

# MZT1650S Messko calibration bath

## Operating Instructions BA2112/00/01



Messko







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# 1 Device Description and Intended Use

## 1 Device Description and Intended Use

The Messko calibration bath is a portable unit for service tasks and is intended to inspect thermometers, thermostats and resistance thermometers. The operational safety of the supplied instrument is only guaranteed if it is operated according to his intended use (inspection of temperature sensors). Specified limit values (see "Technical Data") should never be exceeded.

It is your responsibility to select the instrument which is suitable for your specific application, to connect it correctly, to carry out tests and to maintain all the components.

This operating manual applies only to the Messko calibration bath MZT1650S.

The Messko calibration bath consists of a robust, black and blue steel housing with an integrated carrying handle.

The **rear part of the housing** contains a metal block/liquid bath with a hole, accessible from the top, for the test specimen fixture.

The heating or cooling elements and the temperature sensor for determining the reference temperature are integrated in the metal block / liquid bath.

The metal block / liquid bath is heat insulated.



Fig. 1:  
Messko calibration bath MZT1650S



The **front part of the housing** contains the complete electronic unit for controlling the reference temperature.

A controller equipped with a 7-segment LED (2 lines, 4 digits) for the reference and set temperature is located on the front plate.

The Messko calibration bath also has a thumb wheel for controlling the stirring speed.

A power supply switch is located on the **front of the housing**. This is also where the IEC plug with fuse for the mains supply can be found.

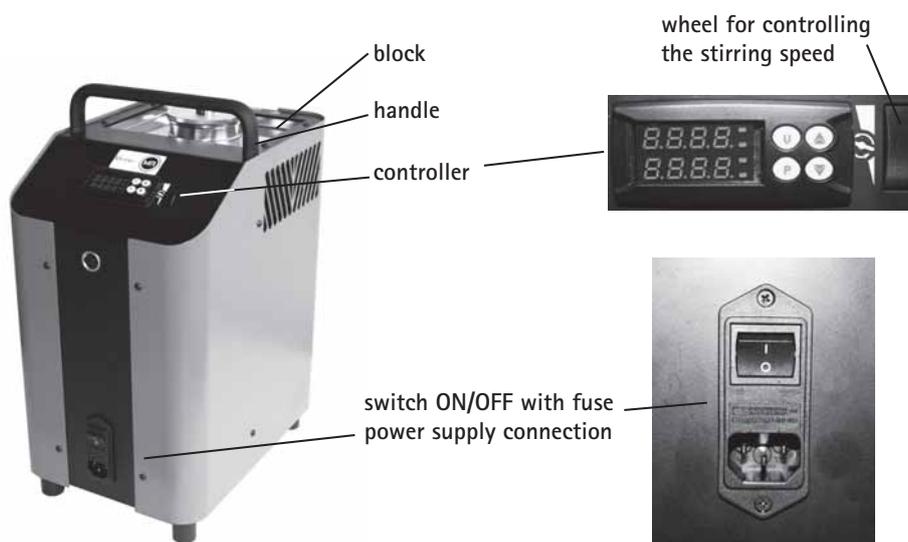


Fig. 2: Component overview

## 2 Safety Instructions

### 2 Safety Instructions

Always read the operating instructions carefully prior to using the new product. Always adhere to the instructions contained herein, especially the safety instructions; otherwise, there is a potential risk of operator injury and damage to the calibration bath and the sensors being tested.

Even though Messko provides assistance for the use of the product through personal consultation or the respective documents, it is the responsibility of the customer to determine the suitability of the product for the specific application.

The Messko calibration bath is a state-of-the-art device. This relates to the accuracy, functioning and the safe operation of the calibration bath. However, professional and safety conscious conduct of the operator is required to ensure safe operation.

#### 2.1 Qualified personnel

- The personnel entrusted with start-up, operation and maintenance of the calibration bath have to be suitably qualified; the required knowledge can be gained via training courses or appropriate on-the-job instruction. The personnel have to be familiar with the contents of these instructions, which have to be available to them at all times.
- The electrical connection should only be carried out by a fully qualified electrician.
- All work has to be carried out in accordance with existing national regulations on accident prevention and safety at work and with any internal regulations of the operator, even if they are not specified in these instructions.
- Always observe the safety information contained in these operating instructions.

#### 2.2 Basic safety regulations

- Only operate the calibration bath when it is in correct, fully functional condition.
- The calibration bath is energized with hazardous voltages via a mains cable. Improper use can result in personal injuries.
- Correct and safe operation of the calibration bath demands correct transport, storage, installation and assembly, as well as proper use and careful operation and maintenance.
- The calibration bath should only be used for its intended purpose. Furthermore, hazardous media should not be used and all technical specifications have to be observed.
- If faults cannot be cleared, immediately shut down the calibration bath and ensure that it cannot be started up accidentally.
- Repairs should only be carried out by the manufacturer. Tampering with or modifying the calibration bath is strictly prohibited.
- Prior to replacing the safety fuse, always de-energize the calibration bath completely by disconnecting the mains cable from the mains outlet.
- Ensure that the complete operating instructions are always available in excellent condition at the calibration bath installation site.
- Ensure that calibration bath operators receive regular instruction in the various aspects of occupational health and safety and environmental protection and have full knowledge of these operating instructions and the safety information contained herein.
- **Thermal fuse**  
For protection purposes, the calibration bath is equipped with an autonomous thermal fuse, which interrupts the power supply to the heater if the temperature exceeds a certain value inside the housing. Once the metal block / liquid bath has cooled down, the calibration bath has to be returned to Messko for inspection.
- The calibration bath has been designed as a measurement and control instrument. If the calibration bath is used for purposes not expressly specified in these operating instructions, additional safety measures have to be taken.



- The calibration bath should **NOT** be used in **explosive atmospheres** without appropriate protection (flammable or explosive atmospheres).
- If malfunctioning of the calibration bath can result in personal injuries or damage to property, the system has to be protected with additional electromechanical protective equipment.

### 2.3 Safety instructions for the application of calibration liquids

Calibration liquid silicone oil:

- Only use the silicone oil specified in this manual.
- Always read the safety data sheet supplied with the silicone oil before using it.
- Always ensure adequate ventilation when working with silicone oil, since hazardous substances can be released.
- Prevent silicone oil from coming into contact with your eyes.
- Since silicone oil is hygroscopic, always use the transport cover to close the calibration bath after use.
- The transport cover is equipped with a safety valve. If the calibration bath is closed when warm, impermissible pressure can build up. In order to prevent excess pressure which can destroy the liquid bath, the safety valve is activated once the pressure reaches approx. 2.5 bar. This can result in hot steam being released.
- **Risk of severe burns!**  
Prior to transport or contact with the metal block / liquid bath ensure that it has cooled down sufficiently, otherwise there is a risk of severe burns caused by the metal block / liquid bath and the test specimen.

If problems or questions arise, please contact Messko directly.

## 3 Unpacking and Inspecting the Delivery

### 3 Unpacking and Inspecting the Delivery

⇒ Unpack your calibration bath.

The calibration bath is delivered in special protective packaging. Keep this protective packaging for sending the instrument for recalibration or repairs to the Messko.

⇒ Inspect the delivery first.

