LAMPERT.

Operating manual
PUK D3

PUK D3

OPERATING MANUAL (translation)
"PUK D3" with welding microscope "SM5"

Dear Customer,

This operating manual is intended to familiarise you with the commissioning process and operation of your PUK D3 as well as the associated SM5 welding microscope. Please read the operating instructions carefully and follow the advice given here diligently. Disruptions and operational faults will thus be avoided. Your personal safety, constant availability and long service life can be assured by this.

THE COMMISSIONING OF THE DEVICE MUST ONLY BE UNDERTAKEN BY TRAINED SPECIALISTS AND ONLY WITHIN THE SCOPE OF APPROPRIATE USE. THE MANUFACTURER ACCEPTS NO LIABILITY FOR DAMAGES CAUSED THROUGH INAPPROPRIATE USE AND IMPROPER OPERATION. THE “GENERAL SAFETY REQUIREMENTS” AND "PERSONAL BODY PROTECTION" CHAPTERS MUST BE READ BEFORE COMMISSIONING.

Please keep these operating instructions safe.

The equipment produced by “Lampert Werktechnik GmbH” fulfils the conformity requirements of the CE mark and is constructed in accordance with the VDE guidelines.

The eye protection systems used on the "SM5" welding microscope are tested and certified by DIN-CERTCO (DIN department for eye protection).

Only use original spare parts for maintenance and overhaul work. Our customer service department will naturally be happy to help you.

THE DEVICE MUST ONLY BE OPENED OR MODIFIED BY AUTHORISED CUSTOMER SERVICE PERSONNEL, OTHERWISE ALL GUARANTEES AND WARRANTIES ARE VOID.

LAMPERT WERKTECHNIK GMBH

November 2017

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1. WARNING AND INFORMATION SIGNS

	Warning! “Warning” identifies a potentially dangerous situation. If this is not avoided, the consequences can be death or severe injuries.
	Caution! "Caution!" identifies a potentially hazardous situation. If this is not avoided, the consequences can be slight or minor injuries as well as property damage.
	Note! “Note” identifies the product at risk from the hazard and possible damage to the equipment.
	Important! "Important!" designates user tips and other especially useful information. This is not a signal word for hazardous or dangerous situations.

2. APPROPRIATE USE (FIELD OF APPLICATION)

- Outdoor operation is impermissible. Use this device only in dry rooms!
- PUK D3: the application of spot welds to all customary dental alloys as well as titanium for the manufacture of new articles and for repairs on dental work.

WELDS INSIDE AND ON THE HUMAN BODY ARE PROHIBITED.

GENERALLY NO LIABILITY IS ACCEPTED FOR THE DURABILITY OF THE WELDING. WE RECOMMEND THAT THE WELDING BE CHECKED IN EVERY CASE.

SM5: Observation and microscopic viewing of objects through the ocular of the microscope and illumination of the working area.

The SM5 unit may only be used for welding if it has been properly connected to a PUK fine-welding device.

3. SAFETY INSTRUCTIONS

3.1 GENERAL SAFETY REQUIREMENTS

PERSONS WHO WEAR ACTIVE IMPLANTS (HEART PACEMAKERS) MUST MAINTAIN A SAFETY DISTANCE OF 20 CM BETWEEN THE WELDING CURRENT CABLE / SOURCE OF THE WELDING CURRENT AND THE IMPLANT

The opening of the device is only permitted when undertaken by an electrician. Before opening remove the mains cable and ensure that the device is de-energised. Discharge any components in the device that could hold electrical charge.
In case of doubt or uncertainty, always consult with a specialist. Our customer support department is naturally always available to assist you with their professional trained personnel, appropriate tooling and equipment.
Always use the original cables and ensure that workpiece clamps are properly attached.
Both the mains and welding currents can be a source of danger.

The device must be isolated from the mains power when undertaking any repair or maintenance work on the power source. The power socket is to be clearly blocked when undertaking any work on the system beyond minor manipulations where it is necessary to leave the workplace, even for brief periods.

The highest and thus the most dangerous voltage in the welding circuit is the no-load voltage. The highest permissible no-load voltages are recorded in the national and international regulations in accordance with the type of welding current, construction of the current source and the extent of the electrical hazard to the workplace.
If it can be assumed that risk-free operation is no longer possible, the unit must be put out of operation and secured against being unintentionally restarted.

It can be assumed that risk-free operation is no longer possible, if

- the equipment shows visible signs of damage,
- malfunctions occur,
- or the equipment is no longer working.

The PUK must, as standard, be operated with a mains voltage of 230 V~.
Yellow-green wire = protective earth terminal (PE). The other wires L1 and N are to be connected to the phase and neutral conductors of the power plug.
Mains power is defined as 230 V Europe-wide since introduction of Euro Norm IEC 38 (valid from May 1987).
The welding device is factory-adjusted to 230 V!
This means that as a result of the tolerance range of +/- 10 %, the system can also be operated at 220 V~. Devices configured to voltages other than 230V will be designated as such by means of a label.

THE DEVICE MUST ONLY BE OPENED BY AUTHORISED SERVICE PERSONNEL!
IF THE DEVICE HAS BEEN CONFIGURED FOR A CUSTOM VOLTAGE, THE TECHNICAL DATA ON THE DEVICE SPECIFICATION PLATE APPLY! MAINS PLUGS MUST CORRESPOND TO THE MAINS VOLTAGE AND POWER CONSUMPTION OF THE WELDING EQUIPMENT (see technical data!)
THE FUSING FOR THE MAINS SUPPLY MUST BE MATCHED TO THE POWER CONSUMPTION OF THE WELDING EQUIPMENT!
ONLY USE THE SUPPLIED MAINS CABLE!

THE PUK D3 IS A PIECE OF ELECTRICAL EQUIPMENT. NATIONAL REGULATIONS ON TESTING INTERVALS AND THE SCOPE OF REQUIRED RECURRING SAFETY-RELATED TESTS MUST BE OBSERVED.

3.2 HAZARDS AND PERSONAL BODY PROTECTION

Please also observe the relevant regulations of the respective country.

 RISK OF INJURY FROM RADIATION OR HEAT:
Protective gloves must be worn when welding.
Uncovered areas of the skin must be protected from the UV radiation generated during welding in order to avoid skin damage.
Wear suitable dry protective clothing with no synthetic fibers.
The workpiece and the electrode tip can become very hot during welding – risk of burns.
Welding can cause sparks and spatters – risk of burns.

 EYE PROTECTION WHEN WELDING:
Never look into the arc without eye protection; always use a welding mask with certified protective glass.
In addition to light and thermal radiation, which can cause dazzling and burning, the electric arc also emits UV radiation. With insufficient protection this invisible ultraviolet radiation causes very painful conjunctivitis, which can first be noticed hours later, and can also cause permanent eye damage.
The Lampert eye protection systems with its integrated LCD protective welding screen offers reliable protection against these risks and provides permanent protection from UV / IR rays in both light and dark state. The protective class of the filter is defined such that dazzling by the arc is effectively prevented.
Persons who are nearby to the electric arc and assistants must also be informed of the dangers and equipped with the appropriate protection; if necessary set up protective partition walls.

