Service Instructions

MIG-O-MAT microflame 140 • 170 • 240 • 300

Hydrogen Soldering Units

• english •

04/2023

CAUTION! Operate the unit only when you have read and understood the present Operating Instruction!

Hausanschrift:
MIG•O•MAT
Mikrofügetechnik GmbH
Werksstrasse 20
DE-57299 Burbach

Telefon: ++ 49 (0)2736 - 41 54 - 0
Telefax: ++ 49 (0)2736 - 41 54 - 99
E-Mail: info@mig-o-mat.com
Internet: www.mig-o-mat.com

Bank: Sparkasse Burbach
Kto. 2568 (BLZ: 460 512 40)
IBAN: DE 36 4605 1240 0000 0025 68
SWIFT-BIC: WELADED1BUB

USt.IdNr.:
DE 811249554
Amtsgericht
Siegen, HRB 4718

Geschäftsführer:
Dipl. Ing. Thomas Schumacher

Contents

1 General

Carefully read the present Operating and Service Instructions, in particular the *Important safety warnings*, before you start operating the unit or before you carry out any repair or service works.

It is assumed that any service staff carrying out repair works possess the required basic electrical knowledge and safety-related special knowledge. Basic and self-evident safety instructions are therefore not repeated for the individual instructions in each section.

We reserve the right to carry out technical modifications on the units due to advanced development.

1.1 Structure of the present service instructions

Safety warnings	Carefully read before any repair or service work.
Maintenance	Description of simple measures of maintenance and upkeep of the unit.
Repair and service	Instructions on trouble shooting, repair and service of the unit.
Spare parts list	The major spare parts are listed. If a more detailed list of spare parts is required please contact the manufacturer.

2 Important safety warnings

Carefully read and observe before putting into operation!

Instructions for the operator

The present unit operates with acid, flammable and – depending on the type of vaporizer liquid – toxic substances. Therefore, a predetermined operating sequence and strict observance of the safety and protection measures described below are prerequisite.

The present operating instructions cannot take each and every specific regulation into consideration which might apply in various countries. The operator of the unit must ensure that all relevant local regulations concerning the prevention of accidents and the use of hazardous substances are known and observed.

Intended use

MIG-O-MAT soldering and welding units are intended for soldering, welding and melting of metals. Operation is allowed by industrial and commercial businesses only.

Operating staff

The unit must be operated by specialized, trained staff only. The operating instructions must be strictly observed. The unit must not be operated by unauthorized persons or by children.

Mains connections

For reasons of safety, the unit must be connected to a shockproof socket only. The technical data indicated on the nameplate must correspond with the available local connection conditions, particularly with regard to mains voltage and current consumption values.

Risks due to electric current

For maintenance and service works, in case of liquid inside the unit and malfunctions, and when you have finished working with the unit pull the main plug. In case of a malfunctioning please contact your supplier or the manufacturer.

The unit must be opened by authorized and specialized staff only!

Risks caused by electrolyte

Electrolyte solution can cause severe chemical burns!

Always wear base-resistant gloves and goggles when you work with electrolyte solution! Do not eat or drink while filling electrolyte solution into the unit!

Wash your hands after filling the reactor!
Avoid contact with eyes and skin! In case of contact with the eyes rinse the open eye(s) under running water for several minutes and seek medical advice. In case of contact with the skin wash immediately with soap and rinse thoroughly.

If you have overfilled the unit, do not remove any excess electrolyte by sucking it through a hose by mouth. There is a risk of severe chemical burns! If you have overfilled the unit by mistake, use a suitable base-resistant suction device which is not operated by mouth.

Electrolyte containers which are not completely empty must be kept tightly closed and stored out of reach of unauthorized persons, in particular of children. Thoroughly rinse empty electrolyte containers with water. Then the container can be disposed of into the ordinary waste. We recommend to contact the local authorities for information on the use and waste disposal of electrolytes.

Risks caused by vaporizer liquid

Risk of fire and explosion! The vaporizer liquid is a flammable substance! Keep away from ignition sources while filling vaporizer liquid into the unit!

Avoid inhaling the vapours! Do not eat, drink or smoke while handling the vaporizer liquid! Wear goggles and gloves!

The MIG-O-MAT vaporizer liquid **BLQ1800** is not toxic. When using other, methanol-containing vaporizer liquids, take into consideration that these substances may be highly toxic! Read and observe the relevant instructions on the labels of the products used.

Risks caused by burnable gas and gas flame

Risk of fire and explosion! Do not leave the unit switched on unsupervised. The gas escaping from the unit is highly flammable and explosive. The switched-on unit must be operated with opened valve only until the flame ignites. Any escaping gas which does not burn in a flame causes a high risk of fire and explosion! For refilling the reactor keep away from ignition sources! Even the open pressure-less reactor contains highly explosive burnable gases.

To prevent the creation of electrostatic sparks immediately before opening the reactor (e.g. for checking the filling level or for refilling distilled water), touch the cap nuts on the top part of the unit or the metal screws on the housing with both hands.

Risk of burning and fire! Hang the burner hand piece with burning flame onto the soldering stand for short operating stops. Ensure that there is a sufficient distance between the flame and any flammable items. Ensure that there is sufficient ventilation for all soldering and welding operations!

Exclusion of laibility

The manufacturer cannot be held liable for damages on persons, equipment or work pieces caused by improper use. The operator is responsible for the correct instruction of the operating staff.

Repair and service

2.1 Demands on service staff

The present service manual is intended to be used by instructed specialized service staff. Legitimate users of the manual are all service staff who do not require to be instructed on the risks caused by and during works on the electrical system. It is assumed that any service staff carrying out repair works possesses the required basic electrical knowledge and safety-related special knowledge on the work with and on appliances operated at mains voltage and on the handling of concentrated bases and solvents.

2.2 Liability

The service staff must be acquainted with the particular safety instructions given in the present manual and learn to apply the safety instruction correctly before carrying out any of the described service works.

The manufacturer cannot be held liable for any service work carried out by service staff members. The responsibility for the minute observance of the prescribed safety instructions and for the safe and proper execution of the service measures taken lies solely with the executing service staff.

2.3 Testing aids, tools and inspection equipment

In addition to the standard electromechanical equipment the following testing and inspection aids and tools and protection gear are required for carrying out the repair and service works described in the present manual:

Protection gear	Goggles, rubber gloves, smock
Software	Software and adapter cable for diagnosis purposes and for resetting the service intervals, depends of production year (available from MIG-O-MAT)
Vacuum pump	For taking the electrolyte liquid out of the reactor
Current probe	D.C. current probe / clamp-on ampere meter (measuring range > DC 170 A) for measuring the electrolysis current
Multimeter	For measuring D.C. and A.C. voltages and for electric continuity measurings
Manometer	For leak checks on the reactor tank

2.4 Safety instructions

CAUTION!

Maintenance, service and repair works must be carried out by instructed specialized staff only.

Observe and follow the safety instructions below when carrying out any maintenance, service or repair works that require the handling of electrolyte or vaporizer liquid:

WARNING!

Caution when handling electrolyte! Risk of chemical burn! Strong acid base!

Risk of chemical burn due to spilling base or splashes of base from the filling duct during filling!

Always wear protective gloves and goggles when handling hazardous substances!

WARNING!

Caution with open filling duct of the electrolyte reactor! Risk of fire and explosion due to ignition sources!

Risk of ignition of the detonating gas in the electrolyte reactor due to ignition sources!

Keep unit away from any ignition sources! Do not use the burner flame to shine into the filling duct!

WARNING!

Caution with open filling duct of the electrolyte reactor! Risk of fire and explosion due to electrostatic discharging!

Risk of ignition of the detonating gas in the electrolyte reactor due to electrostatic discharging!

Touch the cap nuts on the holding angle pieces of the top part with both hands for a short period of time before you open the glass containers. This will branch off any possible electrostatic charging of the **operator** without any risk (mains cable must be connected to the mains)!

WARNING!

Caution when handling vaporizer liquid! Risk of fire and explosion due to ignition sources!

Risk of ignition of the flammable liquids contained in the unit, and of the flammable liquids used for filling, due to ignition sources in the vicinity of the unit!

Keep the open vaporizer glass container and the vaporizer liquid away from any ignition sources!

WARNING!

Caution when handling vaporizer liquid! Risk of fire and explosion due to electrostatic discharging!

Risk of ignition of the flammable liquids contained in the unit top part, and of the flammable liquids used for filling, due to electrostatic discharging!

Touch the cap nuts on the holding angle pieces of the top part with both hands for a short period of time before you open the glass containers. This will branch off any possible electrostatic charging of the **operator** without any risk (mains cable must be connected to the mains)!

3 Malfunction and service indications in the display

3.1 Service interval has run down

During operation of a soldering unit the anodes and cathodes wear out. Therefore, the gas drawing hours are measured by the control of the unit to ensure safe operation.

Show service level

The service level can be called by changing the display.

Press the key to indicate the gas drawing hours and the service level:

„100 %“ service level is he standard status of the unit when delivered or when the unit has been serviced. The reactor should be serviced every two years or when a service level of „0 %“ is indicated.

A signal tone and a message in the display indicate when the unit must be serviced:

Service interval
has run down!

The signal tone can be silenced by pressing any key. Operation of the unit may continue for a limited period of time.

Carry out the service measures described in *section 7* as soon as possible.

Caution: The manufacturer cannot be held liable for any damage on persons, or for damage on the equipment caused by operation of the unit after the service interval has run down!

Transformer overload

In case of malfunctions of the unit caused by thermal overcharging or overpressure, the gas production is automatically stopped: the unit changes the set value to zero. A signal tone indicates the malfunction. Close the valve at the hand piece. The signal tone can be silenced by pressing any key.

If the main transformer is overloaded, the display shows the following malfunction message:

Transf. overload!
Let cool down!

Operation can be continued only after the transformer has cooled down. For this change the set value back to the required value.

3.2 Excess temperature

If the allowed reactor temperature of 80°C is exceeded, the display shows the following malfunction message:

Excess temp.! **Let cool down!**

Causes An excess reactor temperature may be caused by the following:

- Filling level of electrolyte too low: check the filling level.
- Ventilator not operating: check if the ventilator operates during drawing of gas, or at a temperature of approx. 40°C without drawing of gas. The ventilator speed is controlled depending on the reactor temperature.
- Adverse ambient conditions:
  - the unit is placed at an insufficiently ventilated workplace
  - the lateral ventilation openings are blocked
  - extremely high ambient temperature
  - extreme utilization with at least one of the above adverse conditions

Operation can be continued after the unit has cooled down. For this change the set pressure value back to the required value.

In case of malfunctions due to overheating it is important not to switch off the unit at the mains switch, as the ventilator will then stop operating, too. If the noise of the operating ventilator is too loud switch the unit into stand-by operating mode by pressing the *on/off* key  . In this mode, the ventilator speed is reduced. Cooling down will take considerably longer!

3.3 Faulty pressure control

If the pressure control device has broken down the unit automatically switches off and the display shows the following malfunction message:

Faulty pressure control!

