



EN

welding torch

PM301 W F1
PM451 W F1
PM551 W F1

099-700053-EW501

Observe additional system documents!

21.08.2024

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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.

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

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
	Exit		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 fume extractor 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!

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.

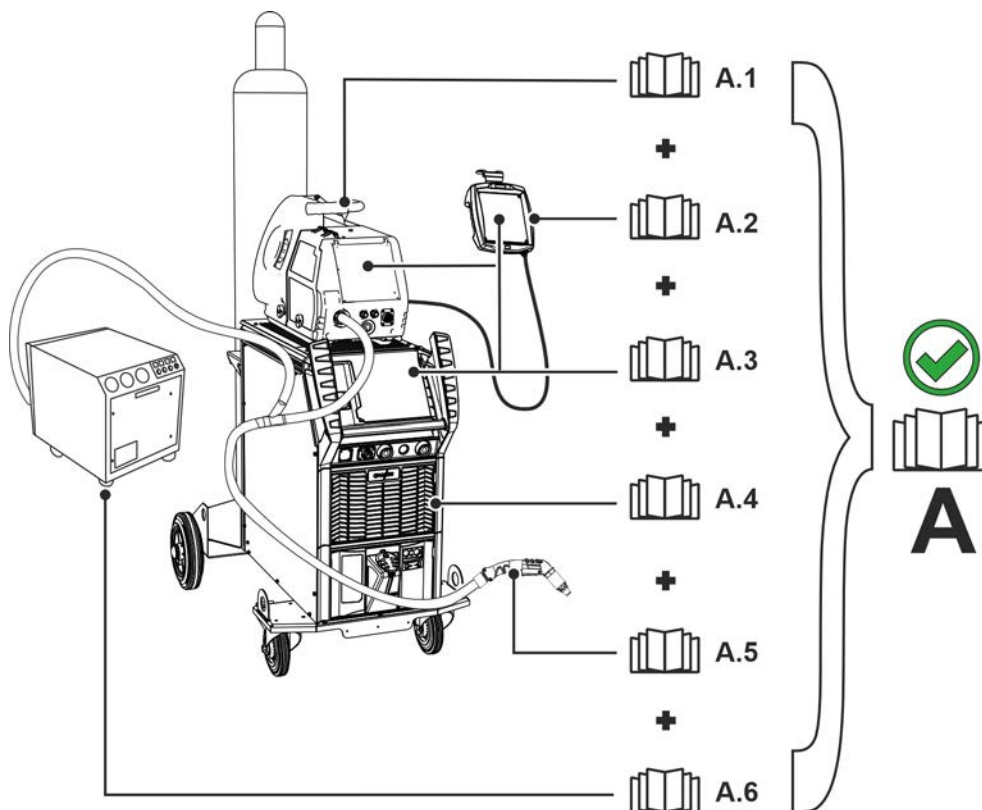


Figure 3-1

The illustration shows a general example of a welding system.






Item	Documentation
A.1	Wire feeder
A.2	Remote control
A.3	Control
A.4	Power source
A.5	Welding torch
A.6	Extraction and filter system
A	Complete documentation

4 Product description – quick reference

4.1 Product variants

Version	Functions	Rated output
PM	Professional MIG	
W	Water-cooled Switching the welding process on and off with the torch trigger. Interchangeable contact tip holder.	PM301, -451, -551W
G	Gas-cooled Switching the welding process on and off with the torch trigger. Interchangeable contact tip holder.	PM221, -301G
BK	Cap - standard	PM221, -301G PM301, -451, -551W
BP	Bypass Bypass regulates the volume flow of the welding fume extraction.	PM221, -301G PM301, -451, -551W
2U/D	2 up/down torch 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, -301G PM301, -451, -551W
RD2	Remote display-2-welding torch 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, -301G PM301, -451, -551W
RD3	Remote display-3-welding torch 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, -301G PM301, -451, -551W
X	X technology Welding torch with X technology – function torch without a separate control cable.	PM221, -301G PM301, -451, -551W
LED	LED lighting Automatic LED lighting when the welding torch is moving.	PM221, -301G PM301, -451, -551W
F1	Fume extraction torch The welding torch is designed for the extraction of welding fumes and is equipped with a ball joint.	PM221, -301G PM301, -451, -551W

4.1.1 Ways of combination

Factory-fit option	Version				
	BK	BP	2U/D X	RD2 X	RD3 X
LED X					

4.2 Welding fume extractor

4.2.1 PM301-, PM451, PM551 W F1

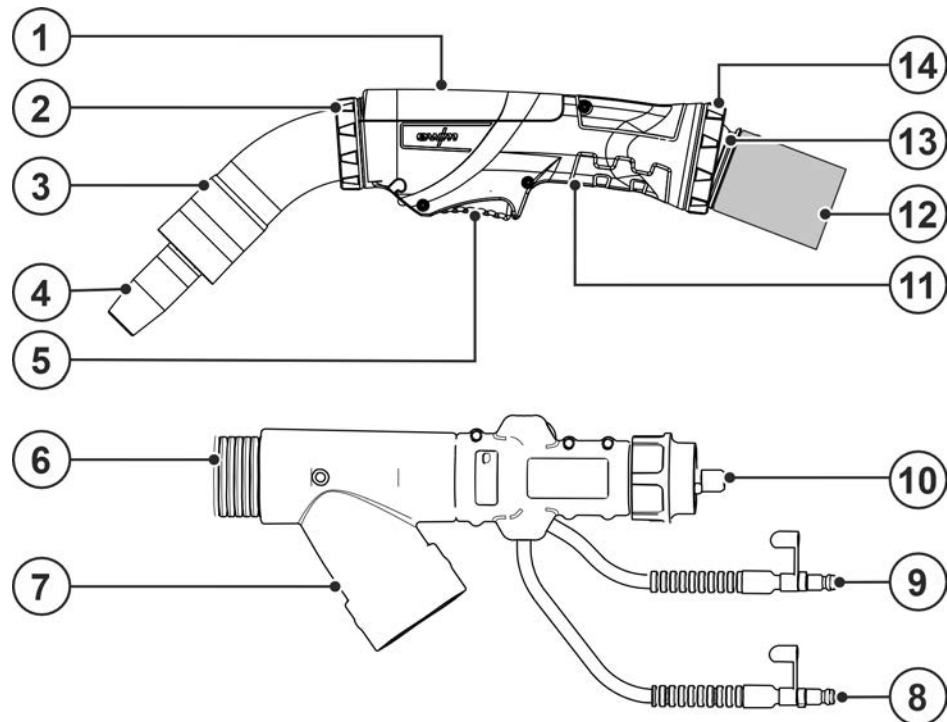



Figure 4-1

Item	Symbol	Description
1		Cap - standard Other versions > see 4.2.1.1 chapter.
2		Lock ring
3		Extraction elbow - integrated extraction nozzle
4		Gas nozzle
5		Torch trigger
6		Welding torch hose package
7		Connection, extraction unit Connect to extraction device or central extraction unit Ø = 42.5 mm
8		Quick connect coupling, blue (coolant supply)
9		Quick connect coupling, red (coolant return)
10		Euro central connection
11		Grip plate
12		Torch hose package with leather hose Leather hose option > see 9 chapter
13		Ball joint with rotation stop
14		Lock ring

4.2.1.1 Variants

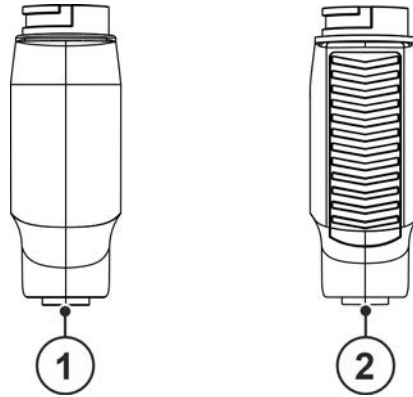


Figure 4-2

Item	Symbol	Description
1		BK- Cap - standard
2		BP - Bypass Bypass slider

4.2.2 PM301-, PM451, PM551 W F1 X

4.2.2.1 X-Technologie

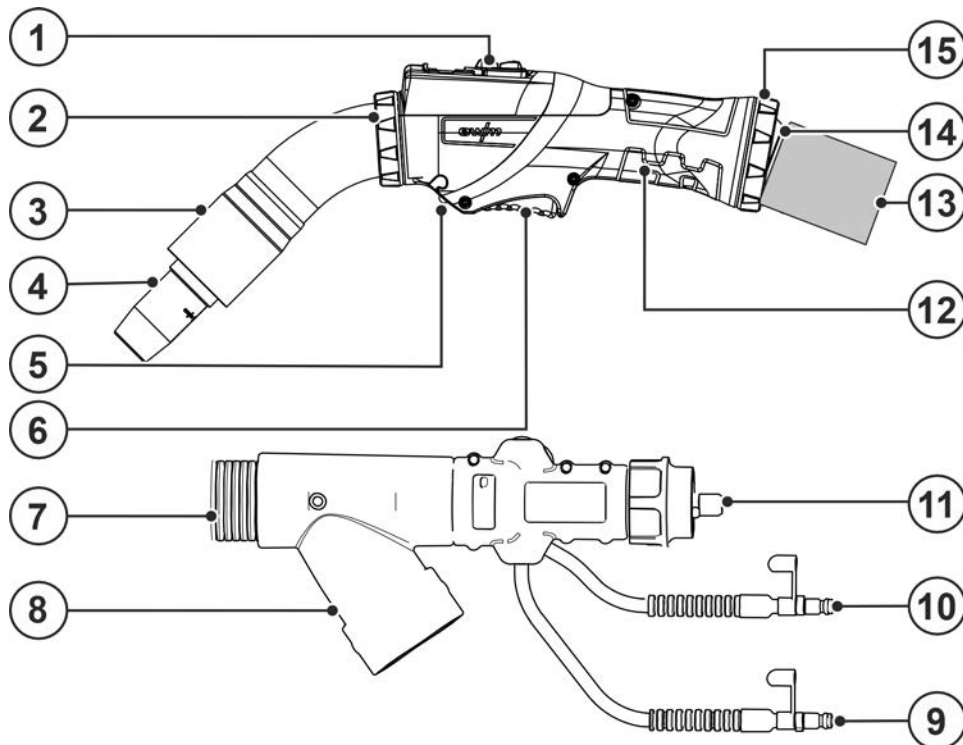



Figure 4-3

Item	Symbol	Description
1		Operating elements > see 5.8.3 chapter
2		Lock ring
3		Extraction elbow - integrated extraction nozzle
4		Gas nozzle
5		LED lighting
6		Torch trigger

Item	Symbol	Description
7		Welding torch hose package
8		Connection, extraction unit Connect to extraction device or central extraction unit Ø = 42.5 mm
9		Quick connect coupling, blue (coolant supply)
10		Quick connect coupling, red (coolant return)
11		Euro central connection
12		Grip plate
13		Torch hose package with leather hose Leather hose option > see 9 chapter
14		Ball joint with rotation stop
15		Lock ring

4.2.2.2 Variants

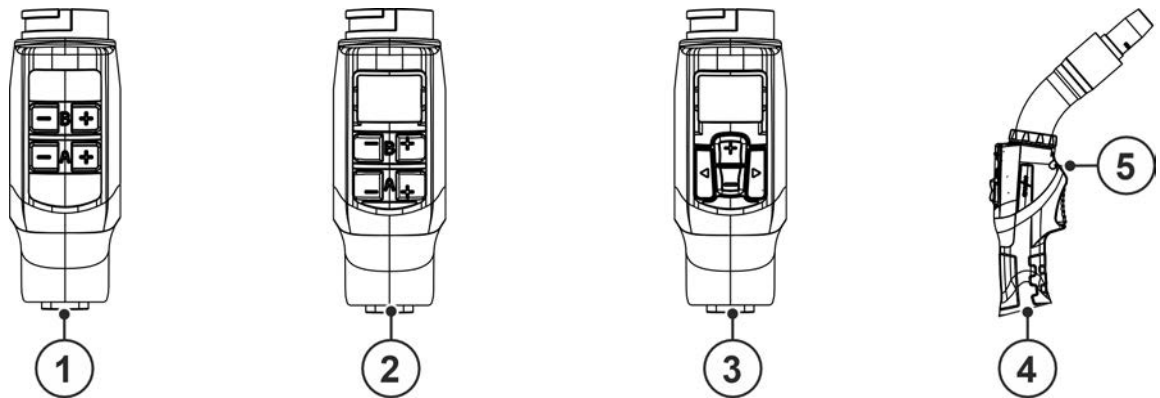


Figure 4-4

Item	Symbol	Description
1		2U/DX - Up/down torch - X-Technology - option ex works
2		RD2X - RD2 welding torch - X-Technology - option ex works
3		RD3X - RD3 welding torch - X-Technology - option ex works
4		LED X - LED lighting - X-Technology - option ex works
5		LED lighting

5 Design and function

5.1 General

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!



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 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!



To prevent damage to the fume extraction torch, never operate it without the extraction nozzle.



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!**



Machine damage due to incompletely assembled welding torch!

Incomplete assembly may destroy the welding torch.

- **Always assemble the welding torch completely.**



After each opening of the welding torch, using the "gas test" "gas flush" function and increased flow rates, remove moisture, atmospheric oxygen and any impurities from the welding torch.



Do not twist the hose package to no end in one direction so as to prevent damage to the fume extraction torch and the torch hose package. It is necessary to untwist the hose package regularly

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

5.2 Scope of delivery

The delivery is checked and packaged carefully before dispatch, however it is not possible to exclude the possibility of damage during transit.

Receiving inspection

- Check that the delivery is complete using the delivery note!

In the event of damage to the packaging

- Check the delivery for damage (visual inspection)!

In the event of complaints

If the delivery has been damaged during transport:

- Please contact the last haulier immediately!
- Keep the packaging (for possible checking by the haulier or for the return shipment).

Packaging for returns

If possible, please use the original packaging and the original packaging material. If you have any queries on packaging and protection during transport, please contact your supplier.

5.3 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!