EYE PROTECTION WHEN OPERATING THE LED ILLUMINATION:
Never look into the LED lamp or its reflections without eye protection; use protective shield or safety glasses with suitable protective glass.

 SMOKES AND GASES:
When welding, especially in small spaces, ensure that there is an adequate fresh air supply or use an external extractor fan, as smoke and hazardous gases occur.

 EXPLOSION HAZARD – DANGER WHEN WELDING ON CONTAINERS:
It is not permitted to carry out welding on containers that have been used for storing gases, propellants, mineral oils or similar, even if they have been empty for a long time, as there is a risk of explosions caused by residues.
Particular regulations apply to fire and explosion endangered spaces.

 OTHER DANGERS:
The electrode tip installed in the handpiece means a risk of injury (stabbing and scratching of e.g. hand, face and eyes).

3.3 HAZARDS OF SHIELDING GAS CYLINDERS

 Observe all applicable safety measures when handling gas cylinders as well as the safety regulations for handling gases. Gas tanks must especially be secured against falling over / falling down and heat (max. 50°C); it is particularly important to ensure they are not subjected to sunlight for extended periods and that they are protected from severe frost.

3.4 RISK OF ALLERGIC REACTIONS:

 Please note that the device's raw materials that could come into contact with the operator's skin may cause allergic reactions in susceptible people.

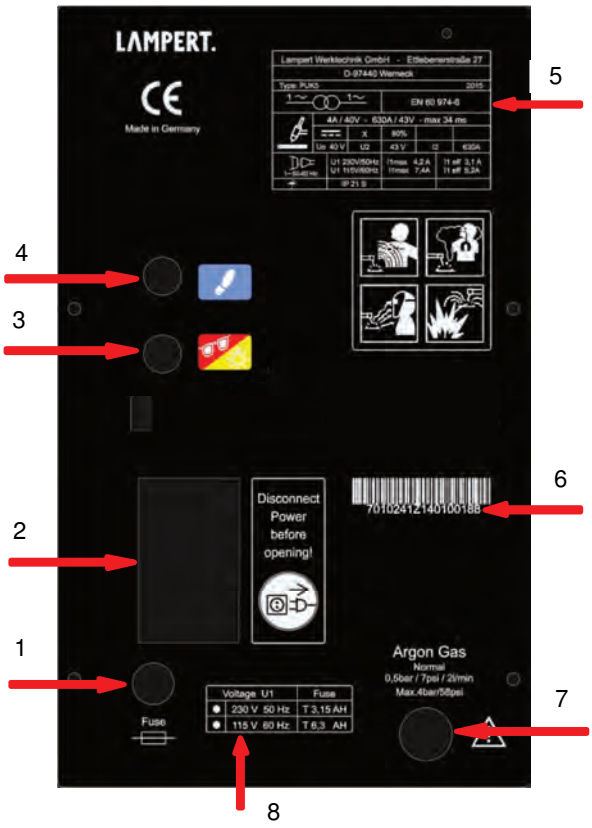
4. SETUP AND INSTALLATION

4.1 SET-UP OF THE DEVICE

The system is to be set up so that cooling air is able to reach all of the surfaces of the housing without hindrance. The device may not be covered! The device is to be placed on a non-combustible surface! The device should be set up on a base that is solid, level, and insulated - ideally on a suitable workbench. Fasten the two hand supports for the microscope with 2 Allen screws using the supplied Allen key by inserting the screws into the designated holes from underneath the microscope baseplate and into the hand supports.

4.2 DESCRIPTION OF THE REAR OF THE DEVICE

(Fig. 2)



(1) FUSEBOX ("Fuse")

(2) MASTER MAINS SWITCH as well as
AC POWER SOCKET
(for connecting the mains cable)

(3) CONNECTION SOCKET FOR EYE PROTECTION SYSTEM AND LED MICROSCOPE ILLUMINATION

(4) CONNECTION SOCKET FOR THE FOOT SWITCH

(5) TYPE PLATE

(6) SERIAL NUMBER

(7) PROTECTIVE GAS CONNECTION ("Argon Gas")
For 6.0 mm diameter pressure hose (max. 4.0 bar / 58 psi)

(8) APPROVED MAINS VOLTAGE FOR THIS DEVICE

4.3 CONNECT EYE PROTECTION AND LED ILLUMINATION OF THE WELDING MICROSCOPE TO THE PUK:

The circular connector for the eye protection system and the LED illumination should be inserted into the connecting socket (3) on the rear of the PUK welding device (marked in red and yellow colour) and is to be tightened in place with the coupling nut (hand tight)..

WARNING!

ONLY SUITABLE ORIGINAL EYE PROTECTION SYSTEMS FROM LAMPERT MAY BE CONNECTED TO THE WELDING SYSTEM! OTHER EYE PROTECTION SYSTEMS ARE NOT APPROVED AND CAN LEAD TO PERMANENT HEALTH DAMAGE OR DAMAGE TO THE WELDING DEVICE.

ALWAYS OBSERVE THE OPERATING INSTRUCTIONS FOR THE CONNECTED EYE PROTECTION SYSTEM

4.4 CONNECT SHIELDING GAS SUPPLY:

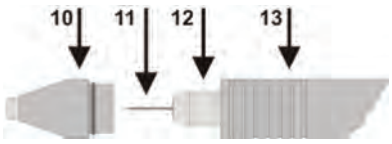
Fasten the suitable flow regulator with the corresponding tool to the shielding gas tank. ATTENTION: In doing so, always observe the enclosed special operating instructions provided. (Where possible, use argon with min. 99.9 % purity, e.g. "Argon 4.6"). The pressure hose is to be fastened by hand with the help of the quick coupling adapter to the flow regulator as well as the shielding gas connector (7) on the rear of the device.

CHECK REGULARLY THAT ALL OF THE HOSE CONNECTIONS AND GAS HOSES ARE IN OPTIMAL CONDITION, ARE PROPERLY FASTENED AND ARE AIRTIGHT!

4.5 INSERTING THE ELECTRODES INTO THE WELDING HANDPIECE:

PLEASE ALWAYS CHECK THAT THE MACHINE IS SWITCHED OFF, PRIOR TO EXCHANGING THE ELECTRODES. THIS PREVENTS UNCONTROLLED TRIGGERING OF THE WELDING PROCESS.

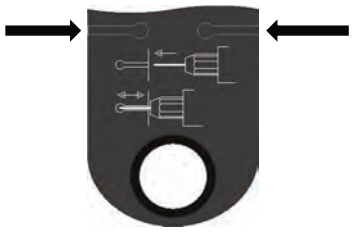
(Fig. 3)



Lightly rotate the nozzle (10) back and forth and in doing so, pull it off of the handpiece (13). It is only pushed-on, not screwed in place.

Release the threaded electrode connection (12), insert a well sharpened tungsten electrode (11) and tighten up (hand-tight – do not use a tool to tighten).