Switch off the unit at the mains switch and restart it (reset the unit).

Cause If the malfunction continues, the pressure sensor is probably faulty or damaged (*see Section 6.6*).

3.4 Excess pressure – safety pressure switch broken

If the safety pressure switch is broken the display shows the following malfunction message

Excess pressure!
Safety pressure switch faulty!

A signal tone indicates the malfunction. The reactor is switched off automatically and the gas production is stopped.

Replace the safety pressure switch as described in *Section 6.8*.

4 Trouble shooting

Malfunction / Fault	Possible cause	Remedy
The unit does not build up any pressure: The set pressure is e.g. 150 mbar, the actual pressure does not reach the set pressure value (with burner hand piece closed!)	Unit is leaking.	Carry out the leak check and check if there is a leak in the gas route. If a leak is detected (indicated in the display) search for the leak as described in Section 6.1.
Unit builds up pressure extremely slowly, the set pressure is not reached or it takes extremely long until the set pressure is reached.	Unit is leaking.	Carry out the leak check and check if there is a leak in the gas route. If a leak is detected (indicated in the display) search for the leak as described in Section 6.1.
	Electrolyte filling level too low.	Check filling level, refill distilled water if required.
	Reactor output is reduced due to contaminated or too old electrolyte.	Check reactor performance as described in Section 6.3.
Flame is very weak and „sits“ on the nozzle (nozzle tip is glowing). The set pressure, e.g. 150 mbar, is reached. During operation the actual pressure goes down to a value which does not produce the same flame as before with the same nozzle.	Set pressure is too low for the nozzle size used, unallowable nozzle size (too large).	Check if the used nozzle is allowed for the unit. If the nozzle size is OK increase the set pressure value.
	Very small leak in the unit.	Carry out the leak check and check if there is a leak in the gas route. If a leak is detected (indicated in the display) search for the leak as described in Section 6.1.
	Electrolyte filling level too low.	Check filling level, refill distilled water if required.
	Gas route is partly obstructed.	Check gas route for obstructions as described in *Section 6.2*.

	Reactor output is reduced due to contaminated or too old electrolyte.	Check reactor performance as described in Section 6.3.
Malfunction	**Possible cause**	**Remedy**
The flame is instable.	The nozzle is obstructed.	Clean or replace the nozzle.
	The gas route is partly obstructed.	Check the gas route for obstructions as described in *Section 6.2.*
	The vaporizer liquid has been consumed.	Remove remaining vaporizer liquid and fill new vaporizer liquid, clean the glass.
No gas at the nozzle / no flame possible. When the valve at the hand piece is opened the actual pressure does not go down (even with removed nozzle).	Gas route is obstructed.	Check the gas route for obstructions as described in *Section 6.2.*
Gas production is automatically switched off due to excess temperature. The display shows the malfunction message: *Excess temperature*	Excess reactor temperature (max. 80°C).	Let unit cool down.
Foam inside gas hose.	Unit has been overfilled.	Check the filling level, reduce if necessary (suck off electrolyte) as described in *Section 5.1*.
	Electrolyte is contaminated.	If the filling level is OK (no overfilling), exchange the electrolyte (drain reactor as described in *Section 5.1)* and clean the reactor (see *Section 7.5*).
The display is dark, unit is dead.	Faulty fuse(s) on circuit board or main switch.	Check fuses and replace if necessary (*Section 5.4 / 12.4.1*).

(Main switch on the unit rear is switched on and the start button in the display has been pressed.)	Circuit board faulty.	If the fuses are OK, replace the circuit board (*Section 6.7*).
Malfunction / Fault	**Possible cause**	**Remedy**
The display shows the following malfunction message: Operating pressure control faulty	The hose to the pressure sensor on the circuit board is obstructed by residues of electrolyte (electrolyte has been overfilled).	Check the hose to the pressure sensor, replace if necessary (*Section 6.5*).
	The pressure sensor on the circuit board is damaged (electrolyte has been overfilled).	If the malfunction message continues to be displayed after exchange of the obstructed hose: replace the pressure sensor (*Section 6.7*).
The display shows the following malfunction message: Excess pressure! Faulty safety pressure switch!	The safety pressure switch is faulty.	Replace the safety pressure switch (*Section 6.8*).

5 Preparatory measures

5.1 Remove the electrolyte from the reactor

For shipment of the microflame unit, and for particular maintenance works, remove all electrolyte from the unit.

For emptying the electrolyte reactor use a suitable base-resistant suction device (waterlock), or e.g. a simple suction device consisting of a PVC hose and a plastic bottle or a syringe.

Fig. 5.1 Plastic bottle and hose for removal of electrolyte from the reactor

WARNING!

Caution! Strong acid base!

Risk of severe chemical burn on skin, mucous membranes and eyes!

Do not suck any electrolyte through a hose by mouth!

To prevent dangerous chemical burn when handling electrolyte always wear protective gloves and goggles!

How to proceed

1. Switch off the microflame at the mains switch at the back of the unit.
2. Open the screw cap of the filling duct for electrolyte.
3. Take out the glass floating body. Caution! The glass floating body is covered with base! Rinse the floating body with water.
4. Remove all electrolyte from the reactor by means of a suitable suction device.

Example plastic bottle with PVC hose:
1. Insert the hose into the filling duct of the reactor and push it down as far as it goes.

2. Compress the plastic bottle, then create a vacuum by releasing the bottle.
3. As soon as electrolyte starts flowing through the hose, pull off the bottle and hold the hose end into an base-resistant container. Let all electrolyte drain into the container.

5. Keep the electrolyte in an base-resistant container and clearly mark the container. Store the container at a safe place and keep it away from unauthorized persons, in particular from children. Or dispose of the electrolyte as described in *Section 9.2*.

5.2 Remove the vaporizer liquid from the vaporizer glass

For shipment of the microflame unit, and for particular maintenance works, remove all vaporizer liquid from the unit. For the disposal of the vaporizer liquid observe the instructions given in *Section 9.3.*

WARNING!

Caution when handling vaporizer liquid! Risk of fire and explosion due to ignition sources and electrostatic charging!

When handling vaporizer liquid keep away from any ignition sources!

Avoid electrostatic discharging!

Touch the cap nuts on the holding angle pieces of the top part with both hands for a short period of time before you open the vaporizer glass container (the mains cable must be connected to the mains supply). This will branch off any possible electrostatic charging of the operator without any risk!

How to proceed

1. Press the *on/off* key in the operating panel to switch off the gas production.
2. Unscrew the fastening ring by turning it to the left (*see fig. 7.2.D*).
3. Remove the vaporizer glass. Move the complete top part to the side to facilitate removal of the vaporizer glass.
4. Drain the vaporizer liquid.
5. Fill the vaporizer liquid into a specially marked container and store out of reach of unauthorized persons, in particular of children. Or dispose of the electrolyte as described in *Section 9.3*.
6. Remount the vaporizer glass by screwing the fastening ring back to the right (*see fig. 7.2.E*).

5.3 Open the unit

Opening of the unit by authorized, specialized staff only

Repair and maintenance works that require the unit to be connected and opened must be carried out by authorized specialized staff only.

WARNING!

Risk of electric shock due to live parts inside the unit!

Pull the mains plug before you open the unit!

The manufacturer cannot be held liable for any damage caused by unauthorized repair works on the unit.

5.4 Open the operating panel for detail repair on electronics

For repair works on the circuit board or the pressure sensor it is only necessary to open the operating panel:

How to proceed

1. Separate the unit from the mains!
2. Unscrew the screws at the operating panel.
3. Carefully tip the operating panel to the front.
4. Pull the electric contact of the LED connection (*fig. 5.4.A*) off the circuit board.
5. Cut the cable clip (*fig. 5.4.B*) to allow some space to remove the operating panel from the unit.

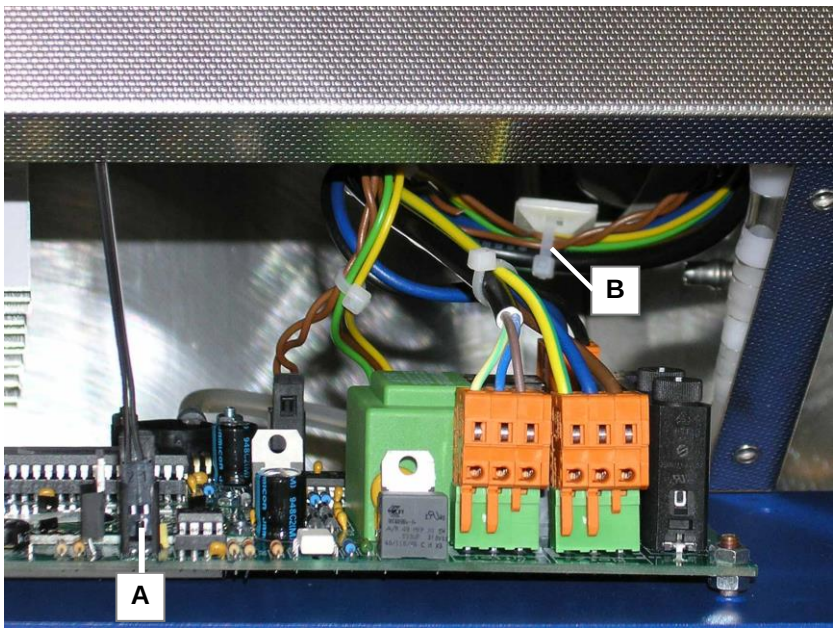


Fig. 5.4 Pull off the LED connection cable – cut the cable clip

5.4.1 Description of circuit board

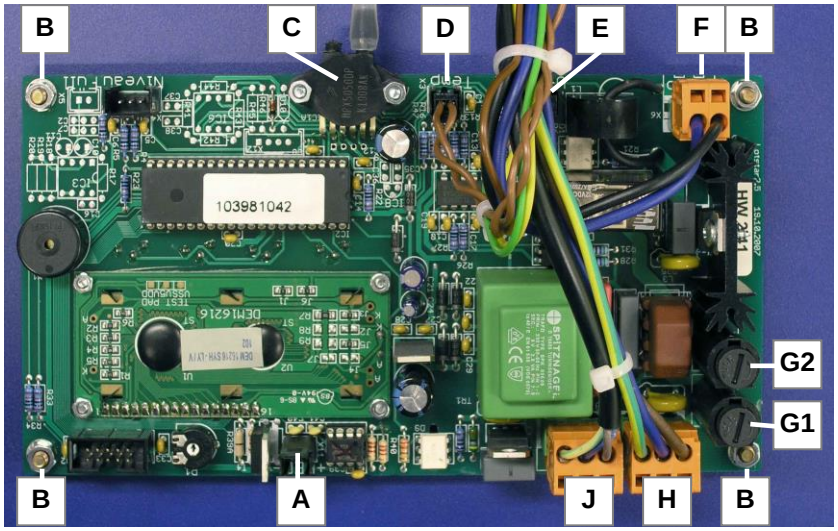


Fig. 5.4.1 Circuit board completely assembled

A Connection for LED vaporizer glass lighting
B Fastening screws (4 pcs)
C Pressure sensor with gas hose
D Connection for temperature sensor
E Connection for excess pressure switch
F Connection for transformer
G1 Time-lag fuse 10A
G2 Time-lag fuse 500mA
H Connection for mains supply

J Connection for ventilator

5.5 Open the casing top for repair and service purposes

For a number of repair and service works the casing top and cover must be removed. Proceed as follows:

How to proceed

1. Separate the unit from the mains!
2. Drain the vaporizer liquid from the vaporizer glass (*fig. 5.5.A*) and store it safely.
3. Unscrew the screw connection (*C*) at the reactor outlet.
4. Unscrew the 4 cap nuts (*B*) that fasten the top part with the glasses and put the top part at a safe place.
5. Unscrew the 4 screws that hold the casing cover
6. Remove the cover.

