



**EN**

welding torch

PHW 100

099-008232-EW501

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26.05.2020

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# General instructions

## **WARNING**



### **Read the operating instructions!**

**The operating instructions provide an introduction to the safe use of the products.**

- Read and observe the operating instructions for all system components, especially the safety instructions and warning notices!
- Observe the accident prevention regulations and any regional regulations!
- The operating instructions must be kept at the location where the machine is operated.
- Safety and warning labels on the machine indicate any possible risks. Keep these labels clean and legible at all times.
- The machine has been constructed to state-of-the-art standards in line with any applicable regulations and industrial standards. Only trained personnel may operate, service and repair the machine.
- Technical changes due to further development in machine technology may lead to a differing welding behaviour.

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

**A list of authorised sales partners can be found at [www.ewm-group.com/en/specialist-dealers](http://www.ewm-group.com/en/specialist-dealers).**

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

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

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

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## 2 For your safety

### 2.1 Notes on using these operating instructions

**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
			Switch
	Incorrect / Invalid		Turn
	Correct / Valid		Numerical value – adjustable
	Input		Signal light lights up in green
	Navigation		Signal light flashes green

Symbol	Description	Symbol	Description
	Output		Signal light lights up in red
	Time representation (e.g.: wait 4 s / actuate)		Signal light flashes red
	Interruption in the menu display (other setting options possible)		
	Tool not required/do not use		
	Tool required/use		

## 2.3 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.

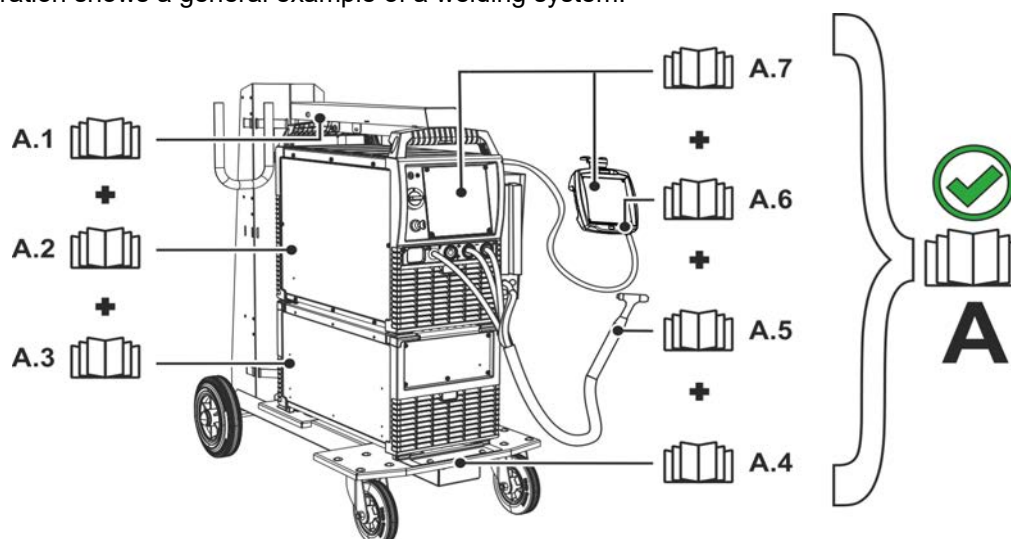


Figure 2-1

Item	Documentation
A.1	Options conversion instructions
A.2	Power source
A.3	Cooling unit, voltage converter, tool box etc.
A.4	Transport cart
A.5	Welding torch
A.6	Remote control
A.7	Controller
A	Complete documentation

### 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 torches for arc welding systems for plasma welding.

#### 3.2 Documents which also apply

##### 3.2.1 Warranty

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

##### 3.2.2 Declaration of Conformity



This product corresponds in its design and construction to the EU directives listed in the declaration. On request, we will send you the relevant original declaration of conformity.

##### 3.2.3 Service documents (spare parts)

#### WARNING



##### **Do not carry out any unauthorised repairs or modifications!**

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

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

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

Spare parts can be obtained from the relevant authorised dealer.

## 4 Machine description – quick overview

### 4.1 PHW 100

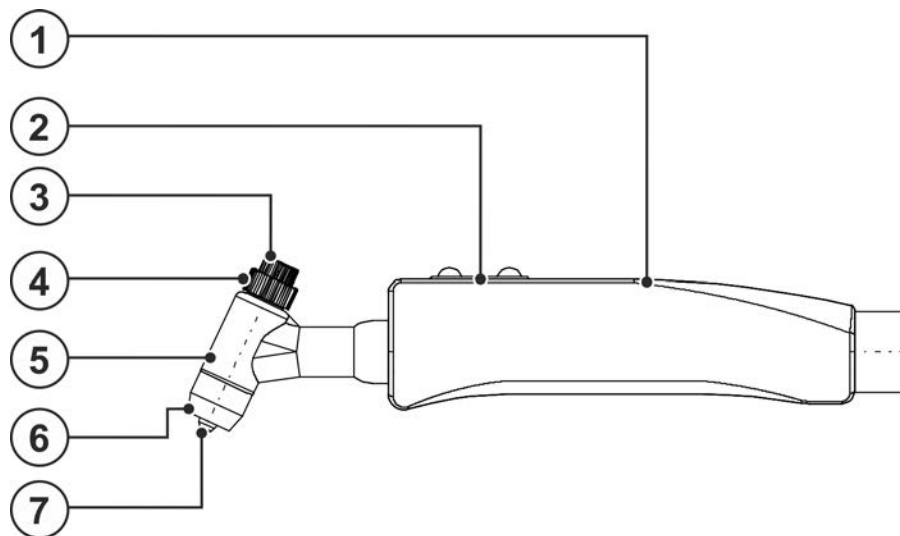


Figure 4-1

Item	Symbol	Description
1		Grip plate
2		Torch trigger
3		Back cap
4		Collet housing
5		Torch body
6		Gas nozzle
7		Plasma nozzle



## 5 Design and function

### ⚠ WARNING



**Risk of injury from electrical voltage!**

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

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



**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!

### ⚠ CAUTION



**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.



**Risk from electrical current!**

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

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



**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.**



**Machine damage due to incompletely assembled welding torch!**

**Incomplete assembly may destroy the welding torch.**

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

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

### 5.1 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.

## 5.2 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!

### 5.2.1 Ambient conditions



**Equipment damage due to contamination!**

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

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

#### 5.2.1.1 In operation

**Temperature range of the ambient air:**

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

**Relative humidity:**

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

#### 5.2.1.2 Transport and storage

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

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

**Relative humidity**

- up to 90 % at 20 °C (68 F)

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

## 5.3 Functional characteristics

Liquid-cooled plasma torch for gas shielded arc welding of high-quality steels, copper and titanium alloys of different material thicknesses. Essentially, all metals can be welded that can be welded using the TIG process (DC). This also includes titanium, zirconium, gold, silver and copper with its alloys.

Operation requires the use of a power source in conjunction with a circulating-air or recooling unit. Trade and industry use the diversity of this process.

### 5.3.1 Procedure

In physics, a plasma is an electrically conductive gas consisting of a mixture of molecules, electrons, atoms and ions. Depending on the plasma gas used, temperatures of 15,000 to 20,000 K are reached in the plasma jet.

The welding torch works on the principle of the transferring arc. The arc burns between electrode and workpiece during welding and is constricted by the plasma nozzle, the composition and the amount of shielding gas used. This enables joints to be made with high quality at high working speeds.

To make the path between the electrode and the workpiece electrically conductive, the pilot arc is first ignited inside the torch between the electrode and the plasma nozzle by applying high-frequency high voltage. The pilot gas is ionised, emerges from the plasma nozzle and makes the path between the electrode and the workpiece electrically conductive. When the ionised gas jet touches the workpiece surface, the main circuit is closed. This forms the main arc between electrode and workpiece and the welding process begins.

The good cooling of the torch and the high welding speed help to keep the heat-affected zone and the thermal distortion of the material to be processed low.

Indirect electrode cooling ensures easy and fast electrode replacement. If handled correctly, no coolant water can get into the interior of the torch when changing the electrode leading to ignition failure and reduction of the service life of electrode and nozzle.