#### Standard delivery micro calibration bath:

- Calibration bath
- Transport cover
- Sensor cage
- Carrier for up to 5 sensors
- Magnetic stirrer
- Mains connection cable
- 1 liter silicone oil (10CS) (Messko Art. no. 649-000-001)
- Bilge pump
- Test certificate
- Operating Instructions
- Service and transport case

## 4 Description of the Controls

### 4.1 Front of the controller

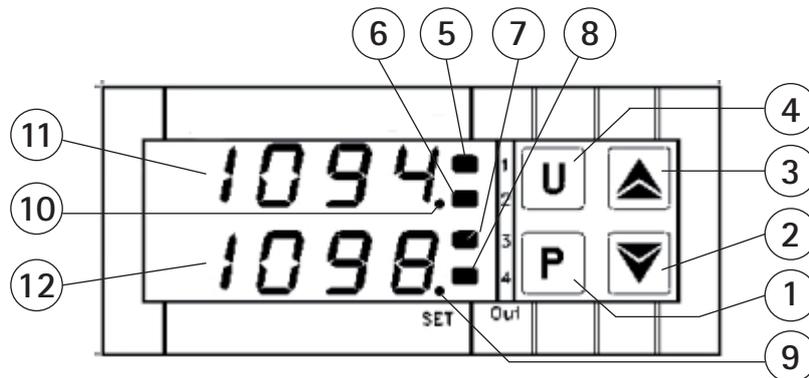


Fig. 3: Overview of the controls on the front of the controller

#### 1 – P key

- Accessing the default set temperature
- Accessing menu items and parameters
- Confirming inputs

#### 2 - ▼ key

- Reducing the setting values
- Selecting individual menu items
- Returning to the previous menu level



### **3 - ▲ key**

- Increasing the setting values
- Selecting individual menu items
- Returning to the previous menu level

### **4 – U key**

- Retrieving the saved set temperatures

### **5 - LED OUT 1**

- Signals the status of the output for the temperature control
  - If the LED OUT 1 lights up, the calibration bath is heating
  - If the LED OUT 1 does not light up, the calibration bath is not heating

### **6 - LED OUT 2**

Heating and cooling instrument

- Signals the status of the output for the temperature control
  - If the LED OUT 2 lights up, the calibration bath is cooling
  - If the LED OUT 2 does not light up, the calibration bath is not cooling

### **7 - LED OUT 3**

- This LED has no function here

### **8 - LED OUT 4**

- This LED has no function here

### **9 - LED SET**

- When flashing, it signals access to the individual menu items and parameters

### **10 - LED AT/ST**

- This LED has no function here

### **11 – Upper indicator**

- Displays the current reference temperature
- Displays the individual modes, menu items and parameters

### **12 – Lower indicator**

- Displays the set temperature
- Displays certain parameters in the individual modes and menu items

# 5 Start-up of the Calibration Bath

## 5 Start-up of the Calibration Bath

### 5.1 Operating position

The calibration bath has to be placed in a vertical standing position for operation. This position guarantees optimum temperature distribution in the metal block / liquid bath.

### 5.2 Preparing the calibration bath

In order to achieve the best possible accuracy of a calibration bath, it has to be filled with a suitable calibration liquid.

#### 5.2.1 Characteristics of the calibration liquid

Different calibration liquids supply varying calibration results due to their specific characteristics. The Messko calibration bath is adjusted on the silicon oil shown below.

We recommend the following calibration liquid for the specified temperature range:

	Calibration Range		Ignition Temperature
Dow Corning 200 fluid with 10 CS	-35°C	155°C	165°C

- ⇒ Only use the silicone oil specified in this manual.
- ⇒ Always read the safety data sheet supplied with the silicone oil before using it.
- ⇒ Always ensure adequate ventilation when working with silicone oil, since hazardous substances can be released.
- ⇒ Prevent silicone oil from coming into contact with your eyes.
- ⇒ Since silicone oil is hygroscopic, always use the transport cover to close the calibration bath after use.

### 5.2.2 Filling the calibration bath

- ⇒ Remove the transport cover.
- ⇒ Insert the test specimen into the sensor cage.
- ⇒ Fill the tank with calibration liquid. The max. filling level in the tank is displayed by the upper edge of the aluminium lining (see Fig. 4). The max. filling level is 0.5 litres.

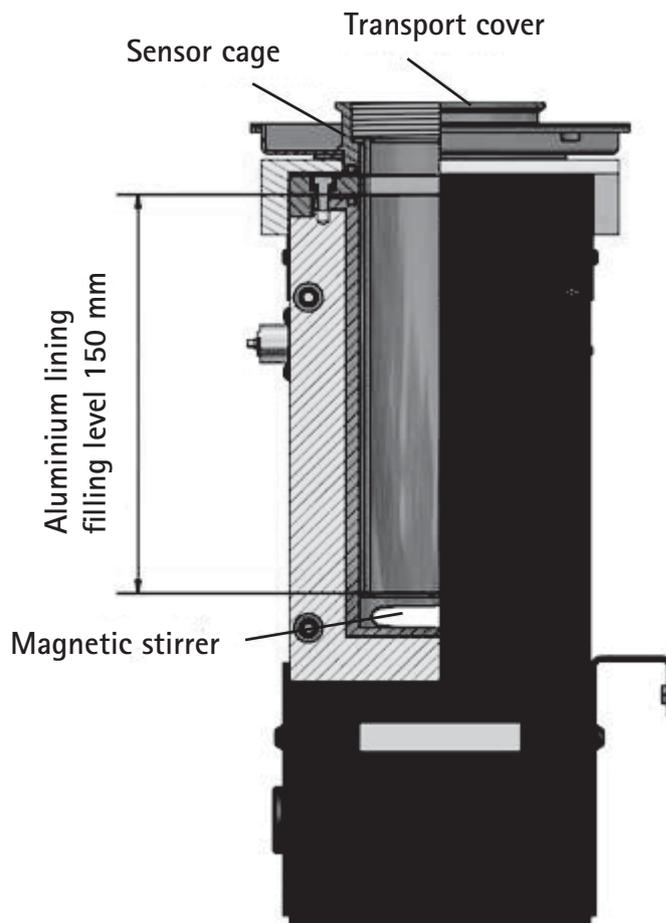


Fig. 4: Max. filling level of the liquid bath

**Note:**

The transport cover is equipped with a safety valve. If the calibration bath is closed when warm, impermissible pressure can build up. In order to prevent excess pressure which can destroy the liquid bath, the safety valve is activated once the pressure reaches approx. 2.5 bar. This can result in hot steam being released.

## 5 Start-up of the Calibration Bath

### 5.2.3 Operating the magnetic stirrer

The best possible homogeneity is achieved by stirring the calibration liquid with the magnetic stirrer.

- ⇒ Set the stirring speed to the respective max. speed. Turn the thumb wheel (Fig. 6) upwards to increase and downwards to decrease the stirring speed.



Fig. 5: Liquid bath



Fig. 6: Front of the controller with stirring speed wheel

### 5.3 Testing temperature sensors

A separate temperature measuring instrument connected to the test specimen is required to test the temperature sensors. By comparing the temperature displayed at the external measuring instrument with the reference temperature it is possible to assess the status of the test specimen. Remember that the test specimen requires a short period of time until it absorbs the temperature of the metal block or liquid bath.

#### Caution!

It is not possible to inspect earthed temperature sensors, because the heating block is earthed and any measurement would produce incorrect results.

### 5.4 Start-up procedure

If the calibration bath is not used for a longer period, it is possible for moisture to enter the heating elements due to the material used (magnesium oxide).

After calibration bath transport or storage in a damp environment, the heating elements have to be gently brought up to operating temperature. During the drying out procedure it has to be assumed that the calibration bath has not yet achieved the required insulation voltage for protection class I. The start-up set value is  $T_{\text{start}}=120^{\circ}\text{C}$  for a stop period of  $t_{\text{h}}=15$  min.