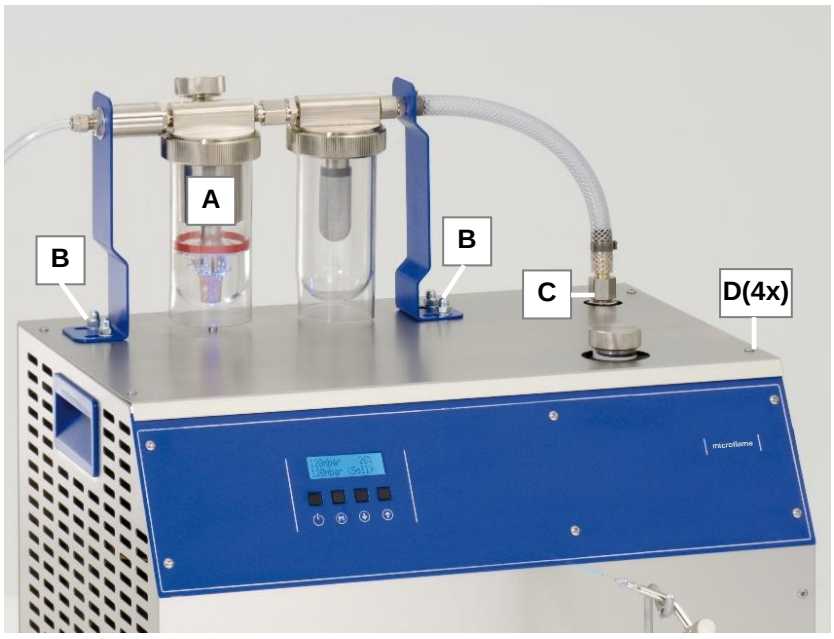


Fig. 5.5 Top part complete with glasses

5.5.1 Description of internal components

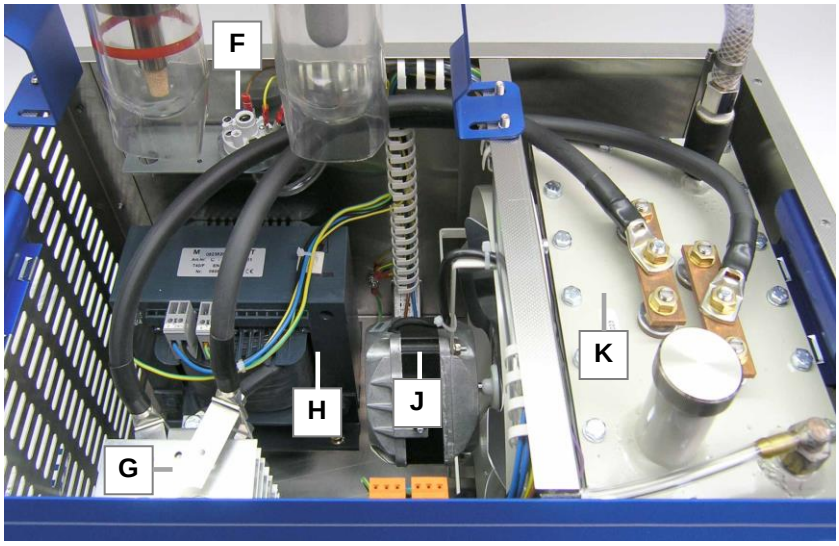


Fig. 5.5.1 Opened unit with top part mounted

F Safety pressure switch
G Rectifier
H Transformer
J Ventilator
K Reactor

6 Troubleshooting

6.1 Leak check indicates malfunction – unit leaky

Display indicates a leak

A leak can only be indicated in the display during the leak check. Any loss of gas during operation can be detected e.g. when there is less gas available at the nozzle.

Unit is leaking!
Repair the leak!

If the display indicates this message during start-up (leak check), check the unit following the instructions below.

In case of a major leak, the build-up of pressure during the leak check (pressure for leak check is 200 mbar) within the pre-set time may fail. The display shows the same message as above.

There may also be a leak, if the flame is too weak and/or sits on the nozzle with full operating pressure (200 mbar) and suitable nozzle. If this is the case, carry out the leak check. If a leak is detected check the unit following the instructions below.

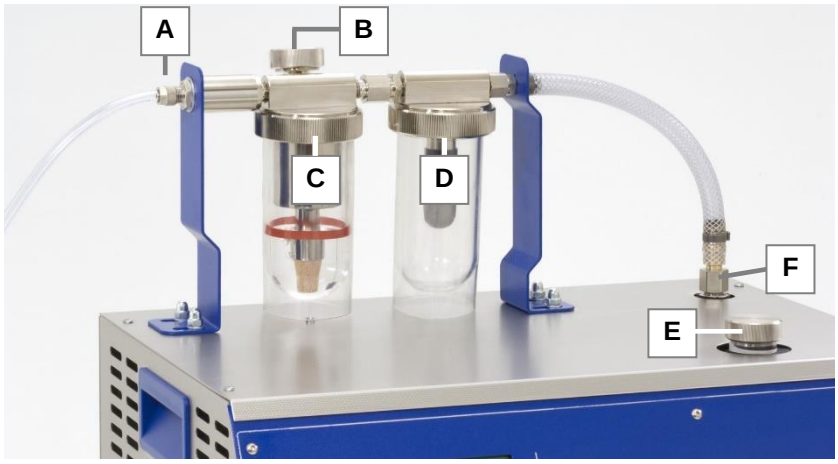


Fig. 6.1.1 Top part of Elmaflame unit

How to proceed

Find the section where the leak has occurred:

Screw connections / glass containers

Unscrew the glass containers and check the rim for damage. If OK, screw the glass containers back in.

Tighten the screws *Fig. 7.2*. *A – B – C – D – E* hand-tight. Attention! Do not use a pipe wrench!

Repeat the leak check. If the display still indicates a leak retighten the lock nut (*F*):

Lock nut at reactor outlet

Use a 19 mm fork wrench to retighten the lock nut (*F*) at the reactor outlet.

Repeat the leak check. If the display still indicates a leak, these screw connections are tight.

Now check the hand piece:

Hand piece

Open and remove the screw connection of the burner hand piece.

Seal the gas outlet at the unit with your thumb (section A).

Repeat the leak check:

1. If the result of the leak check is OK, the leak is in the hand piece.
   Reconnect and screw the gas hose to the unit.
   Hold the hand piece into a bucket/container filled with water.
   Repeat the leak check: Probably, there are gas bubbles visible coming out of the hand piece which indicate the leak (Fig. 6.1.2 arrows). Carry out another leak check with open gas regulation screw to check if the nozzle is mounted correctly.
2. If the leak check is not OK the hand piece is OK. Now check the reactor.

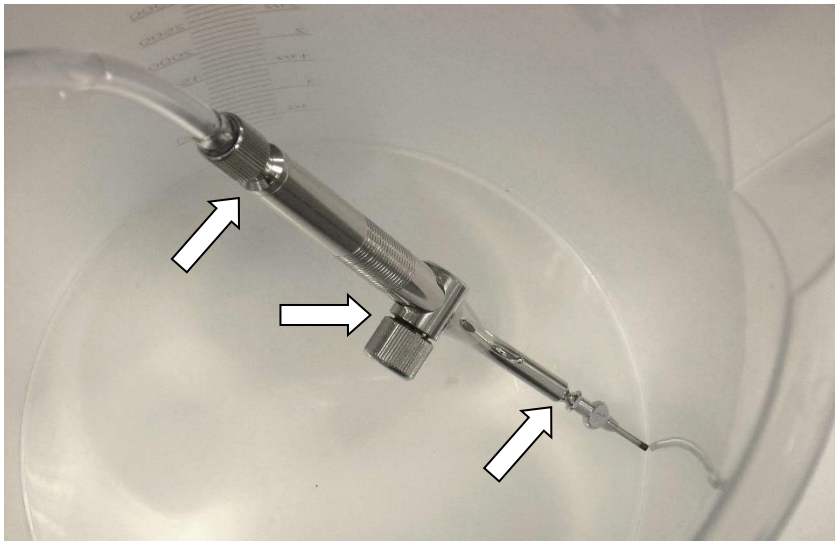


Fig. 6.1.2 Hand piece immersed in water

Reactor

Use a 19 mm fork wrench to loosen the lock nut (*Fig. 6.1.1.F*) at the reactor outlet and remove the gas hose from the reactor.

Seal the reactor outlet manually (hand, thumb – wear rubber gloves!).

Repeat the leak check:

1. If the leak check is not OK, check the reactor following the instructions below.
2. If the leak check is OK (which is not very probable, as all sections where a leak is possible have been checked) start the leak detection process again.

Check reactor with manometer

Another way to check the reactor for leaks is the use of a manometer (*Fig. 6.1.3*), available from the manufacturer / supplier of the unit. The measuring range should be up to approx. 200 mbar.

Remove the gas hose from the reactor outlet and mount the manometer to the outlet.

Fig. 6.1.3 Manometer mounted to gas outlet duct

6.2 Gas route obstructed, no flame

If the unit builds up and indicates pressure, e.g. 150 mbar, but there is no or little gas coming out of the nozzle (no flame, no gas perceptible at the nozzle), the gas route is obstructed. Another symptom indicating an obstruction of the gas route is, if the actual pressure indicated in the display does not go down with opened hand piece and largest possible nozzle.

Find the obstruction

In order to find the obstruction the gas route must be opened at suitable sections. Set the pressure to 200 mbar and open the hand piece. When the pressure goes down by one of the measures the obstruction is located.

How to proceed

Carry out the following checks in the indicated order and observe the pressure indication to see if the pressure goes down:

Nozzle

1. Pull off the nozzle (*fig. 6.2.A*): if the pressure goes down the nozzle is obstructed and must be replaced.

Hand piece

2. Pull off the hand piece hose (e.g. at the screw connection at the top part (*B*): if the pressure goes down the hand piece is obstructed and must be replaced.

Check valve

3. Open the screw cap (*D*) at the vaporizer glass: if the pressure goes down the check valve is obstructed and must be replaced (*see Section 7.3*).

