



EN

Welding machine

Pico 350 cel puls pws dgs

099-002127-EW501

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23.03.2017

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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.

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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.

2.1.1 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		

2.2 Part of the complete documentation

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

The illustration shows a general example of a welding system.

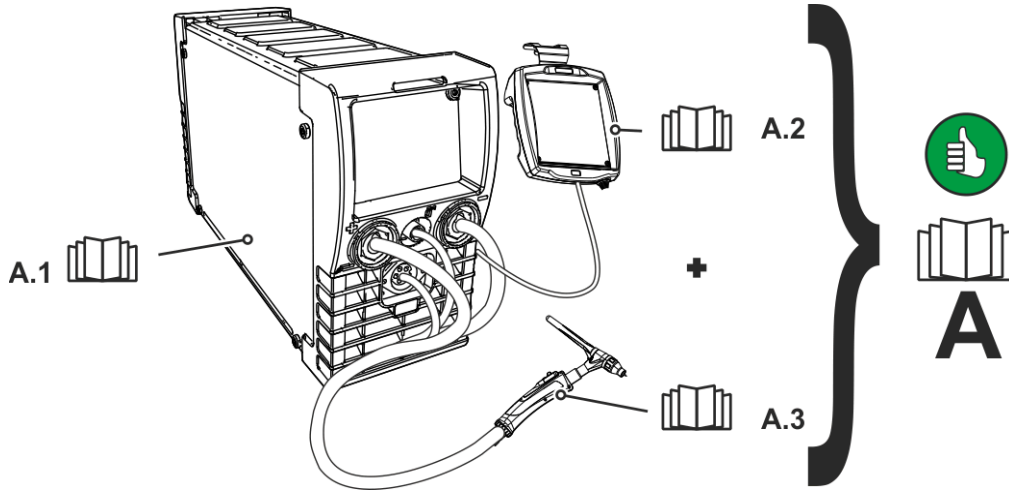


Figure 2-1

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

2.3 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!

⚠ WARNING**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!

**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

2.4 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 system for MMA DC welding with pole reversing switch for quick polarity switching and, as secondary process, TIG DC welding with lift arc (touch starting) or MIG/MAG welding with constant voltage (CV) or constant current (CC).

3.1.1 Degaussing

By degaussing ferromagnetic workpieces for welding tasks, arc deflection, arc instability, irregular droplet detachment, spatter and irregular sidewall fusion are reduced.

3.1.2 MIG/MAG standard welding



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

	Pico drive 4L	Pico drive 200C
Pico 350		<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

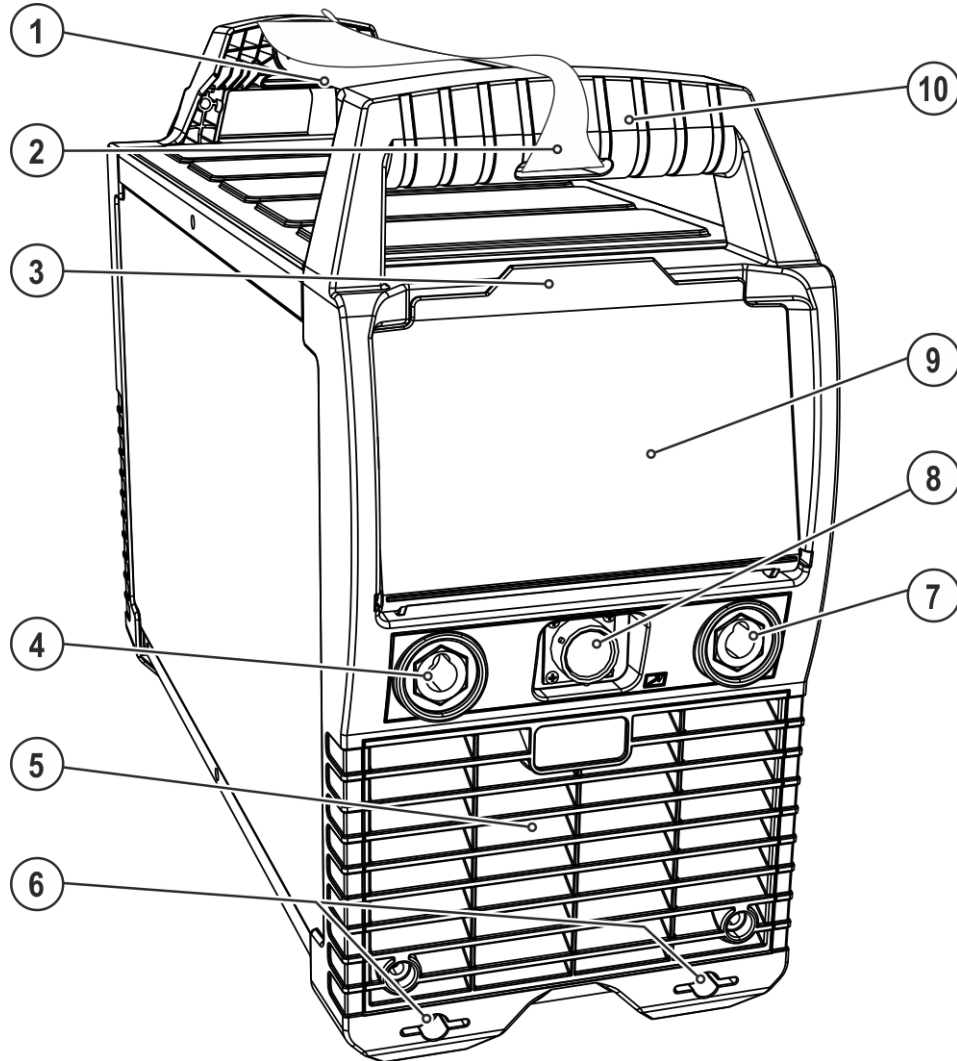


Figure 4-1

Item	Symbol	Description
1		Transport bar
2		Carrying strap > see 5.1.4 chapter
3		Protective cap
4	+ - 	Connection socket, welding current (workpiece) The welding current polarity (+/-) can be reversed by pressing the welding current polarity push-button (except with TIG welding) and is indicated by a signal light above the relevant welding current socket. How to connect the accessories depends on the welding procedure. Please observe the connection description for the corresponding welding procedure > see 5 chapter.
5		Cooling air inlet Dirt filter can be retrofitted
6		Machine feet
7	+ - 	Connection socket, welding current (electrode holder) The welding current polarity (+/-) can be reversed by pressing the welding current polarity push-button (except with TIG welding) and is indicated by a signal light above the relevant welding current socket. How to connect the accessories depends on the welding procedure. Please observe the connection description for the corresponding welding procedure > see 5 chapter.

Item	Symbol	Description
8		19-pole connection socket Control cable for remote control and/or wire feeder
9		Protective cap, welding machine control > see 4.3 chapter
10		Carrying handle

4.2 Rear view

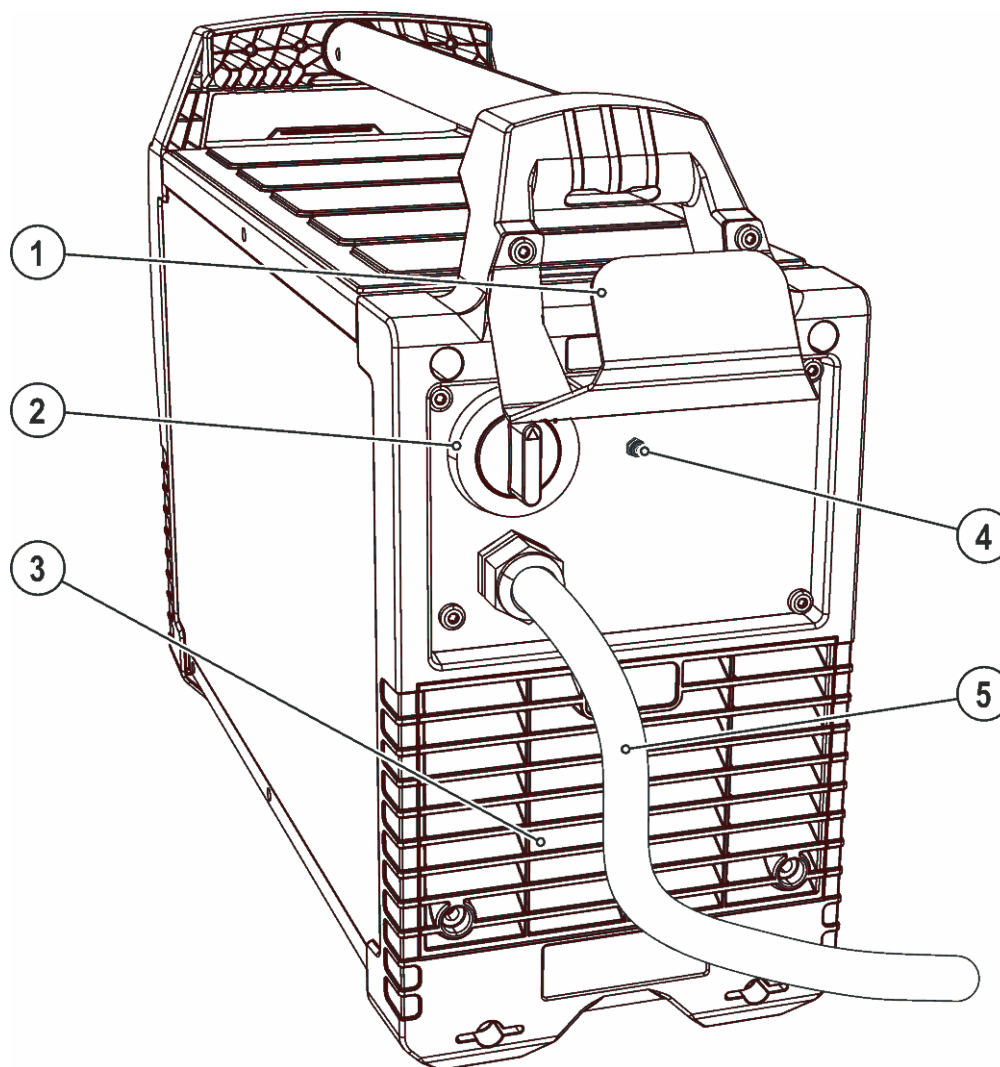


Figure 4-2

Item	Symbol	Description
1		Cable holder
2		Main switch, machine on/off
3		Cooling air outlet
4		Key button, automatic cutout Wire feed motor supply voltage fuse press to reset a triggered fuse
5		Mains connection cable > see 5.1.9 chapter

4.3 Machine control – Operating elements

Operating elements that are not listed have no function!