5.3.1 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) ^[1]

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) ^[1]

Relative humidity

- up to 90 % at 20 °C (68 F)

^[1] Ambient temperature dependent on coolant! Observe the coolant temperature range of the torch cooling

5.3.2 Welding torch cooling system



Material damage due to unsuitable coolants!

Unsuitable coolant, coolants mixed with other types / liquids or use in an unsuitable temperature range will result in material damage and loss of the manufacturer's warranty!

- **Operation without coolant is not permitted! Dry running will destroy the cooling components such as the coolant pump, welding torch and hose packages.**
- **Only use the coolants described in these instructions for the specified ambient conditions (temperature range) > see 5.3.2.1 chapter.**
- **Do not mix coolants of different types (including those described in these instructions).**
- **When changing the coolant, all liquid must be replaced and the cooling system flushed.**

Dispose of the coolant in accordance with local regulations and the material safety data sheets.

5.3.2.1 Permitted torch coolant

Coolant	Temperature range
blueCool -10	-10 °C to +40 °C (14 °F to +104 °F)
blueCool -30	-30 °C to +40 °C (-22 °F to +104 °F)

5.3.2.2 Maximal hose package length

All information relates to the total hose package length of the complete welding system and presents exemplary configurations (of components of the EWM product portfolio with standard lengths). A straight kink-free installation is to be ensured, taking into account the max. delivery height.

Pump: Pmax = 3,5 bar (0.35 MPa)

Power source	Hose package	Wire feeder	miniDrive	Welding torch	Max.
Compact	✘	✘	✔ (25 m / 82 ft.)	✔ (5 m / 16 ft.)	30 m 98 ft.
	✔ (20 m / 65 ft.)	✔	✘	✔✔ (5 m / 16 ft.)	
Decompact	✔ (25 m / 82 ft.)	✔	✘	✔ (5 m / 16 ft.)	
	✔ (15 m / 49 ft.)	✔	✔ (10 m / 32 ft.)	✔ (5 m / 16 ft.)	

Pump: Pmax = 4.5 bar (0.45 MPa)

Power source	Hose package	Wire feeder	miniDrive	Welding torch	Max.
Compact	✘	✘	✔ (25 m / 82 ft.)	✔ (5 m / 16 ft.)	30 m 98 ft.
	✔ (30 m / 98 ft.)	✔	✘	✔✔ (5 m / 16 ft.)	40 m 131 ft.
Decompact	✔ (40 m / 131 ft.)	✔	✘	✔ (5 m / 16 ft.)	45 m 147 ft.
	✔ (40 m / 131 ft.)	✔	✔ (25 m / 82 ft.)	✔ (5 m / 16 ft.)	70 m 229 ft.

For optimum welding results, a maximum cable length of 30 meters (workpiece lead+ intermediate hose package + torch hose package) should be used. Ensure the proper routing of the welding power leads.

5.4 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!

Switch off the extraction system.

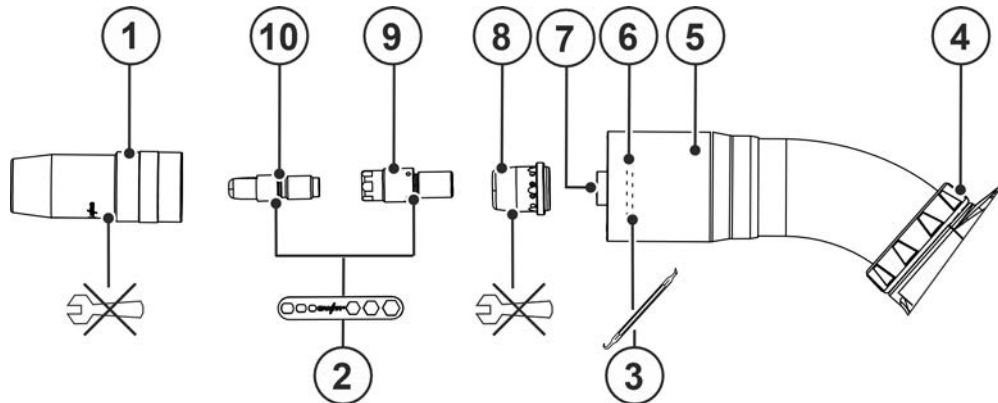


Figure 5-1

Item	Symbol	Description
1		Gas nozzle
2		Torch key > see 9 chapter
3		O-ring picker > see 9 chapter
4		Lock ring
5		Extraction elbow - integrated extraction nozzle
6		O-ring
7		Torch neck 45°
8		Gas distributor
9		Contact tip holder
10		Contact tip

- Unscrew the gas nozzle anticlockwise without using any tools.
- Loosen the contact tip and contact tip holder with the torch key > see 5.4.1 chapter.
- Remove the gas diffuser on PM301 and PM451 without using any tools.
Remove the gas diffuser on PM551 without using any tools.

Impurities in the welding result from worn O-rings!

Worn O-rings lead to gas losses or the penetration of atmospheric oxygen that may adversely affect the welding result.

- Check and if necessary replace the O-rings when converting the welding torch!



Comply with the permissible tightening torques to prevent damage to the torch and ensure correct attachment and contact tip contact > see 8 chapter!

- Assemble by following these steps in the reverse order

5.4.1 Using the torch key



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

5.4.1.1 Contact tip

The illustration serves as an example only.

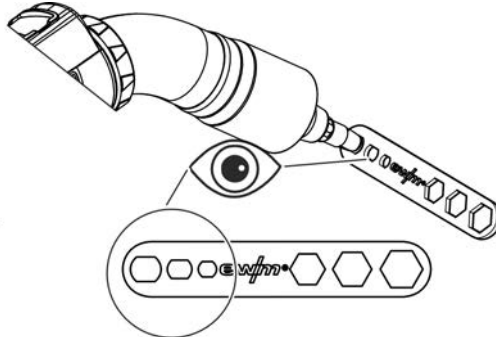


Figure 5-2

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

5.4.1.2 Contact tip holder

The illustration serves as an example only.

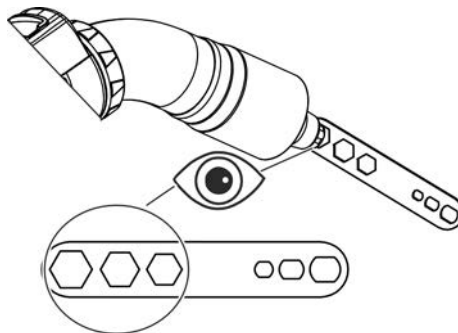


Figure 5-3

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

5.5 Equipment recommendations

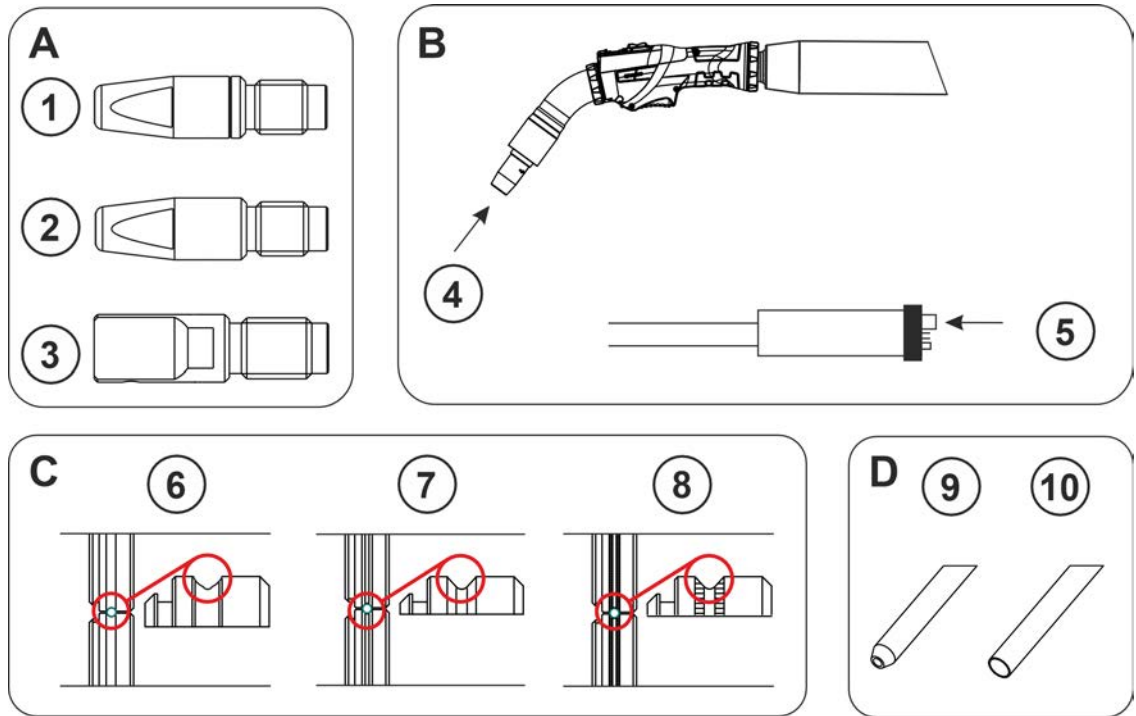


Figure 5-4

	Material	Design of contact tip (A)	Equipment side (B)	Wire feed rolls (C)	Capillary tube ^⑨ / guide tube ^⑩ (D)
DWire 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
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 Welding wire	Ø Wire guide	Liner	Length of the 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		
	Hard-facing	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 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		
	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		

5.6 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!

5.6.1 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!

5.6.2 Guide spiral

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

5.6.3 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!

Equipment side for steel liner or liner > see 5.5 chapter.

5.6.3.1 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.

The illustration serves as an example only.

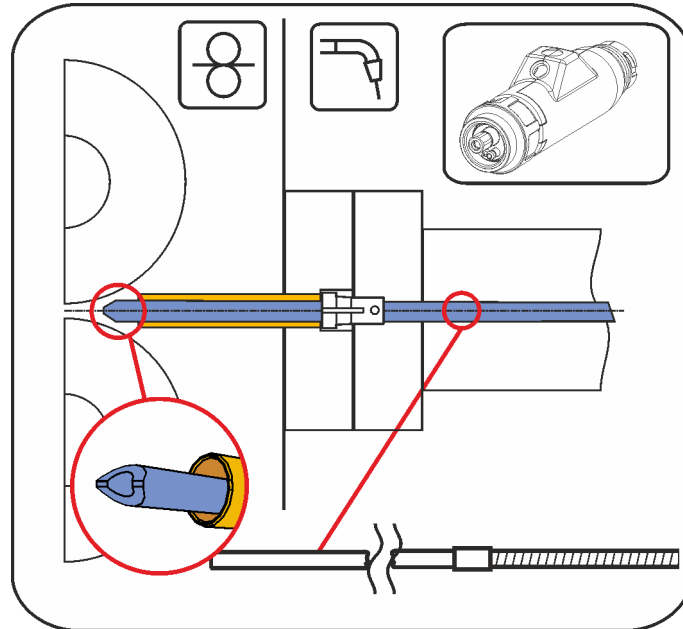


Figure 5-5

1.

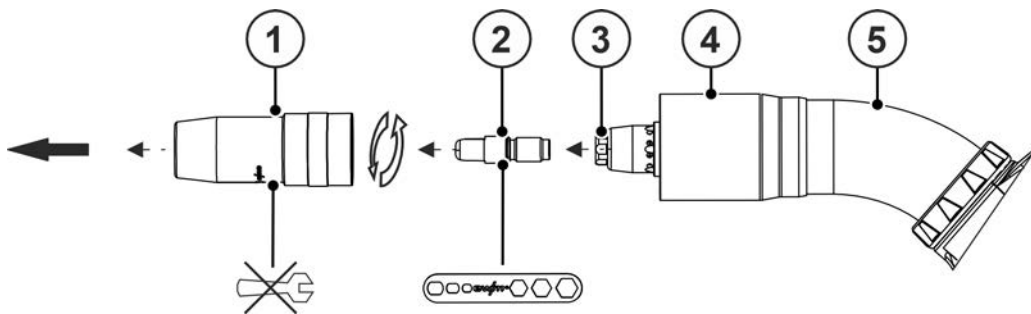


Figure 5-6

2.

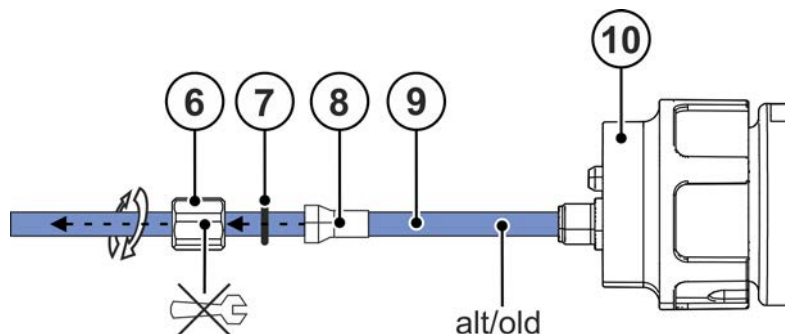


Figure 5-7

3.

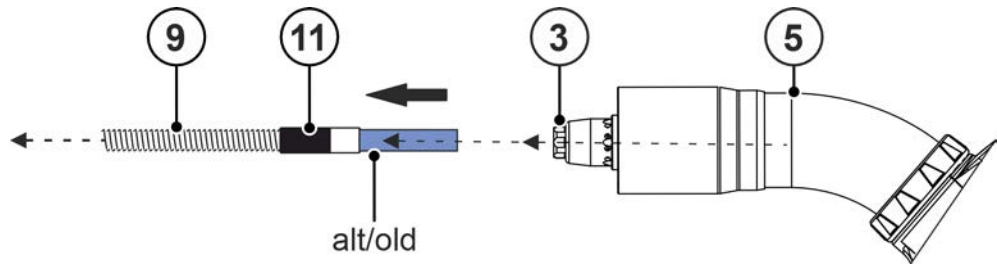


Figure 5-8

4.

Adjust the brass liner > see 5.5 chapter.

