



**EN**

## Welding machine

Pico 160 cel puls

Pico 160 cel puls VRD (RU)

Pico 160 cel puls VRD (AUS)

099-002129-EW501

Observe additional system documents!

15.10.2020

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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/en/specialist-dealers](http://www.ewm-group.com/en/specialist-dealers).**

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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## 2 For your safety

### 2.1 Notes on using these operating instructions

#### 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 hold
			Switch
	Incorrect / Invalid		Turn
	Correct / Valid		Numerical value – adjustable
	Input		Signal light lights up in green
	Navigation		Signal light flashes green
	Output		Signal light lights up in red
	Time representation (e.g.: wait 4 s / actuate)		Signal light flashes red
	Interruption in the menu display (other setting options possible)		
	Tool not required/do not use		
	Tool required/use		

## 2.1.2 Complete documentation

These operating instructions are part of the complete documentation and valid only in combination with the "Safety instructions"!

Read and observe the documents for all system components!

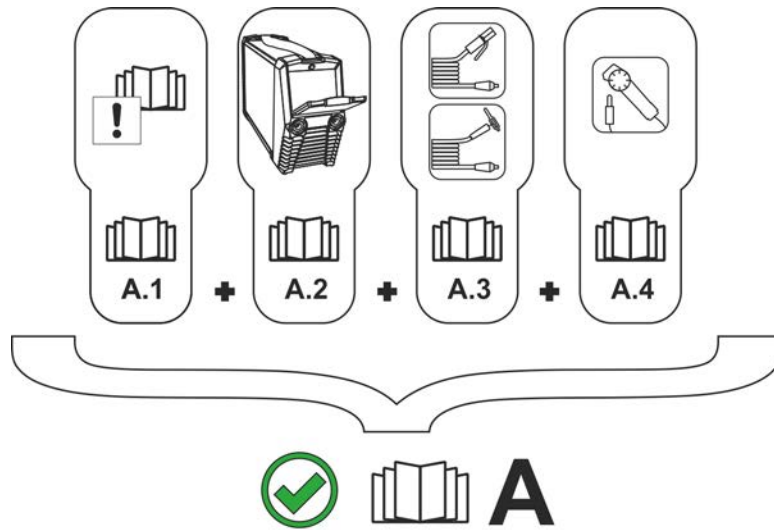


Figure 2-1

Item	Documentation
A.1	Safety instructions
A.2	Power source
A.3	Electrode holder/welding torch
A.4	Remote control
A	Complete documentation

## 2.2 General

### ⚠ CAUTION



#### 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.

## 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 MMA DC welding with TIG DC welding with lift arc (touch starting) as secondary process.

#### 3.1.1 Demagnetize function (degaussing)

The degaussing of ferromagnetic workpieces in welding technology is intended to reduce arc deflection, arc instability, uneven droplet detachment, spatter and irregular flank connections.

### 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](http://www.ewm-group.com)!

#### 3.2.2 Declaration of Conformity



This product corresponds in its design and construction to the EU directives listed in the declaration. The product comes with a relevant declaration of conformity in the original.

The manufacturer recommends carrying out the safety inspection according to national and international standards and guidelines every 12 months.

#### 3.2.3 Welding in environments with increased electrical hazards



Power sources with this marking can be used for welding in an environment with increased electrical hazard (e.g. boilers). For this purpose, appropriate national or international regulations must be followed. The power source must not be placed in the danger zone!

#### 3.2.4 Calibration/Validation

An original certificate is enclosed with the product. The manufacturer recommends calibration / validation at intervals of 12 months.



## 4 Machine description – quick overview

### 4.1 Front view

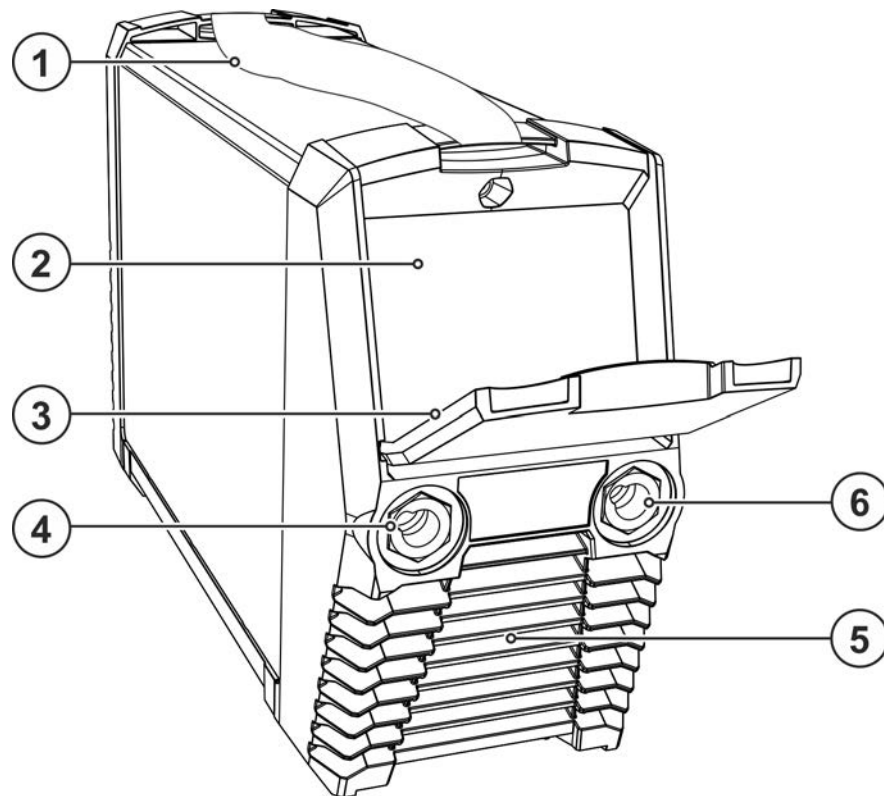


Figure 4-1

Item	Symbol	Description
1		<b>Carrying strap</b> > see 5.1.4.1 chapter
2		<b>Machine control</b> > see 4.3 chapter
3		<b>Protective cap</b>
4	<b>+</b>	<b>Connection socket, "+" welding current</b> <ul style="list-style-type: none"> <li>• MMA: Electrode holder or workpiece lead connection</li> <li>• TIG: Connection for workpiece lead</li> </ul>
5		<b>Cooling air outlet</b>
6	<b>—</b>	<b>Connection socket, "-" welding current</b> <ul style="list-style-type: none"> <li>• MMA: Connection of electrode holder or workpiece lead</li> <li>• TIG: Connection of TIG welding torch</li> </ul>

## 4.2 Rear view

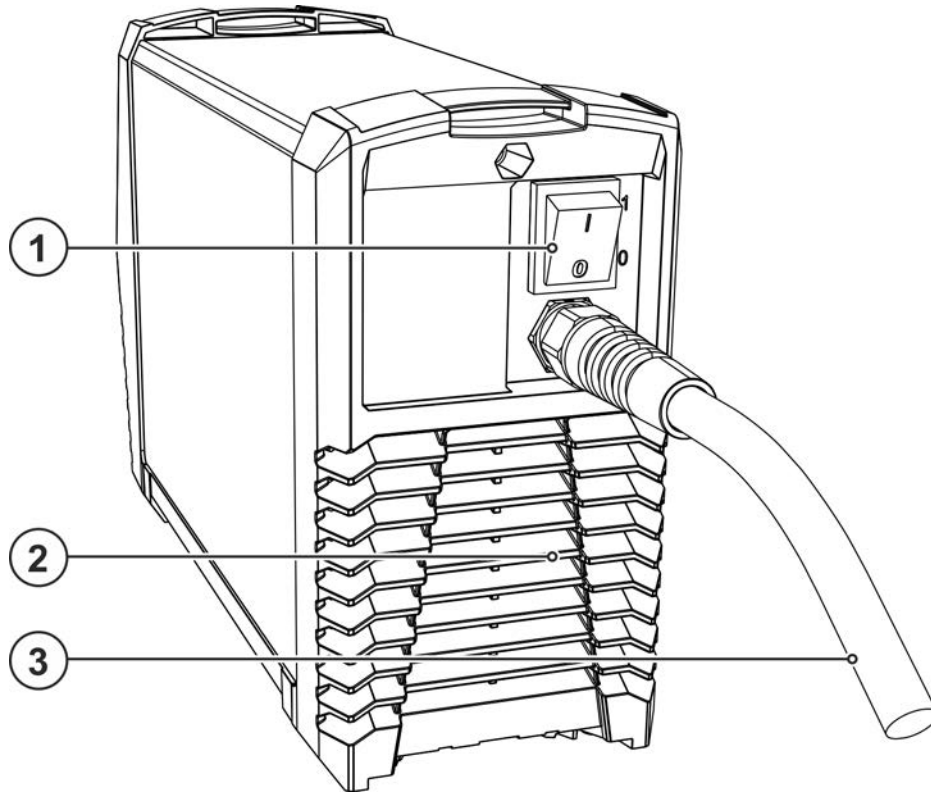



Figure 4-2

Item	Symbol	Description
1		<b>Main Switch</b> Switching the machine on or off.
2		<b>Cooling air inlet</b>
3		<b>Mains connection cable &gt; see 5.1.7 chapter</b>

