



**EN**

welding torch

PM 221 G

PM 301 G

PM 401 G

099-700000-EW501

Observe additional system documents!

15.01.2024

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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).**

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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.

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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.

### **Data security**

The user is responsible for backing up data of all changes from the factory setting. The user is liable for erased personal settings. The manufacturer does not assume any liability for this.

# 1 Contents

<b>1</b>	<b>Contents.....</b>	<b>3</b>
<b>2</b>	<b>For your safety.....</b>	<b>5</b>
2.1	Notes on using these operating instructions .....	5
2.2	Explanation of icons .....	6
2.3	Safety instructions.....	7
2.4	Transport and installation .....	10
<b>3</b>	<b>Intended use.....</b>	<b>12</b>
3.1	Applications.....	12
3.2	Documents which also apply.....	12
3.2.1	Warranty.....	12
3.2.2	Declaration of Conformity.....	12
3.2.3	Service documents (spare parts).....	12
3.2.4	Part of the complete documentation.....	13
<b>4</b>	<b>Product description – quick reference.....</b>	<b>14</b>
4.1	Product variants.....	14
4.2	Standard welding torch .....	15
4.3	Function torch.....	16
4.4	Euro torch connector without control cable.....	16
4.5	Euro torch connector with control cable .....	17
<b>5</b>	<b>Design and function.....</b>	<b>18</b>
5.1	Transport and installation .....	18
5.1.1	Ambient conditions .....	18
5.2	Function specification .....	19
5.2.1	Settings.....	19
5.2.2	Operating elements in the machine .....	20
5.2.3	Operating elements for 2 U/D / 2U/D X welding torches.....	20
5.2.4	Operating elements for the RD2 X welding torch.....	21
5.2.4.1	Welding data display.....	22
5.2.5	Operating elements for the RD3 X welding torch.....	22
5.2.5.1	Welding data display.....	23
5.2.5.2	Programs, setting operating points.....	24
5.2.5.3	Component management on the welding torch.....	26
5.2.5.4	LED lighting.....	27
5.3	Configure welding torch.....	27
5.3.1	Using the torch key .....	28
5.3.1.1	Contact tip.....	28
5.3.1.2	Contact tip holder.....	28
5.3.2	Turning the torch neck.....	29
5.3.3	Changing the torch neck.....	29
5.4	Equipment recommendations.....	31
5.5	Adapting the Euro torch connection on the device .....	33
5.5.1	Liner.....	33
5.5.2	Guide spiral.....	33
5.5.3	Assemble the wire guide.....	33
5.5.3.1	Liner.....	33
5.5.3.2	Guide spiral.....	36
<b>6</b>	<b>Maintenance, care and disposal.....</b>	<b>40</b>
6.1	General.....	40
6.1.1	Identifying damage or worn components .....	40
6.1.2	Maintenance and care before each use.....	42
6.1.3	Regular maintenance.....	42
6.2	Disposing of equipment.....	43
<b>7</b>	<b>Rectifying faults.....</b>	<b>44</b>
7.1	Checklist for rectifying faults .....	44
<b>8</b>	<b>Technical data.....</b>	<b>45</b>
8.1	PM 221-, 301-, 401 G .....	45

<b>9 Accessories</b> .....	<b>46</b>
9.1 Option for retrofitting.....	46
9.2 General accessories.....	46
9.3 List of tools.....	46
<b>10 Replaceable parts</b> .....	<b>47</b>
10.1 PM 221 G.....	47
10.2 PM 301 G.....	48
10.3 PM 401 G.....	50
<b>11 Service documents</b> .....	<b>52</b>
11.1 Circuit diagrams.....	52
11.1.1 PM G, -W.....	52
11.1.2 PM G, -W LED.....	53
11.1.3 PM G, -W (ON TT PM Standard).....	54
11.1.4 PM G, -W LED (ON TT PM Standard).....	55
11.1.5 PM G, -W 2U/D.....	56
11.1.6 PM°G, -W 2U/DX.....	57
11.1.7 PM°G, -W RD2 X.....	58
11.1.8 PM G, -W RD3 X.....	59
<b>12 Appendix</b> .....	<b>60</b>
12.1 Display, explanation of symbols.....	60
12.2 Searching for a dealer.....	62

## 2 For your safety

### 2.1 Notes on using 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.



***Technical aspects which the user must observe to avoid material or equipment damage.***

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

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

## 2.2 Explanation of icons

Symbol	Description	Symbol	Description
	Indicates technical aspects which the user must observe.		Activate and release / Tap / Tip
	Switch off machine		Release
	Switch on machine		Press and hold
	Incorrect / Invalid		Switch
	Correct / Valid		Turn
	Input		Numerical value – adjustable
	Navigation		Signal light lights up in green
	Output		Signal light flashes green
	Time representation (e.g.: wait 4 s / actuate)		Signal light lights up in red
	Interruption in the menu display (other setting options possible)		Signal light flashes red
	Tool not required/do not use		Signal light lights up in blue
	Tool required/use		Signal light flashes blue

## 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!
- The device must not be used to defrost pipes!



**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 radiation or heat!**

**Arc radiation can lead to skin and eye injuries.**

**Contact with hot workpieces and sparks can lead to burns.**

- Use hand shield or welding helmet with the appropriate safety level (depends on the application).
- Wear dry protective clothing (e.g. hand shield, gloves, etc.) in accordance with the applicable regulations of your country.
- Persons who are not directly involved should be protected with a welding curtain or suitable safety screen against radiation and the risk of blinding!

## **WARNING**



### **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.



### **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 may lead to shortness of breath and poisoning! The ultraviolet radiation of the arc may also convert solvent vapours (chlorinated hydrocarbon) into poisonous phosgene.**

- Ensure sufficient fresh air!
- Keep solvent vapours away from the arc beam field!
- Wear suitable respiratory protection if necessary!
- To prevent the formation of phosgene, residues of chlorinated solvents on workpieces must first be neutralised using appropriate measures.

**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!



**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

**Electromagnetic fields!**

**The power source can create electrical or electromagnetic fields that may impair the function of electronic systems such as EDP and CNC devices, telecommunication, power and signal lines as well as pacemakers and defibrillators.**



- Follow the maintenance instructions > see 6 chapter!
- Unwind the welding leads completely!
- Shield radiation-sensitive equipment or facilities appropriately!
- The function of pacemakers may be impaired (seek medical advice if necessary).

**⚠ 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.

## 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.

**Risk of accidents due to incorrectly installed leads!**

Incorrectly installed leads (mains, control and welding leads or intermediate hose packages) can present a tripping hazard.

- Lay the supply lines flat on the floor (avoid loops).
- Avoid laying the leads on passage ways.

**Risk of injury from heated coolant and its connections!**

The coolant used and its connection or connection points can heat up significantly during operation (water-cooled version). When opening the coolant circuit, escaping coolant may cause scalding.

- Open the coolant circuit only when the power source or cooling unit is switched off!
- Wear proper protective equipment (protective gloves)!
- Seal open connections of the hose leads with suitable plugs.



***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

Welding torch for arc welding machines for GMAW.

### 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 (from commissioning).

#### 3.2.3 Service documents (spare parts)

### **WARNING**



#### **No improper repairs and modifications!**

To prevent injuries and damage to the machine, only competent personnel (authorised service personnel) are allowed to repair or modify the machine.

**Unauthorised manipulations will invalidate the warranty!**

- Instruct competent personnel (authorised service personnel) to repair the machine.

Spare parts can be obtained from the relevant authorised dealer.

### 3.2.4 Part of the complete documentation

This document is 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.

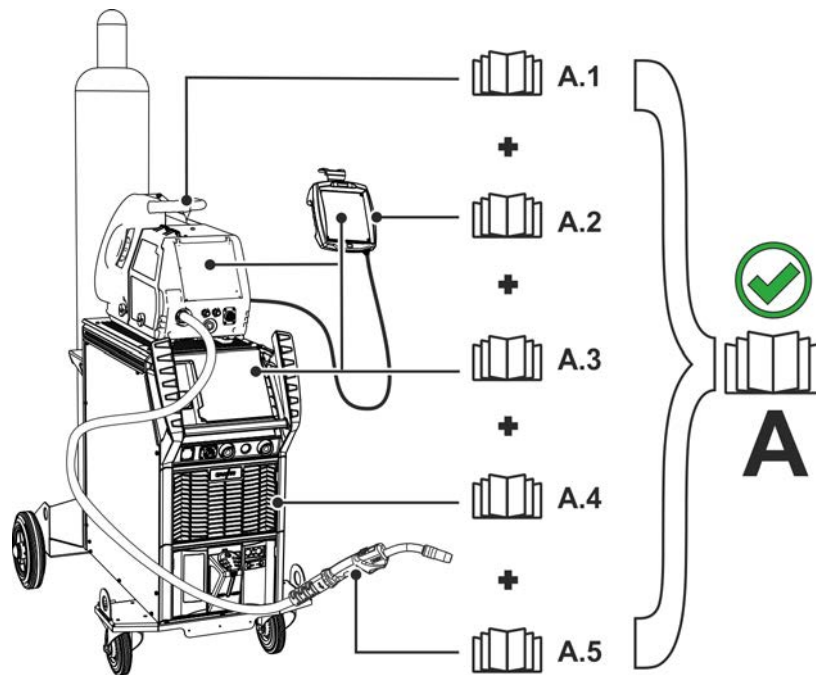


Figure 3-1

Item	Documentation
A.1	Wire feed unit
A.2	Remote control
A.3	Control
A.4	Power source
A.5	Welding torch
A	Complete documentation

## 4 Product description – quick reference

### 4.1 Product variants

Version	Functions	Rated output
<b>PM</b>	<b>Professional MIG</b>	PM221/301/401G, PM301/451/551W
<b>W</b>	<b>Water-cooled</b> Switching the welding process on and off with the torch trigger. Interchangeable contact tip holder.	PM301/451/551W
<b>G</b>	<b>Gas-cooled</b> Switching the welding process on and off with the torch trigger. Interchangeable contact tip holder.	PM221/301/401G
<b>S</b>	<b>Short torch neck</b> For welding narrow operating points. High duty cycle.	PM451/551WS
<b>L</b>	<b>Extended torch neck</b> For welding operating points which are difficult to reach. High duty cycle.	PM451/551WL
<b>C</b>	<b>Interchangeable torch neck</b> Torch neck can be continuously fixed through 360°.	PM221/301CG PM301/451CW
<b>2U/D</b>	<b>2 up/down torch</b> The welding power (welding current/wire feed speed) and the voltage correction or the JOB number and program number can be adjusted on the welding torch.	PM221/301/401G, PM301/451/551W
<b>RD2</b>	<b>Remote display-2-welding torch</b> The welding power (welding current/wire feed speed) and the voltage correction or the JOB number and program number can be adjusted on the welding torch. Values and changes are shown on the welding torch display.	PM221/301/401G, PM301/451/551W
<b>RD3</b>	<b>Remote display-3-welding torch</b> The welding power (welding current / wire feed speed), welding voltage correction, program number, dynamics and welding procedure can be changed from the welding torch. Values, changes, faults and error messages are displayed on the welding torch display.	PM221/301/401G, PM301/451/551W
<b>X</b>	<b>X technology</b> Welding torch with X technology – function torch without a separate control cable	PM221/301/401G, PM301/451/551W
<b>LED</b>	<b>LED lighting</b> Automatic LED lighting when the welding torch is moving.	PM221/301/401G, PM301/451/551W

## 4.2 Standard welding torch

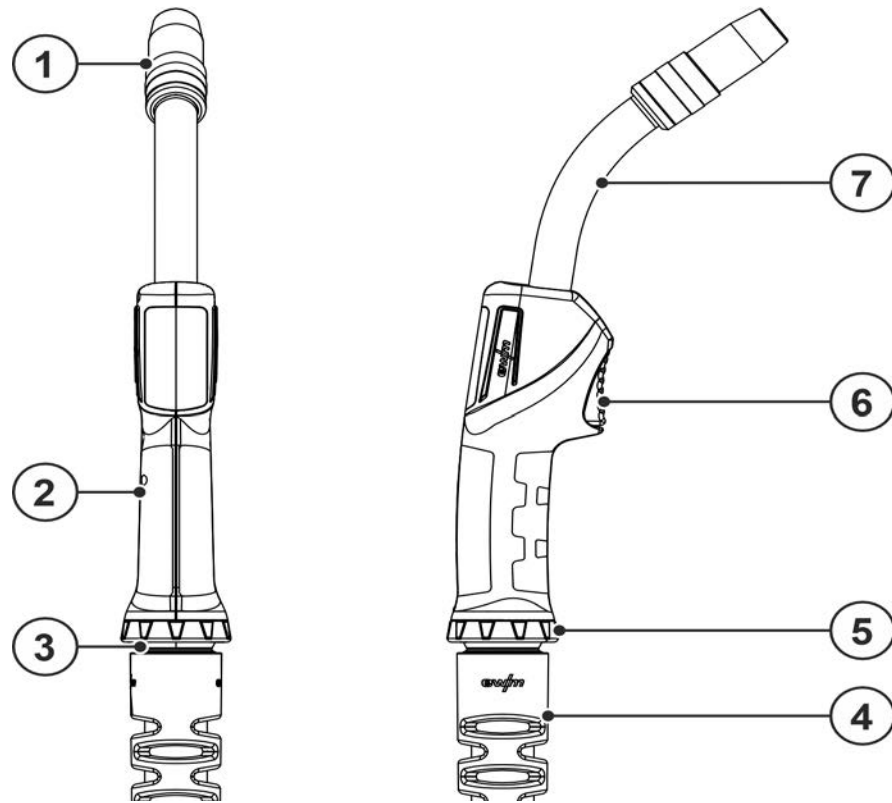


Figure 4-1

Item	Symbol	Description
1		Gas nozzle
2		Grip plate
3		Ball joint
4		Anti-kink device
5		Lock ring
6		Torch trigger
7		Torch neck 45°

## 4.3 Function torch

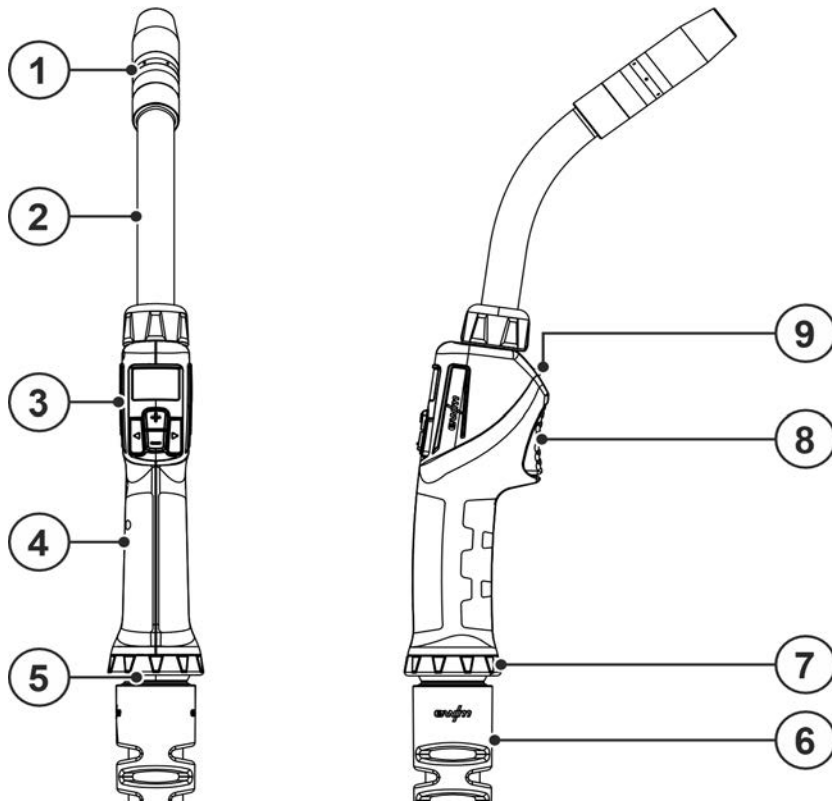


Figure 4-2

Item	Symbol	Description
1		Gas nozzle
2		Torch neck 45°
3		Operating elements > see 5.2.3 chapter
4		Grip plate
5		Ball joint
6		Anti-kink device
7		Lock ring
8		Torch trigger
9		LED lighting

## 4.4 Euro torch connector without control cable

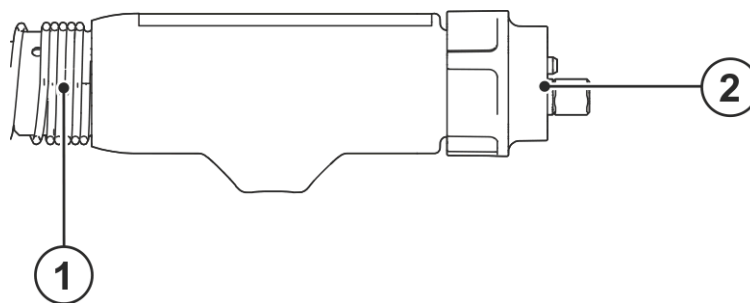


Figure 4-3

Item	Symbol	Description
1		Anti-kink spring
2		Euro central connection



### 4.5 Euro torch connector with control cable

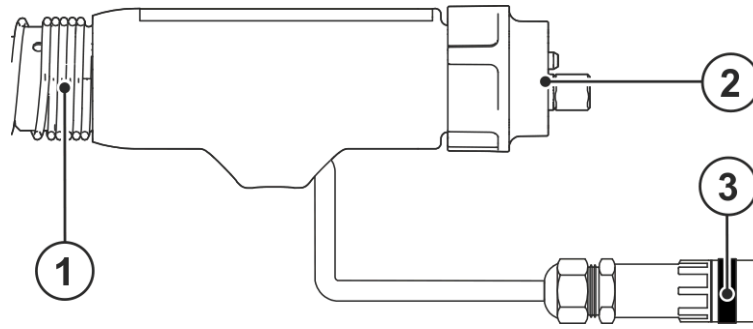


Figure 4-4

Item	Symbol	Description
1		<b>Anti-kink spring</b>
2		<b>Euro central connection</b>
3		<b>Control cable plug</b> Only for control variant 2U/D.