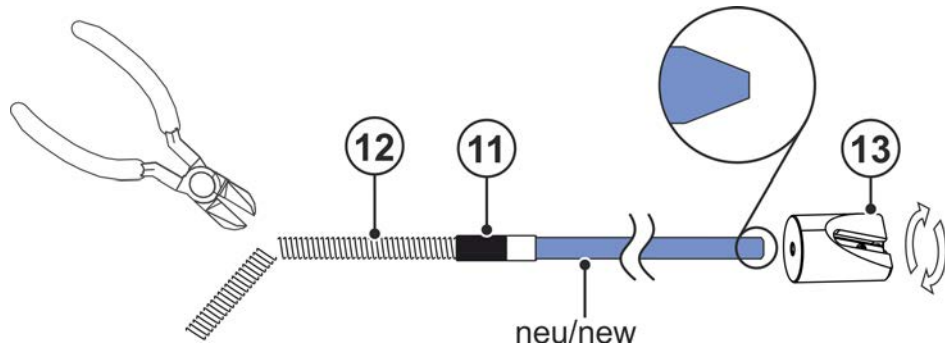


Figure 5-9

5.

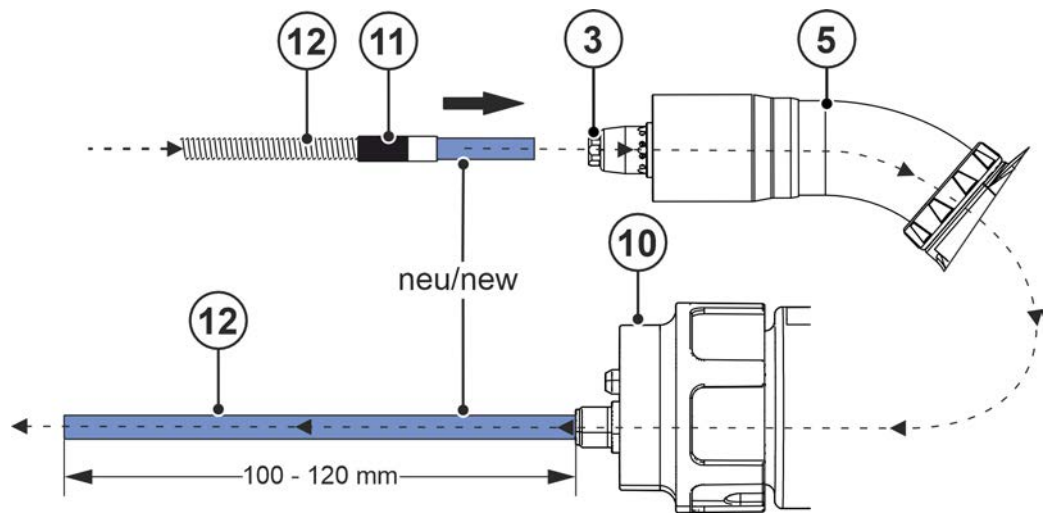


Figure 5-10

6.

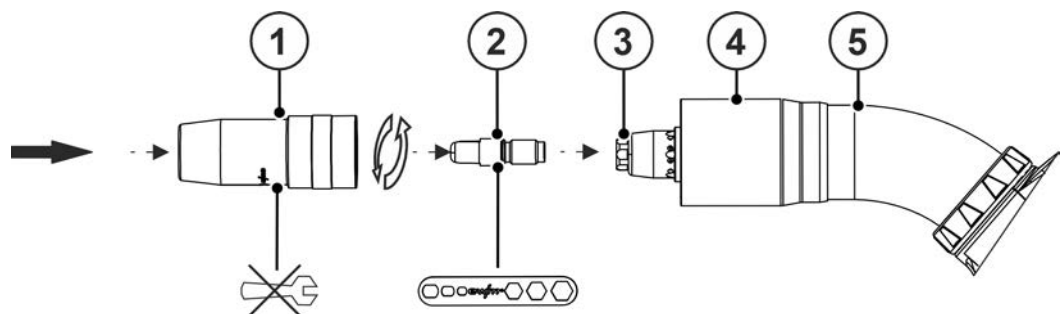


Figure 5-11

7.

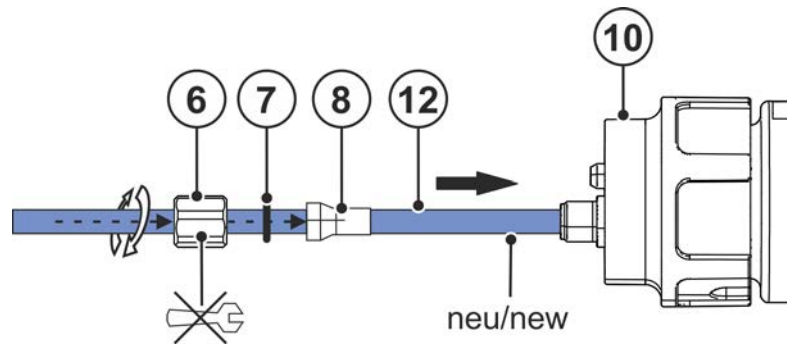


Figure 5-12

8.

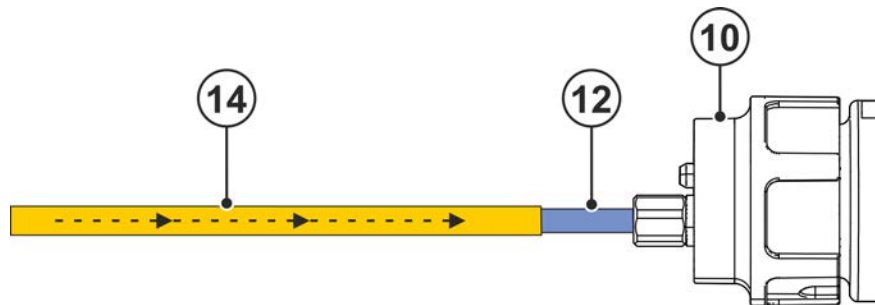


Figure 5-13

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

5.6.3.2 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.
The illustration serves as an example only.

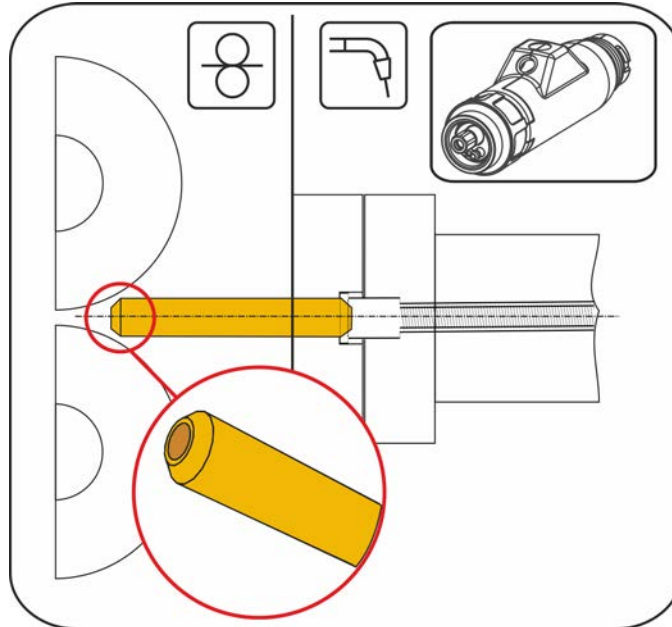


Figure 5-14

1.

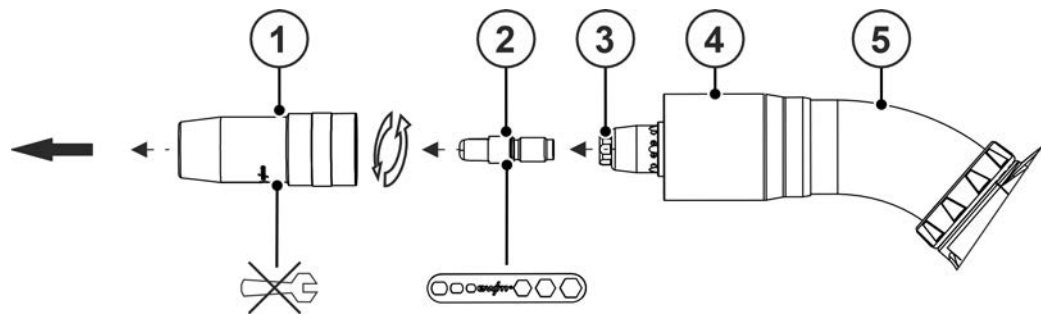


Figure 5-15

2.

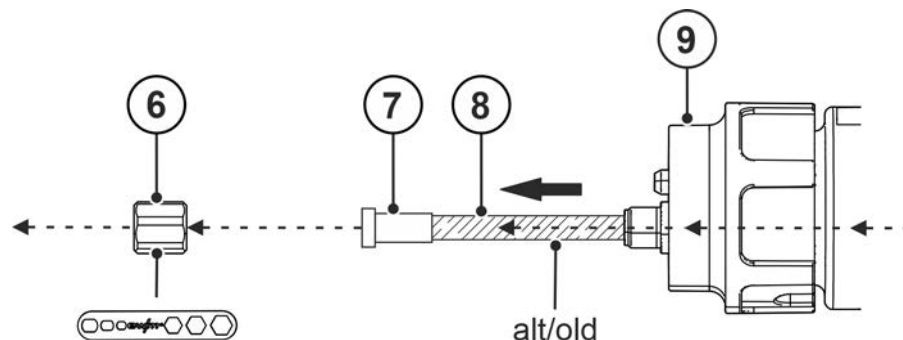


Figure 5-16

3.

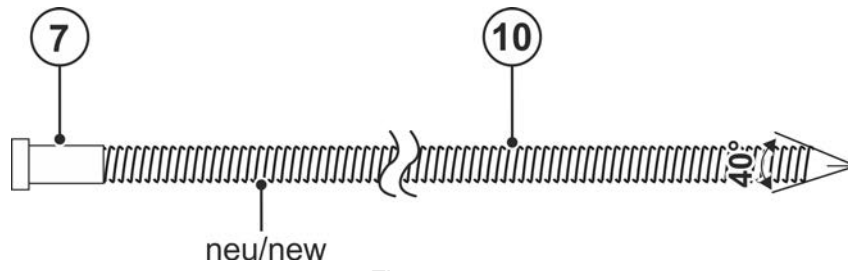


Figure 5-17

4.

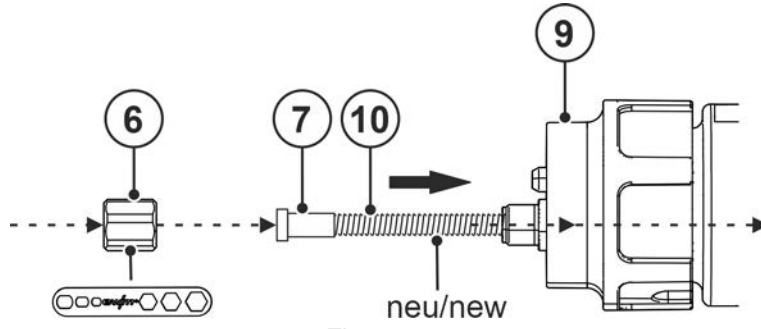


Figure 5-18

5.

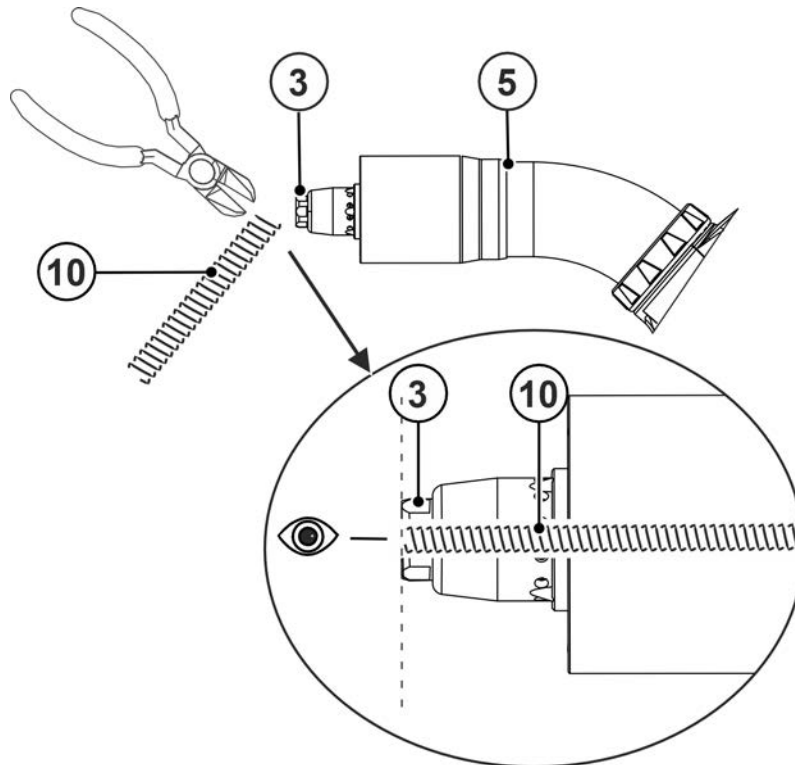


Figure 5-19

6.

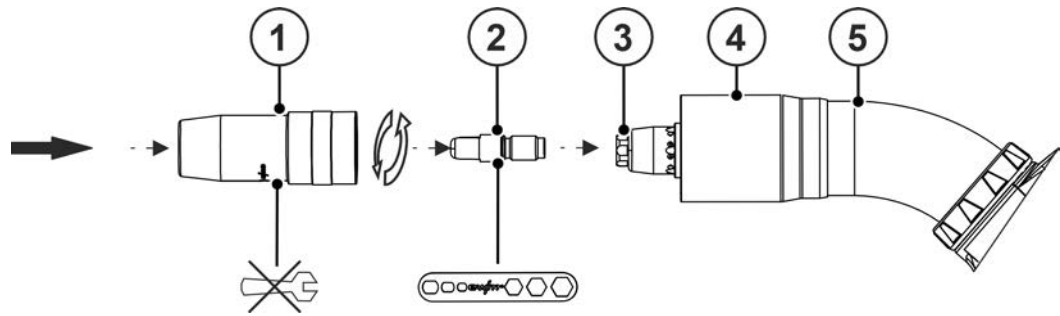


Figure 5-20

7.

