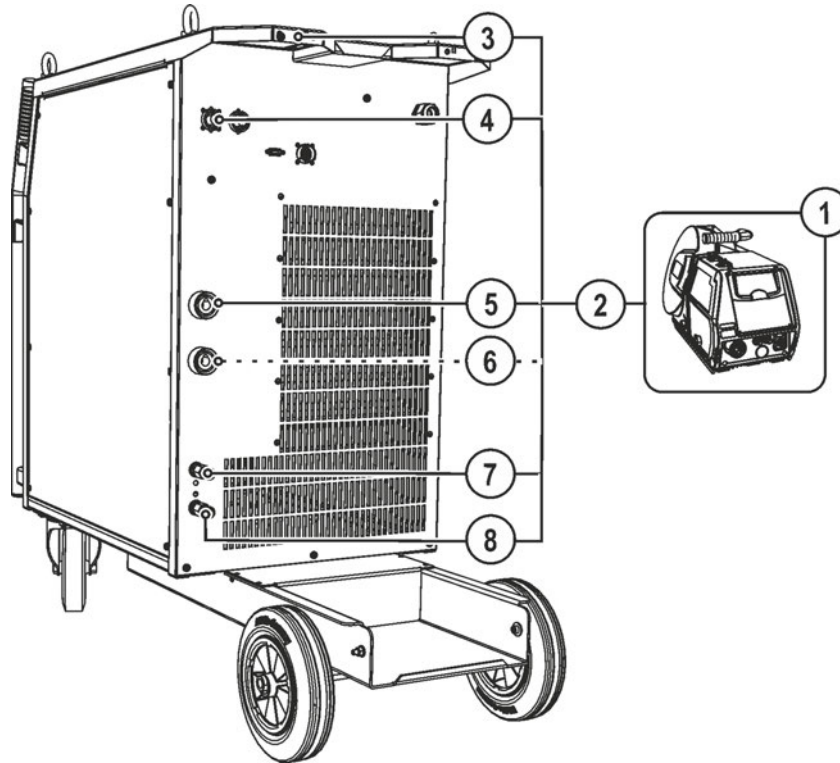


Figure 5-1

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).

5.1.6 Welding torch cooling system



Insufficient frost protection in the welding torch coolant!

Depending on the ambient conditions, different liquids are used for cooling the welding torch > see 5.1.6.1 chapter.

Coolants with frost protection (KF 37E or KF 23E) must be checked regularly to ensure that the frost protection is adequate to prevent damage to the machine or the accessory components.

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



Coolant mixtures!

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

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



Dispose of the coolant in accordance with local regulations and the material safety data sheets (German waste code number: 70104).

May not be disposed of in household waste.

Prevent entry into sewers.

Absorb with liquid-binding material (sand, gravel, acid-binding agents, universal binding agents, sawdust).

5.1.6.1 Approved coolants overview

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

5.1.6.2 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)

5.1.6.3 Adding coolant

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

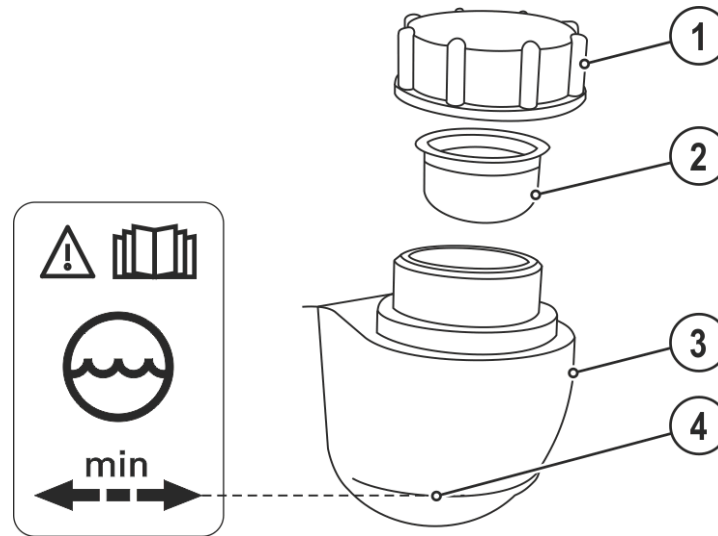


Figure 5-2

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 7.5 chapter.

5.1.7 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).