**Version with control cable only with control variant 2U/D.**

## 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!

### ⚠ CAUTION



**Risk from electrical current!**

**If welding is carried out alternately using different methods and if a welding torch and an electrode holder remain connected to the machine, the open-circuit/welding voltage is applied simultaneously on all cables.**

- The torch and the electrode holder should therefore always be placed on an insulated surface before starting work and during breaks.



**Risk of injury due to moving parts!**

**The wire feeders are equipped with moving parts, which can trap hands, hair, clothing or tools and thus injure persons!**

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



**Risk of injury due to welding wire escaping in an unpredictable manner!**

**Welding wire can be conveyed at very high speeds and, if conveyed incorrectly, may escape in an uncontrolled manner and injure persons!**

- Before mains connection, set up the complete wire guide system from the wire spool to the welding torch!
- Check wire guide at regular intervals!
- Keep all casing covers or protective caps closed during operation!

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

### 5.1 Transport and installation

#### ⚠ 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!

#### 5.1.1 Ambient conditions



**Machine damage due to contamination!**

**Unusually high amounts of dust, acid, corrosive gas or substances may damage the machine (note the maintenance intervals > see 6.1.3 chapter).**

- **Prevent high amounts of smoke, weld spatter, steam, oil vapour, grinding dust and corrosive ambient air from developing!**

##### In operation

Temperature range of the ambient air:

- -10 °C to +40 °C (-13 F to 104 F) <sup>[1]</sup>

Relative humidity:

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

### Transport and storage

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

- -25 °C to +55 °C (-13 F to 131 F) <sup>[1]</sup>

Relative humidity

- up to 90 % at 20 °C (68 F)

<sup>[1]</sup> Ambient temperature dependent on coolant! Observe the coolant temperature range of the torch cooling

## 5.2 Function specification

### 5.2.1 Settings

Parameter changes are saved immediately and displayed on the welding machine control.

#### Special features:

The full range of functions of the RD3 X PM function torch is only available in conjunction with the XQ MIG/MAG device series and the Drive XQ wire feeder. The welding torch has the function of process switching instead of JOB switching.

When the RD3 X function torch is connected to another EWM device series with multi-matrix, the welding torch switches to compatibility mode and the functions are restricted to RD2 X.

JOBs that can be changed with the function torch and the job switching parameter are free jobs and are only accessible in combination with the special parameters P11, P12 and P13.

Depending on the torch version, the user can change the following welding parameters of the main programs.

	Control			
	2U/D	2U/D X	RD2 X	RD3 X *)
Program switching	✓	✓	✓	✓
JOB switching	✓	✓	✓	✗
Process switching	✗	✗	✗	✓
Operating mode	✗	✗	✗	✓
Welding type	✗	✗	✗	✓
Wire feed speed	✓	✓	✓	✓
Voltage correction	✓	✓	✓	✓
Current correction	✓	✓	✓	✓
Arc dynamics	✗	✗	✗	✓
OLED display	✗	✗	✓	✓
Faults and error messages	✗	✗	✗	✓
Xnet Welding task selection	✗	✗	✗	✓
Xnet component management	✗	✗	✗	✓
LED work light	✗	✓	✓	✓

\*) only for the XQ series

## 5.2.2 Operating elements in the machine

This setting affects the torch types 2U/D, 2U/D X and RD2 X / RD3 X.

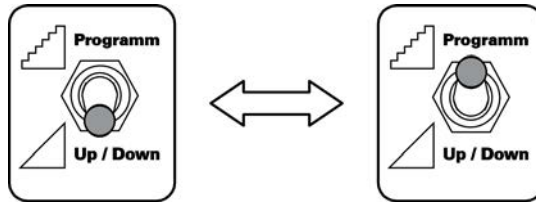


Figure 5-1

- Switch the "Program or up/down mode" changeover switch at the welding machine to the up/down or program mode position (see chapter "Design and function").

The 'Program or up/down function' changeover switch may look different on your machine. Use the operating instructions for your power source to operate the switch.

## 5.2.3 Operating elements for 2 U/D / 2U/D X welding torches

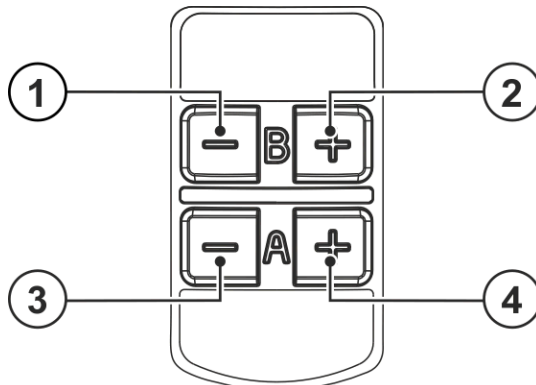


Figure 5-2

Item	Symbol	Description
1	—	"B -" button (program mode) Decrease JOB number "B -" button (up/down mode) Welding voltage correction, decrease value
2	+	"B +" button (program mode) Increase JOB number "B +" button (up/down mode) Welding voltage correction, increase value
3	—	"A -" button (Program mode) Decrease program number "A -" button (Up/Down mode) Reduce welding performance (welding current/wire-feed speed)
4	+	"A +" button (Program mode) Increase program number "A +" button (Up/Down mode) Increase welding performance (welding current/wire-feed speed)

## 5.2.4 Operating elements for the RD2 X welding torch

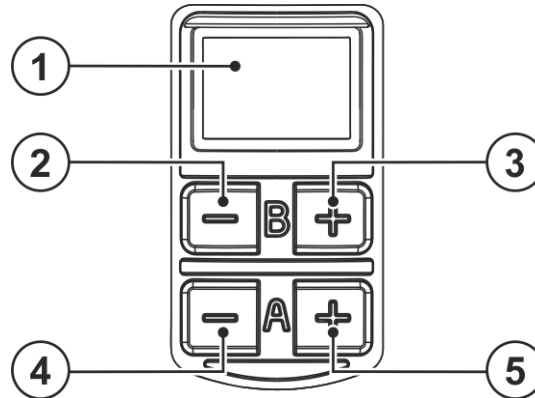


Figure 5-3

Item	Symbol	Description
1		<b>OLED display</b> Graphical display to show the functions.
2	—	<b>"B -" button (program mode)</b> Decrease JOB number <b>"B -" button (up/down mode)</b> Welding voltage correction, decrease value
3	+	<b>"B +" button (program mode)</b> Increase JOB number <b>"B +" button (up/down mode)</b> Welding voltage correction, increase value
4	—	<b>"A -" button (Program mode)</b> Decrease program number <b>"A -" button (Up/Down mode)</b> Reduce welding performance (welding current/wire-feed speed)
5	+	<b>"A +" button (Program mode)</b> Increase program number <b>"A +" button (Up/Down mode)</b> Increase welding performance (welding current/wire-feed speed)

## 5.2.4.1 Welding data display

The display shows the currently selected welding parameter and the corresponding parameter value. When the welding machine is switched on, the display shows the nominal welding current set point set by the control unit.

During the up/down operation, the corresponding parameter value is shown on the display when the parameter is changed. If this parameter is not changed for more than approx. 5 s, the display switches back to the values set by the control unit.

### Examples for welding parameters in the welding data display

Welding parameters	Display
Welding current	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>108</b> A                 </div>
Wire feed speed	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>3.0</b> m/min                 </div>
Voltage correction	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>-1.9</b> V                 </div>
Programs	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>2</b> PROG                 </div>
JOB number	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>169</b> JOB                 </div>

## 5.2.5 Operating elements for the RD3 X welding torch

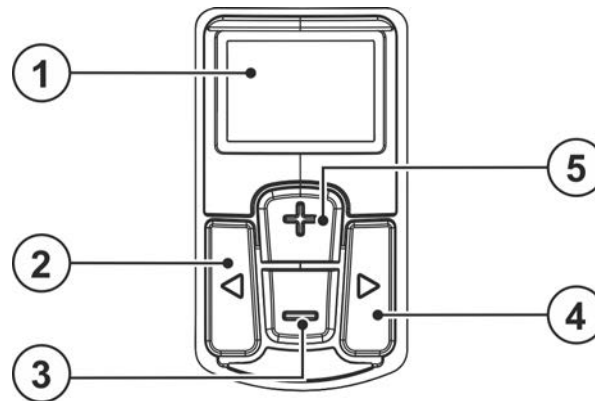


Figure 5-4

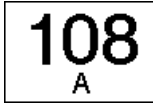

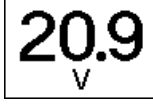

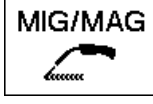


Item	Symbol	Description
1		<b>OLED display</b> Graphical display to show the functions.
2	◀	<b>Parameter selection push-button</b> Welding parameters are selected one after the other.
3	▶	<b>Parameter selection push-button</b> Welding parameters are selected one after the other.
4	+	<b>Push-button “+”</b> Process switching or increasing the parameter value.
5	-	<b>Push-button “-”</b> Process switching or decreasing the parameter value.

### 5.2.5.1 Welding data display

The display shows the currently selected welding parameter and the corresponding parameter value. When the welding machine is switched on, the display shows the nominal welding current set point set by the control unit.

During the up/down operation, the corresponding parameter value is shown on the display when the parameter is changed. If this parameter is not changed for more than approx. 5 s, the display switches back to the values set by the control unit.

#### Examples for welding parameters in the welding data display

Welding parameters	Display
Welding current	
Wire feed speed	
Welding voltage	
Programs	
Welding procedure	
Dynamics	
Fault, error message	

### 5.2.5.2 Programs, setting operating points

Distinction is made between main and program level during the parameter setting.

After switching on the welding machine, you are always at the main level.

Process switching, program number, wire feed speed, dynamics (hard to soft arc), welding current and welding voltage are specified here.

Welding type (standard or pulse welding) and operating mode (2-cycle, 4-cycle, etc.) are set at the program level.

The following illustration is an example of use:

#### Main level

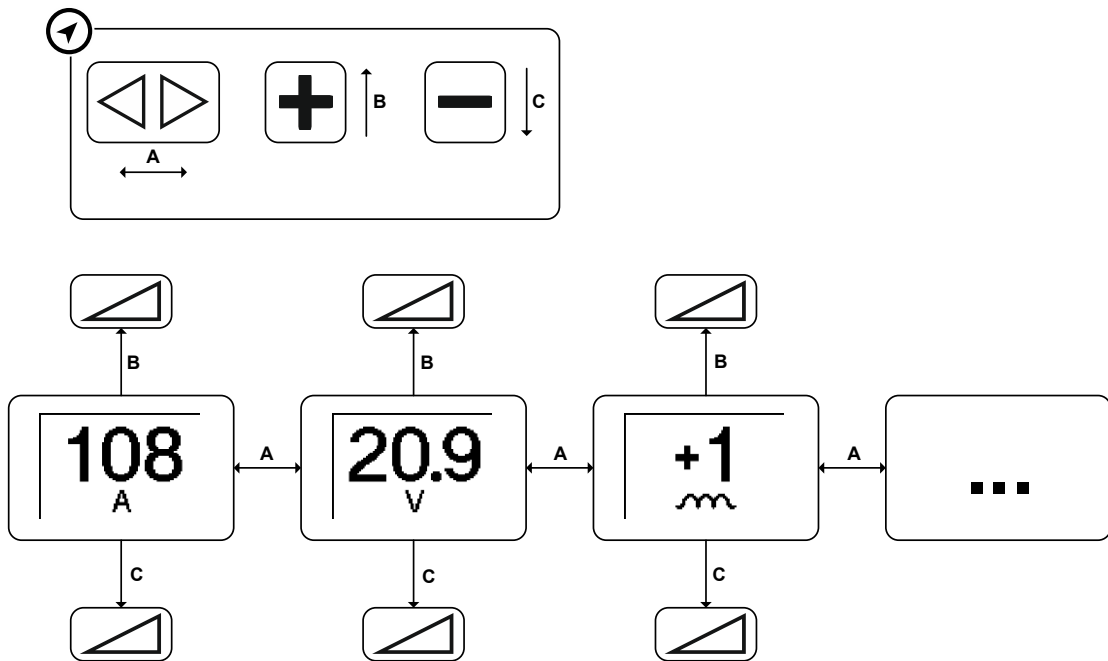


Figure 5-5



Program level

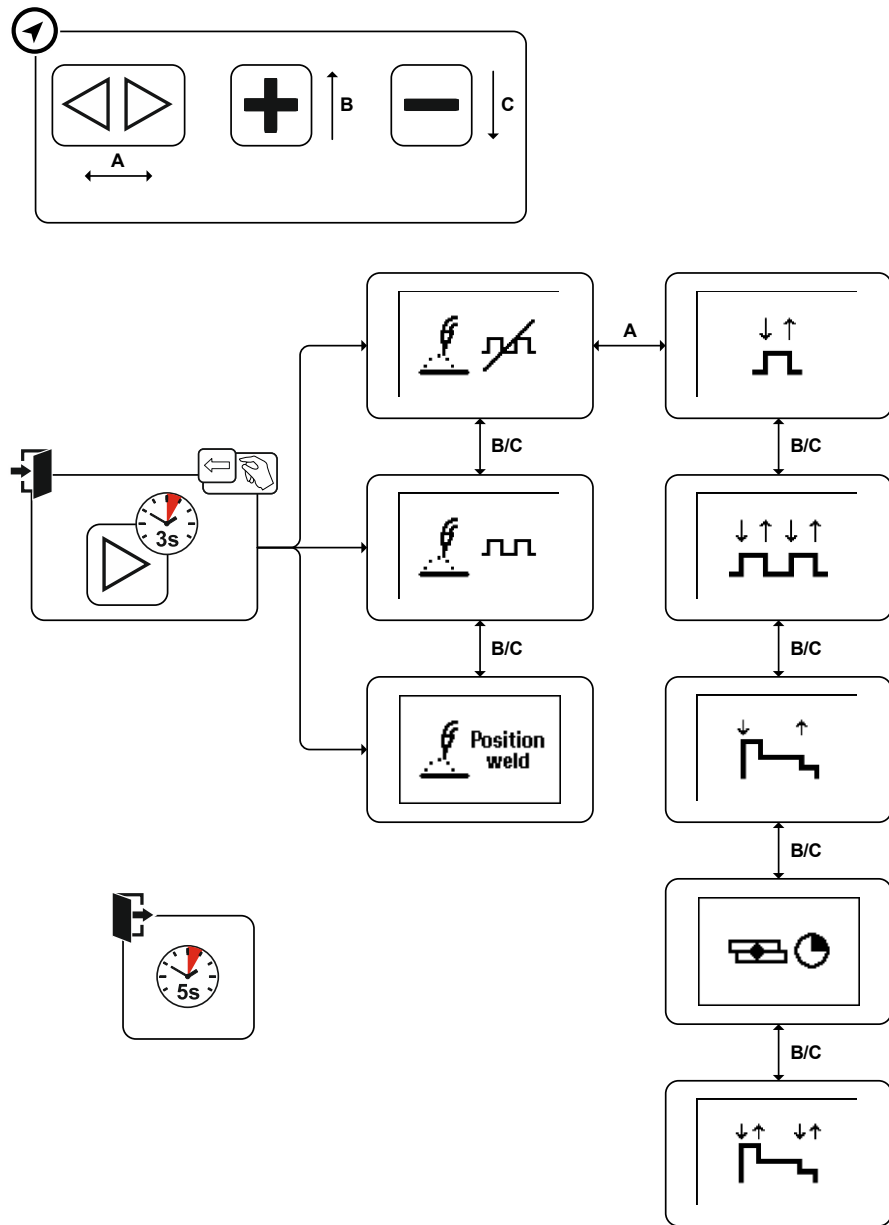


Figure 5-6

### 5.2.5.3 Component management on the welding torch

The Xnet component management software can be used to manage components, create welding sequence plans and assign WPS. The display shows seams and runs. After completion they can be acknowledged with the burner. A temporary exit (free-welding mode) from the seam sequence is possible by pressing a key on the torch.

The following illustration is an example of use:

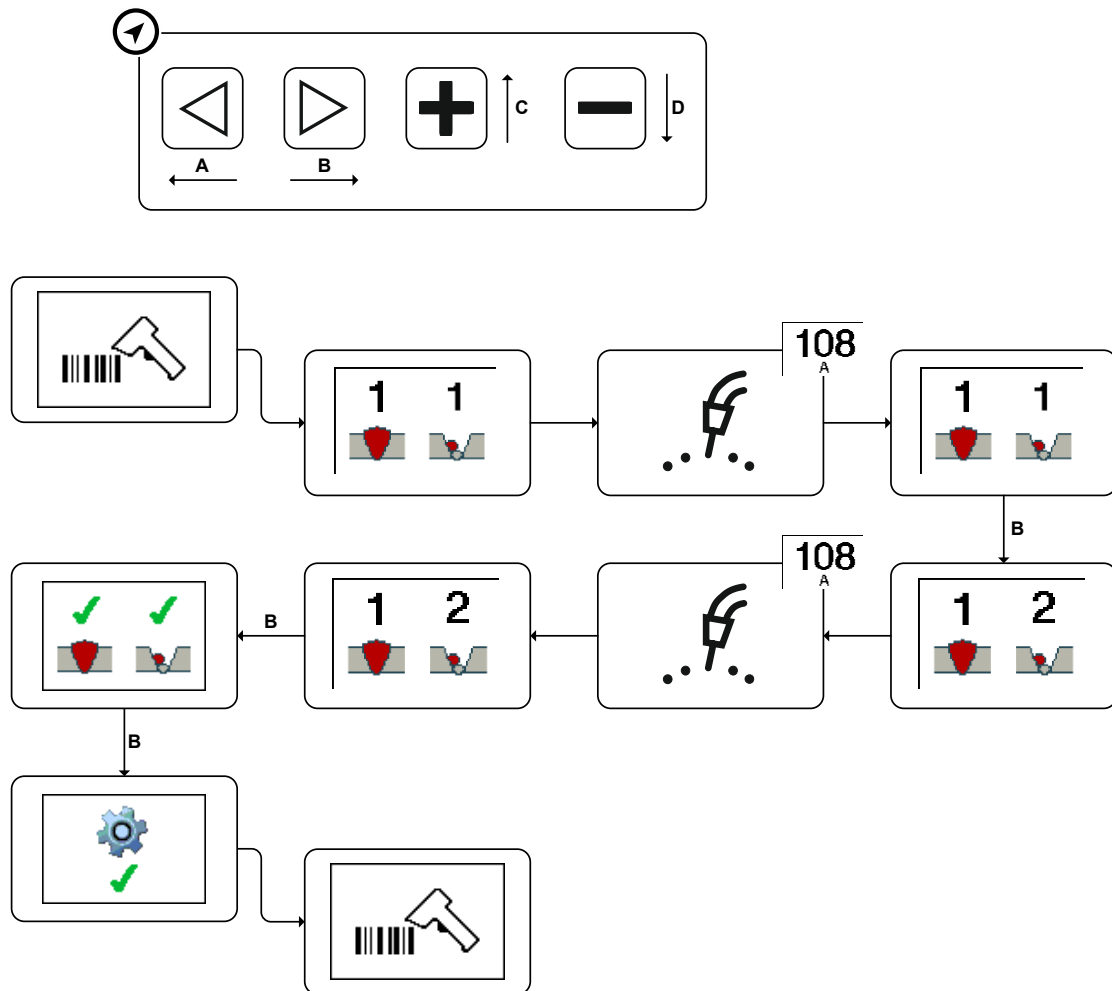


Figure 5-7

The arrow key on the right ► can be used to acknowledge welding beads. To enter the submenu, hold button ► for 3s. After 3s without selection, the component mode is displayed again.