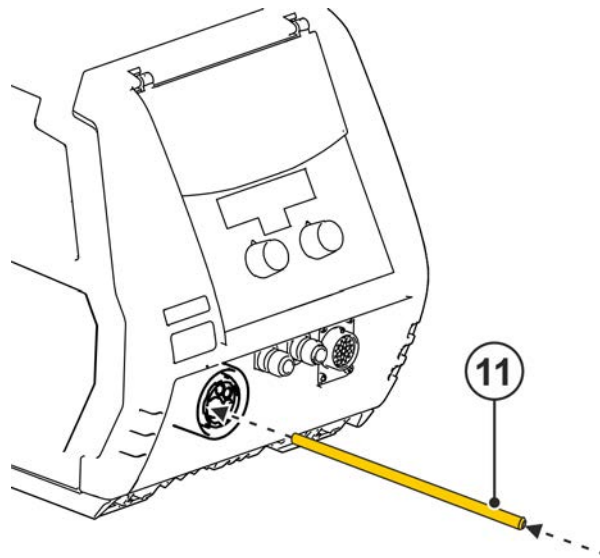


Figure 5-21

Item	Symbol	Description
1		Gas nozzle
2		Contact tip
3		Contact tip holder
4		Extraction elbow - integrated extraction nozzle
5		Torch neck 45°
6		Crown nut, welding torch central connection (euro)
7		Centring sleeve
8		old spiral guide
9		Euro central connection
10		new spiral guide
11		Capillary tube

5.7 Setting the welding smoke flow rate

5.7.1 Test preparation



The measuring tool for welding-fume volume adjustment (airflow meter) is not heat resistant and must be protected against heat. Therefore, do not place it on hot objects and protect it from welding spatter. Adjust the welding fume volume only when the welding torch is cold or has completely cooled.

- Before checking the flow rate, it is necessary to measure the amount of shielding gas.
- The quantity of shielding gas is measured at the gas nozzle of the welding torch and is set either directly on the pressure regulator or, if available, on the gas control unit of the wire feeder or power source.
- Connect the welding torch to the welding machine or wire feeder.
- Connect the welding fume extractor hose to the welding torch using an adapter > see 9 chapter.
- Connect the welding fume extractor hose to the extraction system

The welding smoke flow rate can be influenced by using the bypass slider.

The illustration serves as an example only.

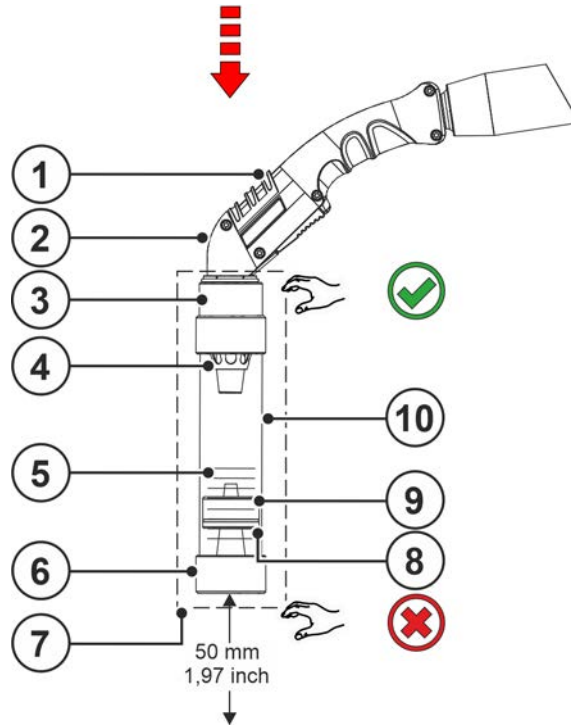


Figure 5-22

Item	Symbol	Description
1		Bypass slider, extraction capacity
2		Welding fume extractor
3		Nozzle holder with diaphragm grommet
4		Extraction nozzle
5		Scale Welding smoke flow rate (values > see 8 chapter)
6		Endcap
7		AirFlow Meter - Airflow meter assembly > see 9 chapter
8		O-ring for floats
9		Float
10		Measuring tube

5.7.2 Checking the flow rate of the welding fumes

- Setting values of the welding smoke flow rate > see 8 chapter.
- Calculate the welding smoke flow rate as a function of the altitude > see 12.2 chapter.
- Insert the welding fume extraction torch with the extraction nozzle vertically from above into the nozzle holder of the AirFlow Meter until it stops.
- The AirFlow Meter must be held with one hand at the top (green ticks).
- The intake opening at the bottom must not be covered by fingers or the hand (red cross).
- The minimum distance between the AirFlow Meter and an object should be at least 50 cm / 19.7 inches.
- The openings of the extraction nozzle must not be blocked and be free of dirt.
- The openings of the extraction nozzle must be located inside the AirFlow Meter and not be covered by the diaphragm grommet of the nozzle holder.
- Note the installation direction of the floater. The O-ring of the floater must point downwards.
- The extraction nozzle of the welding fume extraction torch must fit precisely into the airflow meter.
- Close the bypass slider on the fume extraction torch.
- Switch on the filter and extraction system.
- The welding smoke flow rate is indicated at the centre of the O-ring of the floater, on the scale of the AirFlow Meter's measuring tube.
- Adjust the welding fume volume flow on the controller of the extraction system until the specified value Q_{vm} and the displayed value match.

5.8 Functional characteristics

5.8.1 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 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	✗	✓	✓

	Control		
	2U/D X	RD2 X	RD3 X *)
Faults and error messages	✘	✘	✔
Xnet Welding task selection	✘	✘	✔
Xnet component management	✘	✘	✔
LED work light	✔	✔	✔

*) only for the XQ series

5.8.2 Operating elements in the machine

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

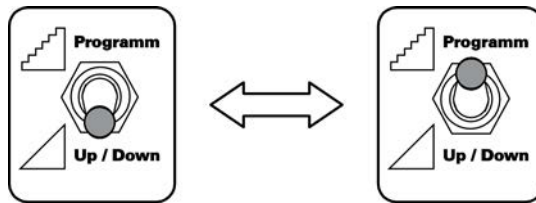


Figure 5-23

- 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.

5.8.3 Operating elements BP (bypass slider)

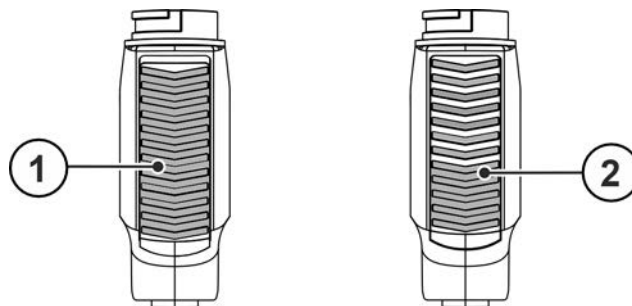


Figure 5-24

Item	Symbol	Description
1		Bypass slider The bypass slider is closed: full welding fume extraction capacity
2		Bypass slider The bypass slider is open: reduced welding fume extraction capacity

5.8.4 Operating elements 2U/D X - welding torch

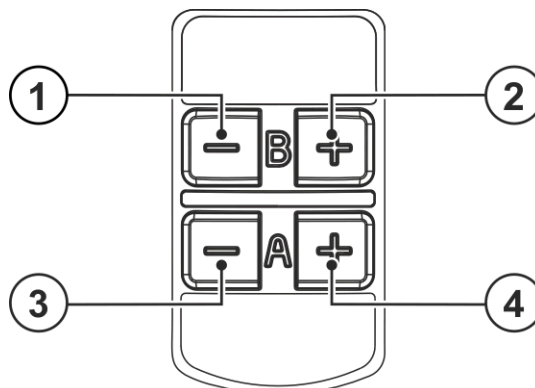


Figure 5-25

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)

5.8.5 Operating elements for the RD2 X welding torch

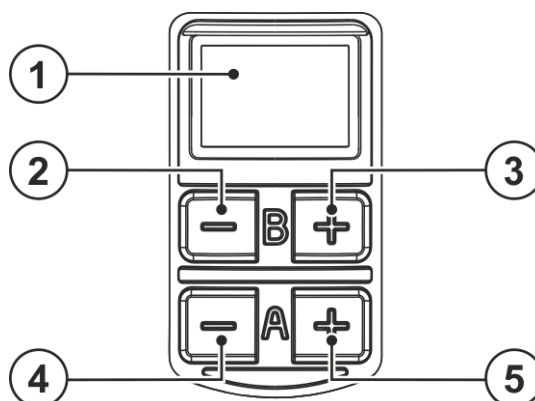





Figure 5-26

Item	Symbol	Description
1		OLED display Graphical display to show the functions.
2	—	"B -" button (program mode) Decrease JOB number "B -" button (up/down mode) Welding voltage correction, decrease value

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

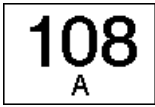

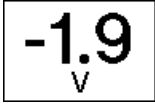


5.8.5.1 Welding data display

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	
Voltage correction	
Programs	
JOB number	

5.8.6 Operating elements for the RD3 X welding torch

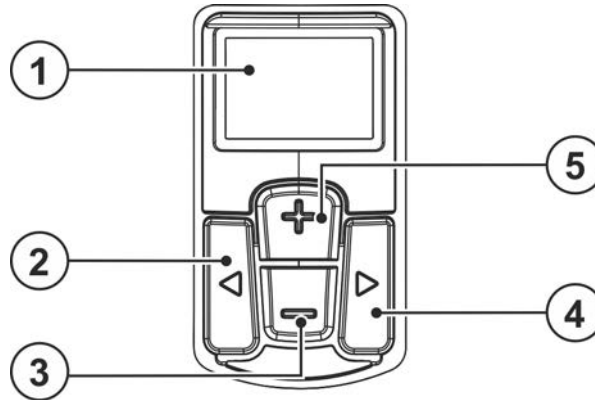


Figure 5-27

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

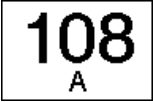

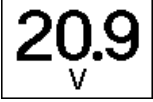

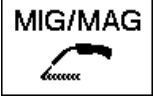


5.8.6.1 Welding data display

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	

5.8.6.2 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

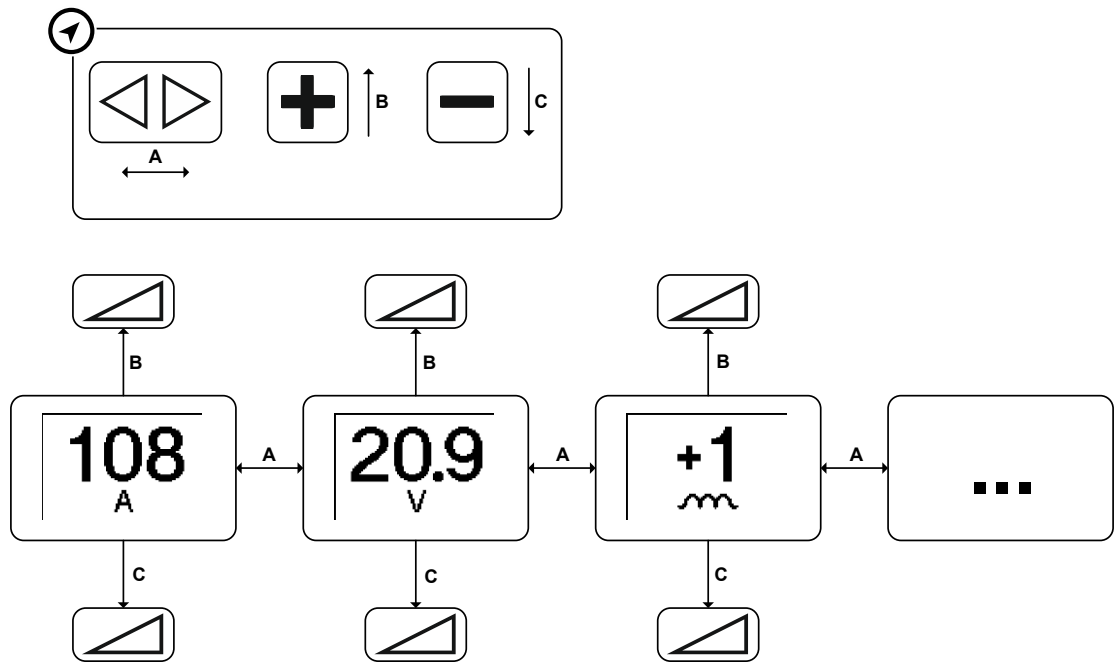


Figure 5-28

Program level

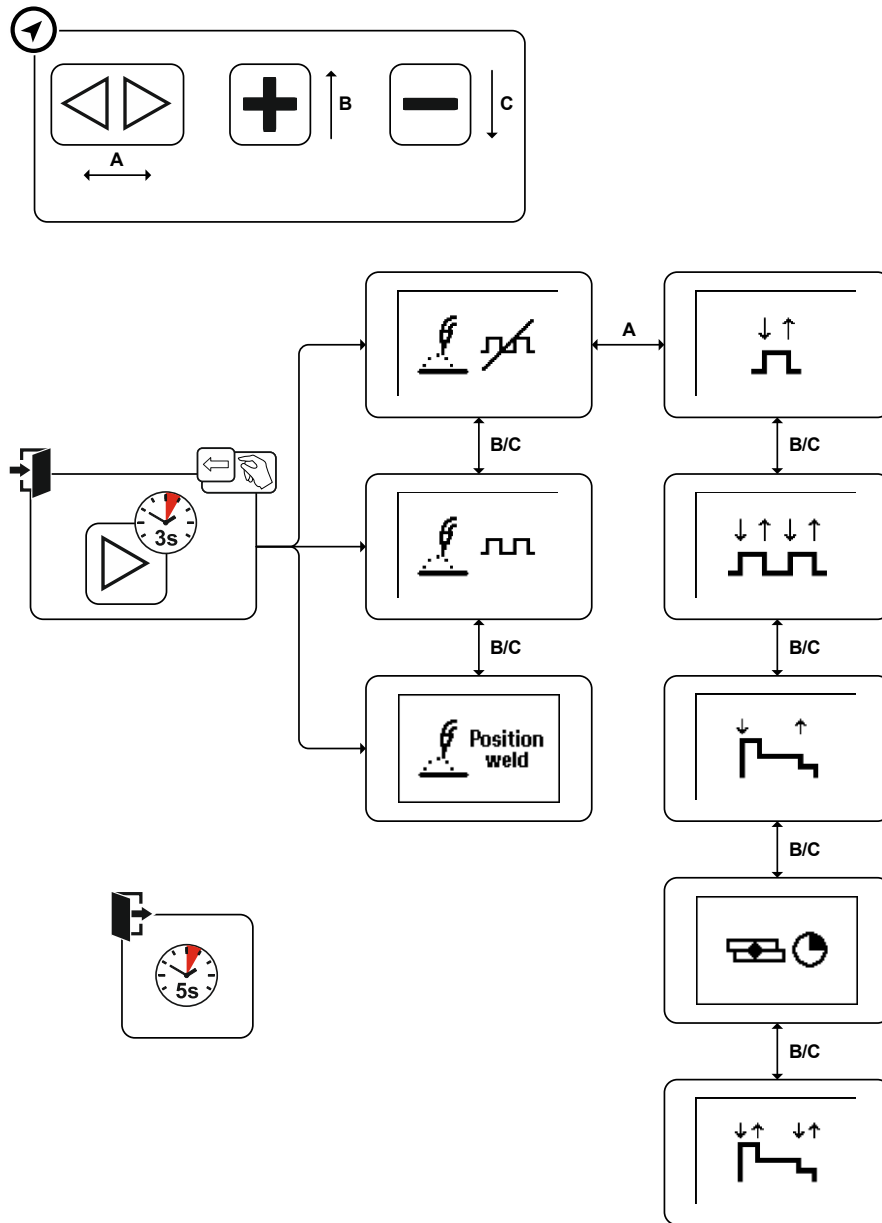


Figure 5-29

5.8.6.3 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:

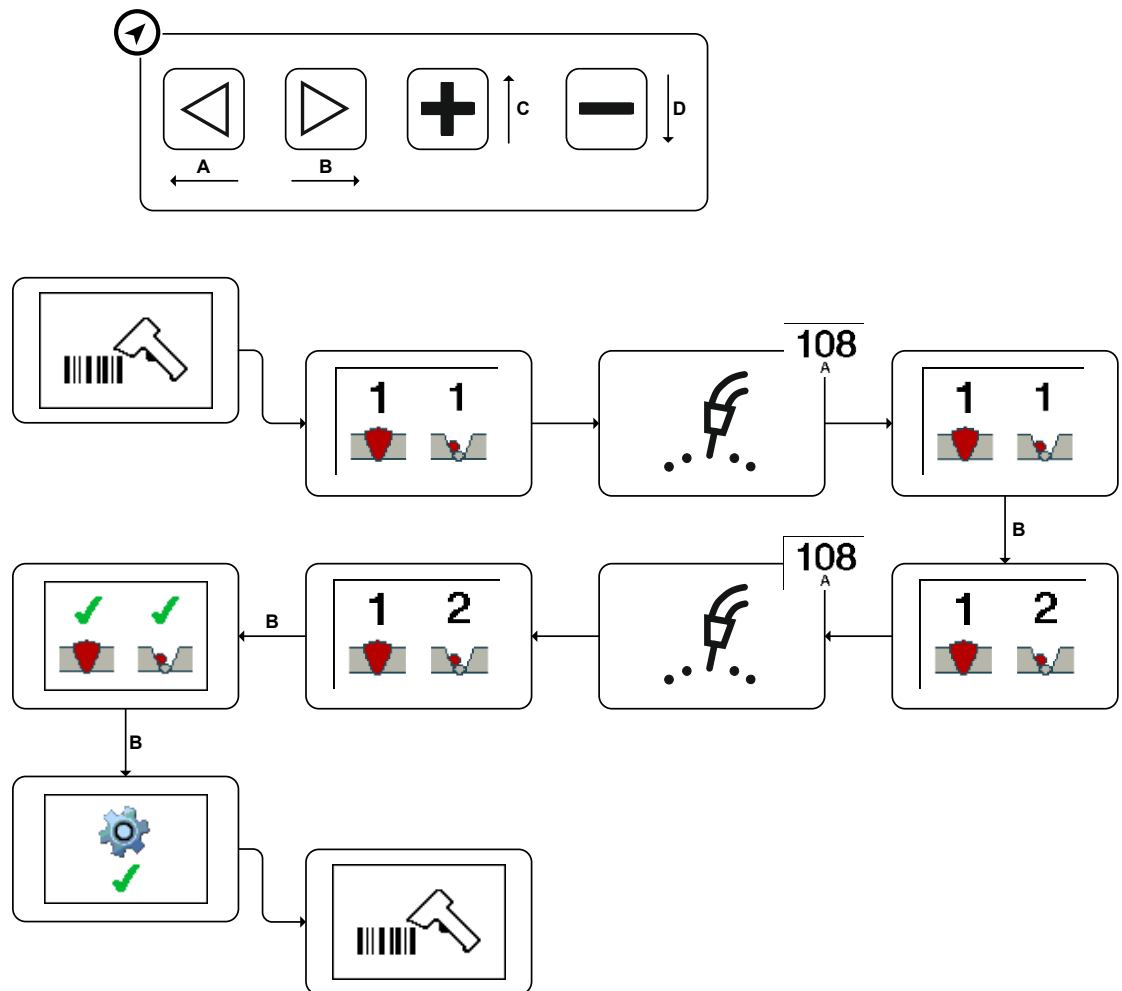


Figure 5-30

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 of ◀. 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.

5.8.7 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.

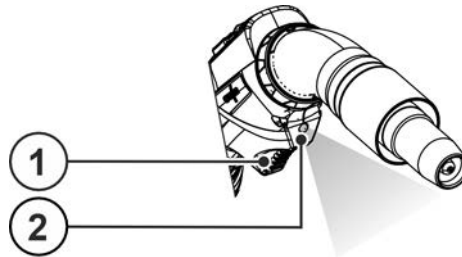


Figure 5-31

Item	Symbol	Description
1		Torch trigger
2		LED lighting

5.8.8 General

A usable MIG/MAG welding torch consists of: Tube package, handle and torch neck with the relevant fittings and consumable parts.

All elements together form a functional unit which, supplied with the relevant operating materials, generates an arc for welding. For welding, a wire electrode is fed through the tube package and the welding torch. The arc and molten pool are shielded using inert gas (MIG) or active gas (MAG).

The wire electrode is a melting solid or cored wire which is conveyed through the contact nozzle. The contact nozzle transfers the welding current onto the wire electrode. The arc is formed between the wire electrode and workpiece. The welding torches are gas or fluid cooled depending on the version. The tube package is equipped accordingly.

The torch button on the MIG welding torch is normally used for starting and stopping the welding process. The operating elements on the UP/DOWN torch and POWERCONTROL torch provide additional functions over and above those of a standard torch.

5.8.9 Welding fume extractor

⚠ CAUTION



Smoke and gases!

Smoke and gases may cause shortness of breath and poisoning. The ultraviolet radiation of the arc may also convert solvent vapours (chlorinated hydrocarbon) into poisonous phosgene.

- Ensure the continuous operation of the extraction system.
- The bypass slider must normally be closed.
- To reach critical points of a welding process, the bypass slider may be opened briefly.

All components on the fume extraction torch must be mounted in the correct position and good condition. No components may be removed. The bypass slider must normally be closed and may only be opened briefly in critical welding positions to prevent pore formation.

The extraction power must be determined > see 12.2 chapter and set > see 5.7 chapter .

An extraction value that is too low involves the risk that the welding fumes will not be extracted optimally.

An extraction value that is too high involves the risk that shielding gas will be unintentionally extracted from the weld seam.

Removing the extraction nozzle during welding leads to a reduction in welding smoke capture. As a result, the welding torch no longer conforms to the standard and the performance specifications in the technical data.

Configurations differing from the delivery condition no longer correspond to the standard and the performance specifications in the technical data.

5.8.10 Commissioning

5.8.10.1 Hose package connection

Information on the connection of the torch hose package can be found in the corresponding operating instructions for the power source.

5.8.10.2 Welding fume extractor



To prevent damage and to ensure full functionality of the fume extraction torch, comply with the points below:

- *Observe the local occupational safety regulations.*
 - *Mount all fume extraction torch components in accordance with the regulations.*
 - *Prior to each use, connect the fume extraction torch to the extraction device or filter system and switch these on.*
 - *Check the extraction hoses for damage or soiling at regular intervals and no less than once a week.*
 - *Observe warning signals and indicators on the welding fume extraction unit. Replace saturated filters.*
 - *Additional hoses or hoses from other manufacturers can result in a drop in pressure of the fume extraction torch.*
- Connect the exhaust hoses of the exhaust and filter system.
 - Switch on the exhaust and filter system
 - Check the flow rate; too high of a flow rate can cause welding defects.

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
- The O-ring of the gas nozzle holder is worn (for water-cooled welding torches)

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
- For water-cooled welding torches, check the coolant connections for damage

Grip

- Cracks, penetration

Hose package

- Cracks, penetration

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

- **Do not hit (hammer) the welding torch on hard objects!**
- **Do not use the welding torch for levering or straightening!**
- **Do not bend the extraction tube!**
- **The hose package has a rotation stop. Do not overtwist the hose package with force!**
- **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 use the welding torch to guide or pull welding machines or wire feeders!**

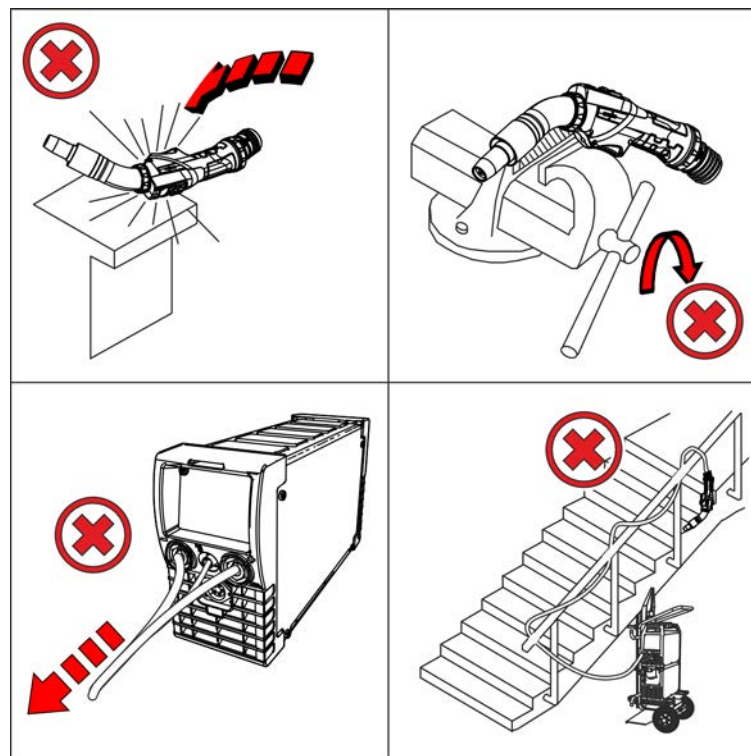


Figure 6-1

6.1.2 Maintenance and care before each use

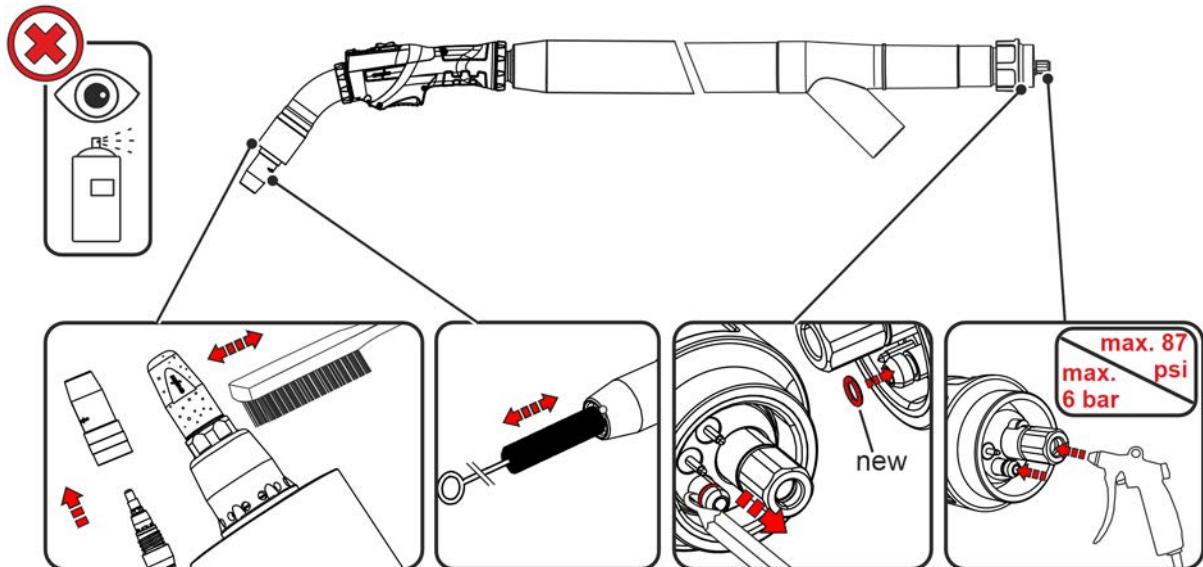


Figure 6-2



Welding spatter protection spray must not be used on the gas nozzle of the welding fume extractor torch or other components. The aerosols clog the filters of the extraction system.

- 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.
- For water-cooled welding torches, check for leaks / flow in the coolant connections and the coolant level on the cooling unit.
- 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.