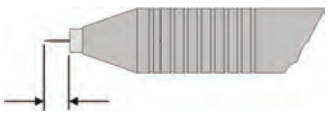
(Fig. 4)



The correct length for the electrode can easily be checked and corrected if necessary by means of the milled marks on the handpiece clamping arm (Fig. 4).

Now replace the nozzle.

(Fig. 5)



The electrode must protrude approx. 4 - 6mm out of the nozzle (Fig. 5).

ONLY USE THORIUM OXIDE FREE ORIGINAL ELECTRODES

Subsequently insert the connector of the handpiece as straight as possible into the socket (23) on the front of the PUK and fasten in place by tightening the coupling nut hand-tight in a clockwise direction. Insert the connecting cable used into the socket (24) on the front side of the housing.

4.6 CONNECT POWER SUPPLY:

Insert the power cable with the mains connector into the corresponding socket (2) on the rear of the housing and insert the mains plug into a suitable socket with the correct mains voltage.

CAUTION!

AS SOON AS THE MASTER MAINS SWITCH ON YOUR PUK IS SWITCHED ON, THE VOLTAGE IS APPLIED TO THE CONNECTED CROCODILE CLIPS OR CABLES. IT IS TO BE ENSURED THAT THESE PARTS ARE NOT ALLOWED TO COME INTO CONTACT WITH ELECTRICALLY CONDUCTIVE OR EARTHED PARTS, SUCH AS THE HOUSING, ETC. IN DOING SO, THERE IS NO RISK FOR THE OPERATOR, WITH THE EXCEPTION OF POSSIBLE CIRCUMSTANCES ARISING FROM OPERATING ERROR.

4.7 CONFIGURATION THE WELDING MICROSCOPE:

ESSENTIAL PRIOR TO THE INITIAL WELDING OPERATION: PRECISE CONFIGURATION OF THE MICROSCOPE OPTICS

FIRST STEPS

Align the handpiece holder so that you are able to comfortably introduce a workpiece with your hands to the tip of the handpiece mounted in the supporting arm. It should be possible to comfortably place both hands and palms on the baseplate hand supports. You also have the option of changing the angle of inclination for the microscope. In order to do so, release the locking screw

(14) on the stand, angle the microscope to the desired position and re-fasten the screw. A metal pin extends from the stand to support the microscope on your working surface.

ADJUSTING THE INTEROCULAR DISTANCE

Look through the two oculars (17) and move the ocular tubes (15) inwards or outwards by holding the prism housing (18) still and moving them in or out. The interocular distance is correct if the range of vision as viewed through the two oculars is complete and is united into a single image. The interocular distance should be individually set for each user.

FOCUSING

Mount the welding handpiece with clamped electrode into the supporting arm. Rotate the focusing knob (20) to a medium focus range. Adjust the mounting height of the microscope head: Hold the microscope head (19) with one hand, without touching one of the lenses, and use the other hand to release the screw on the head bracket. The head can now be moved. Look through the oculars and move the microscope head up or down until the object appears focused. The correct distance between the handpiece holder and the microscope head amounts to approx. 6 cm on the stand rod. Now re-tighten the adjusting screw on the head bracket once more. Subsequently use the focusing knob (20) to focus the image.

DIOPTRE ADJUSTMENT

The sleeve for adjusting the dioptre (16) is fitted to the left-hand ocular (17). In the normal position, the lower part of the tube is aligned to the marking on the ocular tube. In the event of differing vision in both eyes: Open the right eye only, look into the right-hand ocular (15) and adjust the focus using the focusing knob (20). Now look through the left-hand ocular with your left eye and adjust the focus by turning the dioptre control (16) on the left tube (17) until the image appears focused.

5. COMMISSIONING

5.1 DESCRIPTION OF THE FRONT-SIDE CONTROLS

(Fig. 1)

(21) TOUCHSCREEN-DISPLAY with slide function

(22) CONNECTION SOCKET FOR HANDPIECE (-)

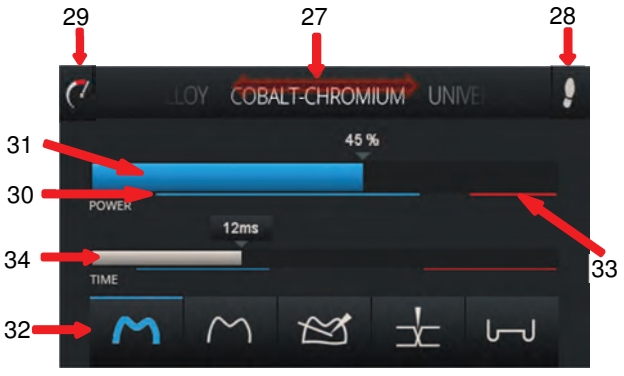
(23) SOCKET (-)
For connecting the blue contact terminal for fixation welding

(24) SOCKET (+)
For connecting contact elements such as contact terminals and clamps.

(25) ROTARY CONTROLLER
Select the welding power/time or switch to the next user level

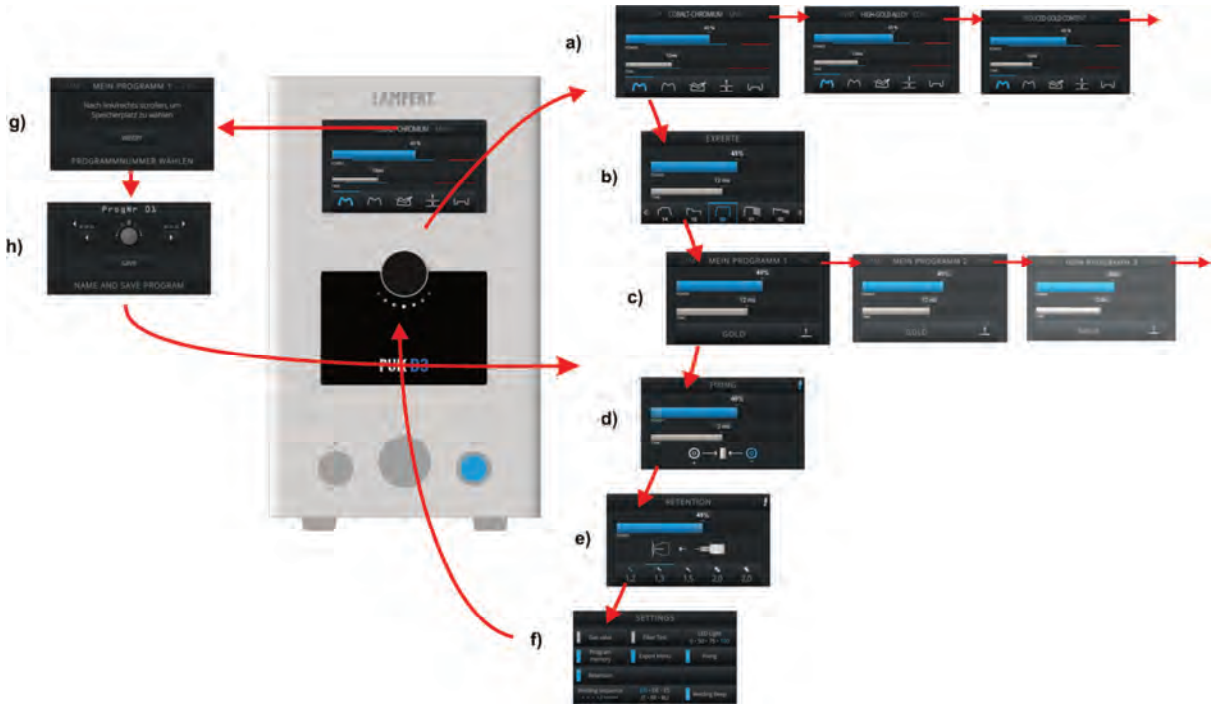
- Pressing the rotary controller for short time (< 1 second) switches from the power (POWER) parameter to the pulse duration (TIME) parameter.
  (It jumps back to power automatically after 1 second)
- Turning the controller to the left or the right changes the selected parameter.
- Pressing the controller for longer time (> 1 second) switches to the next user level, see chapter 5.2.