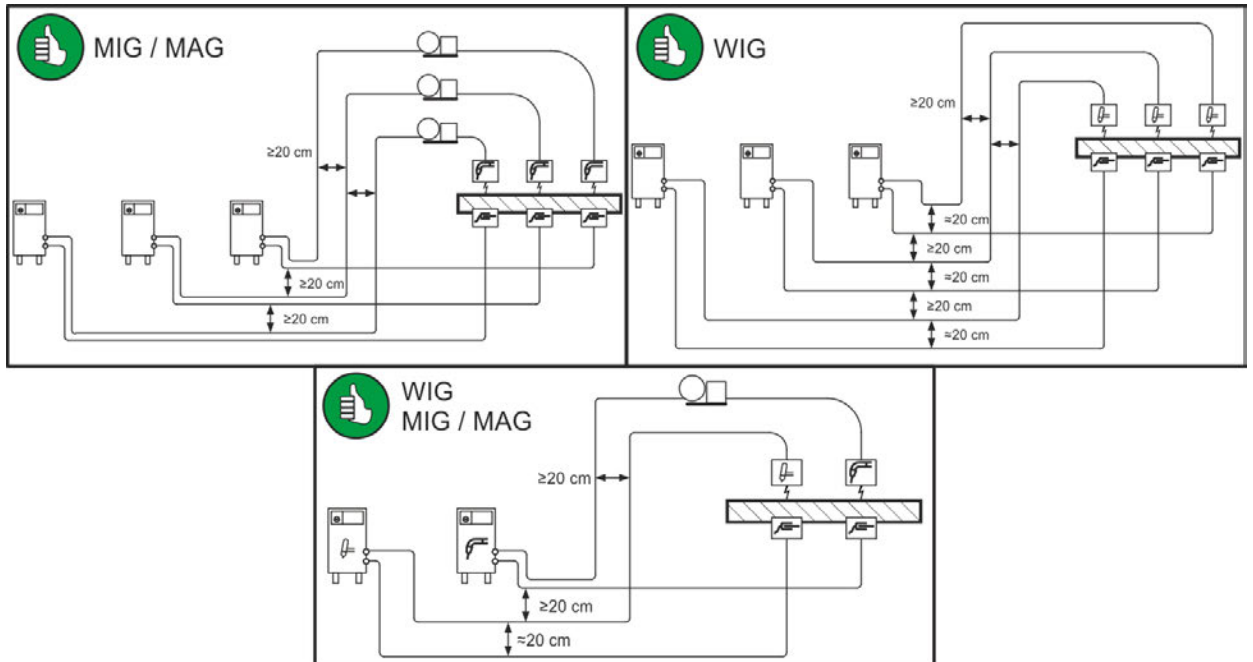


Figure 5-3



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

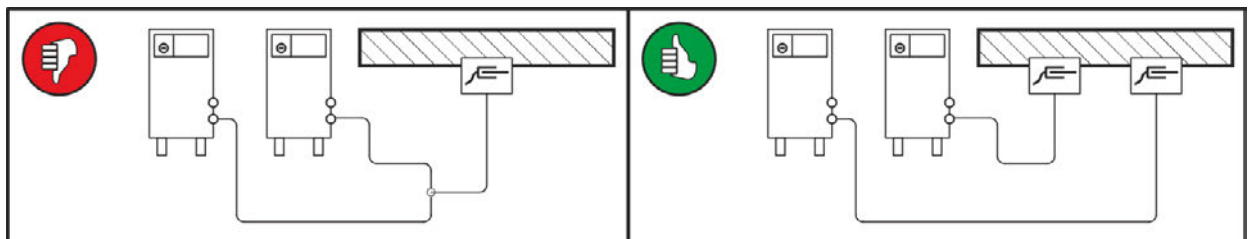


Figure 5-4



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.

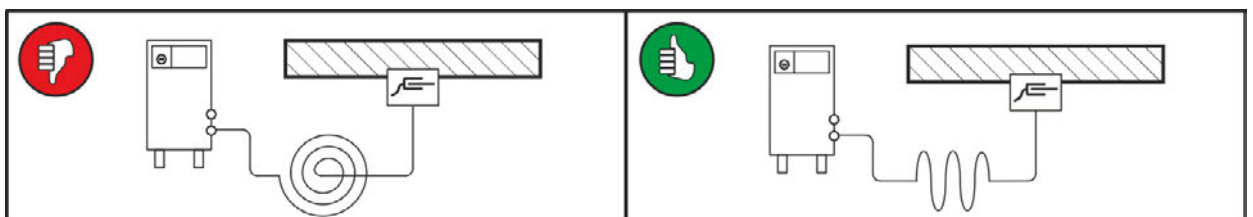


Figure 5-5

5.1.7.1 Stray welding currents

⚠ WARNING



Risk of injury due to stray welding currents!

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

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

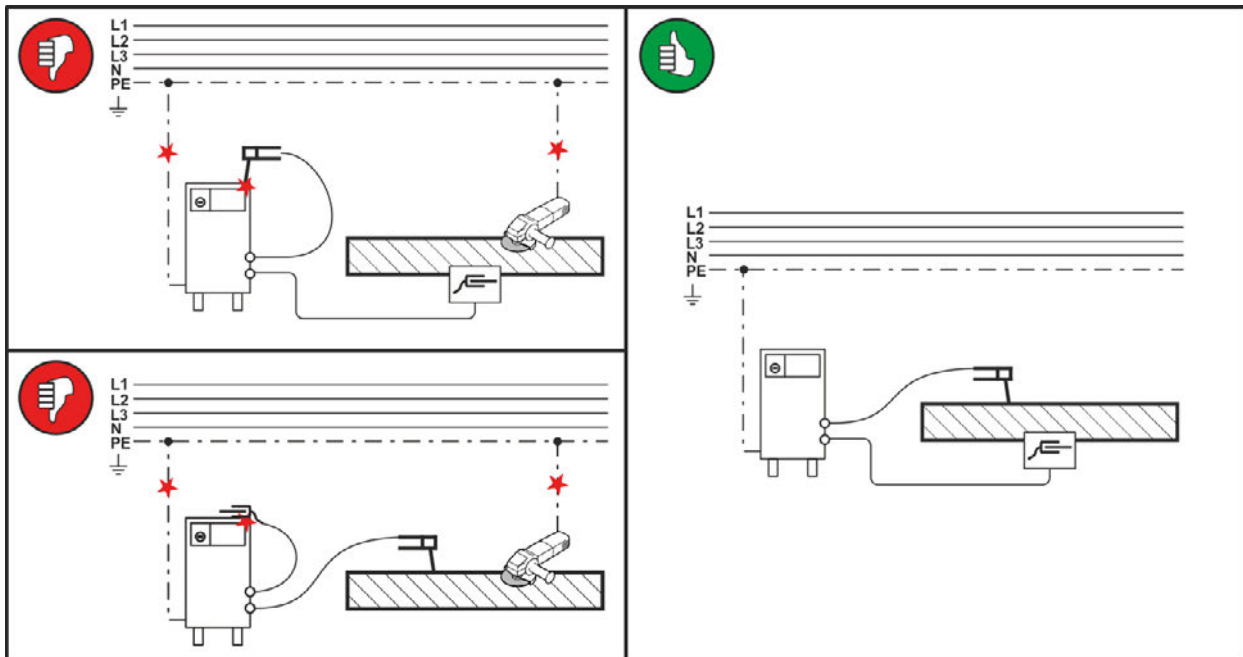


Figure 5-6

5.1.8 Mains connection

⚠ DANGER



Hazards caused by improper mains connection!

