

Summary

1. Handling

- 1.1. General advices
- 1.2. Setting to work
- 1.3. Switch on/off
- 1.4. Menu
 - 1.4.1. Measuring unit switching (Unit)
 - 1.4.2. Difference temperature (L in2)
 - 1.4.3. Calibration (CAL)
 - 1.4.4. Channel activation (Chnl)
 - 1.4.5. Memory setup (Lo6)
- 1.5. Recalling memory data (HOLD/MAX/MIN/AVG)
- 1.6. Measuring rate (FAST-mode)
- 1.7. AUTO-OFF-function
- 1.8. TARE-Function (ZERO-Mode F1)

2. Power supply / Changing the battery

3. Error codes / troubleshooting



1. Handling

1.1 General advices

- For cleaning the instrument please do not use abrasive cleaner but a dry or wet piece of cloth.
- Please store the measuring instrument in a dry and clean place.
- Avoid any force like shocks or pressure to the instrument.
- Do not use force to connect the probe or interface plugs in. The interface plug is different from the probe plug.
- If no sensor is connected to the instrument while switching on "open" shows on the display (Please refer to chapter error codes / troubleshooting).
- A retractable stand on the back of the instrument allows it to be used as a bench top instrument.

1.2 Operation

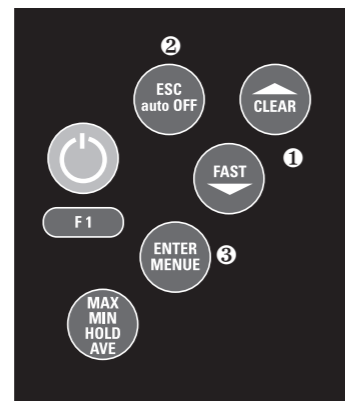
Before switching on the instrument, connect the probe/s to the instrument and insert the battery (Please refer to chapter 2. Power supply/changing the battery). A number on the instrument's housing marks each port.

1.3 Switching on and off

By operating the ON/OFF-key the instrument switched on or off. After switching on the instrument indicates a full segment test for 15 seconds, then it starts to function in measurement mode indicating the actual measurement value.

1.4 Menu

The adjustments of the instruments function: measurement value, calibration of probes, deactivation of channels, for example, are selected from the menu structure. Enter into the main menu by pushing [ENTER/ MENU]. Use the up and down keys [▲▼] to select the required menu. Push [ESC] to revert back to the measuring mode.



- ① Up and down keys
- ② [ESC] key
- ③ [ENTER/MENU] key

Menu structure

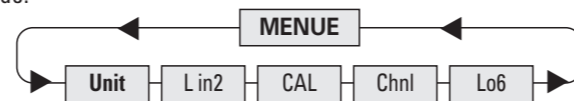
Unit	L in2	CAL	Chnl	Lo6
°C	T1-T2	CoFF	oFF	oFF
°F		oP 1	on	on
0		oP 2		
		oP 3		
		oP 4		

1.4.1 Measuring unit switching °C, °F and Resistance (Ohm's) [Unit]

Unit = Measuring unit

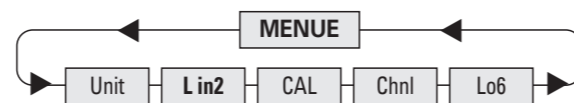
Measuring unit temperature (°C=Celsius, °F=Fahrenheit; o=Ohm)

To change the measuring unit push [ENTER/MENU]. Use the up and down keys [▲▼] to select **Unit**. Push again [ENTER/MENU]. On the right corner of the display appears °C, °F or o. Use the up and down keys [▲▼] again to adjust the requested measuring unit and push [ENTER/MENU] to confirm. Push [ESC] to be back in the measuring mode.



1.4.2 Temperature difference (only 2-channel instruments) / [L in2]

To display the temperature difference push [ENTER/MENU]. Use the up and down keys [▲▼] to select **L in2**. Push again [ENTER/MENU]. On the right corner of the display appears a T1-T2. Use the up and down keys [▲▼] to adjust the requested selection. Push [ENTER/MENU] to confirm. Push [ESC] to revert back to the measuring mode.



Note: Both channels have to be activated for displaying temperature difference.

1.4.3 Calibration function / [CAL]

Despite high quality manufacturing techniques, each probe is slightly different from specified standards. To eliminate inaccuracies caused by exchanging or ageing of probes, the instrument offer

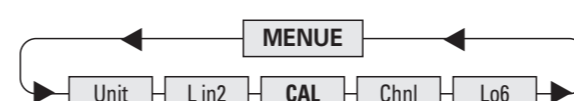
easy calibration functions which guarantee that the system accuracy is always as good as if the instrument was specifically calibrated to the individual probes in our laboratory.

