LAMPERT.
PRECISION WELDING

OPERATING MANUAL **PUK6.1**

Lampert Werktechnik GmbH
Fine welding device

Issue EN 2025/01

MADE IN GERMANY

Product :	Fine welding device
Type:	PUK 6.1
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Revision index:	1.0
Date of revision:	2025/01

Contents

1 About this operating manual

Before operating the device for the first time or starting any other work on the device, you are required to read these operating instructions carefully.

Pay particular attention to the chapter 2 "General safety regulations".

1.1 General

These operating instructions are intended to help you get to know the device and use it as intended. They contain important information on how to operate the device safely and properly.

The operating instructions must

- be fully read and applied by any person assigned to work on the device.
- be stored in such a way that they are accessible at all times to all users at the place of use of the device.
- be handed over to third parties together with all necessary documents when the device is passed on.

Observance of the operating instructions helps

- to avoid dangers.
- to reduce repair costs and downtime.
- to increase the reliability and service life of the device.

In addition to the operating instructions, the accident prevention and environmental protection regulations applicable in the country of use and at the place of use must also be observed.

Safety and danger notices on the device must be kept in legible condition and must not be removed, covered or damaged.

1.2 Presentation of information

Handling instructions

The instructions explain step by step which activities have to be carried out and how to proceed.

In these operating instructions, handling instructions are marked with the following symbols:

➢ The steps marked with this activity symbol may be carried out in any order.

1) Numbered steps **must be** carried out exactly in the given order.

✓ The result symbol describes the result or intermediate result of an action.

Application tip

The "**TIP**" indicates additional information for easy and safe use of the device.

TIP: Note on the optimal use of the device.

1.3 Structure of the warnings

Signal word	Avoidance of ...	Possible consequences if the warning is not heeded:
DANGER	Personal injury (imminent danger)	Death or severe injuries!
WARNING	Personal injury (potentially hazardous situation)	Death or severe injuries!
CAUTION	Personal injury	Light or minor injuries!
NOTE	Property damage	Damage to the device or its immediate surroundings!

Tab. 1.1 Warning levels

The warnings are structured as follows:

- Warning sign with signal word in accordance with the warning level (see Tab 1.1)
- Type of hazard (description of the hazard)

- Consequences of the hazard (description of the consequences of the hazard)
- Hazard prevention (measures to prevent the hazard)

DANGER!

Type of hazard

Consequences of hazard

➢ Hazard prevention

Warning sign

Special warnings are given at relevant points. They are marked with the following pictograms.

General warning sign
This sign warns of personal injury.

In the case of a clearly identifiable source of danger, it is preceded by one of the following pictograms.

Electrical voltage
Warning of possible electric shock, potentially with fatal consequences.

Hand injuries
Warning about the danger of hand injuries.

Hot surfaces
Warning of hot surfaces.

Pressurised containers
Warning of fire and explosion hazard.

Optical radiation
Warning of optical radiation.

Hazard due to electromagnetic radiation
Warning of electromagnetic fields.

2 General safety regulations

2.1 Principles

The device shall be used only when in flawless condition and is intended exclusively for work in accordance with the intended use.

2.2 Intended use

The device is intended for welding on all metals and alloys that are suitable for arc welding.

Intended use also includes

- the complete reading and following of all instructions in the operating manual.
- the complete reading and following of all safety and hazard instructions.
- compliance with maintenance and servicing work.

The device is designed for use in industrial and commercial applications. The manufacturer is not liable for damage resulting from use outside this area of application.

Temperature range of the ambient air:

- during operation: -10 °C to + 40 °C (14 °F to 104 °F)
- during transport and storage: -20 °C to +55 °C (-4 °F to 131 °F)

Relative humidity:

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

The ambient air should be free of dust, acids, corrosive gases or substances.

2.3 Foreseeable misuse

The hardware and software of the device is designed in such a way that misuse is largely avoided or reduced to a minimum by safety features. Nevertheless, in exceptional cases, misuse by the user is possible and must be avoided when operating the device:

- Welding of non-weldable metals or alloys
- Use of an inappropriate shielding gas
- Exerting too much pressure on the electrode
- Use of the device without personal protective equipment

2.4 Safety instructions

General information

- If the device shows signs of damage, it must be taken out of service.
- If malfunctions occur, the device must be taken out of service.

Personal protective equipment

The personal protective equipment listed below must be worn during every welding operation:

- Gloves
- Eye protection
- Dry clothing (non-synthetic and flame retardant)

Furthermore, the workplace must be sufficiently ventilated. If this cannot be ensured by fresh air supply, an exhaust system must be installed.

Handling protective gas cylinders

Observe the relevant precautions when handling gas cylinders, as well as the safety rules for handling gases.

In particular, gas cylinders must be secured against falling over and down and protected against heating (max. 50 °C), especially during prolonged exposure to sunlight and against severe frost.

During transport

- Ensure that all connecting cables have been removed from the device to prevent the operator from tripping and damaging the device.
- When transporting the device, ensure that it is always securely packed and not dropped or knocked over.

During installation

- The device must be placed in a stable and non-slip position at the workplace.
- The device must be placed on a non-combustible surface.

During commissioning

- The device must not be connected to a circuit in which devices (e.g. TIG welders) that work with high frequency are operated at the same time. This may cause irreparable damage to the device. In the case of simultaneous operation with equipment that operates at high frequency, always ensure that the device is operated on a separate, individually fused circuit that is shielded and protected from high frequency input from other equipment. In addition, physical separation and a minimum distance of at least 5 metres from devices that work with high frequency must always be maintained.
- The eye protection must be checked for correct fit and proper function. Follow the instructions in the operating manual of the respective eye protection system.
- Before each start-up of the device, make sure that the gas connection on the back of the device as well as the connection on the flow regulator have been hand-tightened without tools.

- If there are indications of leaks in the gas hose or gas connection (e.g. audible hissing or whistling noise or unusually rapid loss of pressure in the gas container), the device must be taken out of operation and defective components replaced.

During operation

- Always wear gloves when welding. Do not touch the workpiece without gloves during or immediately after the welding process.
- During the welding process, parts of the skin must never be directly exposed to the UV radiation that is generated by the welding process.
- The contact clamp for fixation welding must be removed from the blue socket on the right hand side of the PUK 6.1 (-) again after fixation welding has been completed. In normal welding operation, always make sure that the contact clamp for fixation welding is not connected to the device.
- The workplace must be sufficiently ventilated. If this can't be guaranteed by a fresh air supply, an extraction system must be installed.
- The flow rate at the flow regulator must be between 2 - 3 litres/minute.

Maintenance and inspection work

- Disconnect the device from the power supply before carrying out maintenance, inspection and cleaning work.
- The clamping nut on the handpiece must be hand-tightened after replacing the electrodes.
- When regrinding electrodes, wear protective gloves and do not touch the rotating grinding wheel.
- When regrinding electrodes, make sure that the resulting grinding dust is not inhaled.
- The device fuse may only be replaced by a qualified electrician and only the fuse approved by the manufacturer for the respective mains voltage may be used.

During disassembly

- The valve on the gas cylinder must always be closed during decommissioning and dismantling.

- When dismantling the device, disconnect it from the power supply.
- When dismantling, remove the electrode from the handpiece to avoid puncture injuries.

2.5 Residual risks for device operation

In principle, it is not possible to exclude the following hazards:

- Puncture injury from electrode due to improper handling of the handpiece
- Danger from leaking or improperly connected protective gas cylinders
- Eye and skin damaging arc radiation on uncovered skin areas

2.6 Selection and qualification of personnel

The operator undertakes to only allow persons to work on the device who

- are familiar with the basic regulations on occupational safety and accident prevention and have been instructed in the handling of the device.
- have read and understood this operating manual, in particular the "General safety regulations" chapter.
- are trained with regard to the requirements for the work results.