An improper mains connection can cause injuries or damage property!

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

5.1.8.1 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

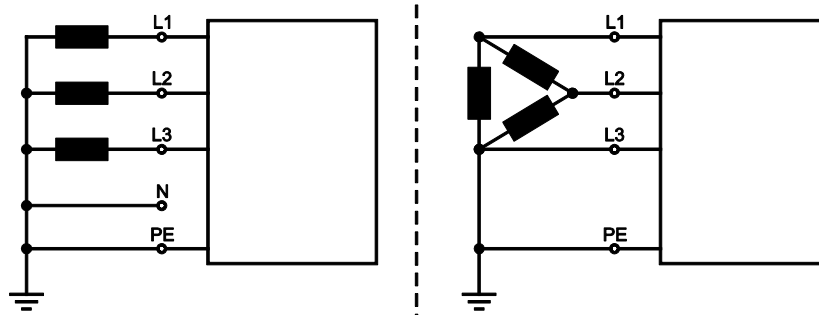


Figure 5-7

Legend

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

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

5.1.9 Aligning the cable resistance

The resistance value of cables can either be set directly or it can be aligned using the power source. The factory setting of the power sources is 8 mΩ. This value corresponds 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 realigning the cable resistance. It is recommended to align 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 aligned. For all other configurations it is sufficient to align the (rL1) parameter.

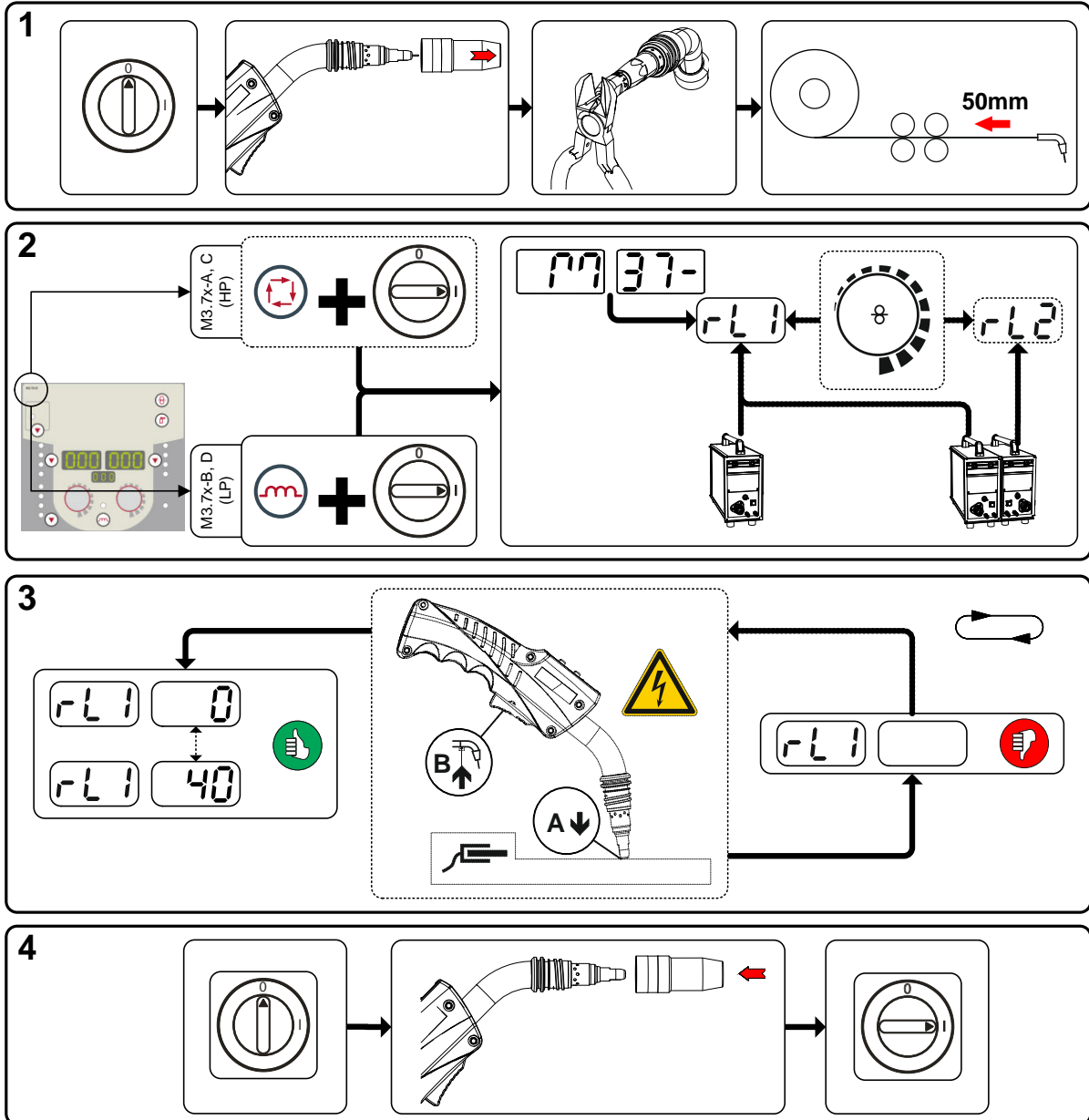


Figure 5-8

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 or choke effect" push-button while simultaneously switching on the welding machine. Release push-button.
 - "Welding parameter" push-button on the M3.7x-A and M3.7x-C control.
 - "Choke effect" push-button on the M3.7x-B and M3.7x-D control.
- The required parameter can now be selected using the 'Welding parameter setting' rotary knob. Parameter rL1 must be aligned 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 alignment with parameter rL2 must be performed.