### 5.5 Switching on the calibration bath

- ⇒ Connect the supplied mains plug to a mains outlet.

- ⇒ Actuate the mains switch.

The controller is initialized

tESt appears on the upper display (red).

The version number, e.g. rL 2.2, appears on the lower display (green).

Initialization is completed after approx. 5 sec., the **calibration mode** is then automatically displayed.

The installed heating and cooling elements automatically adjust the metal block from the room temperature to the set temperature set at the controller.

## 5.6 Reference and set temperature display

### Upper display (red):

The red, 4-digit, 7-segment display shows the current temperature of the metal block / liquid bath.

### Lower display (green):

The green, 4-digit, 7-segment display shows the current set temperature of the metal block / liquid bath.

Once the set temperature has been achieved, the radiated heat energy from the metal block / liquid bath is supplied by short firing pulses, thus ensuring that the temperature inside is kept constant.

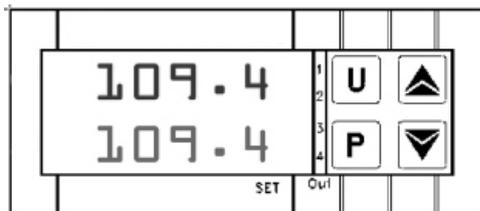


Fig. 7: Reference and set temperature display

## 5.7 Stabilizing the reference temperature

The switch on time of the heater is displayed by the red LED OUT 1.

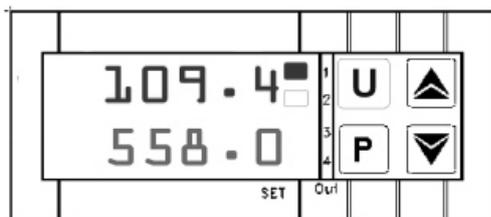


Fig. 8: LED OUT 1 displays

During the heating up phase a constantly lit LED displays the supply of heat energy, a flashing LED indicates that the reference temperature has almost reached the set temperature and the heat energy is now being supplied at short intervals.

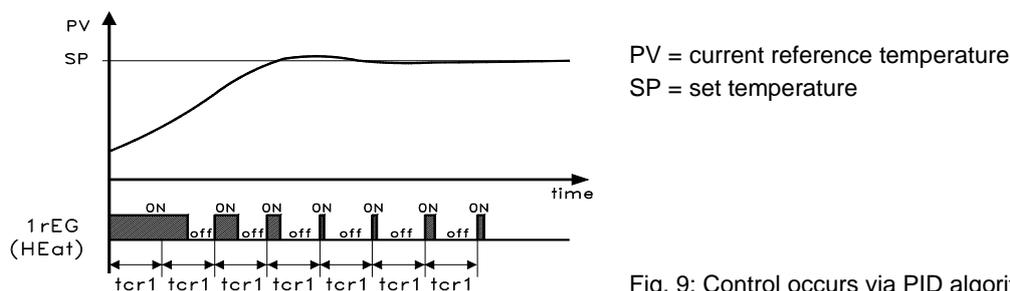


Fig. 9: Control occurs via PID algorithm

In order to guarantee excellent temperature stability, the cycle time of the controller is set to low and the control output is addressed on a regular basis.

## 6 Operating the Calibration Bath

### 6 Operating the Calibration Bath

Three operating modes are available:

- **Calibration mode**  
This is the normal operating mode in which the inspection of test specimens is carried out.
- **Set value mode**  
The set temperatures can be entered in this mode.
- **Main menu**  
All the settings can be carried out in this mode, e.g. presetting the set temperatures or setting the control parameters.

#### 6.1 Calibration mode

The calibration bath is automatically in **calibration mode** as soon as it has been switched on and after initialization.

The current reference temperature is displayed by the **upper display (red)**.

The set temperature is displayed by the **lower display (green)**.

The LED **OUT 1** indicates the status of the output for the heater control:

- If LED OUT 1 lights up, the temperature is being increased.
- If LED OUT 1 does not light up, the heater is switched off.

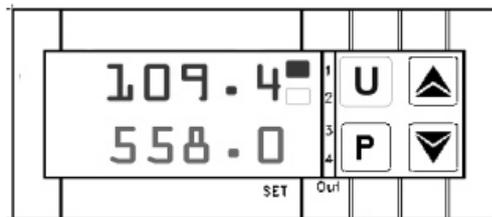


Fig. 10: Calibration mode HEATING displays

The LED **OUT 2** indicates the status of the output for the fan / cooling control:

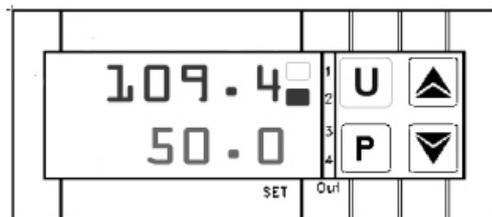


Fig. 11: Calibration mode FAN or COOLING displays

The LED **OUT 2** indicates the status of the output for the cooling control:

- If LED OUT 2 lights up, the temperature is being decreased.
- If LED OUT 2 does not light up, cooling is switched off.

There are two ways to set the set temperature: Either you set a temporary set temperature (see section 6.2) or you save fixed set temperatures in the main menu (see section 6.3).



### 6.2 Setting a temporary set temperature (set value mode)

In this operating mode it is possible to temporarily modify a saved set temperature.

- ⇒ Press the **P** key.  
The currently active set value memory, e.g. SP 2 (set point 2), is displayed by the **upper display (red)**.  
The respective set temperature is displayed by the **lower display (green)**.

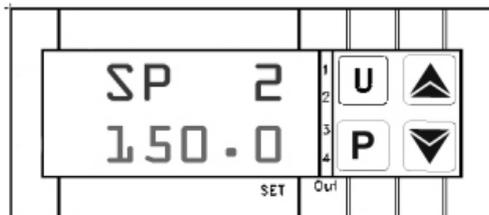


Fig. 12: Temporary set temperature setting

- ⇒ Press the **▲** key to increase the set temperature.  
Press the **▼** key to decrease the set temperature.
- ⇒ Press the **P** key again to confirm the new set value.

#### Note:

- Press the **▲** and **▼** key to raise and lower the value by 0.1 respectively. If the keys are held pressed for at least one second, the value increases or decreases quickly and after two seconds even more quickly; this means the desired value can be reached rapidly.
- If no key is pressed in the **set value mode** for approx. 15 seconds, the device automatically returns to the **calibration mode**.

# 6 Operating the Calibration Bath

## 6.3 Programming (main menu)

All the settings can be carried out in this menu structure.

- ⇒ Press the **P** key for approx. 5 seconds. The main menu opens.
- ⇒ Use the **▼** and **▲** keys to select the desired main menu (see overview).
- ⇒ Press the **P** key to confirm the selected menu item.