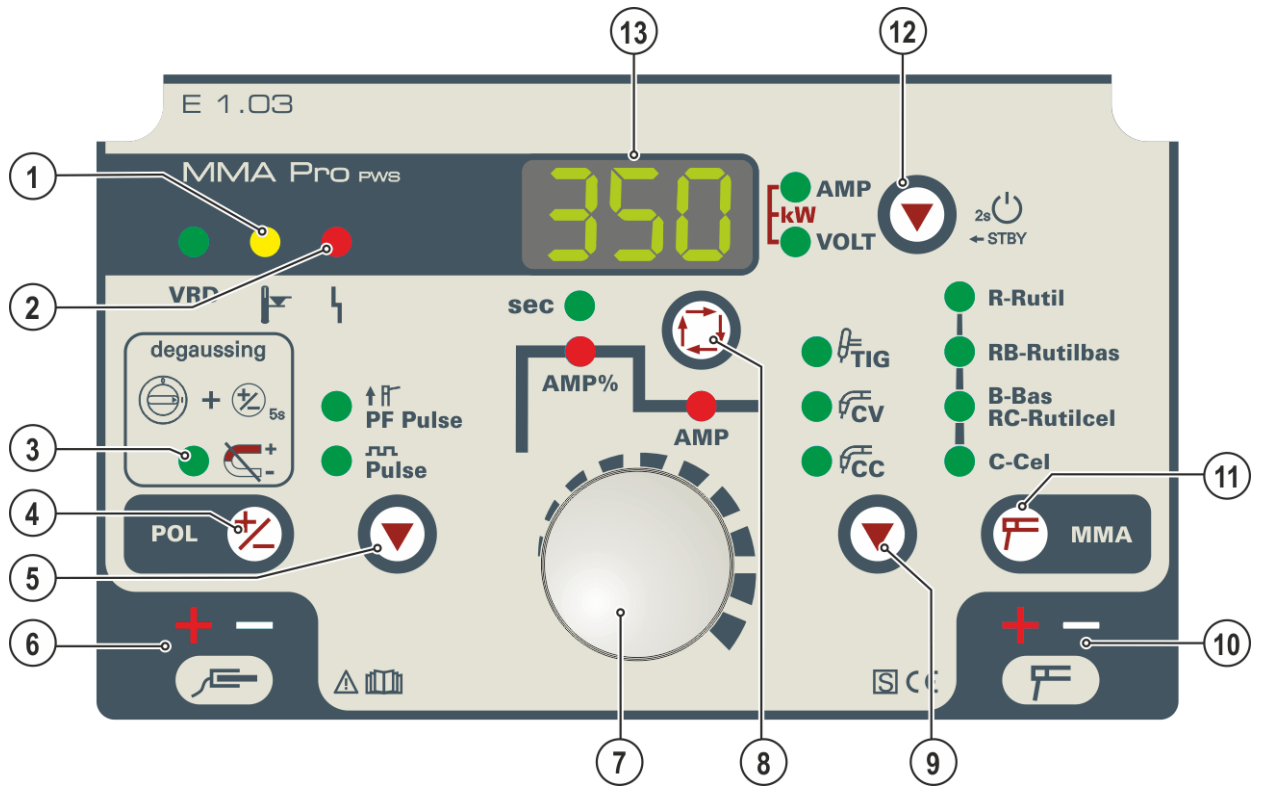







Figure 4-3

Item	Symbol	Description
1		Excess temperature signal light In case of excess temperature, temperature monitors de-activate the power unit, and the excess temperature control lamp comes on. Once the machine has cooled down, welding can continue without any further measures.
2		Collective interference signal light For error messages, > see 7 chapter
3		Degaussing signal light The degaussing signal light flashes during the degaussing process.
4		Welding current polarity (pole reversal)/degaussing push-button. Use this push-button to reverse the welding current polarity of the welding current sockets. Signal lights at the welding current sockets show the polarity selected. Use this push-button to start and stop the degaussing process.
5		Pulsing push-button ↑ ▬ ----- PF pulsing (MMA) ▬ ▬ ----- Pulsing (MMA/TIG)
6		Welding current polarity signal light The signal light shows the selected polarity at the welding current socket below. Use the welding current polarity push-button to reverse the welding current polarity of the welding current sockets.
7		Welding parameter setting rotary transducer Setting of welding current and other welding parameter and their values
8		Select welding parameters button This button is used to select the welding parameters depending on the welding process and operating mode used.

Item	Symbol	Description
9		Welding procedure selection push-button TIG ----- TIG welding CV ----- MIG/MAG welding with constant voltage characteristics Default characteristics "CV constant voltage" for nearly all MIG/MAG processes CC ----- MIG/MAG welding with constant current characteristics Used for special wires (flux cored wires), which, according to the manufacturer, are to be welded using "CC constant current"
10		Welding current polarity signal light The signal light shows the selected polarity at the welding current socket below. Use the welding current polarity push-button to reverse the welding current polarity of the welding current sockets.
11		Welding procedure/MMA characteristics selection push-button Select MMA welding procedure and electrode type R ----- Electrode type rutile RB ----- Electrode type rutile-basic B / RC -- Electrode type basic/rutile-cellulose C ----- Electrode type cellulose
12		Display/Power-saving mode switching push-button AMP ----- Welding current display VOLT --- Welding voltage display kW ----- Welding performance display (both signal lights are illuminated) STBY --- Press for 2 s to put machine into power-saving mode. To reactivate, activate one of the operating elements.
13		Welding data display (3-digit) Displays the welding parameters and the corresponding values > see 5.2 chapter

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!

5.1 Transport and installation

⚠ WARNING



Risk of accident due to improper transport of machines that must not be lifted!

Do not lift or suspend the machine! The machine can drop and cause injuries! The handles, straps or brackets are suitable for transport by hand only!


- The machine must not be suspended or lifted using a crane.

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

5.1.1 Ambient conditions

 **The machine may only be placed and operated on a suitable, load-bearing and even surface (according to IP 34s in case of outside operation as well)!**

- **Ensure the machine is operated on an even, anti-slip floor and provide sufficient lighting of the work area.**
- **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)!**

5.1.1.1 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

5.1.1.2 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

5.1.2 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!**

5.1.3 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!

5.1.4 Adjusting the length of the carrying strap



To demonstrate adjustment, lengthening the strap is shown in the figure. To shorten, the strap's loops must be inched in the opposite direction.

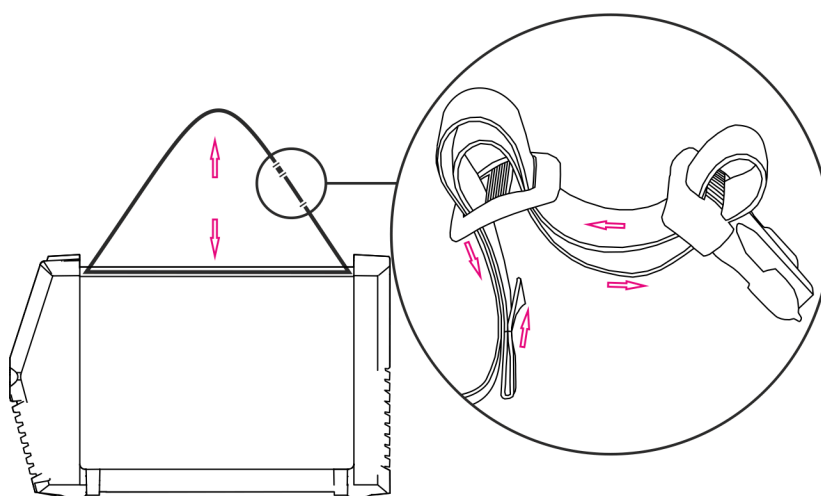


Figure 5-1

5.1.5 Cable strap

In the delivery state, the machine has a cable strap for easy and orderly transport of earth lead, welding torch, electrode holder etc. The following figure shows the fastened strap and how the components can be secured.

The machine itself may not be transported with this cable strap!

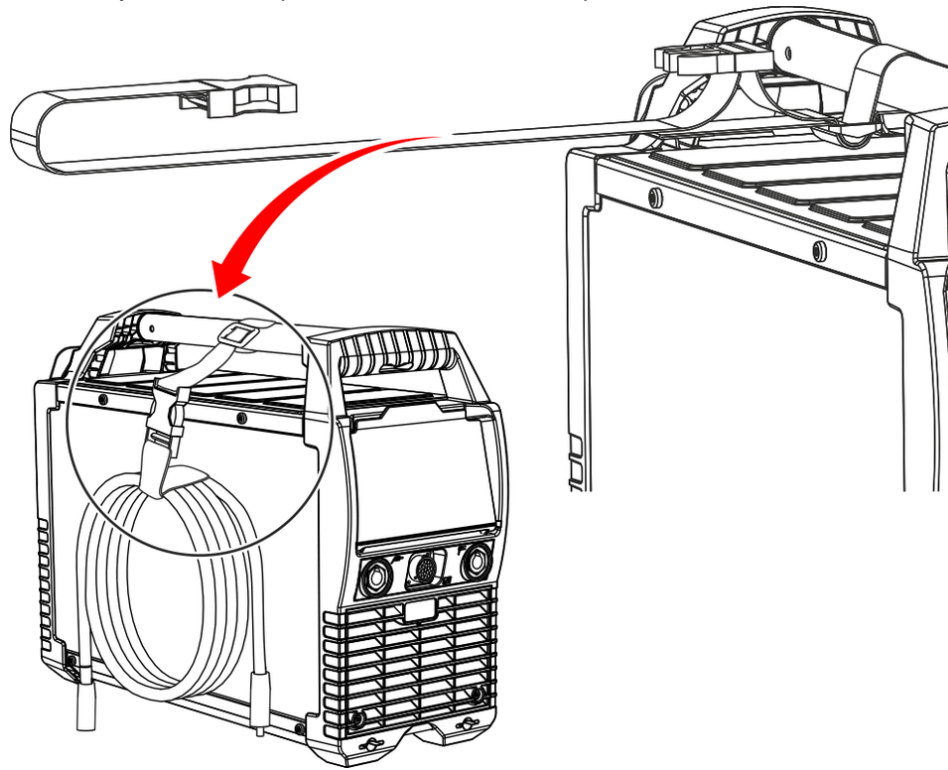


Figure 5-2

5.1.6 Cable holder

The machine is supplied with a cable holder with mounting material. This cable holder can be used to coil and conveniently transport the mains cable. Install the cable holder as shown in the figure.