Sinter piece

4. Unscrew and remove the dryer glass (not the vaporizer glass): if the pressure goes down the sinter piece (*E*) is obstructed and must be replaced.

Filter candle

5. If the pressure does not go down with unscrewed and removed dryer glass the filter candle (F) is obstructed and must be replaced.

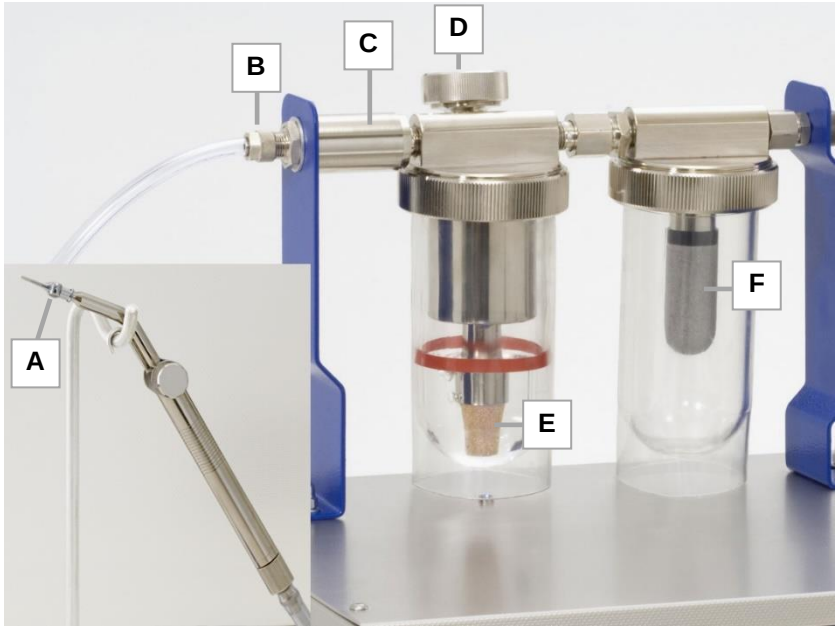


Fig. 6.2 Top part with nozzle

6.3 Gas flow reduced, flame too weak

If the flame is too weak or „sits“ on the nozzle (which can damage and destroy the nozzle) this can have a number of reasons.

Carry out the following checks:

Operating pressure Ensure that the set gas pressure is sufficient for the nozzle used; increase the gas pressure if necessary.

Nozzle size Check if the nozzle used is larger than permitted for the type of unit that is being operated.

Filling level reactor Check the reactor filling level: the glass floating body must be visible at the upper edge of the filling duct (*see fig. 6.4.1 in Section 6.4*). If necessary fill the missing quantity of distilled water.
In case of an overfilling see how to proceed in *Section 6.4.*

If the reactor filling level is too low this may cause malfunctions, accelerated wear and tear and excess temperatures of the reactor due to a too high concentration of the electrolyte.

Check for leaks Carry out a leak check to ensure that the unit has no leak.

Service status Check the service status in the display.
Press the key Ⓜ: the operating panel indicates the total gas drawing time and the service level:

If the service level is „0 %“ the electrolyte may not be powerful enough. The unit requires to be serviced (*see Section 7*).

Hand piece The gas flow through the hand piece may be obstructed partially due to deposits in the hand piece or after one or more flashbacks.

Further checks:

Measure the electrlysis current The electrolysis current indicates the condition of the electrolyte.

Use a current probe / clamp-on ampere meter (measuring range > DC 170 A) to measure the current at the cables A and B (*see fig. 6.3.1.G*). The measured value must be around the following values:

microflame 140	Microflame 170	Microflame 240	Microflame 300
70 A	100 A	140 A	170 A

If the electrolysis current is considerably lower than the indicated values, clean the reactor and exchange the electrolyte (provided the filling level is correct).

Measure voltage drop

High transition resistance values at the connecting cables for the electrolysis current (*fig. 6.3.1 A / B*) can cause a voltage drop which reduces the reactor performance.

Measure the D.C. between C – D (*fig. 6.3.2*) and then between E – F (*fig. 6.3.3*). Compare the measured values: The voltage drop between rectifier and reactor must not exceed 0.1V DC. If the difference of the measured values is larger than that, unscrew and clean the contacts.

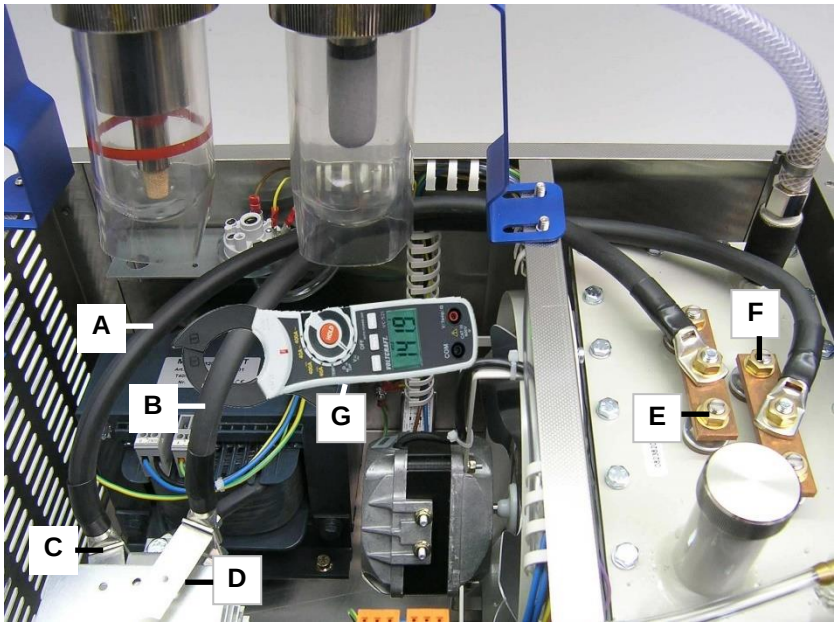


Fig. 6.3.1 Electric measuring points overview

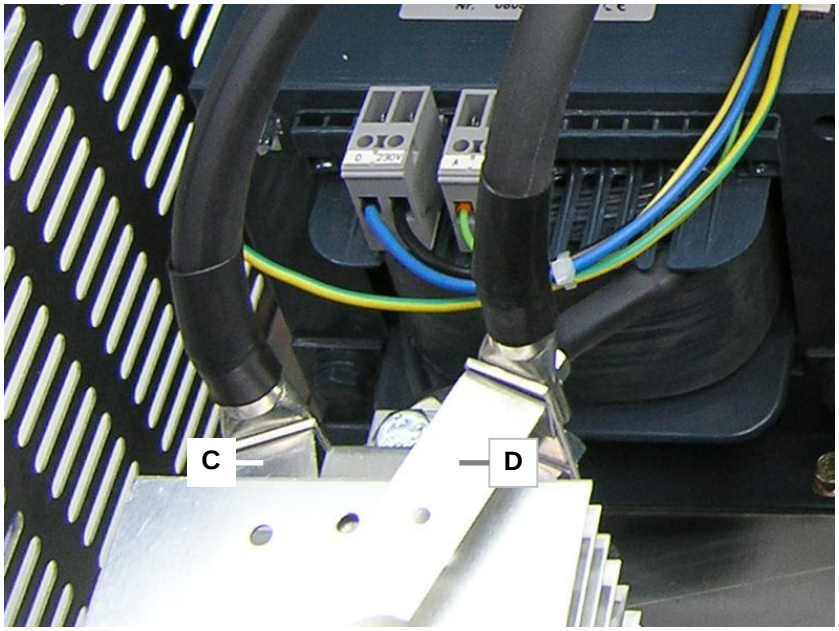


Fig. 6.3.2 Electric measuring points rectifier

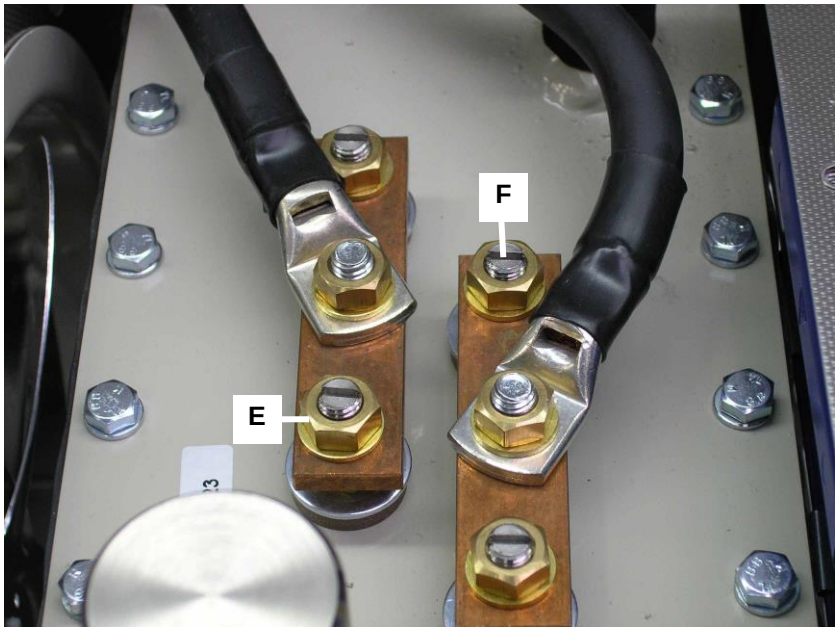


Fig. 6.3.3 Electric measuring points reactor connection

6.4 Unit overfilled – damage by overfilling

If the display indicates the following malfunction message:

Operating pressure control faulty!

it must be assumed that the pressure sensor has been damaged by entering liquid.

Check filling level

At first, check the reactor filling level: An overfilling is indicated by the position of the glass floating body (*fig. 6.4.1.B*) in the filling duct (*A*).

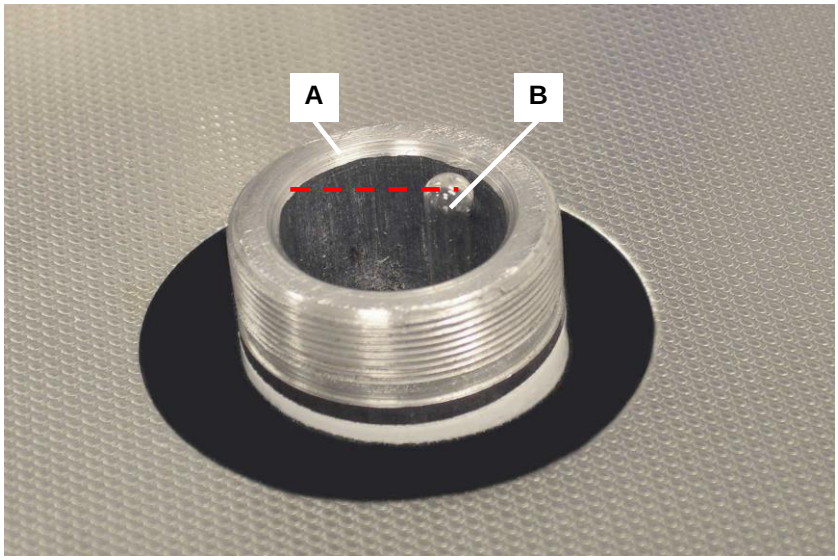


Fig. 6.4.1 Filling duct with glass floating body at correct filling level

Remove excess electrolyte

If the glass floating body protrudes higher than the upper edge of the filling duct, remove the excess electrolyte. Proceed as described in *Section 5.1* until the correct filling level is reached.