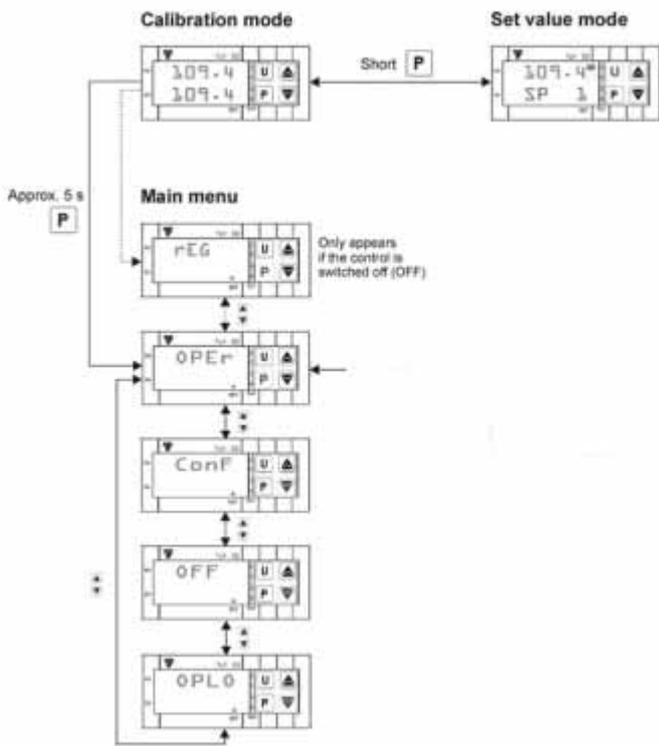


Fig. 13: Menu structure (main menu)

As displayed by the menu structure, it is possible to reach the **group** and **parameter levels** to carry out settings via **OPER**.

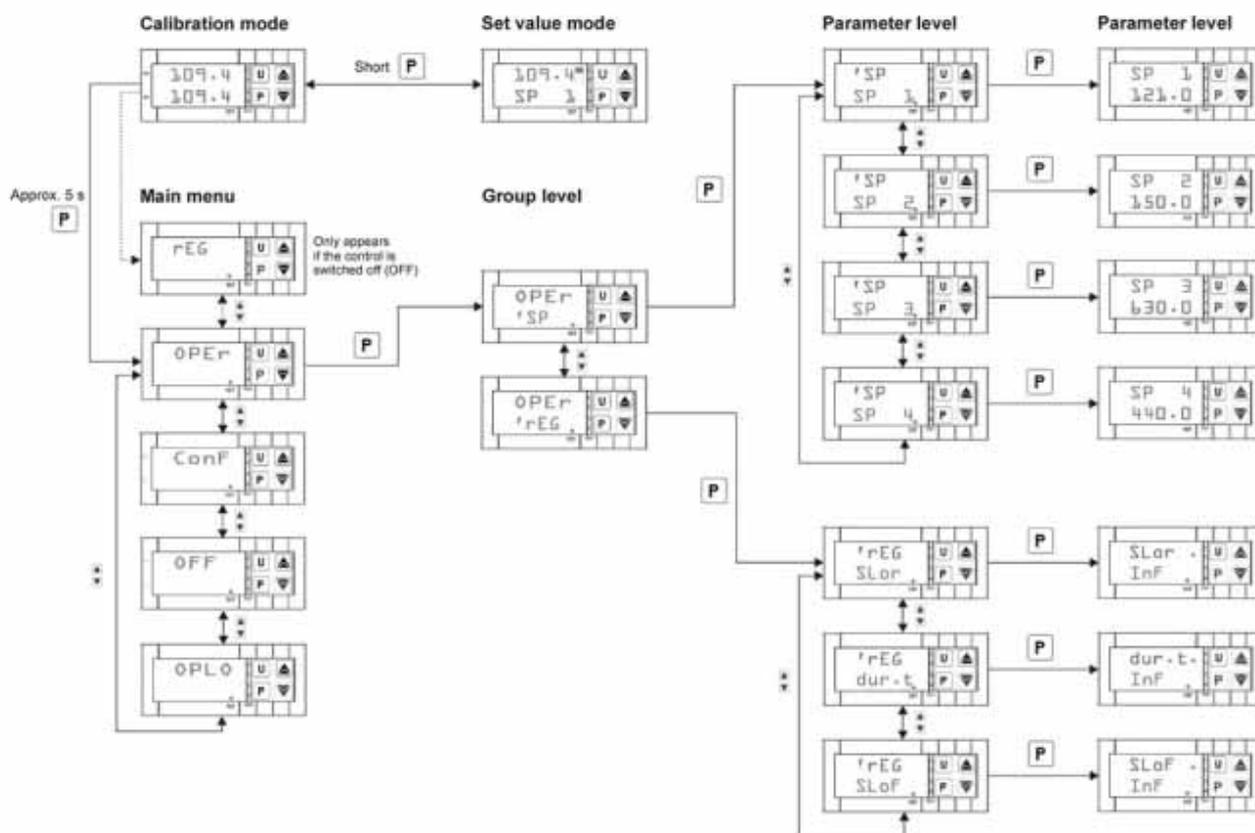


Fig. 14: Menu structure at group and parameter level

### Returning to another level

If no key is pressed in the **main menu** at the **group** or **parameter level** for approx. 15 seconds, the device automatically returns to the previous level up to the **calibration mode**.

You can also return to a previous level by pressing and holding the **▼** or **▲** key.

## 6 Operating the Calibration Bath

### 6.3.1 Switching off the automatic control

For certain tasks it can be advantageous to switch off the control, e.g. to carry out settings at the calibration bath.

- ⇒ Press the **P** key when in calibration mode for approx 5 sec., the main menu opens.  
**OPEr** appears on the **upper display (red)**  
LED SET flashes on the **lower display (green)**.

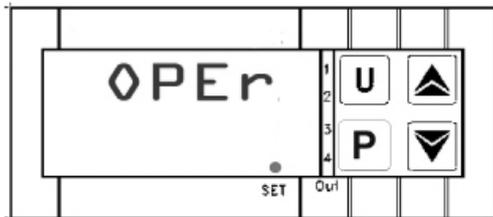


Fig. 15: Main menu display

- ⇒ Press the **▲** or **▼** key until **OFF** appears.

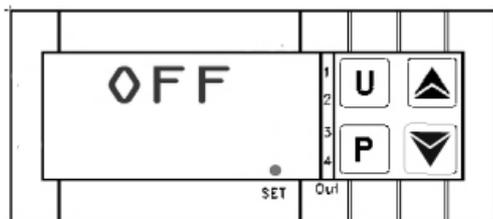


Fig. 16: Menu control OFF

- ⇒ Press the **P** key to confirm.  
An alternating display of the current reference temperature and **OFF** appears on the **upper display (red)**.  
The current set temperature appears on the **lower display (green)**.

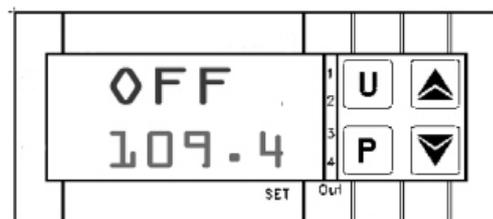


Fig. 17: Control OFF setting display

**Caution!** The control has now been switched off and the reference temperature will constantly drop without being regulated.

### 6.3.2 Switching on the automatic control

The control is switched off if the following display appears:

An alternating display of the current reference temperature and **OFF** appears on the **upper display (red)**.  
The current set temperature appears on the **lower display (green)**.

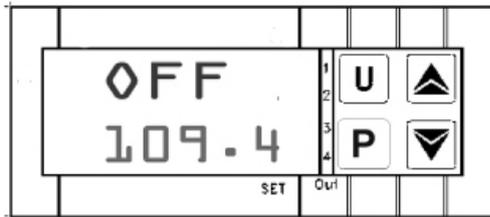


Fig. 18: Control OFF setting display

Switch the control back on by:

- ⇒ Pressing the **P** key for approx. 5 sec., the main menu opens.  
**rEG** appears on the **upper display (red)**.  
LED SET flashes on the **lower display (green)**.