5.1.6.1 Deinstallation/Installation

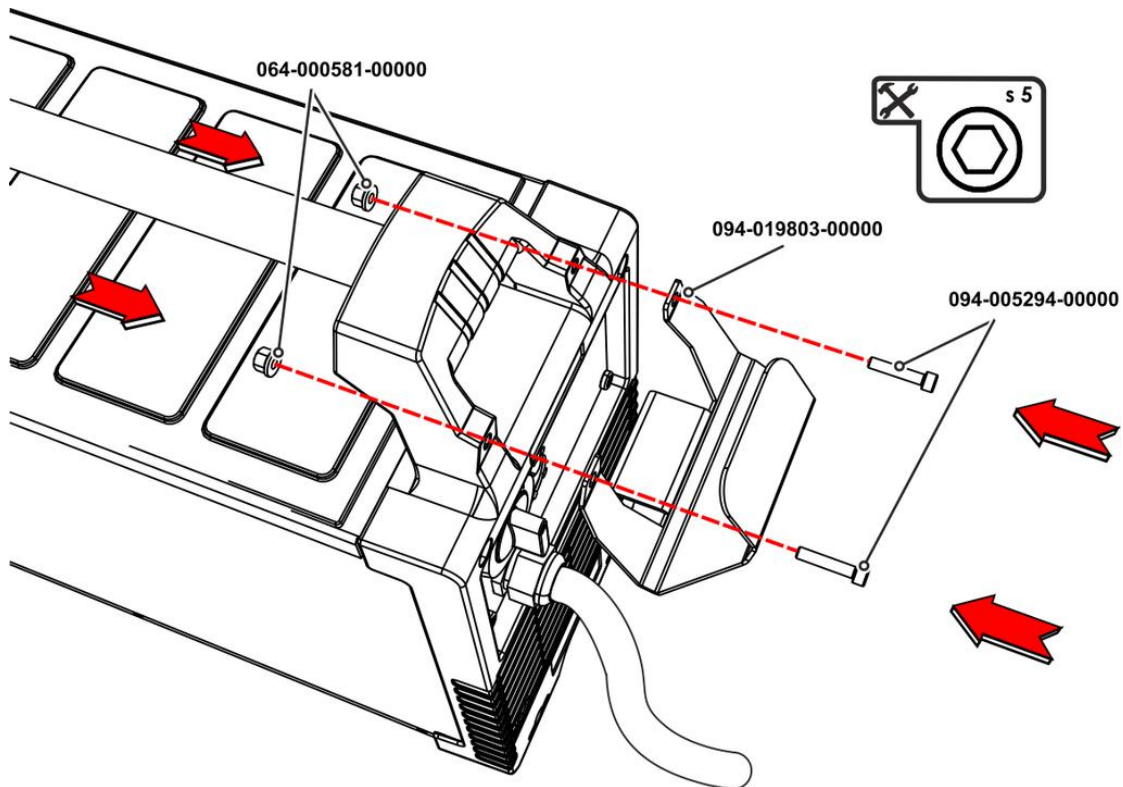


Figure 5-3

5.1.6.2 Application

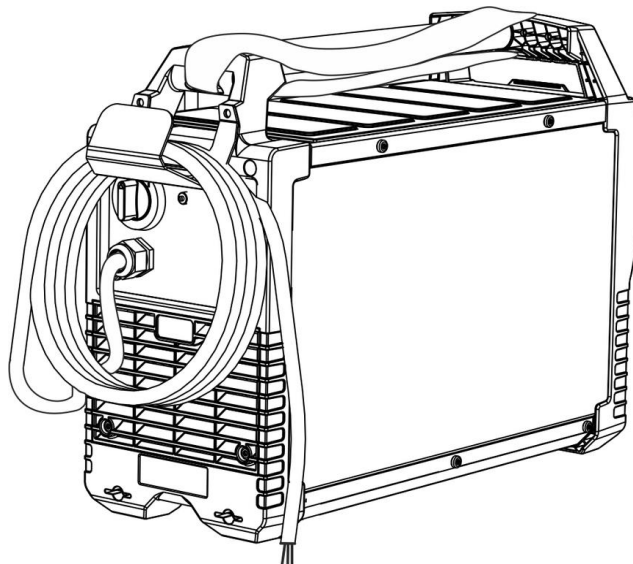


Figure 5-4

5.1.7 Protective flap, welding machine control

5.1.7.1 Deinstallation/Installation

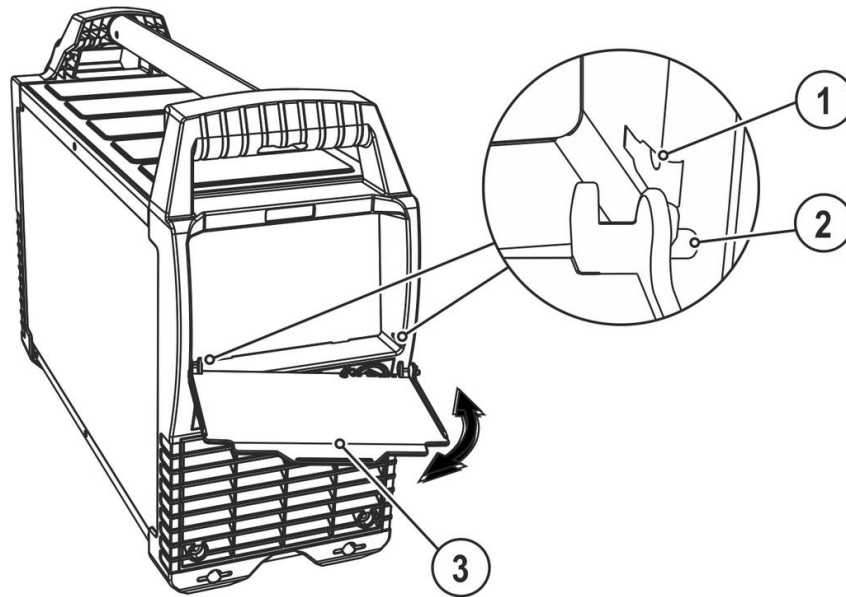


Figure 5-5

Item	Symbol	Description
1		Seating hole for mounting nipple
2		Mounting nipple, protective cap
3		Protective cap

- Remove the protective cap by gently pressing from the side while simultaneously pulling. To attach, insert and snap into place.

5.1.8 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).

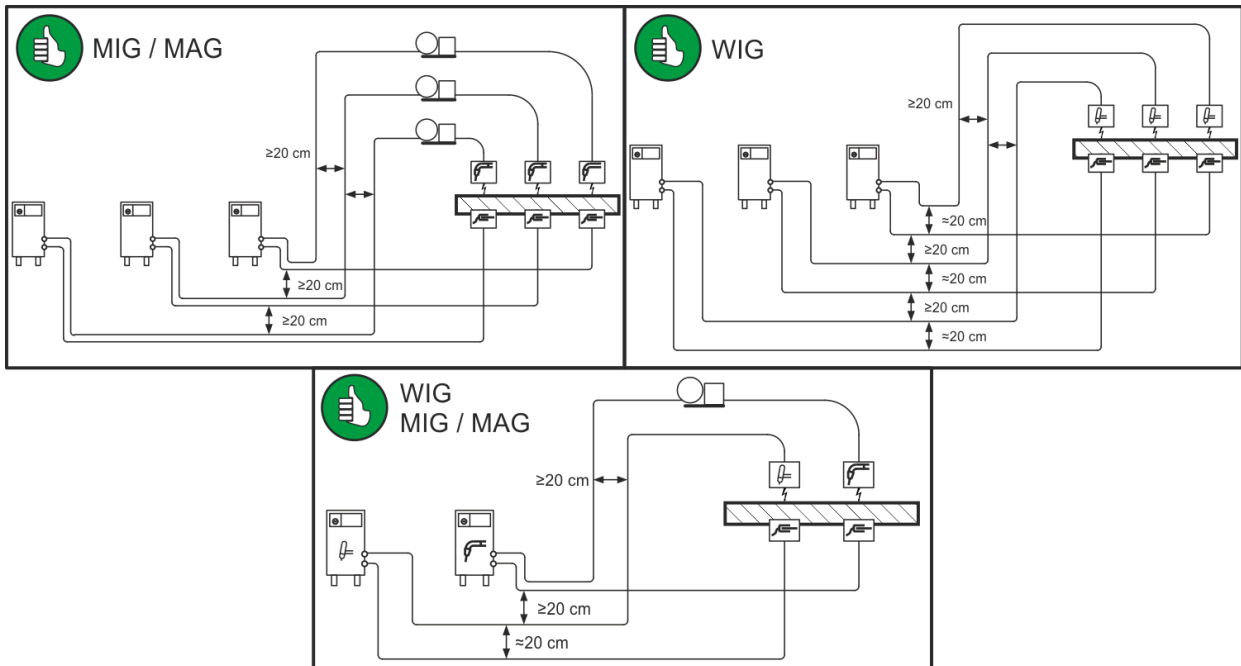


Figure 5-6



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

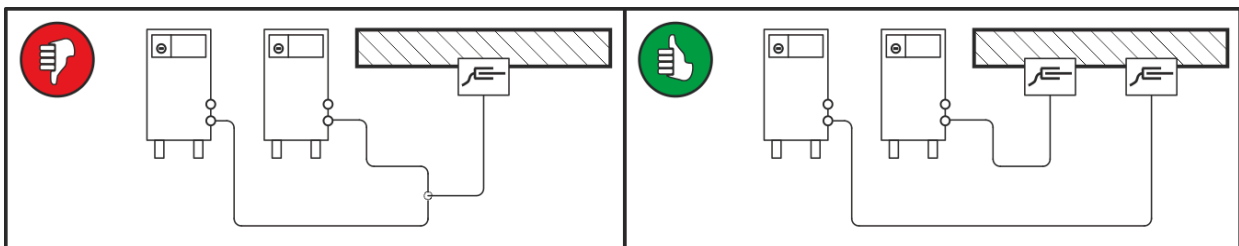


Figure 5-7



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.

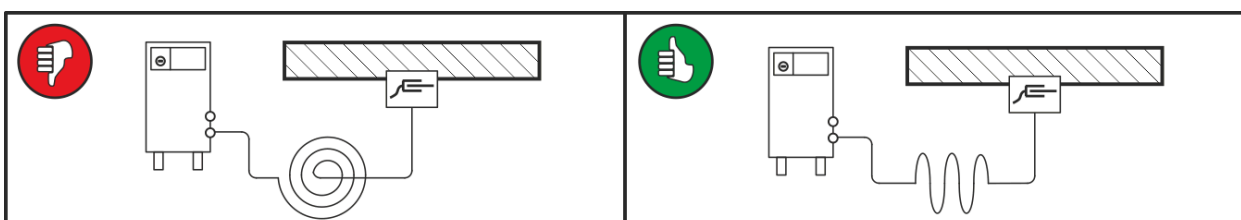


Figure 5-8

5.1.8.1 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.

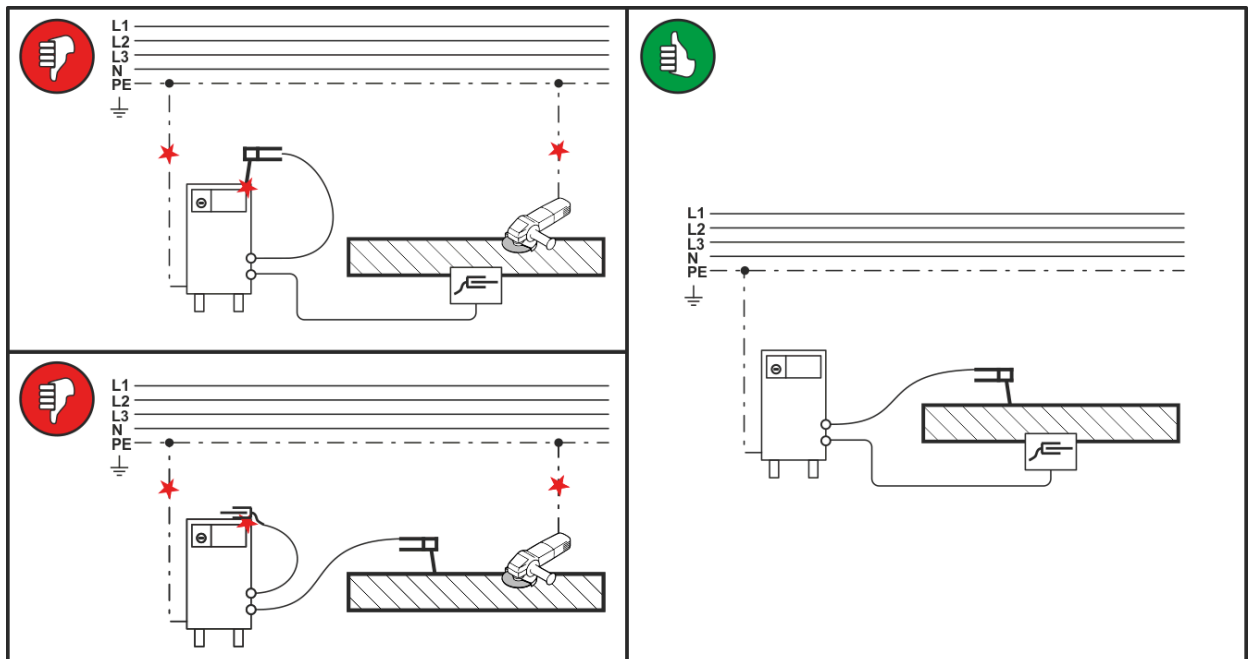


Figure 5-9

5.1.9 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.