## 4.3 Machine control – Operating elements

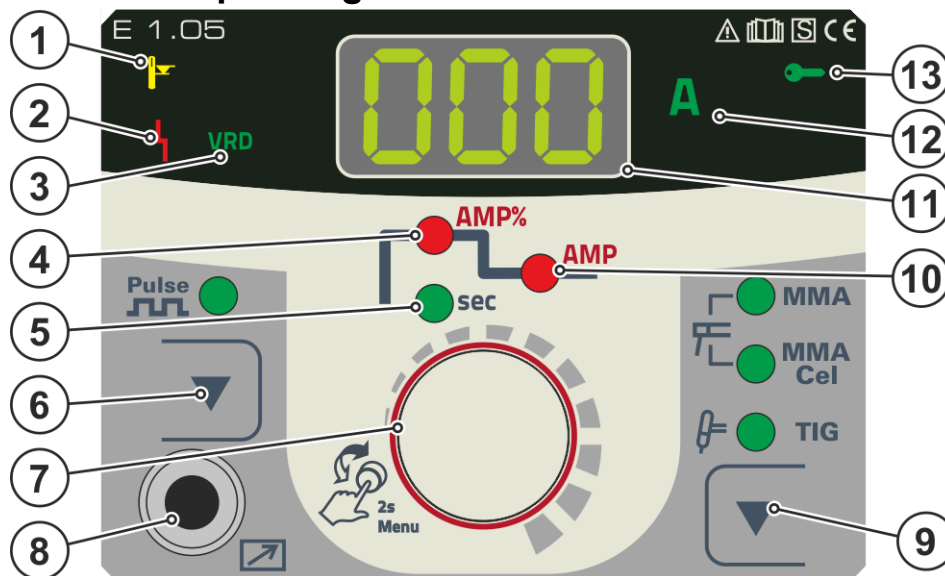


Figure 4-3

Item	Symbol	Description
1		<b>Excess temperature signal light</b> 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		<b>Collective interference signal light</b> For error messages, > see 7 chapter
3	VRD	<b>Voltage reduction device (VRD) signal light</b> > see 5.10 chapter
4	AMP%	<b>Hotstart current signal light</b>
5	sec	<b>Hotstart time signal light</b>
6		<b>Pulsed welding/power-saving mode push-button</b> MMA -----pulse welding > see 5.4.6 chapter TIG -----pulse welding > see 5.5.7 chapter Press for 2 s to put the machine into power-saving mode. To reactivate, activate one of the operating elements > see 5.9 chapter.
7		<b>Control button</b> Central control button to be pressed or turned > see 5.2 chapter.
8		<b>3-pole connection socket</b> Remote control control cable
9		<b>Pushbutton welding process / degaussing (activgauss)</b> > see 5.6 chapter <b>MMA</b> --MMA welding > see 5.4 chapter <b>MMA Cel</b> -----MMA welding (Cel characteristics) <b>TIG</b> -----TIG welding > see 5.5 chapter
10	AMP	<b>Main current signal light</b> I <sub>min</sub> to I <sub>max</sub> (1 A increments)
11		<b>Welding data display (3-digit)</b> Displays the welding parameters and the corresponding values > see 5.3 chapter
12	A	<b>“Welding current unit” signal light</b> Illuminates when welding currents are displayed.
13		<b>Access control active signal light</b> Signal light is on when access control is active on the machine control > see 5.11 chapter.

## 5 Design and function

### **WARNING**



**Risk of injury from electrical voltage!**

**Contact with live parts, e.g. power connections, can be fatal!**

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

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

### 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.

#### 5.1.1 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!**

#### 5.1.2 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!

### 5.1.3 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.*



*Equipment damage due to contamination!*

*Unusually high amounts of dust, acids, corrosive gases or substances can damage the machine (observe maintenance intervals > see 6.2 chapter).*

- *Avoid large amounts of smoke, steam, oily fumes, grinding dust and corrosive ambient air!*

#### 5.1.3.1 In operation

**Temperature range of the ambient air:**

- -25 °C to +40 °C (-13 °F to 104 °F)

**Relative humidity:**

- up to 50 % at 40 °C (104 °F)
- up to 90 % at 20 °C (68 °F)

#### 5.1.3.2 Transport and storage

**Storage in a closed room, temperature range of the ambient air:**

- -30 °C to +70 °C (-22 °F to 158 °F)

**Relative humidity**

- up to 90 % at 20 °C (68 °F)

### 5.1.4 Transport belt

#### 5.1.4.1 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.

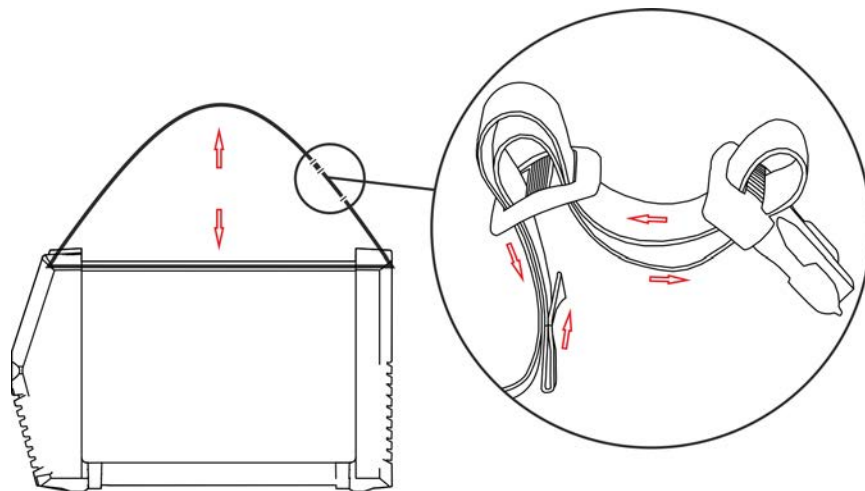


Figure 5-1

## 5.1.5 Notes on the installation of welding current leads

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

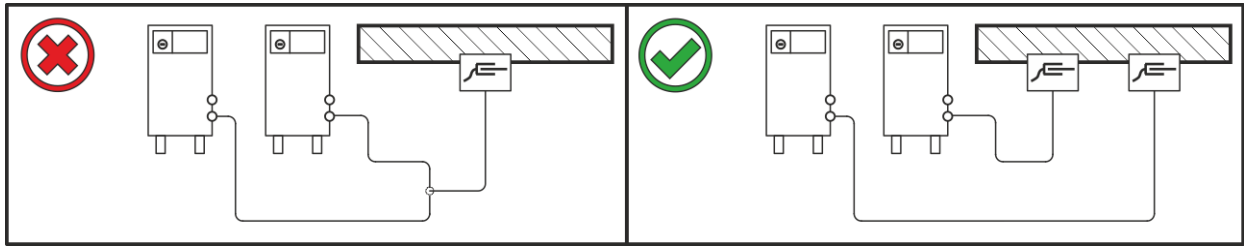


Figure 5-2

- Fully unroll welding current leads, torch hose packages and intermediate hose packages. Avoid loops!
- Always keep leads as short as possible!

Lay any excess cable lengths in meanders.

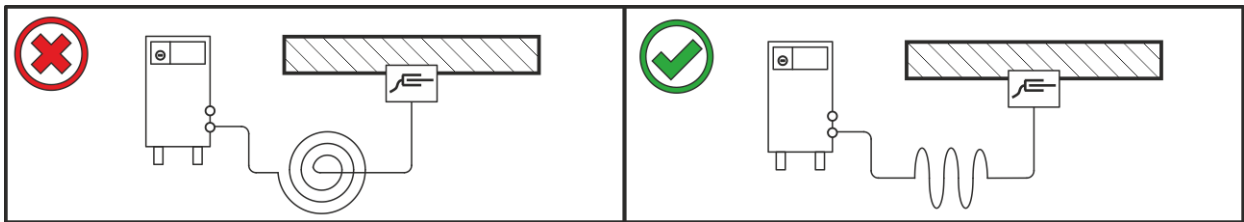


Figure 5-3

## 5.1.6 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.

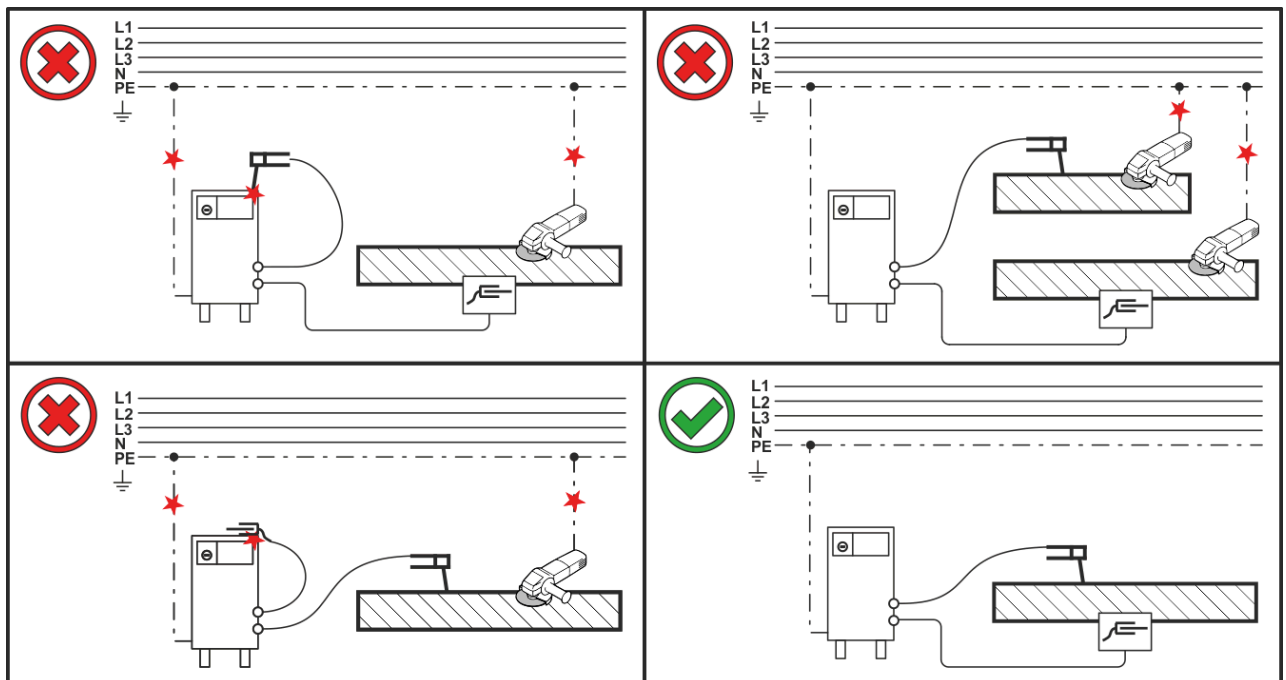


Figure 5-4

## 5.1.7 Mains connection

### DANGER



#### Hazards caused by improper mains connection!

#### An improper mains connection can cause injuries or damage property!

- The connection (mains plug or cable), the repair or voltage adjustment of the device must be carried out by a qualified electrician in accordance with the respective local laws or national regulations!
- The mains voltage indicated on the rating plate must match the supply voltage.
- Only operate machine using a socket that has correctly fitted protective earth.
- Mains plug, socket and lead must be checked by a qualified electrician on a regular basis!
- When operating the generator, always ensure it is earthed as stipulated in the operating instructions. The network created must be suitable for operating machines according to protection class I.