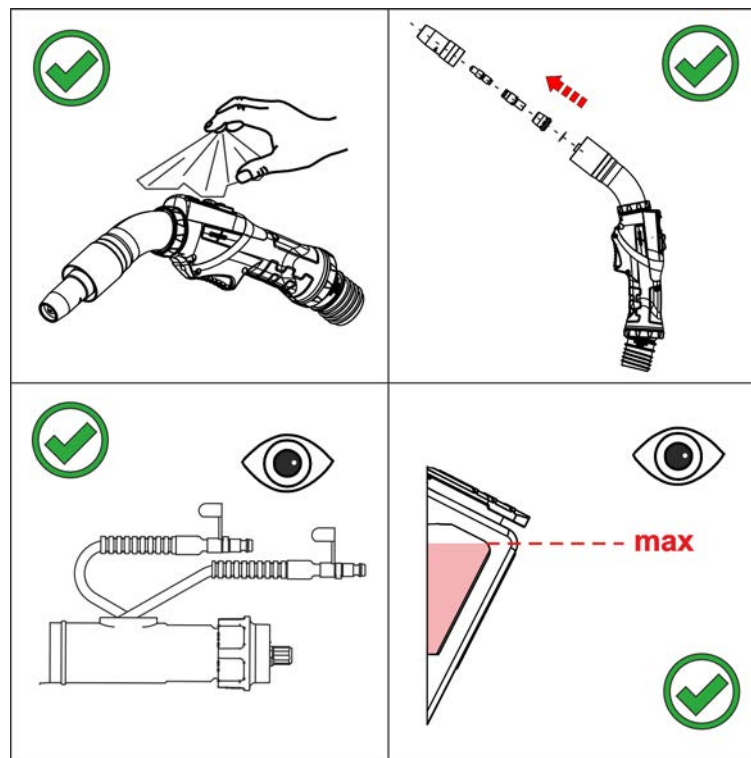


Figure 6-3

- 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 coolant container for sludge deposits and check the coolant for cloudiness. Clean the coolant container if contaminated, and change the coolant.
- If the coolant is dirty, rinse through the welding torch alternately several times with fresh coolant using the coolant return and supply.
- 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

- ↗ Insufficient coolant flow
 - ✘ Check coolant flow rate
 - ✘ Check coolant level and refill if necessary
 - ✘ Eliminate kinks in conduit system (hose packages)
 - ✘ Vent coolant circuit > see 7.2 chapter
- ↗ 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
- ↗ 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.
 - ✘ Check the control line connections for damage.
- ↗ High welding fume load
 - ✘ Reduce the welding fume extraction rate.
 - ✘ Clean the welding torch.
 - ✘ If necessary, close the bypass slider on the welding torch.
 - ✘ Properly attach the extraction nozzle and extraction hose and check for leak-tightness.
 - ✘ The extraction nozzle openings must be free of deposits.
 - ✘ Ensure that the extraction system is switched on.
 - ✘ Check the extraction system filter and replace it if saturated.

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
- ✓ Contact tip blocked
 - ✘ Clean and, if necessary, replace.
- ✓ Setting the spool brake
 - ✘ Check settings and correct if necessary
- ✓ Setting pressure units
 - ✘ Check settings and correct if necessary
- ✓ Worn wire rolls
 - ✘ Check and replace if necessary
- ✓ Wire feed motor without supply voltage (automatic cutout triggered by overloading)
 - ✘ Reset triggered fuse (rear of the power source) by pressing the key button
- ✓ Wire guide core or spiral is dirty or worn
 - ✘ Clean core or spiral; replace kinked or worn cores

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)
 - ✘ Use gas lens for aluminium applications and high-alloy steels
 - ✘ Check the welding smoke flow rate using an airflow meter and if necessary correct
 - ✘ Depending on the application, reduce the welding fume flow rate using the bypass slider.
- ✓ Unsuitable or worn welding torch equipment
 - ✘ Check size of gas nozzle and replace if necessary
 - ✘ Check the O-ring on the Euro torch connector and if necessary replace.
- ✓ Condensation in the gas tube
 - ✘ Purge hose package with gas or replace

7.2 Vent coolant circuit

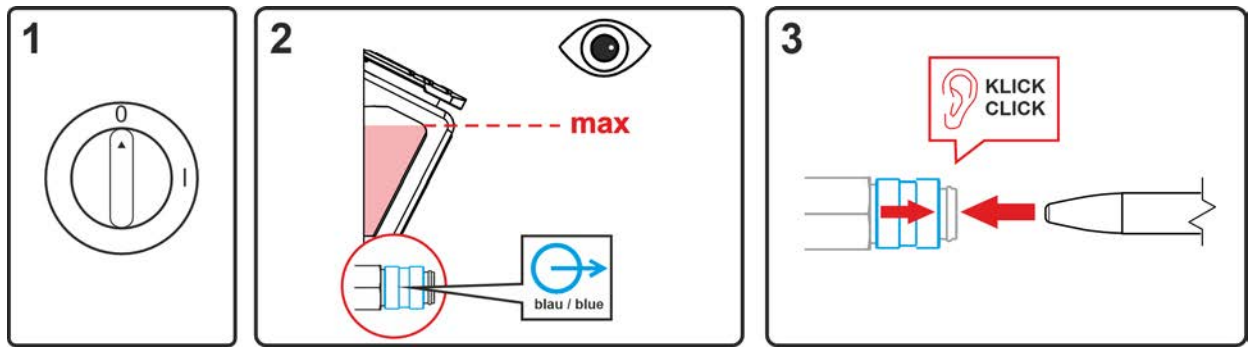


Figure 7-1

- Switch off the machine and fill the coolant tank to the maximum level.
- Unlock the quick-connect coupling with a suitable tool (connection open).

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

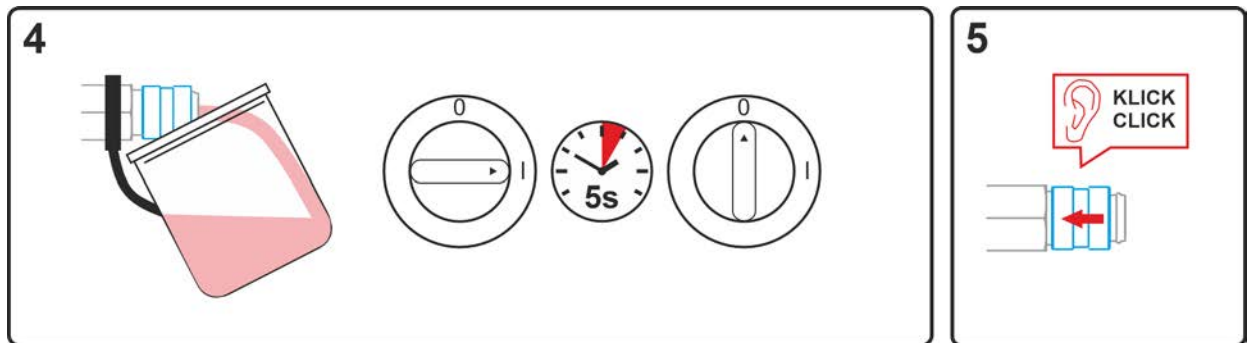


Figure 7-2

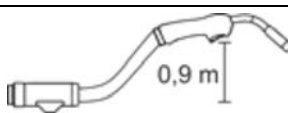
- Position a suitable collection container for collecting the escaping coolant at the quick-connect coupling and switch on the machine for approx. 5s.
- Lock the quick-connect coupling by pushing back the locking ring.

8 Technical data

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

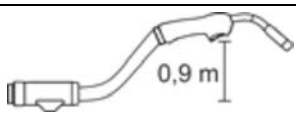
8.1 PM 301 W F1, -451 W F1, -551 W F1

8.1.1 3 m / 118.11 inch Hose package

	PM301 W F1	PM451 W F1	PM551 W F1
Welding torch polarity	Usually positive		
Guide type	Manually operated		
Voltage type /°Shielding gas	Direct voltage DC°/°Shielding gas according to ISO 14175		
Duty cycle DC at 40°C/104°F [1]	100 %		
Maximum welding current CO ²	330 A	500 A	550 A
Maximum welding current M21	290 A	450 A	520 A
Maximum welding current pulse M21	250 A	350 A	420 A
Switching voltage Push-button	15 V		
Switching current Push-button	10 mA		
Cooling capacity°/°max. Flow temperature	min. 800 W / 40 °C / 104 °F		
Torch input pressure, coolant	3 - 6 bar (min. - max.)		
Flow rate Connector Q _{vc} [2]	90 m ³ /h 117.72 yd ³ /h	90 m ³ /h 117.72 yd ³ /h	95 m ³ /h 124.26 yd ³ /h
Flow rate Nozzle Q _{vn} [2]	72 m ³ /h 94.176 yd ³ /h	72 m ³ /h 94.176 yd ³ /h	72 m ³ /h 94.176 yd ³ /h
Low pressure Connector Δ _{pc} [2] [3]	5900 Pa	6700 Pa	6000 Pa
Flow volume (min.)	1,2 l/min 0.317gal/min	1,4 l/min 0.37gal/min	1,6 l/min 0.423gal/min
max. Coolant conductance	350 μS/cm		
Wire types	Standard round wires		
Wire diameter	0,8 - 1,2 mm 0.031 - 0.047 inch	0,8 - 1,6 mm 0.031 - 0.063 inch	0,8 - 2,0 mm 0.031 - 0.079 inch
Ambient temperature	-10 °C to + 40 °C / -17 °F to + 104 °F		
Voltage measurement	113 V (Peak value)		
Protection classification for the machine connections (EN 60529)	IP3X		
Gas flow	10 - 25 l/min / 2642 – 6605 gal/min		
Hose package length	3-, 4-, 5-, 6,5 m / 118-, 157-, 197-, 256 inch		
Tightening torque Contact tip holder	max. 10 Nm	max. 15 Nm	
Tightening torque Contact tip	max. 5 Nm	max. 10 Nm	
Connection	Euro torch connector		
Operating weight 	1,37 kg 3.02 lb	1,34 kg 2.95 lb	1,55 kg 3.42 lb
Standards used	See declaration of conformity (appliance documents)		
Test mark	CE / EAC / UK		

- [1] Load cycle: 10 min. (60 % DC \triangleq 6 min. welding, 4 min. pause) AC power sources: 50 Hz - waveform = square.
- [2] > see 8.1.4.1 chapter
- [3] Reference altitude sea level (SL) > see 12.2 chapter

8.1.2 4 m / 157.48 inch Hose package


	PM301 W F1	PM451 W F1	PM551 W F1
Welding torch polarity	Usually positive		
Guide type	Manually operated		
Voltage type /°Shielding gas	Direct voltage DC°/°Shielding gas according to ISO 14175		
Duty cycle DC at 40°C/104°F [1]	100 %		
Maximum welding current CO²	330 A	500 A	550 A
Maximum welding current M21	290 A	450 A	520 A
Maximum welding current pulse M21	250 A	350 A	420 A
Switching voltage Push-button	15 V		
Switching current Push-button	10 mA		
Cooling capacity°/°max. Flow temperature	min. 800 W / 40 °C / 104 °F		
Torch input pressure, coolant	3 - 6 bar (min. - max.)		
Flow rate Connector Q_{vc} [2]	85 m ³ /h 111.18 yd ³ /h	89 m ³ /h 116.412 yd ³ /h	89 m ³ /h 116.412 yd ³ /h
Flow rate Nozzle Q_{vn} [2]	72 m ³ /h 94.176 yd ³ /h	72 m ³ /h 94.176 yd ³ /h	72 m ³ /h 94.176 yd ³ /h
Low pressure Connector Δ_{pc} [2] [3]	6600 Pa	8000 Pa	6600 Pa
Flow volume (min.)	1,2 l/min 0.317gal/min	1,4 l/min 0.37gal/min	1,6 l/min 0.423gal/min
max. Coolant conductance	350 μS/cm		
Wire types	Standard round wires		
Wire diameter	0,8 - 1,2 mm 0.031 - 0.047 inch	0,8 - 1,6 mm 0.031 - 0.063 inch	0,8 - 2,0 mm 0.031 - 0.079 inch
Ambient temperature	-10 °C to + 40 °C / -17 °F to + 104 °F		
Voltage measurement	113 V (Peak value)		
Protection classification for the machine connections (EN 60529)	IP3X		
Gas flow	10 - 25 l/min / 2642 – 6605 gal/min		
Hose package length	3-, 4-, 5-, 6,5 m / 118-, 157-, 197-, 256 inch		
Tightening torque Contact tip holder	max. 10 Nm	max. 15 Nm	
Tightening torque Contact tip	max. 5 Nm	max. 10 Nm	
Connection	Euro torch connector		
Operating weight 	1,37 kg 3.02 lb	1,34 kg 2.95 lb	1,55 kg 3.42 lb
Standards used	See declaration of conformity (appliance documents)		
Test mark	CE / ENEC / UKCA		

[1] Load cycle: 10 min. (60 % DC \triangleq 6 min. welding, 4 min. pause) AC power sources: 50 Hz - waveform = square.