The free-welding mode is activated via the arrow key on the left ◀. Press and hold button ◀ 3s. The display shows a ⚙ symbol. Free-welding mode for e. g. tacking is now activated. Pressing and holding repeatedly will get you back to component mode.

The keys + and - allow the navigation of the seams and runs. Long pressing of the + button skips to the last not yet acknowledged weld bead.

### 5.2.5.4 LED lighting

Integrated LED lighting makes welding in corners and dark areas of the working area easier. The lighting switches on independently of the burner button when the burner is moved. After approx. 10 seconds without movement, the light switches off automatically.

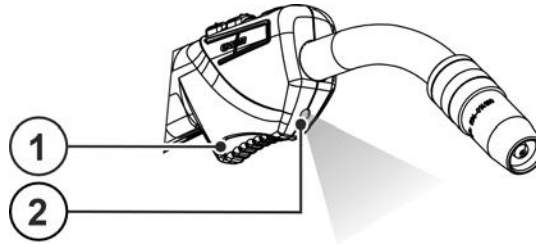


Figure 5-8

Item	Symbol	Description
1		Torch trigger
2		LED lighting

## 5.3 Configure welding torch

### ⚠ WARNING



Risk of burns and electric shock on the welding torch!



Welding torch (torch neck or torch head) and coolant (water-cooled version) heat up strongly during the welding process. During assembly work, you may come into touch with electrical voltage or hot components.

- Wear proper protective equipment!
- Switch off the power source or torch cooling and allow the welding torch to cool!

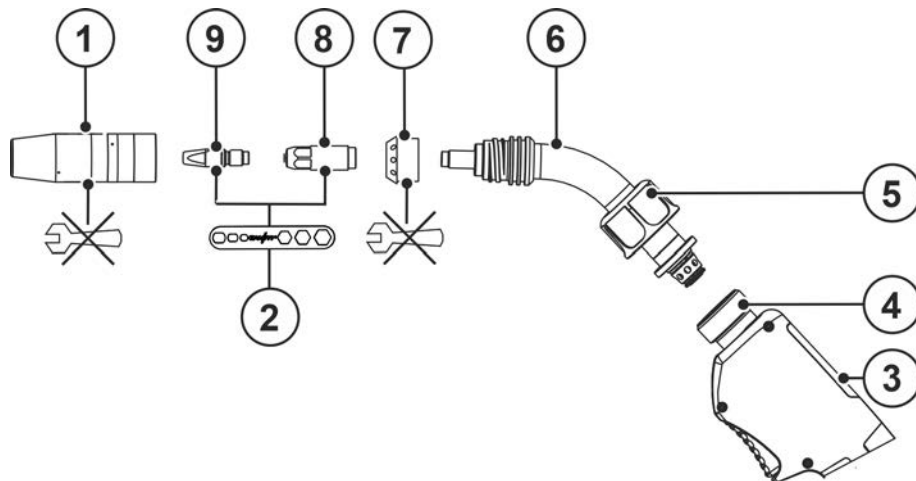


Figure 5-9

Item	Symbol	Description
1		Gas nozzle
2		Torch key > see 9 chapter
3		Grip plate
4		Torch connection block
5		Crown nut
6		Torch neck 45°
7		Gas distributor
8		Contact tip holder
9		Contact tip

- Unscrew the gas nozzle anti-clockwise by hand.
- Loosen the contact tip and contact tip holder with the torch key > see 5.3.1 chapter.
- Unscrew the gas diffuser by hand.
- Assemble by following these steps in the reverse order

## 5.3.1 Using the torch key



**To prevent torch damage, carried out the assembly in a clockwise direction and disassembly in an anti-clockwise direction.**

### 5.3.1.1 Contact tip

The illustration serves as an example only.

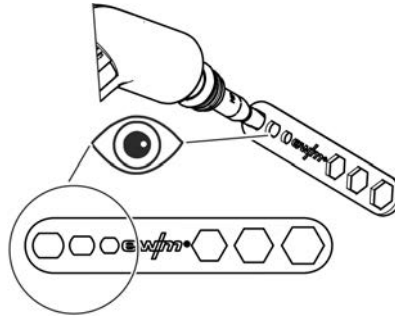


Figure 5-10

- When assembling and disassembling the contact tip, use the corresponding slot weld of the torch key.

### 5.3.1.2 Contact tip holder

The illustration serves as an example only.

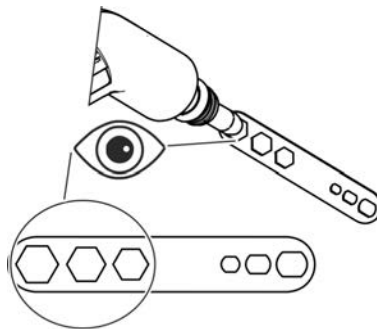


Figure 5-11

- When assembling and disassembling the contact tip holder, use the appropriate hexagon on the torch key.

### 5.3.2 Turning the torch neck

This function is only available with the "CG" and "CW" version!

- Unfasten the crown nut by several turns from the handle until the torch neck can move freely.
- Rotate the torch neck into the required position.
- Tighten the crown nut hand-tight until the torch neck can no longer be moved.

### 5.3.3 Changing the torch neck

The welding torches can be optionally equipped with torch necks of 45°, 36°, 22° and 0°. To change the torch neck, proceed as described in this section.

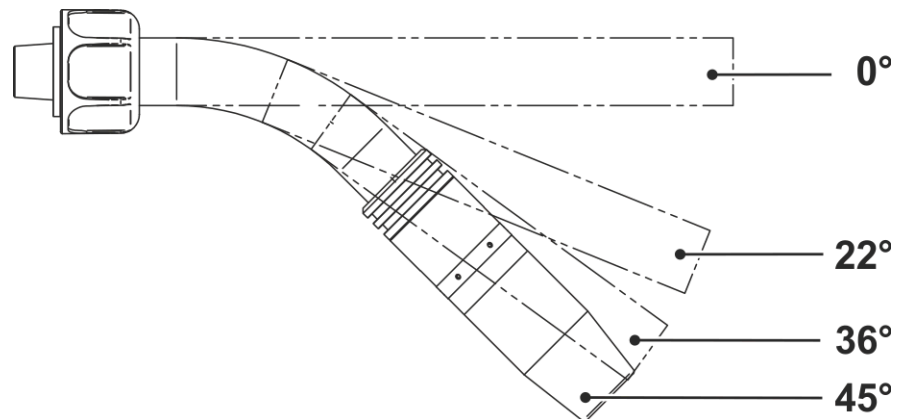


Figure 5-12

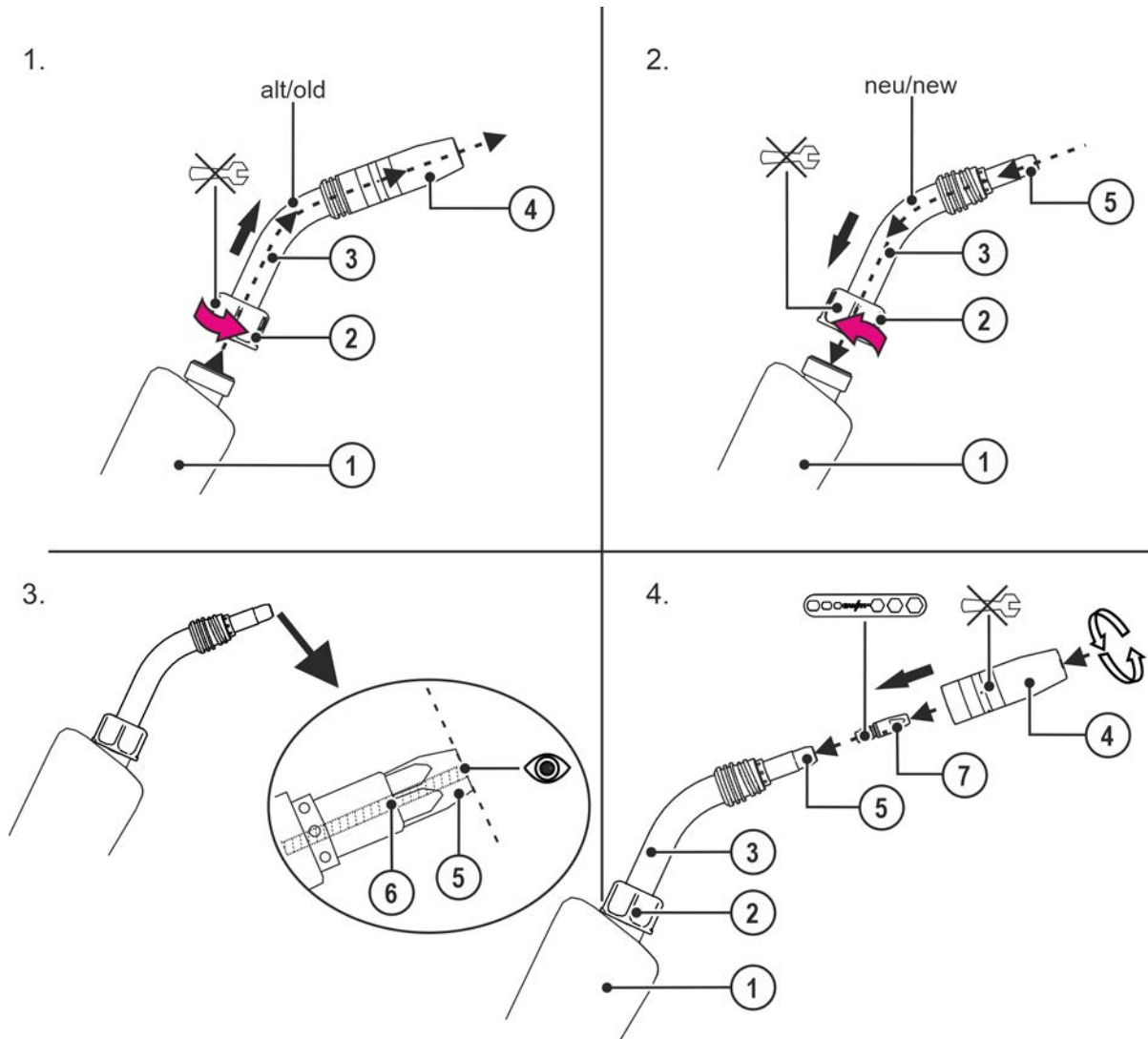


Figure 5-13

Item	Symbol	Description
1		Grip plate
2		Crown nut
3		Torch neck 45°
4		Gas nozzle
5		Contact tip holder
6		Liner
7		Contact tip

Connect welding torch after performing the maintenance and rinse using the "Gas Test" with shield gas.

### 5.4 Equipment recommendations

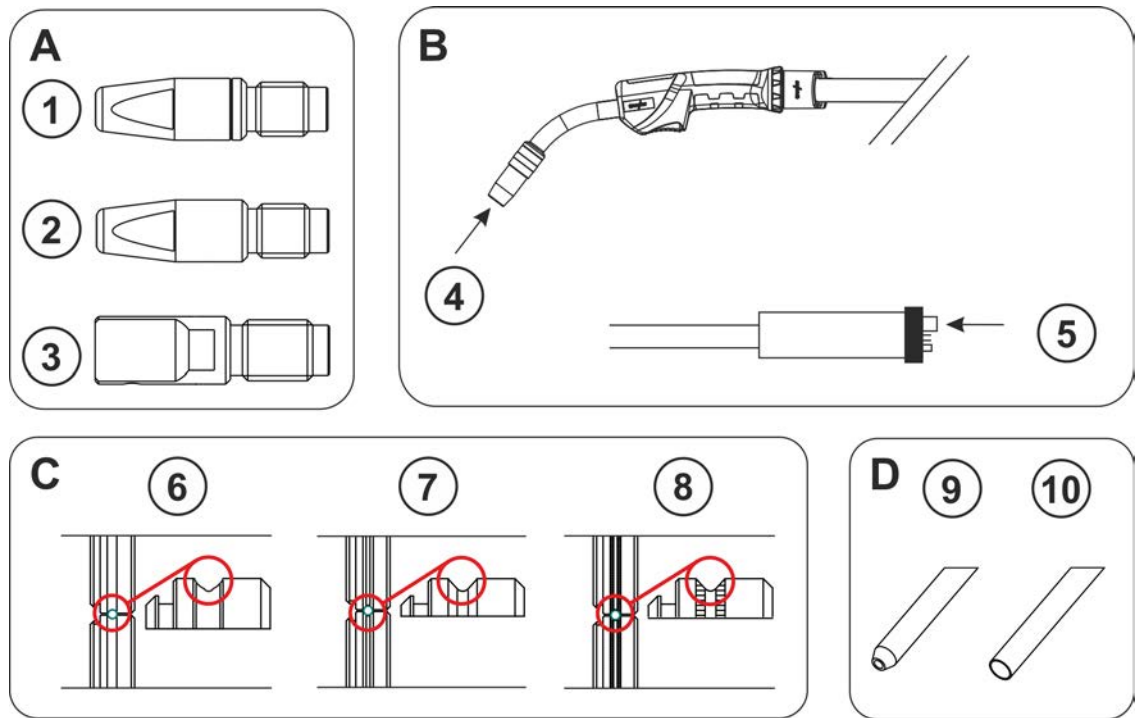


Figure 5-14

	Material	Design of contact tip (A)	Equipment side (B)	Wire feed rolls (C)	Capillary tube ⑨/ guide tube ⑩(D)
<b>D</b> Wire electrodes	Low-alloy	① CT CuCrZr	⑤	⑦ V-groove	⑨
	medium-alloy	① CT CuCrZr	⑤	⑦ V-groove	⑩
	Hardfacing	① CT CuCrZr	⑤	⑦ V-groove	⑩
	High-alloy	① CT CuCrZr	⑤	⑦ V-groove	⑩
	Aluminium	② CTAL E-Cu	④	⑥ U-groove	⑩
	Aluminium (AC)	③ CT ZWK CuCrZr	④	⑥ U-groove	⑩
	Copper alloy	① CT CuCrZr	⑤	⑦ V-groove	⑩
<b>F</b> Flux cored wire electrode	Low-alloy	① CT CuCrZr	⑤	⑧ V-groove knurled	⑨
	High-alloy	① CT CuCrZr	⑤	⑧ V-groove knurled	⑩

	Material	Ø Wire	Ø Wire guide	Liner	Length of brass liner
Wire electrodes	Low-alloy	0.8	1.5 x 4.0	Steel liner	
		1.0	1.5 x 4.0		
		1.2	2.0 x 4.0		
		1.6	2.4 x 4.5		
	medium-alloy	0.8	1.5 x 4.0	Combined liner	200 mm
		1.0	1.5 x 4.0		
		1.2	2.0 x 4.0		
		1.6	2.3 x 4.7		
	Hardfacing	0.8	1.5 x 4.0	Combined liner	200 mm
		1.0	1.5 x 4.0		
		1.2	2.0 x 4.0		
		1.6	2.3 x 4.7		
	High-alloy	0.8	1.5 x 4.0	Combined liner	200 mm
		1.0	1.5 x 4.0		
		1.2	2.0 x 4.0		
		1.6	2.3 x 4.7		
	Aluminium	0.8	1.5 x 4.0	Combined liner	30 mm
		1.0	1.5 x 4.0		
		1.2	2.0 x 4.0		
		1.6	2.3 x 4.7		
Aluminium AC welding	0.8	1.5 x 4.0	Combined liner	100 mm	
	1.0	1.5 x 4.0			
	1.2	2.0 x 4.0			
	1.6	2.3 x 4.7			
Copper alloy	0.8	1.5 x 4.0	Combined liner	200 mm	
	1.0	1.5 x 4.0			
	1.2	2.0 x 4.0			
	1.6	2.3 x 4.7			
Flux cored wire electrode	Low-alloy	0.8	1.5 x 4.0	Steel liner	
		1.0	1.5 x 4.0		
		1.2	2.0 x 4.0		
		1.6	2.4 x 4.5		
	High-alloy	0.8	1.5 x 4.0	Combined liner	200 mm
		1.0	1.5 x 4.0		
		1.2	2.0 x 4.0		
		1.6	2.3 x 4.7		



## 5.5 Adapting the Euro torch connection on the device

On delivery, the Euro torch connector on the wire feeder is fitted with a capillary tube for welding torches with a steel liner!