5.1.9.1 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

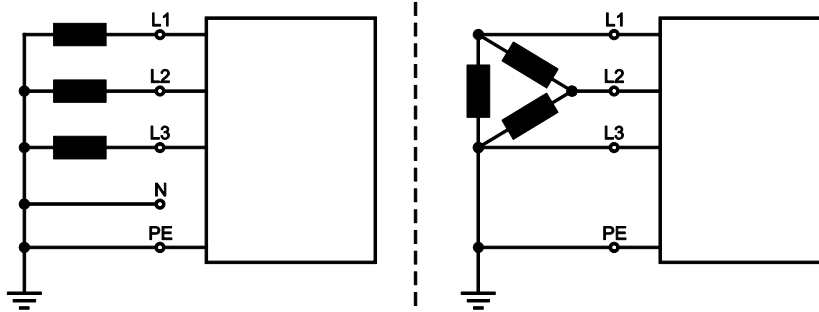


Figure 5-10

Legend

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

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

5.2 Welding data display

All relevant welding parameters with their values are shown depending on the welding procedure selected and the associated functions. Machine parameters and error codes are shown as well in a unique manner. The meaning of the parameters and values shown is explained in the relevant chapter for the function.

Next to the display is the Display/Power-saving mode switching push-button. Each time the push-button is pressed the display switches between the desired parameters.

Depending on the process, the parameters are shown as nominal values (before welding), actual values (during welding) or hold values (after welding):

MMA welding, TIG welding and MIG/MAG welding with constant current (CC):

	Nominal values	Actual values	Hold values (5 s)
Welding current (AMP)	<input checked="" type="checkbox"/>	<input type="checkbox"/> / <input checked="" type="checkbox"/> ^[1]	<input type="checkbox"/> / <input checked="" type="checkbox"/> ^[1]
Welding voltage (VOLT)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Welding performance (kW)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Open circuit voltage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

By turning the rotary transducer for the welding parameter settings the display automatically switches to the welding current display.

MIG/MAG welding with constant voltage (CV):

	Nominal values	Actual values	Hold values (5 s)
Welding current (AMP)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Welding voltage (VOLT)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Welding performance (kW)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

By turning the rotary transducer for the welding parameter settings the display automatically switches to the welding voltage display.

^[1] optionally adjustable – > see 5.11 chapter

5.3 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.

5.3.1 Connecting the electrode holder and workpiece lead

The signal lights above the welding current sockets show the welding current polarity (+/-), depending on the electrode type selected at the machine control.

Use the welding current polarity push-button (pole reversal) to reverse the welding current polarity (+/-) without having to change the electrode holder or workpiece lead > see 5.8 chapter. This reversal can also be effected using a suitable remote control (PWS).

The polarity cannot be reversed during welding.

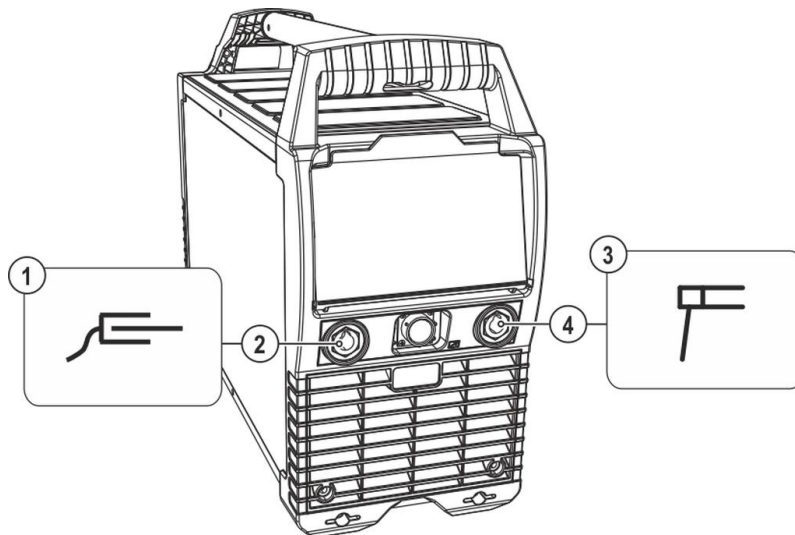


Figure 5-11

Item	Symbol	Description
1		Workpiece
2		Connection socket, welding current (workpiece)
3		Electrode holder
4		Connection socket, welding current (electrode holder)

- Insert cable plug on the workpiece lead into the welding current socket “” and lock by turning to the right.
- Insert cable plug on the electrode holder into the welding current socket “” and lock by turning to the right.



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

5.3.2 Welding task selection

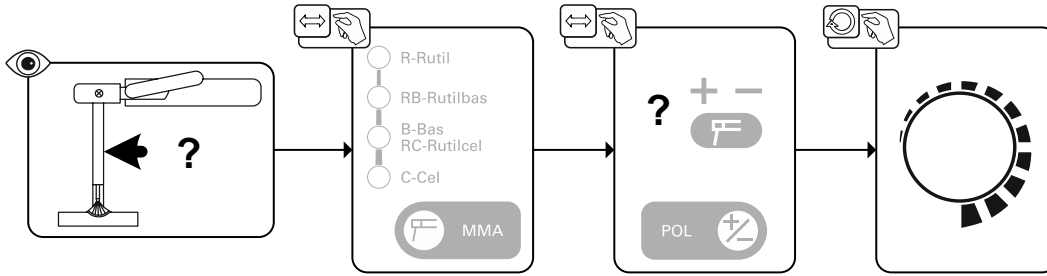
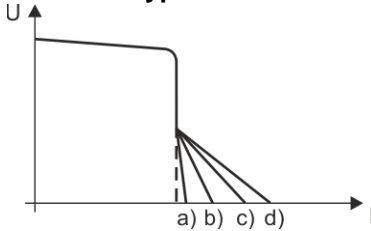


Figure 5-12

5.3.2.1 Arcforce (welding characteristics)

During the welding process, arcforce prevents the electrode sticking in the weld pool with increases in current. This makes it easier to weld large-drop melting electrode types at low current strengths with a short arc in particular.

Electrode type allocation



Item	Electrode type
a)	R rutile
b)	RB rutile basic
c)	B/RC basic and rutile/cellulose
d)	C cellulose

Figure 5-13

The electrode characteristics you can select at the machine control are guiding values. Each characteristics can be optimised according to electrode type and the related welding properties. .

5.3.3 Hotstart

The hot start function improves the arc striking.

After striking the stick electrode, the arc ignites at the increased hot start current and decreases to the set main current once the hot start time has elapsed.

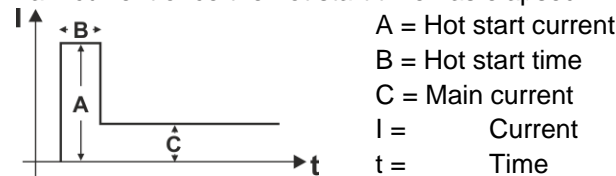


Figure 5-14

5.3.3.1 Hotstart time

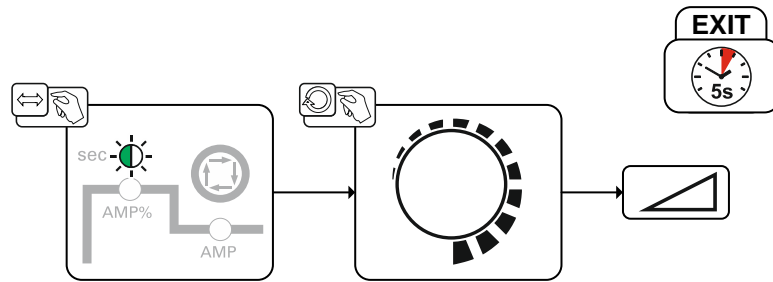


Figure 5-15

5.3.3.2 Hotstart current

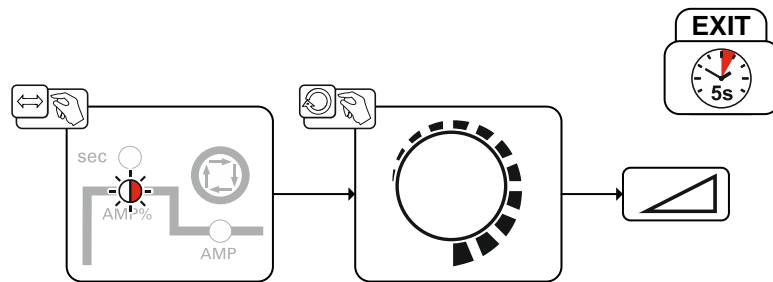
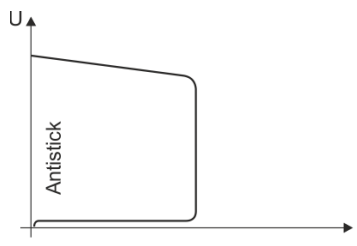


Figure 5-16

5.3.4 Antistick



Anti-stick prevents the electrode from annealing.

If the electrode sticks in spite of the Arcforce device, the machine automatically switches over to the minimum current within about 1 second to prevent the electrode from overheating. Check the welding current setting and correct according to the welding task!

Figure 5-17

5.3.5 Average value pulse welding

Average value pulse welding means that two currents are switched periodically, a current average value (AMP), a pulse current (I_{puls}), a balance (bAL) and a frequency (FrE) having been defined first. The predefined ampere current average value is decisive, the pulse current (I_{puls}) is defined by the IPL parameter as a percentage of the current average value (AMP). The pulse pause current (IPP) requires no setting. This value is calculated by the machine control, so that the welding current average value (AMP) is maintained at all times.

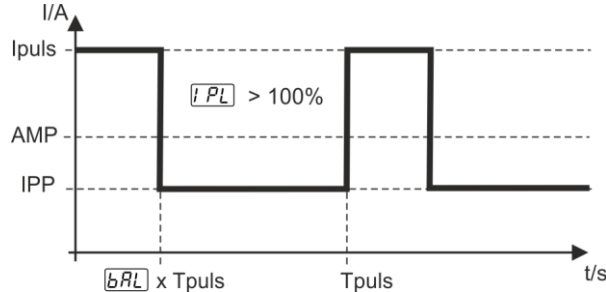


Figure 5-18

AMP = Main current; e.g. 100 A

IPL = Pulse current = $IP1 \times AMP$; e.g. $170\% \times 100 \text{ A} = 170 \text{ A}$

IPP = Pulse pause current

$Tpuls$ = Duration of one pulse cycle = $1/FrE$; e.g. $1/1 \text{ Hz} = 1 \text{ s}$

bAL = Balance

The pulse pause current (IPP) requires no setting. This value is calculated by the machine control, so that the welding current average value always corresponds to the main current selected.

For parameter setting, .

Selection

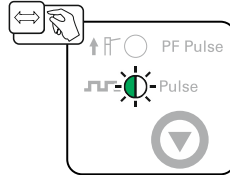


Figure 5-19

5.3.5.1 Average value pulsing in the vertical-up position (PF)

This pulse variant was developed for welding in the PF position. Where necessary, the user can adjust the preset welding parameters:

Parameter ePL is used for pulse current correction IPL

Parameter eFr is used for frequency correction FrE

Parameter eBA is used for balance correction bAL

Selection

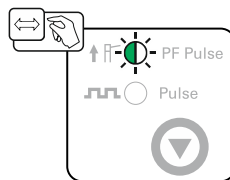


Figure 5-20

5.3.6 Expert menu (MMA)

The Expert menu has adjustable parameters stored that don't require regular setting. The number of parameters shown may be limited, e.g. if a function is deactivated.

The setting ranges for the parameter values are summarised in the Parameter overview section.