The safety-conscious working of the personnel must be checked at regular intervals.

All persons who are instructed to work on the device undertake, before starting work, to

- observe the fundamental regulations governing occupational safety and accident prevention
- confirm with their signature that they have read and understood this operating manual, and in particular the chapter on “safety instructions”, and that they will observe this information.

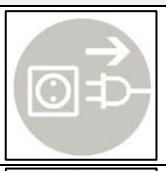
2.7 Safety devices

- The device has a thermal cut-off device that is activated if the heat build-up is too high, preventing the device from overheating.

2.8 Safety signs

Fig. 2.1 Safety signs on the back of the device

Safety sign	Description
	Electromagnetic fields may impair the function of pacemakers.
	Inhaling welding fumes can endanger your health.
	Arcs can damage the eyes and injure the skin.
	Welding sparks may cause an explosion or fire.

Safety sign	Description
	In case a qualified electrician needs to open the device, the main cable always needs to be unplugged before.
	The union nut of the protective gas hose may only be tightened by hand on the protective gas connection. The use of tools (e.g. wrenches) can damage the protective gas connection.

Tab. 2.1 Safety sign

3 Structure and function

3.1 Functional description

The PUK 6.1 is a micro-pulse TIG welder. The welding process is controlled by the central control and regulation unit of the PUK 6.1. For a precise welding process and a perfect result, the welding process is continuously monitored and the target parameters are adjusted as required using control algorithms. The energy pulses generated by the power source are transferred to the workpiece via the handpiece included in the scope of delivery and its electrode, thereby carrying out the welding process.

Scope of delivery

The scope of delivery of the device includes:

- Handpiece with connection cable
- Mains cable
- 3 m gas hose
- Contact cable with contact clamp
- Set of electrodes and diamond grinding wheel

3.2 General overview

Fig. 3.1 Overview of PUK 6.1 with handpiece

1. PUK 6.1
2. Handpiece with connection cable

3.3 PUK 6.1

Fig. 3.2 PUK 6.1 Front

1. Display
2. Turn-push controller with tilt function
3. Socket (-) for contacting tools (fixation welding)
4. Handpiece connection socket (-) for the welding handpiece
5. Socket (+) for contacting tools (spot welding)

Display Displays the user interface of the operating software.

Turn-push controller

The Turn-push controller can be turned, tilted and pressed. Depending on the software dialogue, the following actions can be triggered:

- Turn: Changing the welding parameters or the operating mode
- Tilt: Navigating the user interface
- Press: Confirm the selected choice

Socket (-) for contacting tools

For connecting contact elements for fixation welding.

Handpiece socket (-)

For connecting the handpiece.

Socket (+) for contacting tools

For connecting contact elements such as welding table, contact terminals or clamps.

Fig. 3.3 PUK 6.1 Rear

1. Type plate
2. Bus connection
3. USB connection
4. LAN connection
5. Mains switch
6. Fuse compartment
7. IEC-60320 C14 socket
8. Protective gas connection
9. Mains voltage approved for this device
10. Ventilation opening
11. Connection socket for foot switch
12. Connection socket for electrode grinding motor
13. Hazard warnings
14. Connection socket for eye protection system

Type plate	The type plate shows the most important technical data for the device.
Bus connection	Currently without function.
USB connection	The USB port is used to update the device software via USB data carrier.
LAN connection	The LAN connection is used for device diagnostics or enables an external control of the device via Modbus protocol. This function depends on the model and software version of the welding device (not implemented as a standard).
Mains switch	The mains switch can be used to disconnect the device from the power supply.
Fuse compartment	The device fuse is located in the fuse compartment.
IEC-60320 C14 socket	The mains cable supplied is connected to the mains socket.
Gas connection	The gas connection allows the connection of argon inert gas. The gas hose must have a diameter of 6.0 mm and may carry a maximum pressure of 4 bar.
Ventilation opening	The ventilation opening is used for air circulation and cooling of heat-sensitive electronic components inside the device.
Mains voltage approved for this device	The permissible mains voltage for the device is marked with a red dot-shaped marking and must not be exceeded.
Connection socket for foot switch	A foot switch with M12 connection can be connected to this socket.
Connection socket for electrode grinding motor	A Lampert electrode grinding motor from the accessories range can be connected to this socket.
Connection socket for eye protection system	A Lampert eye protection system from the accessories range can be connected to this socket.
Hazard warnings	The hazard warnings indicate the hazards that can potentially arise from the device.

3.4 Handpiece with connection cable

Fig. 3.4 Handpiece with connection cable

1. Handpiece with argon nozzle
2. Connection cable
3. Handpiece plug

Handpiece with argon nozzle

The handpiece holds the welding electrode and enables the user to move the welding electrode to the workpiece in a targeted manner. The handpiece can be guided freely (appropriate eye protection required) or clamped in a corresponding device (e.g. handpiece holding arm of a Lampert welding microscope). The nozzle with ceramic insert ensures the targeted gas supply at the welding location.

Connection cable

The connection cable contains both the cable guide for the power transmission and the hose for the gas supply to the handpiece.

Handpiece plug

The handpiece connector connects the handpiece firmly and gas-tight to the PUK welding device.

3.5 Optional electrode grinding motor (item no. 100 858)

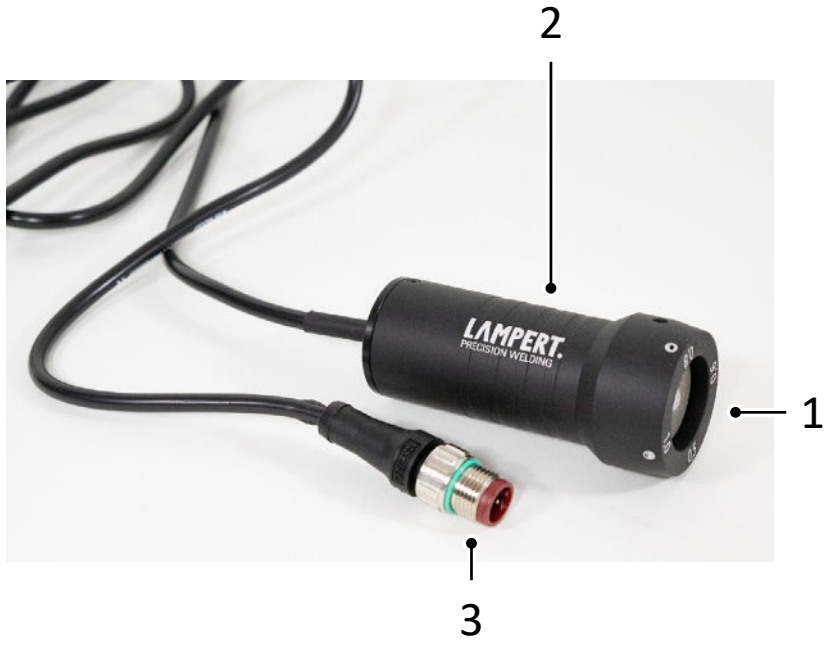


Fig. 3.5 Electrode grinding motor

1. Diamond grinding wheel with flange
2. Electrode grinding motor housing - Base body
3. Connection cable with plug

Diamond grinding wheel with flange

The diamond grinding wheel is used for grinding the electrodes and can be replaced if it shows signs of wear after prolonged use.

Electrode grinding motor - housing

The electrode grinding motor housing consists of a housing with guide holes (15° angle, Ø 0.6, 0.8, 1.0 and 1.3 mm) and an on/off button.