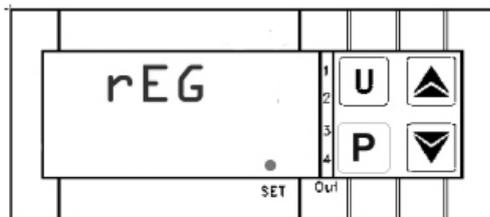


Fig. 19: rEG display

- ⇒ Press the **P** key to confirm switching on the control.

**Caution!** The control has been reactivated. The calibration bath is in calibration mode and the set temperature is targeted.

## 6 Operating the Calibration Bath

### 6.3.3 Switching on the manual control

It is possible to switch off the automatic control of the calibration bath and to achieve the desired temperature via manual control.

- ⇒ Press the **P** key for approx 5 sec., the main menu opens.  
**OPEr** appears on the **upper display (red)**.  
LED SET flashes on the **lower display (green)**.

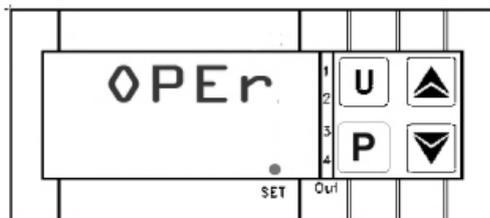


Fig. 20: Main menu display

- ⇒ Press the **▲** or **▼** key until **OPLO** appears  
**OPLO** appears on the **upper display (red)**.  
LED SET flashes on the **lower display (green)**.

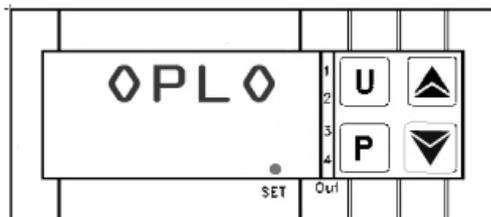


Fig. 21: Menu manual control OPLO

- ⇒ Press the **P** key to confirm.  
The current reference temperature appears on the **upper display (red)**.  
The letter H and the currently set output capacity in % appear on the **lower display (green)**.

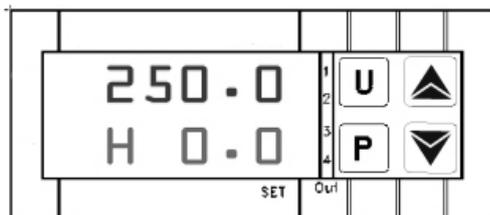


Fig. 22: Manual control OPLO setting display

- ⇒ Press the **▲** key, to **increase** the output capacity.
- ⇒ Press the **▼** key, to **decrease** the output capacity.

**Caution!** Press the **▲** and **▼** key to raise and lower the value by 0.1 respectively. If the keys are held pressed for at least one second, the value increases or decreases quickly and after two seconds even more quickly; this means the desired value can be reached rapidly.

### 6.3.4 Switching off the manual control

The manual control is switched on if the following display appears:

The current reference temperature appears on the **upper display (red)**.

The letter H and the currently set output capacity in % appear on the **lower display (green)**.

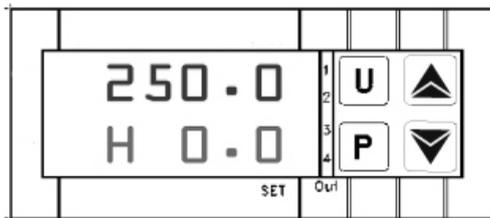


Fig. 23: Manual control OPLO setting display

Switch the manual control off again by

- ⇒ Pressing the **P** key for approx. 5 sec., the main menu opens.  
**rEG** appears on the **upper display (red)**.  
LED SET flashes on the **lower display (green)**.

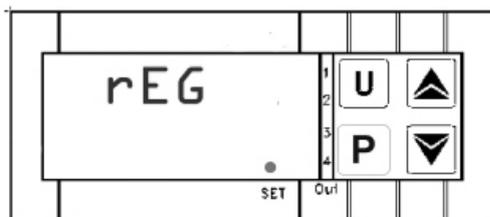


Fig. 24: Main menu display

- ⇒ Press the **P** key to confirm switching on the automatic control.

## 6 Operating the Calibration Bath

### 6.3.5 Setting and saving fixed set temperatures

In order to save set temperatures in the calibration bath, the respective set value memory has to be opened.

- ⇒ Press the **P** key for approx 5 sec. when in **calibration mode**, the main menu opens.  
**OPEr** appears on the **upper display (red)**.  
LED SET flashes on the **lower display (green)**.

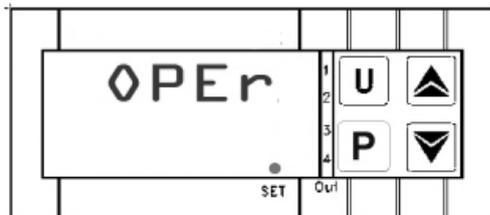


Fig. 25: Operator menu OPEr

- ⇒ Press the **P** key again, the **group level** opens.  
**OPEr** appears on the **upper display (red)**.  
'**SP** appears on the **lower display (green)** and LED SET flashes.

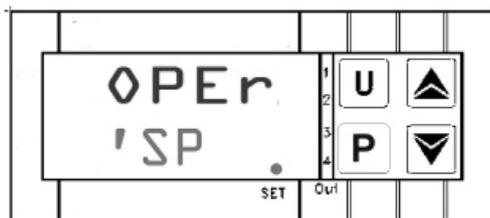


Fig. 26: Group SP

- ⇒ Press the **P** key again, the **parameter level** opens.  
'**SP** appears on the **upper display (red)**.  
The set value memory **SP 1** and LED SET flash on the **lower display (green)**.

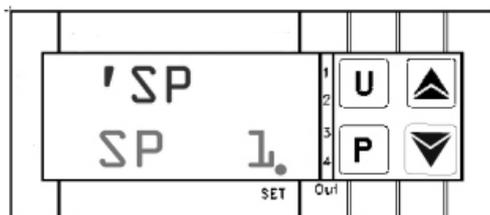


Fig. 27: Parameter for the set memory SP1

- ⇒ Use the **▲** or **▼** key to select one of the four set value memories SP1, SP2, SP3 and SP4.



- ⇒ Press the **P** key to open the respective set value memory.  
The selected set value memory, e.g. **SP 3** flashes on the **upper display (red)**.  
The corresponding current set temperature appears on the **lower display (green)**.

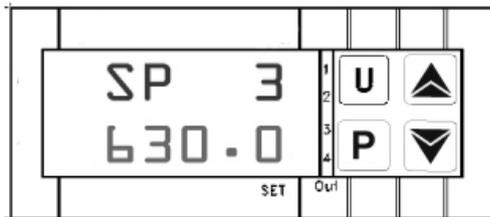


Fig. 28: Set value memory SP3 entry

- ⇒ Press the **▲** key to **increase** the set temperature.
- ⇒ Press the **▼** key to **decrease** the set temperature.

**Note:**

Press the **▲** and **▼** key to raise and lower the value by 0.1 respectively. If the keys are held pressed for at least one second, the value increases or decreases quickly and after two seconds even more quickly; this means the desired value can be reached rapidly.

- ⇒ Press the **P** key to confirm the set temperature.  
The set value memory closes and the display returns to the **parameter level**.
- ⇒ Press and hold the **▼** or **▲** key to return to the **calibration mode**.

If no key is pressed for approx. 15 seconds, the device automatically returns to a previous level up to the **calibration mode**.