The instruments offer five different calibration options:

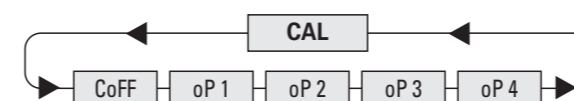
- 1) [CoFF]: Standard characteristic curve (e.g. Pt100-resistance according EN 60751)
- 2) [oP 1]: Calibration by code (2 x four digit code) is equivalent to a 2-point calibration. The code is marked clearly by a label on each standard probe.
- 3) [oP 2]: Calibration by physical standard references (1-point, 2-point or 3-point calibration)
- 4) [oP 3]: Calibration according to Coefficients of EN60751 (R0, ABC)
- 5) [oP 4]: Smart EEprom probes with internal calibration (AUTO-Detection)

CAL = calibration

Push [ENTER/MENU] to calibrate the instrument with sensor. Use the up and down keys [▲▼] to select **CAL**. Push again [ENTER/MENU]. On the left corner of the display appears a small 1, which indicates the selected channel. To change the channel (1 or 2) use the up and down keys [▲▼]. Push [ENTER/MENU] to confirm.



Use the up and down keys [▲▼] to select the requested calibration option. Push [ENTER/MENU] to confirm.



1) Standard calibration according to DIN EN 60751 / [CoFF]

Use the up and down keys [▲▼] to select [CoFF]. Push [ENTER/MENU] to confirm. Push [ESC] to revert back to the measuring mode.

2) Calibration by code / oP 1

Use the up and down keys [▲▼] to select **oP 1**. Push [ENTER/MENU] to confirm. On the bottom of the display appears a small 1, after this number a four-digit number (Hex-Code/0..F) is displayed. For changing the number use the up key [▲]. To step to the next number use the down key [▼].

If the requested number is complete then push [ENTER/MENU] to confirm. At the bottom of the display a very small 2 appears, after which a second four-digit number is displayed. For changing the number please follow the manual as before. Push [ESC] to revert back to the measuring mode.

Note:

After confirming **oP 1** by pushing [ENTER/MENU] the function **oP 1** (calibration by code) is activated, even though you leave the menu by pressing [ESC].

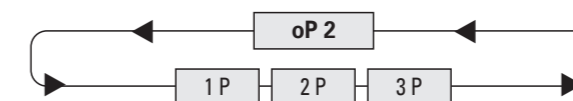
Display-indication with active calibration code (oP 1):



The **CAL**-segment and the small 1 indicates to the user that **oP 1** is activated.

3) Calibration by physical standard references / oP 2

Use the up and down keys [▲▼] to select **oP 2**. Push [ENTER/MENU] to confirm. On the bottom of the display appears 1 P. For changing between a 1-Point [1 P], 2-Point [2 P] or 3-Point [3 P] - calibration use the up and down keys [▲▼].



Example of a 1-Point calibration:

Push [ENTER/MENU] to confirm. On the display appears **CALC**. After the displayed measuring value is stable push [ENTER/MENU]. On the first display line you can see the "frozen" measurement value. On the second line as a default you can see **-100.000**. Now you have to enter (instead of **-100.000**) the correct measurement value from your reference:

By using the up key [▲] you are able to move the decimal point to setup the number of decimal places. Push [ENTER/MENU] to confirm.

Now the algebraic sign is blinking "-". Use the up key [▲] to toggle for positive or negative number. Change the number using the up and down keys [▲▼]:

▲ is changing the blinking segment

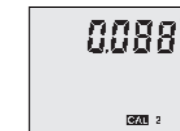
▼ is jumping to the next segment

Push [ENTER/MENU] to confirm, revert back to the measuring mode.

Important:

To abort the physical calibration use the [ESC]-button.

Display-indication with active calibration code (oP 2):



The **CAL**-segment and the small 2 indicates to the user that **oP 2** is activated.

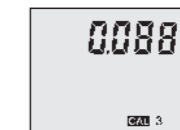
4) Calibration according to Coefficients of EN60751 (R0, ABC) / oP 3

By using Option 3 you are able to activate coefficients according to EN60751 (R0, A, B, C). The coefficients have to be calculated using special software on a PC (e. g. P7_CALC). Before you are able to activate this option you have to transmit the coefficients from the PC to the instrument. Therefore you have to use the Software P7_CALC, too.

Use the up and down keys [▲▼] to select **oP 3**. Push [ENTER/MENU] to confirm. Now the calibration option 3 is activated! Push [ESC] to revert back to the measuring mode.

Note: After confirming **oP 3** by pushing [ENTER/MENU] the function **oP 3** (calibration by code) is activated, even though you leave the menu by pressing [ESC].

Display-indication with active calibration code (oP 3):

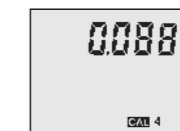


The **CAL**-segment and the small 3 indicates to the user that **oP 3** is activated.

5) Smart EEprom-probes with internal calibration (AUTO-Detection) / oP 4

The Option 4 will be activated automatically by using Smart EEprom probes. This option will be activated by switching on the instrument when the Smart EEprom probe has been connected to the instrument.