Connection cable with plug

The connection cable is screwed with the M12 plug to the corresponding socket on the rear of the welding device housing.

3.6 Optional foot switch (item no. 100 850)

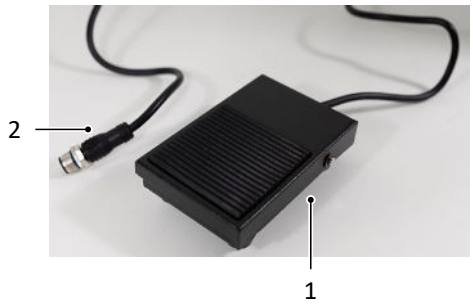


Fig. 3.6 Foot switch

1. Foot switch
2. Connection cable with M12 plug

Foot switch

The welding process can alternatively be triggered by pressing the foot switch. When the foot switch is active, automatic triggering by electrical contact (workpiece contact) is deactivated. When the fixation welding mode is selected, the foot switch is permanently activated.

Connection cable with M12 plug

The foot switch connection cable with M12 plug is screwed to the back of the welding device.

3.7 Optional PIN welding adapter set (item no. 100 760)

A PIN welding adapter for the welding handpiece is required for welding pins and ear studs when using the PIN mode. The set consists of adapters with Ø 0.65, 0.8, 0.9 and 1 mm. Also, the foot switch (item no. 100 850) is required for working with the PIN mode. Handling and working of/with the adapters are also explained in chapter 6.4.

3.8 Type plate

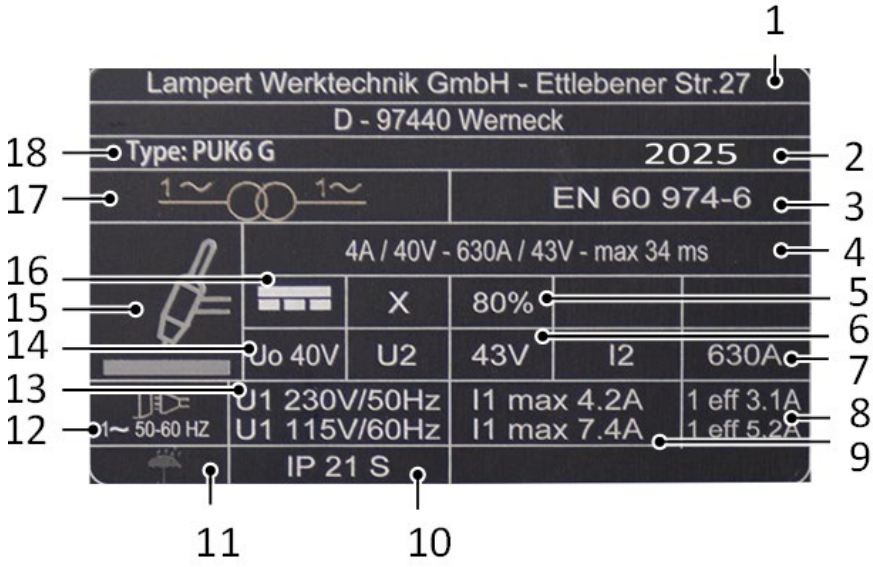


Fig. 3.7 Type plate

1. Manufacturer
2. Date of manufacture
3. Product standard
4. Minimum welding current and maximum welding current with corresponding standardised working voltage as well as maximum pulse duration.
5. Duty cycle in percent
6. Standardised working voltage
7. Standardised operating current
8. Maximum rated value of the mains current
9. RMS value of the largest mains current
10. Protection type
11. Keep away from precipitation
12. Mains circuit, rated frequency
13. Maximum rated welding current at 20 °C ambient temperature
14. No-load peak value
15. Symbol for the welding process: Tungsten inert gas welding here
16. Symbol for the welding current: DC here
17. Welding current source symbol: Single-phase transformer here
18. Manufacturer's type designation

4 Transport and storage

4.1 Transport

In principle, the welder can be carried and transported by hand without any special precautions. For longer transport distances, however, we expressly recommend packing the device in the original box or a similar suitable container. To avoid scratches or damage to the surface, it is also advisable to line transport containers with soft, dry and scratch-free materials (e.g. foam).

4.2 Storage

For longer storage, disconnect the mains plug and cut off the gas supply.

The storage location of the device must be dry and dust-free and must not be subject to extreme temperatures (colder than -20 °C or hotter than +55 °C).

5 Commissioning

5.1 Setting up the device

- The device must be free-standing and not covered with other objects.
- The ventilation openings of the device must be kept free.

Requirements for the location where being used

- The device shall not be used outdoors.
- The device shall be used in dry rooms only.
- The device shall be used in a well-ventilated location.
- There shall be no direct draughts at the welding site.
- The device must be placed on a non-combustible surface.

- The device must be placed on a level (maximum angle of inclination 10°), stable and insulated surface.

5.2 Establishing supplies

Electrical supply

Plug the mains cable with the mains plug into the mains socket on the back of the device. Then plug the mains plug into a socket with a suitable mains voltage.

Inert gas supply

WARNING

Pressurised containers

Fire and explosion hazard

➢ Check the tightness of gas cylinders and supply lines.

- Fasten the appropriate flow regulator to the shielding gas cylinder with the corresponding tool. ATTENTION: In doing so, observe the separate operating instructions provided by the manufacturer.
- Use only inert gases as shielding gas, e.g. argon 4.6

5.3 Connect eye protection

Warning! Only suitable original eye protection systems from Lampert may be connected to the welding system! Other eye protection systems can lead to permanent health damage or damage to the welding device. The operating instructions of the respective personal protective equipment (microscope) must be observed.

The eye protection must be checked for correct function each time it is put into operation. The performance of this functional test is explained in more detail in chapter 7.3.

5.4 Insert the electrode into the handpiece

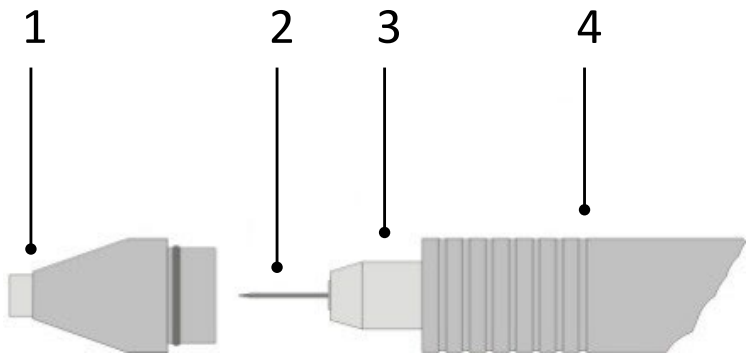


Fig. 5.1 Handpiece components

1. Argon nozzle
2. Tungsten electrode
3. Clamping nut with collet
4. Handpiece housing

Argon nozzle The argon nozzle with ceramic insert ensures the targeted gas supply at the welding location.

Tungsten electrode The tungsten electrode is used to make electrical contact with the workpiece. Since the arc created during the welding process is generated directly at the tungsten electrode, a well ground tungsten electrode must always be used to ensure an optimum welding result

Clamping nut with collet The clamping nut inside the handpiece ensures the tungsten electrode fit snugly in the collet by hand-tightening. The collet chuck and clamping nut in the handpiece hold the electrode firmly in the handpiece.

Handpiece housing The handpiece housing is used to attach, grip or guide the handpiece.

5.5 Adjusting the electrode length

Only thoriumoxide-free original electrodes may be used as electrodes.

When changing or inserting a new electrode, the following steps must be carried out:

1) Wait until the electrode has cooled down

2) Gently rotate the argon nozzle back and forth while pulling it off the handpiece. The argon nozzle is plugged into place, not screwed on.