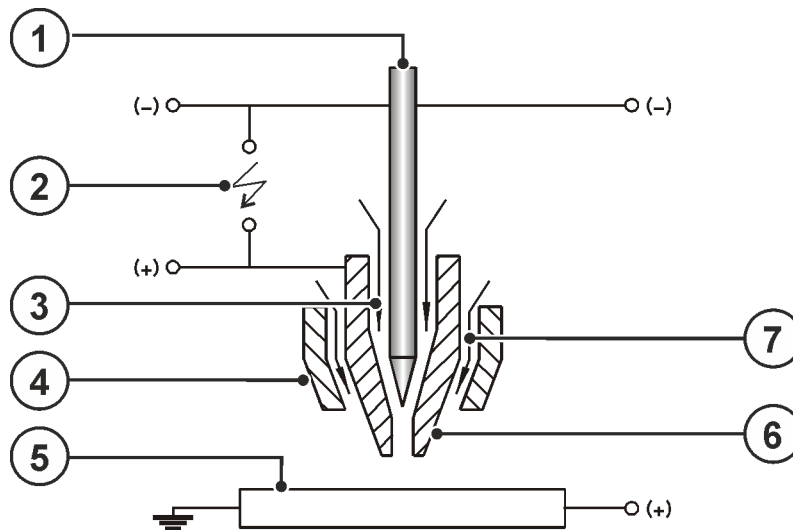


Figure 5-1

Item	Symbol	Description
1		Electrode
2		High voltage
3		Plasma gas
4		Gas nozzle
5		Work piece
6		Plasma nozzle
7		Shielding gas

## 5.4 Welding torch cooling system



### **Coolant mixtures!**

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

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

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

## 5.4.1 Permitted torch coolant

Coolant	Temperature range
KF 23E	-10 °C to +40 °C

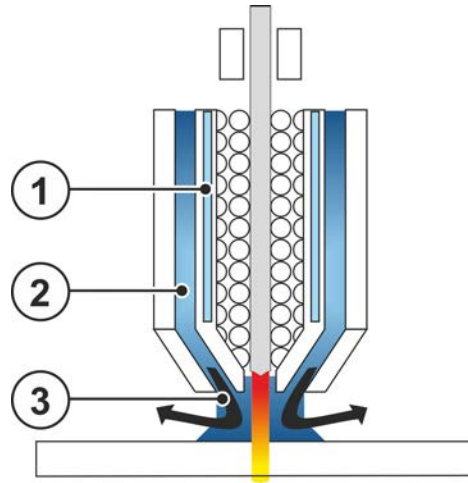


Figure 5-2

Item	Symbol	Description
1		Water cooling
2		Shielding gas
3		Shielding gas exit

Part of the heat is released to the cooling system of the welding torch over the plasma nozzle and gas lens, and part of the shielding gas is blown out of the welding torch.

## 5.4.2 Plasma torch - cooling circuit



**Do not integrate any additional modules in the cooling circuit of the welding torch.**

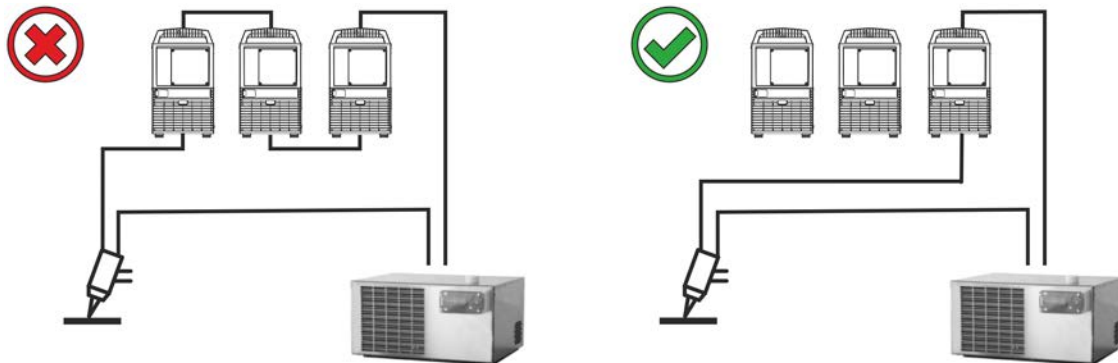


Figure 5-3

## 5.5 Welding torch connection

Depending on the machine, various adapter sets are required to connect the welding torch.

### 5.5.1 Connection variant Microplasma 25, -55, -105

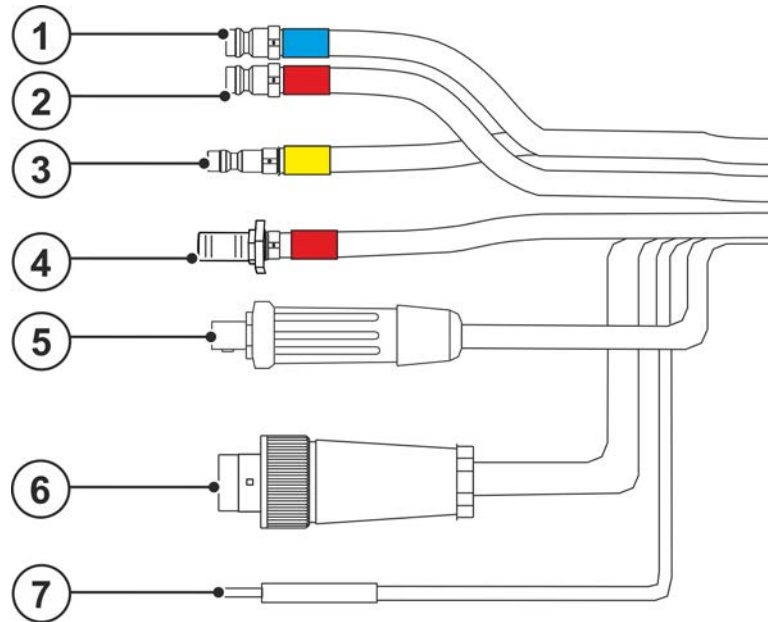


Figure 5-4

Item	Symbol	Description
1		<b>Quick connect nipple (9 mm / 0.35 inch)</b> Coolant feed (blue)
2		<b>Quick connect nipple (9 mm / 0.35 inch)</b> Coolant return (red)
3		<b>Quick connect nipple (5 mm / 0.2 inch)</b> Shielding gas (yellow)
4		<b>Quick connect coupling (5 mm / 0.2 inch)</b> Plasma gas (red)
5		<b>Connector plug (9 mm / 0.35 inch)</b> Welding current connection
6		<b>Connector plug (5-pole)</b> Control cable assembly
7		<b>Connector plug (4 mm / 0.16 inch)</b> Pilot arc current

## 5.5.2 Connection variant Microplasma 20, -50

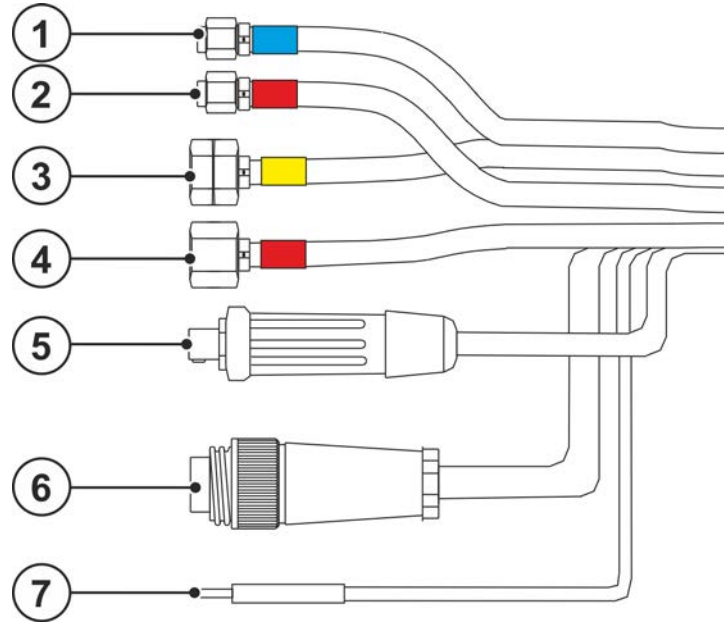


Figure 5-5

Item	Symbol	Description
1		<b>Connecting nipple (M12x1)</b> Coolant feed (blue)
2		<b>Connecting nipple (M12x1)</b> Coolant return (red)
3		<b>Connecting nipple (G 1/4" LH)</b> Shielding gas (yellow)
4		<b>Connecting nipple (G 1/4" RH)</b> Plasma gas (red)
5		<b>Connector plug (9 mm / 0.35 inch)</b> Welding current connection
6		<b>Connector plug (5-pole)</b> Control cable assembly
7		<b>Connector plug (4 mm / 0.16 inch)</b> Pilot arc current

## 5.6 Ultraviolet radiation

### **WARNING**



**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!

Welding current	Eye protection filter
< 1 A	Level 5
1 to 2.5 A	Level 6
2.5 to 5 A	Level 7
5 to 10 A	Level 8
10 to 15 A	Level 9
> 15 A	Level 10

## 5.7 Gas supply (shielding and plasma gas)

### ⚠ 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.



**Allow the plasma gas to flow through the welding torch for a few minutes to blow out any moisture. This prevents ignition problems.**

**Using the special welding torch caps prevents the penetration of air humidity during longer breaks (overnight, weekend).**

### 5.7.1 Hydrogen

Follow the safety precautions below to exclude the risk of explosion during plasma welding with hydrogen in the gas mixture:

1. Pipes, hoses, screw connections and machines through which gases flow must be gas-tight and kept that way. Therefore, it is necessary to check the leak-tightness at regular intervals (weekly) with a leak detection spray or soapy water.
2. A ceiling-mounted extraction system is recommended.
3. Set up the gas cylinders only in a place where no flying sparks can occur (even during the connection). The gas cylinder must be secured against falling over.
4. The connection nozzles of the gas cylinder valves and that of the pressure regulator must not be directed towards other gas cylinders.
5. Unused manometers for gas quantity must remain closed during welding.
6. After the welding has been completed, close the gas cylinder valves, depressurise the pressure regulator and disconnect the system from the mains.