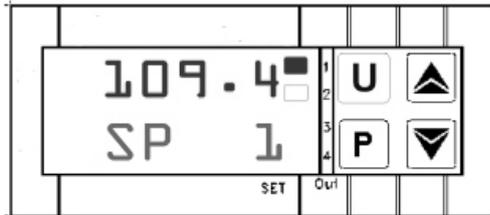
## 6 Operating the Calibration Bath

### 6.3.6 Retrieving the saved set temperatures

The saved set temperatures can be retrieved in calibration mode.

- ⇒ Press the **U** key for approx 2 sec., the current set value memory opens.  
The current reference temperature appears on the **upper display (red)**.  
The set value memory SP1, SP2, SP3 or SP4 appears on the **lower display (green)** for 2 sec.  
followed by the current set temperature.

Firstly, the set value memory SP1, SP2, SP3 or SP4



Secondly, the saved set temperature

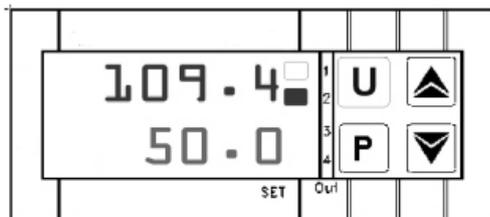


Fig. 29: Retrieving the set temperatures display

- ⇒ To receive another saved set value, press the **U** key again.

The selected temperature value is immediately adopted and targeted.



### 6.3.7 Setting a gradient control and a temperature profile

It is possible to carry out a gradient control yourself and thus determine the time in which the set temperature is reached. The time can be shorter or longer than the time usually required by the calibration bath.

When modifying the set temperature or switching on the calibration bath it is automatically determined which of the gradients (heating gradient "SLor" or cooling gradient "SLoF") is to be used.

Additionally, you can ensure that the calibration bath switches to the set temperature in set value memory SP2 as soon as the set temperature in set value memory SP1 has been achieved and after a programmed duration time "dur.t"; this creates a simple temperature profile.

After switching on the calibration bath the temperature profile is automatically carried out.

PV = current reference temperature

SP = set temperature

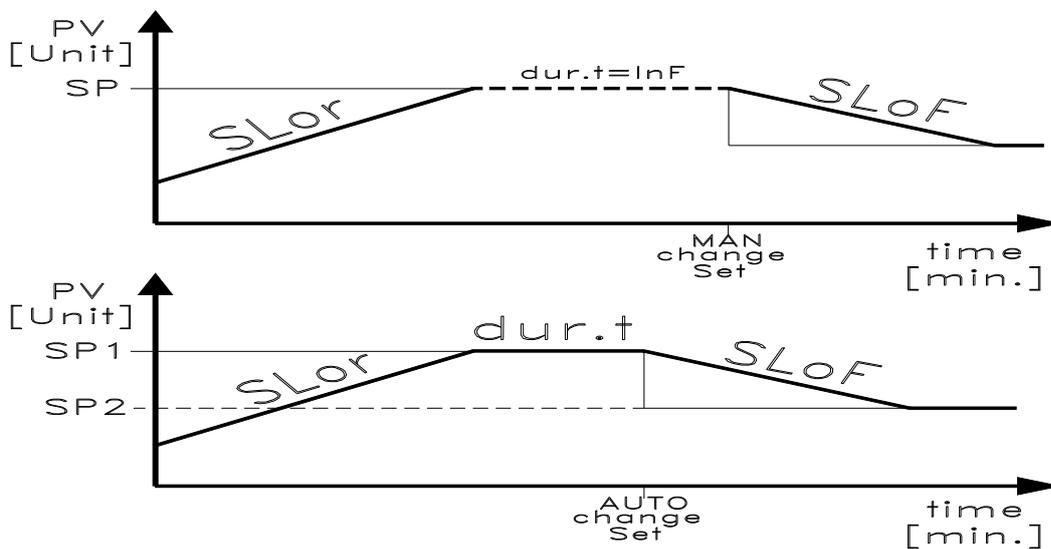


Fig. 30: Gradient control and temperature profile

#### Heating gradient "SLor"

The heating gradient "SLor" is active if the reference temperature is lower than the set temperature.

The heating capacity of the calibration bath is limited. Hence only such settings make sense which extend the time for achieving the set temperature (compared with the default setting).

Calibrator type (heating/cooling)	Setting for "SLor"
MZT1650S with silicone oil 10CS	< 3 °C/min

## 6 Operating the Calibration Bath

### Cooling gradient "SLoF"

The cooling gradient "SLor" is active if the reference temperature is higher than the set temperature. Only settings below the cooling capacity of the calibration bath have an effect on the cooling gradients.

Messko calibration bath (heating/cooling)	Setting for "SLoF"
MZT1650S with silicone oil 10CS	< 6 °C/min

The **duration time "dur.t"** is active if the set temperature SP1 has been achieved. Subsequently, the calibration bath automatically switches to set temperature SP2.

### Warning:

If you have carried out settings for these three settings, the calibration bath uses the new values only when modifying the set temperature or switching the calibration bath off and on again.

A further procedure is to switch off the automatic control prior to modifying parameters (see section 6.3.1), and to switch it on again afterwards (see section 6.3.2).

The heating and cooling gradients and the duration time can be set in the parameter level <sup>1</sup>rEG.

This is achieved by

Pressing the **P** key for approx. 5 sec., the main menu opens.

**OPEr** appears on the **upper display (red)**.

LED SET flashes on the **lower display (green)**.

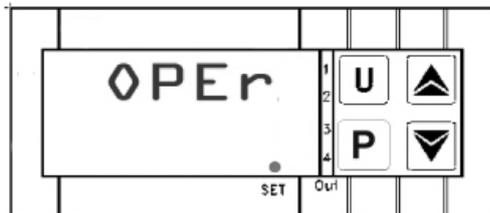


Fig. 31: Operator menu OPEr



- ⇒ Press the **P** key again, the **group level** opens.  
**OPEr** appears on the **upper display (red)**.  
**'SP** appears on the **lower display (green)** and LED SET flashes.

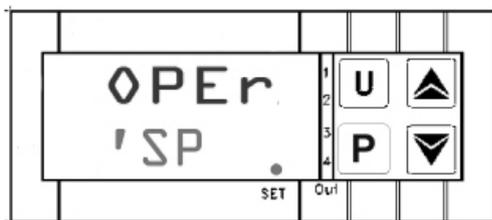


Fig. 32: Group 'SP

- ⇒ Use the **▼** key to select the group **'rEG**.  
**OPEr** appears on the **upper display (red)**.  
**'rEG** appears on the **lower display (green)** and LED SET flashes.

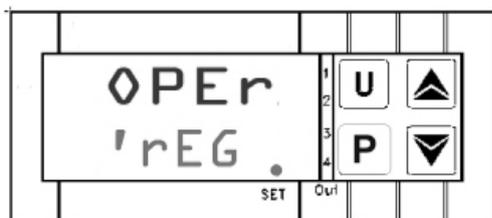


Fig. 33: Group 'rEG

- ⇒ Press the **P** key again, the **parameter level** opens.  
**'rEG** appears on the **upper display (red)**.  
**SLor** flashes on the **lower display (green)**.



Fig. 34: Parameters for heating gradient SLor

## 6 Operating the Calibration Bath

### 6.3.7.1 Setting the heating gradient

The heating gradient "**SLor**" is active if the reference temperature is lower than the set temperature. The setting range extends from 99.99 °C/min up to 0.00 °C/min.

**Caution!** The function is deactivated if **SLor** = InF (In no Function) has been set.

You are in the **parameter level**

'**rEG** appears on the **upper display (red)**.  
**SLor** flashes on the **lower display (green)**.