3) Loosen the clamping nut counter-clockwise and remove the used tungsten electrode if necessary.

4) If a different electrode diameter is to be used, the collet chuck might also have to be changed accordingly. To do this, completely loosen and remove the clamping nut and then pull the collet out and insert a matching collet. Screw the clamping nut back on.

   ➢ Insert the new tungsten electrode into the collet and adjust to the correct length. If you have a Lampert welding microscope, you can measure the electrode length on the handpiece holding arm. To do this, insert the electrode into the milling on the right or left as far as it will go. The clamping nut must rest against the outer edge of the holding arm. Now hand-tighten the nut and fit the argon nozzle. (See Fig. 5.2)

   ➢ If you do not have a Lampert welding microscope, clamp the tungsten electrode in the handpiece so that it protrudes approx. 4 - 6 mm beyond the nozzle. (See Fig. 5.3)

✓ Welding can now be resumed with the new electrode.

Fig. 5.2 Adjusting electrode length with handpiece holding arm

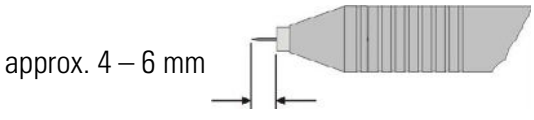


Fig. 5.3 Electrode length adjustment

5.6 Connecting the handpiece

Screw the connector plug of the handpiece into the handpiece socket on the front of the device. To do this, screw the nut on the handpiece connector hand-tight as far as the thread will allow. This is important to ensure proper electrical contact and that no gas can escape from the system.

5.7 Connecting the contact clamp

Insert the black contact clamp supplied into the left socket, marked plus.

5.8 Connecting optional accessories

The optional accessories (e.g. grinding motor or foot switch) are connected via the M12 plug attached to the connection cable. The respective sockets on the back of the device are colour-coded for this. Always tighten the plugs only hand-tight.

6 Graphical user interface

The graphical user interface has the following basic functions:

- Setting the welding parameters
- Displaying recommended welding parameters
- Selecting different operating levels or functions
- Performing test functions
- Showing error messages

6.1 Main menu

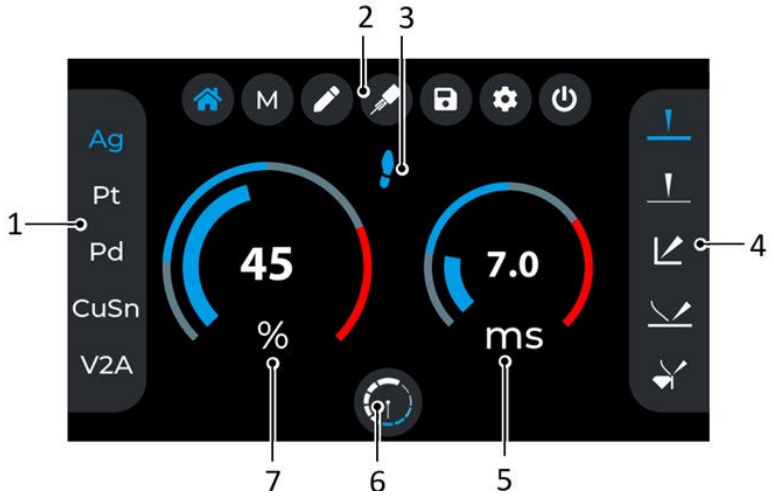


Fig. 6.1 Main menu

1. Material selection
2. Menu bar
3. Foot switch activated (optional)
4. Geometry selection
5. Pulse duration (in milliseconds)
6. Speed levels (1 – 10)
7. Welding power (in percent)

Material selection

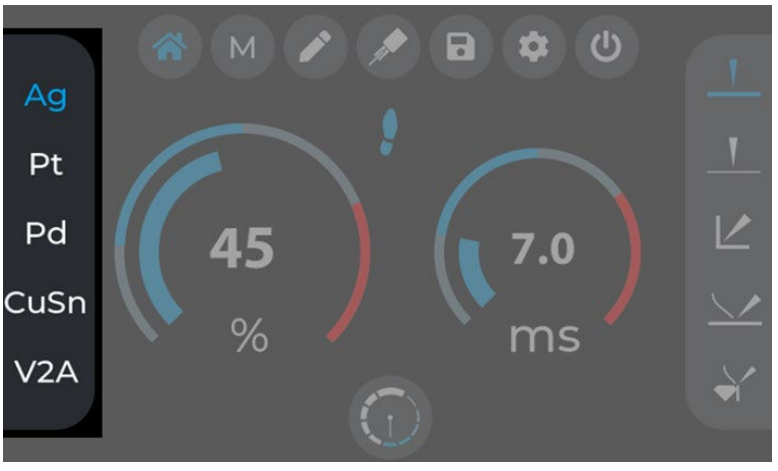


Fig. 6.2 Material selection

Here you select the material to be processed.
The following materials are available for selection:

Abbreviation	Material designation
Uni	Universal
Au	Gold
Ag	Silver
Pt	Platinum
Pd	Palladium
CuSn	Bronze
V2A	Stainless steel
Ti	Titanium
Sn	Tin
CuZn	Brass
Cu	Copper

Tab. 6.1 Material selection

Welding power and pulse duration

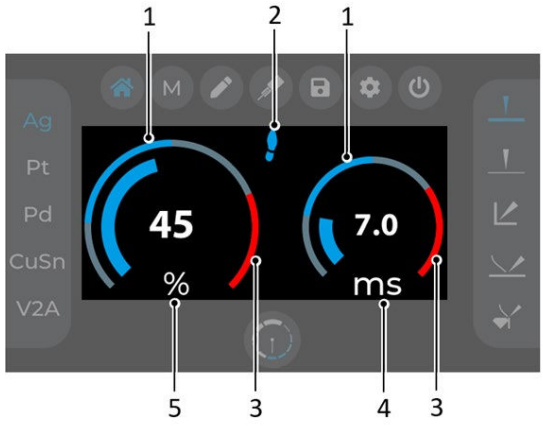


Fig. 6.3 Welding energy and pulse duration

1. Blue range
2. Foot switch activated (optional)
3. Red range
4. Welding power
5. Pulse duration

Blue range

To make welding with the PUK 6.1 easier, a value range for the welding power and pulse duration is marked blue in the display as a recommendation for each material-geometry combination.

Foot switch (optional, item number 100 850)

The foot switch is activated by pressing the connected foot switch for a longer time (approx. 3 seconds). The blue foot symbol on the display indicates that the foot switch is ready for operation. The welding process can now be triggered directly via the foot switch. In foot switch mode, the contact of the workpiece with the tungsten electrode is signalled by periodic dimming of the eye protection system.

Red range

The red range indicates the parameter range in which damage to the material to be welded may occur. The use of welding parameters in the red range is therefore only recommended for experienced users.

Welding power

The welding power controls the size and intensity of the welding spots. The greater the power selected, the more energy the device uses for welding and the larger the weld spot. With very thin materials an excessive power level can damage the workpiece. If the material behaviour is unknown, it is therefore recommended to start with a very low welding power and slowly work up to higher powers. To make welding with the PUK 6.1 easier, a value range for the welding power is marked blue in the display as a recommendation for each material-geometry combination.

TIP: For silver alloys, it is NOT recommended to set the welding power higher than 50 %, otherwise liquefied material may be thrown out of the welding spot (spattering)

TIP: Welding power of more than 70 % is only recommended in special material and geometry-related applications. Otherwise, there is a risk of inhomogeneous welds. The use of higher welding powers in the red range is therefore only recommended for experienced users.