3 Alignment/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 on 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.

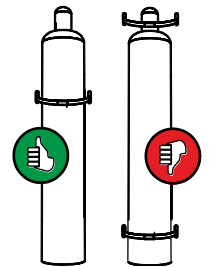
5.1.10 Shielding gas supply (shielding gas cylinder for welding machine)

⚠ WARNING



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

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



An unimpeded 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.**

5.1.10.1 Pressure regulator connection

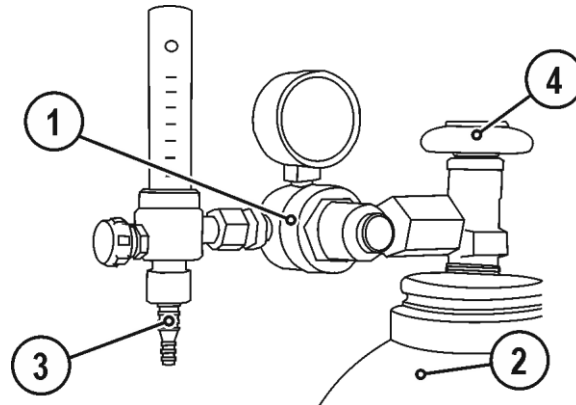


Figure 5-9

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

- Before connecting the pressure regulator to the gas cylinder, open the cylinder valve briefly to blow out any dirt.
- Tighten the pressure regulator screw connection on the gas bottle valve to be gas-tight.
- Screw gas hose connection crown nut onto the output side of the pressure regulator.

5.1.10.2 Gas test – setting the shielding gas volume

⚠ CAUTION



Electric shocks!

When setting the shielding gas quantity, high voltage ignition pulses or open circuit voltage are applied at the welding torch; these can lead to electric shocks and burning on contact.

- Keep the welding torch electrically insulated from persons, animals or equipment during the setting procedure.

- 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.
- You can activate the gas test on the machine control (see Control operating instructions) or by pressing the "Gas test/rinse hose package" push-button briefly (welding voltage and wire feed motor remain switched off – no unintentional ignition of the arc). Some welding systems have several push-buttons to set the shielding gas. The push-button is generally found near a wire feeder.

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

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!

Setting instructions

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)
TIG	Gas nozzle diameter in mm corresponds to l/min gas throughput

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

5.2 MIG/MAG welding

5.2.1 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!

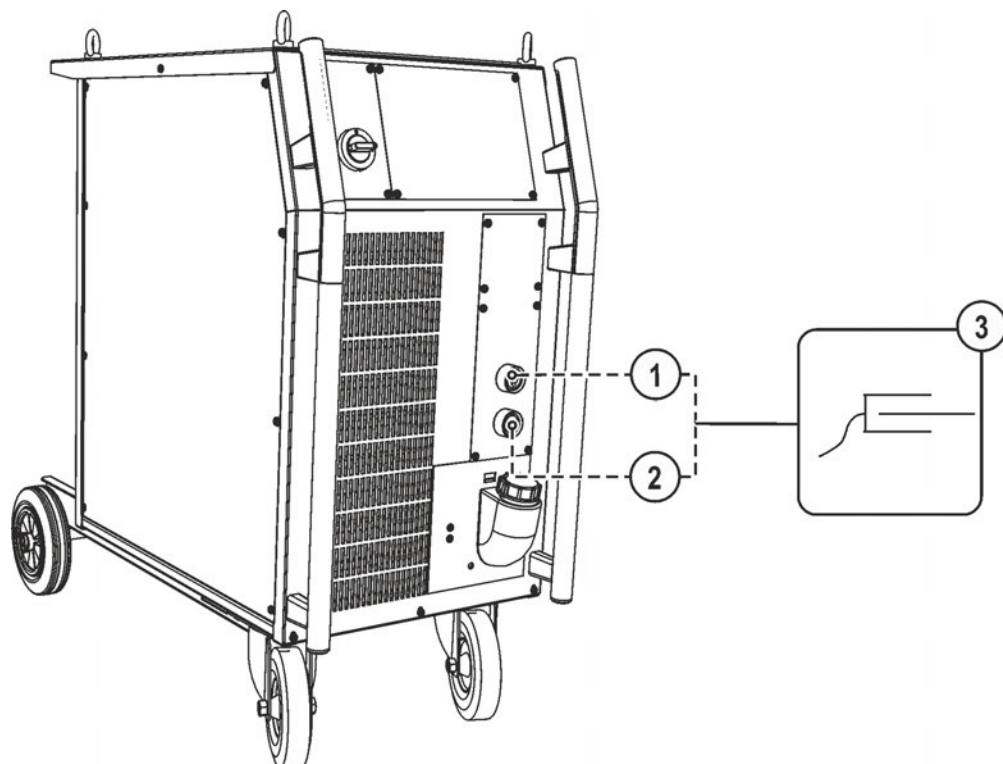


Figure 5-10

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.