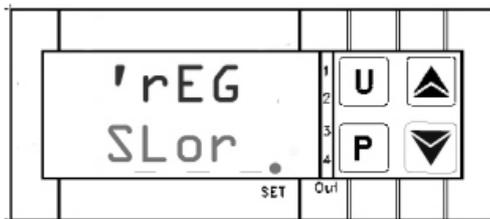


Fig. 35: Parameters for heating gradient **SLor**

- ⇒ Press the **P** key.  
**SLor** flashes on the **upper display (red)**.  
The respective **currently set heating gradient** appears on the **lower display (green)**.

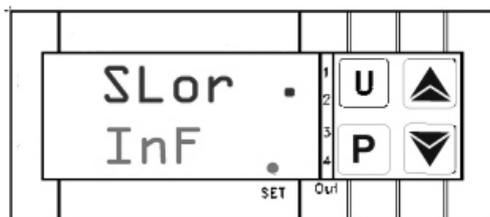


Fig. 36: Heating gradient entry

- ⇒ Press the **▲** key to **increase** the heating gradient **SLor**.  
Press the **▼** key to **decrease** the heating gradient **SLor**.

**Note:**

Press the **▲** and **▼** key to raise and lower the value by 0.1 respectively. If the keys are held pressed for at least one second, the value increases or decreases quickly and after two seconds even more quickly; this means the desired value can be reached rapidly.

- ⇒ Press the **P** key to confirm the set heating gradient **SLor**.  
The display returns to the parameter level and you can set the other parameters.

**Caution!** If no key is pressed for approx. 15 seconds, the device automatically returns to a previous level up to the **calibration mode**.

**Important:**

- ⇒ After carrying out the settings, the calibration bath uses the new values only when modifying the set temperature or switching the calibration bath off and on again.

## 6.3.7.2 Setting the cooling gradient

The cooling gradient "SLoF" is active if the reference temperature is higher than the set temperature. The setting range extends from 99.99 °C/min up to 0.00 °C/min.

**Caution!** The function is deactivated if SLoF = InF (In no Function) has been set.

You are in the **parameter level**.

'rEG appears on the **upper display (red)**.  
SLoF flashes on the **lower display (green)**.



Fig. 37: Parameters for heating gradient SLoF

- ⇒ Use the **▼** or **▼** key to select the parameter **SLoF**.  
'rEG appears on the **upper display (red)**.  
**SLoF** flashes on the **lower display (green)**.

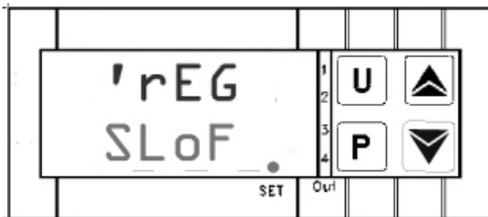


Fig. 38: Cooling gradient entry

- ⇒ Press the **P** key.  
**SLoF** flashes on the **upper display (red)**.  
The respective **currently set cooling gradient** appears on the **lower display (green)**.

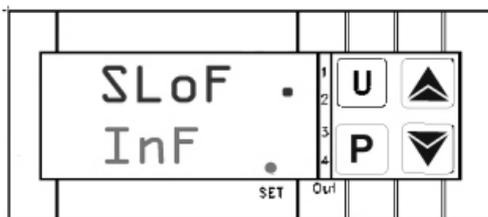


Fig. 39: Display of the cooling gradient input

- ⇒ Press the **▲** key to **increase** the cooling gradient **SLoF**.
- ⇒ Press the **▼** key to **decrease** the cooling gradient **SLoF**.

## 6 Operating the Calibration Bath

### Note:

Press the ▲ and ▼ key to raise and lower the value by 0.1 respectively. If the keys are held pressed for at least one second, the value increases or decreases quickly and after two seconds even more quickly; this means the desired value can be reached rapidly.

Press the **P** key to confirm the set cooling gradient **SLoF**.

The display returns to the parameter level and other parameters can be set.

**Caution!** If no key is pressed for approx. 15 seconds, the device automatically returns to a previous level up to the **calibration mode**.

### Important:

⇒ After carrying out the settings, the calibration bath uses the new values only when modifying the set temperature or switching the calibration bath off and on again.

### 6.3.7.3 Setting the duration time

The duration time "**dur.t**" is active if the set temperature SP1 has been achieved. Subsequently, the calibration bath automatically switches to set temperature SP2.

The setting range extends from 99:59 [hh:min] to 00:00 [hh:min].

**Caution!** The function is deactivated if **dur.t = InF** (In no Function) has been set.

You are in the **parameter level**.

**rEG** appears on the **upper display (red)**.

**SLoF** flashes on the **lower display (green)**.



Fig. 40: Parameters for heating gradient SLoF

⇒ Use the ▼ or ▼ key to select the parameter **dur.t**.

**rEG** appears on the **upper display (red)**.

**dur.t** flashes on the **lower display (green)**.

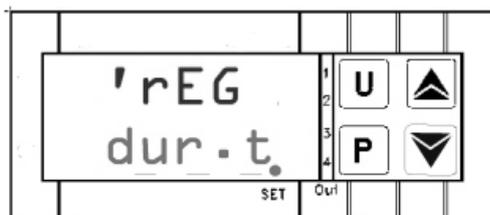


Fig. 41: Parameters for the duration time dur.t



- ⇒ Press the **P** key.  
**dur.t** flashes on the **upper display (red)**.  
The respective **currently set duration time** appears on the **lower display (green)**.

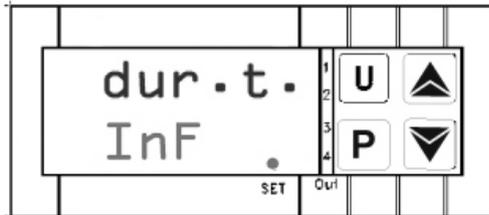


Fig. 42: Duration time entry

- ⇒ Press the **▲** key to **increase** the duration time **dur.t.**
- ⇒ Press the **▼** key to **decrease** the duration time **dur.t.**

**Note:**

Press the **▲** and **▼** key to raise and lower the value by 0.1 respectively. If the keys are held pressed for at least one second, the value increases or decreases quickly and after two seconds even more quickly; this means the desired value can be reached rapidly.

- ⇒ Press the **P** key to confirm the set duration time **dur.t.**  
The display returns to the parameter level.

**Caution!** If no key is pressed for approx. 15 seconds, the device automatically returns to a previous level up to the **calibration mode**.

**Important:**

- ⇒ After carrying out the settings, the calibration bath uses the new values only when modifying the set temperature or switching the calibration bath off and on again.

## 7 Error Messages

### 7 Error Messages

Error	Possible cause	Remedy
----	Interruption of the internal reference sensor or the internal reference sensor is defective.	The controller switches off the power supply to the heating cartridge (servicing required).
uuuu	Measured temperature under the limit value of the internal reference sensor (under range $-200\text{ }^{\circ}\text{C}$ )	
oooo	Measured temperature above the limit value of the internal reference sensor (over range $+850\text{ }^{\circ}\text{C}$ )	
ErEP	Possible fault in the EEPROM memory of the controller	Press the P key
Fan not running	The fan is defective or blocked	The temperature switch is possibly triggered, switching off the power supply to the heating cartridge (servicing required)
End temperature is not achieved	Solid state relay is defective or the heating / cooling element has short circuited or aged	Servicing required
No display	Controller defective	Servicing required
No function	Network connection not established correctly or fuse defective	Check the network connection and fuse

⇒ If servicing is required, shut down the calibration bath (see chapter 12) and return it to Messko.