Check gas hose

1. Pull the mains plug!
2. Unscrew the 6 Allen screws (*see Section 5.4*) to remove the operating panel.
3. Check the hose inside the unit (*fig. 6.4.2.C*) between reactor and pressure sensor (*fig. 6.4.2.D*) for traces of liquid (electrolyte) or crystal deposits (dried electrolyte).
4. If there are a lot of deposits the level sensor is probably damaged. Replace the circuit board as described *in Section 6.7*.
5. Remove any residues from the hose (e.g. by rinsing) or replace the hose.

Check pressure sensor

Switch on the unit: No malfunction message must be indicated.

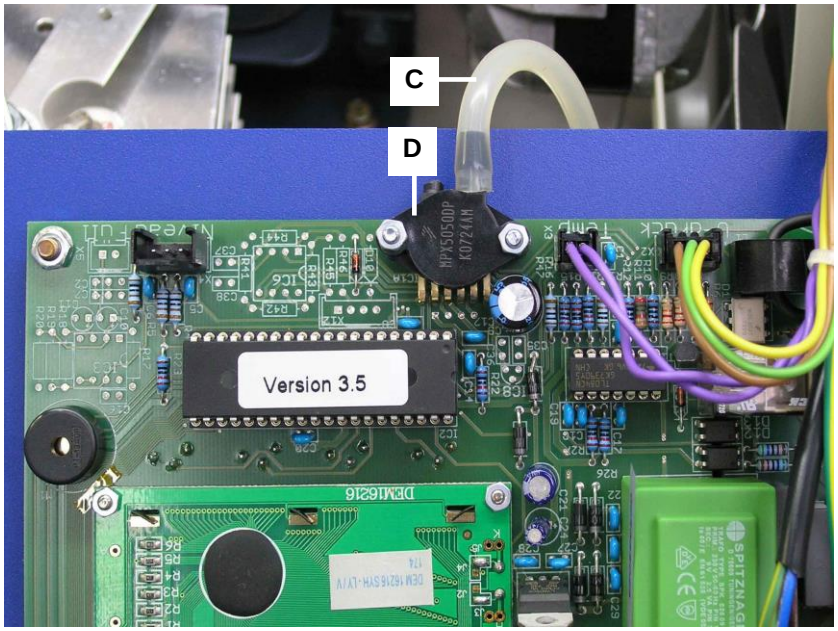


Fig. 6.4.2 Gas hose with pressure sensor

6.5 Foaming of electrolyte in gas hose

A brown foaming inside the gas hose, in the dryer glass and/or in the hose to the pressure sensor (inside the unit) indicates either a massive overfilling of the reactor, or a contamination of the electrolyte. Possibly ordinary water, vaporizer liquid or another substance has been filled into the reactor instead of distilled water.
A light brown colouring of the gas hose at the connection to the reactor is caused by oxidation residues and is harmless.

Carry out the following measures to solve the problem:

Check electrolyte filling level

Check the position of the glass floating body in the reactor (*see Section 6.4 fig. 6.4.1).*
If the reactor has been overfilled remove the excess quantity of electrolyte as described in *Section 5.1*.
Switch on the unit: If the problem is still there the electrolyte is probably contaminated and can no longer be used.

Proceed as follows:

Empty and clean reactor

1. Remove all electrolyte from the reactor (*see Section5.1*).
2. Open and clean the reactor. For this dismount and remove the reactor from the unit (*see Sections 7.4 and 7.5*).
3. Replace the reactor sealing and remount the reactor.

Check the gas hose to the pressure sensor visually, replace the pressure sensor if necessary (*see Section 6.4/6.6*).

6.6 Defect of pressure sensor

The pressure sensor can be damaged by overfilling of the electrolyte reactor or by foaming excess electrolyte. In this case, liquid (electrolyte) or crystal deposits are visible in the gas hose.

A damaged pressure sensor is generally indicated by the following malfunction message in the display:

Operating pressure control faulty!

If pressure sensor is defect, circuit board can be returned to the manufacturer for repair or a new circuit board can be installed.

6.7 Exchange the circuit board

In case of a breakdown of the display check the fuses (*fig. 6.7.E*) on the circuit board.

NOTE

When handling the circuit board, electrostatic discharging can destroy the sensitive electronic components on the circuit board. Observe the ESD protection measures.

If the circuit board needs to be exchanged follow the instructions below:

1. Open the operating panel of the unit as described in *Section 5.4*.
2. Pull the hose off the pressure sensor, pull off the electric connectors.
3. Use a 7 mm fork wrench to unscrew the 4 fastening screws (*see fig. 6.7.A*).
4. Mount the new circuit board in reverse order. Ensure that there is a minimum distance of 6 mm between the circuit board and the operating panel.

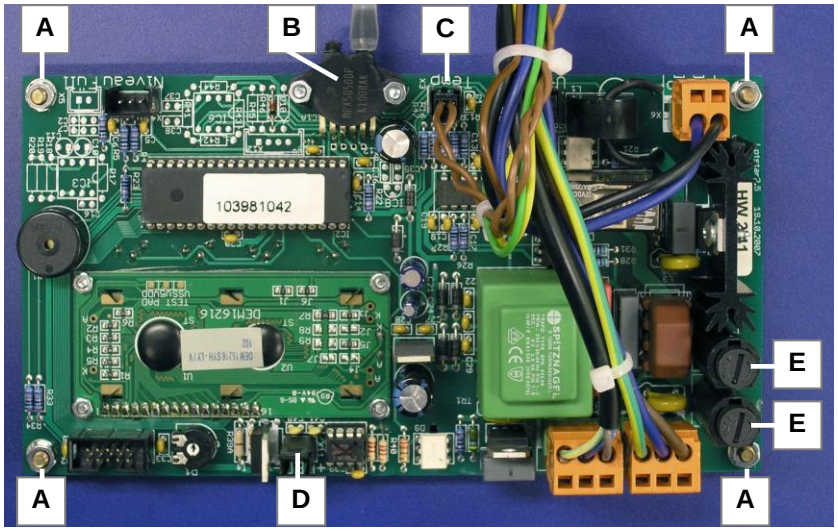


Fig. 6.7 Control board mounted

6.8 Exchange the safety pressure switch

A breakdown of the safety pressure switch is indicated by the following malfunction message in the display:

Excess pressure!
Safety pressure switch faulty!

The unit emits an acoustic alarm signal (high-pitched whistle). The reactor is automatically switched off and the gas production is stopped.

To replace the safety pressure switch follow the instructions below:

1. Open the cover as described in *Section 5.5*.
2. Pull the gas hose (*fig. 6.8.A*) off the safety pressure switch.
3. Unscrew the fastening nut (*B*) with a 17 mm fork wrench.
4. Take the faulty safety pressure switch out of the support and plug the electric connections (*C*) onto the new safety pressure switch.
5. Mount the component and attach the gas hose.
6. Check again if all electric connections are positioned correctly (*see fig. 6.8.C*).

NOTE

The safety pressure switch is set to the correct releasing pressure by the manufacturer. For reasons of safety the settings must not be modified at any later time.

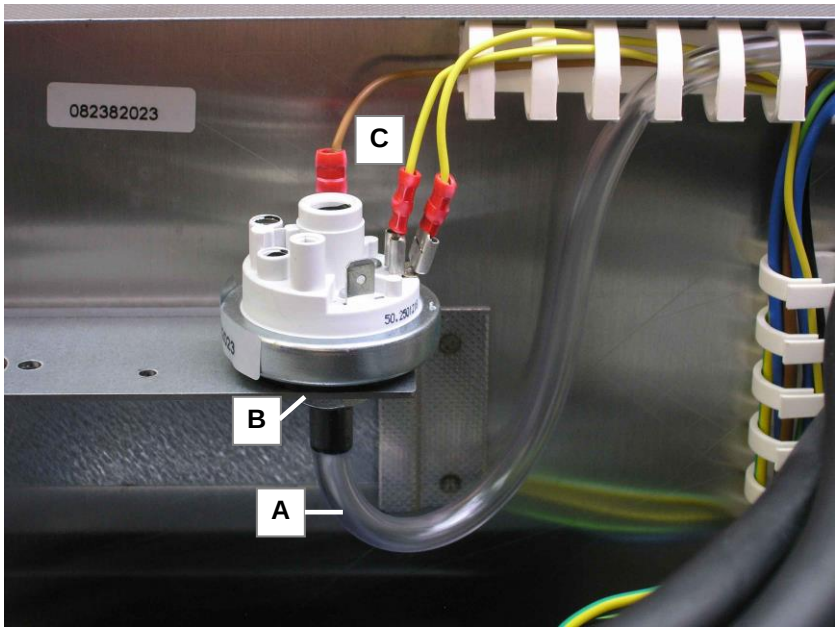


Fig. 6.8 Safety pressure switch mounted

6.9 Ventilator out of operation / Display indicates excess temperature

The ventilator cools the reactor to counteract the heating of the electrolyte during operation. The 4-step speed of the ventilator depends on the reactor temperature. The ventilator is started at a reactor temperature of approx. 40°C, or during gas withdrawal even under 40°C. A thermo-controlled safety switch-off of the reactor is carried out at 80°C, the ventilator continues operating at top speed to cool the reactor.

If the ventilator does not start operating after a certain operating time and with an increased reactor temperature, this can be caused by a problem of the ventilator control or by a faulty ventilator.

Check if the ventilator blades rotate freely or if they are blocked by a cable, etc.

Then carry out the following instructions to find the fault:

Check ventilator

Pull the connector of the ventilator power supply (*see Section 5.4.1 fig. 5.4.1.J*) from the circuit board. Measure the internal resistance at the connector contacts.

The internal resistance is < 1 Ohm. The ventilator motor is very probably OK if the measured value does not considerably deviate from this value.

In case of an interruption, or if the measured resistance is infinite replace the ventilator as described in *Section 6.10*.

Check temperature sensor

Measure the resistance of the temperature sensor at the connector (*see Section 5.4.1 fig. 5.4.1.D*). Depending on the type of the measuring tips of the device used, the connector must be pulled off to reach the contacts.

At a reactor temperature of approx. 20°C/room temperature the resistance is aprox. 980 Ohm. If the measured value deviates considerably exchange the temperature sensor as described in *Section 6.11*.

Check power supply

Measure the power supply voltage of the ventilator at the connection jack (*see Section 5.4.1 fig. 5.4.1.J*) on the circuit board. At a reactor temperature of approx. 20°C/room temperature the voltage is approx. 230 V. If the measured value deviates considerably, or if it is 0 V exchange the circuit board as described in *Section.7*.