5.2.2 Welding task selection



For selection of the welding task and for general operation see the relevant Wire feeder instructions.

5.3 TIG welding

5.3.1 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!*

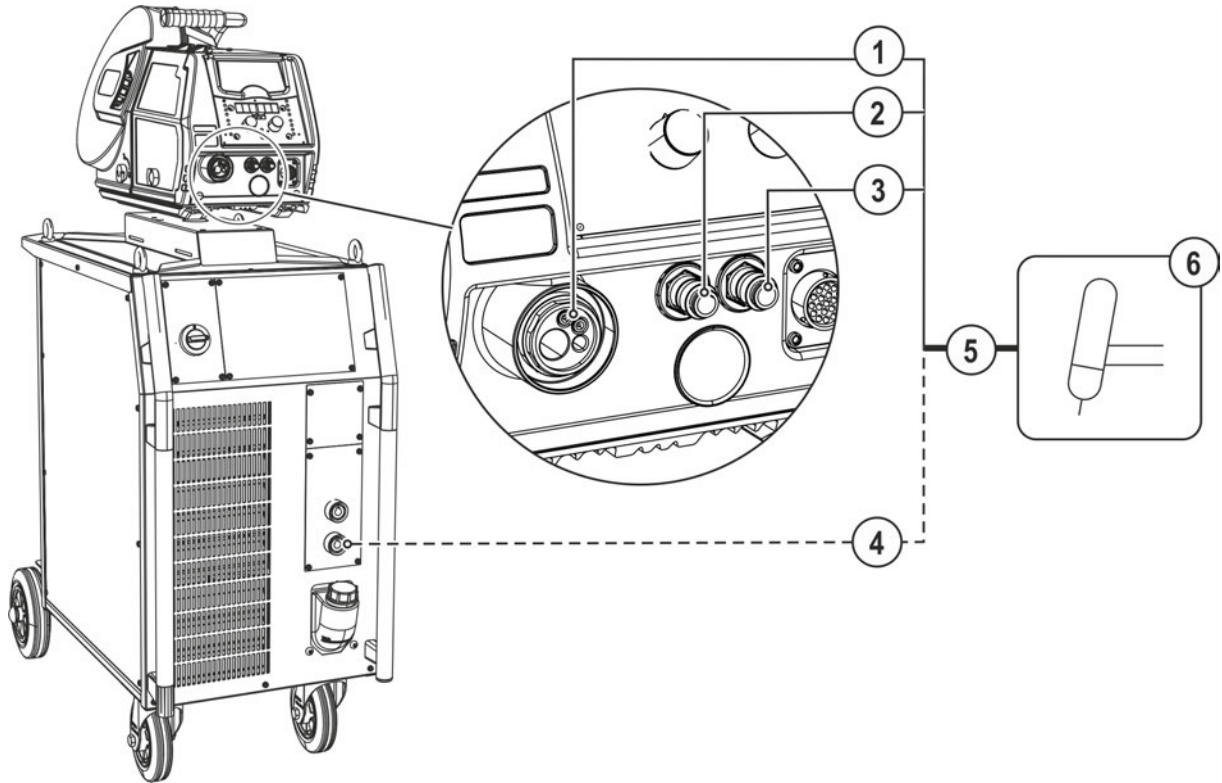


Figure 5-11

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).

5.3.2 Connection for workpiece lead

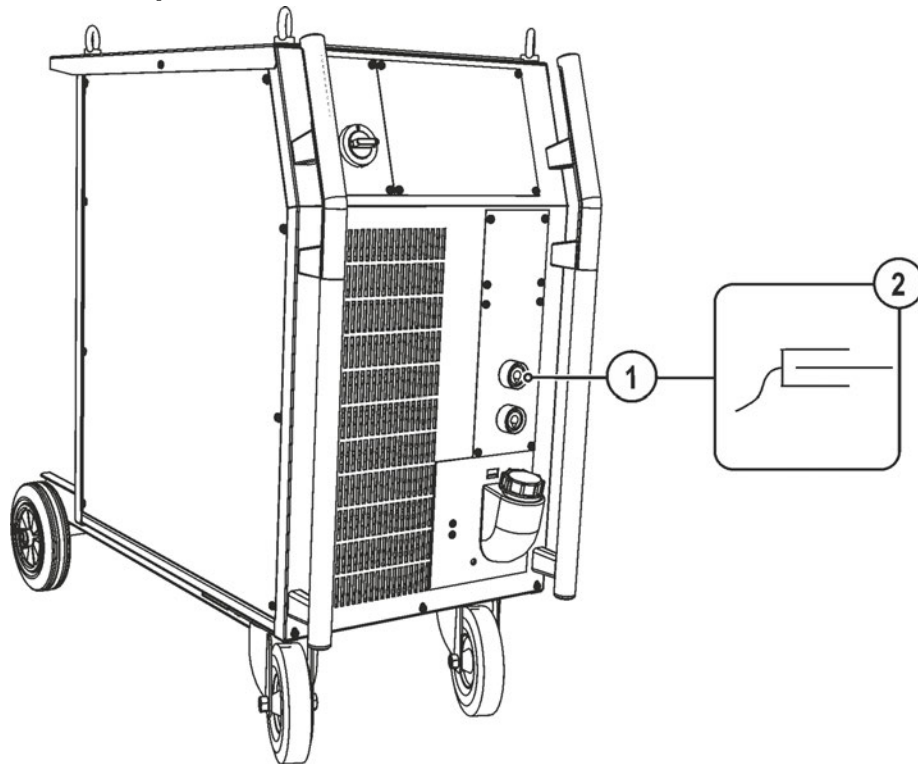


Figure 5-12

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.