### 5.5.1 Liner

- Push forward the capillary tube on the wire feed side in the direction of the Euro torch connector and remove it there.
- Insert the guide tube from the Euro torch connection.
- Insert the welding torch connector with the excessively long liner carefully into the Euro torch connector and screw hand-tight using the crown nut.
- Cut off the liner using a special cutter or sharp knife just before the wire feed roller, making sure not to pinch it.
- Loosen the welding torch connector and remove.
- Cleanly trim the separated end of the liner!

### 5.5.2 Guide spiral

- Check the Euro torch connector for correct seating of the capillary tube!

### 5.5.3 Assemble the wire guide

Use the correct wire guide from spool to molten pool!

The wire guide has to be adjusted to the wire electrode type and diameter in order to achieve good welding results!

- Equip the wire feeder according to wire electrode type and diameter!
- Refer to the manufacturer instructions for the right wire feed unit equipment. Refer to Annex 1 in these operating instructions for the right EWM machine equipment > see 10 chapter.
- Use a steel liner inside the torch hose package to guide hard, unalloyed wire electrodes (steel)!
- Use a plastic liner inside the torch hose package to guide soft or alloyed wire electrodes!

**Which equipment side must be used for a steel liner or liner, see > see 5.4 chapter.**

#### 5.5.3.1 Liner

 **Observe permissible torque > see 8 chapter!**

The distance between the plastic liner and drive rollers should be as short as possible.

Use only sharp, stable knives or special tongs for cutting to ensure that the plastic liner does not become misshapen!

Always make sure the hose package is straight when replacing the wire guide.

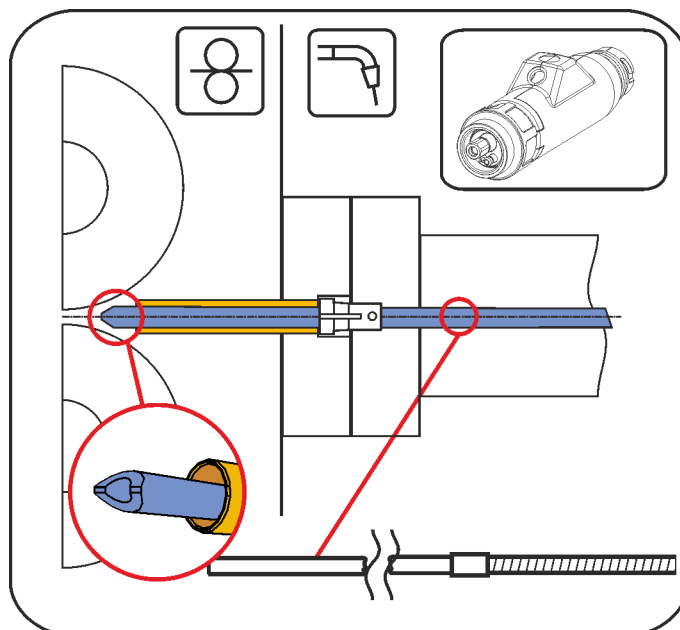


Figure 5-15

1.

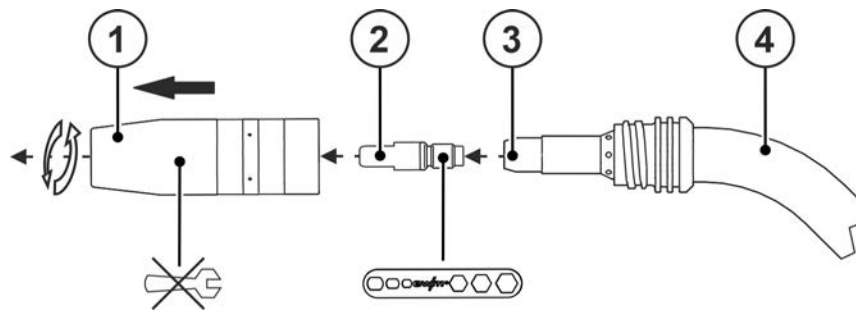


Figure 5-16

2.

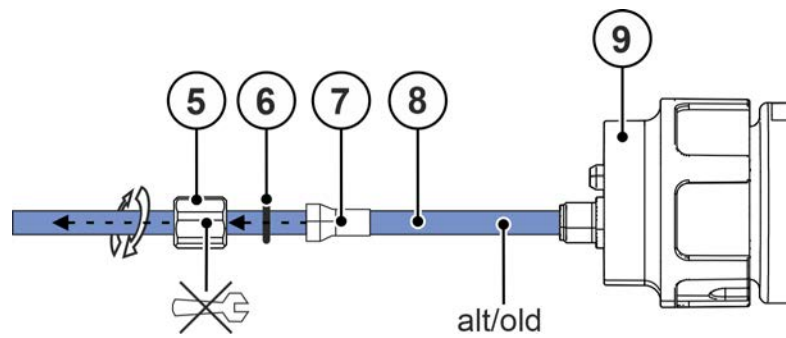


Figure 5-17

3.

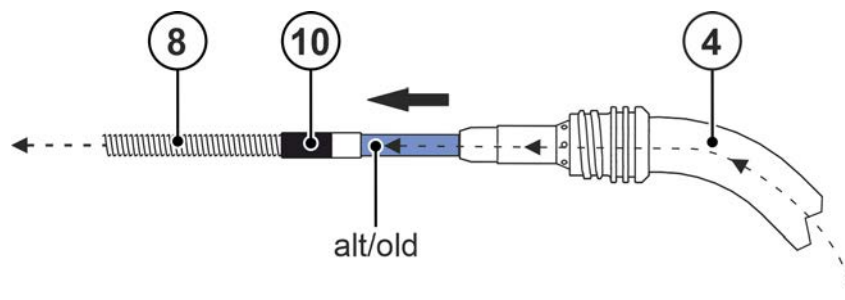


Figure 5-18

4.

**Adjust the brass liner > see 5.4 chapter.**

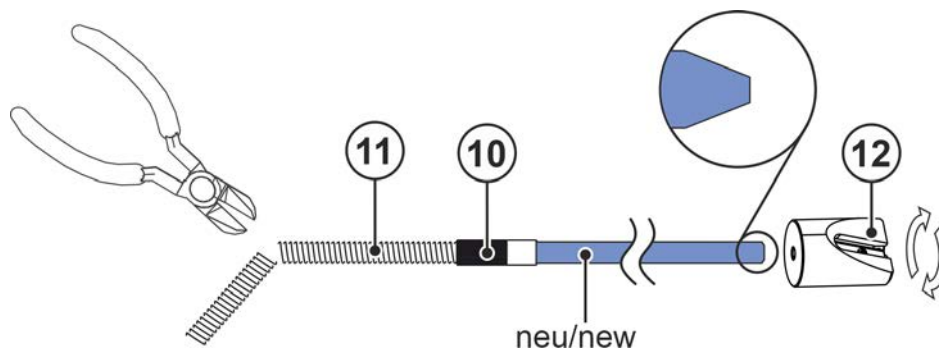


Figure 5-19

5.

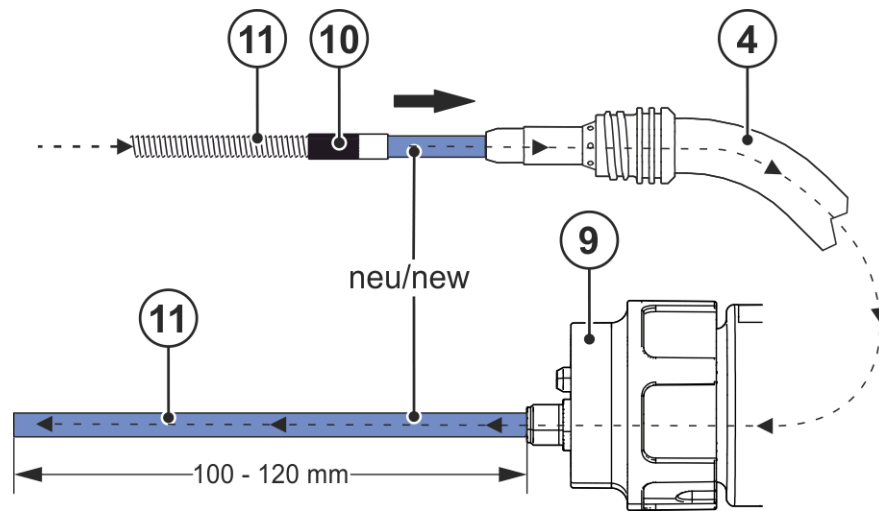


Figure 5-20

6.

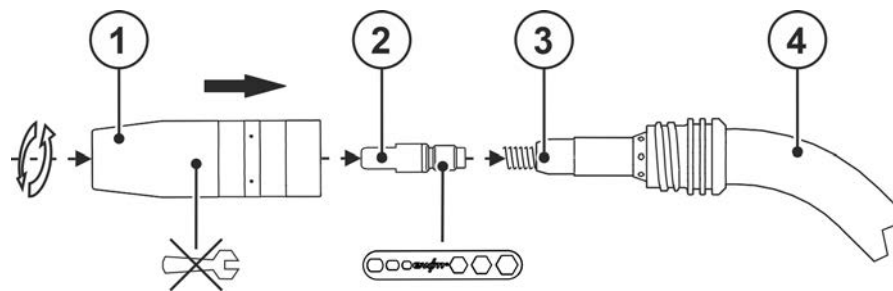


Figure 5-21

7.

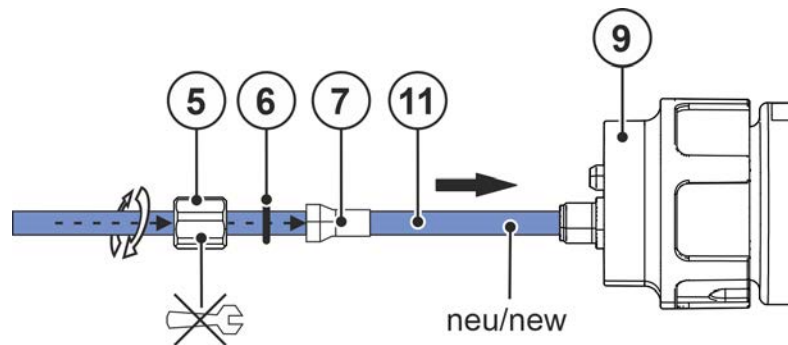


Figure 5-22

8.

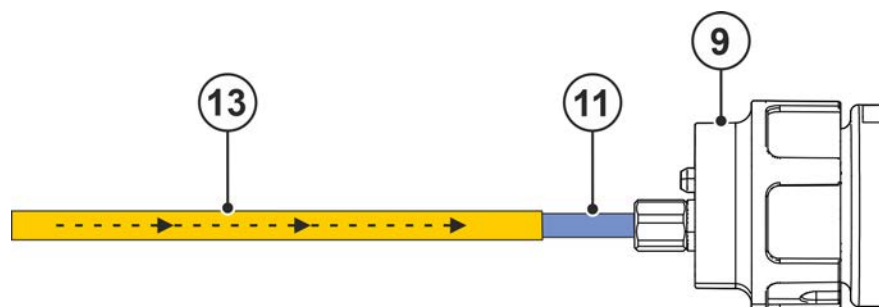



Figure 5-23

Item	Symbol	Description
1		Gas nozzle
2		Contact tip
3		Contact tip holder
4		Torch neck 45°
5		Crown nut
6		O-ring
7		Collet
8		Combined liner
9		Euro central connection
10		Connecting sleeve
11		New combined liner
12		Liner sharpener > see 9 chapter
13		Guiding tube for welding torch Euro torch connector

### 5.5.3.2 Guide spiral

 **Observe permissible torque > see 8 chapter!**

Insert the grinded end towards the contact tip holder to ensure tight fit with the contact tip.  
Always make sure the hose package is straight when replacing the wire guide.

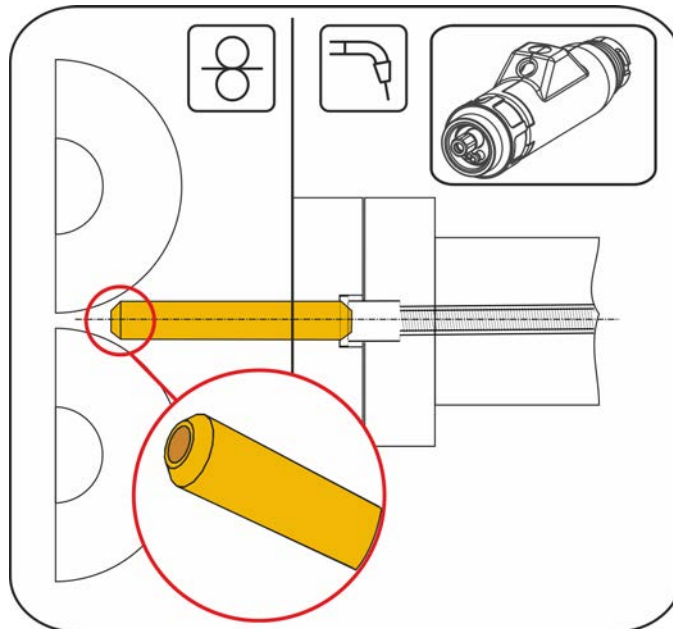


Figure 5-24

1.

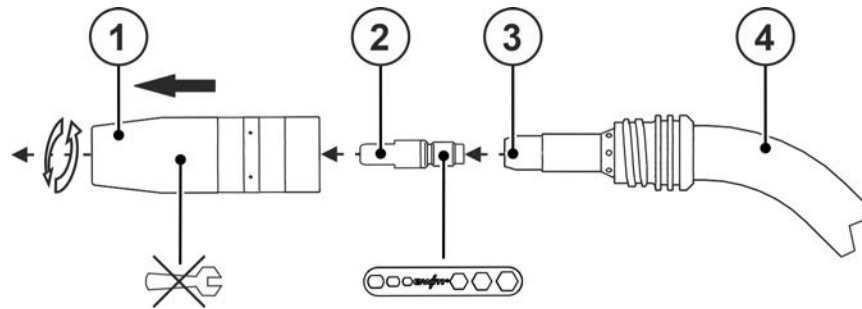


Figure 5-25

2.

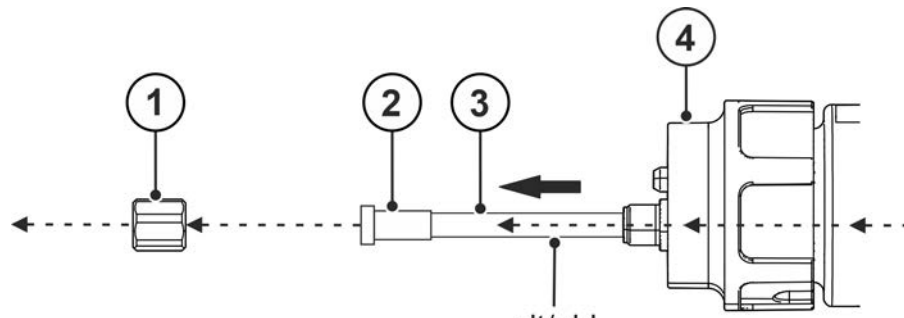


Figure 5-26

3.

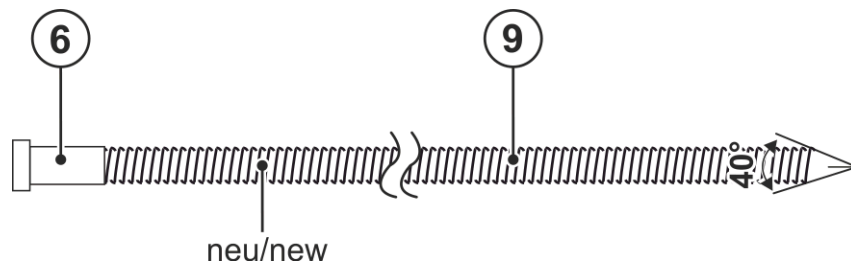


Figure 5-27

4.

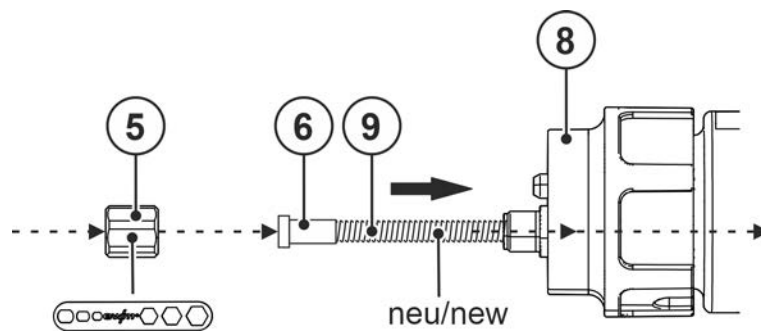


Figure 5-28

5.

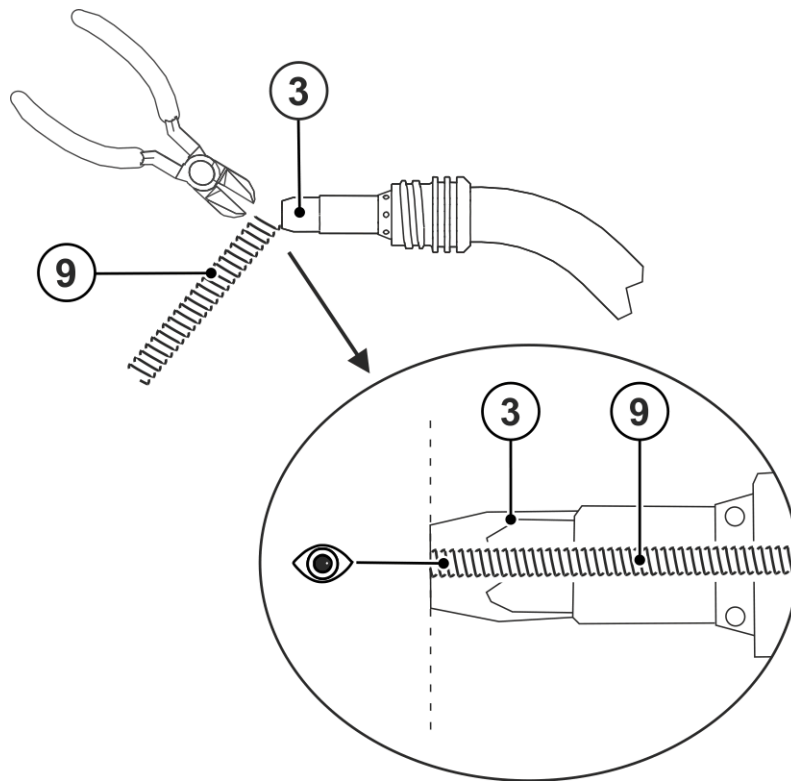


Figure 5-29

6.