TIP: For fine welding, it is recommended to start with a lower welding power of less than 20 % with a very short pulse duration and to work up to the correct value by small changes of the welding parameters.

Pulse duration The pulse duration determines how long (in milliseconds) the welding energy acts. The longer the pulse duration selected, the longer and deeper the energy impact on the workpiece. At the same time, this also results in a higher heat generation.

TIP: With very thin materials or wires, it is advisable to select a shorter pulse duration.

TIP: When working close to precious gemstones, pearls or other heat-sensitive materials, a pulse duration of less than 3 ms is recommended.

TIP: With many silver alloys or other conductive metals, a longer pulse duration can be advantageous in order to avoid heat cracks.

TIP: For successful work with the welding device, it is important to consider the power and pulse duration in a close context with each other in every case. The total energy introduced into the workpiece is always made up of both set parameters – these must be selected before a weld after a detailed analysis of the welding task, the material and the workpiece geometry.

Menu bar

The menu bar can be used to switch to the various menu and setting levels.

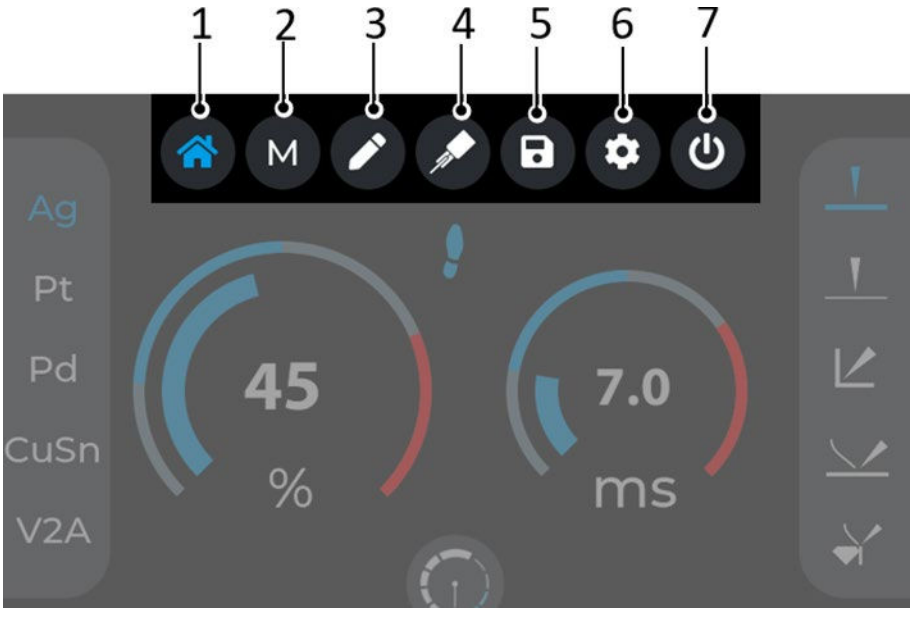


Fig. 6.4 Menu bar

The menu bar consists of the following menu levels:

1. Main menu
2. Micro mode
3. Fixation mode
4. PIN mode
5. Program memory (P1 – P5)
6. Settings menu
7. Standby mode

Geometry selection

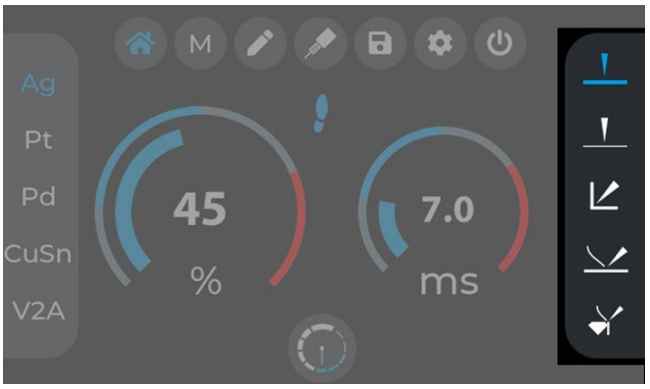
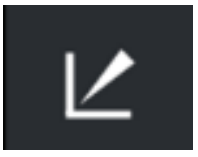


Fig. 6.5 Geometry selection

Universal setting for material thicknesses from approx. 0.3 mm.

Setting for sheet metal or wire parts equal to or thinner than approx. 0.3 mm. This setting offers very low development of heat, especially in combination with short pulse durations.



Welding in sharp angles and tight joint situations.
Here it is IMPORTANT to use short pulse durations.

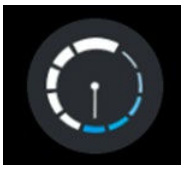
Melting of welding wire. Use identical alloy wire with a diameter of approx. 0.4 mm.

Application of welding wire on claws and stone settings. Particularly low-energy melting of thin welding wire with a diameter of approx. 0.2 mm.

Speed levels

With the speed selection (symbol at bottom of the display), the welding cycle can be set in 10 different speed levels.

A reduced welding cycle allows longer cooling times between the welding spots and thus results in a lower heat input into the workpiece.
Enables more controlled welding in welding situations that are crucial or difficult to reach.



A medium welding cycle setting is universally suitable for numerous applications and is pre-selected for all various welding functions.

The faster the pre-selected welding cycle, the faster welding is possible which prevents cooling down of the workpiece during welding.
Caution: A faster welding cycle results in a higher heat input into the workpiece. However, this may possibly be advantageous for alloys with high thermal conductivity.

6.2 Micro mode

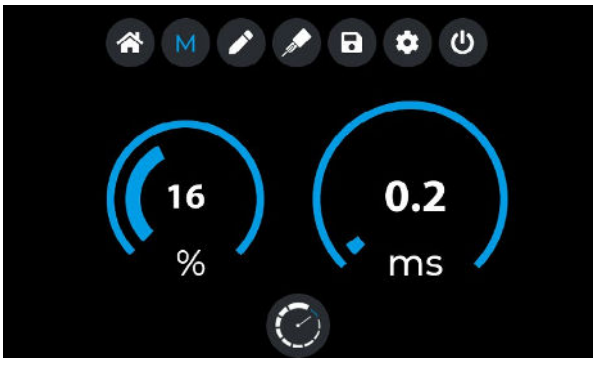


Fig. 6.6 Micro mode

Micro mode is suitable for particularly sensitive materials and thin material thicknesses. In micro mode, the pulse duration is always preselected as the

focus because it is critical for the introduction of heat into the workpiece. In micro mode, the pulse duration can be selected in even smaller steps of 0.1 ms. The shortest possible pulse duration is 0.1 ms.

6.3 Fixation mode

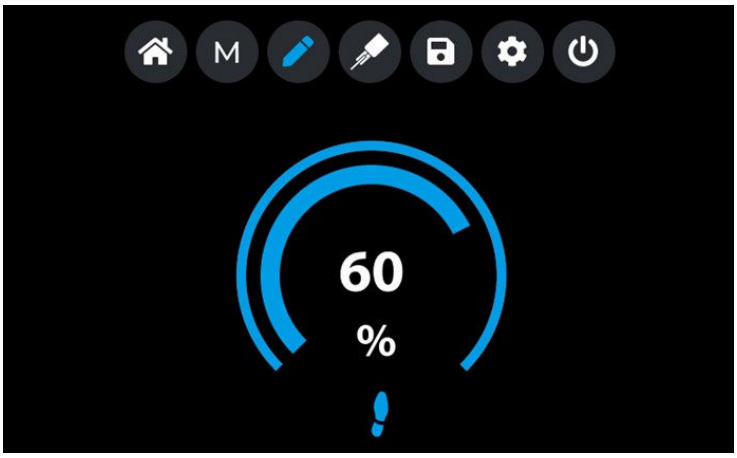


Fig. 6.7 Fixation mode

For fixation welding, the foot switch and an additional contact clamp are required (alternatively, the fixation welding set - optional accessory item number 100 845).