### 5.1.7.1 Mains configuration



*The machine may only be connected to a one-phase system with two conductors and an earthed neutral conductor.*

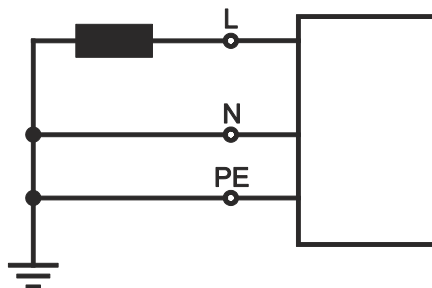


Figure 5-5

#### Legend

Item	Designation	Colour code
L	Outer conductor	brown
N	Neutral conductor	blue
PE	Protective conductor	green-yellow

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

## 5.2 Operating the machine control

### 5.3 Machine display

The machine control switches to the main screen after it has been turned on or a setting has been completed. This means that the previously selected settings (indicated by signal lights where applicable) have been applied and the current nominal value (A) is displayed in the welding data display.

#### 5.3.1 Welding power setting

The welding power is set using the control button. You can also adjust the parameters in the operation sequence or settings in the different machine menus.

#### 5.3.2 Welding parameter setting in the operation sequence

During the operation sequence you can set a welding parameter by briefly pressing the control button (navigate the parameters) and then turning the button (set the parameter).

#### 5.3.3 Setting advanced welding parameters (Expert menu)

The Expert menu contains functions and parameters which cannot be set directly in the machine control or which do not need to be set on a regular basis. The number and display of these parameters depends on the previously selected welding procedure or the functions.

#### 5.3.4 Changing basic settings (machine configuration menu)

The basic welding system functions can be adjusted in the machine configuration menu. Only experienced users should change the settings > see 5.12 chapter.



## 5.4 MMA welding

### 5.4.1 Connecting the electrode holder and workpiece lead

#### ⚠ CAUTION



**Risk of crushing and burns!**

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

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

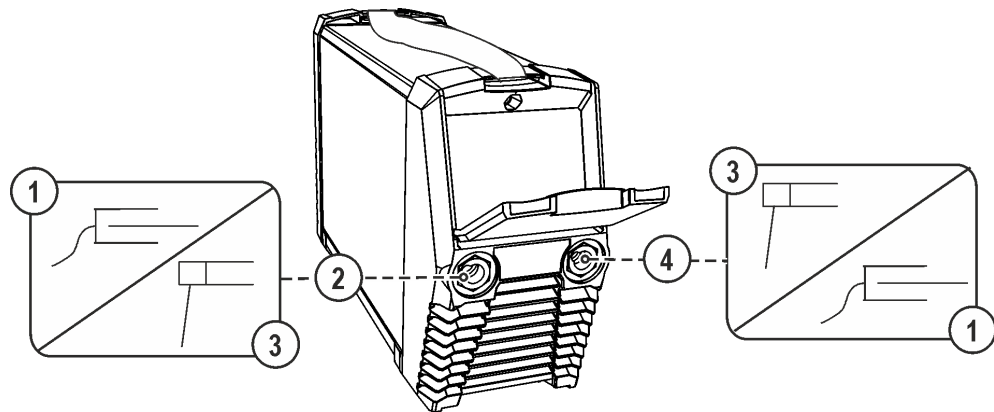


Figure 5-6

Item	Symbol	Description
1		<b>Workpiece</b>
2		<b>Connection socket for "+" welding current</b> Electrode holder or workpiece lead connection
3		<b>Electrode holder</b>
4		<b>Connection socket, "-" welding current</b> Workpiece lead or electrode holder connection

- Insert the electrode holder plug and workpiece lead into the welding current socket depending on application and lock in place by turning to the right. The corresponding polarity will be based on the information of the electrode manufacturer on the electrode packaging.

## 5.4.2 Welding task selection

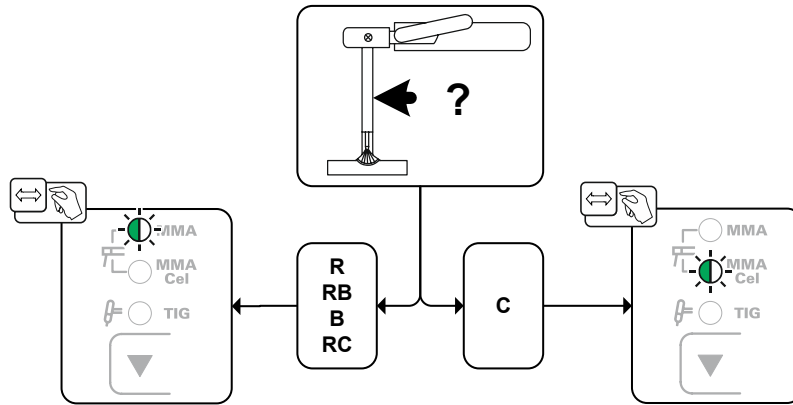


Figure 5-7

Type	Electrode type
R	Rutile
RB	Rutile-basic
B	Basic
RC	Rutile cellulose
C	Cellulose

## 5.4.3 Arcforce

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.

For parameter setting, > see 5.4.7 chapter.

## 5.4.4 Hotstart

The function hot start ensures a secure igniting of the arc and a sufficient heating to the still cold parent metal at the beginning of the welding process. The ignition takes place here with increased current (hot start current) over a certain time (hot start time).

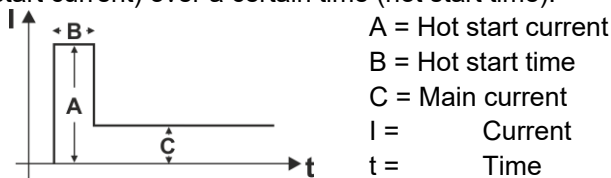


Figure 5-8

### Setting

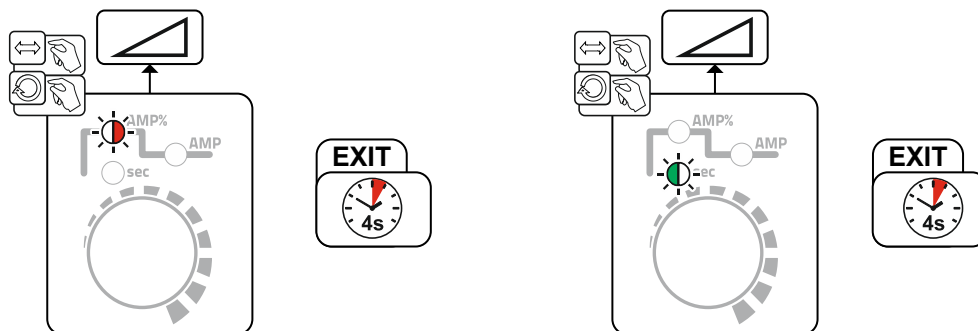
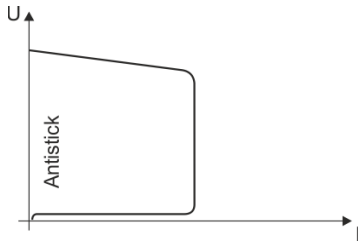


Figure 5-9

## 5.4.5 Antistick



**The Antistick feature prevents the electrode from annealing.** Should the electrode stick despite the Arcforce feature, the machine automatically switches to the minimum current within approx. one second. This prevents the electrode from annealing. Check the welding current setting and correct for the welding task in hand.

Figure 5-10

## 5.4.6 Average value pulse welding

Average value pulse welding means that two currents are switched periodically, a current average value (AMP), a pulse current (Ipuls), a balance ( $\overline{bRL}$ ) and a frequency ( $\overline{FrE}$ ) having been defined first. The predefined ampere current average value is decisive, the pulse current (Ipuls) is defined by the  $\overline{fPL}$  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.

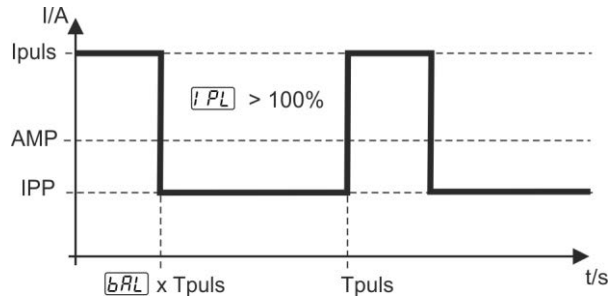


Figure 5-11

AMP = Main current; e.g. 100 A

Ipuls = Pulse current =  $\overline{fPL}$  x AMP; e.g. 140% x 100 A = 140 A

IPP = Pulse pause current

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

$\overline{bRL}$  = Balance

### Selection

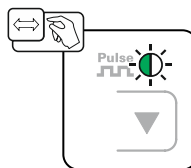


Figure 5-12

For parameter setting, > see 5.4.7 chapter.

## 5.4.7 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 > see 11.1 chapter.

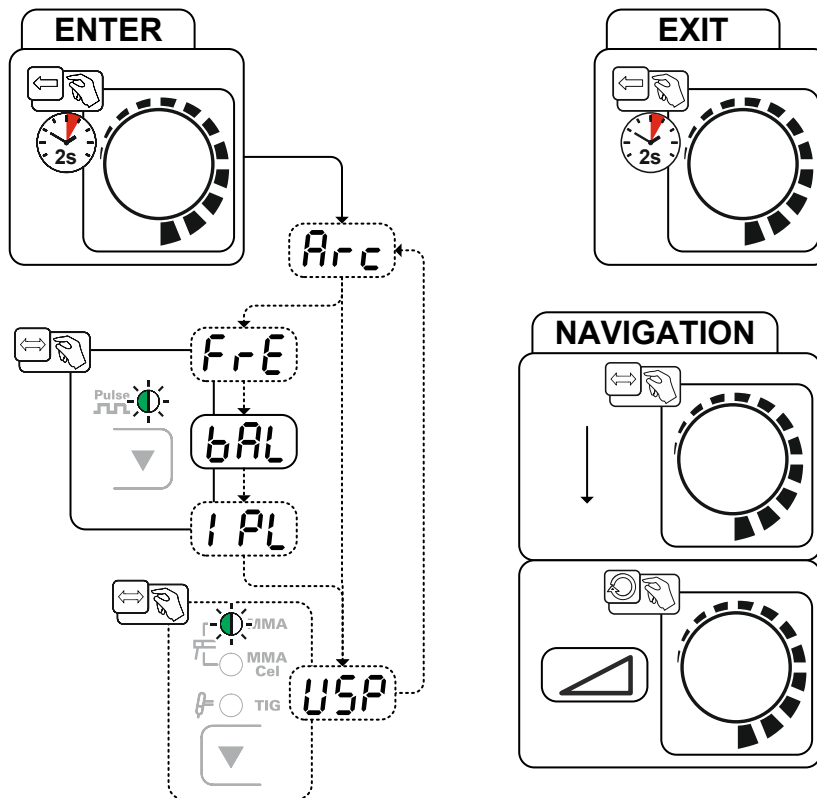


Figure 5-13

Display	Setting/selection
<b>Arc</b>	<b>Arcforce correction</b> <ul style="list-style-type: none"> <li>• Increase value &gt; harder arc</li> <li>• Decrease value &gt; softer arc</li> </ul>
<b>FrE</b>	<b>Pulse frequency</b>
<b>bAL</b>	<b>Pulse balance</b>
<b>I PL</b>	<b>Pulse current &gt; see 5.4.6 chapter</b>
<b>USP</b>	<b>Arc length restriction &gt; see 5.8 chapter</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> on ----- Function switched on</li> <li><input type="checkbox"/> OFF ----- Function switched off</li> </ul>