### 5.7.2 Plasma gas

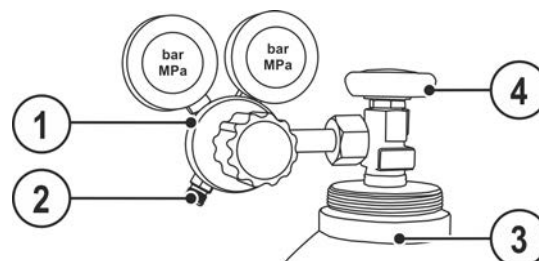


Figure 5-6

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

- Place the shielding gas cylinder into the relevant cylinder bracket.
- Secure the shielding gas cylinder against falling over.

**Use only 2-stage bottle pressure regulators with bar display on the output side.**

Argon is usually used as the arc-forming gas. It is easier to ionise and, therefore, allows a low-energy arc. In some cases, a mixture of argon with up to 10% hydrogen or helium may be used. Larger additions may destroy the welding torch.

The amount of plasma gas required is directly related to the nozzle aperture. The larger the nozzle aperture, the more plasma gas is required. A plasma gas quantity that is too low leads to premature wear of the plasma nozzle.

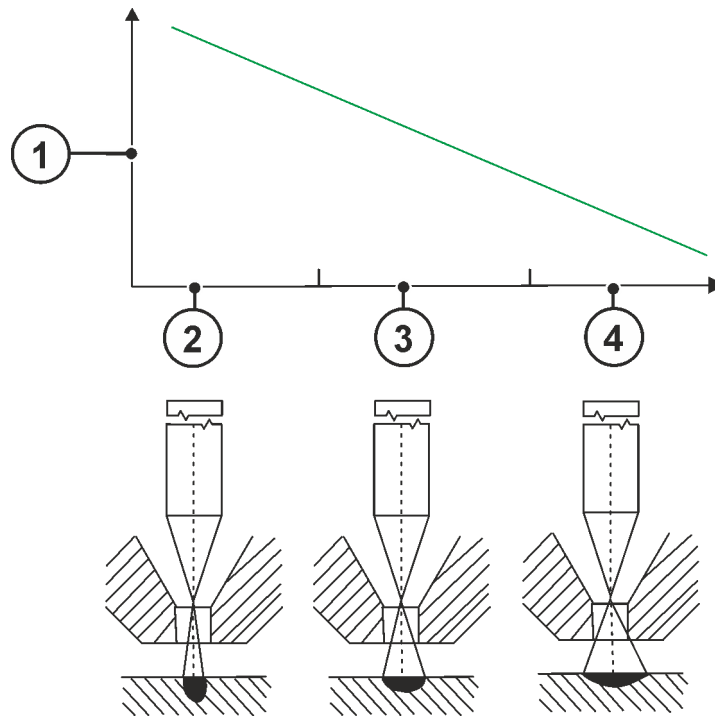


Figure 5-7

Item	Symbol	Description
1		Plasma gas quantity
2		deep penetration (small seam width)
3		medium penetration
4		shallow penetration (large seam width)

A reduced quantity of plasma gas (pos. 2 to 4) results in a softer arc characteristic and a shallow penetration. A reduced quantity of plasma gas (pos. 4 to 2) results in a shallow penetration.

### 5.7.3 Shielding gas

Argon is usually used as shielding gas. To fully achieve the desired constriction effect, up to 10%, in special cases up to 30%, hydrogen must be added to the shielding gas. This reduces the surface tension of the weld pool and thereby promotes wettability.

The materials copper or copper-containing alloys and the reactive metals titanium, tantalum and zirconium are an exception. In these cases, helium is used as an additive instead of hydrogen.

### 5.7.4 Forming gas

The forming gas protects the underside of the seam from oxidation and prevents the root from sagging excessively thanks to its supporting effect. Depending on the materials to be welded, the following gas mixtures are used.

- Ar
- Ar/H<sub>2</sub>
- N<sub>2</sub>/H<sub>2</sub>



## 5.8 Tables of current carrying capacity



The indicated gas flow rates are guide values. Depending on the application, other values may lead to a better welding result. The plasma gas must stream out with a minimum quantity dependent on the nozzle aperture and current. If the quantity falls below the minimum, damage to the welding torch can be expected.

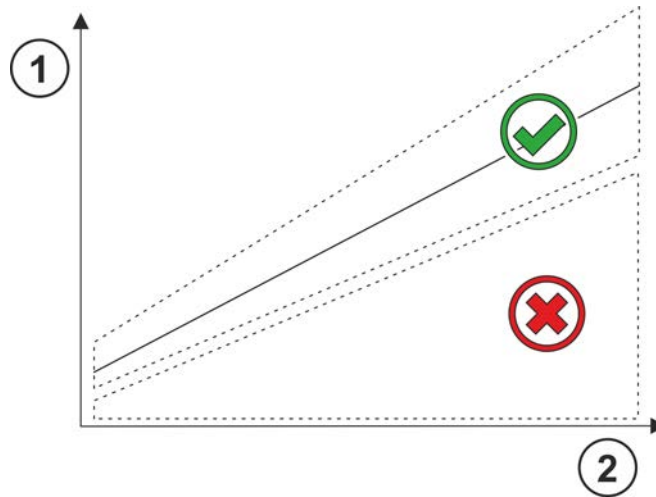


Figure 5-8

Item	Symbol	Description
1		Plasma gas quantity
2		Plasma nozzle size

The plasma nozzles and electrodes have a limited current consumption capacity that should not be exceeded. The limit values are listed in the table below:

### 5.8.1 Current carrying capacity and plasma gas quantities for standard nozzle 18 mm / 0.71 inch

Guide values for the current-carrying capacity of PHW 100 plasma nozzles, electrode at the negative pole, electrode diameter 1.0, 1.5, 2.4 mm / 0.04, 0.06, 0.09 inch.

The plasma gas used is generally Argon.


Diameter of plasma nozzles	Amount of plasma gas	Electrode diameter	Current
0.5 mm / 0.02 inch	0.1-0.2 l/min	1.0/1.5 mm / 0.04/0.06 inch	8 A
0.6 mm / 0.02 inch	0.03-0.05 gal/min	1.0/1.5 mm / 0.04/0.06 inch	10 A
0.8 mm / 0.03 inch	0.2-0.3 l/min 0.05-0.08 gal/min	1.0/1.5 mm / 0.04/0.06 inch	20 A
1.0 mm / 0.04 inch		1.0/1.5 mm / 0.04/0.06 inch	25 A
1.2 mm / 0.05 inch	0.25-0.4 l/min 0.07-0.11 gal/min	1.5 mm / 0.06 inch	30 A
1.4 mm / 0.06 inch		1.5 mm / 0.06 inch	40 A
1.6 mm / 0.06 inch		1.5 mm / 0.06 inch	50 A
1.8 mm / 0.07 inch	0.3-0.5 l/min 0.08-0.13 gal/min	1.5 mm / 0.06 inch	60 A
2.0 mm / 0.08 inch		1.5/2.4 mm / 0.06/0.09 inch	70 A
2.2 mm / 0.09 inch	0.3-0.5 l/min 0.08-0.13 gal/min	1.5/2.4 mm / 0.06/0.09 inch	80 A
2.4 mm / 0.09 inch		1.5/2.4 mm / 0.06/0.09 inch	85 A
2.6 mm / 0.10 inch		1.5/2.4 mm / 0.06/0.09 inch	90 A
3.0 mm / 0.12 inch	0.4-0.6 l/min	1.5/2.4 mm / 0.06/0.09 inch	100 A
3.2 mm / 0.13 inch	0.11-0.16 gal/min	1.5/2.4 mm / 0.06/0.09 inch	100 A