This mode is used for workpiece fixation.

Attention! The blue connection cable may be connected only if the fixation mode has been activated. Before the fixation mode is quit, the cable must be removed again to prevent erroneous welding.

Connect both of the workpieces which are to be fixed to an area of bare metal, using a contact clamp, one to the blue one and the other to the black. When the two workpieces are touching, the welding process can be triggered by using the foot switch. The hand piece is not used during this process.

The required welding power is determined by the strength of the connection desired as well as the workpiece geometry.

During fixation welding, the foot switch is always active, and cannot be deactivated. The shielding gas flow is deactivated during fixation welding.

TIP: Fixation welding is particularly well suited for metals with low conductivity, for example titanium or stainless steel.

6.4 PIN mode

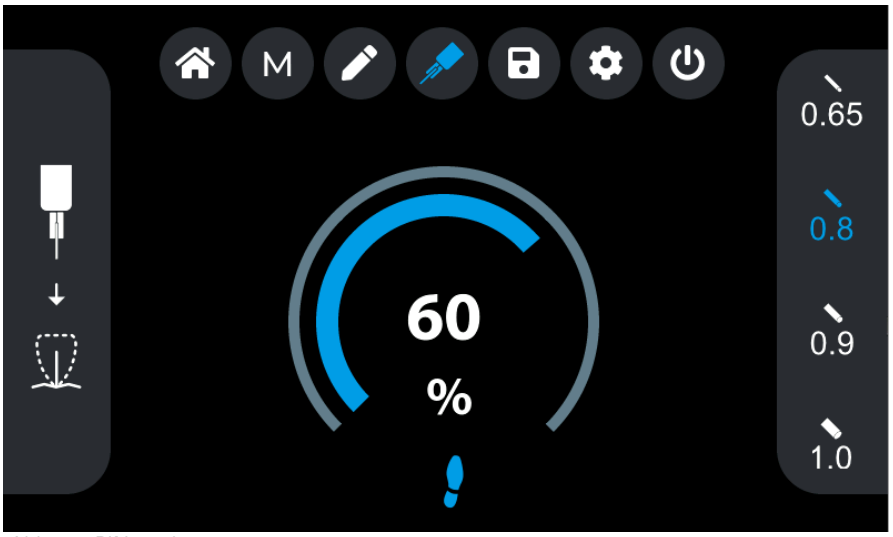


Abb. 6.8 PIN mode

The PIN mode can weld pins (e.g., ear studs in various diameters) onto workpiece surfaces. The optional accessory PIN welding adapter set (item no. 100 760, consisting of one adapter ea. Ø 0.65, 0.8, 0.9 and 1.0 mm) and the foot switch (item no. 100 850) are required for this. In PIN mode, the foot switch is activated as standard and cannot be deactivated.

Please switch off the device before replacing the electrode and adapters. This prevents uncontrolled triggering of a weld. Remove the electrode and replace the clamping nut and pliers with a PIN adapter. Work without the clamping nut and argon nozzle of the handpiece.

Then select the diameter of the adapter used (symbols on the right-hand side of the display). Now connect the workpiece to a connection terminal at a bare metal point. Insert a pin with the appropriate diameter into the PIN adapter. Shielding gas will not be emitted during the entire process.

Procedure:
First, when the workpiece is touched lightly, the PIN adapter retracts.

With the 2nd light touch, the eye protection system (shutter) in the microscope darkens periodically, clearly visible.

The welding process is triggered by pressing the foot switch.

TIP: Prior sand blasting or roughening of polished welding points can have a positive effect on the welding behaviour when welding in the PIN welding mode.

TIP: The pin must not be pressed on too firmly in order to achieve an optimum welding result

6.5 Program memory

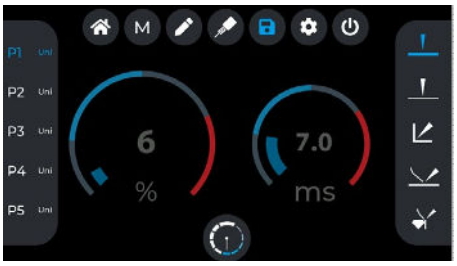
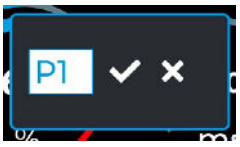


Abb. 6.9 Program memory

The PUK 6.1 provides the option of storing 5 individual parameter configurations. After having selected the desired parameters of the alloy, welding geometry, welding power, pulse duration and welding speed, they can be stored as follows:

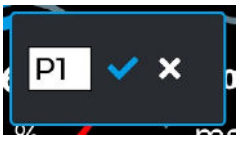
1: Press and hold the turn-push controller centred up until a new dialog field opens in the centre of the display:



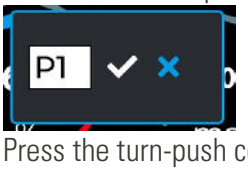
2: Press the turn-push controller once, then
select the program position (P1 - P5) by turning the turn-push controller.

Press the turn-push controller again shortly:
=> program position confirmed

3a: Turn the turn-push controller right to the check mark:



Briefly press the turn-push controller: => settings are saved
or:
3b: Turn the turn-push controller right to the cross:



Press the turn-push controller shortly: => saving process is cancelled

6.6 Settings menu

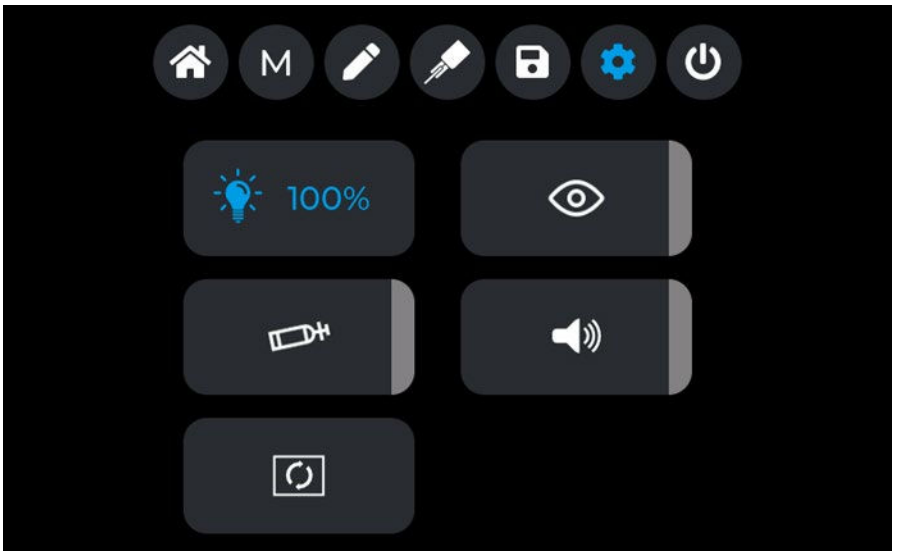
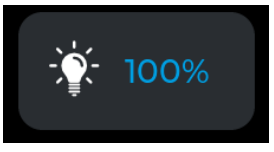
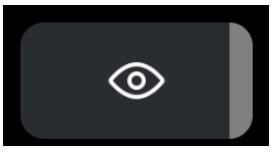


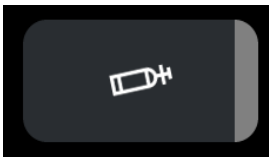
Fig. 6.10 Settings menu



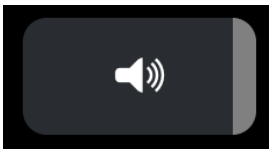
Here the brightness of the LED illumination in the microscope can be selected in the steps 0 %, 25 %, 50 %, 75 % and 100 % by pressing the rotary-push control.