## 5.5 TIG welding

### 5.5.1 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).

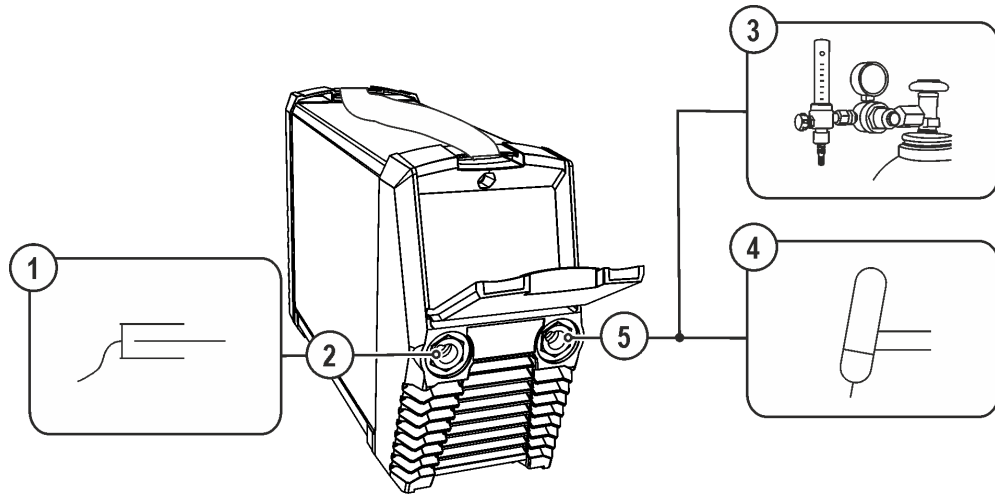


Figure 5-14

Item	Symbol	Description
1		<b>Workpiece</b>
2		<b>Connection socket for "+" welding current</b> Workpiece lead connection
3		<b>Output side of the pressure regulator</b>
4		<b>Welding torch</b>
5		<b>Connection socket, "-" welding current</b> Welding current lead connection for TIG welding torch

- Insert the welding current plug on the welding torch into the welding current connection socket and lock by turning to the right.
- Insert the cable plug on the work piece lead into the "+" welding current connection socket and lock by turning to the right.
- Screw the shielding gas hose of the welding torch to the pressure regulator outlet.

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

**⚠ WARNING**

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

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



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

- **All shielding gas connections must be gas tight.**

## 5.5.3 Pressure regulator connection

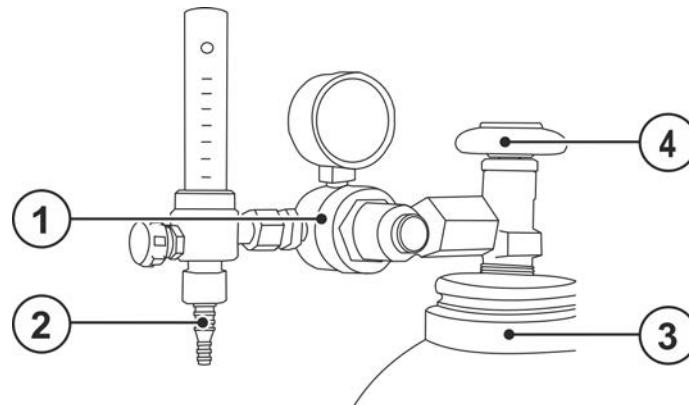


Figure 5-15

Item	Symbol	Description
1		Pressure regulator
2		Output side of the pressure regulator
3		Shielding gas cylinder
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 gas hose connection to the outlet side of the pressure regulator gas-tight.

## 5.5.4 Welding task selection

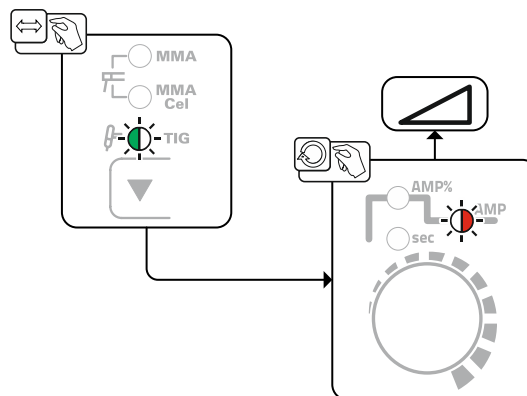


Figure 5-16

## 5.5.5 Gas test – setting the shielding gas volume

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.

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.

- Slowly open the gas cylinder valve.
- Set the relevant gas quantity for the application on the pressure regulator.

## 5.5.6 Arc ignition

### 5.5.6.1 Liftarc

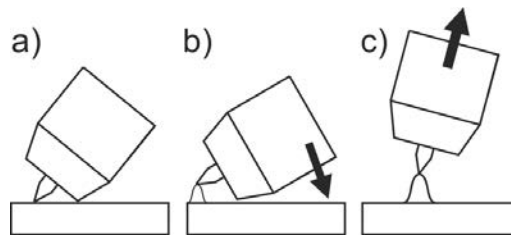


Figure 5-17

**The arc ignites through contact with the workpiece:**

- Carefully place the torch gas nozzle and tungsten electrode tip against the workpiece (lift arc current flows independent of the set main current)
- Angle the torch above the torch gas nozzle until the distance between electrode tip and workpiece is approx. 2–3 mm (arc ignites, current increases to the set main current).
- Lift the torch off and bring into normal position.

**Complete the welding task: Remove the torch from the workpiece so that the arc extinguishes > see 5.8 chapter.**

## 5.5.7 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 ( $bRL$ ) and a frequency ( $F_{rE}$ ) having been defined first. The predefined ampere current average value is decisive, the pulse current ( $I_{puls}$ ) is defined by the  $\overline{IPL}$  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.

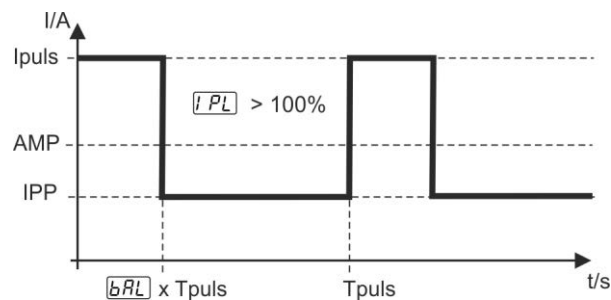


Figure 5-18

AMP = Main current; e.g. 100 A

$I_{puls}$  = Pulse current =  $\overline{IPL}$  x AMP; e.g. 140% x 100 A = 140 A

IPP = Pulse pause current

$T_{puls}$  = Duration of one pulse cycle =  $1/F_{rE}$ ; e.g. 1/1 Hz = 1 s

$bRL$  = Balance

**For parameter setting, > see 5.5.8 chapter.**

**Selection**

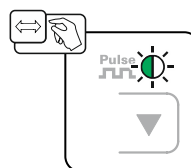


Figure 5-19

## 5.5.8 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 11.1 chapter.

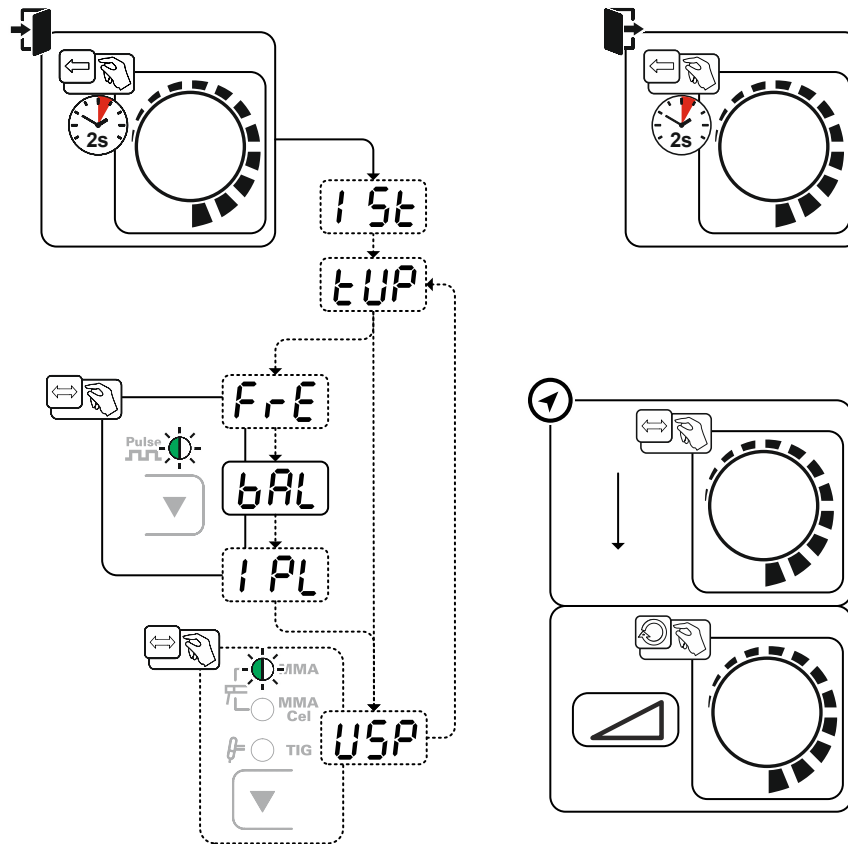


Figure 5-20

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 5.5.7 chapter
USP	Arc length restriction > see 5.8 chapter <input type="checkbox"/> on ----- Function switched on <input type="checkbox"/> FF ----- Function switched off



## 5.6 Degaussing

### ⚠ CAUTION



**Movement forces due to electromagnetic fields!**

**Electromagnetic fields may exert movement forces on unsecured metal objects! This may result in injury for example by tools that are set in motion uncontrolled, etc.**

- Remove metal objects lying around from the working area or secure against movement.