TOUCHSCREEN



(27) Select the material or welding program (depending on the user level) by sliding to the left or right within the selected user level. Press and hold for 2 seconds to call the memory menu.
(28) Foot switch activated
(29) Smoothing mode activated
(30) Recommended setting range
(31) Output scale as a percentage (POWER in %)
(32) Preselect welding situation and pulse shape (depending on user level)
(33) Red range: In this range the settings no longer make sense and there is a possible risk of damaging the workpiece.
(34) Pulse duration scale in milliseconds (TIME in ms)

5.2 EXPLANATION / OVERVIEW OF MENUS
(Fig. Schematic diagram of user levels)



ONCE IT IS SWITCHED ON, THE PUK D3 STARTS UP IN ITS START LEVEL (MAIN MENU).THE FOLLOWING USER LEVELS CAN BE NAVIGATED AFTER PRESSING LONGER (> 1 SEC.) THE ROTARY CONTROLLER (25):

a) Start level (main menu):
Preselection of the material to be welded and preselection of the welding situation with display of the recommended settings range for welding power and pulse duration
b) Expert level (if activated in the settings)
Arbitrary preselection of the various welding curves
c) User programs and stored custom settings (if activated in the settings)
d) Fixation welding (if activated in the settings)
e) Retention welding (if activated in the settings)
f) Settings (Language, gas valve, lighting,…)

At the start level and in "Custom Programs", sliding in the header bar on the display scrolls between the different preset materials or stored programs depending on the selected user level.

Beginners using the PUK system are advised to remain within the start level.

PRESSING THE SELECTED MATERIAL (27) IN THE TOP OF THE DISPLAY FOR 2 SEC. CAUSES THE PROGRAMMING MENU TO BE LAUNCHED:

g) Selection of the memory location and saving the settings (if activated in the settings). Storing custom welding parameters (20 memory slots)

h) Input and saving of the desired program (if activated in the settings)

5.3 SWITCHING ON THE DEVICE

First, carefully open the gas tank valve. Then switch the master mains switch (2) on the rear of the housing to the “I” position – the display shows the safety prompt regarding eye protection and the operating manual. Confirm your compliance with the safety instructions by pressing the rotary controller or by touching the touchscreen.

5.4 ADJUSTING FOR THE CORRECT GAS FLOW

The PUK D3 only works with shielding gas connected and sufficient gas flow. If no shielding gas is connected or the gas flow is insufficient, then a corresponding error message is shown in the display and the device fails to weld in the TIG-mode (starting and expert level, and in the stored custom settings).

PLEASE CONSIDER THAT GOOD WELDING RESULTS CAN ONLY BE ACHIEVED WITH A CORRECTLY ADJUSTED GAS FLOW.

In order to configure the correct gas flow, activate the "Gas valve" in the "Settings" menu (see chapter 5.5). This opens the gas valve in the welding device. Now set the flow regulator to the correct flow rate of approx. 2 - 3 litres/min. In doing so, also observe the instructions provided with the flow regulator. Once the gas volume is correctly adjusted, close again the "Gas valve" function by pressing the corresponding button.

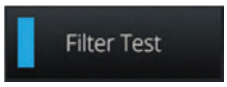
5.5 OPERATING LEVEL "SETTINGS"

The "Settings" user level can be used to modify basic settings and launch various test functions.

- **Gas valve:**

Pressing the corresponding button causes the gas valve to be opened. This function is important in order to set the correct gas flow on the flow regulator (see chap. 5.4). Pressing the button again causes the gas valve to be closed. In addition, any other operation of the device will automatically quit that function.

- **Filter-Test:**

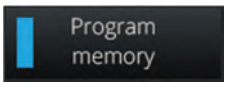


Pressing this button causes a shading of the eye protection filter. This enables correct function of the eye protection filter to be checked.
Pressing the button again quits the test.

- **LED light:**

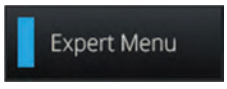
Pressing the button enables the brightness of the LED lamp on the welding microscope to be adjusted in 3 steps or to be switched off.

- **Program memory:**



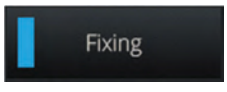
You can activate or deactivate the saving and calling functions for programs that you created yourself here. If this menu is activated, it appears as an additional user level. The user levels can be toggled by pressing the rotary controller for 1 second.

- **Expert Menü:**



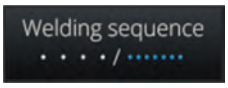
The expert menu can be activated here. If this menu is active, it appears as an additional user level. The user levels can be toggled by pressing the rotary controller for 1 sec.

- **Fixation:**



Pressing this button activates or deactivates the operating menu for fixation welding. If this menu is activated, it appears as an additional user level. The user levels can be toggled by pressing the rotary controller for 1 sec.

- **Welding sequence:**

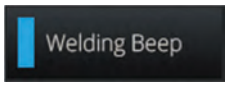


You can press the button to preselect a "standard" or "short" basic welding sequence. If you select "short", a shortened gas pre-flow time results in a shorter time gap for triggering in a series of welding points.

- **Language**

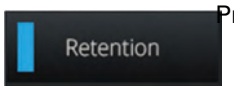
Pressing the button with the country codes enables the system language for the welding device to be changed. The system can be toggled between English (EN), German (DE), Spanish (ES), French (FR) and Italian (IT).

- **Welding signal tone:**



Pressing the button activates or deactivates the acoustic signal that notifies the triggering of the weld.

- **Retention welding:**



Pressing this button activates or deactivates the operating menu for welding retentions. When activated, the corresponding menu appears as an additional user level. The user levels can be toggled by pressing the power regulator.

6. SELECTION OF THE WELDING PARAMETERS AND USER LEVELS

6.1 SELECTION OF THE WELDING PARAMETERS

Pressing for a short time (< 1 second) the rotary controller (25) or touching the POWER or TIME scales on the display switches between the power (POWER) and pulse duration (TIME) parameters. It jumps back to power (POWER) automatically after 1 second. Rotating the rotary controller or sliding the power (POWER) or pulse duration (TIME) scales changes the relevant value.