## 5.8.2 Current carrying capacity and plasma gas quantities for standard nozzle 23 mm / 0.91 inch

Diameter of plasma nozzles	Amount of plasma gas	Electrode diameter	Current
0.5 mm / 0.02 inch	0.1-0.2 l/min 0.03-0.05 gal/min	1.5 mm / 0.06 inch	8 A
0.6 mm / 0.02 inch		1.5 mm / 0.06 inch	10 A
0.8 mm / 0.03 inch	0.2-0.3 l/min 0.05-0.08 gal/min	1.5 mm / 0.06 inch	20 A
1.0 mm / 0.04 inch		1.5 mm / 0.06 inch	25 A
1.2 mm / 0.05 inch		1.5 mm / 0.06 inch	30 A
1.4 mm / 0.06 inch		1.5 mm / 0.06 inch	40 A
1.6 mm / 0.06 inch		1.5 mm / 0.06 inch	45 A
1.8 mm / 0.07 inch	0.25-0.4 l/min 0.07-0.11 gal/min	1.5 mm / 0.06 inch	50 A
2.0 mm / 0.08 inch		1.5 mm / 0.06 inch	60 A
2.2 mm / 0.09 inch	0.3-0.5 l/min 0.08-0.13 gal/min	1.5 mm / 0.06 inch	70 A
2.4 mm / 0.09 inch		1.5 mm / 0.06 inch	80 A
2.6 mm / 0.10 inch		1.5 mm / 0.06 inch	85 A
3.0 mm / 0.12 inch	0.4-0.6 l/min	1.5/2.4 mm / 0.06/0.09 inch	90 A
3.2 mm / 0.13 inch	0.11-0.16 gal/min	1.5/2.4 mm / 0.06/0.09 inch	100 A

## 5.8.3 Current carrying capacity and plasma gas quantities for the angled nozzle

Diameter of plasma nozzles	Amount of plasma gas	Electrode diameter	Current
0.5 mm / 0.02 inch	0.1-0.2 l/min 0.03-0.05 gal/min		
0.6 mm / 0.02 inch		1.5 mm / 0.06 inch	10 A
0.8 mm / 0.03 inch	0.2-0.3 l/min 0.05-0.08 gal/min	1.5 mm / 0.06 inch	18 A
1.0 mm / 0.04 inch		1.5 mm / 0.06 inch	22 A
1.2 mm / 0.05 inch		1.5 mm / 0.06 inch	27 A
1.4 mm / 0.06 inch		1.5 mm / 0.06 inch	36 A
1.6 mm / 0.06 inch		1.5 mm / 0.06 inch	40 A
1.8 mm / 0.07 inch	0.25-0.4 l/min 0.07-0.11 gal/min	1.5 mm / 0.06 inch	45 A
2.0 mm / 0.08 inch		1.5 mm / 0.06 inch	55 A
2.2 mm / 0.09 inch	0.3-0.5 l/min 0.08-0.13 gal/min	1.5 mm / 0.06 inch	65 A
2.4 mm / 0.09 inch		1.5 mm / 0.06 inch	70 A
2.6 mm / 0.10 inch			
3.0 mm / 0.12 inch	0.4-0.6 l/min		
3.2 mm / 0.13 inch	0.11-0.16 gal/min		

 The load values of the plasma nozzles are closely related to other parameters, especially the selected plasma gas quantities and the position of the electrode tip in the plasma nozzle. In particular, the variation in the amount of plasma gas, even beyond the above-mentioned limits, causes a fundamental change in the plasma jet characteristics.

## 5.8.4 Current carrying capacity and plasma gas quantities for the electrode at the positive pole or AC operation

Guide values for current carrying capacity of PHW 100 plasma nozzles, electrode > see 5.9.3 chapter of dimension "L" at the positive pole or in AC operation, electrode diameter 3.2 mm / 0.13 inch.

The plasma gas used is generally Argon.

Diameter of plasma nozzles	Amount of plasma gas	Positive-pole operation	AC operation
1.2 mm / 0.05 inch	0.2-0.4 l/min	30 A	30 A
1.6 mm / 0.06 inch	0.05-0.11 gal/min	35 A	40 A
2.0 mm / 0.08 inch	0.3-0.5 l/min		60 A
2.4 mm / 0.09 inch	0.08-0.13 gal/min		80 A

## 5.9 Wear part replacement

When the welding quality deteriorates, the cause in most cases is worn electrodes and / or nozzles. To prevent damage to the welding torch, the replacement of wear parts must not be delayed unnecessarily.

**Before starting any work on the welding torch, the welding system must be switched off and secured against accidental re-start. All machine components must have cooled down.**

The threads of the wear parts are all right-hand threads:

- To loosen parts: turn anti-clockwise
- To mount parts: turn clockwise

**All screw and or plug connections can be made without tools.**

When changing wear parts, all individual components must always be checked for damage or wear and replaced if necessary. All part connections or sealing surfaces must be cleaned.

### 5.9.1 Deinstallation/Installation

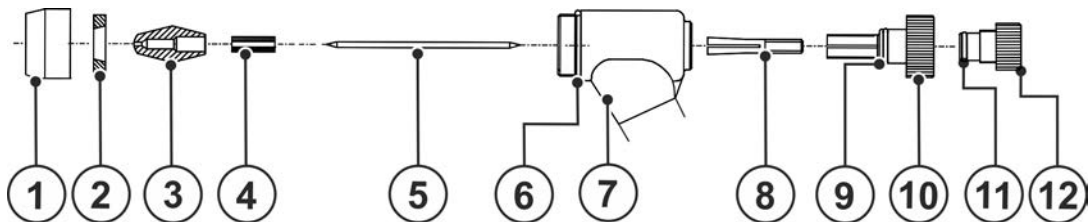


Figure 5-9

Item	Symbol	Description
1		Gas nozzle
2		Gas lens
3		Plasma nozzle
4		Gas guide insert
5		Electrode
6		Sealing ring of the gas nozzle
7		Torch body
8		Collet chuck
9		Sealing ring
10		Collet housing
11		Sealing ring of the back cap
12		Back cap

## 5.9.2 Changing the contact tip

The choice of the plasma nozzle depends on the application and the associated current load > see 5.8 chapter.

The plasma nozzle should be replaced when the nozzle channel is damaged and therefore no longer circular.

When changing the nozzle, the electrode and the centring piece should always be checked for wear and damage.

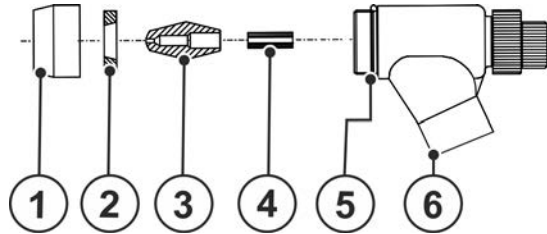


Figure 5-10

Item	Symbol	Description
1		Gas nozzle
2		Gas lens
3		Plasma nozzle
4		Gas guide insert
5		Sealing ring of the gas nozzle
6		Torch body

- Unscrew the gas nozzle (1).
- Remove the gas lens (2) from the gas nozzle or plasma nozzle (3).
- Pull the plasma nozzle carefully by hand out of the torch body (6). Turn the nozzle slightly around its axis if it is too tight. For plasma nozzles with a circumferential groove, pliers can be used; for plasma nozzles with key flats, the nozzle key must be used. Never force the plasma nozzle out by canting as the retainer cone in the torch body will be deformed.
- Remove the gas guide insert (4) from the plasma nozzle.
- Clean the sealing surfaces and check for defective components before inserting new parts.
- Check the sealing ring of the gas nozzle (5) and replace if damaged. Rub the sealing ring of the gas nozzle lightly with lubricant VR 500<sup>[1]</sup>.
- Check the gas lens for damage, especially the retainer cone for the plasma nozzle.
- Place the gas lens in the gas nozzle and make sure that it lies flat on the provided attachment of the gas nozzle and that it can still be moved freely when inserted in the gas nozzle.
- Push the gas guide insert into the new plasma nozzle.
- Rub the contact surface of the plasma nozzle towards the torch body lightly with thermal paste <sup>[1]</sup>, place it in the retainer cone of the gas lens and insert it together with the gas nozzle in the welding torch. The electrode leads through the centre hole of the gas guide insert.
- Screw the gas nozzle with the plasma nozzle firmly onto the welding torch to ensure good heat dissipation to the water-cooled retainer cone of the nozzle.