### 5.6.1 Description of procedure

With the process activgauss, an adjustable direct current is used to generate an opposing magnetic field. The opposing magnetic field is applied during the welding process and counteracts the magnetism present in the workpiece. This reduces arc deflection (arc instability), irregular droplet detachment, spatter and irregular flank connections.

When using the activgauss method, only the magnetic fields in which the opposing field is identical are compensated. The magnetic field along the welding joint is usually not constant. This means that in practical use the field around the welding start should be compensated. The welder begins to weld. If the arc becomes unsteady, the magnetic flux density must be measured and re-compensated until the pipe root has been completely welded. Experience has shown that this process must be carried out 3 to 4 times over the circumference. As the root welding progresses, the existing magnetic field decreases to 0.

Degaussing the workpiece successfully and demonstrably requires the measuring of the magnetic flux density in millitesla (mT). This requires a field strength or magnetic flux density meter.

### 5.6.2 Notes on laying power cables

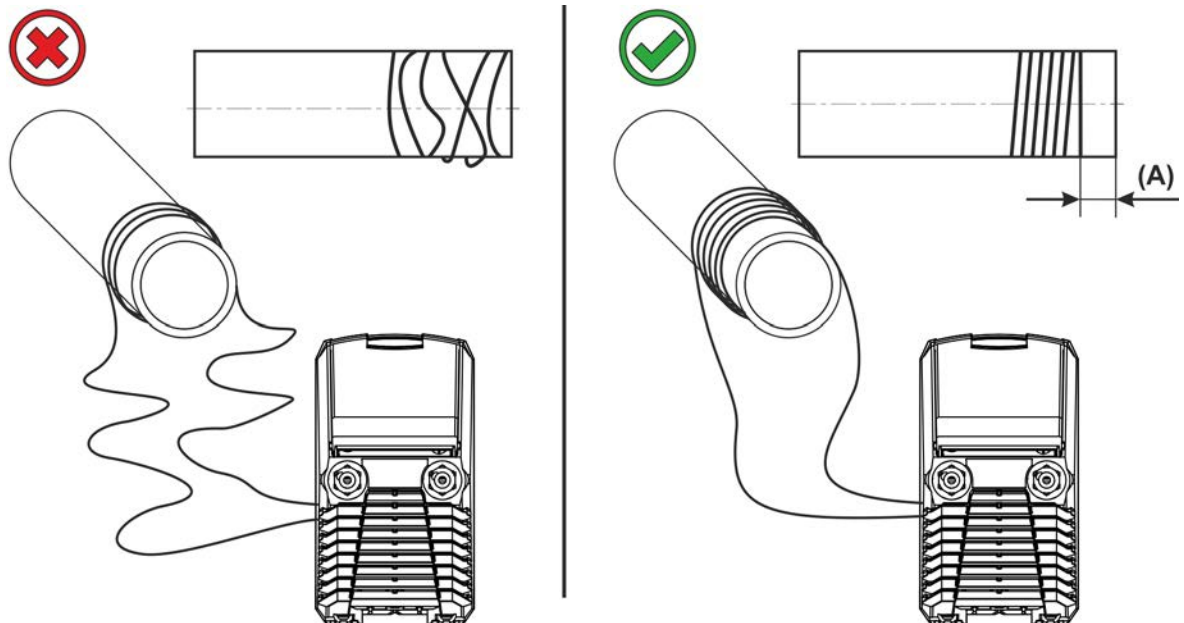


Figure 5-21

- Lay power cables close together around the component.
- The greater the distance to the welding-relevant area (A), the greater the number of turns you must select. Using the activgauss method, it is possible to increase the degaussing current as an alternative or in addition.

## Large or long workpieces

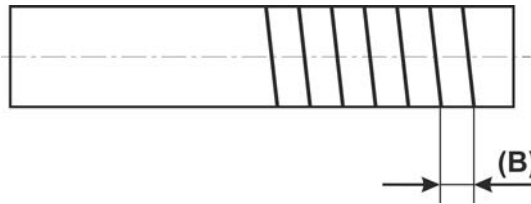


Figure 5-22

- Lay power cables tightly around the component.
- Lay power cables up to the welding-relevant area, such as the sidewall of the joint.

**If the space required by the power lines is too large, the turns can also be placed on top of each other. This has no significant influence on the degaussing process.**

**As the distance between the individual turns (B) increases, the current must be corrected upwards to achieve the desired result.**

### 5.6.3 Generating an opposing magnetic field during welding (activgauss)

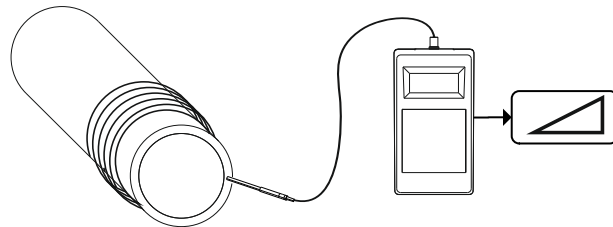


Figure 5-23

- Measure the magnetic flux density.

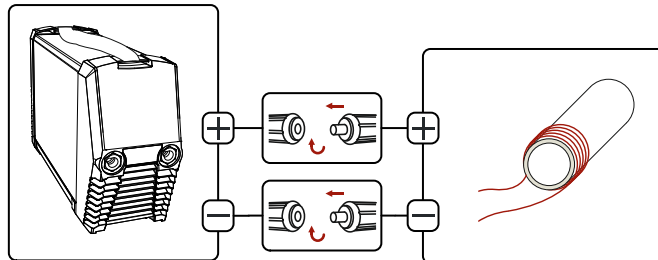


Figure 5-24

- Lay power cables tightly around component > see 5.6.2 chapter.
- Connect power cables to the power source (the polarity is freely selectable).

The process must be activated before use. The subsequent restarting of the power source switches back to the last active welding procedure.

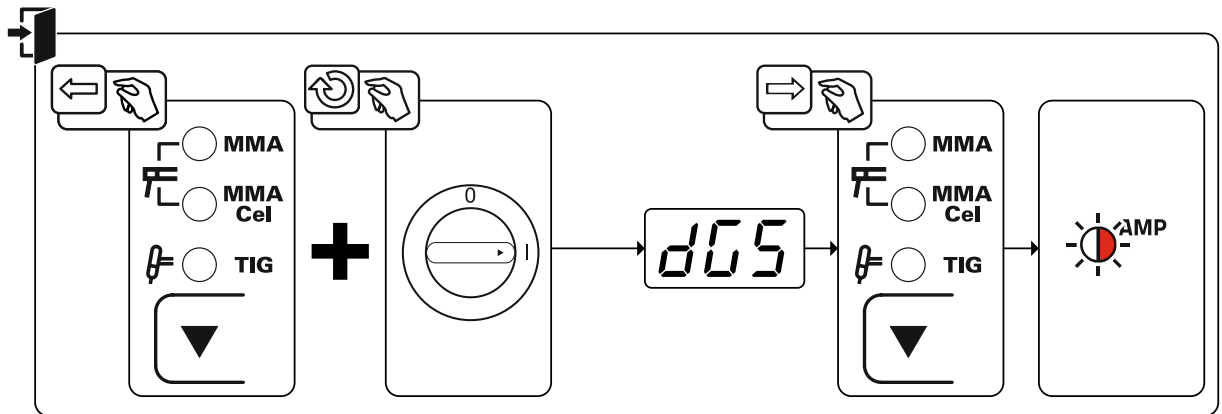


Figure 5-25

Display	Setting/selection
	Degaussing is activated.

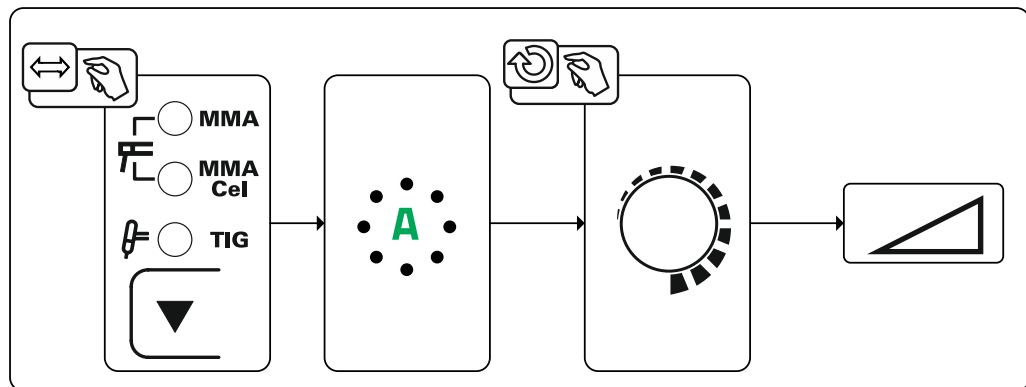


Figure 5-26

- Press the welding procedure/ degaussing pushbutton.
- The signal light "A" flashes.
- Check the magnetic field on the workpiece with the magnetic field meter.
- Increase the current with the rotary transducer until the magnetic field in the component decreases towards "0".

If the field strength increases in the workpiece:

- Switch off activgauss.
- Change polarity by switching cables.
- Switch on activgauss.
- Increase the current with the rotary transducer until the magnetic field in the workpiece decreases towards "0".

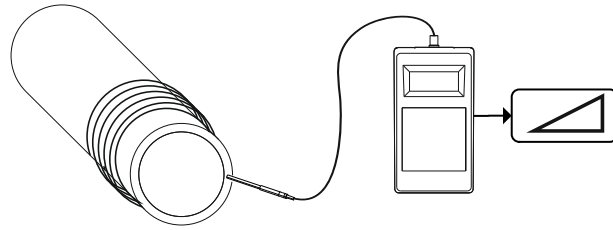


Figure 5-27

- Measure the magnetic flux density.
- Compare the measured magnetic flux density with the table “Guide values for residual flux density” > see 11.2 chapter for the corresponding welding process.