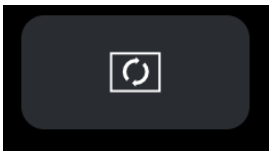
Here the eye protection filter is activated and thus darkened. With this function, the Lampert eye protection system can be checked for correct function.



Here the gas valve in the device is opened. This function is used to be able to set the gas flow correctly on the flow controller (recommended gas flow 2 – 3 l/min).



Here the welding tone to announce the start of the welding process is activated or deactivated.



This opens the update menu.

6.7 Update menu

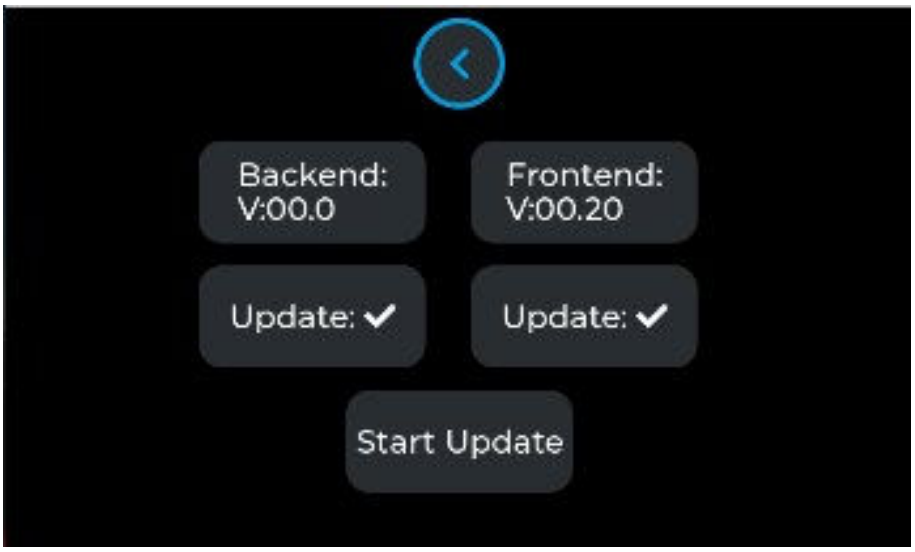


Fig. 6.11 Update menu

Proceed as follows to update the device software:

1) Transfer the update file to a USB data carrier. This should have a maximum of 16 GB memory capacity and be formatted in FAT32 format.
2) Switch off the welding device on the back of the device.
3) Insert the USB data carrier into the USB port on the back of the device.
4) Switch on the welding device on the back of the device.
5) In the settings menu, select the update button with the rotary-push control and confirm.
6) An update window opens as shown in Fig. 6.11. The update can be started with the "Start Update" button. The progress of the update is shown in percent on the display.
7) The device restarts after the update.
8) You can check whether the software version has been updated correctly in the update menu.
9) If the correct software version is installed, remove the USB data carrier.

✓ The device software is now updated.

If the update was not successful, the above steps must be repeated. If the update did not work even after repeated attempts, please contact customer service.

6.8 Standby mode

Fig. 6.12 Standby mode

Standby mode saves energy when the device is not used for welding for a short period. The settings are saved and no uncontrolled welds are possible. This means you do not have to switch off the device between two consecutive applications.

If you do not use the device for more than one hour between two applications, we always recommend that you switch the device off completely using the mains switch for optimum energy consumption.

7 Using the PUK 6.1

7.1 Switching on the PUK 6.1

CAUTION!

Danger due to operating errors

As soon as the device is switched on at the mains master switch, voltage is applied to the contact tools. If these come into contact with electrically conductive or earthed parts such as the casing this can lead to undesired erroneous welding.

➢ Keep electrically conductive parts and earthed housings away from the welding equipment.

DANGER!

Hazard due to electromagnetic radiation

Pacemakers and other medical implants can be damaged due to electromagnetic radiation. Cables carrying welding current must also not be wrapped around the body. Both can lead to the complete failure of medical implants.

➢ The device generates a strong electromagnetic field during operation. If you are a medical implant user, check with the implant manufacturer or an authorised medical professional before using the device. If use is possible, clarify the required minimum distance in advance and do infringe upon this distance at any time when working with the device.

Proceed as follows:

1) Make sure that the mains cable is connected to the device and the socket.
2) Check the gas connection and carefully open the gas cylinder valve.
3) Set the power switch to "I".
4) Read the safety instruction on the display and confirm it by pressing the rotary-push control.

✓ The device is now ready for operation

7.2 Adjusting the gas flow

Before the welding process can be started, the flow must be set correctly on the flow controller.

Proceed as follows:

1) Close the flow regulator. To do this, turn the black rotary knob counter-clockwise until it stops.
2) Carefully open the main valve of the gas cylinder counter-clockwise with two hands.
3) In the settings menu, select the button for opening the gas valve of the welding device and open the gas valve by pressing the control dial. Now the gas flow can be adjusted to a value between 2 and 3 litres/minute by turning the flow regulator clockwise. Please also refer to the separate operating instructions for the flow regulator. After setting the correct flow rate, close the gas valve by pressing the control knob again.

✓ The gas flow is now set correctly.

7.3 Welding with the PUK 6.1

CAUTION

Hot surfaces

Danger of burns to the skin

➢ It is absolutely essential to wear gloves when welding

WARNING

Optical radiation

Danger of eye damage

➢ Suitable eye protection must always be worn during welding.

Proceed as follows:

1) Check the function of the eye protection filter. To do this, connect the eye protection system to the welding device. Press the button for the eye protection test in the settings menu of the welding device. This darkens the field of vision. This can be checked by looking through the oculars. If the button for the eye protection test is pressed again, the LED illumination must be visible again when looking through the oculars.
2) Check the flow rate of the gas. The optimal flow rate is 2 - 3 litres/minute.
3) Select the welding parameters.
4) Free the workpiece from contamination with a suitable cleaner.
5) Connect a metallic blank section of the workpiece with the contact clamp.
6) Move the workpiece towards the electrode in the handpiece holding arm.
7) Apply light pressure to establish contact between the workpiece and the electrode. The welding process now starts automatically.
8) Do not release the contact between the workpiece and the electrode until the welding process is finished.
9) By touching the workpiece again, you can trigger the next welding process.

The fine welding device is equipped with a function to prevent the electrode becoming welded to the workpiece by incorrectly pressing or pressing too hard. If a welding point has already been set and too much pressure has been exerted with the workpiece on the electrode when it comes into contact again, the welding process is not triggered; instead, a signal tone will indicate that no welding can be performed without contact interruption. The electrode's contact to the workpiece must be stopped and the welding process must be started again. The welding process can be interrupted at any time by lifting the electrode away from the workpiece.

TIP: Always work with a well ground electrode.

TIP: Never weld "freehand", i.e. use the hand rests on the microscope. Even a slight trembling of the hands can impair the welding results.

7.4 Switching off the PUK 6.1

Proceed as follows:

1) Set the contact clamp down such that no accidental contact can take place.
2) Switch off the device at the main switch on the back of the device.
3) Close the valve on the gas cylinder.

✓ The device is switched off.