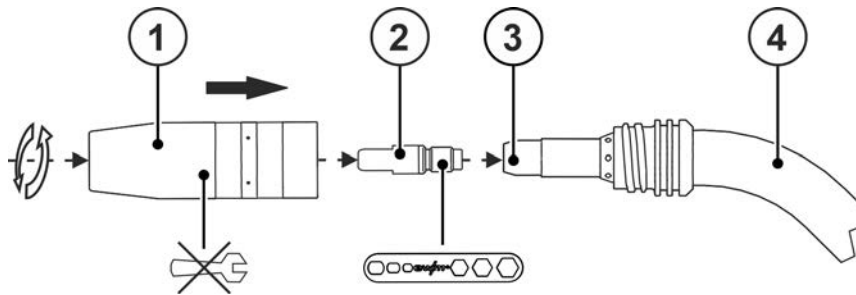


Figure 5-30

7.

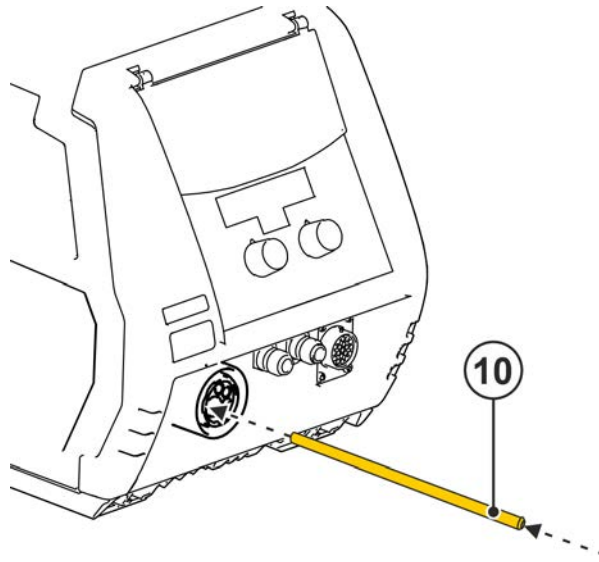


Figure 5-31

Item	Symbol	Description
1		Gas nozzle
2		Contact tip
3		Contact tip holder
4		Welding torch neck
5		Crown nut
6		Centring sleeve
7		old spiral guide
8		Euro central connection
9		new spiral guide
10		Capillary tube

## 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



**Improper maintenance, testing and repairs!**

**Maintenance, testing and repair of the machine may only be carried out by skilled and qualified personnel (authorised service personnel). A competent person is someone who, based on training, knowledge and experience, can recognize the hazards and possible consequential damage that may occur when testing power sources and can take the necessary safety precautions.**

- Follow the maintenance instructions > see 6.1.3 chapter.
- If any of the test requirements below are not met, the unit must not be put back into operation until it has been repaired and tested again.

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.

The welding torch is one of the most stressed components of the welding system. Due to the high thermal load and contamination, regular maintenance and care not only extends the service life of the system but also saves costs in the long term through the use of fewer replacement parts and less downtime. Perfect welding results can only be achieved with a properly maintained welding torch.

For maintenance and care, use only the tools, aids and tightening torques specified in the operating instructions.

#### 6.1.1 Identifying damage or worn components

Contact tip

- Oval, ground bore at the wire outlet
- Clinging weld spatter that can no longer be removed
- Penetration or burn-off at the contact tip
- Contact tip that sits eccentrically

Gas nozzle

- Clinging weld spatter, deformation, notches, penetration and damaged threads

Gas diffuser

- Clogged bores, cracks, burnt-off outer edges

Contact tip holder

- The key flat is defective or worn, thread damaged, clinging weld spatter

Torch head

- The thread is defective or worn



Euro torch connector

- The O-ring of the connecting nipple for shielding gas is defective or worn
- The spring pins of the torch trigger are bent, jammed or dirty
- The thread of the crown nut is dirty or damaged

Grip

- Cracks, penetration

Hose package

- Cracks, penetration



**To prevent damage to and malfunction of the welding torch and hose package:**

- **Never strike hard objects (hammering)!**
- **Do not use the welding torch for levering or straightening!**
- **Do not bend the torch neck! Bending flexible torch necks is possible considering the maximum bending cycles.**
- **During breaks or after work, place the welding torch in the torch holder provided on the welding machine or at the workplace!**
- **Never throw the welding torch!**
- **Do not pull welding machines / wire feeders with the welding torch!**

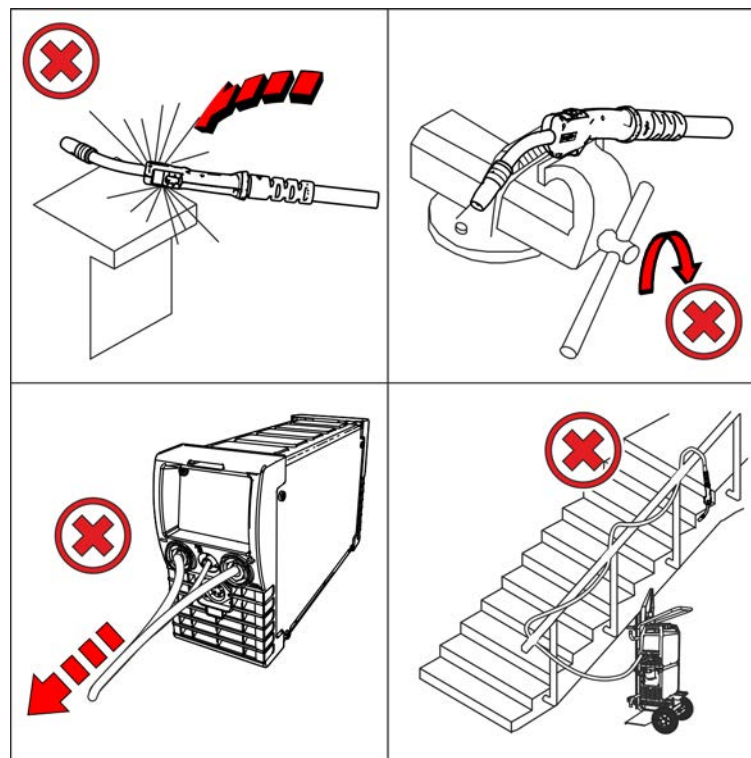


Figure 6-1

## 6.1.2 Maintenance and care before each use

The illustration serves as an example only.

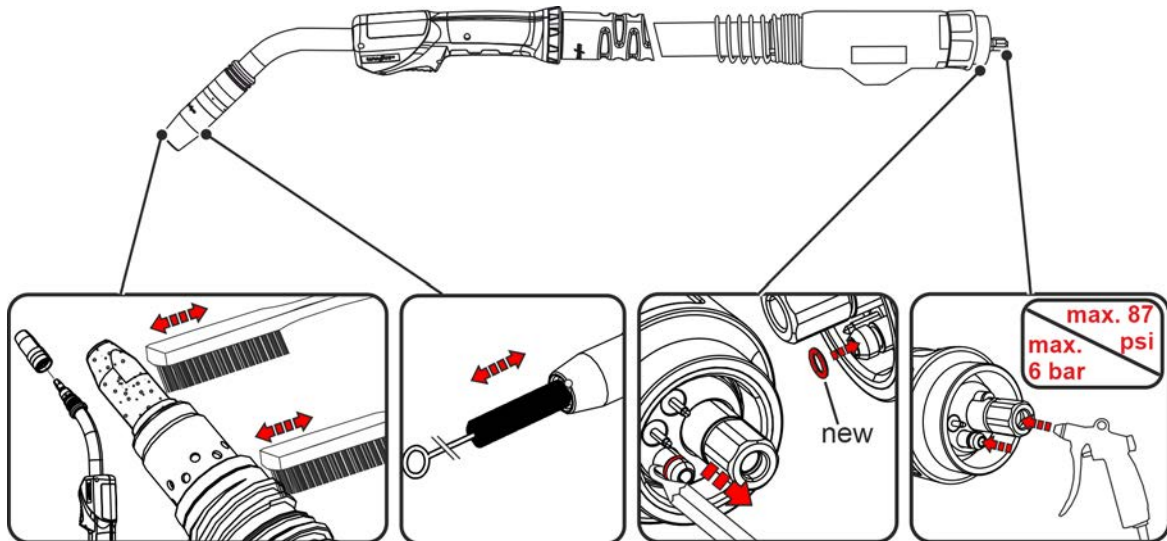


Figure 6-2

- Loosen the gas nozzle, check the replacement parts for damage, replace if necessary and ensure a tight fit.
- Clean and remove soiling and welding spatter from the welding torch and, particularly, the wear parts; replace any worn or defective parts, if necessary.
- Check the O-rings on the torch neck and Euro torch connector for damage and presence. Replace defective O-ring.
- Check the grip and hose package for cracks and damage.

## 6.1.3 Regular maintenance

The regular maintenance of a welding torch depends heavily on the duration of use and the stress and must be specified by the operator / owner. As a rule of thumb, every time the wire spool or wire basket is replaced or, if necessary, at a change of shift.

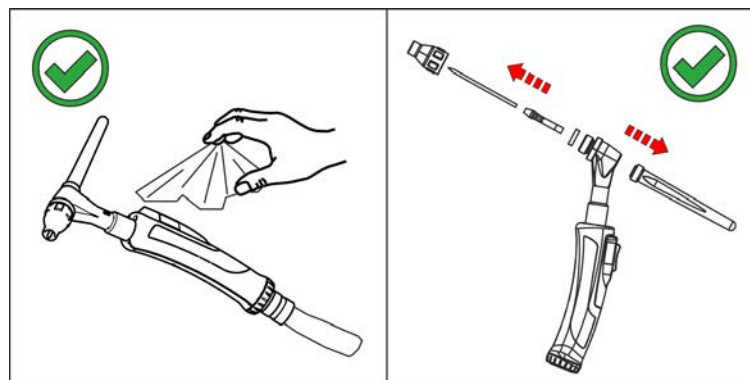


Figure 6-3

- Disconnect the welding torch from the machine, remove the replacement parts and blow out the wire duct and gas connection of the torch alternately with compressed air (max. 4 bar) free of oil and condensed water.
- Mount the replacement parts, connect the welding torch to the machine and purge twice with shielding gas (gas test).
- Check the liner or steel liner for damage and replace if necessary.
- Check the screw and plug connectors of connections for proper seating and tighten if necessary.

## 6.2 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!

In addition to the national or international regulations mentioned below, it is mandatory to follow the respective national laws and regulations on 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 electrical 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.

The deletion of personal data is the responsibility of the end user.

Lamps, batteries or accumulators must be removed and disposed of separately before disposing of the device. The type of battery or accumulator and its composition is marked on the top (type CR2032 or SR44). The following EWM products may contain batteries or accumulators:

- Welding helmets  
Batteries or accumulators are easy to remove from the LED cassette.
- Device controls  
Batteries or accumulators are located on the back of these in corresponding sockets on the circuit board and are easy to remove. The controls can be removed using standard tools.

Information on returning used equipment or collections can be obtained from the respective municipal administration office. Devices can also be returned to EWM sales partners across Europe.

Further information on the topic of the disposal of electrical and electronic equipment can be found on our website at: <https://www.ewm-group.com/de/nachhaltigkeit.html>.

## 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

#### Welding torch overheated

- ↘ Loose welding current connections
  - ✘ Tighten power connections on the torch and/or on the workpiece
  - ✘ Screw contact tip holder and gas nozzle tightly into place correctly
  - ✘ Tighten contact tip correctly
- ↘ Overload
  - ✘ Check and correct welding current setting
  - ✘ Use a more powerful welding torch

#### Functional error with the welding torch operating elements

- ↘ Connection problems
  - ✘ Make control lead connections and check that they are fitted correctly.

#### Wire feed problems

- ↘ Unsuitable or worn welding torch equipment
  - ✘ Adjust contact tip to wire diameter and -material and replace if necessary
  - ✘ Adjust wire guide to material in use, blow through and replace if necessary
- ↘ Kinked hose packages
  - ✘ Extend and lay out the torch hose package
- ↘ Incompatible parameter settings
  - ✘ Check settings and correct if necessary

#### Unstable arc

- ↘ Unsuitable or worn welding torch equipment
  - ✘ Adjust contact tip to wire diameter and -material and replace if necessary
  - ✘ Adjust wire guide to material in use, blow through and replace if necessary
- ↘ Incompatible parameter settings
  - ✘ Check settings and correct if necessary

#### Pore formation

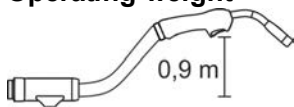
- ↘ Inadequate or missing gas shielding
  - ✘ Check shielding gas setting and replace shielding gas cylinder if necessary
  - ✘ Shield welding site with protective screens (draughts affect the welding result)
- ↘ Unsuitable or worn welding torch equipment
  - ✘ Check size of gas nozzle and replace if necessary
- ↘ Condensation in the gas tube
  - ✘ Purge hose package with gas or replace
- ↘ Splashes in the gas nozzle
- ↘ Gas distributor out of order or missing

## 8 Technical data

### 8.1 PM 221-, 301-, 401 G

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

Typ	-221 G	-301 G	-401 G
Welding torch polarity	Usually positive		
Guide type	Manually operated		
Voltage type	Direct voltage		
Shielding gas	Shielding gas according to ISO 14175		
Duty cycle DC at 40° C <sup>[1]</sup>	60 %		35 %
Maximum welding current M21	220 A	300 A	400 A
Maximum welding current M21, pulse	150 A	210 A	260 A
Maximum welding current CO2	250 A	330 A	450 A
Switching voltage Push-button	15 V		
Switching current Push-button	10 mA		
Wire types	Standard round wires		
Wire diameter	0,8 to 1,2 mm	0,8 to 1,6 mm	0,8 to 2,0 mm
Ambient temperature	-10 °C to + 40 °C		
Voltage measurement	113 V Peak value		
Protection classification for the machine connections (EN 60529)	IP3X		
Gas flow	10 to 20 l/min		
Hose package length	1,5-, 3-, 4-, 5 m		
Tightening torque Contact tip holder	10 Nm	15 Nm	
Tightening torque Contact tip	5 Nm	10 Nm	
Connection	Euro torch connector		
Test mark	CE / EAC / UK		
Standards used	See declaration of conformity (appliance documents)		
Operating weight	1,09 kg	1,16 kg	1,3 kg



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

## 9 Accessories

### 9.1 Option for retrofitting

Type	Designation	Item no.
ON TT PM Standard	Conversion kit, upper torch trigger, for PM standard welding torch	092-007938-00000
ON TT PM LED	Torch trigger, on top with LED for PM welding torch	092-007939-00000
ON TV PM Standard	Torch trigger extension for the PM standard welding torch	094-022327-00000
ON TV PM LED	Torch trigger extension for PM welding torch with LED	094-023891-00000
ON HSS Ø 18-10 mm	Heat shield for PM/MT welding torch	094-025359-00000
ON TH PM	Optional pistol grip	092-007944-00000
ON LED PM Standard	Retrofit kit LED lighting for PM standard welding torch	092-007940-00000

### 9.2 General accessories

Type	Designation	Item no.
ADAP CZA	Adapter for welding torches from Euro torch connector to CLOOS connector (gas/water on the outside)	094-019852-00000
ADAP EZA/DZA	Adapter for welding torches from Euro torch connector to DINSE connector on the machine	394-000134-00000
original FIX®	MIG/MAG torch holder	098-004206-00000
GFM 25	Flow meter	094-000074-00000
HST 39mm/13mm	Shrink hose	094-026752-00000

### 9.3 List of tools

Type	Designation	Item no.
Cutter	Hose cutter	094-016585-00000
DSP	Sharpener for liner	094-010427-00000
SW5-SW12MM	Torch key	094-016038-00001
O-Ring Picker	O-ring picker	098-005149-00000
CBB Ø 15 mm	Cylinder brushes, brass wire 15mm	098-005208-00000
CBB Ø 20 mm	Cylinder brushes, brass wire 20mm	098-005209-00000