6.10 Replace the ventilator

In case of a breakdown of the ventilator caused by a fault on the ventilator (see *Section 6.9)* follow the instructions below to replace the ventilator:

1. Open the cover as described in *Section 5.5*.
2. Pull the ventilator power supply connector (*see Section 5.4.1 fig. 5.4.1.J*) from the circuit board and cut the cable clips where necessary.
3. Unscrew the ventilator. The position of the screws depends on the model and the used ventilator.
4. Insert and mount the new ventilator in reverse order. Ensure that no cables touch the ventilator blades and that the blades can rotate easily.

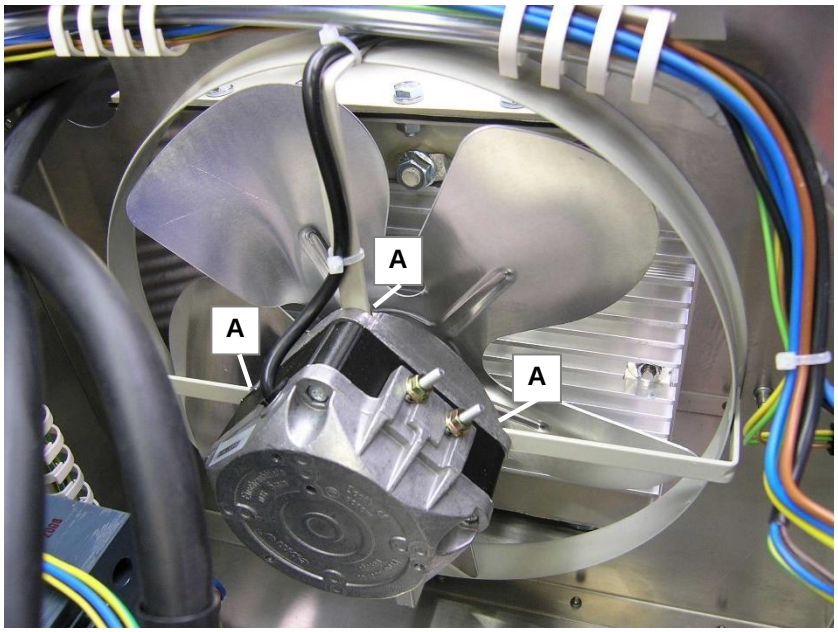


Fig. 6.10 Ventilator correctly mounted

6.11 Replace the temperature sensor

In case of a breakdown of the temperature sensor (see *Section 6.9)* follow the instructions below to replace the component:

1. Open the cover as described in *Section 5.5*.
2. Pull the temperature sensor connector (*see Section 5.4.1 fig. 5.4.1.D*) from the circuit board and cut the cable clips where necessary.
3. Use a 17 mm fork wrench to unscrew the nuts (*see fig. 6.11.B*) that fasten the temperature sensor to the reactor, take out the temperature sensor.
4. Mount the new temperature sensor in reverse order. Ensure that no cables touch the ventilator blades.

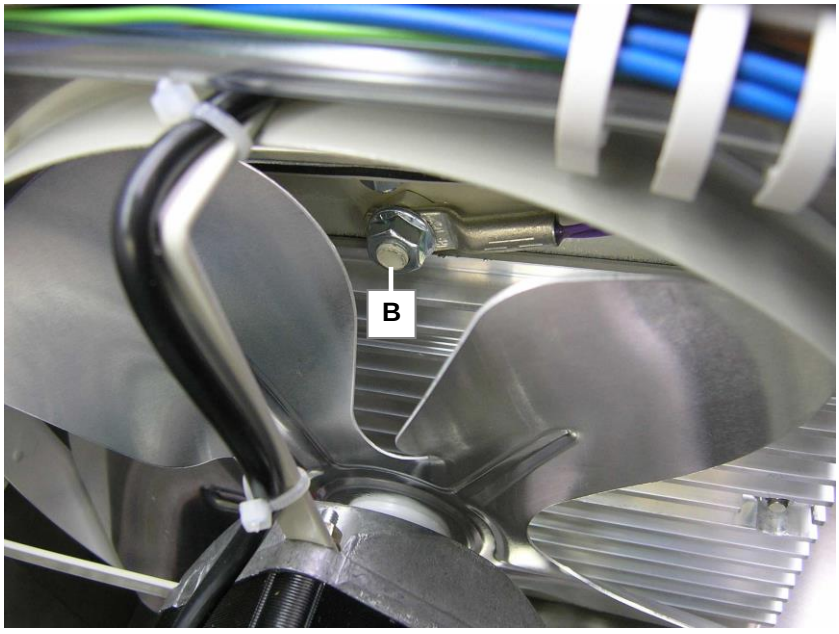


Fig. 6.11 Temperature sensor mounted to the reactor

7 Unit service at service status 0 %

The unit needs to be serviced when the service status indicated in the display is „0 %“.

Observe the following service measures which are described in detail below:

- Open and clean the reactor, if necessary replace the electrodes (cathode and anode).
- Replace the reactor sealing (fig. *7.A*).
- Replace the set of washers of the electrodes (*B*).
- Replace the check valve (*C*).
- Replace the filter candle in the dryer glass (*D*).
- Replace the sinter piece in the vaporizer glass (*E*).
- Check the glasses for damage.
- Replace o-rings of glasses (2 pcs).
- Replace any contaminated hoses.
- Fill new electrolyte, check unit for leaks, carry out a trial run.
- Reset maintenance counter.

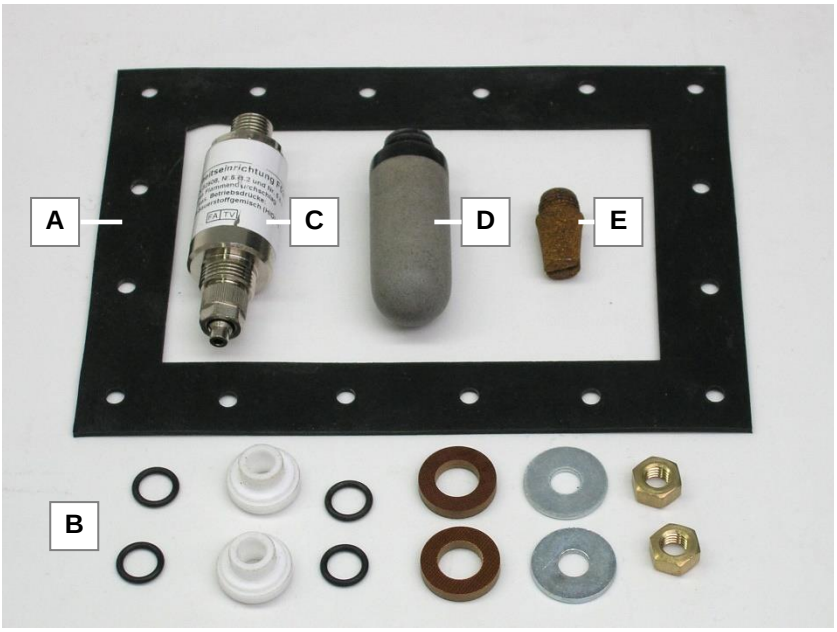


Fig. 7 Standard replacement kit for unit service

7.1 Reset maintenance counter

At microflame machines up to production date 2012 you have to use the MIG-O-MAT service software to read out any malfunction messages and to set the service status back to 100%.

At machines from 2012 you can use the following button combinations to reset the maintenance counter.

1. Turn off power at the main switch
2. Then simultaneously press the M-Button and Down-Button and hold them while turn on the unit again at the main switch
3. Release the buttons. The display shows “Service reset”

7.2 Replace sinter piece and filter candle

Replace the filter candle and the sinter piece, check the glasses for damage.

How to proceed

1. Turn the screw ring of the vaporizer glass (*fig. 7.2.A*) anticlockwise (*D*).
   Caution: Do not use any tools!
2. Check the edge of the glass for damage.
3. Unscrew the used sinter piece (*B*) anticlockwise and remove it from the socket, screw in the new sinter piece, tighten handtight.
4. Screw the vaporizer glass clockwise (*E*), tighten handtight.
5. Repeat the procedure with the dryer glas (*D*) / filter candle (*C*).

WARNING

Risk of injury by splintering glass!

Combustion of gas inside the glasses, e.g. caused by a flashback, can cause the glasses to burst.

Do not operate the unit without protective hood over the glasses
(*fig. 7.2.G*)!

After replacing either one or both of the glasses, pull the protective hood(s) over the new glass(es).

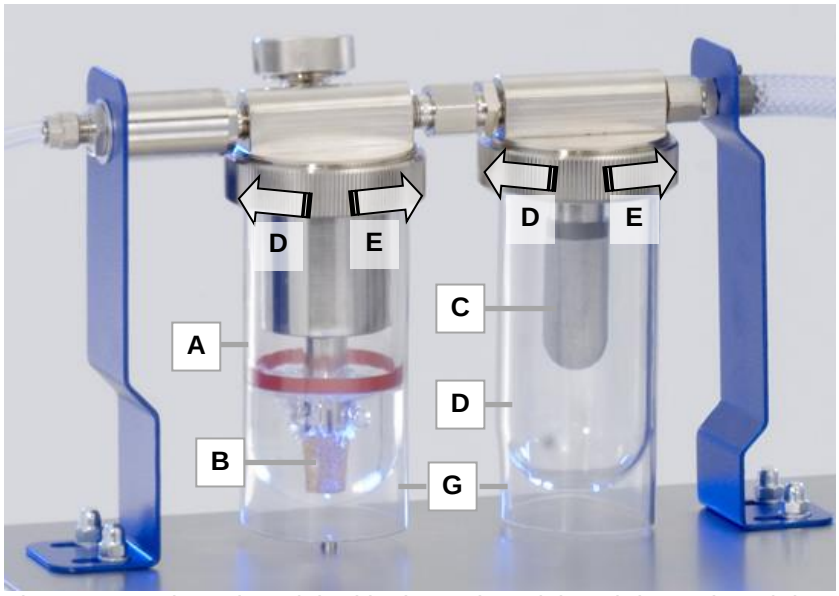


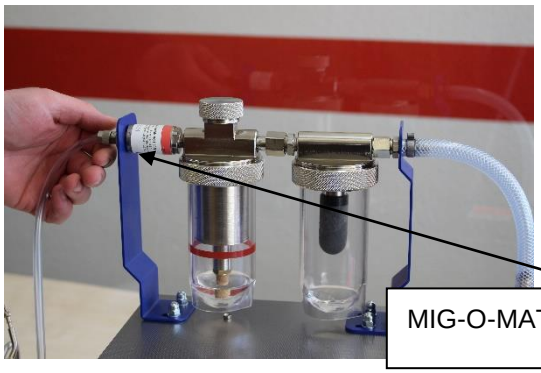
Fig. 7.2 Vaporizer glass (A) with sinter piece (B) and dryer glass (D) with filter candle (C)

7.3 Replace the check valve

If the flame barrier is blocked by a backflash or clocked by flux it has to be changed. Also as it is a safety relevant part, we recommend to change it due to the conditions of use every 1-2 years.