7.5 Basic information and tips

- The quality of the welding result depends essentially on the quality of the grinding of the electrode.
- Perfect electrical contact of the workpiece to the contact terminal must always be ensured, i.e. the workpiece should be connected to the terminal of the connecting cable or via a contacting tool at a metallically bright point.
- Free-hand welding leads to poorer welding results due to uncontrollable movements of the hands.
- The pressure on the electrode tip should only be light.
- A gas flow rate of approx. 2-3 litres/minute is recommended. The gas flow should be checked regularly at the flow controller and readjusted if necessary.

- The angle at which the workpiece touches the electrode tip significantly influences the flow direction of the spot weld.
- For welding tasks at deeper spots, the electrode can be clamped in such a way that it protrudes slightly longer from the nozzle. The gas flow rate can be slightly increased in this case.
- In many cases, it is helpful to work with welding wire as a welding filler. The use of solder is not permitted.

8 Help with faults

No.	Fault	Possible cause	Fault rectification / solution
1	Main power switch on, but device does not start.	Mains cable interrupted	Check mains cable and mains voltage
		Device fuse blown	Replace device fuse with identical fuse
2	Device switched on, but welding process does not start	Cable connection interrupted	Check all cable connections
		Connection with the workpiece interrupted	Check connection to the workpiece
		Fault due to leakage current	Switch device off and on again. If the fault is not corrected, please contact customer service
3	Mains protection trips	Mains fuse rating too low	Fuse mains properly
		Mains protection trips while the device is in standby	Contact customer service
4	Poor welding characteristics	Incorrect shielding gas	Use inert shielding gas (e.g. Argon 4.6)
5	Poor ignition characteristics	Electrode clamped loosely in hand piece	Tighten the clamping nut on the handpiece by hand
6	Oxidation and rusting	Excessive gas pressure	Reduce flow rate – approx. 2 l/min
7	Severe oxidation of the welding points	Incorrect shielding gas	Use inert shielding gas (e.g. Argon 4.6)
8	Tungsten embeddings in base material	Excessive pressure of the electrodes on the workpiece	Touch workpiece with extremely light pressure
9	Tungsten electrode welds to workpiece	Excessive pressure of the electrodes on the workpiece	Touch workpiece with extremely light pressure
10	Tungsten electrode melts off immediately	Electrode abraded ground too steeply	Use the recommended angle of abrasion grinding (approx. 15°)
11	Static discharge over the surface of the device	Special local conditions	Use special foot mat for the workspace

No.	Fault	Possible cause	Fault rectification / solution
12	Device begins to weld immediately when touching the workpiece (no gas pre-flow)	Malfunction	Immediately put the device out of operation and contact customer service

Tab. 8.1 Causes of errors and fault rectification

9 Care and inspection work

The device must always be switched off before care and inspection work.

9.1 Care and inspection schedule

Interval	Care and inspection work	Comments
Daily	Check working environment	Clean if necessary
	Check the condition and cleanliness of the device	Clean if necessary
	Check the gas hose for leaks	
As required	Clean the screw connection of the electrode in the handpiece to ensure electrical contact.	
	The electrode can be reground.	Replace electrode when worn out.

Tab. 9.1 Care and inspection schedule

9.2 Carry out care and inspection work

Cleaning the PUK 6.1

- Use a dry / slightly damp cloth to remove dust and carefully clean the surfaces of the device.
- A non-abrasive glass cleaner (e.g. spectacles cleaner) can be used for the screen on the front of the display.

Regrinding electrodes

1) Switch off the device.
2) Remove the electrode from the handpiece.

3) Use the electrode grinding motor with a fine or medium-fine grinding wheel to grind the electrode.
4) Grind the electrode at a 15° angle. With the grinding motor from the PUK 6.1 original accessories, this angle is predetermined by the guide holes.

✓ Now the electrode can be reinserted into the handpiece.

10 Disposal and recycling

Render discarded devices unusable by removing the mains cable. Only for EU countries: In accordance with European directive 2012/19/EU regarding the disposal of used electrical and electronic equipment, discarded electrical devices must be separated and collected and sent for recovery in an environmentally friendly manner.

11 Dimensions and technical data

11.1 Device dimensions

Name		Value	Unit
Weight		9.5	kg
Dimensions	Length	365	mm
	Width	190	mm
	Height	305	mm

Tab. 11.1 Machine dimensions

11.2 Technical data for the device

Name		Value	Unit
Electrical connection			
Voltage (supply)	L+N+PE	230	V AC
Frequency		50	Hz
Fuse/breaker protection provided by the operator Tripping characteristics:		B	
Power consumption		300	W
Power consumption stand-by mode		8 – 10	W
Max. current		4.4	A
Protection class per EN 61140:2016		Protection class I	
Closed circuit voltage		25 - 43	V
No-load voltage		43	V
Duty cycle		80 %	
General data			
Max. operating temperature		60	°C
Max. outside temperature	Transport/storage	-20 - +55	°C
	Operation	-10 - +40	°C
Relative humidity		Up to 50 % at 40 °C Up to 90 % at 20 °C	
Max. location altitude (above sea level)		1000	m
Protection type per EN 60529:2014		IP21S	
Shielding gas		argon	
Maximum gas pressure		4	bar

Tab. 11.2 Technical data for the machine

12 Appendix

12.1 Service address

If you have any problems with your PUK fine welding device, please contact your Lampert partner company or the Lampert dealer from whom you purchased the device.

In the event that you have not purchased the device via an authorised Lampert partner company or are unable to locate one, please contact the manufacturer directly:

Lampert Werktechnik GmbH
Ettlebener Strasse 27
97440 Werneck
Germany
+49 9722 9459 0
mail@lampert.info

12.2 Spare and wear parts

Only original spare and wear parts may be used for your PUK 6.1. These are listed in the Lampert spare parts catalogue and on the manufacturer's website.

12.3 CE conformity

EU declaration of conformity

in accordance with the Low-Voltage Directive 2014/35/EU, Annex IV

Original

The manufacturer bears the sole responsibility for issuing this declaration of conformity

Lampert Werktechnik GmbH

Ettlebener Straße 27

97440 Werneck

Germany

Object of this declaration

Product / Article	Microarc spot welding device
Type	PUK 6G
Commercial name	PUK 6.1 jewelry welder
Model	PUK 6.1

The object of the declaration described above meets the relevant harmonisation legislation of the European Union:

2014/35/EU	Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits Published in 2014/L 96/357 of 29.03.2014
2014/30/EU	Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast) Published in 2014/L 96/79 of 29.03.2014
2011/65/EU	Corrigendum to Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment Published in 2014/L 44/55 of 14.02.2014
2023/988/EU	Regulation (EU) 2023/988 of the European Parliament and of the Council of 10 May 2023 on general product safety, amending Regulation (EU) No 1025/2012 of the European Parliament and of the Council and Directive (EU) 2020/1828 of the European Parliament and the Council, and repealing Directive 2001/95/EC of the European Parliament and of the Council and Council Directive 87/357/EEC Published in 2023/L 135 of 23.05.2023

Applied harmonised standards:

EN 60974-6:2016	Arc welding equipment – Part 6: Limited duty equipment
EN 61000-6-2:2005	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-4:2007/A1:2011	Electromagnetic compatibility (EMC) – Part 6-4: Generic standards - Emission standard for industrial environments
EN 61000-3-2:2014	Electromagnetic compatibility (EMC) – Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <=16 A per phase) (IEC 61000-3-2:2018)
EN 61000-3-3:2013	Electromagnetic compatibility (EMC) – Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection
EN 63000:2018	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Additional information: none

Signed for and on behalf of:

Werneck, 20.01.2025

Place, Date

Dr. Martin Plöckinger
CEO

Jürgen Fuchs
Head of Research and Development

1/1

LAMPERT.
PRECISION WELDING

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Subject to technical changes EN 2025/01