## 10 Replaceable parts



**Parts and / or wearing parts may only be replaced when the components have cooled down and switched off!**

### 10.1 PM 221 G

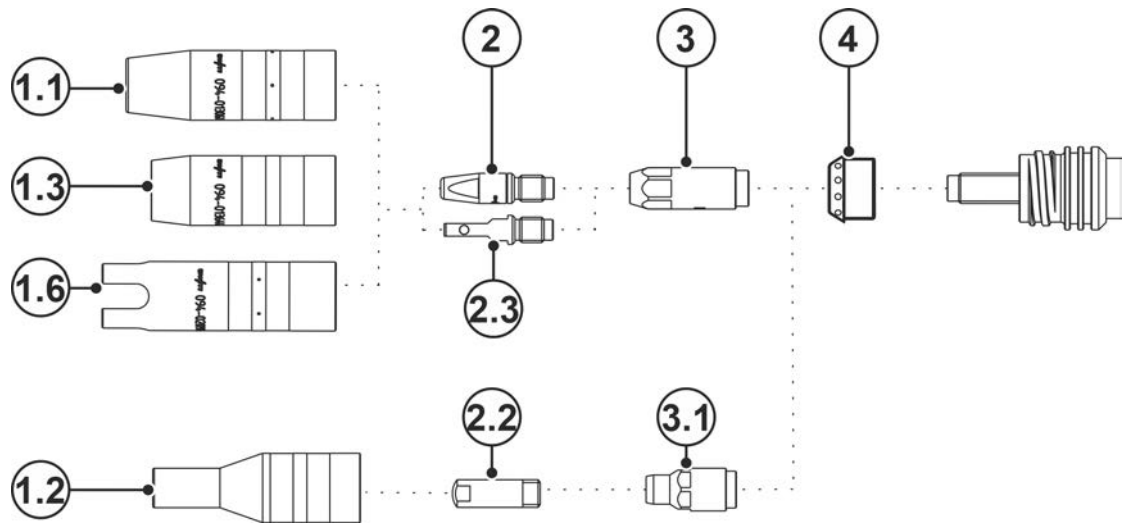


Figure 10-1

Item	Order number	Type	Name
1.1	094-013061-00001	GN TR 20 66mm D=13mm	Gas nozzle
1.1	094-013062-00001	GN TR 20 66mm D=11mm	Gas nozzle
1.1	094-013063-00001	GN TR 20 66mm D=16mm	Gas nozzle
1.2	094-020136-00000	GN TR 20x4 68mm D=10,5mm	Gas nozzle, Bottleneck
1.3	094-013644-00000	GN FCW TR 20 58mm	Gas nozzle, Inner shield
1.6	094-020944-00000	GN TR 20, 75 mm, D=18 mm	Spot welding nozzle
2	094-013071-00000	CT M6 CuCrZr, D=0,8 mm	Contact tip
2	094-013072-00000	CT M6 CuCrZr, D=1,0 mm, L=28 mm	Contact tip
2	094-013122-00000	CT M6 CuCrZr, D=0,9 mm	Contact tip
2	094-013535-00001	CT CUCRZR M7X30MM D=0.8MM	Contact tip
2	094-013536-00001	CT CUCRZR M7X30MM D=0.9MM	Contact tip
2	094-013537-00001	CT CUCRZR M7X30MM D=1.0MM	Contact tip
2	094-013538-00001	CT CUCRZR M7X30MM D=1.2MM	Contact tip
2	094-013550-00000	CTAL E-CU M7X30MM D=0.8MM	Contact tip, Aluminium welding
2	094-013551-00000	CTAL E-CU M7X30MM D=0.9MM	Contact tip, Aluminium welding
2	094-013552-00000	CTAL E-CU M7X30MM D=1.0MM	Contact tip, Aluminium welding
2	094-013553-00000	CTAL E-CU M7X30MM D=1.2MM	Contact tip, Aluminium welding
2	094-014317-00000	CT M6 CuCrZr D=1,2 mm	Contact tip
2	094-016101-00000	CT M6x28mm 0.8mm E-CU	Contact tip
2	094-016102-00000	CT M6x28mm 0.9mm E-CU	Contact tip
2	094-016103-00000	CT M6x28mm 1.0mm E-CU	Contact tip
2	094-016104-00000	CT M6x28mm 1.2mm E-CU	Contact tip
2	094-016105-00000	CTAL E-CU M6X28MM D=0.8MM	Contact tip, Aluminium welding
2	094-016106-00000	CTAL E-CU M6X28MM D=0.9MM	Contact tip, Aluminium welding
2	094-016107-00000	CTAL E-CU M6X28MM D=1.0MM	Contact tip, Aluminium welding
2	094-016108-00000	CTAL E-CU M6X28MM D=1.2MM	Contact tip, Aluminium welding
2.2	094-005403-00000	CT M6 x 25 mm, 0.6 mm, CuCrZr	Contact tip
2.2	094-020689-00000	CT M6 x 25 mm, 0.8 mm, CuCrZr	Contact tip

Item	Order number	Type	Name
2.2	094-020690-00000	CT M6 x 25 mm, 1.0 mm, CuCrZr	Contact tip
2.2	094-020691-00000	CT M6 x 25 mm, 0.6 mm, E-Cu	Contact tip
2.2	094-020692-00000	CT M6 x 25 mm, 0.8 mm, E-Cu	Contact tip
2.2	094-020693-00000	CT M6 x 25 mm, 0.9 mm, E-Cu	Contact tip
2.2	094-020694-00000	CT M6 x 25 mm, 1.0 mm, E-Cu	Contact tip
2.2	094-020695-00000	CT M6 x 25 mm, 0.6 mm, E-Cu (Alu)	Contact tip, Aluminium welding
2.2	094-020696-00000	CT M6 x 25 mm, 0.8 mm, E-Cu (Alu)	Contact tip, Aluminium welding
2.2	094-020697-00000	CT M6 x 25 mm, 0.9 mm, E-Cu (Alu)	Contact tip, Aluminium welding
2.2	094-020698-00000	CT M6 x 25 mm, 1.0 mm, E-Cu (Alu)	Contact tip, Aluminium welding
2.3	094-025535-00000	CT ZWK CuCrZr M7x30 mm Ø 1,0mm	Contact tip forced contact
2.3	094-025536-00000	CT ZWK CuCrZr M7x30 mm Ø 1,2mm	Contact tip forced contact
3	094-013069-00002	CTH CUCRZR M6 L=30.5MM	Contact tip holder
3	094-013070-00002	CTH CUCRZR M6 L=33.5MM	Contact tip holder
3	094-013541-00002	CTH CUCRZR M7 L=31.5MM	Contact tip holder
3	094-013542-00002	CTH CUCRZR M7 L=34.5MM	Contact tip holder
3.1	094-020562-00000	CTH M6 CuCrZr 30.5mm	Contact tip holder
4	094-013094-00004	GD PM / MT 221G / 301W	Gas diffuser
-	094-016038-00001	TT SW5-SW12MM	Torch key
-	094-013967-00000	4,0MMX1,0MM	O-Ring for Euro torch connector
-	098-005149-00000	O-Ring Picker	O-Ring Picker

## 10.2 PM 301 G

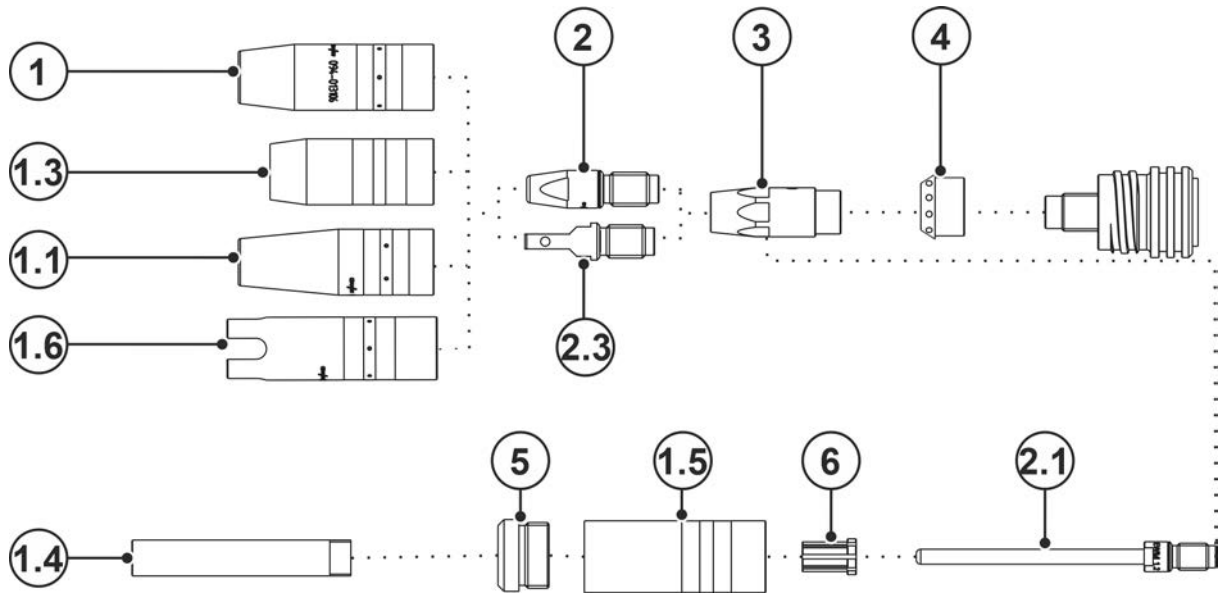


Figure 10-2

Item	Order number	Type	Designation
1	094-013105-00001	GN TR 22 71mm D=13mm	Gas nozzle
1	094-013106-00001	GN TR 22 71mm D=15mm	Gas nozzle
1	094-013107-00001	GN TR 22 71mm D=18mm	Gas nozzle
1	094-019821-00001	GN TR 22 65mm D=15mm	Gasdüse, short
1	094-019822-00001	GN TR 22 65mm D=18mm	Gasdüse, kurz
1.1	094-019853-00001	GN NG TR22X4 71mm D=13mm	Gasdüse Highly conical, narrow gap welding



Item	Order number	Type	Designation
1.3	094-019554-00000	GN FCW TR 22x4 59.5MM	Gasdüse, Inner shield
1.4	094-019626-00000	GN NG M12 73mm	Gasdüse, Engspaltschweißen
1.4	094-022226-00000	GN NG M12 76mm	Gasdüse, Engspaltschweißen
1.5	094-019623-00000	GNC TR22x4	Gas nozzle body
1.6	094-020945-00000	GN TR 22, 80 mm, D=20 mm	Spot welding nozzle
2	094-007238-00000	CT E-CU M8X30MM D=1.2MM	Contact tip
2	094-013113-00000	CT M8 CuCrZr 30mm, 1.2mm	Contact tip
2	094-013129-00000	CT CUCRZR M8X30MM D=0.9MM	Contact tip
2	094-013528-00001	CT CUCRZR M9X35MM D=0.8MM	Contact tip
2	094-013529-00001	CT CUCRZR M9X35MM D=0.9MM	Contact tip
2	094-013530-00001	CT M9 CuCrZr 1.0mm	Contact tip
2	094-013531-00001	CT CUCRZR M9X35MM D=1.2MM	Contact tip
2	094-013532-00001	CT CUCRZR M9X35MM D=1.4MM	Contact tip
2	094-013533-00001	CT CUCRZR M9X35MM D=1.6MM	Contact tip
2	094-013543-00000	CTAL E-CU M9X35MM D=0.8MM	Stromdüse, Aluminium welding
2	094-013544-00000	CTAL E-CU M9X35MM D=0.9MM	Contact tip, aluminium welding
2	094-013545-00000	CTAL E-CU M9X35MM D=1.0MM	Contact tip, aluminium welding
2	094-013546-00000	CTAL E-CU M9X35MM D=1.2MM	Contact tip, aluminium welding
2	094-013547-00000	CTAL E-CU M9X35MM D=1.4MM	Contact tip, aluminium welding
2	094-013548-00000	CTAL E-CU M9X35MM D=1.6MM	Contact tip, aluminium welding
2	094-014024-00000	CT CUCRZR M8X30MM D=0.8MM	Contact tip
2	094-014191-00000	CT CUCRZR M8X30MM D=1.4MM	Contact tip
2	094-014192-00000	CT CUCRZR M8X30MM D=1.6MM	Contact tip
2	094-014222-00000	CT CUCRZR M8X30MM D=1.0MM	Contact tip
2	094-016109-00000	CT E-CU M8X30MM D=0.8MM	Contact tip
2	094-016110-00000	CT E-CU M8X30MM D=0.9MM	Contact tip
2	094-016111-00000	CT E-CU M8X30MM D=1.0MM	Contact tip
2	094-016112-00000	CT E-CU M8X30MM D=1.4MM	Contact tip
2	094-016113-00000	CT E-CU M8X30MM D=1.6MM	Contact tip
2	094-016115-00000	CTAL E-CU M8X30MM D=0.8MM	Contact tip, aluminium welding
2	094-016116-00000	CTAL E-CU M8X30MM D=0.9MM	Contact tip, aluminium welding
2	094-016117-00000	CTAL E-CU M8X30MM D=1.0MM	Contact tip, aluminium welding
2	094-016118-00000	CTAL E-CU M8X30MM D=1.2MM	Contact tip, aluminium welding
2	094-016119-00000	CTAL E-CU M8X30MM D=1.4MM	Contact tip, aluminium welding
2	094-016120-00000	CTAL E-CU M8X30MM D=1.6MM	Contact tip, aluminium welding
2.1	094-019616-00000	CT M9 x 100 mm; Ø 1,0 mm CuCrZr	Stromdüse, Narrow gap welding
2.1	094-019617-00000	CT M9 x 100 mm; Ø 1,2 mm CuCrZr	Contact tip, narrow gap welding
2.1	094-019618-00000	CT M9 x 100 mm; Ø 1,6 mm CuCrZr	Contact tip, narrow gap welding
2.1	094-020019-00000	CT M9 x 100 mm; Ø 1,4 mm CuCrZr	Contact tip, narrow gap welding
2.1	094-021189-00001	CT M9 x 100 mm; Ø 0,8 mm CuCrZr	Contact tip, narrow gap welding
2.3	094-017007-00001	CT ZWK CuCrZr M9x35 mm Ø 1,0 mm	Stromdüse, forced contact
2.3	094-016159-00001	CT ZWK CuCrZr M9x35 mm Ø 1,2 mm	Stromdüse, forced contact
2.3	094-025533-00001	CT ZWK CuCrZr M9x35 mm Ø 1,6 mm	Stromdüse, zwangskontaktiert
3	094-013109-00002	CTH CUCRZR M8 L=34.1MM	Contact tip holder
3	094-013110-00002	CTH CUCRZR M8 L=37.1MM	Contact tip holder
3	094-013539-00002	CTH M9 CuCrZr 34.5mm	Contact tip holder

Item	Order number	Type	Designation
3	094-013540-00002	CTH M9 CuCrZr 37.5mm	Contact tip holder
4	094-013096-00004	GD Ø11,7 mm, L=14 mm	Gas diffuser
5	094-019625-00000	IT ES M22X1,5 M12X1	Insulation part
6	094-019627-00000	ZH GDE ID=5MM AD=10MM L=15MM	Centring sleeve
-	094-016038-00001	TT SW5-SW12MM	Torch key
-	094-013967-00000	4,0MMX1,0MM	O-Ring for Euro torch connector
-	098-005149-00000	O-Ring Picker	O-Ring Picker

## 10.3 PM 401 G

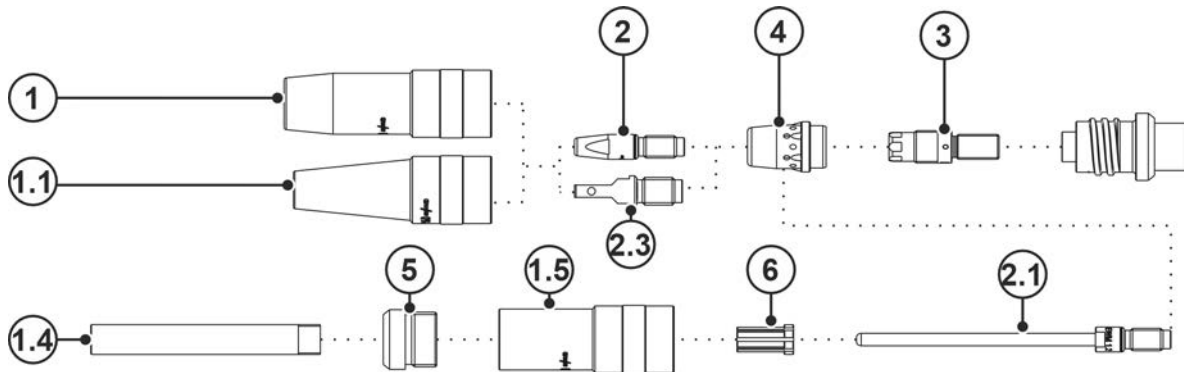


Figure 10-3

Item	Order number	Type	Designation
1	094-014177-00001	GN TR 23 63mm D=15mm	Gas nozzle
1	094-014178-00001	GN TR 23 66mm D=15mm	Gas nozzle
1	094-014179-00001	GN TR 23 63mm D=17mm	Gas nozzle
1	094-014180-00001	GN TR 23 66mm D=17mm	Gas nozzle
1	094-014181-00001	GN TR 23 63mm D=19mm	Gas nozzle
1	094-014182-00001	GN TR 23 66mm D=19mm	Gas nozzle
1.1	094-019702-00000	GN NG TR23X4 63mm D=13mm	Gasdüse Highly conical, narrow gap welding
1.1	094-022227-00000	GN NG TR23X4 66mm D=13mm	Gas nozzle highly conical, Engspalt-schweißen
1.4	094-019626-00000	GN NG M12 73mm	Gas nozzle, narrow gap welding
1.4	094-022226-00000	GN NG M12 76mm	Gasdüse, Engspaltschweißen
1.5	094-019624-00000	GNC TR23x4	Gas nozzle body
2	094-007238-00000	CT E-CU M8X30MM D=1.2MM	Contact tip
2	094-013113-00000	CT M8 CuCrZr 30mm, 1.2mm	Contact tip
2	094-013129-00000	CT CUCRZR M8X30MM D=0.9MM	Contact tip
2	094-013528-00001	CT CUCRZR M9X35MM D=0.8MM	Contact tip
2	094-013529-00001	CT CUCRZR M9X35MM D=0.9MM	Contact tip
2	094-013530-00001	CT M9 CuCrZr 1.0mm	Contact tip
2	094-013531-00001	CT CUCRZR M9X35MM D=1.2MM	Contact tip
2	094-013532-00001	CT CUCRZR M9X35MM D=1.4MM	Contact tip
2	094-013533-00001	CT CUCRZR M9X35MM D=1.6MM	Contact tip
2	094-013534-00001	CT CUCRZR M9X35MM D=2.0MM	Contact tip
2	094-013543-00001	CTAL E-CU M9X35MM D=0.8MM	Stromdüse, Aluminium welding
2	094-013544-00001	CTAL E-CU M9X35MM D=0.9MM	Contact tip, aluminium welding
2	094-013545-00001	CTAL E-CU M9X35MM D=1.0MM	Contact tip, aluminium welding
2	094-013546-00001	CTAL E-CU M9X35MM D=1.2MM	Contact tip, aluminium welding
2	094-013547-00001	CTAL E-CU M9X35MM D=1.4MM	Contact tip, aluminium welding