5.3.3 Welding task selection



For selection of the welding task and for general operation see the relevant Wire feeder instructions.

5.4 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.

5.4.1 Connecting the electrode holder and workpiece lead



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

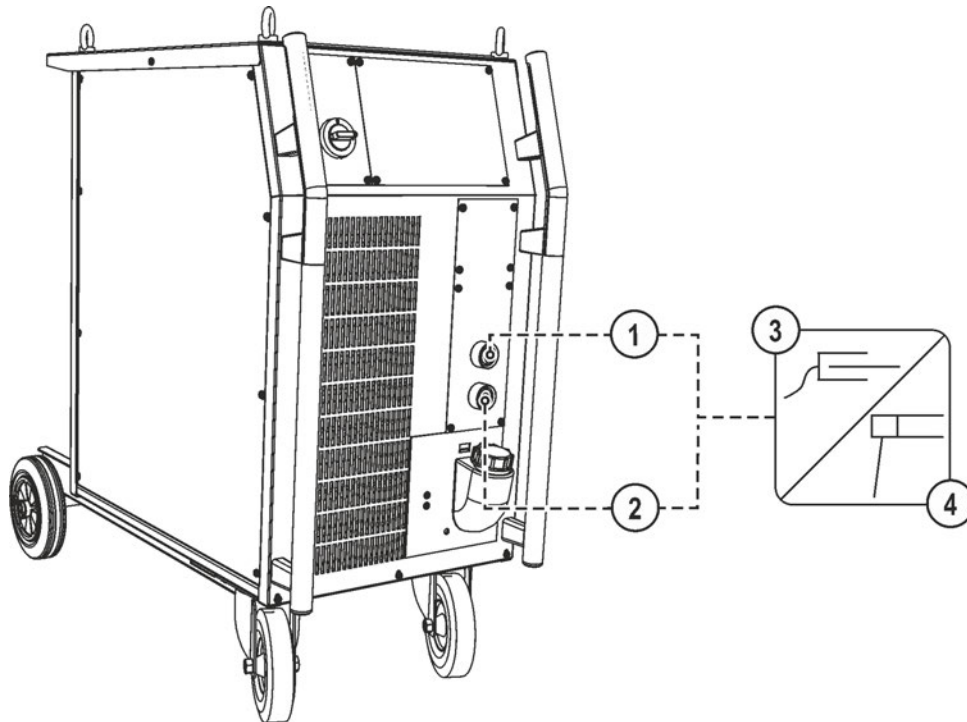


Figure 5-13

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.

5.4.2 Welding task selection



For selection of the welding task and for general operation see the relevant Wire feeder instructions.

5.5 Remote control

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

5.6 Interfaces for automation

WARNING



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

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

Unsuitable control cables or incorrect input/output signal assignment can cause damage to the machine. Use shielded control cables only.

5.6.1 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).

5.6.2 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.

5.6.3 BUSINT X11 Industrial bus interface

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

- Profinet/Profibus
- EnthernetIP/DeviceNet
- EtherCAT

etc.

5.7 PC interface



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)!***

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

6.1 General

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 maintenance instructions > see 6.3 chapter!
- The machine may only be put into operation again once the testing has been successful.



Risk of injury due to electrical voltage after switching off!

Working on an open machine can lead to fatal injuries!

Capacitors are loaded with electrical voltage during operation. Voltage remains present for up to four minutes after the mains plug is removed.

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

WARNING



Cleaning, testing and repair!

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

- In the event of failure of any one of the following tests, the machine must not be operated again until it has been repaired and a new test has been carried out.

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

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

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

6.2 Cleaning

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

6.3 Maintenance work, intervals

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.

6.3.1 Daily maintenance tasks

6.3.1.1 Visual inspection

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

6.3.1.2 Functional test

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

6.3.2 Monthly maintenance tasks

6.3.2.1 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

6.3.2.2 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.
- Check coolant tubes and their connections for impurities
- Check and clean the welding torch. Deposits in the torch can cause short circuits and have a negative impact on the welding result, ultimately causing damage to the torch.

6.3.3 Annual test (inspection and testing during operation)



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.

6.4 Disposing of equipment



Proper disposal!

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

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



6.4.1 Manufacturer's declaration to the end user

- According to European provisions (guideline 2012/19/EU of the European Parliament and the Council of Juli, 4th 2021), 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.

6.5 Meeting the requirements of RoHS

We, EWM AG in Mündersbach, Germany, hereby confirm that all products which we supply to you and that are subject to the RoHS directive comply with RoHS requirements (also see applicable EC directives on the Declaration of Conformity on your machine).

7 Rectifying faults

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

7.1 Checklist for rectifying faults



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

Legend	Symbol	Description
	↗	Fault/Cause
	✘	Remedy


Coolant error/no coolant flowing

- ↗ Insufficient coolant flow
 - ✘ Check coolant level and refill if necessary
- ↗ Air in the coolant circuit
 - ✘ Vent coolant circuit > see 7.5 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)
- ↗ 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)