[2] > see 8.1.4.1 chapter

[3] Reference altitude sea level (SL) > see 12.2 chapter

8.1.3 5 m / 196.85 inch Hose package

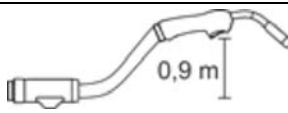
	PM301 W F1	PM451 W F1	PM551 W F1
Welding torch polarity	Usually positive		
Guide type	Manually operated		
Voltage type /°Shielding gas	Direct voltage DC°/°Shielding gas according to ISO 14175		
Duty cycle DC at 40°C/104°F [1]	100 %		
Maximum welding current CO ²	330 A	500 A	550 A
Maximum welding current M21	290 A	450 A	520 A
Maximum welding current pulse M21	250 A	350 A	420 A
Switching voltage Push-button	15 V		
Switching current Push-button	10 mA		
Cooling capacity°/°max. Flow temperature	min. 800 W / 40 °C / 104 °F		
Torch input pressure, coolant	3 - 6 bar (min. - max.)		
Flow rate Connector Q _{vc} [2]	86 m ³ /h 112.488 yd ³ /h	90 m ³ /h 117.72 yd ³ /h	90 m ³ /h 117.72 yd ³ /h
Flow rate Nozzle Q _{vn} [2]	72 m ³ /h 94.176 yd ³ /h	72 m ³ /h 94.176 yd ³ /h	72 m ³ /h 94.176 yd ³ /h
Low pressure Connector Δ _{pc} [2] [3]	8200 Pa	9800 Pa	8100 Pa
Flow volume (min.)	1,2 l/min 0.317gal/min	1,4 l/min 0.37gal/min	1,6 l/min 0.423gal/min
max. Coolant conductance	350 μS/cm		
Wire types	Standard round wires		
Wire diameter	0,8 - 1,2 mm 0.031 - 0.047 inch	0,8 - 1,6 mm 0.031 - 0.063 inch	0,8 - 2,0 mm 0.031 - 0.079 inch
Ambient temperature	-10 °C to + 40 °C / -17 °F to + 104 °F		
Voltage measurement	113 V (Peak value)		
Protection classification for the machine connections (EN 60529)	IP3X		
Gas flow	10 - 25 l/min / 2642 – 6605 gal/min		
Hose package length	3-, 4-, 5-, 6,5 m / 118-, 157-, 197-, 256 inch		
Tightening torque Contact tip holder	max. 10 Nm	max. 15 Nm	
Tightening torque Contact tip	max. 5 Nm	max. 10 Nm	
Connection	Euro torch connector		
Operating weight 	1,37 kg 3.02 lb	1,34 kg 2.95 lb	1,55 kg 3.42 lb
Standards used	See declaration of conformity (appliance documents)		
Test mark	CE / ENEC / UKCA		

[1] Load cycle: 10 min. (60 % DC \triangleq 6 min. welding, 4 min. pause) AC power sources: 50 Hz - waveform = square.

[2] > see 8.1.4.1 chapter

[3] Reference altitude sea level (SL) > see 12.2 chapter

8.1.4 6,5 m / 255.906 inch Hose package

	PM301 W F1	PM451 W F1	PM551 W F1
Welding torch polarity	Usually positive		
Guide type	Manually operated		
Voltage type /°Shielding gas	Direct voltage DC°/°Shielding gas according to ISO 14175		
Duty cycle DC at 40°C/104°F [1]	100 %		
Maximum welding current CO ²	330 A	500 A	550 A
Maximum welding current M21	290 A	450 A	520 A
Maximum welding current pulse M21	250 A	350 A	420 A
Switching voltage Push-button	15 V		
Switching current Push-button	10 mA		
Cooling capacity°/°max. Flow temperature	min. 800 W / 40 °C / 104 °F		
Torch input pressure, coolant	3 - 6 bar (min. - max.)		
Flow rate Connector Q _{vc} [2]	87 m ³ /h 113.716 yd ³ /h	91 m ³ /h 119.028 yd ³ /h	91 m ³ /h 119.028 yd ³ /h
Flow rate Nozzle Q _{vn} [2]	72 m ³ /h 94.176 yd ³ /h	72 m ³ /h 94.176 yd ³ /h	72 m ³ /h 94.176 yd ³ /h
Low pressure Connector Δ _{pc} [2] [3]	10600 Pa	12600 Pa	10400 Pa
Flow volume (min.)	1,2 l/min 0.317gal/min	1,4 l/min 0.37gal/min	1,6 l/min 0.423gal/min
max. Coolant conductance	350 μS/cm		
Wire types	Standard round wires		
Wire diameter	0,8 - 1,2 mm 0.031 - 0.047 inch	0,8 - 1,6 mm 0.031 - 0.063 inch	0,8 - 2,0 mm 0.031 - 0.079 inch
Ambient temperature	-10 °C to + 40 °C / -17 °F to + 104 °F		
Voltage measurement	113 V (Peak value)		
Protection classification for the machine connections (EN 60529)	IP3X		
Gas flow	10 - 25 l/min / 2642 – 6605 gal/min		
Hose package length	3-, 4-, 5-, 6,5 m / 118-, 157-, 197-, 256 inch		
Tightening torque Contact tip holder	max. 10 Nm	max. 15 Nm	
Tightening torque Contact tip	max. 5 Nm	max. 10 Nm	
Connection	Euro torch connector		
Operating weight 	1,37 kg 3.02 lb	1,34 kg 2.95 lb	1,55 kg 3.42 lb
Standards used	See declaration of conformity (appliance documents)		
Test mark	CE / EAC / UK		

[1] Load cycle: 10 min. (60 % DC \triangleq 6 min. welding, 4 min. pause) AC power sources: 50 Hz - waveform = square.

[2] > see 8.1.4.1 chapter

[3] Reference altitude sea level (SL) > see 12.2 chapter

8.1.4.1 Definition of terms

The illustration serves as an example only.

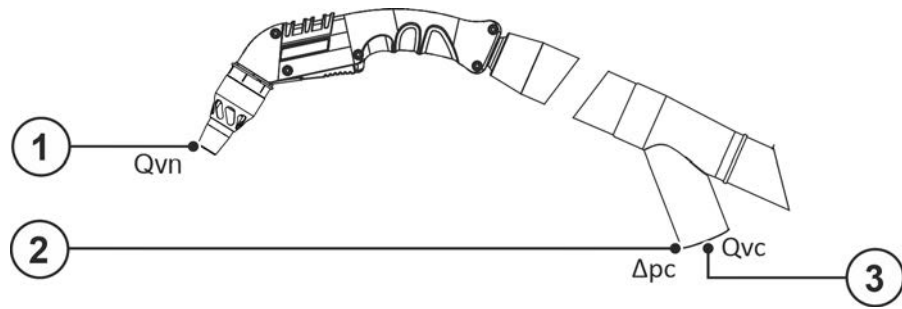


Figure 8-1

Item	Symbol	Description
1	Q_{vn}	Flow-rate nozzle
2	Δ_{pc}	Vacuum connector
3	Q_{vc}	Flow rate connector

9 Accessories

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

9.1 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
3 x 5/6	Spark plug brush	098-004718-00000
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

9.2 Dimensions

Type	Designation	Item no.
AirFlow Meter	Airflow meter assembly	092-004851-00000

9.2.1 Spare parts for airflow meters

Type	Designation	Item no.
MBDT D68X10,1	Diaphragm grommet	059-003992-00000

9.3 Adapter for welding fume extractor torch F3

Type	Designation	Item no.
ADAP PVCE NW 44	Adapter for extraction hose with nominal diameter of 44 mm	096-001280-00000
ADAP PVCE NW 51	Adapter for extraction hose with nominal diameter of 51 mm	398-004591-00000

9.4 Extraction hose

Type	Designation	Item no.
NW 44 mm 1 m	Extraction hose, nominal diameter 44 mm	092-004032-00010
NW 44 mm 3 m	Extraction hose, nominal diameter 44 mm	092-004032-00030
NW 44 mm 5 m	Extraction hose, nominal diameter 44 mm	092-004032-00050
NW 44 mm 7,5 m	Extraction hose, nominal diameter 44 mm	092-004032-00075
NW 51 mm 1 m	Extraction hose, nominal diameter 51 mm	092-004033-00010
NW 51 mm 3 m	Extraction hose, nominal diameter 51 mm	092-004033-00030
NW 51 mm 5 m	Extraction hose, nominal diameter 51 mm	092-004033-00050
NW 51 mm 7,5 m	Extraction hose, nominal diameter 51 mm	092-004033-00075

9.5 Replacement parts set

Type	Designation	Item no.
SRP MT221G/MT301W ST/CR M6	Replacement parts set, steel/chrome nickel	092-013427-40000
SRP MT221G/MT301W AL M6	Replacement parts set, aluminium	092-013427-40001
SRP MT221G/MT301W ST/CR M7	Replacement parts set, steel/chrome nickel	092-013427-30000
SRP MT221G/MT301W AL M7	Replacement parts set, aluminium	092-013427-30001
SRP MT301G/MT451W ST/CR M8	Replacement parts set, steel/chrome nickel	092-013428-40000
SRP MT301G/MT451W AL M8	Replacement parts set, aluminium	092-013428-40001
SRP MT301G/MT451W ST/CR M9	Replacement parts set, steel/chrome nickel	092-013428-30000
SRP MT301G/MT451W AL M9	Replacement parts set, aluminium	092-013428-30001

9.6 Option

Type	Designation	Item no.
ON TT PM F1 Standard*	Conversion kit; upper torch trigger for PM standard welding torch	092-007975-00000
ON TT PM F1 LED	Conversion kit; torch trigger with LED on top for PM F1 welding torch	092-007976-00000
ON TH PM F1*	Pistol grip option for PM F1 welding torch	092-007977-00000
ON LED PM F1	Retrofit kit LED lighting for PM F1 standard fume extraction torch	092-007978-00000
ON BP PM F1	Conversion kit; bypass slider for PM F1 welding torches	092-007979-00000
ON BP RSF PM F1*	Conversion kit; bypass slider with return spring for PM F1 welding torch	092-007980-00000
ON Protection Sleeve 2 m	Leather hose with hook and loop fastener	092-007981-00000
ON Protection Sleeve 5 m	Leather hose with hook and loop fastener	092-007982-00000
ON TV PM LED	Torch trigger extension for PM welding torch with LED	094-023891-00000
ON TV PM Standard	Torch trigger extension for the PM standard welding torch	094-022327-00000
ON TS F2/F3 D.01	Holder for the fume extraction torch	092-004323-00000

* Available from quarter 01/2025

9.7 Welding torch cooling system

Type	Designation	Item no.
HOSE BRIDGE UNI	Tube bridge	092-007843-00000
LFMG HANNA DIST 3	Conductivity meter	094-026184-00000

9.7.1 Coolant - type blueCool

Type	Designation	Item no.
blueCool -10 5 l	Coolant up to -10 °C (14 °F), 5 l	094-024141-00005
blueCool -10 25 l	Coolant up to -10 °C (14 °F), 25 l	094-024141-00025
blueCool -30 5 l	Coolant up to -30 °C (22 °F), 5 l	094-024142-00005
blueCool -30 25 l	Coolant up to -30 °C (22 °F), 25 l	094-024142-00025
FSP blueCool	Frost protection tester	094-026477-00000

10 Replaceable parts



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

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

Configurations differing from the delivery condition no longer correspond to the standard and the performance specifications in the technical data.

10.1 PM 301 W F1

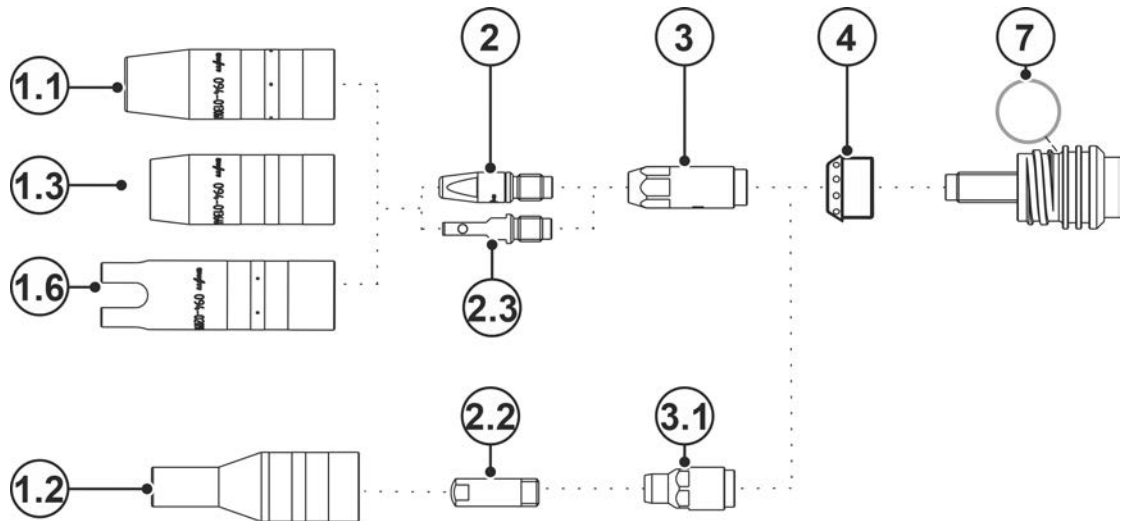


Figure 10-1

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, cylinder neck
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

Item	Order number	Type	Name
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
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
7	094-025320-00000	17 mm x 1,8 mm	O-ring for gas nozzle holder
	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 for picker

10.2 PM 451 W F1

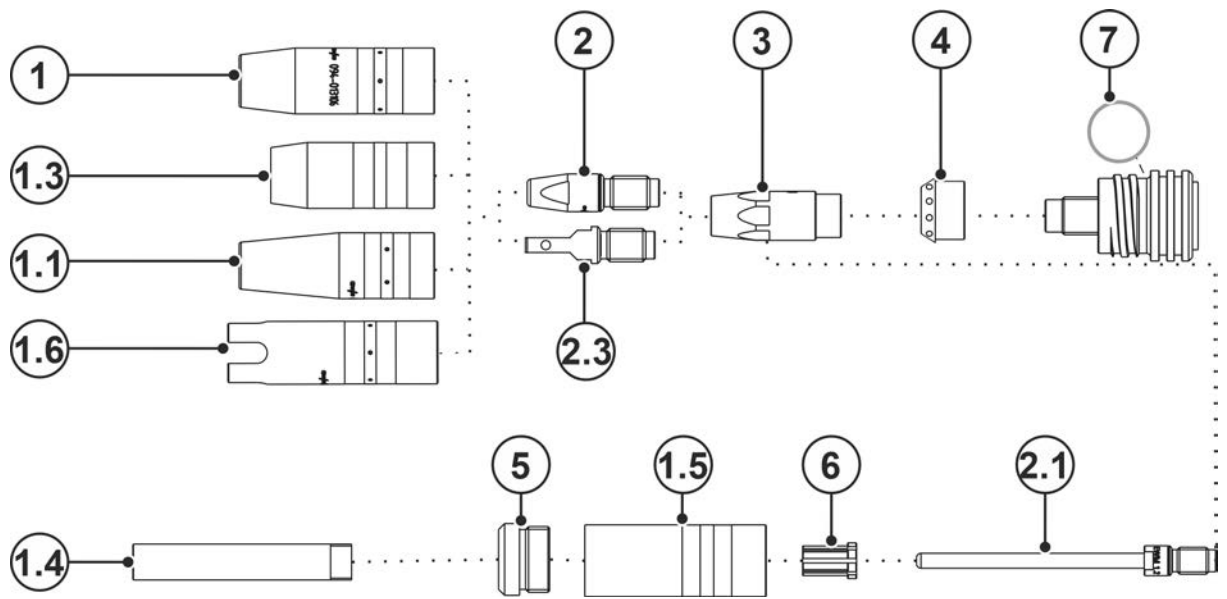


Figure 10-2

Item	Order number	Type	Name
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	Gas nozzle, short
1	094-019822-00001	GN TR 22 65mm D=18mm	Gas nozzle, short
1.1	094-019853-00001	GN NG TR22X4 71mm D=13mm	Highly conical gas nozzle, narrow gap welding
1.3	094-019554-00000	GN FCW TR 22x4 59.5MM	Gas nozzle, inner shield
1.4	094-019626-00000	GN NG M12 73mm	Gas nozzle, narrow gap welding
1.4	094-022226-00000	GN NG M12 76mm	Gas nozzle, narrow gap welding
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	Contact tip, 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