BASIC INFORMATION ABOUT THE EFFECTS OF WELDING POWER AND WELDING TIME:

POWER:

With the parameter “welding power” the strength of welding energy is set.
The size and intensity of the welding points are controlled in this way, i.e. the higher the power the larger the welding point.
With very thin materials too high a power level can also quickly result in damage, i.e. it makes sense to experiment with samples for beginners with the PUK system to find the optimum power level, starting at a power of 20 % or with very fine welding, even lower. Power settings between 35 and 50 % are considered medium welding powers.

Most dental alloys can be welded with higher power levels, just as with stainless steel. Power levels above 70 % are only practical in the most unusual circumstances. There is a danger of inhomogeneous welds and only experienced users should move outside this range.

WELDING TIME OR PULSE DURATION:

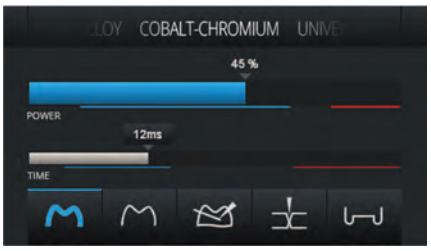
The welding time setting determines for how many milliseconds the welding power is applied, i.e. a longer pulse duration results in a longer and deeper application of the energy to the workpiece and thus simultaneously a greater development of heat.
With very thin materials or wires it is recommended to use a shorter welding time, primarily when welding near to acrylic or ceramic parts or other heat-sensitive materials. Welding times of no more than 4 msec are recommended here.
With some cobalt chromium alloys, with silver alloys or other highly conductive metals a longer welding time can be advantageous in order to avoid hot cracks, starting at 10 msec.

IMPORTANT FOR SUCCESSFUL OPERATION WITH THE PUK:

Welding power and pulse duration must be considered in close context with each other in all cases! The total energy applied to the workpiece is comprised of these two parameter settings together - prior to welding this must be considered carefully following an in-depth analysis of the welding task, the materials and the workpiece geometry.

SELECTION OF THE WELDING PARAMETERS ON THE PUK D3:

The welding parameters are set in two stages:



1) In the upper area of the display, select the metal to be welded by sliding over the metal names.

2) Pressing one of the 5 buttons on the lower edge of the display selects the given welding situation.

This selection causes numerous settings to be made in the background. The important information for the user is then shown on the display:

- A welding time is preselected and the recommended setting range for the selected welding situation is marked under the scale by means of a blue bar. Settings outside of the recommended blue setting range are always possible, however, they are not recommended for the selected welding situation.
- The power is also preselected and the recommended setting range for the power is marked with a blue bar. Settings outside of the recommended blue setting range are always possible, however, they are not recommended for the selected welding situation.

RED RANGE:

If you move above the predefined values for welding time and welding power, the colour of the cursor and the parameter value displayed changes from white to red from a certain setting. In these ranges, there is a risk of damaging the material being welded, i.e. we expressly advise you against working in these extreme conditions.

DESCRIPTION OF THE WELDING SITUATION WITH ASSOCIATED SYMBOL ON TOUCHSCREEN:

- In the start level, the meaning of the following symbols is always the same for each of the preconfigured materials.
- In The start level shows in addition to the welding power and pulse duration for each stored material also the recommended working range in the respective scales of the touchscreen, highlighted in colour.

Universal setting for material thicknesses from 0.3 mm. This is well suited for most applications (≥ 0.3 mm).

Setting for thin or delicate parts less than 0.3 mm thick. This setting offers very low development of heat, especially in combination with short welding times.

Welding in sharp angles and tight joint situations. Here it is important to use short welding times.

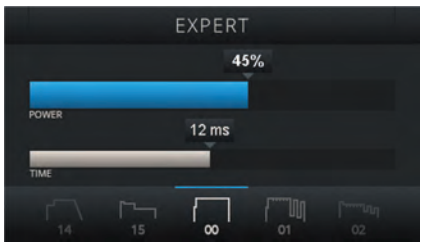
Melting of welding wire. Use identical alloy wire with a diameter of 0.3 to 0.4 mm. Ideal is a diameter of 0.35 mm.

Very low-energy melting for welding (orthodontic) wires or very thin material.

PUSHING/TOUCHING THE RESPECTIVE BUTTON FOR 2 SEC. BRINGS UP AN INFO WINDOW ON THE DISPLAY; SEE ALSO CHAPTER 6.3 "HELP FUNCTION".

6.2 EXPERT MENU

>>>THE EXPERT MENU CAN BE ACTIVATED FROM THE "SETTINGS" USER LEVEL



After activation, the expert mode appears as a separate user level, which can be accessed by pressing the rotary controller for 1 sec. The various welding characteristic curves are stored in the expert mode, which have been developed and defined in the start level for the preconfigured metals and welding geometries. However, here they are shown without content-related assignment.
This mode is designed for experienced welders who want to experiment with the various stored energy characteristic curves (pulse modulations). In this user level it is possible to choose between the various energy curves and store these together with individual settings for the output and time.

WHEN SWITCHING FROM THE MAIN MENU TO THE EXPERT MENU, THE RELEVANT SETTINGS ARE CARRIED OVER FROM THE MAIN MENU. THIS MEANS THAT THE WELDING CURVES STORED IN THE MAIN MENU CAN STILL BE VIEWED.

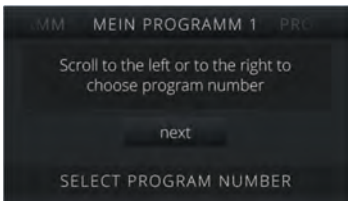
6.3 HELP FUNCTION

The buttons on the bottom of the display are provided with accessible info screens in all user levels. Touching / pressing the button for 2 sec. causes the info screen to appear for the respective button, which contains explanatory information for the button's function. Touching the display button again causes the active user screen to be shown once more.

6.4 PROGRAMMING

SAVING CUSTOM PROGRAMS

Pressing the metal name for a longer time (2 seconds) calls the programming menu. In the first step, scroll/slide to the left/right to select the program slot into which you want to store your custom settings.

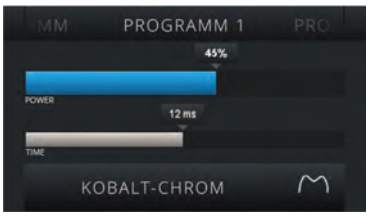


Then save your data by pressing the "Next" button. Saved data cannot be deleted. It can only be overwritten.

The following screen provides the option of assigning a program name to the stored settings. The program name can comprise upper and lower case letters and special characters. You can use the arrow buttons on the display to select the active cursor position and you can use the rotary controller (25) to select the desired characters.

Once the name has been entered, confirm your entry by pressing the "Save" button. After saving, you will be returned to the "Custom Programs" user level automatically, and the previously saved data is active.