 **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 (Err)	Category			Possible cause	Remedy
	a)	b)	c)		
1	-	-	x	Mains overvoltage	Check the mains voltages and compare with the welding machine connection voltages
2	-	-	x	Mains undervoltage	
3	x	-	-	Welding machine excess temperature	Allow the machine to cool down (mains switch to "1")
4	x	x	-	Low coolant level	Top up the coolant Leak in the coolant circuit > repair the leak and top up the coolant Coolant pump is not working > check excess current trigger on air cooling unit
5	x	-	-	Wire feeder/tachometer error	Check the wire feeder Speedometer is not emitting a signal, M3.51 defective > inform Service.
6	x	-	-	Shielding gas error	Check shielding gas supply (for machines with shielding gas monitoring)
7	-	-	x	Secondary overvoltage	Inverter error > inform Service
8	-	-	x	Earth fault between welding wire and earth line	Separate the connection between welding wire and casing or an earthed object
9	x	-	-	Fast cut-out Triggered by BUSINT X11 or RINT X12	Rectify error on robot
10	-	x	-	Arc interruption Triggered by BUSINT X11 or RINT X12	Check wire feeding
11	-	x	-	Ignition error after 5 s Triggered by BUSINT X11 or RINT X12	Check wire feeding
13	x	-	-	Emergency stop deactivation	Check the emergency stop circuit at the interface for automated welding
14	-	x	-	Wire feeder not detected. Control cable not connected.	Check cable connections.
				Incorrect ID numbers assigned during operation with multiple wire feeders.	Check ID number assignation
15	-	x	-	Wire feeder 2 not detected. Control cable not connected.	Check cable connections.
16	-	-	x	VRD (open circuit voltage reduction error).	Inform Service.
17	-	x	x	Excess current detection on wire feeder	Check wire feeding
18	-	x	x	No speedometer signal from second wire feeder (slave drive)	Check the connection and particularly the speedometer for the second wire feeder (slave drive).
56	-	-	x	Mains phase failure	Check mains voltages

Error (Err)	Category			Possible cause	Remedy
	a)	b)	c)		
59	-	-	x	Machine incompatible	Check machine used
60	-	-	x	Software update required	Inform Service.

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 push-button:

Welding machine control	Push-button
RC1 / RC2	
Expert	
Expert 2.0	
CarExpert / Progress (M3.11)	
alpha Q / Concept / Basic / Basic S / Synergic / Synergic S / Progress (M3.71) / Picomig 305	not possible

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

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

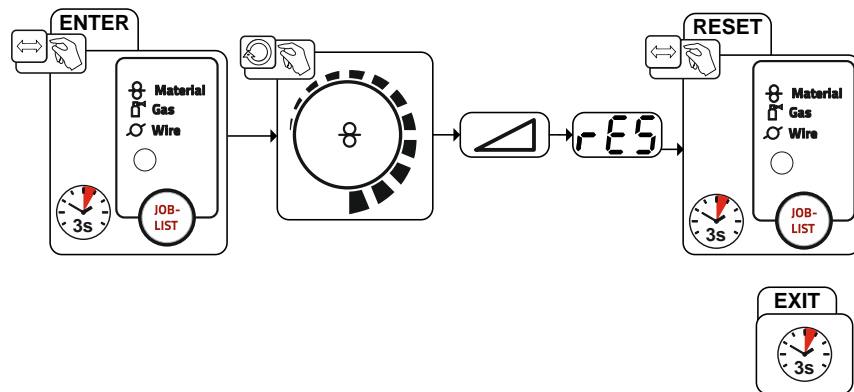


Figure 7-1

Display	Setting/selection
	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.

7.3.2 Resetting all JOBs

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

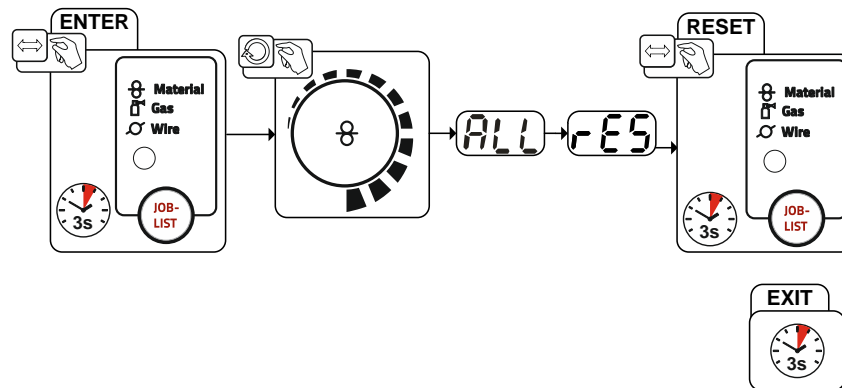


Figure 7-2

Display	Setting/selection
	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 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!