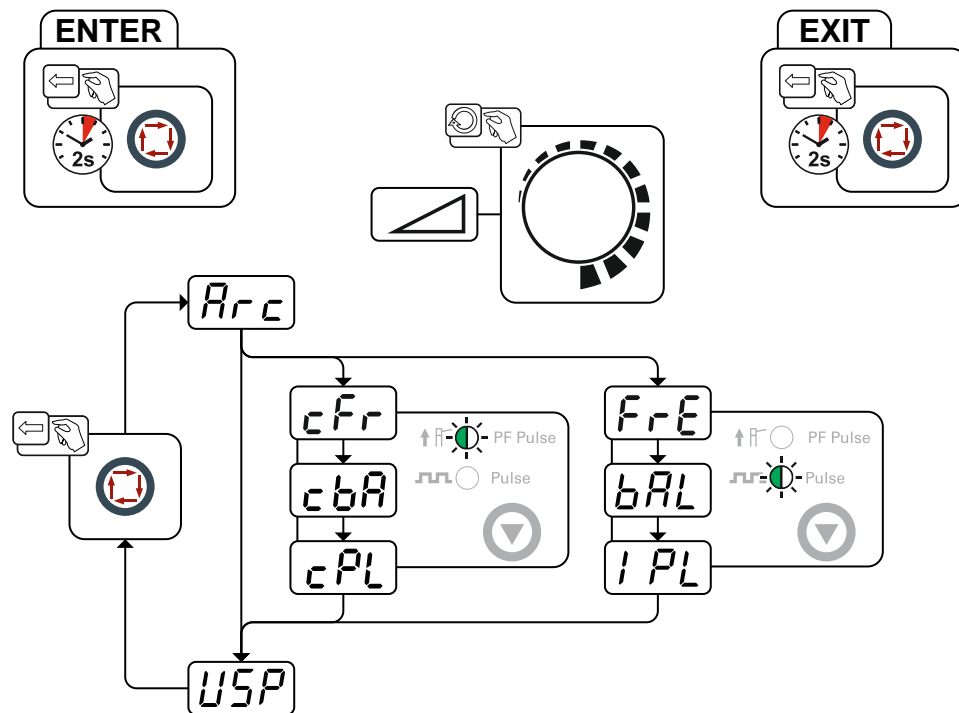



Figure 5-21

Display	Setting/selection
Arc	Arcforce correction <ul style="list-style-type: none"> • Increase value > harder arc • Decrease value > softer arc
cFr	Frequency correction Frequency correction of the PF Pulse parameter in per cent.
cbA	Balance correction Balance correction of the PF Pulse parameter in per cent
cPL	Pulse current correction Pulse current correction of the PF Pulse parameter in per cent.
FrE	Pulse frequency
bAL	Pulse balance
I PL	Pulse current
USP	Arc length restriction on -----Function switched on off -----Function switched off

5.4 TIG welding

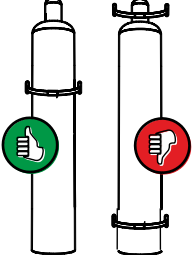
5.4.1 Shielding gas supply (shielding gas cylinder for welding machine)

⚠ 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.**

5.4.1.1 Connecting the shielding gas supply

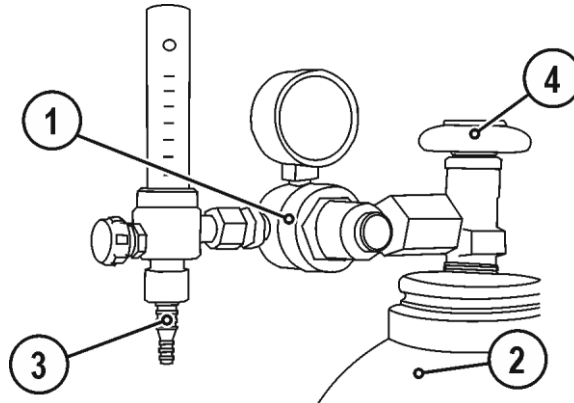


Figure 5-22

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 the shielding gas hose of the welding torch to the pressure regulator outlet.

5.4.2 Connecting a TIG welding torch with rotating gas valve

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

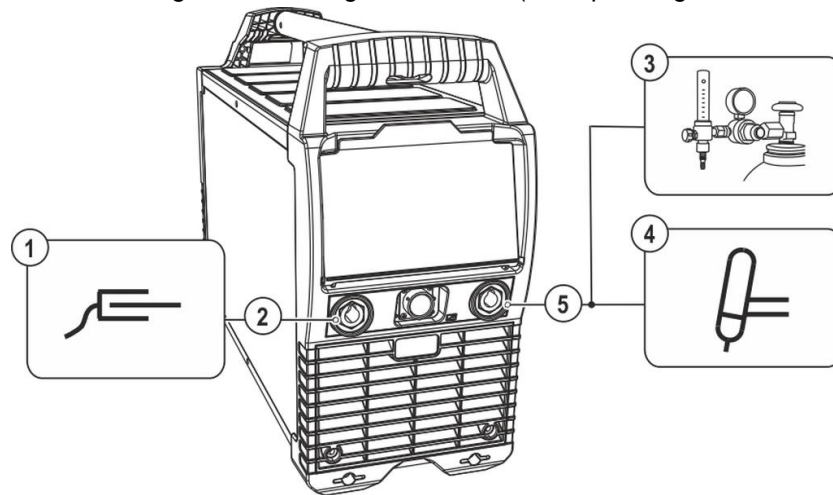


Figure 5-23

Item	Symbol	Description
1		Workpiece
2		Connection socket, welding current (workpiece)
3		Output side of the pressure regulator
4		Welding torch
5		Connection socket, welding current (electrode holder) Welding current lead connection for TIG welding torch

- Insert cable plug on the workpiece lead into the welding current socket “” and lock by turning to the right.
- Plug the welding current plug of the welding torch into the connection socket and lock by turning to the right.
- Screw the shielding gas hose of the welding torch to the pressure regulator outlet.
- Slowly open the gas cylinder valve.
- Open the welding torch rotary valve.



If the rotary gas valve is open, the shielding gas flows permanently from the welding torch (no adjustment with a separate gas valve). The rotary valve must be opened before each welding procedure and closed after each welding procedure.

- Set the required shielding gas quantity at the pressure regulator.

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!

Rule of thumb for the gas flow rate:

Diameter of gas nozzle in mm corresponds to gas flow in l/min.

Example: 7mm gas nozzle corresponds to 7l/min gas flow.

5.4.3 Welding task selection

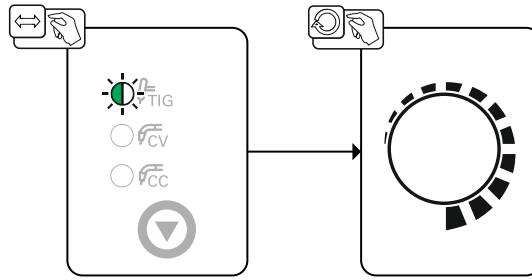


Figure 5-24

5.4.4 Arc ignition

5.4.4.1 Liftarc

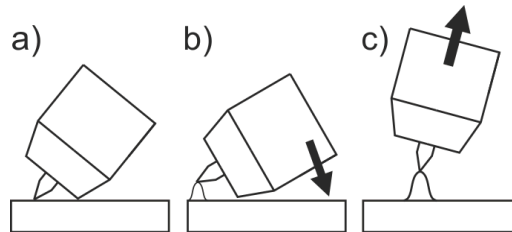


Figure 5-25

The arc is ignited on contact with the workpiece:

- Carefully place the torch gas nozzle and tungsten electrode tip onto the workpiece (liftarc current flowing, regardless of the main current set).
- Incline the torch towards the torch gas nozzle until there is a gap of approx. 2-3mm between the tip of the electrode and the workpiece (arc ignites, current increases to the main current set).
- Lift off the torch and swivel to the normal position.

Ending the welding process: Remove the torch from the workpiece until the arc goes out.

5.4.5 Average value pulse welding

Average value pulse welding means that two currents are switched periodically, a current average value (AMP), a pulse current (I_{puls}), a balance (bAL) and a frequency (FrE) having been defined first. The predefined ampere current average value is decisive, the pulse current (I_{puls}) is defined by the IPL parameter as a percentage of the current average value (AMP). The pulse pause current (IPP) requires no setting. This value is calculated by the machine control, so that the welding current average value (AMP) is maintained at all times.

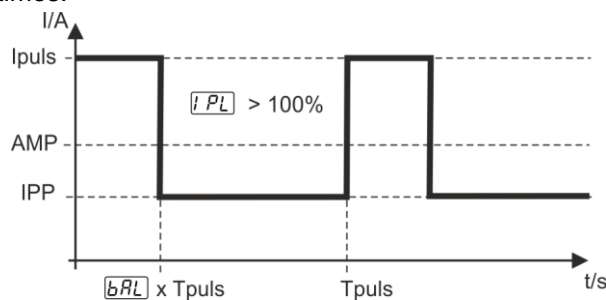


Figure 5-26

AMP = Main current; e.g. 100 A

IPL = Pulse current = $IP1 \times AMP$; e.g. $170\% \times 100 \text{ A} = 170 \text{ A}$

IPP = Pulse pause current

$Tpuls$ = Duration of one pulse cycle = $1/FrE$; e.g. $1/1 \text{ Hz} = 1 \text{ s}$

bAL = Balance

The pulse pause current (IPP) requires no setting. This value is calculated by the machine control, so that the welding current average value always corresponds to the main current selected.

For parameter setting, > see 5.4.6 chapter.

Selection

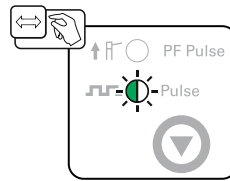


Figure 5-27

5.4.6 Expert menu (TIG)

The Expert menu has adjustable parameters stored that don't require regular setting. The number of parameters shown may be limited, e.g. if a function is deactivated.

The setting ranges for the parameter values are summarised in the Parameter overview section > see 10.1 chapter.

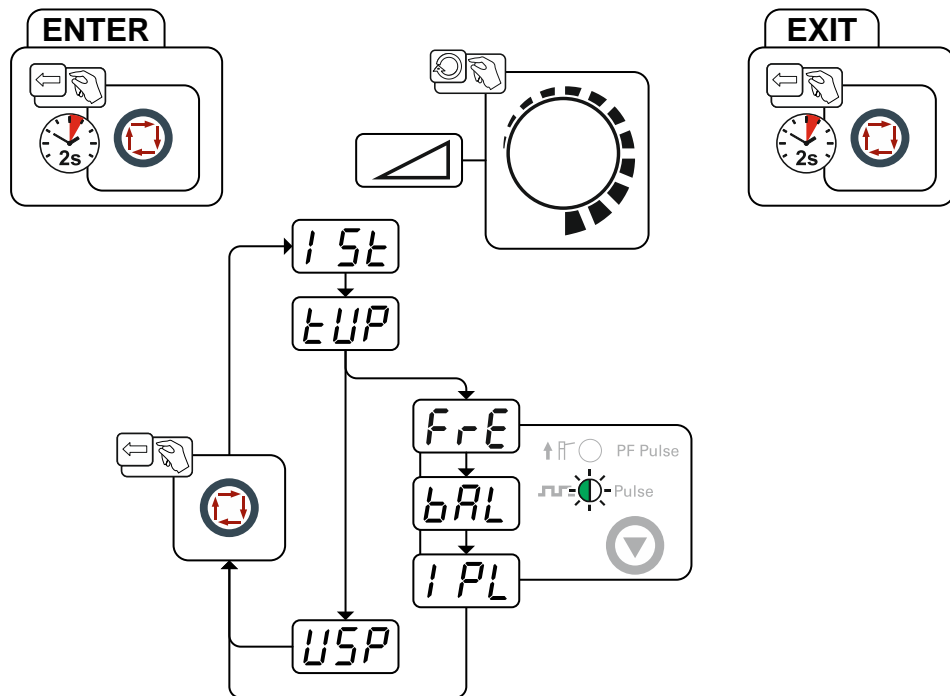


Figure 5-28

Display	Setting/selection
15t	Ignition current (as percentage, dependent on main current)
tUP	Upslope time to main current
FrE	Pulse frequency
bAL	Pulse balance
I PL	Pulse current > see 5.4.5 chapter
USP	Arc length restriction > see 5.7 chapter
	on -----Function switched on
	oFF -----Function switched off

5.5 MIG/MAG welding

5.5.1 Connecting the intermediate hose package to the power source

With this machine series, the earth cable on the intermediate hose package must not be connected to the welding machine or wire feeder! Remove the earth cable or push back into the hose package!