<sup>[1]</sup> > see 10 chapter

## 5.9.3 Electrode change



**To prevent damage to the device and incorrect welding results, the electrode gap must be set with an electrode setting gauge each time the electrode is changed > see 5.9.3.3 chapter.**

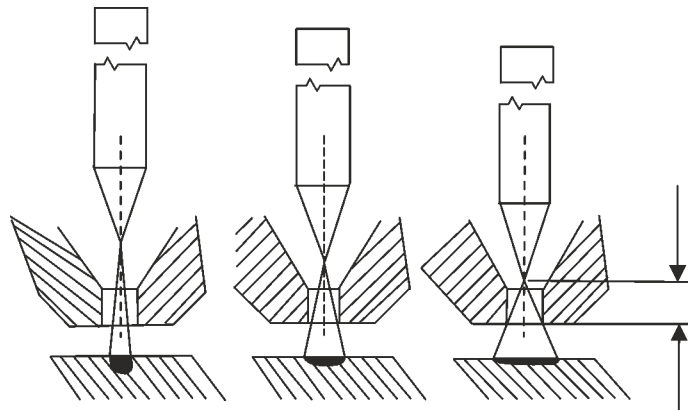


Figure 5-11

### 5.9.3.1 Regrinding the electrode

The electrode shape is decisive for a good welding result. Therefore, it is necessary to grind electrodes by machine to the correct shape before use. The electrode must be replaced if the electrode tip is excessively worn, tarnished too much, or burned back asymmetrically.

The following guide values apply to the electrodes of the welding torch

Nozzle type	Electrode diameter	Tip bevel	Max. length	Min. Length
Standard nozzle	1.5 mm / 0.06 inch	30° on both sides	51 mm / 2.00 inch	30 mm / 1.18 inch
Standard nozzle	2.4 mm / 0.09 inch	30° on both sides	34 mm / 1.34 inch	20 mm / 1.07 inch
Angled nozzle	1.5 mm / 0.06 inch	30° on both sides	51 mm / 2.00 inch	30 mm / 1.18 inch
Long plasma nozzle	1.5 mm / 0.06 inch	30° on both sides	54 mm / 2.13 inch	35 mm / 1.38 inch
Positive-pole nozzle	3.2 mm / 0.13 inch	One-sided, bevel 45°	30 mm / 1.18 inch	26 mm / 1.02 inch

Note the grinding direction

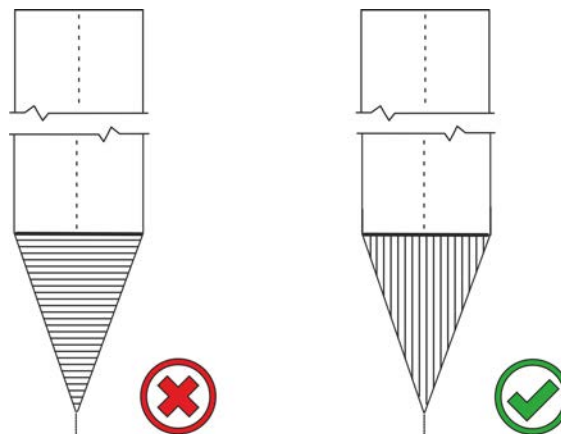


Figure 5-12

## Regrinding electrodes centrally

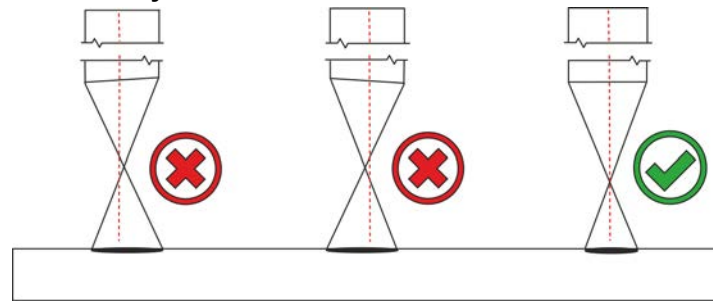


Figure 5-13

The tip of the electrode should be centred in the longitudinal axis of the electrode. In the case of deviations, there is a risk that the arc will become unstable. Especially in automated welding, a non-centred electrode tip leads to ignition next to the proper ignition point.

## Penetration above grinding angle

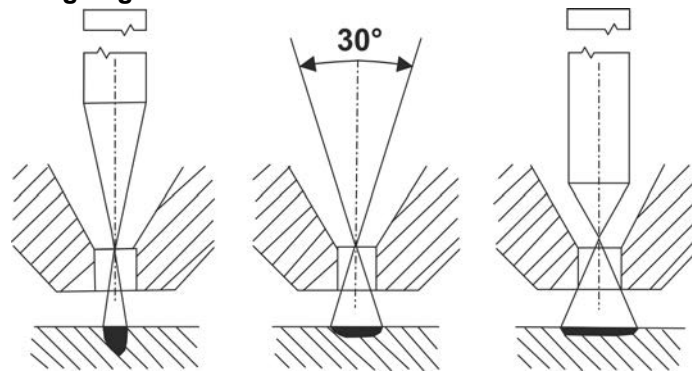


Figure 5-14

The more pointed the grinding cone, the deeper the penetration. The wider the grinding cone, the shallower the penetration.

### 5.9.3.2 Removal and reassembly of the electrode with mounted electrode clamping unit

The welding torch has an electrode clamping mechanism that allows the position of the electrode to the plasma nozzle to be changed within a certain range even during the welding process. In this way you can find the optimal distance for the respective welding process.

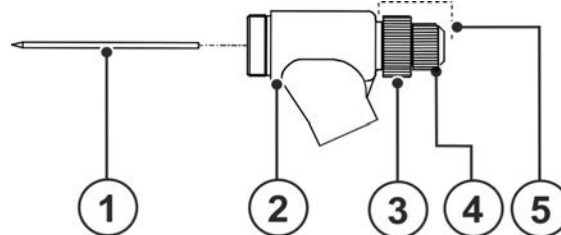


Figure 5-15

Item	Symbol	Description
1		Electrode
2		Torch body
3		Collet housing
4		Back cap
5		Electrode clamping unit

- Remove the electrode (1) by holding the knurled ring of the collet housing (3) with one hand and turning the knurled back cap (4) anti-clockwise approx. 2 turns with the other hand.
- The back cap remains with the remaining thread in the collet housing and should not be completely unscrewed to change the electrode.
- You can now pull the electrode out of the torch body (2).
- Push the new or a reground electrode with the blunt side first through the torch body into the collet and screw the back cap a little further into the collet housing. This pulls the collet into the collet housing and the electrode is held by the collet to such an extent that it can no longer slide out of the collet by itself. However, it must still be possible to move the electrode by hand for precise positioning.

For removal, the electrode clamping unit (5) is completely unscrewed from the torch with the back cap detached. Then the back cap is unscrewed from the collet housing and the collet is pushed forward out of the housing. This is only necessary in case of maintenance.

### 5.9.3.3 Setting the electrode gap

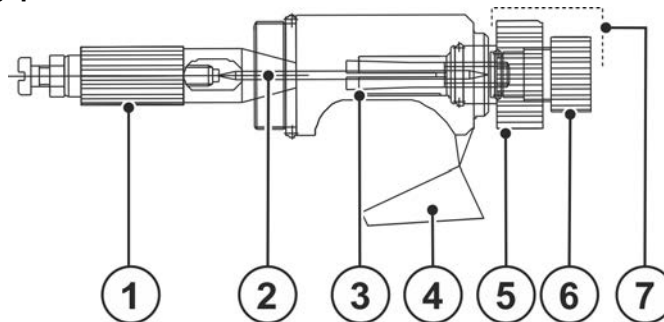


Figure 5-16

Item	Symbol	Description
1		Electrode setting gauge
2		Electrode
3		Collet chuck
4		Torch body
5		Collet housing
6		Back cap
7		Clamping module

- Push the electrode setting gauge (1) over the electrode (2) into the torch body (4).
- Hold the adjusting ring of the collet housing (5) lightly and tighten the back cap (6) only so far that the electrode can no longer be moved from its position.
- Do not screw the collet housing up to the stop into the torch body.
- It must still be possible to turn the collet housing in both directions using its grip ring. After the correct clamping of the electrode, the clamping module should have an adjustment range of approx.  $\pm 1.0$  mm in both directions. This enables a precise adaptation of the electrode's position to the respective welding task.