**If the residual field strength is too high, the process of degaussing can be repeated as often as desired (increase the number of turns if necessary).**

### 5.6.3.1 Automatic cut-out

The demagnetization process is stopped within 5 seconds if no current flow can be established. The display shows the message  $\text{brE}$  (interruption). Check all circuit connections and repeat the process.

### 5.6.4 Decommissioning

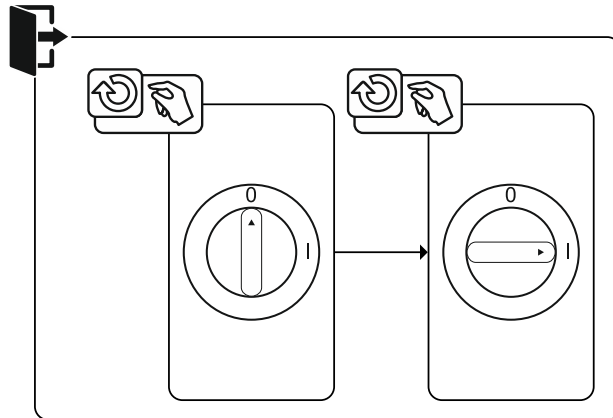


Figure 5-28

- Switch off machine at the main switch.
- Remove all connections.

## 5.7 Remote control

Remote controls are used for the remote operation of various machine functions. The 2-pin remote control connection is installed on the device controller > see 4.3 chapter.

## 5.8 Arc length restriction (USP)

The arc length restriction  $\text{USP}$  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 5.4.7 chapter

TIG welding > see 5.5.8 chapter

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

## 5.9 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  $\overline{SbA}$ ) > see 5.12 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.

## 5.10 Voltage reducing device

Only machine variants with the (VRD/SVRD/AUS/RU) code are equipped with a voltage reduction device (VRD). The VRD is used for increased safety, especially in hazardous environments such as shipbuilding, pipe construction or mining.

A VRD is mandatory in some countries and required by many on-site safety instructions for power sources.

The VRD > see 4.3 chapter signal light is illuminated when the voltage reduction device is operating without fault and the output voltage is reduced to a value specified in the relevant standard (see technical data > see 8 chapter).

## 5.11 Access control

The control can be locked to secure some basic parameters against unauthorised or unintentional adjustment of machine settings. The access block operates as follows:

- The parameters and their settings in the machine configuration menu, Expert menu and operation sequence can only be viewed but not changed.
- Welding procedure cannot be changed.

The parameters for the access block are configured in the machine configuration menu > see 5.12 chapter.

### Enabling the access block

- Assign the access code for the access block: Select parameter  $\overline{cod}$  and select a number code (000–999).
- Enable the access block: Set parameter  $\overline{loc}$  to access block enabled  $\overline{on}$ .

The access block activation is indicated by the "Access block active" signal light > see 4.3 chapter.

### Disabling the access block

- Enter the access code for the access block: Select parameter  $\overline{cod}$  and enter the previously selected number code (000–999).
- Disable the access block: Set parameter  $\overline{loc}$  to access block disabled  $\overline{off}$ . The only way to disable the access block is to enter the previously selected number code.

### 5.12 Machine configuration menu

Basic machine settings are defined in the machine configuration menu.

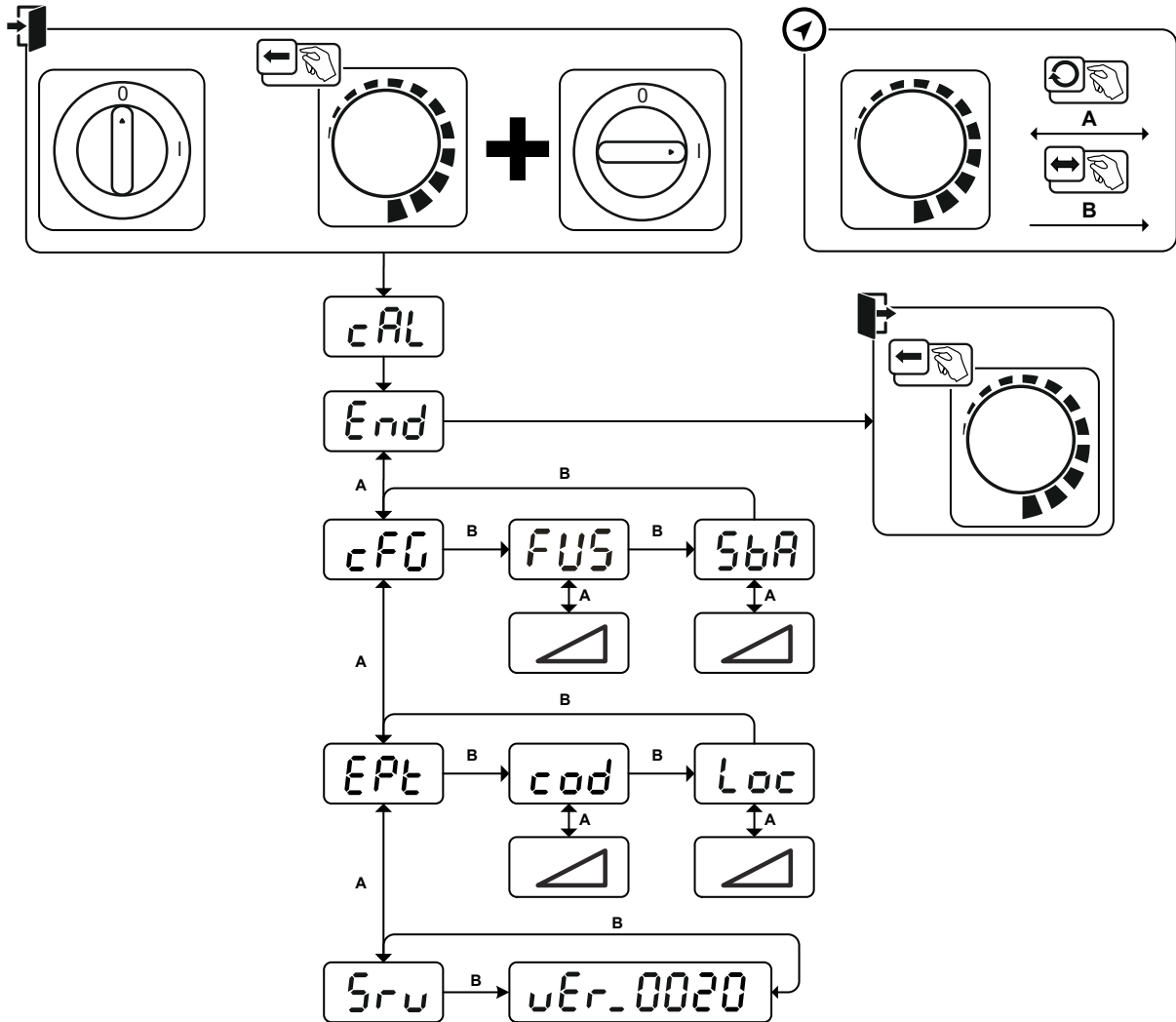
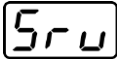
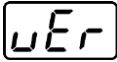


Figure 5-29

Display	Setting/selection
	<b>Calibration</b> The machine will be calibrated for approx 2 seconds each time it is switched on.
	<b>Exit the menu</b> Exit
	<b>Machine configuration</b> Settings for machine functions and parameter display
	<b>Dynamic power adjustment &gt; see 7.4 chapter</b>
	<b>Time-based power-saving mode &gt; see 5.9 chapter</b> Time to activation of the power-saving mode in case of inactivity. Setting  = disabled or numerical value 5-60 min..
	<b>Expert menu</b>
	<b>Access control – access code</b> Setting: 000 to 999 (000 ex works)
	<b>Access control &gt; see 5.11 chapter</b> ----- Function enabled ----- Function disabled (ex works)

---

Display	Setting/selection
	<b>Service menu</b> Any changes to the service menu should be agreed with the authorised service personnel.
	<b>Software version of the machine control</b> Version display

---

## 6 Maintenance, care and disposal

### 6.1 General

#### **DANGER**



**Risk of injury due to electrical voltage after switching off!**

**Working on an open machine can lead to fatal injuries!**

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

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

#### **WARNING**



**Incorrect maintenance, testing and repair!**

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

Observe the maintenance instructions > see 6.2 chapter.

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

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

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

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

#### 6.1.1 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.

#### 6.1.2 Dirt filter

The duty cycle of the welding machine decreases due to the reduced cooling air flow. The dirt filter must be removed at regular intervals and cleaned by blowing out with compressed air (depending on the level of soiling).



## 6.2 Maintenance work, intervals

### 6.2.1 Daily maintenance tasks

Visual inspection

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

Functional test

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

### 6.2.2 Monthly maintenance tasks

Visual inspection

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

Functional test

- Selector switches, command devices, emergency stop devices, voltage reducing devices, message and control lamps
- Check wire guide elements (wire feed roll holder, wire feed nipple, wire guide tube) for tight fit. Recommendation for replacing the wire feed roll holder (eFeed) after 2000 hours of operation, see replacement parts).
- 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.

### 6.2.3 Annual test (inspection and testing during operation)

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

For more information refer to the "Warranty registration" brochure supplied and our information regarding warranty, maintenance and testing at [www.ewm-group.com](http://www.ewm-group.com)!

## 6.3 Disposing of equipment



### Proper disposal!

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




- Do not dispose of in household waste!
- Observe the local regulations regarding disposal!
- According to European provisions (Directive 2012/19/EU on Waste of Electrical and Electronic Equipment), used electric and electronic equipment may no longer be placed in unsorted municipal waste. It must be collected separately. The symbol depicting a waste container on wheels indicates that the equipment must be collected separately.  
This machine has to be disposed of, or recycled, in accordance with the waste separation systems in use.
- According to German law (law governing the distribution, taking back and environmentally correct disposal of electric and electronic equipment (ElektroG)), used machines are to be placed in a collection system separate from unsorted municipal waste. The public waste management utilities (communities) have created collection points at which used equipment from private households can be disposed of free of charge.
- Information about returning used equipment or about collections can be obtained from the respective municipal administration office.
- In addition to this, returns are also possible throughout Europe via EWM sales partners.