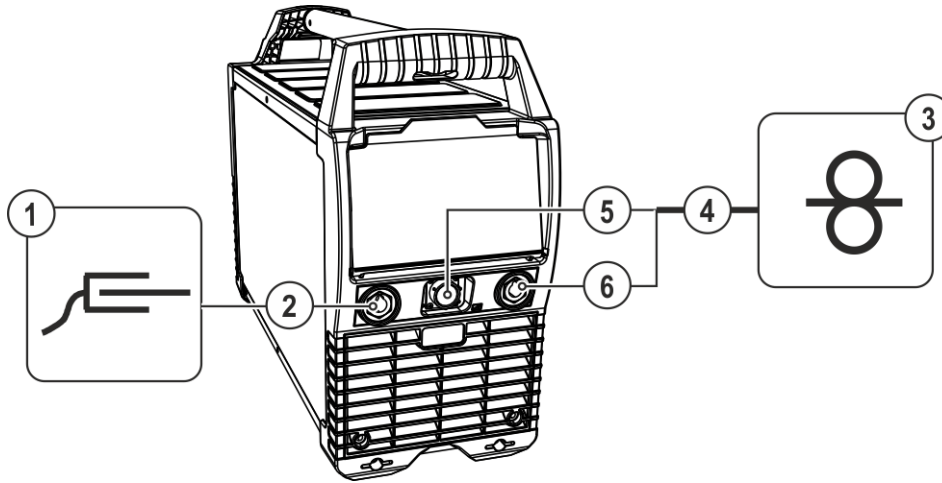


Figure 5-29

Item	Symbol	Description
1		Workpiece
2		Connection socket, welding current (workpiece)
3		Wire feed unit
4		Intermediate hose package
5		19-pole connection socket Control cable for remote control and/or wire feeder
6		Connection socket, welding current (electrode holder) Welding current connection for wire feeder

- Insert cable plug on the workpiece lead into the welding current socket “” and lock by turning to the right.
- Insert cable plug on the control lead into the 19-pole connection socket and secure with crown nut (the plug can only be inserted into the connection socket in one position).
- Plug the welding current lead plug (wire feeder) into the connection socket and lock by turning to the right.

Some wire electrodes (e.g. self-shielding flux cored wire) are welded using negative polarity. Use the welding current polarity push-button (pole reversal) to reverse the welding current polarity (+/-) without having to change the welding current leads. Signal lights above the welding current sockets show the welding current polarity (+/-) selected.

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

- Place the shielding gas cylinder into the relevant cylinder bracket.
- Secure the shielding gas cylinder using a securing chain.

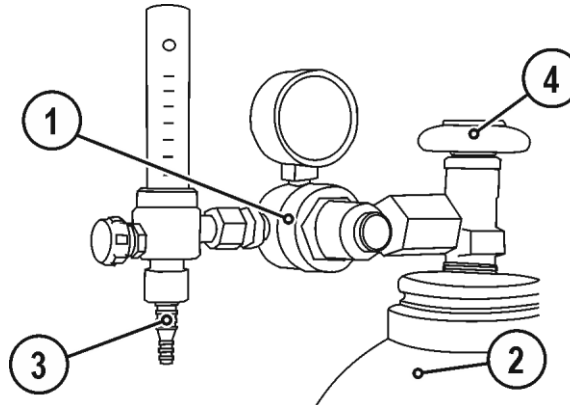


Figure 5-30

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

- Tighten the pressure regulator screw connection on the gas bottle valve to be gas-tight.
- Screw the gas hose connection nipple (intermediate hose package) onto the output side of the pressure regulator.

5.5.2.1 Gas test – setting the shielding gas volume

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

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

Helium-rich gas mixtures require a higher gas volume!

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

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

5.5.3 MIG/MAG welding with constant voltage characteristics (CV)

Default characteristics "CV constant voltage" for nearly all MIG/MAG processes

5.5.3.1 Welding task selection

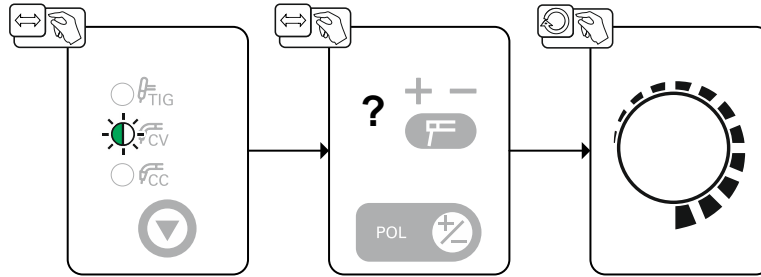


Figure 5-31

5.5.3.2 Expert menu

The Expert menu has adjustable parameters stored that don't require regular setting. The number of parameters shown may be limited, e.g. if a function is deactivated.

The setting ranges for the parameter values are summarised in the Parameter overview section > see 10.1 chapter.

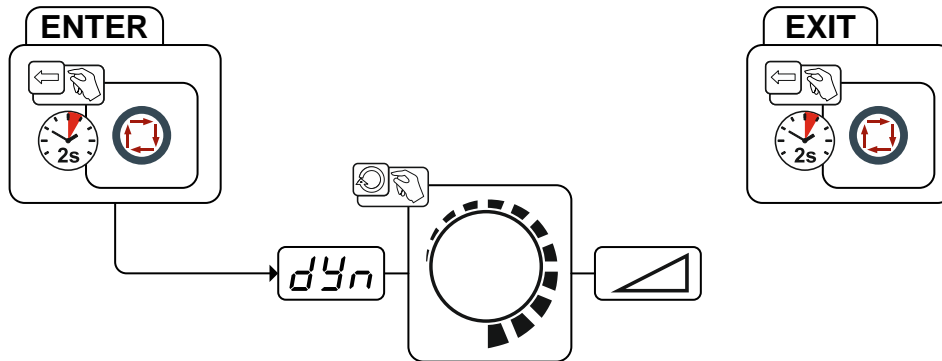


Figure 5-32

Display	Setting/selection
	Dynamic correction <ul style="list-style-type: none"> • Increase value > harder arc • Decrease value > softer arc

5.5.4 MIG/MAG welding with constant current characteristics (CC)

Used for special wires (flux cored wires), which, according to the manufacturer, are to be welded using "CC constant current"

5.5.4.1 Welding task selection

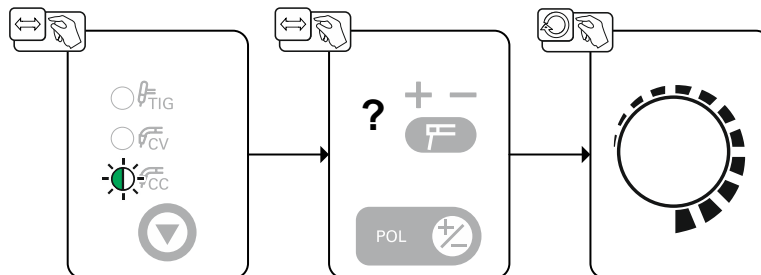


Figure 5-33

5.5.4.2 Expert menu

The Expert menu has adjustable parameters stored that don't require regular setting. The number of parameters shown may be limited, e.g. if a function is deactivated.

The setting ranges for the parameter values are summarised in the Parameter overview section > see 10.1 chapter.

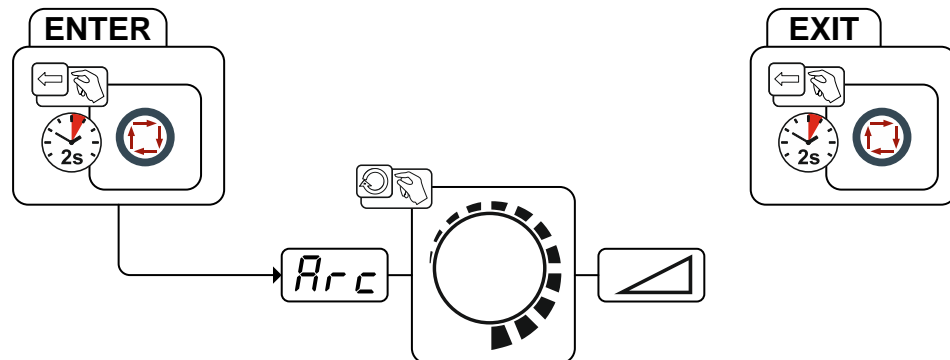


Figure 5-34

Display	Setting/selection
	Arcforce correction <ul style="list-style-type: none"> • Increase value > harder arc • Decrease value > softer arc

5.5.5 MIG/MAG welding – voltage-sensing

This welding machine supports wire feeders with voltage detection (voltage-sensing). Voltage is supplied to these wire feeders solely by the welding voltage. The wire feeder has a lead to connect to the workpiece, to ensure voltage detection and supply. No other control cables are required. When activated, the power source provides a permanent supply and welding voltage for the wire feeder.

If a wire feeder without control cable or connection lead is connected to the power source and one of the MIG/MAG characteristics (CC/CV) is selected, the open circuit voltage is provided as supply voltage for the wire feeder at the welding current sockets.

5.5.5.1 Connection plan

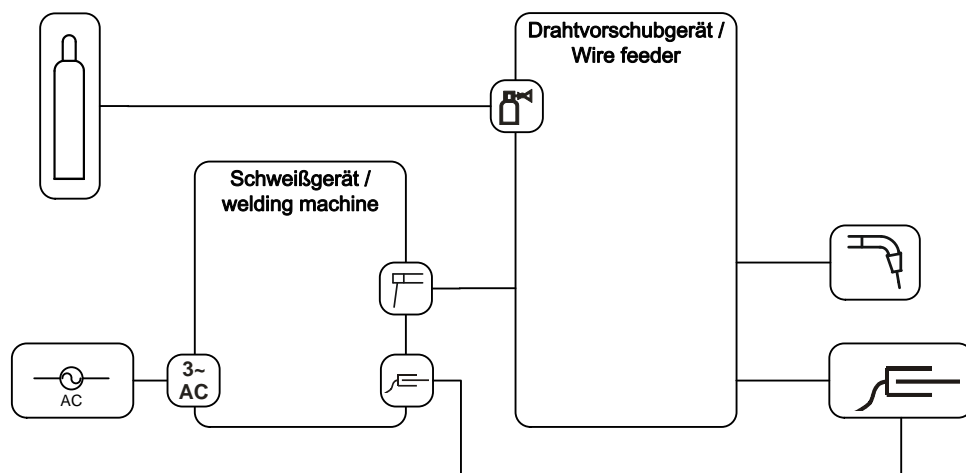


Figure 5-35

5.5.5.2 Legend

Symbol	Description
	Shielding gas
	Welding machine supply voltage
	Welding torch
	Workpiece
	Electrode holder

5.5.5.3 Connecting the supply lines

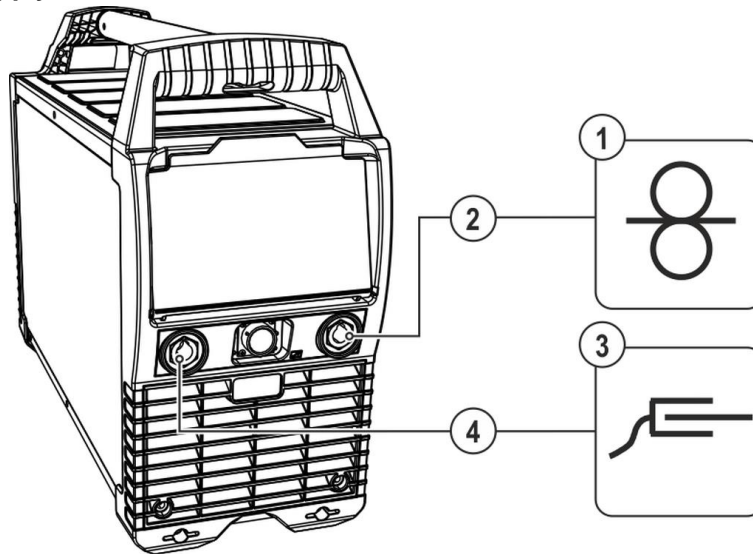


Figure 5-36

Item	Symbol	Description
1		Wire feed unit
2		Connection socket, welding current (electrode holder) Welding current connection for wire feeder
3		Workpiece
4		Connection socket, welding current (workpiece)

- Plug the welding current lead plug (wire feeder) into the connection socket and lock by turning to the right.
- Insert cable plug on the workpiece lead into the welding current socket "" and lock by turning to the right.