### 5.9.3.4 Electrode setting gauge (basic setting - dimension "L")

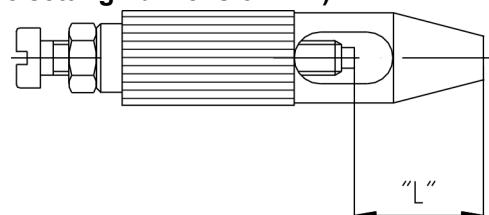


Figure 5-17

The electrode setting gauge is adjustable using a calliper with round depth measuring rod. The factory-set electrode setting gauge must be adjusted to the different electrode lengths.

## 5.9.3.5 Guide values for basic setting (electrode at the negative pole)

Nozzle diameter	Dimension "L" for nozzle diameter					
	Nozzle type					
	Standard	Long	Overlong	Extra-long	Angled nozzle Standard	Angled nozzle Long
0.5 mm / 0.02 inch	17.0 mm / 0.67 inch	21.5 mm / 0.85 inch	24.5 mm / 0.96 inch	28.5 mm / 1.12 inch	16.0 mm / 0.63 inch	20.0 mm / 0.79 inch
0.6 mm / 0.02 inch						
0.8 mm / 0.03 inch	16.0 mm / 0.63 inch	20.5 mm / 0.81 inch	23.5 mm / 0.93 inch	27.5 mm / 1.08 inch		
1.0 mm / 0.04 inch						
1.2 mm / 0.05 inch	15.5 mm / 0.61 inch	20.0 mm / 0.79 inch	23.0 mm / 0.91 inch	27.0 mm / 1.06 inch		
1.4 mm / 0.06 inch						
1.6 mm / 0.06 inch	15.0 mm / 0.59 inch	19.5 mm / 0.77 inch	22.5 mm / 0.89 inch	26.5 mm / 1.04 inch		
1.8 mm / 0.07 inch						
2.0 mm / 0.08 inch	14.5 mm / 0.57 inch	19.0 mm / 0.75 inch	22.0 mm / 0.87 inch	26.0 mm / 1.02 inch		
2.2 mm / 0.09 inch						
2.4 mm / 0.09 inch	14.0 mm / 0.55 inch	19.0 mm / 0.75 inch	22.0 mm / 0.87 inch	26.0 mm / 1.02 inch		
2.6 mm / 0.10 inch						
3.0 mm / 0.12 inch	14.0 mm / 0.55 inch	19.0 mm / 0.75 inch	22.0 mm / 0.87 inch	26.0 mm / 1.02 inch		
3.2 mm / 0.13 mm						

## 5.9.3.6 Guide values for basic setting (electrode at the positive pole or for alternating current)

Nozzle diameter	Dimension "L" for nozzle diameter	
	Nozzle type	
	Positive pole	
1.2 mm / 0.05 inch	15.5 mm / 0.61 inch	
1.6 mm / 0.06 inch	15.3 mm / 0.60 inch	
2.0 mm / 0.08 inch	15.1 mm / 0.59 inch	
2.4 mm / 0.09 inch	15.1 mm / 0.59 inch	

The electrode on the positive pole must be briefly loaded with 30 to 35 amperes after positioning to allow the formation of a hemispherical electrode tip. Afterwards, the position of the electrode tip must be checked again and readjusted according to the values mentioned above or already determined. The position of the electrode is optimised by turning the clamping module back and forth. If it is difficult to adjust the collet housing, the tension of the electrode can be reduced slightly.



### 5.9.3.7 Installation of the electrode with the electrode clamping unit removed

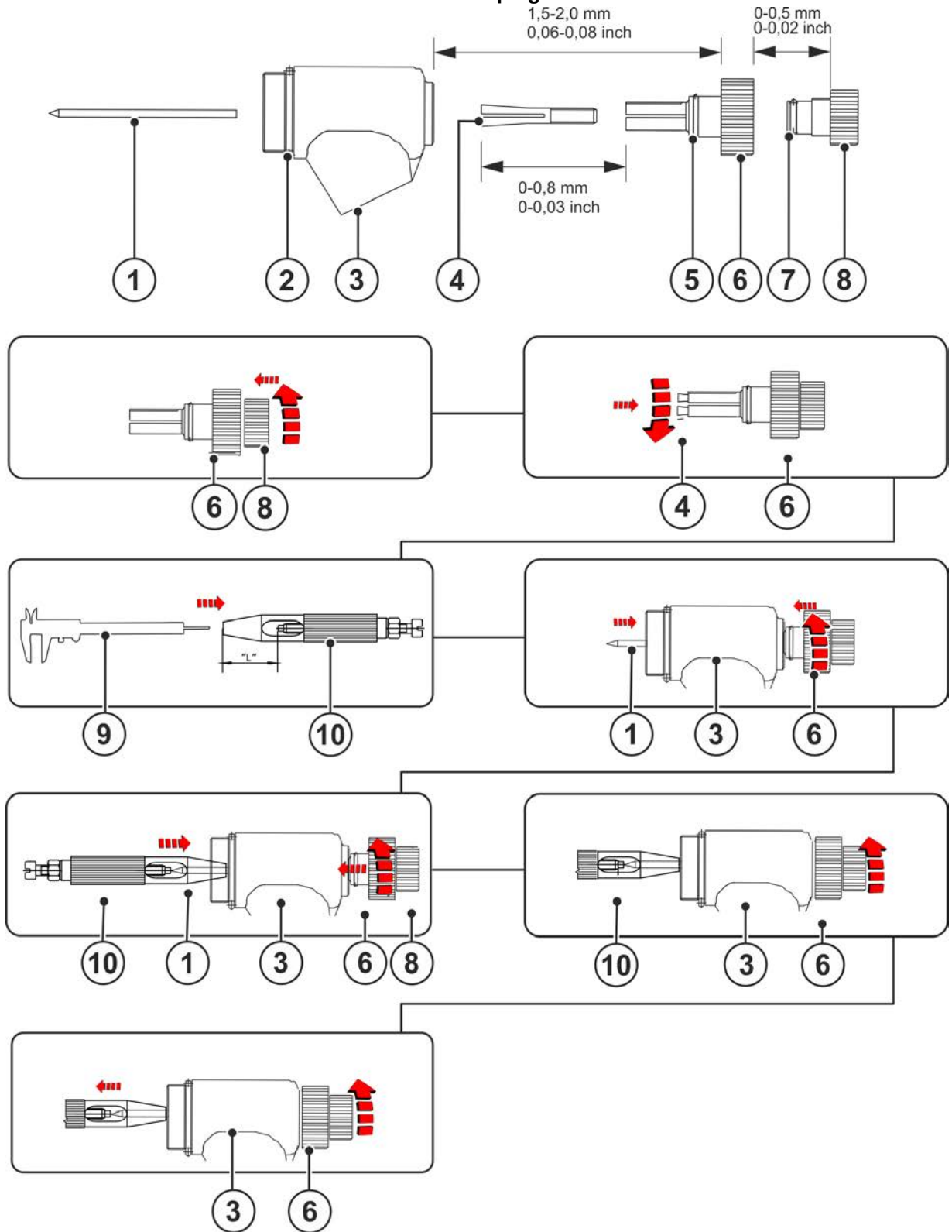


Figure 5-18

Item	Symbol	Description
1		Electrode
2		Sealing ring of the gas nozzle
3		Torch body
4		Collet chuck
5		Sealing ring of the collet housing

Item	Symbol	Description
6		Collet housing
7		Sealing ring of the back cap
8		Back cap
9		Calliper with round depth measuring rod
10		Electrode setting gauge

- Remove all sealing rings from the torch body (3) and rub sparingly with lubricant VR 500<sup>[1]</sup>. Then insert all sealing rings in the torch body.
- Screw the back cap (8) into the collet housing (6) (note the gap).
- Insert the collet (4) into the collet housing and screw it into the back cap from 0 to 0.5 mm.
- Transfer the dimension "L" to the electrode setting gauge (9) using the calliper > see 10 chapter with round depth measuring rod (10).
- Screw the pre-assembled electrode clamping unit into the torch up to the sealing ring of the collet housing (5).
- Push the electrode (1) with the blunt side first from the front through the torch body into the collet.
- Push the pre-set electrode setting gauge from the front over the electrode into the torch body.
- Screw the electrode clamping unit into the torch housing up to a gap of 1.5 to 2.0 mm. The tip of the electrode must touch the screw of the electrode setting gauge all the time during this process.
- Secure the collet housing with one hand and tighten the back cap with the other hand. The gap of 1.5-2.0 mm from the collet housing to the torch body is retained.
- Ensure the correct gap of the electrode by turning in the collet housing. Remove the electrode setting gauge from the torch body.
- The electrode must never turn when the torch cap is turned. If necessary, reassemble the electrode clamping unit.