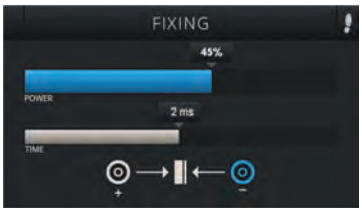
6.5 LOADING SAVED PROGRAMS AND THE USER LEVEL "CUSTOM PROGRAMS"



All custom stored programs are summarised in the "Custom Programs" user level. In the upper display area on this user level, select the relevant custom program by sliding to the left or to the right.

6.6 FIXATION WELDING

>>> THE FIXATION WELDING MENU CAN BE ACTIVATED FROM THE "SETTINGS" USER LEVEL.



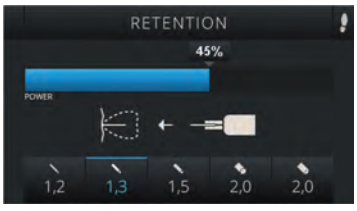
After activation (see also point 5.5 / Settings), the fixation mode appears as a separate user level, which can be accessed by pressing the rotary controller several times for 1 sec.

This mode is used for the fixation of two work piece parts. See also Chapter 7.4.1.
For using the fixation mode the tack welding set is required (optional accessory).

PLEASE NOTE: TACK WELDING IS PARTICULARLY WELL SUITED FOR METALS WITH LOW ELECTRICAL CONDUCTIVITY, FOR EXAMPLE: TITANIUM AND STEEL.

6.6 RETENTION WELDING

>>> THE RETENTION WELDING MENU CAN BE ACTIVATED FROM THE "SETTINGS" USER LEVEL.



After activation (see also point 5.5 / Settings), the retention welding mode appears as a separate user level, which can be accessed by pressing the rotary controller for one second.
This mode is used for the welding of CoCr or NiCr-alloy retention pins using the relevant pin welding adapter (Ø 1.2, 1.3, 1.5 or 2 mm). See also Chapter 7.3 and 7.4.2.

7. WELDING INSTRUCTIONS

NOTE!

PRIOR TO WELDING, ALWAYS CHECK THE FUNCTION OF THE EYE PROTECTION FILTER AS DESCRIBED IN CHAPTER 5.5 "FILTER TEST". IF THE EYE PROTECTION FILTER (SHUTTER) FAILS TO SWITCH OVER FROM LIGHT TO DARK, THEN IT MUST BE IMMEDIATELY EXCHANGED BY SPECIALIST PERSONNEL.

7.1 WELDING INSTRUCTIONS

- First connect a metallic blank section of the workpiece with the contact clamp.
- Lightly touch the area to be welded with the tip of the electrode until welding begins. In doing so, it is important to remain in the position where initial contact is made until welding begins, i.e. neither to follow the electrode with the workpiece if it retracts slightly in the handpiece, nor to pull back.

The welding process starts automatically as soon as the electrode touches the workpiece:

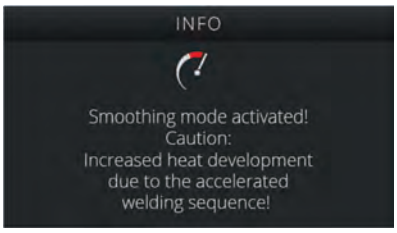
- Shielding gas flows around the welding area.
- A signal tone (if activated in the settings) notifies of the arc.
- The welding protection filter is darkened
- The arc is triggered with a slight delay and the electrode partly withdraws into the handpiece.
- The welding protection filter is lightened and the electrode returns to the initial position.
- The shielding gas supply stops or the welding process is started again by touching the workpiece

WORK ONLY WITH EXTREMELY LIGHT CONTACT AND WITHOUT ANY PRESSURE TO THE TIP OF THE ELECTRODE!

The PUK D3 is equipped with a function to prevent the electrode becoming welded to the workpiece by incorrectly pressing too hard. If a welding point has already been set and is pressed too hard to the workpiece when it comes into contact again, the welding point is not triggered; instead, the eye protection system will be darkened periodically to indicate that the electrode is pressing too hard against the workpiece. The electrode's contact to the workpiece must be stopped for a short time and the welding process must be started again.

THE WELDING PROCESS CAN BE HALTED AT ANY TIME BY MEANS OF LIFTING THE ELECTRODE AWAY FROM THE WORKPIECE.

7.2 WELDING WITH THE SMOOTHING MODE



You can press the "TIME" scale on the display for 2 seconds to activate or deactivate smoothing mode. The smoothing mode can only be activated on the start level, in the expert menu and on the "Custom Programs" level. Smoothing mode enables a faster welding sequence, e.g. to smooth surfaces or to weld with an increased heat transfer (e.g. to reduce the conductivity of silver). If the user switches to a different user level, smoothing mode must be reactivated if required.

7.3 RETENTION WELDING INSTRUCTIONS

This mode is used for the welding of CoCr or NiCr-alloy retention pins using the relevant pin welding adapter (Ø 1.2, 1.3, 1.5 or 2 mm).

Please switch off the machine prior to exchanging the electrodes or the adapter. This prevents uncontrolled triggering of the welding process. Remove the electrodes, replace the clamping nut and chuck with the pin welding adapter. Work without the clamping nut and nozzle. Then select the diameter of the adapter being used, by pressing the respective button on the display of the PUK D3.
Then connect the workpiece to an area of bare metal, using a contact clamp. Insert a pin of the appropriate diameter into the pin welding adapter. No shielding gas flows during the whole process.

The welding process itself proceeds automatically:

- The 1st light touch of the workpiece pulls back the pin welding adapter, and a continuous tone sounds for approx. 3 seconds.
- The 2nd light touch triggers the welding process (during the continuous tone).

A good welded connection is indicated by a clearly audible welding noise. If the process passes off without making a noise, then the connection is presumably of insufficient strength. Blasting or roughening polished welding points before welding may have a positive effect on welding behaviour for pin welding.

FOR INFORMATION ON RETENTION WELDING USING THE FOOT SWITCH, SEE ALSO CHAPTER 7.4.2.

7.4 WELDING WITH FOOT SWITCH

With the PUK D3 switched off, connect the foot switch to the socket (4) marked with the blue foot switch symbol on the rear of the device. Switch the device on, confirm the safety prompt by pressing the rotary controller or touching the screen and wait for the self-test to conclude. The device is now ready for operation.

THE FOOT SWITCH CAN BE ACTIVATED BY PRESSING AND HOLDING IT (APPROX. 2 SEC.). AN INFO MESSAGE AND A WHITE SYMBOL APPEAR IN THE DISPLAY.

Connect a metallic blank section of the workpiece with the contact clamp. Now lightly touch the workpiece with the electrode. The eye protection system starts to turn periodically from its light to its dark setting. If the foot switch is operated in this mode, the welding process will begin automatically as described in chapter 7.1.

PRESSING AND HOLDING THE FOOT SWITCH (APPROX. 2 SEC.) (WITHOUT TOUCHING A WORKPIECE) CAUSES IT TO BE DEACTIVATED AND THE WHITE SYMBOL ON THE DISPLAY DISAPPEARS.