Some wire electrodes (e.g. self-shielding flux cored wire) are welded using negative polarity. Use the welding current polarity push-button (pole reversal) to reverse the welding current polarity (+/-) without having to change the welding current leads. Signal lights above the welding current sockets show the welding current polarity (+/-) selected.

5.6 Degaussing

5.6.1 Notes on the installation of current leads


The image shows a product label for 'degauss' with the following content:

- Brand: ewm-warranty, 24 hours / 7 days, 3 Years, 5 Years transformer and rectifier.
- Dimensions table:

cm		inch	Windungen winding
110 - 80	43.3 - 31.5	min. n = 10	
80 - 50	31.5 - 19.7	min. n = 7	
50 - 30	19.7 - 11.8	min. n = 5	

Additional features on the label include a QR code, a diagram of a winding, and the 'Blue Evolution®' logo. The article number 'Art.-Nr.: 094-020828-00500' is printed at the bottom left.

Figure 5-37

 **The number of loops to be installed are reference values only.**
In the case of strongly magnetized components more loops have to be installed to demagnetize it.

- Install the current leads as close as possible to each other and to the component.
- Lay the current leads up to the area relevant for welding, e.g. to the sidewalls of the joint.

 **In case of large or long components all current leads have to be placed with a distance of 3–4 cm to each other in order to degauss the component.**

5.6.2 Current lead connection

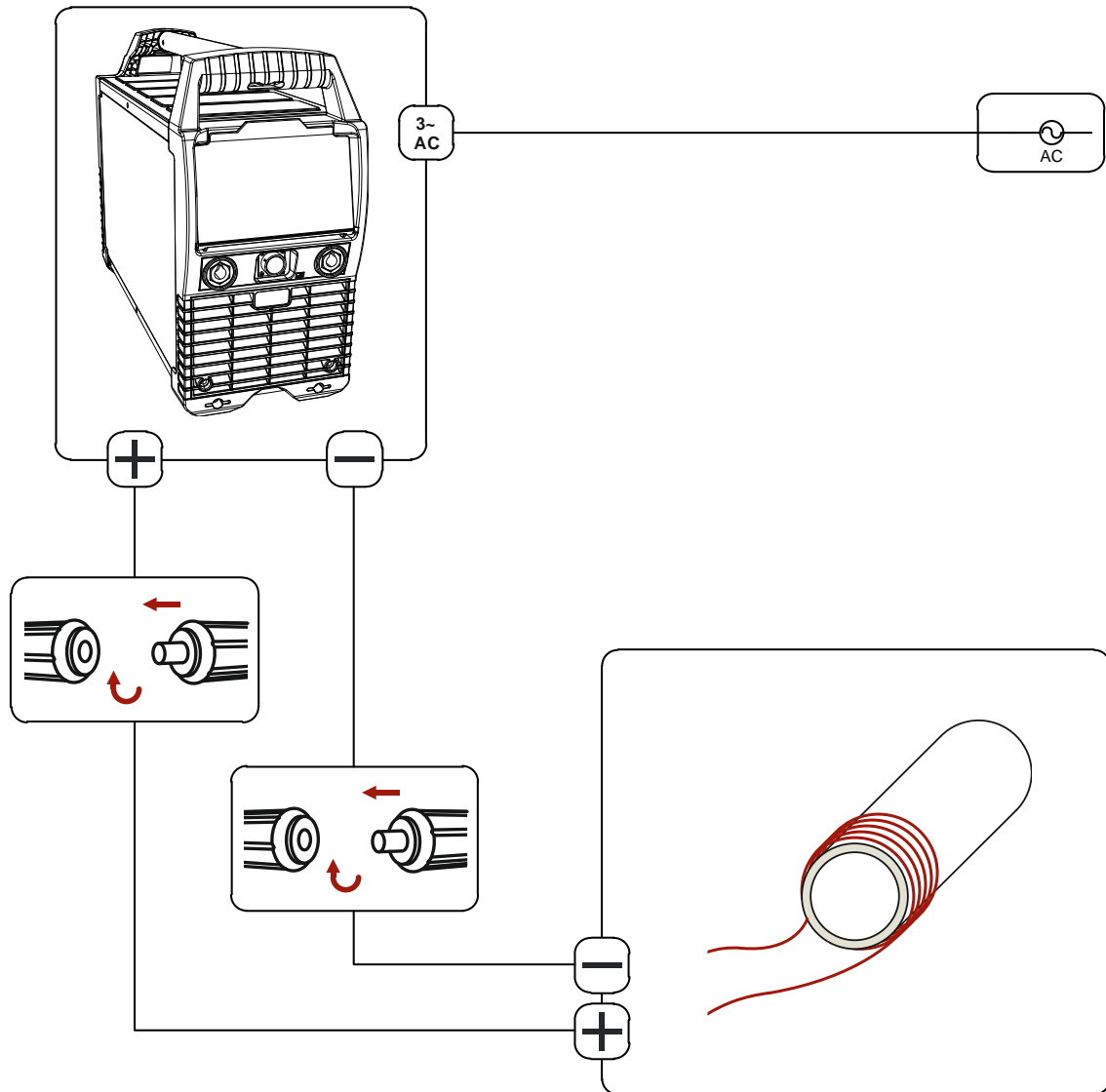


Figure 5-38

5.6.2.1 Legend

3~ AC	Welding machine supply voltage
+	Process current (plus potential)
-	Process current (minus potential)

- Establish all connections, see figure.

5.6.3 Activate degaussing

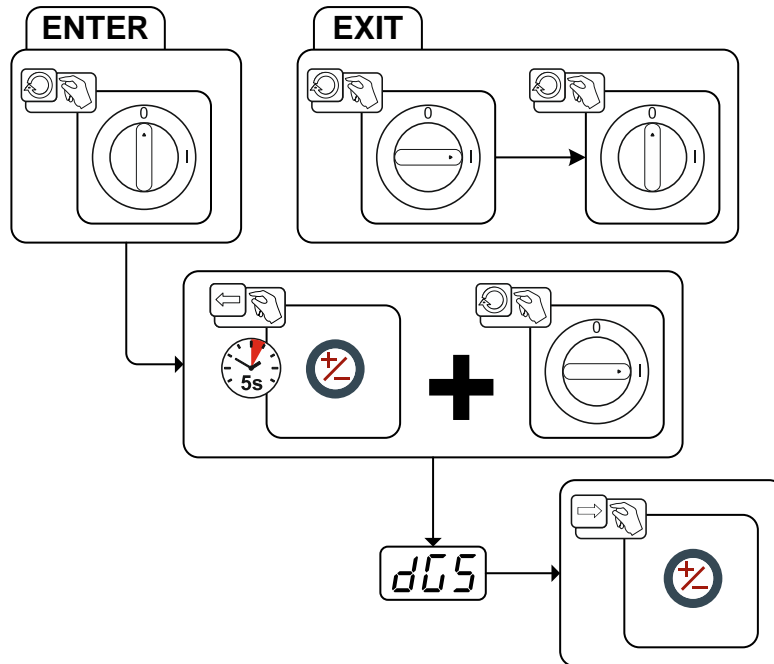


Figure 5-39

Display	Setting/selection
	Degaussing is activated.

By switching off the power source this operating mode will be deactivated and the previous operating mode will be reactivated.

- Press the welding current polarity (pole reversal)/degaussing push-button.
- The signal light flashes.
- The degaussing process runs automatically.
- The signal light flashes continuously.
- The degaussing process is complete.

5.6.3.1 Automatic cut-out



The degaussing process is stopped within 5 seconds if no current flow can be established. The display will then show the letters brE (interruption).

- **Check all circuit connections.**



5.7 Arc length restriction (USP)

The arc length restriction USP function stops the welding process when an excessive arc voltage is detected (unusually high gap between electrode and workpiece). This function can be adjusted in the corresponding Expert menu, depending on the process:

MMA welding > see 5.4.6 chapter

TIG welding

The arc length restriction cannot be used for cel characteristics (if available).

5.8 Welding current polarity reversal (polarity reversal)

This function can be used to reverse the welding current polarity electronically.

For example, when welding with different electrode types for which different polarities are stipulated by the manufacturer, the welding current polarity can be switched easily on the control.

Operating element	Action	Result
		Use this push-button to reverse the welding current polarity of the welding current sockets. Signal lights at the welding current sockets show the polarity selected.
	-	The signal light shows the selected polarity at the welding current socket below.

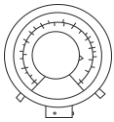
Please note the different functionality in case a RT PWS 1 19POL remote control is connected, > see 5.9 chapter.

5.9 Remote control

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

5.9.1 RT PWS 1 19POL

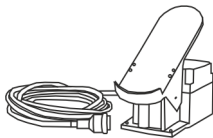
When a remote control is connected, the polarity is changed at the changeover switch of the remote control (ex works). If you wish to change the polarity at the welding machine control (with a remote control connected) you can set this option in the machine configuration menu (parameter rCP). > see 5.11 chapter.



Functions

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

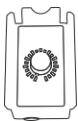
5.9.2 RTF1 19POL



Features

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

5.9.3 RT1 19POL

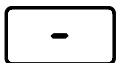


Functions

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

5.10 Power-saving mode (Standby)

You can activate the power-saving mode by either pressing the push-button > see 4.3 chapter for a prolonged time or by setting a parameter in the machine configuration menu (time-controlled power-saving mode **5bA**) > see 5.11 chapter.



When power-saving mode is activated, the machine displays show the horizontal digit in the centre of the display only.

Pressing any operating element (e.g. turning a rotary knob) deactivates power-saving mode and the machine is ready for welding again.