[1]

## 5.10 Commissioning

### 5.10.1 Start of welding

Before starting to weld, the arc has to briefly stabilise.

At this stage, the burning pilot arc is not centred.

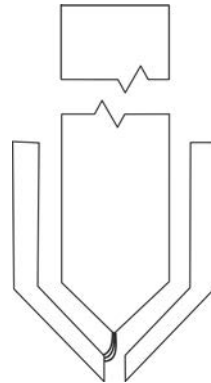


Figure 5-19

### 5.10.2 Double arc

When the current load is too high or the torch held at too steep an angle, a second arc will form between workpiece and plasma nozzle.

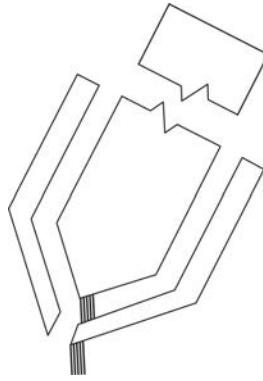


Figure 5-20



***Increased current load and a torch position that is too skew lead to considerable plasma nozzle wear.***

## 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 last 4 minutes until the capacitors have discharged!

#### WARNING



**Incorrect maintenance, testing and repair!**

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

Observe the maintenance instructions > see 6.2 chapter.

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

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

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

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

## 6.2 Maintenance work, intervals

### 6.2.1 Daily maintenance tasks

- Check welding torch, hose package and power connections for external damage and replace if necessary or arrange for repair by specialist staff.
- Check gas and water connections for leaks. Seal properly if necessary.
- Check the cooling device for the welding torch cooling and, if necessary, power source cooling for proper functioning and the coolant level. If necessary, top up with demineralised water or the specified coolant. Arrange for repair if necessary.
- Check the wear parts in the welding torch including the gas lens and the sealing ring of the gas nozzle.
- For welding torches with cold wire feed: Check the cold wire feed nozzle and clamping nut on the cold wire feed tube.

### 6.2.2 Monthly maintenance tasks

- Check the coolant system for contamination (sludge deposits or turbidity). If dirty, clean the coolant tank and replace the coolant. In the case of severe impurity, the cooling system must be flushed several times.
- Do not clean but replace the coolant filter (if present).
- Check the electrical conductivity of the coolant. If conductive, replace coolant.
- Check the condition of the sealing rings (welding torch / connections). Replace if necessary. Always use sealing rings with appropriate lubricant.
- Disassemble and check the plasma torch and the electrode clamping module. Clean if necessary. Danger of high-frequency flashovers in case of contamination.

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

A periodic test according to IEC 60974-4 "Periodic inspection and test" has to be carried out. In addition to the regulations on testing given here, the relevant local laws and regulations must also be observed. For more information refer to the "Warranty registration" brochure supplied and our information regarding warranty, maintenance and testing at [www.ewm-group.com](http://www.ewm-group.com)!

## 6.3 Disposing of equipment



### Proper disposal!

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

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

## 7 Rectifying faults

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

### 7.1 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 level and refill if necessary
  - ✘ Eliminate kinks in conduit system (hose packages)
  - ✘ Vent coolant circuit > see 7.2 chapter
- ↗ Loose welding current connections
  - ✘ Check the plasma nozzle for firm seating.
- ↗ Overload
  - ✘ Check and correct welding current setting
  - ✘ Use a more powerful welding torch

#### No arc ignition

- ↗ Incorrect ignition type setting.
  - ✘ Setting the tungsten electrode
  - ✘ Regrind or replace the tungsten electrode
  - ✘ Ignition type: Select "HF start". Depending on the machine, the setting is defined by the changeover switch for ignition types or the **hF** parameter in one of the machine menus (see the "Control operating instructions", if applicable).

#### Bad arc ignition

- ↗ Material inclusions in the tungsten electrode due to contact with filler material or workpiece
  - ✘ Regrind or replace the tungsten electrode
  - ✘ Clean and change gas nozzle
  - ✘ Insufficient plasma gas quantity
  - ✘ Pilot arc current too low

#### Pilot arc ignites but no main arc forms

- ↗ Distance between workpiece and torch too high
  - ✘ Decrease distance to workpiece
- ↗ Contaminated workpiece surface
  - ✘ Clean the workpiece surface
- ↗ Bad current transfer on ignition
  - ✘ Setting the tungsten electrode
- ↗ Incompatible parameter settings
  - ✘ Check settings and correct if necessary

## Pore formation

- ✓ Inadequate or missing gas shielding
  - ✗ Check shielding gas setting and replace shielding gas cylinder if necessary
  - ✗ Shield welding site with protective screens (draughts affect the welding result)
- ✓ Unsuitable or worn welding torch equipment
  - ✗ Check size of gas nozzle and replace if necessary
- ✓ Condensation (hydrogen) in the gas tube
  - ✗ Purge hose package with gas or replace

## Increased wear

- ✓ Increased electrode wear
  - ✗ Plasma gas purity too low
  - ✗ Electrode distance too high
  - ✗ Insufficient water cooling
  - ✗ Gas supply leak
  - ✗ Shielding gas (argon) pre-/post-flow period too low
- ✓ Increased nozzle wear
  - ✗ Electrode distance too high
  - ✗ Insufficient water cooling
  - ✗ Insufficient plasma gas quantity
  - ✗ Current limit exceeded

## 7.2 Vent coolant circuit

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)!

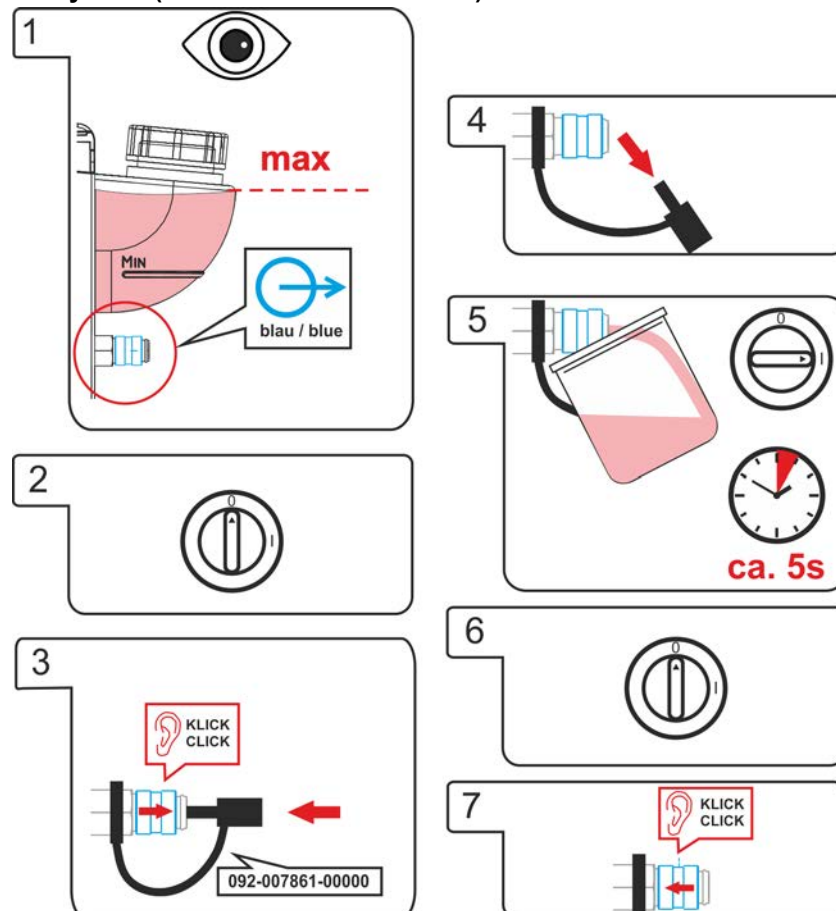


Figure 7-1

## 8 Technical data

### 8.1 PHW 100

max. Power range 100 % Duty cycle DC at 40° C <sup>[1]</sup>	0,5-100 A Direct voltage (Welding torch polarity "-", Electrode Ø: 1,5/2,4 mm / 0,06/0,09 inch) max. 35 A Direct voltage (Welding torch polarity "+", Electrode Ø: 3,2 mm / 0,13 inch) max. 80 A Alternating voltage (Electrode Ø: 3,2 mm / 0,13 inch)
Plasma current (pilot arc)	2-10 A
Plasma gas	Argon
Shielding gas	Argon, Argon-Hydrogen (approx. 95/5 %), Argon-Helium, Helium Argon-Active gas mixture
Torch cooling	water
max. Coolant pressure	4,5 bar
min. Coolant flow	1,2 l/min (Coolant return) 0,32 gal./min (Coolant return)
Coolant return temperature	15-20° C 59-68° F
max. Return flow temperature	35° C 95° F
Hose package length	3-, 4-, 6-, 10 m / 118-, 157-, 236-, 394 inch
Standards used	See declaration of conformity (appliance documents)
Safety marking	CE