## 8 Cooling Down of the Metal Block / Liquid Bath

### Caution! Risk of burns:

Prior to transport or contact with the metal block / liquid bath ensure that it has cooled down sufficiently; otherwise there is a risk of severe burns at the metal block / liquid bath and the test specimen.

⇒ In order to cool down the metal block / liquid bath quickly, set the set temperature to a low temperature, e.g. room temperature.

The controller switches the active cooling on. The LED **OUT 2** indicates the status of the output for the active cooling. If the LED OUT 2 lights up, the active cooling is running. If the LED OUT 2 does not light up, the cooling is not active.

**Caution!** After switching off or after removing the mains connection, the installed fan can no longer provide cooling air. Nevertheless, sufficient thermal isolation between the metal block / liquid bath and the housing is still guaranteed.

## 9 Cleaning and Maintenance

⇒ Allow the calibration bath to cool down as described in chapter 8.

⇒ Switch the calibration bath off and disconnect the mains plug.

### ⇒ **Cleaning the fan grille**

Each calibration bath is fitted with a small meshed air grille via which cooling air enters the calibration bath. Clean the grille at regular intervals (vacuuming or brushing) depending on the level of air pollution.

### ⇒ **Cleaning the micro calibration bath:**

Drain as much of the silicone oil as possible with the aid of the supplied bilge pump. Subsequently remove the sensor cage from the tank and clean the cage, magnetic stirrer and the tank with water and plenty of washing-up liquid. Allow everything to dry completely.



⇒ **External cleaning:**

Clean the outside of the calibration bath with a damp cloth and some water or with a solvent-free mild cleaning agent.

### 10 Warranty and Repairs

The Messko calibration bath is under guarantee for 12 months as from the date of delivery for construction errors or material defects. The guarantee is limited to repairs or replacing the calibration bath.

Warranty shall not apply if the calibration bath is opened and unauthorized repair work is carried out or if the calibration bath is not used for its intended purpose or installed incorrectly.

If the calibration bath malfunctions during or after the warranty period, always contact the Messko "Sales Dept." before sending the calibration bath for repairs.

The defective calibration bath incl. details of the occurred fault can be sent freight paid to Messko, unless other agreements have been made.

### 11 Recalibrating

The calibration bath is adjusted and tested with measuring equipment in accordance with recognized national standards prior to delivery.

The calibration bath should, depending on the application situation, be inspected at appropriate intervals on the basis of DIN ISO 10 012.

### 12 Decommissioning and Disposal

Messko ensures correct disposal of used Messko calibration baths.

- ⇒ Allow the instrument to cool down as described in chapter 8.
- ⇒ Switch off the calibration bath and disconnect the mains plug.
- ⇒ If necessary, remove any existing calibration liquid from the calibration bath (see chapter 9).

**Important!**

Dispose of the silicone oil in accordance with the specifications on the safety data sheet.

- ⇒ Send the Messko calibration bath freight paid to Messko.

# 13 Technical Data

## 13 Technical Data

### 13.1 Technical data

<b>Display range/Setting range</b>	-50.0 °C to +165.0 °C in 0.1 °C resolution
<b>Reference temperature setting range</b> With silicone oil	between -35 °C and 165 °C
<b>Block temperature control</b>	via PID controller
<b>Setting the reference temperature</b>	via the P key and the ▲ or ▼ key to 0.1 °C fine adjustment occurs automatically
<b>Tolerance</b>	+/- 0.1 °C
<b>Control stability</b>	+/-0.05 °C
<b>Block temperature display</b>	4-digit, 7-segment LED, 7mm high Upper display (red) = current reference temperature Lower display (green) = set temperature
<b>Display resolution</b>	0.01 °C in the range from -9.99...99.99 °C else 0.1 °C
<b>Influence of the operating temperature</b> (0...50 °C) to the accuracy	+/- 0.02 °C/°C
<b>Excess temperature behaviour</b>	temperature fuses interrupt the power supply if there is excess temperature inside the housing
<b>Sensor break behaviour</b>	the control is switched off
<b>Display unit</b>	°C or °F (optional)
<b>Display for sensor break</b>	- - - -
<b>Detection speed</b>	130 ms
<b>Controller outputs</b>	1 x voltage output for control of the solid state relay (8 mA/ 8 VDC), heater control  1 x voltage output for control of the solid state relay (8 mA/ 8 VDC), cooling control  1 x relay SPDT (8 A-AC1, 3 A-AC3 / 250 VAC) 100,000 switching cycle, fan control



<b>Power supply</b>	90...240 VAC +/- 10 %, 50/60 Hz	
<b>Power consumption</b>	approx. 400 VA	
<b>Fuse</b>	6.3 A slow	(for 90...240 VAC)
<b>Operating temperature</b>	0...50 °C	
<b>Moisture in the operating area</b>	30...95 %rH not condensing	
<b>Transport and storage temperature</b>	-10...60 °C	
<b>Degree of protection</b>	IP 20	
<b>Test specimen holder</b>	Bore	Ø 60 mm
	Depth	150 mm
<b>Housing dimensions</b>	Width	approx. 210 mm
	Height	approx. 380+50 mm
	Depth	approx. 300 mm
<b>Weight</b>	approx. 12.5 kg	
<b>Sensor cage</b>	Magnetic stirrer protection Working depth 150 mm	

## 13 Technical Data

### 13.2 Heating and cooling periods

Measuring conditions:

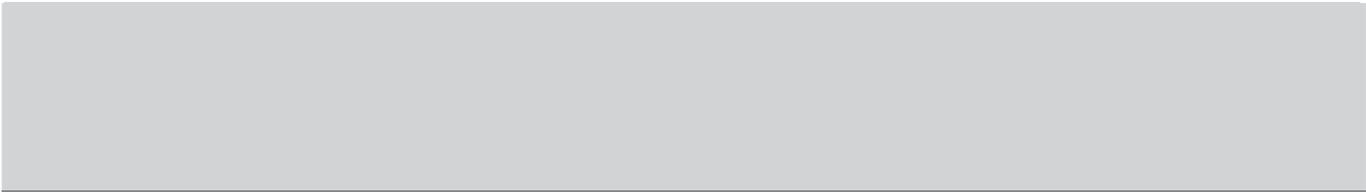
- All periods relate to a reference sensor Pt100/4, D = 6 mm, stainless steel casing
- The reference sensor is located 5 mm above the mesh insert in the middle of the tank
- All periods are throughput periods and do not take the respective required settling time into consideration
- The measurements were carried out at a room temperature of approx. 23 °C with bath without cover

#### With silicone oil 10 CS

Heating up:	Period
-30 °C to -25 °C	1:17 min
-25 °C to -15 °C	1:17 min
-15 °C to 0 °C	1:20 min
0 °C to 25 °C	1:56 min
25 °C to 50 °C	2:30 min
50 °C to 75 °C	3:13 min
75 °C to 100 °C	4:24 min
100 °C to 125 °C	6:47 min
125 °C to 150 °C	12:51 min
150 °C to 165 °C	18:21 min

Cooling down:	Period
165 °C to 150 °C	1:54 min
150 °C to 125 °C	2:37 min
125 °C to 100 °C	3:11 min
100 °C to 75 °C	3:59 min
75 °C to 50 °C	5:02 min
50 °C to 25 °C	6:57 min
25 °C to 0 °C	8:26 min
0 °C to -15 °C	9:58 min
-15 °C to -25 °C	15:33 min
-25 °C to -30 °C	29:45 min







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