7.4.1 FIXATION WELDING

THE BLUE CONNECTION CABLE MAY ONLY BE CONNECTED AFTER THE MODE HAS BEEN ACTIVATED. AFTER WELDING IS COMPLETE, IT IS VITAL THAT THIS CABLE IS REMOVED AGAIN, BEFORE SWITCHING TO ANOTHER MODE, IN ORDER TO AVOID FAULTY WELDS!

Connect both of the workpieces which are to be fixed at an area of bare metal with a contact clamp, one to the blue one and the other to the black. When the two parts are touching, the welding process can be triggered, using the foot switch. The handpiece 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. The welding time setting is of secondary importance in this mode, and can only be varied to a very limited extent.

AFTER WELDING HAS BEEN SUCCESSFULLY COMPLETED, AND BEFORE SWITCHING TO ANOTHER USER LEVEL, PLEASE REMOVE THE BLUE CONNECTION CABLE!

NOTE: DURING FIXATION WELDING, THE FOOT SWITCH IS ALWAYS ACTIVE, AND CANNOT BE DEACTIVATED!

7.4.2 RETENTION WELDING WITH THE FOOT SWITCH

Please switch off the machine prior to exchanging the electrodes or the adapter. This prevents uncontrolled triggering of the welding process.

Remove the electrodes, replace the clamping nut and chuck with the pin welding adapter. Work without the clamping nut and nozzle. Then select the diameter of the adapter being used, by pressing the respective button on the display of the PUK D3. Then connect the workpiece to an area of bare metal, using a connection terminal. Insert a pin of the appropriate diameter into the pin welding adapter.

- The 1st light touch of the workpiece pulls back the pin welding adapter.
- With the 2nd light touch, the eye protection system (shutter) in the microscope can be clearly seen flickering.
  Pressing the foot switch at this stage triggers the welding process.

A good welded connection is indicated by a clearly audible welding noise. If the process passes off without making a noise, then the connection is presumably of insufficient strength. Blasting or roughening polished welding points before welding may have a positive effect on welding behaviour for pin welding. No shielding gas flows during the whole process.

PRESSING AND HOLDING THE FOOT SWITCH (APPROX. 2 SEC.) (WITHOUT TOUCHING A WORKPIECE) CAUSES IT TO BE DEACTIVATED AND THE BLUE DOT ON THE DISPLAY DISAPPEARS

7.5 BASICS AND TIPS

IMPORTANT!

- Always work with a well sharpened electrode (see point 7.5 for information about sharpening the electrodes).
- Ensure extremely good contact between the workpiece and the contact clamp, i.e. make contact between the workpiece and the connection cable terminal at a point which is metallically blank.
- Never weld "free hand", i.e. use the hand rests of the microscope SM5. Shaking hands can cause the configured parameters to be falsified.
- Apply only light force to the electrode tip.
- Weld with the correct gas flow of approx. 2 litres per minute and check this regularly.
- With a little experience you will notice that the angle with which you touch the workpiece with tip of the electrode affects the "direction of flow" of the welding point.
- The electrode can easily be clamped in somewhat longer for welding recessed areas.
- The electrode can easily be clamped in somewhat longer for welding recessed areas.

7.6 GRINDING THE ELECTRODES

Please switch off the machine prior to exchanging the electrodes. This prevents uncontrolled triggering of the welding process.

If possible, the electrodes should be sharpened with a diamond disk with fine or medium grain.

The recommended angle of grinding is approx. 15°.

See also the video “Electrodes” on www.youtube.com/LampertWelding.

8. CARE OF THE SYSTEM COMPONENTS

8.1 CARE OF WELDING DEVICE AND WELDING MICROSCOPE

Your PUK as well as the welding microscope require a minimum of maintenance under normal working conditions. However, it is essential that a few points are observed in order to guarantee the functionality and to keep the spot welding device fully operational for years to come.

- Check the mains plug and cable as well as all welding and connection cables regularly for damage.
- Check that the moving parts of the handpiece move easily.
- If necessary, clean the electrode threaded assembly on the handpiece, in order to ensure optimal contact with the electrodes.
- Clean the device occasionally with a suitable cloth.
- Use the supplied dust cover to cover up the microscope after use.

IF WORK OR REPAIRS THAT ARE NOT DESCRIBED IN THESE OPERATING INSTRUCTIONS ARE NECESSARY THEN CONTACT YOUR DEALER.

WARNING!

IF FUSES REQUIRE EXCHANGING, THEN THEY MUST BE REPLACED WITH FUSES OF THE SAME TYPES AND VALUES. THE GUARANTEE IS VOID IN THE EVENT OF EXCESSIVLY HIGH FUSING!

THE DEVICE MAY ONLY BE OPENED BY A QUALIFIED ELECTRICIAN!

8.2 CARE OF THE OPTICAL COMPONENTS

Do not attempt to disassemble optical components. Please contact the local technical customer service department for repairs which are not covered by this manual.

Remove dust from the lens surface with a special brush prior to cleaning. You can obtain suitable accessories in any photography store.

Cleaning the oculars: Do not remove the oculars (17) from the ocular tubes (15).

Clean the outer surfaces. In doing so, breathe on them. Subsequently dry the lens with suitable cloth or paper for the purpose. Dry the lens with circular movements from the centre to the outside. Do not wipe over a dried lens as they can easily be scratched.

Cleaning and exchanging the protective glass of the eye protection filter:

Never dismantle the eye protection filter (shutter)!

Only clean the surface. Use a cotton cloth with glass cleaner.

If the protective glass requires exchanging, slide it forwards out of the bracket and insert a new protective glass in the same manner.

9. TECHNICAL DATA

9.1 TECHNICAL DATA WELDING DEVICE

Device suitable for welding in dry rooms

Mains voltage	~230 V / 50 - 60 Hz +/-10 %
Mains fusing	T 3.15 A
Power consumption	400 VA
Closed-circuit voltage	30 – 43 V
No-load voltage	43 V
Duty cycle X	80 %
Max. charging time	0.8 sec.
Shielding gas	min. ARGON 99,9 %
Maximum gas pressure	4 bar / 58 psi
Protection class	I
Insulation class	B
Protection type	IP 21S
Weight	7.8 kg

9.2. TECHNICAL DATA MICROSCOPE

Optical eye protection and illumination unit for exclusive use with PUK fine welding devices.
Use only in dry rooms.