Item	Order number	Type	Designation
2	094-013548-00001	CTAL E-CU M9X35MM D=1.6MM	Contact tip, aluminium welding
2	094-013549-00001	CTAL E-CU M9X35MM D=2.0MM	Contact tip, aluminium welding
2	094-014024-00000	CT CUCRZR M8X30MM D=0.8MM	Contact tip
2	094-014191-00000	CT CUCRZR M8X30MM D=1.4MM	Contact tip
2	094-014192-00000	CT CUCRZR M8X30MM D=1.6MM	Contact tip
2	094-014193-00000	CT CUCRZR M8X30MM D=2.0MM	Contact tip
2	094-014222-00000	CT CUCRZR M8X30MM D=1.0MM	Contact tip
2	094-016109-00000	CT E-CU M8X30MM D=0.8MM	Contact tip
2	094-016110-00000	CT E-CU M8X30MM D=0.9MM	Contact tip
2	094-016111-00000	CT E-CU M8X30MM D=1.0MM	Contact tip
2	094-016112-00000	CT E-CU M8X30MM D=1.4MM	Contact tip
2	094-016113-00000	CT E-CU M8X30MM D=1.6MM	Contact tip
2	094-016114-00000	CT E-CU M8X30MM D=2.0MM	Contact tip
2	094-016115-00000	CTAL E-CU M8X30MM D=0.8MM	Contact tip, aluminium welding
2	094-016116-00000	CTAL E-CU M8X30MM D=0.9MM	Contact tip, aluminium welding
2	094-016117-00000	CTAL E-CU M8X30MM D=1.0MM	Contact tip, aluminium welding
2	094-016118-00000	CTAL E-CU M8X30MM D=1.2MM	Contact tip, aluminium welding
2	094-016119-00000	CTAL E-CU M8X30MM D=1.4MM	Contact tip, aluminium welding
2	094-016120-00000	CTAL E-CU M8X30MM D=1.6MM	Contact tip, aluminium welding
2	094-016920-00000	CTAL E-CU M8X30MM D=2.0MM	Contact tip, aluminium welding
2.1	094-019616-00000	CT M9 x 100 mm; Ø 1,0 mm CuCrZr	Stromdüse Narrow gap welding
2.1	094-019617-00000	CT M9 x 100 mm; Ø 1,2 mm CuCrZr	Contact tip, narrow gap welding
2.1	094-019618-00000	CT M9 x 100 mm; Ø 1,6 mm CuCrZr	Contact tip, narrow gap welding
2.1	094-020019-00000	CT M9 x 100 mm; Ø 1,4 mm CuCrZr	Contact tip, narrow gap welding
2.1	094-021189-00001	CT M9 x 100 mm; Ø 0,8 mm CuCrZr	Contact tip, narrow gap welding
2.3	094-017007-00001	CT ZWK CuCrZr M9x35 mm Ø 1,0 mm	Stromdüse forced contact
2.3	094-016159-00001	CT ZWK CuCrZr M9x35 mm Ø 1,2 mm	Contact tip, forced contact
2.4	094-025533-00000	CT ZWK CuCrZr M9x35 mm Ø 1,6 mm	Contact tip, forced contact
3	094-013856-00003	CTH CUCRZR M9 L=35MM	Contact tip holder
3	094-015489-00003	CTH M8 x 35 mm, CuCrZr	Contact tip holder
3	094-016018-00003	CTH M8 x 37,5 mm, CuCrZr	Contact tip holder
3	094-016425-00003	CTH CUCRZR M9 L=38MM	Contact tip holder
4	094-013111-00002	GD D=20,2; 25 mm	Gas diffuser
5	094-019625-00000	IT ES M22X1,5 M12X1	Insulation part
6	094-019627-00000	ZH GDE ID=5MM AD=10MM L=15MM	Centring sleeve
-	094-016038-00001	TT SW5-SW12MM	Torch key
-	094-013967-00000	4,0MMX1,0MM	O-ring for Euro torch connector
-	098-005149-00000	O-Ring Picker	O-ring picker

11 Service documents

11.1 Circuit diagrams

The circuit diagrams are only intended for authorised service personnel!