5.11 Machine configuration menu

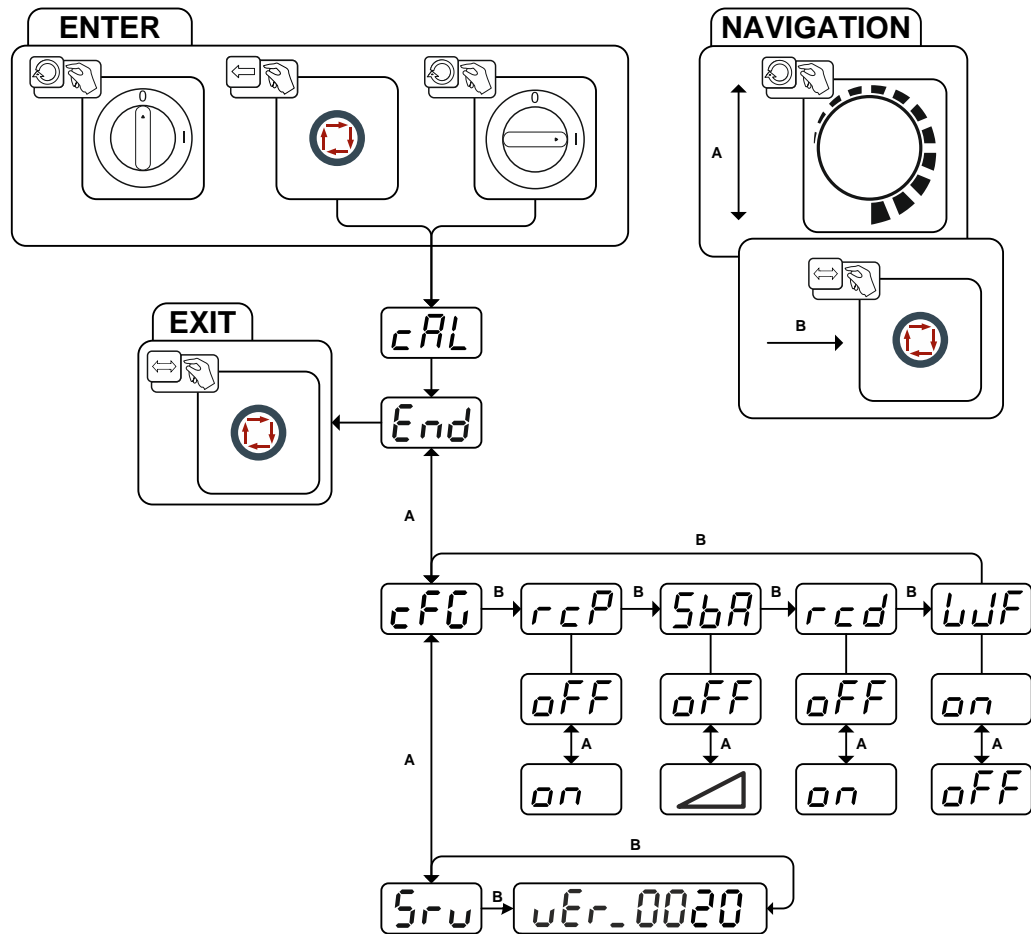


Figure 5-40

Display	Setting/selection
cAL	Calibration The machine will be calibrated for approx 2 seconds each time it is switched on.
End	Exit the menu Exit
cFG	Machine configuration Settings for machine functions and parameter display
rcP	Welding current polarity switching ¹ <input type="checkbox"/> on -----polarity switching at the RT PWS 1 19POL remote control (ex works) <input type="checkbox"/> off -----polarity switching at the welding machine control
SbA	Time-based power-saving mode > see 5.10 chapter 5 min.–60 min. = Time to activation of power-saving mode in case of inactivity. <input type="checkbox"/> off -----inactivated
rcd	Current display switching (MMA) <input type="checkbox"/> on -----Actual value display <input type="checkbox"/> off -----Nominal value display (ex works)
LUF	Use of accessories <input type="checkbox"/> on -----Operation with wire feeder <input type="checkbox"/> off -----Operation with foot-operated remote control
Srv	Service menu Any changes to the service menu should be agreed with the authorised service personnel.
uEr	Software version of the machine control Version display

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 July, 4th 2012), 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

Excess temperature signal light illuminates

- ↗ Excess temperature, welding machine
- ✘ Allow the machine to cool down whilst still switched on

Functional errors

- ↗ Polarity switching at the welding machine control is not working
 - ✘ The changeover switch at the remote control defines the welding current polarity. Unplug remote control or set parameter rCD (machine configuration) to the value off.
- ↗ Polarity switching at the remote control is not working
 - ✘ Set parameter rCD (machine configuration menu) to the value on.
- ↗ 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

Overheating of TIG welding torch (tungsten electrode) when remote control is connected RT PWS1 19POL

- ↗ Welding current polarity setting not suitable
 - ✘ Set changeover switch for welding current polarity to (-) position.

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 message	Possible cause	Remedy
E 0	Start signal set in the event of errors	Do not press the torch trigger or the foot-operated remote control
E 4	Temperature error	Allow the machine to cool down
E 5	Mains overvoltage	Switch off the machine and check the mains voltage
E 6	Mains undervoltage	
E 7	Electronics error	Switch the machine on and off again.
E 9	Secondary overvoltage	If the error persists, notify service department

Error message	Possible cause	Remedy
E12	Voltage reduction error (VRD)	
E13	Electronics error	
E14	Adjustment error in current recording	Switch off the machine, place the electrode holder in an insulated position and switch the machine back on. If the error persists, notify service department
E15	Error in on of the electronics supply voltages	Switch the machine off and on again. If the error persists, notify service department
E23	Temperature error	Allow the machine to cool down
E32	Electronics error	Switch the machine on and off again. If the error persists, notify service department
E33	Adjustment error in voltage recording	Switch off the machine, place the electrode holder in an insulated position and switch the machine back on. If the error persists, notify service department
E34	Electronics error	Switch the machine on and off again. If the error persists, notify service department
E37	Temperature error	Allow the machine to cool down
E40	Motor fault	Check wire feed unit, switch the machine off and on again, inform the service department if the fault persists.
E55	Failure of a mains phase	Switch off the machine and check the mains voltage
E58	Short circuit in welding circuit	Switch off machine and check welding current leads for correct installation, e.g., put down electrode holder in an electrically insulated manner, disconnect degausser current lead.
Error message	Possible cause	Remedy
	Circuit interruption	Check current lead.

7.3 Display machine control software version

The query of the software versions only serves to inform the authorised service staff. It is available in the machine configuration menu > see 5.11 chapter.

7.4 Resetting welding parameters to the factory settings

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

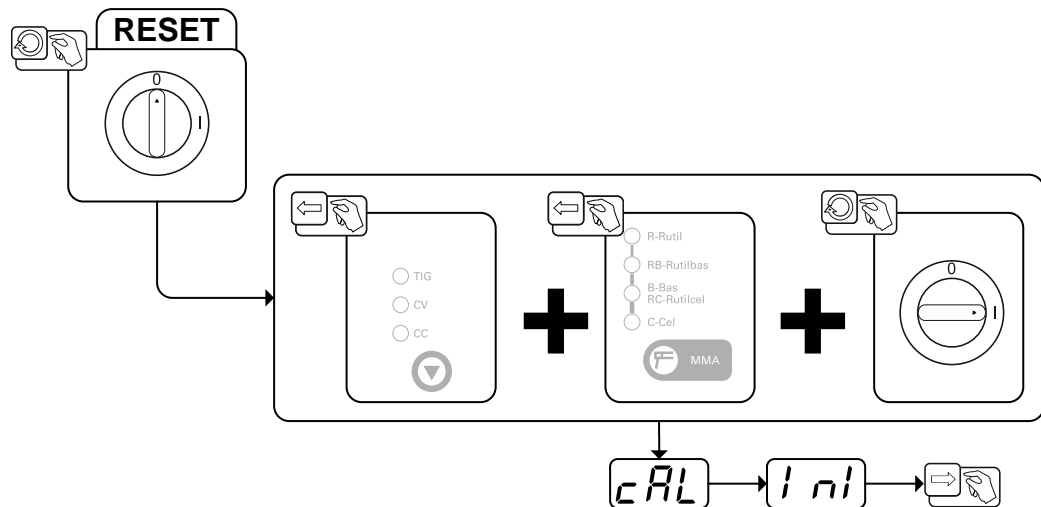


Figure 7-1



Display	Setting/selection
	Calibration The machine will be calibrated for approx 2 seconds each time it is switched on.
	Initialising Keep the push-button pressed until "InI" is shown on the display.

8 Technical data



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

8.1 Pico 350 cel puls pws dgs

	MMA	TIG	MIG/MAG
Current setting range	10 A–350 A		
Voltage setting range	20.4 V–34.0 V	10.4 V–24.0 V	14.4 V–31.5 V
Duty cycle 40 °C			
35%	350 A		
60%	280 A		
100%	230 A		
Load cycle	10 min. (60% DC \wedge 6 min. welding, 4 min. pause)		
Open circuit voltage	95 V		
Mains voltage (tolerances)	3 x 400 V (+20% to –25 %)		
Frequency	50/60 Hz		
Mains fuse (safety fuse, slow-blow)	3 x 16 A	3 x 10 A	3 x 16 A
Mains connection lead	H07RN-F4G2,5		
Max. connected load	15.0 kVA	10.6 kVA	13.9 kVA
Recommended generator rating	20.3 kVA		
cos ϕ with I _{max} /efficiency	0.99/88%		
Insulation class/protection classification	H/IP 34s		
Ambient temperature	–25 °C to +40 °C		
Machine cooling/torch cooling	Fan/gas		
Noise level	<70 dB(A)		
Workpiece lead	50 mm ²		
EMC class	A		
Safety identification	CE /  / 		
Harmonised standards used	IEC 60974-1, -10		
Dimensions L/W/H	539 x 210 x 415 mm 21.2 x 8.3 x 16.3 inch		
Weight	25 kg 55.1 lb		

9 Accessories



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

9.1 Remote controls and accessories

Type	Designation	Item no.
RT1 19POL	Remote control current	090-008097-00000
RT PWS1 19POL	Remote control, vertical-down weld current, pole reversal Suitable for machines with AC welding type only.	090-008199-00000
RA5 19POL 5M	Remote control e.g. connection cable	092-001470-00005
RA10 19POL 10M	Remote control e.g. connection cable	092-001470-00010
RA20 19POL 20M	Remote control e.g. connection cable	092-001470-00020
RTF1 19POL 5 M	Foot-operated remote control current with connection cable	094-006680-00000
RV5M19 19POLE 5M	Extension cable	092-000857-00000

9.2 Options

Type	Designation	Item no.
ON Filter 2756	Dirt filter for air inlet	092-002756-00000

9.3 General accessories

Type	Designation	Item no.
DM 842 Ar/CO2 230bar 30l D	Pressure regulator with manometer	394-002910-00030
5POLE/CEE/32A/M	Machine plug	094-000207-00000

9.4 System components

9.4.1 Wire feed unit

Type	Designation	Item no.
Pico drive 4L	Wire feeder	090-002121-00502
Pico drive 200C	Wire feeder	090-002124-00502

10 Appendix A

10.1 Parameter overview – setting information

Welding data display (3-digit)	Parameters/function	Setting range			
		Standard (ex works)	Min.	Max.	Unit
MMA					
	Hot start current	120	50 - 200	%	
	Hot start time	0,5	0,1 - 20,0	s	
ARC	Arcforce correction	0	-10 - 20		
CFR	Frequency correction (PF Pulse)	0	-99 - 99	%	
CBR	Balance correction (PF Pulse)	0	-99 - 99	%	
CPL	Pulse current correction (PF Pulse)	0	-99 - 99	%	
FRE	Pulse frequency	5,0	0,2 - 500	Hz	
BR	Pulse balance	50	1 - 99	%	
IP	Pulse current	140	1 - 200	%	
USP	Arc length restriction	off	off / on		
MIG/MAG					
ARC	Arcforce (CC)	0	-10 - 20		
DYN	Dynamic correction (CV)	0	-40 - 40		
TIG					
IST	Ignition current	20	1 - 200	%	
EUP	Up-slope time	1,0	0,0 - 20,0	s	
FRE	Pulse frequency	2,8	0,2 - 2000	Hz	
BR	Pulse balance	50	1 - 99	%	
IP	Pulse current	140	1 - 200	%	
USP	Arc length restriction	on	off - on		
Basic parameters (independent of procedure)					
SBR	Time-based power-saving mode	off	5 - 60	min.	
CCP	Welding current polarity switching	on	off / on		
CCD	Current display switching (MMA)	off	off / on		
UJF	Use of accessories	on	off / on		

11 Appendix B

11.1 Overview of EWM branches

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