To change it, you need a open-end wrensch with 10mm, 19mm, 20mm and 22mm.
Attention: the flame barrier can´t be repaired and it is not allowed to open it.

1. Remove the gas tube on left side by unscrewing the nut and pulling of the gas tube



2. loosen the nut with the 19 mm or a 20mm wrench (depends on the model)

3. Remove the blue bracket by loosen the two 10mm wrench

4. Unscrew the flame barrier with a 22 mm wrench. To hold the upper part, you can use a 19 mm wrench or better you clamp the hole top part in a vise.
It is a right-hand thread. It could be helpful to remove the glasses before.

5. Remove the old copper seal and place a new copper seal into the threaded hole

6. Screw the new flame barrier, the bracket and the tube

7. Make a leakage test. If there is a leakage, please check if you have mounted the new copper seal and try to tighten the flame barrier a little bit more.

7.4 Dismount the reactor

Cleaning the reactor is easier if the reactor is dismounted from the unit.

How to proceed

1. Empty the reactor as described in *Section 5.1*.
2. Remove the cover as described in *Section 5.5*. Close the reactor outlet with the original yellow protecting cap (if still available) or with another suitable cap (*see fig. 7.4.1.A*). This will prevent remaining electrolyte from escaping when the unit is tipped over.
3. Unscrew the temperature sensor from the cooling body of the reactor (*see Section 6.11*).
4. Unscrew the electric cables from the reactor (*see fig. 7.4.1.B*); pull off the gas hose (*C*).

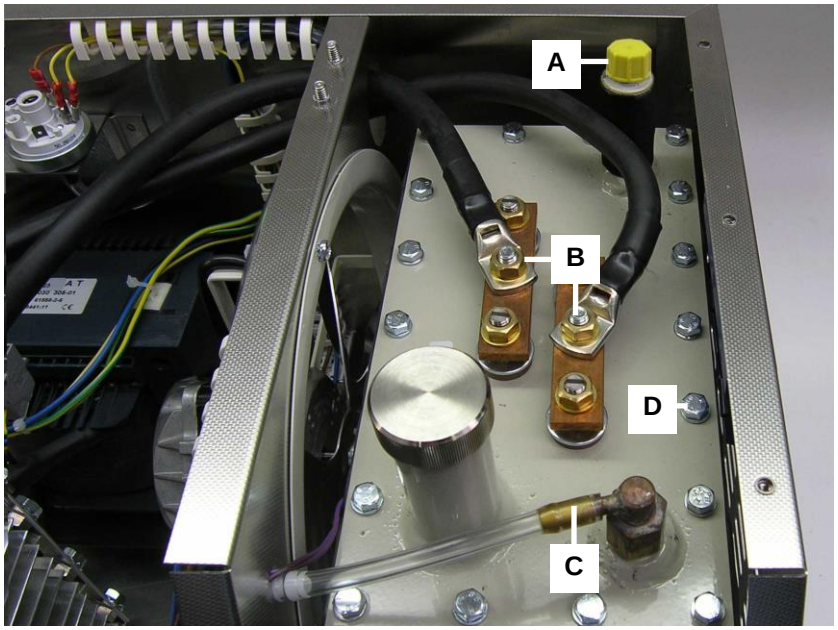


Fig. 7.4.1 Reactor connections and reactor cover screws

5. Place the (emptied) unit on its side or rear and unscrew the 4 fastening screws holding the reactor bottom (*see fig. 7.2.2.C*) e.g. with a 10 mm fork wrench.

6. Take the reactor out of the unit.

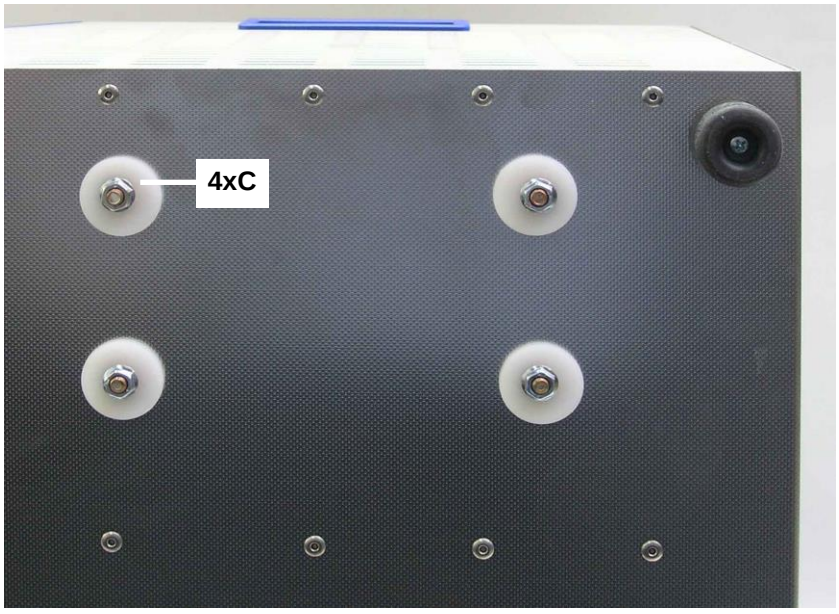


Fig. 7.4.2 Unit bottom with 4 reactor screws

7.5 Clean reactor and electrodes

The reactor contains residues of electrolyte and metal particles which need to be removed.

Cleaning of the reactor

How to proceed

1. Unscrew the 18 screws (*Section 7.4 fig. 7.4.1.D*) from the reactor cover, remove the reactor cover complete with the electrodes from out of the reactor housing.
2. Remove any residues from the reactor inside with a suitable brush and distilled water.

Fig. 7.5.1 Reactor opened and cleaned

Unscrew electrodes

3. Unscrew the nuts (*fig. 7.5.2.A*) and remove the electrodes from the reactor cover.

Clean reactor cover

4. Remove any residues from the reactor cover with a suitable brush and distilled water.

Screw open electrodes

5. Unscrew the 4 plastic nuts (*fig. 7.5.2.B*) and take out the plastic threaded rods (*C*) and spacers (*D*). Anodes and cathodes (*E/F*) are now separated.

Clean electrodes

6. Clean the anodes and cathodes by the same method, or use an ultrasonic cleaning unit (use distilled water only).

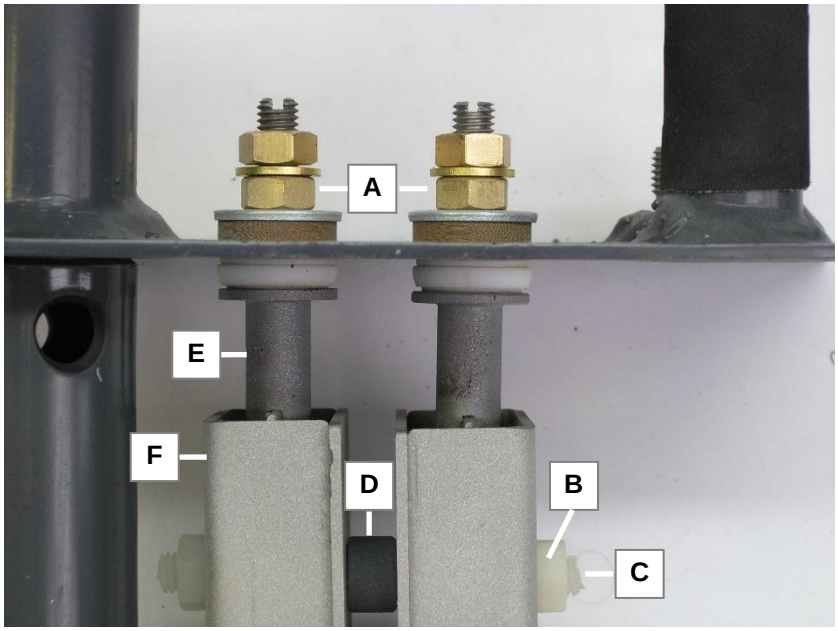


Fig. 7.5.2 Screwed-in electrodes at the reactor cover

Check electrodes

The electrodes (anodes / cathodes) are subject to a process of wear and tear by material abrasion caused by ionic migration between the electrodes.

Check the electrodes: if they are still intact (fig. *7.5.3*), they can be used again after cleaning.

Heavily worn or damaged electrodes (*fig. 7.5.4*) must not be used for reasons of safety (risk of short circuit and risk of combustion of gas inside the reactor).

Replace worn and/or damaged electrodes with new electrodes (available from the supplier and manufacturer of the unit).

Fig. 7.5.3 intact electrodes

Fig. 7.5.4 damaged electrodes

Mount intact/new electrodes after cleaning

Screw anode and cathode together with the plastic nuts, thread rods and spacers. Ensure that there is no electrically conductive connection between the electrodes (*see fig. 7.5.5 and 7.5.6*).

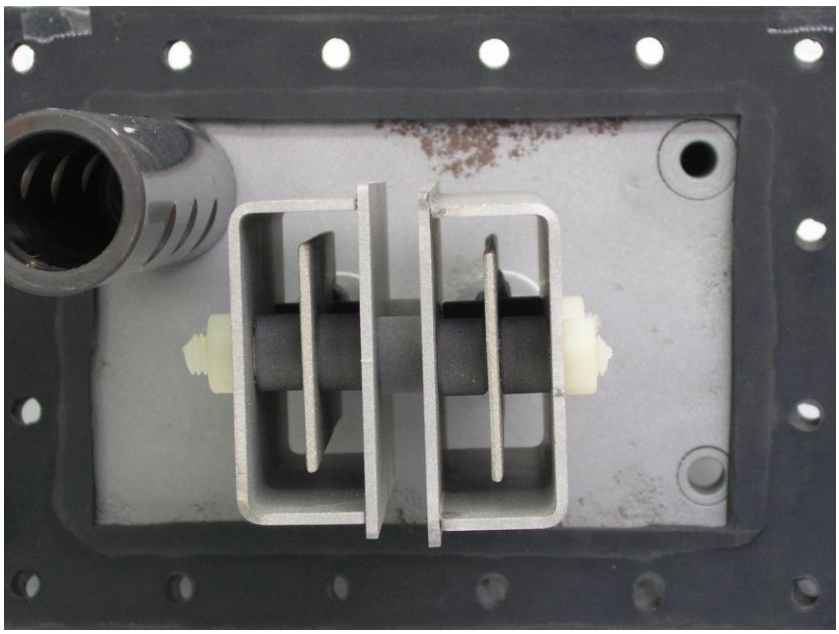


Fig. 7.5.5 Correctly mounted electrodes, view from below

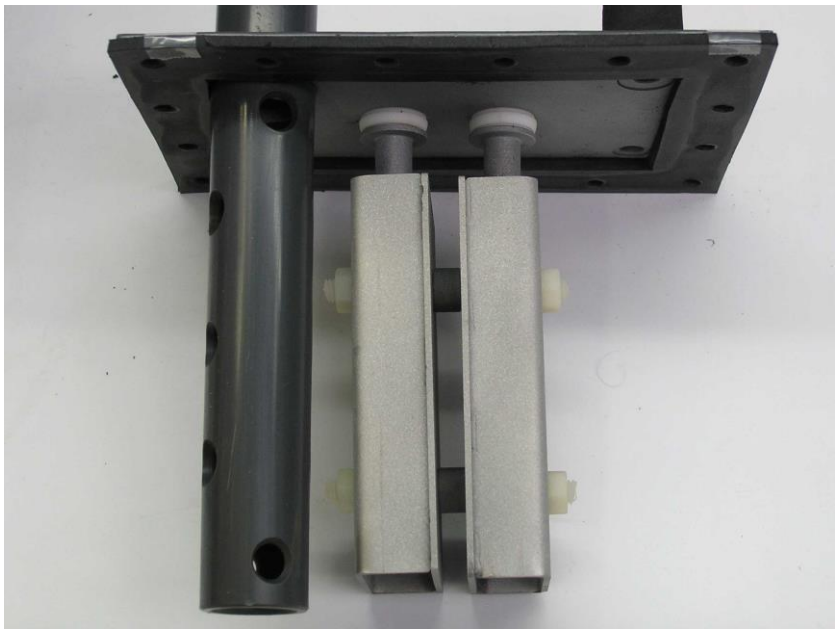


Fig. 7.5.6 Correctly mounted electrodes, view from the side

Mount electrodes to reactor cover

Screw the preassembled electrodes to the reactor cover. Ensure that there is no electrically conductive connection between the electrodes (metal thread rod) and the reactor cover!