11.1.1 PM G, -W

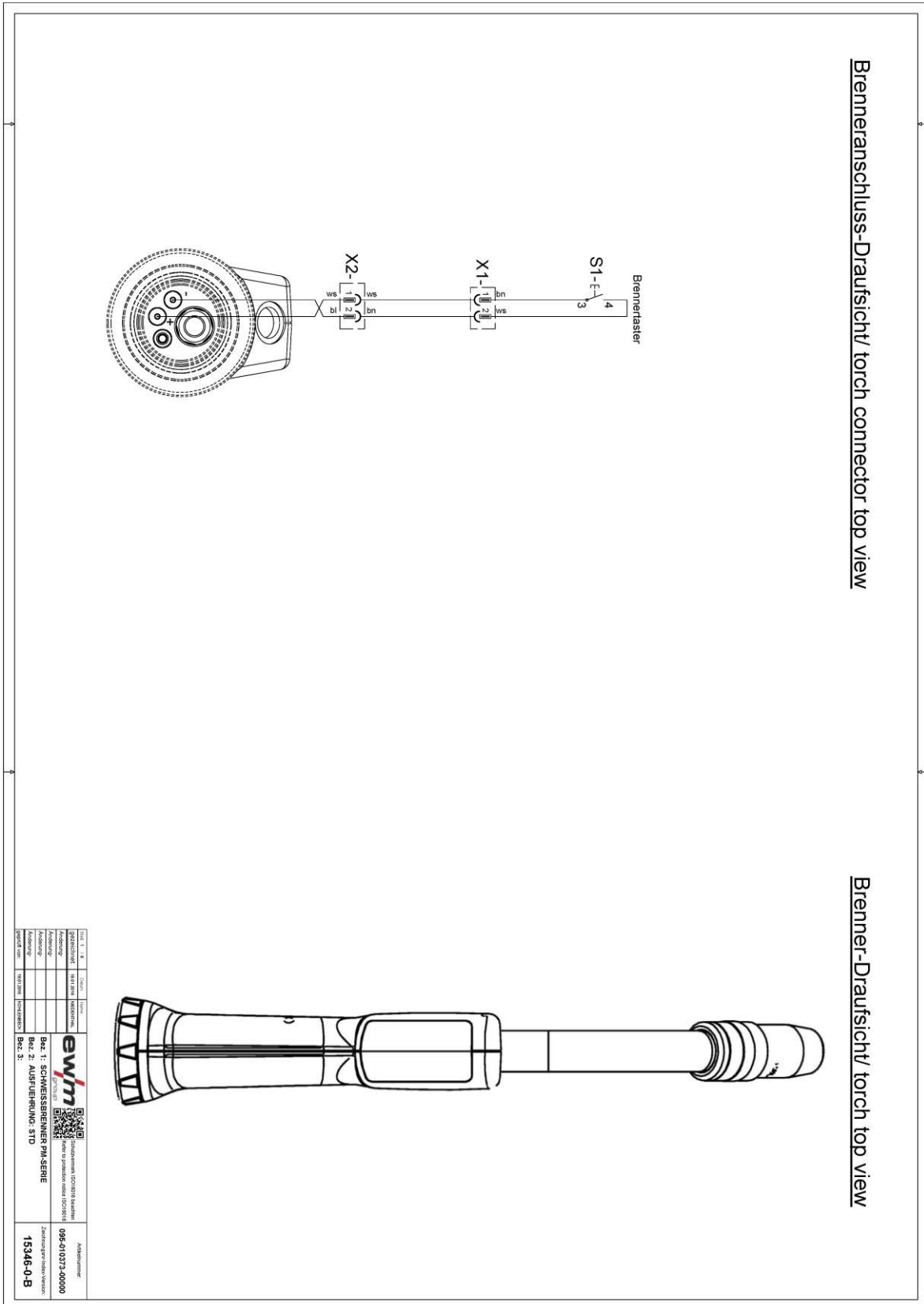


Figure 11-1

11.1.2 PM G, -W LED

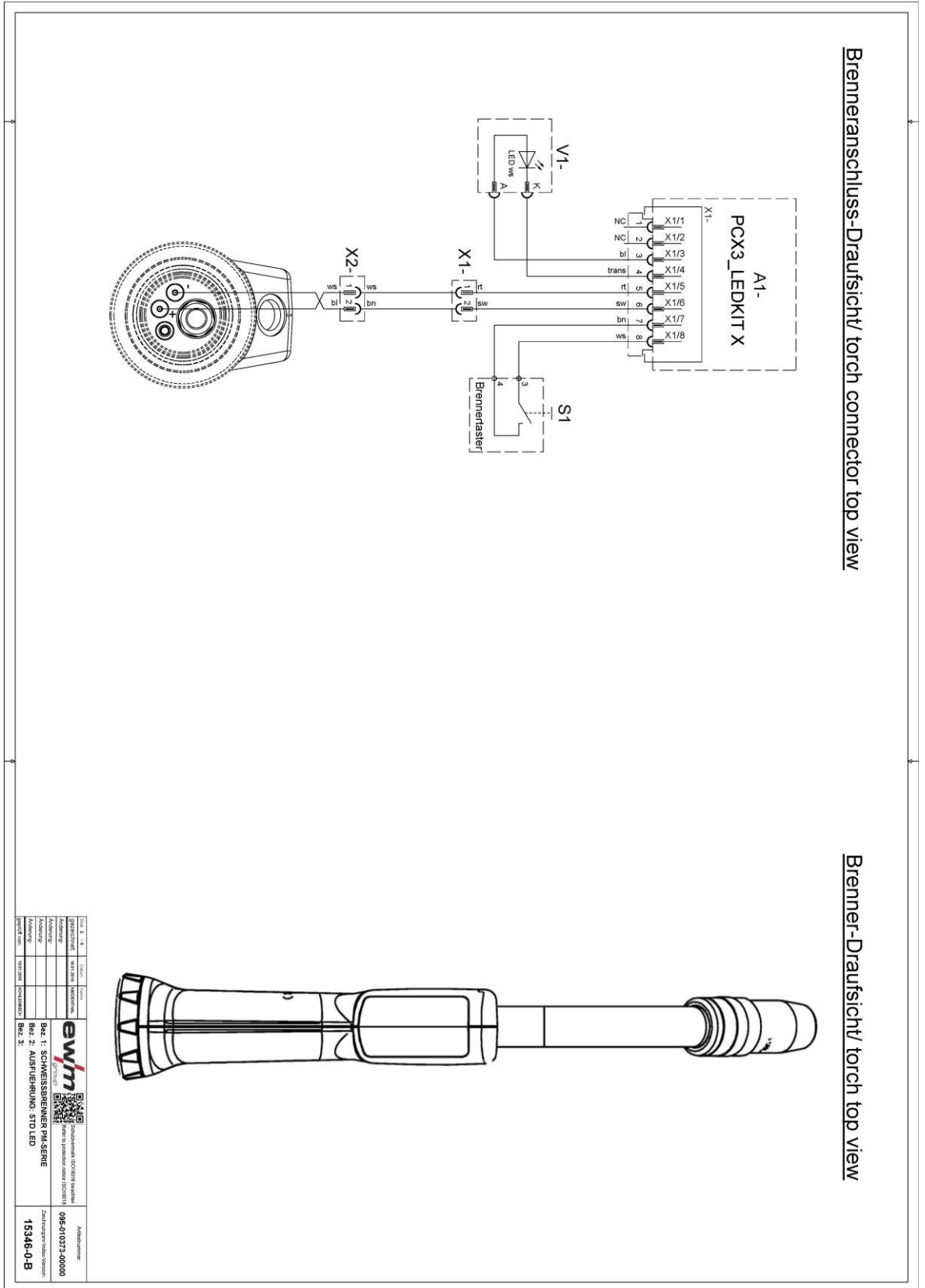


Figure 11-2

### 11.1.3 PM G, -W (ON TT PM Standard)

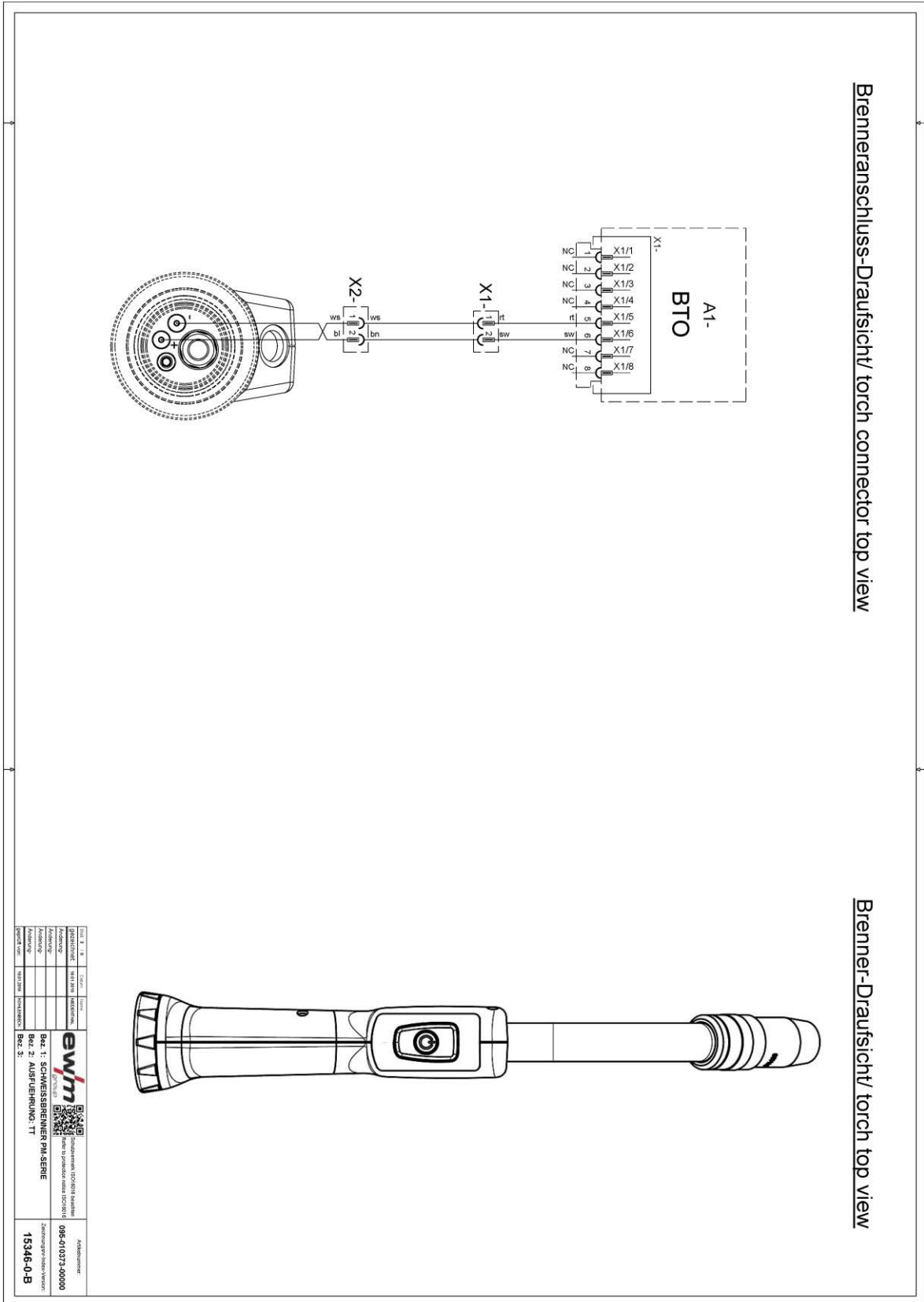


Figure 11-3

### 11.1.4 PM G, -W LED (ON TT PM Standard)

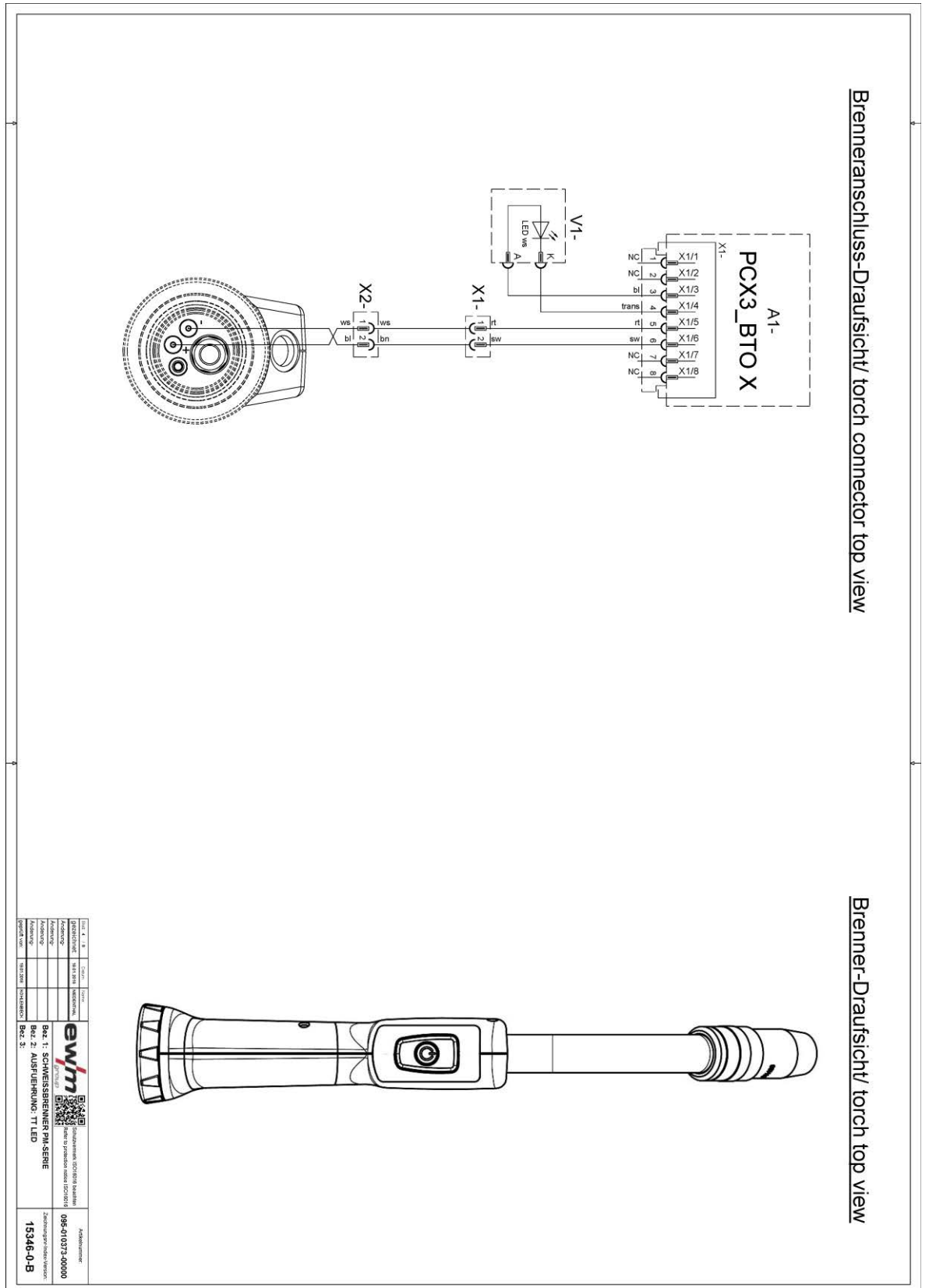


Figure 11-4

11.1.5 PM G, -W 2U/D

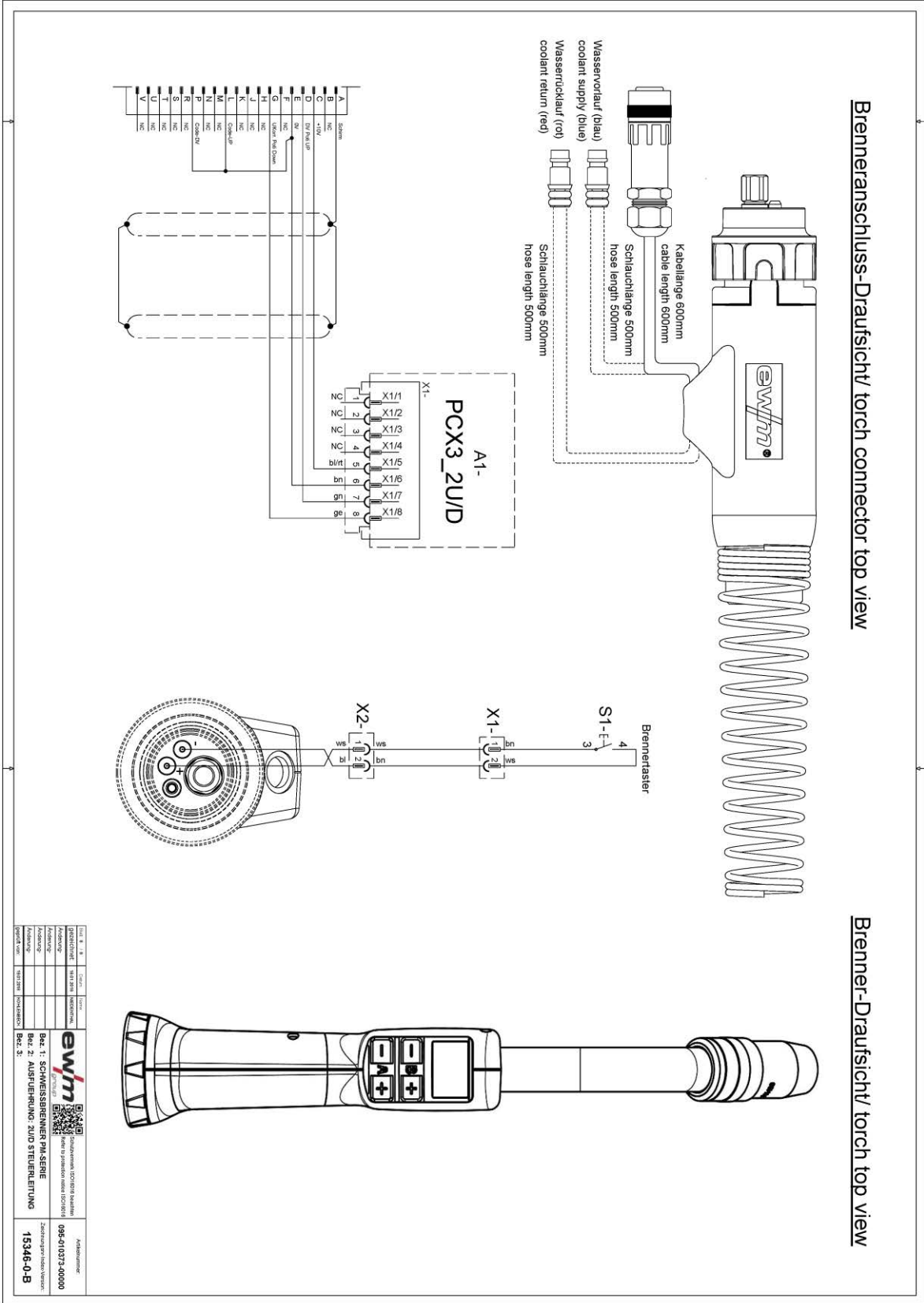


Figure 11-5



**11.1.6 PM°G, -W 2U/DX**

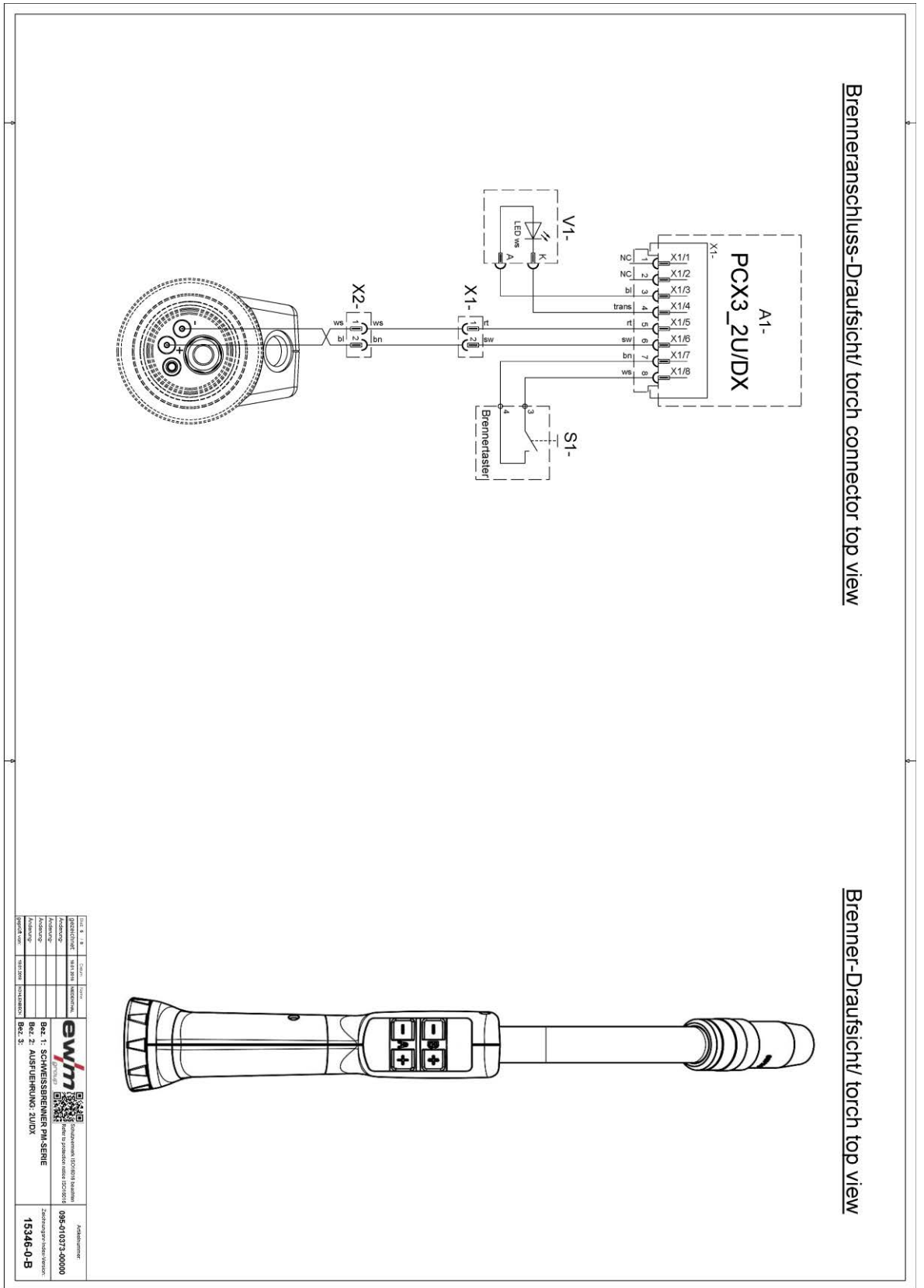


Figure 11-6

11.1.7 PM°G, -W RD2 X

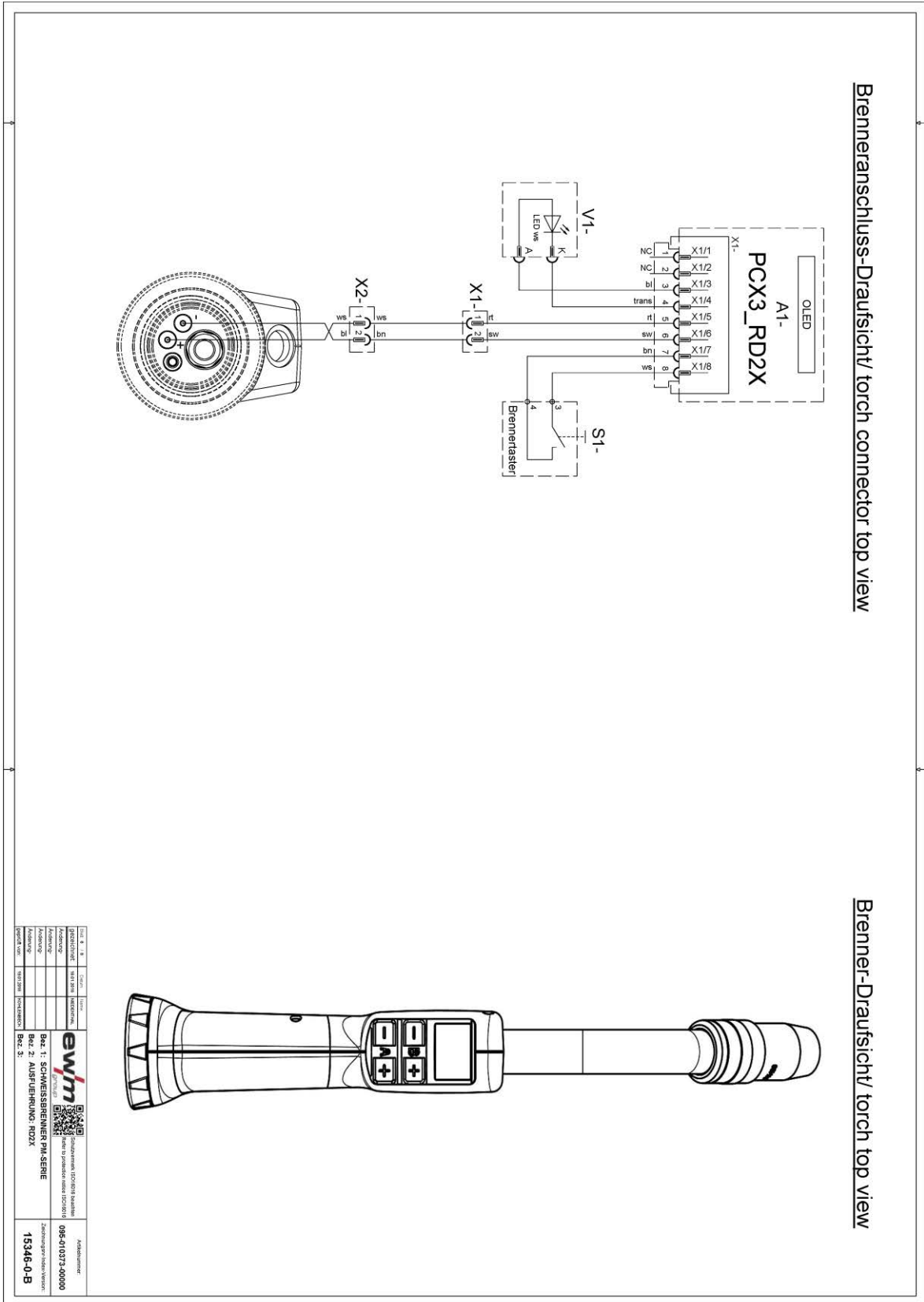


Figure 11-7

### 11.1.8 PM G, -W RD3 X

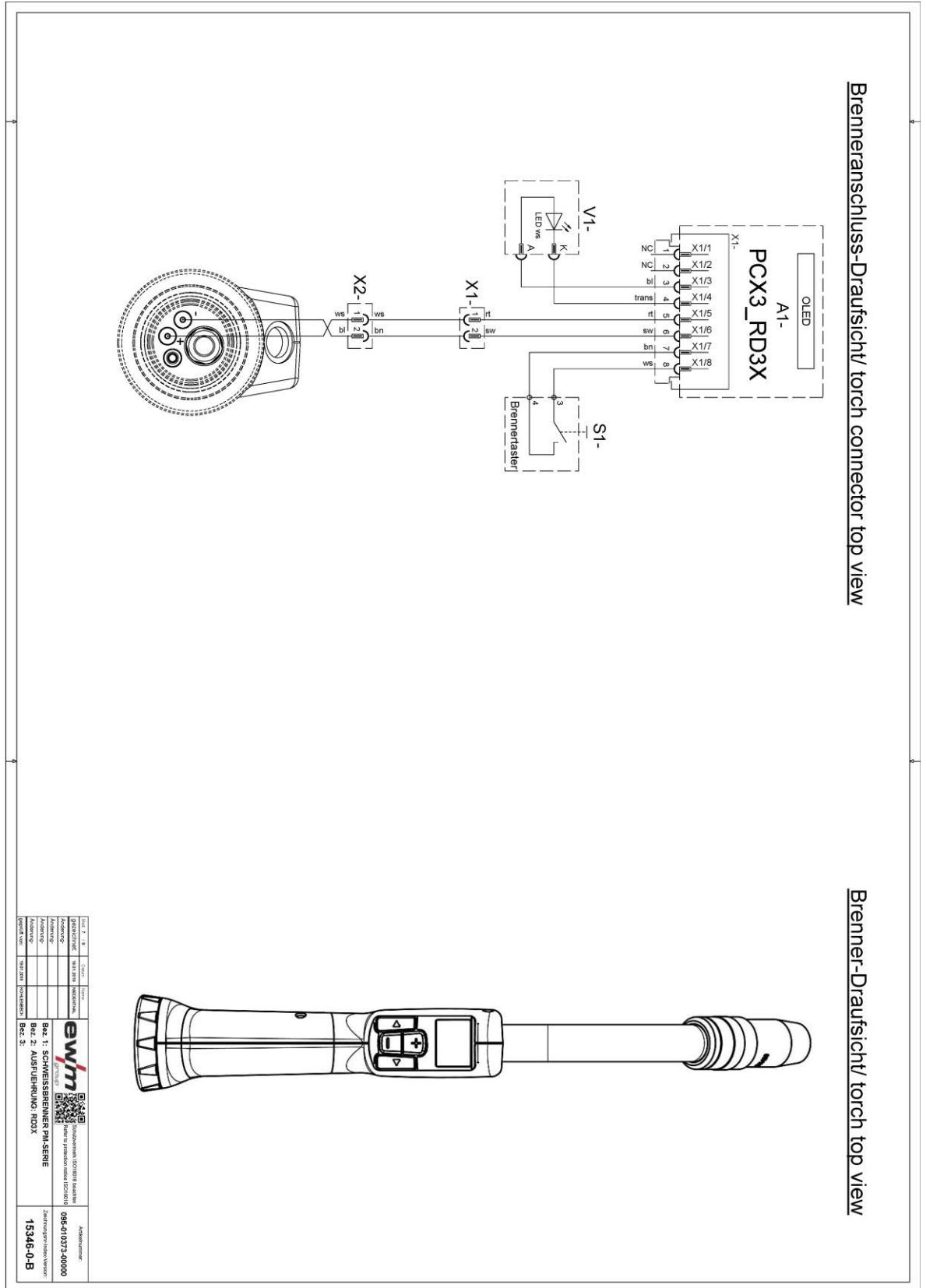















Figure 11-8









## 12 Appendix

### 12.1 Display, explanation of symbols

#### Main level

Display	Setting/selection
	Welding current
	Welding voltage
	Welding voltage correction
	Dynamics
	Wire feed speed Unit: m/min
	Wire feed speed Unit: ipm
	Program selection
	Welding procedure MIG/MAG
	Welding procedure forceArc
	Welding procedure wiredArc
	Welding procedure rootArc
	Welding procedure coldArc
	JOB selection

#### Program level

Display	Setting/selection
	Welding method Standard
	Welding method Pulse
	Welding method Position weld
	Operating mode Non-latched
	Operating mode Latched
	Operating mode Special non-latched
	Operating mode Special latched
	Operating mode Spot welding

**Error messages, warnings**

Display	Setting/selection
	Error
	Error - temperature
	Error - water
	Warning
	Warning wire end

**Component management, Miscellaneous**

Display	Setting/selection
	Unit completed
	Scan component
	Free-welding mode
	Hold value
	Correction mode
	Seam run
	Seam end
	End of component
	End of component, confirmation
	WPS End
	Standby

## 12.2 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"