## 7 Rectifying faults

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

### 7.1 Error messages (power source)

Depending on the options of the machine display, a fault is shown as follows:

Display type - machine control	Display
Graphic display	
two 7-segment displays	
one 7-segment display	

The possible cause of the fault is signalled by a corresponding fault number (see table). In the case of an error, the power unit shuts 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.
- 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 off and on again. If the error persists, notify service department
E 9	Secondary overvoltage	
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 one 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 off and on 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 off and on again. If the error persists, notify service department
E37	Temperature error	Allow the machine to cool down
E40	Motor fault	Check wire feed mechanism, switch the machine off and on again, inform the service department if the fault persists.

Error message	Possible cause	Remedy
E51	Earth fault (PE error)	Connection between welding wire and machine casing
E55	Failure of a mains phase	Switch off the machine and check the mains voltage
E58	Short circuit in welding circuit	Switch off the machine and check welding current leads for correct installation, e.g. by placing the electrode holder in an insulated position; detach current lead from degaussing.

## 7.2 Checklist for rectifying faults

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

Legend	Symbol	Description
	↗	Fault/Cause
	✘	Remedy

### Excess temperature signal light illuminates

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

### 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

## 7.3 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 5.12 chapter.

## 7.4 Dynamic power adjustment

**This requires use of the appropriate mains fuse.**

**Observe mains fuse specification > see 8 chapter!**

This function enables aligning the machine to the mains connection fusing to avoid continuous tripping of the mains fuse. The maximum power input of the machine is limited by an exemplary value for the existing mains fuse (several levels available).

You can predefine this value in the machine configuration menu > see 5.12 chapter using parameter **FUS**. The selected value will be shown on the machine display **ERL** for two seconds after the machine has been switched on.

The function automatically adjusts the welding power to an uncritical level for the mains fuse.



**When using a 20-A mains fuse, a suitable mains plug has to be installed by a qualified electrician.**

## 7.5 Resetting welding parameters to the factory settings

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

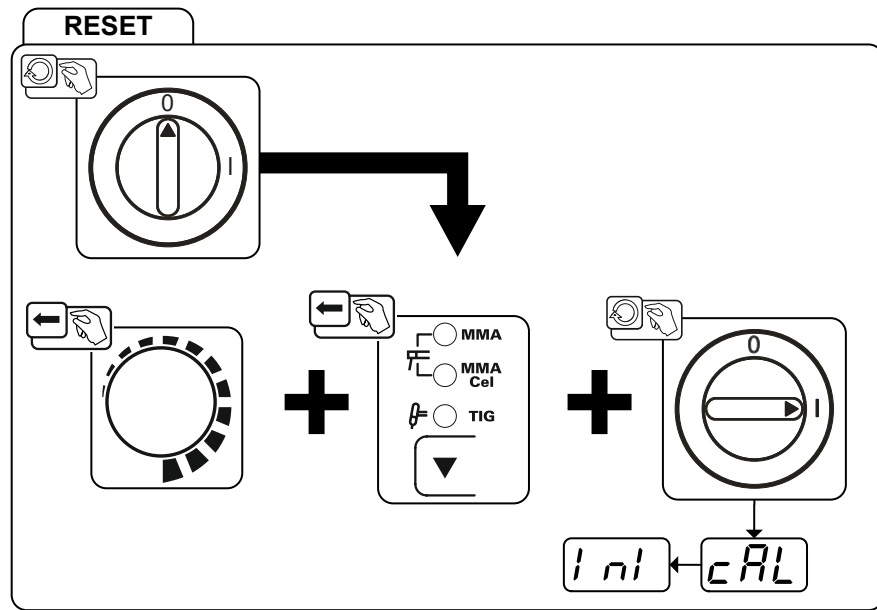


Figure 7-1

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

## 8 Technical data

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

### 8.1 Pico 160 cel puls

	MMA	TIG
Welding current (I <sub>2</sub> )	5 A to 150 A	5 A to 160 A
Welding voltage according to standard (U <sub>2</sub> )	20,2 V to 26,0 V	10,2 V to 16,4 V
Duty cycle DC at 40° C <sup>[1]</sup>		
30 %	150 A	160 A
60 %	120 A	
100 %	110 A	
Mains voltage (Tolerance) / Frequency	1 x 230 V (-40 % to +15 %) / 50/60 Hz	
mains fuse <sup>[2]</sup>	1 x 20 A	
Continuous primary current (100 %)	1 x 20 A	1 x 13 A
Open circuit voltage (U <sub>0</sub> )	94 V	
Open circuit voltage (U <sub>r</sub> ) VRD AUS	33 V	12 V
Open circuit voltage (U <sub>r</sub> ) VRD RU	12 V	12 V
max. Connected load (S <sub>1</sub> )	7,3 kVA	4,9 kVA
Generator rating (Rec.)	9,9 kVA	
Maximum mains impedance (@PCC) <sup>[3]</sup>	xxx mOhm	
Cos φ / efficiency	0,99 / 83 %	
Protection class / Overvoltage category	I / III	
Contamination level	3	
Insulation class / protection classification	H / IP 23	
Residual current circuit breaker	Type B (recommended)	
Noise level <sup>[4]</sup>	<70 dB(A)	
Ambient temperature	-25 °C to +40 °C	
Machine cooling / Torch cooling	Fan (AF) / gas	
Mains connection cable	H07RN-F3G2,5	
EMC class	16 mm <sup>2</sup> / A	
Safety marking	[S] / CE / EMC	
Standards used	See declaration of conformity (appliance documents)	
Dimensions (l x b x h)	370 x 129 x 236 mm / 14.6 x 5.1 x 9.3 inch	
Weight	4,9 kg / 10.8 lb.	

<sup>[1]</sup> Load cycle: 10 min. (60 % DC  $\triangleq$  6 min. welding, 4 min. pause)

<sup>[2]</sup> Safety fuses are recommended DIAZED xxA gG. When using automatic cutouts, the "C" trigger characteristic must be used.

<sup>[3]</sup> This welding equipment does not comply with IEC 61000-3-12. When connecting a welding machine to a public low-voltage supply system, the manufacturer or operator has to consult the electricity utilities to make sure the welding machine may be connected.

<sup>[4]</sup> Noise level during idle mode and operation under standard load according to IEC 60974- 1 at the maximum operating point.

**9 Accessories****9.1 Electrode holder / workpiece lead**

Type	Designation	Item no.
EH25 QMM 4M	Electrode holder	094-005800-00000
WK16mm <sup>2</sup> 170A/60% 4m/K	Workpiece lead	094-005801-00000

**9.2 Remote controls and accessories**

Type	Designation	Item no.
RG13	Remote control	090-008113-00000

**9.3 TIG welding torch**

Type	Designation	Item no.
TIG 26 GDV 4m	TIG welding torch, rotary gas valve, gas-cooled, de-central	094-511621-00100
TIG 26 GDV 8m	TIG welding torch, rotary gas valve, gas-cooled, de-central	094-511621-00108
DM 842 Ar/CO <sub>2</sub> 230bar 30l D	Pressure regulator with manometer	394-002910-00030
GH 2X1/4" 2M	Gas hose	094-000010-00001

**9.4 General accessories**

Type	Designation	Item no.
SKGS 16A 250V CEE7/7, DIN 49440/441	Safety plug	094-001756-00000
ADAP CEE16/SCHUKO	Earth contact coupling/CEE16A plug	092-000812-00000

**9.5 Options**

Type	Designation	Item no.
ON Filter Pico160	Air inlet dirt filter, retrofit option	092-003206-00000
ON Handle Pico 160	Grip, retrofit option	092-003205-00000

**9.6 Degaussing**

Type	Designation	Item no.
Set LC 35 mm <sup>2</sup>	Set: Two 5-metre load cables (35 mm <sup>2</sup> ) and one 20-metre load cable (35 mm <sup>2</sup> ) for degaussing	092-002921-00000

## 10 Service documents

### **⚠ 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)!

### 10.1 Spare and replacement parts

Spare parts can be obtained from the relevant authorised dealer.