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

#### 8.1.1 Dimensions

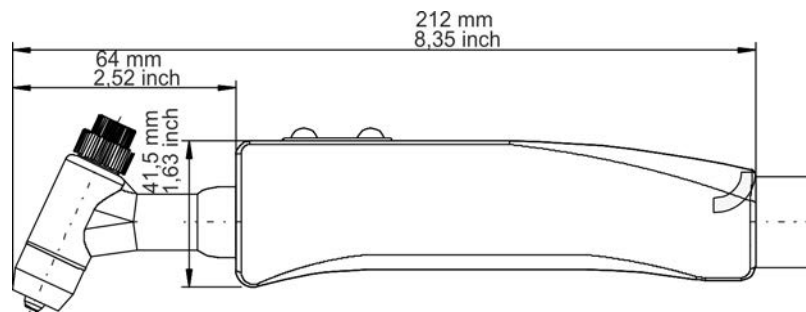


Figure 8-1



## 9 Accessories

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

### 9.1 General

Type	Designation	Item no.
ELECTRODE ADJUSTMENT GAUGE	Electrode setting gauge	094-008262-00000
ON Adap Microplasma new	Adapter for connecting a welding torch with screw coupling to Microplasma 25/55/105	092-003539-00000

### 9.2 Welding torch cooling system

Type	Designation	Item no.
TYP 1	Frost protection tester	094-014499-00000
KF 23E-5	Coolant up to -10 °C (14 °F), 5 l	094-000530-00005
RK2	Reverse cooling unit	094-002284-00000
RK3	Reverse cooling unit	094-002285-00000

## 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.

### 10.1 PWH/PWM 100

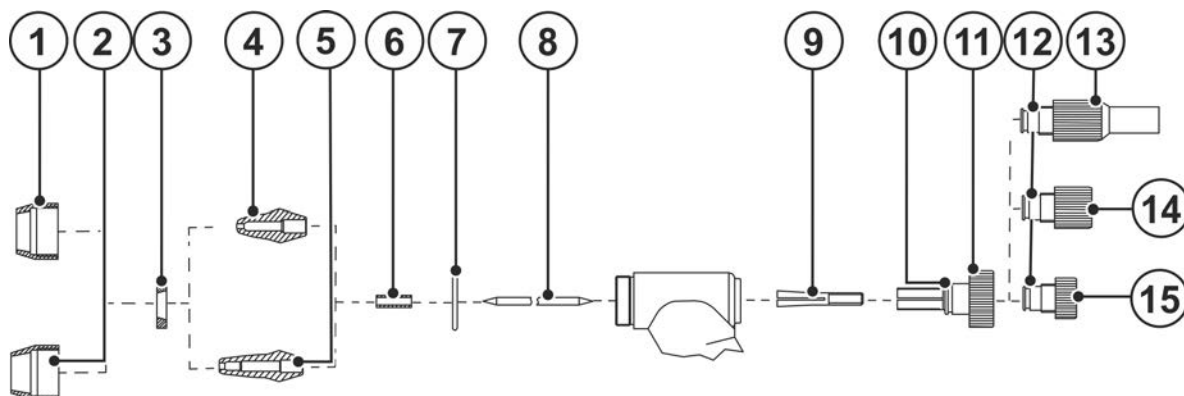


Figure 10-1

Item	Order number	Type	Name
1	094-008237-00000	GASNOZZ SHORT D11mm	Gas nozzle, short
1	094-008238-00000	GASNOZZ SHORT D12MM	Gas nozzle, short
2	094-008240-00000	GASNOZZ LONG 9.5mm	Gas nozzle, long
2	094-008239-00000	GASNOZZ LONG 11mm	Gas nozzle, long
3	094-008281-00000	LENS LARGE PORED	Gas lens, coarse-pored
3	094-008242-00000	LENS PORED	Gas lens, fine-pored
4	094-009256-00000	PNOZZ 8-10 A 0,5 mm	Plasma nozzle
4	094-008282-00000	PNOZZ 15 A 0,6 mm	Plasma nozzle
4	094-008243-00000	PNOZZ PWH/PWM 100 20A 0.8	Plasma nozzle
4	094-008244-00000	PNOZZ PWH/PWM 100 25A 1.0	Plasma nozzle
4	094-008245-00000	PNOZZ PWH/PWM 100 30A 1.2	Plasma nozzle
4	094-008246-00000	PNOZZ PWH/PWM 100 40A 1.4	Plasma nozzle
4	094-008247-00000	PNOZZ PWH/PWM 100 50A 1.6	Plasma nozzle
4	094-008248-00000	PNOZZ PWH/PWM 100 60A 1.8	Plasma nozzle
4	094-008249-00000	PNOZZ PWH/PWM 100 70A 2.0	Plasma nozzle
4	094-009393-00000	PNOZZ 80 A 2.2 mm	Plasma nozzle
4	094-008250-00000	PNOZZ PWH/PWM 100 90A 2.4	Plasma nozzle
4	094-009394-00000	PNOZZ 95 A 2.6 mm	Plasma nozzle
4	094-008251-00000	PNOZZ PWH/PWM 100 100A 3.0	Plasma nozzle
4	094-009126-00000	PNOZZ 3.2mm	Plasma nozzle
5	094-009396-00000	PNOZZ LONG 0.5 mm	Plasma nozzle, long
5	094-009397-00000	PNOZZ LONG 0.6 mm	Plasma nozzle, long
5	094-008252-00000	PNOZZ LONG 0.8 mm	Plasma nozzle, long
5	094-008253-00000	PNOZZ LONG 1.0 mm	Plasma nozzle, long
5	094-008254-00000	PNOZZ LONG 1.2 mm	Plasma nozzle, long
5	094-008255-00000	PNOZZ LONG 1.4 mm	Plasma nozzle, long
5	094-008256-00000	PNOZZ LONG 1.6 mm	Plasma nozzle, long
5	094-008257-00000	PNOZZ LONG 1.8 mm	Plasma nozzle, long
5	094-008258-00000	PNOZZ LONG 2.0 mm	Plasma nozzle, long

Item	Order number	Type	Name
5	094-008550-00000	PNOZZ LONG 2.2 mm	Plasma nozzle, long
5	094-008259-00000	PNOZZ LONG 2.4 mm	Plasma nozzle, long
5	094-008551-00000	PNOZZ LONG 2.6mm	Plasma nozzle, long
5	094-008260-00000	PNOZZ LONG 3.0mm	Plasma nozzle, long
5	094-008479-00000	PNOZZ LONG 3.2 mm	Plasma nozzle, long
6	094-019628-00000	TUBE Ø 1,0 mm	Gas guide insert
6	094-008241-00000	TUBE Ø 1,5 mm	Gas guide insert
6	094-008787-00000	TUBE Ø 2,4 mm	Gas guide insert
7	094-008236-00000	SFN DUE	O-ring for gas nozzle
8	094-019629-00000	TUNGSTEN SPEC Ø1,0 mm X 51 mm	Tungsten electrode, special
8	094-008261-00000	TUNGSTEN SPEC Ø1,5 mm X 51 mm	Tungsten electrode, special
8	094-008951-00000	TUNGSTEN SPEC Ø1,5 mm X 72 mm	Tungsten electrode, special
8	094-008283-00000	TUNGSTEN SPEC Ø2,4 mm X 72 mm	Tungsten electrode, special
9	094-019630-00000	COLLET 1,0	Clamping sleeve
9	094-008235-00000	COLLET 1,5	Collet
9	094-008277-00000	COLLET 2,4	Collet
10	094-008234-00000	O-RING RETAINER	O-ring for the collet housing
11	094-008276-00000	RETAINER COMPLETE	Collet housing
12	094-008233-00000	O-RING TORCH CAP	O-ring for the back cap
13	094-018083-00000	CC XL LONG COMPLETE	Complete back cap, extra-long
14	094-008275-00000	CC LONG COMPLETE	Complete back cap, long
15	094-008274-00000	CC COMPLETE	Back cap, complete
	094-008270-00000	PWH/PWM 100	Spare parts box PWH/PWM 100
	094-019445-00000	VR 500	Lubricant
	094-025527-00000	WLP 35 g	Thermally conductive paste

## 11 Appendix

### 11.1 Searching for a dealer

Sales & service partners

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



"More than 400 EWM sales partners worldwide"