Carefully insert the insulation rings, observe the correct order and positioning (*see fig. 7.5.7*).

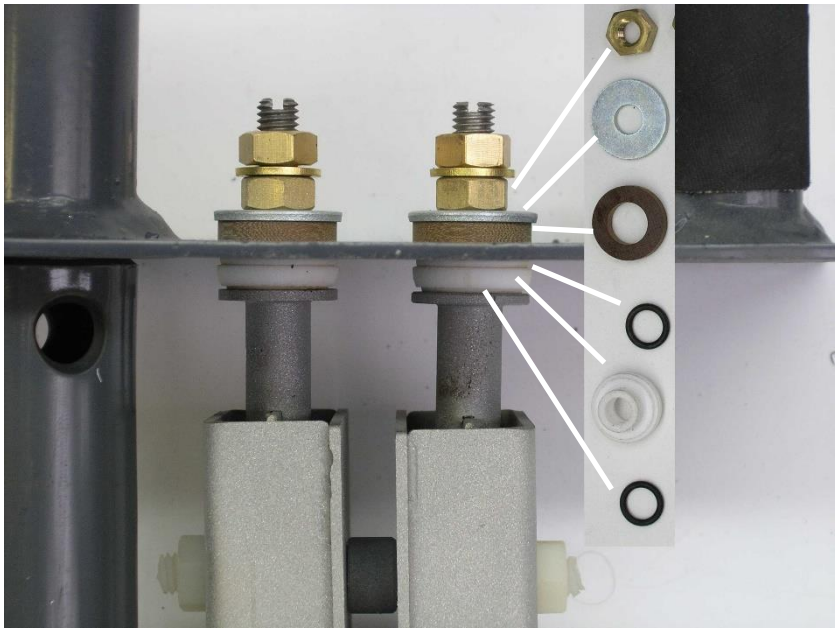


Fig. 7.5.7 Electrodes screwed to the reactor cover

Mount reactor cover

Mount the new reactor cover with using a new reactor sealing. Tighten the screws (fig. *7.5.8.A*) equally.

Fig. 7.5.8 Reactor cover correctly and completely mounted (microflame 140)

Mount reactor into unit

Insert and screw the completely assembled reactor inside the unit. Follow the instructions for dismounting in reverse order (Section *7.4*).

Reconnect the electrode cables, temperature sensor and gas hoses.

7.6 Replace electrodes inside the reactor

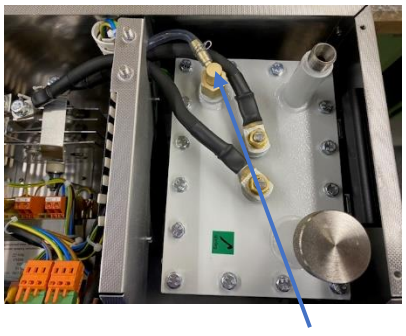
Heavily worn and/or damaged electrodes (*fig. 7.5.4*) must not be used again for reasons of safety (risk of short circuit, risk of combustion of gas inside the reactor).

Replace worn and/or damaged electrodes with new electrodes and new sealings (available from the supplier and manufacturer of the unit).

For the dismounting of worn electrodes and for the mounting of new electrodes follow the instructions given in *Section 7.5*.

7.7 Check elbow fitting of the test line

As part of the annual maintenance or in the event of a malfunction in the pressure control, the elbow fitting (connection of the test line to the reactor) should be checked for possible blockages. To do this, remove the hose from the elbow (e.g. strip it off with flat-nose pliers) and then unscrew the elbow with a 19mm open-end wrench. Check hose nozzle for blockages and clean if necessary (e.g. with a small file or drill) or replace it (order number: 50.2501143)



View of the interior of the device with elbow fitting

Remove any existing hose clamp

Strip off the hose using flat-nosed pliers

Unscrew the elbow connection with a 19mm wrench. To loosen, tap lightly against the elbow fitting.

Check elbow fitting for blockage (here: blockage with blue deposit)

Clean the elbow fitting, e.g. with a drill or a small round file.

7.8 Fill unit and put into operation

Fill reactor Fill the reactor with the adequate quantity of ready-for-use electrolyte as described in *operating manual*.

Fill vaporizer glass Fill the vaporizer glass with BLQ1800 or another suitable solvent.

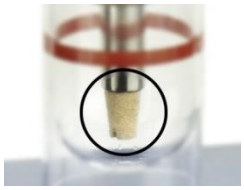
Carry out leak check Switch on the unit and carry out a leak check. If the test is not passed and a leak is indicated follow the instructions given in *Section 6.1* to find the leak.

8 Spare parts

A complete spare parts list is available from the manufacturer of the unit.

Nozzle set 0,5 x 10 consisting of 5 pcs nozzles 0,5 x 10 (G25)	50.25019050
Nozzle set 0,6 x 10 consisting of 5 pcs nozzles 0,6 x 10 (G23)	50.25019060
Nozzle set 0,7 x 10 consisting of 5 pcs nozzles 0,7 x 10 (G22)	50.25019070
Nozzle set 0,8 x 10 consisting of 5 pcs nozzles 0,8 x 10 (G21)	50.25019080
Nozzle set 0,9 x 10 consisting of 5 pcs nozzles 0,9 x 10 (G20)	50.25019090
Nozzle set 1,0 x 10 consisting of 5 pcs nozzles 1,0 x 10 (G19)	50.25019100
Nozzle set 1,2 x 10 consisting of 5 pcs nozzles 1,2 x 10 (G18)	50.25019120
Nozzle set 1,5 x 10 consisting of 5 pcs nozzles 1,5 x 10 (G17)	50.25019150
Nozzle set 1,8 x 10 consisting of 5 pcs nozzles 1,8 x 10 (G15)	50.25019180
Nozzle set (5 St.) for microflame 140 (0,6 | 0,7 | 0,8 | 0,9 |1,0) x 10 mm	50.2501803
Nozzle set (5 St.) for microflame 170 (0,7 | 0,8 | 0,9 |1,0 | 1,2) x 10 mm	50.25019001
Nozzle set (5 St.) for microflame 240/300 (0,8 | 0,9 |1,0 |1,2 | 1,5) x 10 mm	50.25019002
Evaporating liquid type MIG-O-MAT BLQ 1800 (1-liter-bottle)	50.2501631

Evaporating liquid type MIG-O-MAT BLQ 1600 (1-liter-bottle) Especially for use in Plexiglas flame polishing and soft soldering	50.2501641
Methanol (1-liter-bottle)	50.2501609
MIG-O-MAT Flux (1-liter-bottle)	50.2501614
1 liter bottle electrolyte for microflame 80/140/170/240/300	50.2501623
Micro torch with control valve, straight type	50.2502403
	
Micro torch with control valve, cranked type	50.2502411
	
Gas tube (price per meter)	50.2501164
Glass cylinder for gas dryer, including sealing	50.25164140
	
Vaporizer glass (with filling mark), including sealing	50.25164200
	
Glass protection tube For microflame 140-300, fits to glass cylinder for gas dryer and vaporizer	50.2516415

Seal for glasses	50.2516403
Glass float	50.2520820
	
Gas distributor / sinter cone (for vaporizer glass) Note: Due to a technical change, the sinter cone 50.2520207 is to be used for microflame machines with the manufacturing date from the year 2017 onwards.	50.2520211 manufactured -2016
	50.2520207 manufactured 2017-
	
Tube filter (for gas dryer)	50.2520208
	
Safety valve flame barrier with integrated flame stop for microflame 140-300	50.2504210
	
Torch stand with holder for nozzles for microflame	50.2630009
	

9 Putting out of operation and waste disposal

9.1 Waste disposal of microflame unit

After removal of the operating substances (*see sections 5.1 and 5.2*) the components of the microflame can be taken to electronics and metal recycling stations. You can also return the components to the manufacturer for disposal.

9.2 Waste disposal of electrolyte

WARNING!

When handling electrolyte always read and observe the safety warnings given in operating manual (e.g. wear protective goggles and gloves)!

After neutralization*, both electrolyte and electrolyte solution can be disposed of into the sewerage system in compliance with the regulations of the local authorities, or they can be disposed of through specialized waste disposal companies.

See also: safety data sheet of electrolyte.

Containers can also be returned free of charge when they are completely empty. Rinse the containers with water before you return them for waste disposal.

*Neutralization with acid, e.g. acetic acid: For this pour the acetic acid into a suitable tank first, then add the electrolyte step by step.

Caution! The liquid can heat up considerably.

9.3 Waste disposal of vaporizer liquid

WARNING!

When handling vaporizer liquid / flux always read and observe the safety warnings given in operating manual!

Recommendation: 1. Disposal by specialized waste disposal companies: , see also: safety data sheet of *; „Other solvents and solvent mixtures“. 2. Burning in suitable combustion facility in compliance with the regulations of the local authorities.

Do not let escape into the sewerage system / surface water / groundwater. Do not let escape into the soil. Do not let escape into the environment uncontrolled.

Containers can also be returned free of charge when they are completely empty.

10 Manufacturer’s contact address

MIG-O-MAT Mikrofügetechnik GmbH
Werksstrasse 20
57299 Burbach
Germany
Phone: +49 2736 4154-0
Fax: +49 2736 4154-99
Email: info@mig-o-mat.com
Internet: www.mig-o-mat.com

Do you have any queries or suggestions concerning the present unit, its operation or the Operating Instructions?

Please contact us, we will be glad to assist.