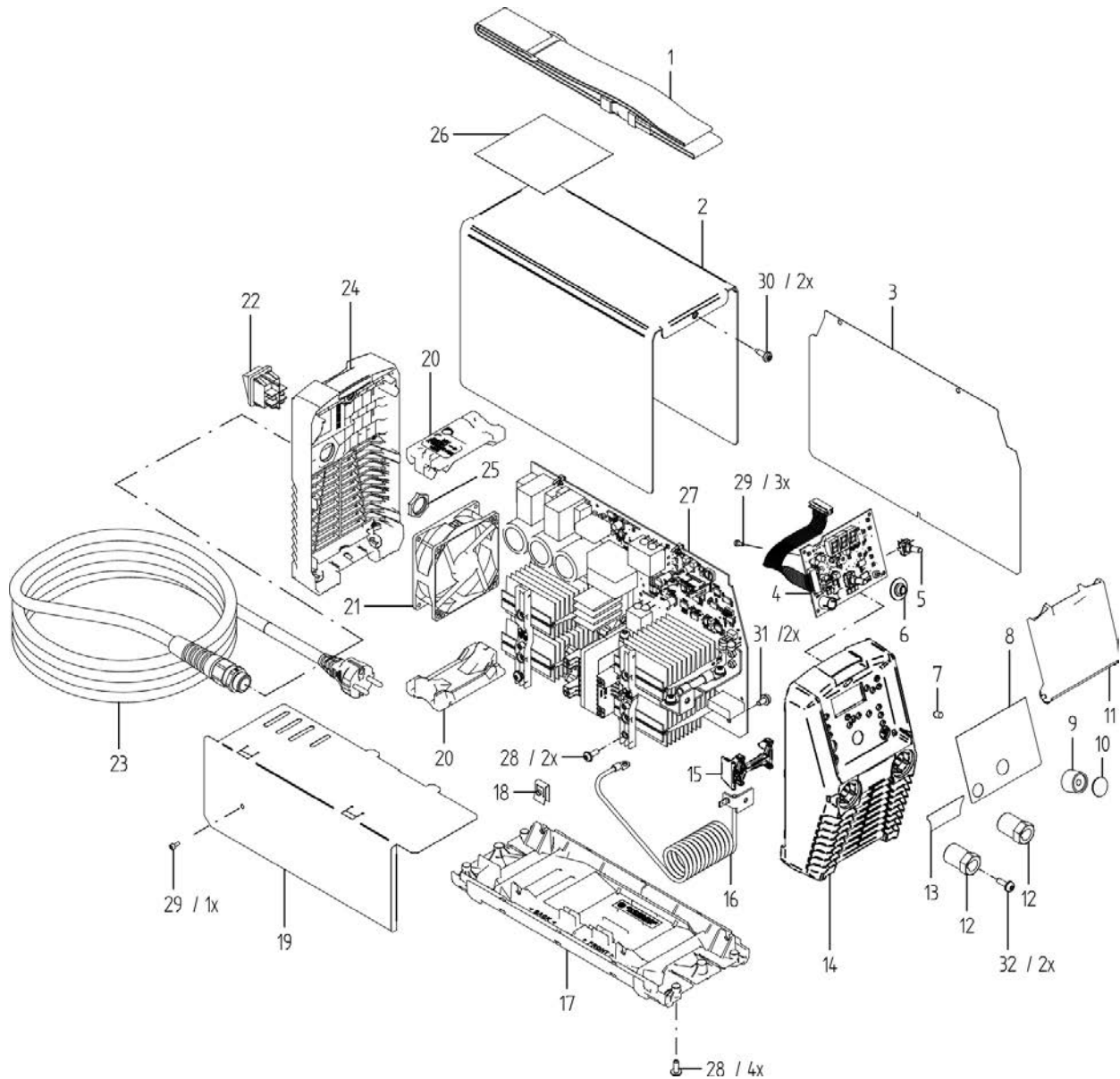


Figure 10-1



Item	Order number	Name	Type
1	094-015236-E0501	Carrying strap	TG3-E
2	094-021818-E0501	Casing panel	BH276,5X201,5X124,2
3	094-021826-00000	Insulating foil	IP
4	040-001090-E0000	Operating panel assembly with rotary transducer	E160
5	044-004185-10015	Rotary transducer	30POS/1,5NCM
6	094-019308-00000	Plastic insulation for rotary transducer	KID/D23X7,3
7	094-021994-00000	Fibre optics	LL8X6
8	094-021794-00502	Adhesive film	KLF-E 1.05
9	074-000315-00000	Rotary knob	KNOB 23MM
10	094-015043-00001	Rotary knob cover	KNOB COVER 23MM
11	094-021514-00000	Cover cap	KKS
12	094-021511-00000	Socket	EB/35-50QMM
13	094-021795-00502	Adhesive film	LOGO/PLUS/MINUS
14	094-021477-00000	Casing, front section	KFG
15	094-022172-00002	Spacer	AHD35X22X4
16	092-003193-00002	Choke	WD
17	094-021509-00000	Casing, lower section	KBG
18	094-014311-00000	Plate nut	M5/21X15X6
19	094-021508-00000	Air duct	IPL
20	094-015248-00001	Foam, fan support	S95X48X23
21	092-019418-00000	Fan	92X92X32
22	094-008045-10000	Mains switch	WS 250V/20A 2POLE
23	092-003003-00001	Mains cable	3X2.5QMM/3.5M SCHUKO
23a	094-020188-00032	Mains cable - Pico 160 VRD (AUS)	1PHASIG/2.5 3.5M BOC
24	094-021478-00000	Casing, back panel	KRG
25	094-019537-00000	Nut	M20x1,5
26	094-021796-00500	Adhesive film	processes PICO CEL PULS
27	040-001084-E0000	PCB inverter circuit board	HB160
27a	040-001424-E0000	PCB inverter circuit board - Pico 160 VRD (AUS)	HB160 VRD
28	094-012942-00000	Screw	M5X14/DELTA-PT-SCHRAUBE
29	094-010089-00000	Screw, Torx	M3X8-DG-SCHRAUBE
30	094-015135-00000	Screw	M5X16/KOMBITORX PLUS T25
31	094-021833-00000	Screw	M5X10/DIN6900-5 Z9/8.8/VERZ.
32	094-022122-00000	Clamping screw	M5X16/DIN6900-5 Z9/8.8/VERZ.

## 10.2 Circuit diagram

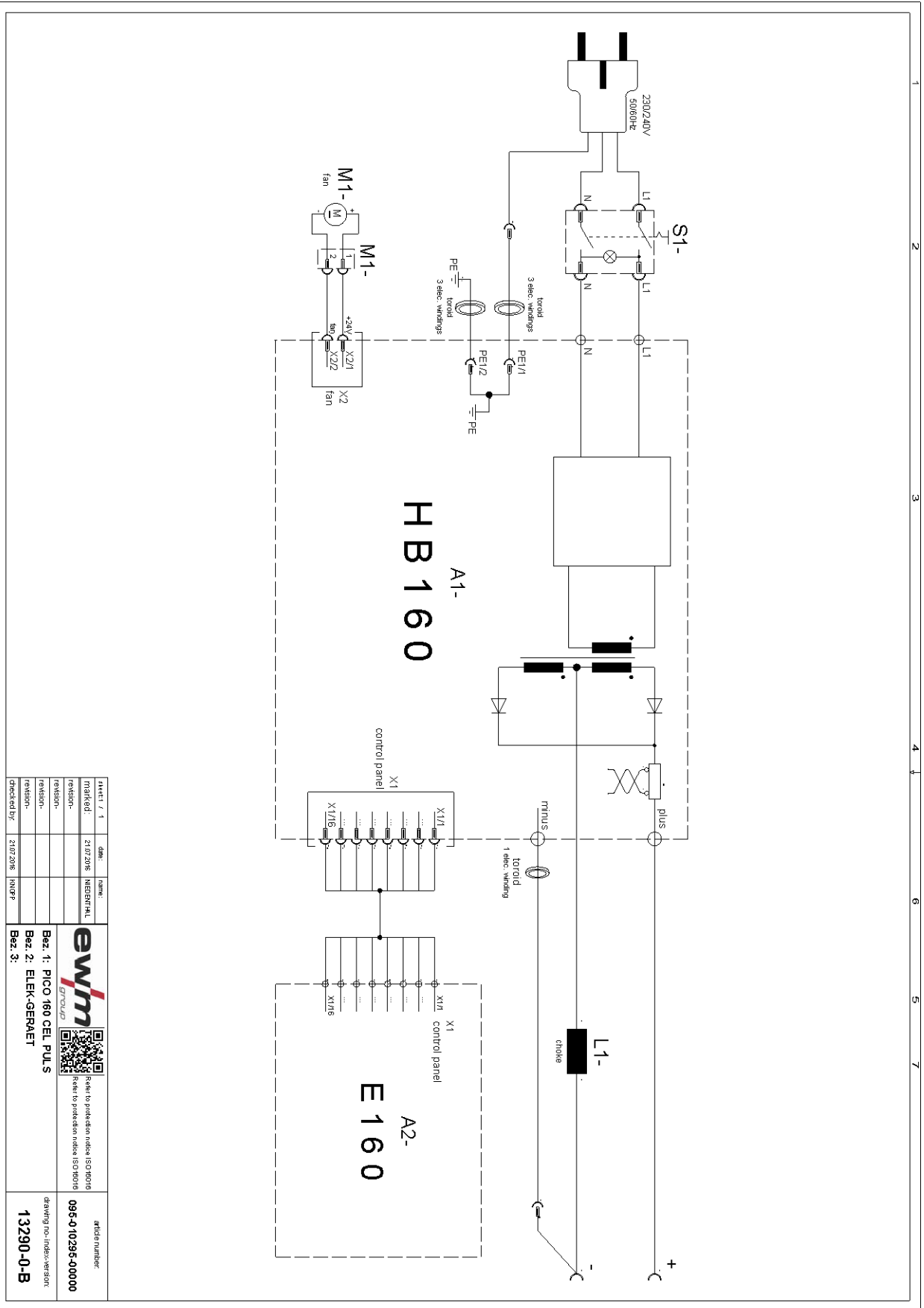























Figure 10-2

sheet / 1	date:	name:		order to protection index: SCD/6016 order to protection index: SCD/6016	article number: <b>095-010295-00000</b>
marked:	21.07.2016	WESBTHAL			
revision:					
revision:			Bez 1: PICO 160 CEL PULS	drawing no./index/revision: <b>13290-0-B</b>	
revision:			Bez 2: ELEK-GERAET		
revision:			Bez 3:		
checked by:	21.07.2016	HWPF			

## 11 Appendix

### 11.1 Parameter overview – setting ranges

Welding data display (3-digit)	Parameters/function	Setting range			
		Standard (ex works)	Min.	Max.	Unit
<b>MMA (MMA)</b>					
	Main current (AMP)	100	5 - 150	A	
	Hot start current (AMP%)	120	50 - 200	%	
	Hot start time (sec)	0,5	0,1 - 20,0	s	
	Arcforce correction	0	-10 - 10		
	Pulse frequency	1,2	0,2 - 500	Hz	
	Pulse balance	30	1 - 99	%	
	Pulse current	142	1 - 200	%	
	Arc length restriction	off	off - on		
<b>TIG (TIG)</b>					
	Main current AMP	100	5 - 160	A	
	Ignition current	20	1 - 200	%	
	Up-slope time	1,0	0,0 - 20,0	s	
	Pulse frequency	2,8	0,2 - 2000	Hz	
	Pulse balance	50	1 - 99	%	
	Pulse current	140	1 - 200	%	
	Arc length restriction	on	off - on		
<b>Basic parameters (independent of procedure)</b>					
	Calibration				
	Exit menu				
	Machine configuration				
	Dynamic power adjustment	16	10 - 20	A	
	Time-based power-saving mode	off	5 - 60	min.	
	Expert menu				
	Access control – access code	000	000 - 999		
	Access control	off	off - on		
	Service menu				
	Power-saving mode active				

## 11.2 Guide values of magnetic flux density, weldability

TIG welding		GMAW welding	
Magnetic flux density	Weldability	Magnetic flux density	Weldability
<0.5 mT	very good	<3 mT	very good
0.5-1 mT	good	3-4 mT	good
1-2 mT	possible	4-6 mT	possible
2-5 mT	poor	6-8 mT	poor
>5 mT	unsuitable	>8 mT	unsuitable

### 11.3 Searching for a dealer

Sales & service partners  
[www.ewm-group.com/en/specialist-dealers](http://www.ewm-group.com/en/specialist-dealers)



"More than 400 EWM sales partners worldwide"