7.5 Vent coolant circuit



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



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

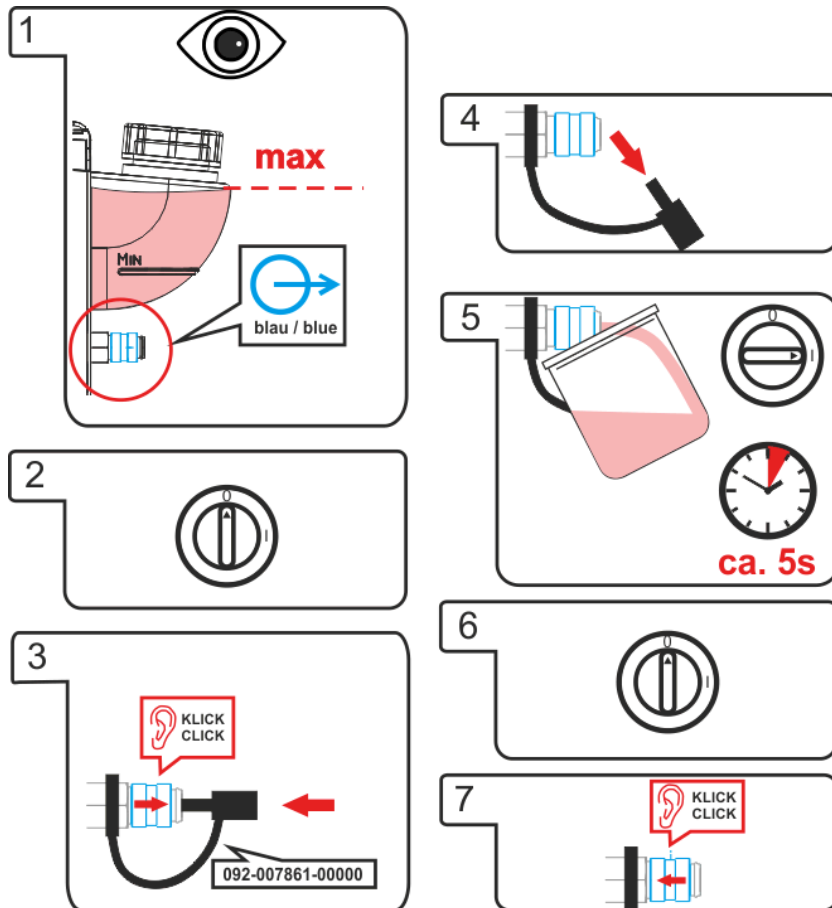



Figure 7-3

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%		
Ambient temperature*	–25 °C to +40 °C		
Machine/torch cooling	Fan (AF)/gas or water		
Noise level	< 70 dB(A)		
Workpiece lead	70 mm ²		
Insulation class/protection classification	H/IP 23		
EMC class	A		
Safety identification			
Harmonised standards used	IEC 60974-1, -2, -10		
Cooling capacity at 1 l/min.	1500 W		
Max. flow rate	5 l/min.		
Max. coolant outlet pressure	3.5 bar		
Tank capacity	12 l		
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		

 ***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%		
Ambient temperature*	–25 °C to +40 °C		
Machine/torch cooling	Fan (AF)/gas or water		
Noise level	< 70 dB(A)		
Workpiece lead	70 mm ²		
Insulation class/protection classification	H/IP 23		
EMC class	A		
Safety identification			
Harmonised standards used	IEC 60974-1, -2, -10		
Cooling capacity at 1 l/min.	1500 W		
Max. flow rate	5 l/min.		
Max. coolant outlet pressure	3.5 bar		
Tank capacity	12 l		
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		



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


8.3 Phoenix 451 FDW

	TIG	MMA	MIG/MAG
Setting range for welding current	5 A–450 A		
Setting range for welding voltage	10.2 V–28.0 V	20.2 V–38.0 V	14.3 V–36.5 V
Duty cycle at 40 °C (100% DC)	450 A (80% DC)		
	420 A (100% DC)		
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	16.3 kVA	22.0 kVA	21.1 kVA
Recommended generator rating	29.7 kVA		
cos ϕ /efficiency	0.99/90%		
Ambient temperature*	–25 °C to +40 °C		
Machine/torch cooling	Fan (AF)/gas or water		
Noise level	< 70 dB(A)		
Workpiece lead	70 mm ²		
Insulation class/protection classification	H/IP 23		
EMC class	A		
Safety identification			
Harmonised standards used	IEC 60974-1, -2, -10		
Cooling capacity at 1 l/min.	1500 W		
Max. flow rate	5 l/min.		
Max. coolant outlet pressure	3.5 bar		
Tank capacity	12 l		
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		



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


8.4 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 \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	19.3 kVA	25.6 kVA	24.9 kVA
Recommended generator rating	34.6 kVA		
cos ϕ /efficiency	0.99/90%		
Ambient temperature*	–25 °C to +40 °C		
Machine/torch cooling	Fan (AF)/gas or water		
Noise level	< 70 dB(A)		
Workpiece lead	70 mm ²		
Insulation class/protection classification	H/IP 23		
EMC class	A		
Safety identification			
Harmonised standards used	IEC 60974-1, -2, -10		
Cooling capacity at 1 l/min.	1500 W		
Max. flow rate	5 l/min.		
Max. coolant outlet pressure	3.5 bar		
Tank capacity	12 l		
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		



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

8.5 Phoenix 551 FDW

	TIG	MMA	MIG/MAG
Setting range for welding current	5 A–550 A		
Setting range for welding voltage	10.2 V–32.0 V	20.2 V–42.0 V	14.3 V–41.5 V
Duty cycle at 40 °C (100% DC)	550 A (60% DC)		
	420 A (100% DC)		
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	22.6 kVA	29.5 kVA	29.2 kVA
Recommended generator rating	39.8 kVA		
cos ϕ /efficiency	0.99/90%		
Ambient temperature*	–25 °C to +40 °C		
Machine/torch cooling	Fan (AF)/gas or water		
Noise level	< 70 dB(A)		
Workpiece lead	95 mm ²		
Insulation class/protection classification	H/IP 23		
EMC class	A		
Safety identification			
Harmonised standards used	IEC 60974-1, -2, -10		
Cooling capacity at 1 l/min.	1500 W		
Max. flow rate	5 l/min.		
Max. coolant outlet pressure	3.5 bar		
Tank capacity	12 l		
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		



**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 LP	Wire feeder, water-cooled, Euro torch connector	090-005412-00502
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 HP	Wire feeder, water-cooled, Euro torch connector	090-005392-00502
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 IC LP	Wire feeder, water-cooled, Euro torch connector	090-005415-00502
drive 4X IC HP	Wire feeder, water-cooled, Euro torch connector	090-005414-00502

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
DM 842 Ar/CO2 230bar 30l D	Pressure regulator with manometer	394-002910-00030
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 HS XX1	Mount for hose packages and remote control	092-002910-00000
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 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

Headquarters

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EWM AG
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