Item	Order number	Type	Name
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	Contact tip, 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	Contact tip, forced contact
2.3	094-016159-00001	CT ZWK CuCrZr M9x35 mm Ø 1,2 mm	Contact tip, forced contact
2.3	094-025533-00001	CT ZWK CuCrZr M9x35 mm Ø 1,6 mm	Contact tip, forced contact
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
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
7	094-025089-00000	18,5 mm x 2 mm	O-ring for gas nozzle holder
	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 for picker

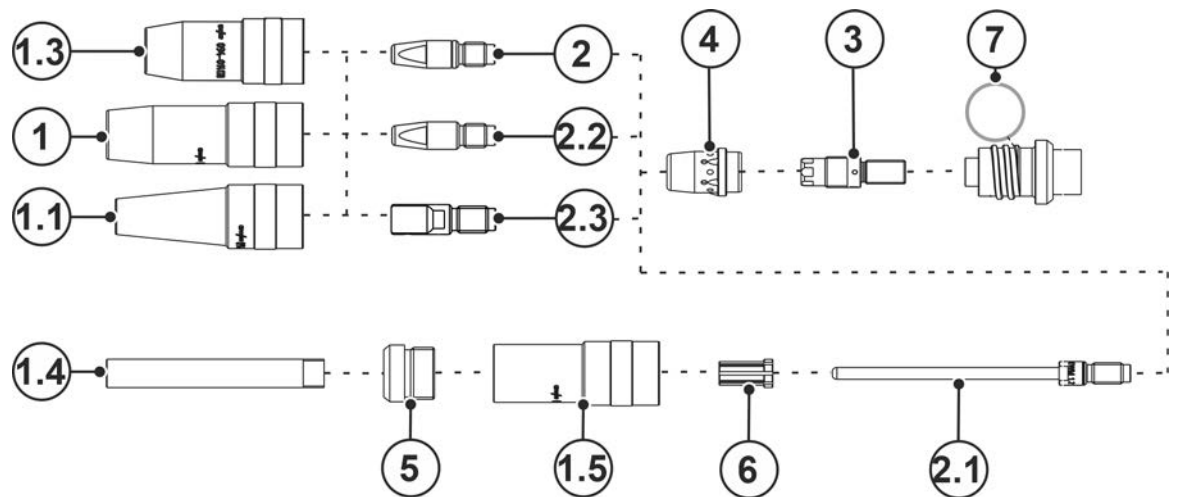
10.3 PM 551 W F1


Figure 10-3

Item	Order number	Type	Name
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	Highly conical gas nozzle, narrow gap welding
1.1	094-022227-00000	GN NG TR23X4 66mm D=13mm	Highly conical gas nozzle, narrow gap welding
*1.3	094-014178-00001	GD TR23X4 NW=15MM L=66MM	Gas nozzle
1.4	094-019626-00000	GN NG M12 73mm	Gas nozzle, narrow gap welding
1.4	094-022226-00000	GN NG M12 76mm	Gas nozzle, narrow gap welding
1.5	094-019624-00000	GNC TR23x4	Gas nozzle body
2	094-013528-00000	CT CUCRZR M9X35MM D=0.8MM	Contact tip
2	094-013529-00000	CT CUCRZR M9X35MM D=0.9MM	Contact tip
2	094-013530-00000	CT M9 CuCrZr 1.0mm	Contact tip
2	094-013531-00000	CT CUCRZR M9X35MM D=1.2MM	Contact tip
2	094-013532-00000	CT CUCRZR M9X35MM D=1.4MM	Contact tip
2	094-013533-00000	CT CUCRZR M9X35MM D=1.6MM	Contact tip
2	094-013534-00000	CT CUCRZR M9X35MM D=2.0MM	Contact tip
2	094-014024-00000	CT CUCRZR M8X30MM D=0.8MM	Contact tip
2	094-013129-00000	CT CUCRZR M8X30MM D=0.9MM	Contact tip
2	094-014222-00000	CT CUCRZR M8X30MM D=1.0MM	Contact tip
2	094-013113-00000	CT M8 CuCrZr 30mm, 1.2mm	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	094-016109-00000	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	094-007238-00000	CT E-CU M8X30MM D=1.2MM	Contact tip
2	094-016112-00000	CT E-CU M8X30MM D=1.4MM	Contact tip

Item	Order number	Type	Name
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
2.1	094-019616-00000	CT M9 x 100 mm; Ø 1,0 mm CuCrZr	Contact tip, 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
2.2	094-013543-00000	CTAL E-CU M9X35MM D=0.8MM	Contact tip, aluminium welding
2.2	094-013544-00000	CTAL E-CU M9X35MM D=0.9MM	Contact tip, aluminium welding
2.2	094-013545-00000	CTAL E-CU M9X35MM D=1.0MM	Contact tip, aluminium welding
2.2	094-013546-00000	CTAL E-CU M9X35MM D=1.2MM	Contact tip, aluminium welding
2.2	094-013547-00000	CTAL E-CU M9X35MM D=1.4MM	Contact tip, aluminium welding
2.2	094-013548-00000	CTAL E-CU M9X35MM D=1.6MM	Contact tip, aluminium welding
2.2	094-013549-00000	CTAL E-CU M9X35MM D=2.0MM	Contact tip, aluminium welding
2.2	094-016115-00000	CTAL E-CU M8X30MM D=0.8MM	Contact tip, aluminium welding
2.2	094-016116-00000	CTAL E-CU M8X30MM D=0.9MM	Contact tip, aluminium welding
2.2	094-016117-00000	CTAL E-CU M8X30MM D=1.0MM	Contact tip, aluminium welding
2.2	094-016118-00000	CTAL E-CU M8X30MM D=1.2MM	Contact tip, aluminium welding
2.2	094-016119-00000	CTAL E-CU M8X30MM D=1.4MM	Contact tip, aluminium welding
2.2	094-016120-00000	CTAL E-CU M8X30MM D=1.6MM	Contact tip, aluminium welding
2.2	094-016920-00000	CTAL E-CU M8X30MM D=2.0MM	Contact tip, aluminium welding
*2.3	094-017007-00001	CT ZWK CuCrZr M9 x 35 mm Ø 1,0 mm	Contact tip, forced contact
*2.3	094-016159-00001	CT ZWK CuCrZr M9 x 35 mm Ø 1,2 mm	Contact tip, forced contact
*2.3	094-025533-00000	CT ZWK CuCrZr M9 x 35 mm Ø 1,6 mm	Contact tip, forced contact
*2.3	094-025524-00000	CT ZWK CuCrZr M8 x 30 mm Ø 1,0 mm	Contact tip, forced contact
*2.3	094-025525-00000	CT ZWK CuCrZr M8 x 30 mm Ø 1,2 mm	Contact tip, forced contact
*2.3	094-025534-00000	CT ZWK CuCrZr M8 x 30 mm Ø 1,6 mm	Contact tip, forced contact
3	094-013856-00003	CTH CUCRZR M9 L=35MM	Contact tip holder
3	094-016425-00003	CTH CUCRZR M9 L=38MM	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
4	094-028487-00000	GV DA20,2MM DI14,5MM L=22MM	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
7	094-022875-00000	O-RING 18,8X2,4MM FPM 75	O-ring for gas nozzle holder
	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 for picker

* Welding torch equipment for aluminium AC welding.

11 Service documents

11.1 Circuit diagrams

The circuit diagrams are only intended for authorised service personnel!

11.1.1 PM G, -W F1 BK

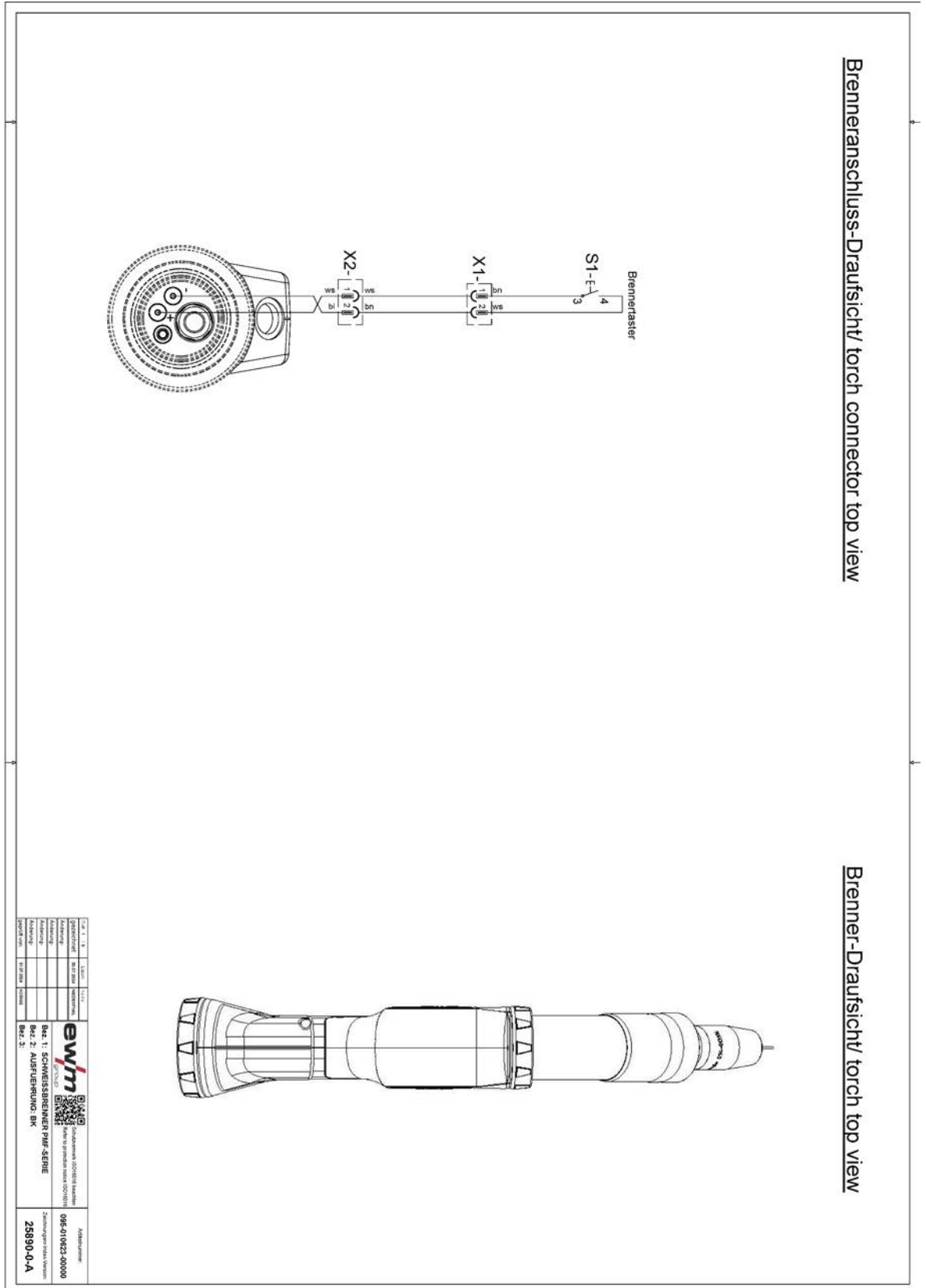















Figure 11-1









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 Altitude alignment

The higher the altitude, the less vacuum is required at the connection piece Δp_c of the welding torch to achieve the required welding fume flow rate at the welding nozzle. Determine the corresponding factor in the following table:

$$P_{c \text{ user}}(Z) = f \times \Delta p_c$$

Explanation:

$P_{c \text{ user}}(Z)$	Required vacuum connector
f	Factor (determined in the following table)
Δp_c	Vacuum connector > see 8 chapter

Altitude Z in (m)	Factor f
0	1.00
250	0.97
500	0.94
750	0.91
1000	0.89
1250	0.86
1500	0.83
1750	0.81
2000	0.78
2250	0.76
2500	0.74

12.3 Average wire electrode usage

5 m/min – 197 ipm								
	mm				inch			
	1.0	1.2	1.6		.040	.045	.060	
Steel	1.8	2.7	4.7	kg/h	3.9	5.9	10.3	lb/h
Stainless steel	1.9	2.8	4.8		4.1	6.1	10.5	
Aluminium	0.6	0.9	1.6		1.3	1.9	3.5	
10 m/min – 394 ipm								
Steel	3.7	5.3	9.5	kg/h	8.1	11.6	20.9	lb/h
Stainless steel	3.8	5.4	9.6		8.3	11.9	21.1	
Aluminium	1.3	1.8	3.2		2.8	3.9	7.0	

12.4 Average shielding gas usage

	mm	1.0	1.2	1.6	2.0
	inch	.040	.045	.060	.080
l/min		10	12	16	20
gal/min		2.64	3.17	4.22	5.28

12.5 Searching for a dealer

Sales & service partners
www.ewm-group.com/en/specialist-dealers



"More than 400 EWM sales partners worldwide"