Operating temperature	+5 °C bis +40 °C
Lamp "LED unit"	3 W / 800 mA
Protection class	III
Insulation class	B
Protection type	IP 20
Weight	3.5 Kg

9.3 OPTICAL DATA MICROSCOPE

Lens	1.0
Ocular	10 x
Working distance	140 mm
Magnification factor	10 x
Field of view	20 mm

9.4 TECHNICAL DATA LCD SHUTTER M11 (BL)

Light shade	DIN 3
Dark shade	DIN 11
Switching time	< 50 msec.
UV protection	> UV 11
IR protection	> IR 11

MARKING ON THE LCD SHUTTER: 3/11 LWT 1/1/1/3/379

Protection shade number in open state	3
Protection shade numbers in closed state	11
Manufacturer identification code	LWT
Optical quality	1
Light scattering	1
Homogeneity	1
Angular dependence	3
Number of the standard	379

Notified body for CE testing of the LCD Shutter: DIN CERTCO, Alboinstrasse 56, 12103 Berlin

9.5 TYPE PLATE

Explanation of pictographs::

A	Current	V	Voltage	IP	Protection type	Hz	Hertz
~	Alternating current (AC)	⎓	Direct current	1 ~ 50-60Hz	Mains input 1 phase / AC / 50 – 60 Hz		Read operating manual
U_0	No-load voltage	U_1	Mains voltage	U_2	Voltage at nominal load		Tungsten inert gas welding
	Earthing	I_2	Nominal welding current	I_{1max}	Power consumption under max. load	I_{1eff}	Power consumption under nominal load
X	Cyclic duration factor	1~ 1~	Single-phase transformer		Keep away from water		

9.6 WARNING NOTICES:

	Breathing welding fumes and gases can be hazardous to your health.
	Welding sparks, hot workpiece, and hot equipment can cause fires and burns.
	Arc rays from the welding process can burn eyes and skin.
	Electro-magnetic fields can affect pacemakers.

10. TROUBLESHOOTING

10.1 WELDING DEVICE

	FAULT	CAUSE	REMEDY
1	**No welding current**		
	Mains master switch on, display remains off	Mains cable interrupted	Check mains cable and mains voltage
		Device fuse blown	Replace device fuse with identical fuse (same type and value)
2	**No welding current**		
	Mains master switch on	Welding cable connections interrupted	Check plugged connections
		Poor or zero contact to the workpiece	Establish connection to the workpiece, fasten contact clamps directly to the workpiece
3	**No welding current**		
	Mains master switch on	Fault due to leakage current	Switch device off and back on again
			If fault reoccurs, arrange for servicing of device
4	**Mains fuse blows or automatic circuit breaker trips**	Mains insufficiently fused or incorrect automatic circuit breaker	Fuse mains properly
		Mains protection trips during idling	Arrange for servicing of device
5	**Poor welding characteristics**	Incorrect shielding gas	Use inert shielding gas (Argon 4.6)
6	**Poor ignition characteristics**	Electrode clamped loosely in handpiece	Tighten the clamping nut in the handpiece (chap.11, no.38) by hand, however, tighten **firmly**.
7	**Oxidation and rusting**	Excessive gas pressure	Reduce flow rate - approx. 2 l/min is recommended
8	**Severe oxidation of the welding points**	Incorrect shielding gas	Use inert shielding gas (Argon 4.6)
9	**Tungsten inclusions in base material**	Excessive pressure of the electrodes on the workpiece	Touch workpiece with extremely light pressure.
10	**Tungsten electrode welds to workpiece**	Excessive pressure of the electrodes on the workpiece	Touch workpiece with extremely light pressure.
11	**Tungsten electrode melts off immediately**	Electrode sharpened too steeply	Use the recommended angle of grinding (approx. 15°)
12	**Static discharge over the surface of the device**	Special local conditions	Use special foot mat for the workspace
13	**Welding power is not released; the welding process starts, but a weld spot is not produced.**	The internal protective circuit has triggered. -> avoid “electrostatic discharges” against the handpiece or housing.	Switch device off and on again.
14	**Device begins to weld immediately when touching the workpiece (no gas pre-flow)**	Fault	Immediately shut down the device, arrange for servicing.

10.2 MICROSCOPE

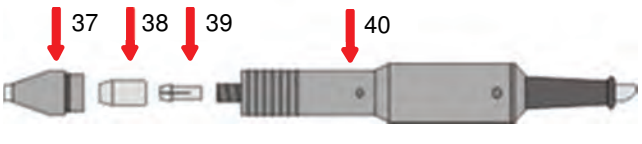
	PROBLEMS WITH ELECTRICAL COMPONENTS		
A	**The LED illumination fails to operate**	Cable not connected.	Connect the plug to the connecting socket (3) marked with the red and yellow eye protection and illumination symbol on the PUK.
		LED faulty	Contact authorized customer service
B	**Eye protection system (shutter) fails to operate**	Cable connected incorrectly	Connect the plug to the connecting socket (3) marked with the red and yellow eye protection and illumination symbol on the PUK.
		Eye protection filter faulty	Arrange to have eye protection unit replaced by qualified personnel
	IMAGE QUALITY		
D	**Poor resolution**	Oculars dirty.	Clean oculars.
E	**Marks or soiling in field of vision**	Oculars dirty.	Clean oculars.
		Protective glass dirty	Clean or exchange protective glass
	* Note: Marks in the field of vision can also be caused by soiling in the interior of the oculars. For this reason, it is recommended to have the lenses cleaned by an authorised customer service engineer		
	PROBLEMS WITH MECHANICAL COMPONENTS		
F	**Focus is not retained**	The sight slides down	Readjust the tension of the focusing knob

REPAIR

If the PUK D3 or the stereo microscope should require a repair or adjustment by qualified personnel, we always recommend to first contact your dealer or an authorized customer service.

WARNING: THE DEVICE MAY ONLY BE OPENED BY A QUALIFIED ENGINEER!

11. SPARE PARTS LIST, SEE ALSO www.lampert.info



Handpiece

(37)	Nozzle (Ø 3 mm)	100 150K
(38)	Clamping nut	100 152
(39)	Chuck Ø 0.5/0.6 – 0.8 mm	100 15x
(40)	Handpiece complete	100 100 04

Gas hose:

6 x 4 mm, sold by the metre	100 153

PLEASE NOTE!
Nozzle (37), clamping nut (38), electrodes and clamping tongs (39) are wearing parts and are not covered by the guarantee.

12. DISPOSAL INFORMATION:

Render discarded devices unusable by removing the mains cable.
Only for EU countries: In accordance with EU 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.

13. EC-DECLARATION OF CONFORMITY

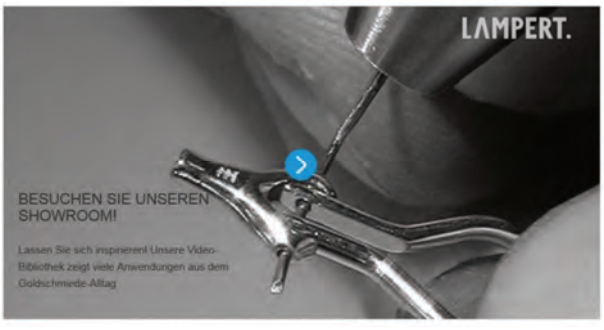
Please find enclosed to this shipment the separate document – Declaration of Conformity.

WORKSHOP NEWS

You are interested in the possibilities of use of our fine-welding devices? Or you are searching for one or another tip on working with your PUK? Then just sign up for our newsletter on www.lampert.info!

VISIT OUR SHOWROOM!

Our video library is showing many applications, our photo gallery various examples of use. Get inspired on www.lampert.info!



Born in Germany.

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