Display-indication with active calibration code (oP 4):



The **CAL**-segment and the small 4 indicates to the user that **oP 4** is activated.

Note:

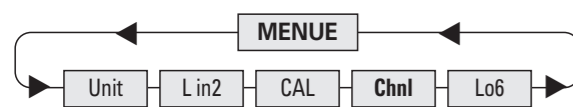
If a Smart probe will be disconnected during the instrument is working the instrument automatically switch to the CAL-menu.

1.4.4 Channel activation (only 2-channel instruments) / [Chnl]

Chnl = Channel

To activate or deactivate a measuring channel push [ENTER/MENUE]. Use the up and down keys [▲▼] to select **Chnl**. Push again [ENTER/MENUE]. On the left corner of the display appears a small **1**, which indicates the selected channel. To change the channel use the up and down keys [▲▼]. Push [ENTER/MENUE] to confirm. Use the up and down keys [▲▼] again to activate on or deactivate off the requested measuring channel and push [ENTER/MENUE] to confirm. Push [ESC] to revert back to the measuring mode.

Note: As a minimum one channel is active!

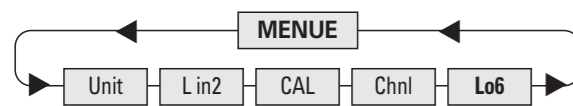


1.4.5 Memory Setup Lo6

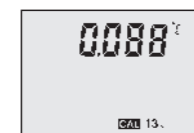
Push [ENTER/MENUE] and use the up and down keys [▲▼] to select **Lo6**. Push [ENTER/MENUE] to confirm. Use the up and down keys [▲▼] again to start [on] or Stop [off] the logger. Push [ENTER/MENUE] to confirm. Use the up and down keys [▲▼] again to select between automatic storage [Auto] or manually operated storage [SPot]. Push [ENTER/MENUE] to confirm. Use the up and down keys [▲▼] again to select between to add on data [Add] and creating a new file [nLo6]. Push [ENTER/MENUE] to confirm. By selected automatic storage at the end you have to select the time interval:

1 S	1 second
5 S	5 seconds
10 S	10 seconds
20 S	20 seconds
30 S	30 seconds
1 M	1 minute
2 M	2 minutes
5 M	5 minutes
10 M	10 minutes
20 M	20 minutes

By selected manually operated storage you are able to save the measurement by pressing ESC by each time. Push [ENTER/MENUE] to confirm. Push [ESC] to revert back to the measuring mode.



E.g. of the instrument's LCD by activated logging mode:



On the bottom you can see the percentage of the occupied memory (0.99%). If a calibration option is activated the display is alternating between displaying memory status and calibration information.

1.5 Recalling the memory data (HOLD MAX MIN AVE)

After pushing first time the key [HOLD MAX MIN AVE] the actual values will be held on the display. Pushing again the key [HOLD MAX MIN AVE], the saved maximum-, minimum and average values will be displayed.

Note: During the recall of the memory data the extremes (MAX MIN) and the average value (AVE) will not be calculated or carried on.

Clearing the memory (MAX MIN AVE)

Press [CLEAR] key once to erase the stored maximum, minimum and average from memory. On the display appears **Clr.** – After erasing the memory the instrument automatically reverts back to measuring mode indicating the actual measured value again.

1.6 Measuring rate
(Normal-Mode / FAST-Mode / Filter-Mode)

The instrument has three different response times to select:

Normal-Mode: high resolution
(0.001 from -199.999 to +199.999)

FAST-Mode: reduced resolution
(0.01 from -199.99 to +199.99)

Filter-Mode: high resolution
(0.001 from -199.999 to +199.999)

Press [FAST/▼] key to change the measuring rate.

By using the Filter-Mode the instrument is performing a moving average to stabilize the displayed measurements. After turning on the instrument it is in the Normal-Mode. After pressing once the [FAST/▼] key the instrument switches to the Fast-Mode. Pressing the same key once again the instrument switches to the Filter-Mode.

E.g. Display with activated Filter-Mode:



The arrow on the top indicates that the instrument is working in the Filter-Mode.

Note: After switching off the instrument, this function is automatically deactivated.

1.7 AUTO-OFF-function

dAoF = Disable Auto-off
EAoF = Enable Auto-off

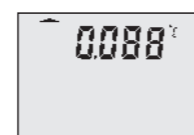
Press [ESC/AUTO-OFF] key once. On the display appears **EAoF**. Now the instrument switches off automatically after app. 30 minutes. Press [ESC/AUTO-OFF] key again. On the display appears **dAoF**. Now the Auto-Off-function is deactivated.

Attention: This setting will be deactivated when the instrument turns off. (Standard setting is **EAoF**).

1.8 TARE-Function (ZERO-Mode F1)

The Instrument has a special Tare/Zero-button. Pressing the [F1] key once, the instrument will subtract the last measured value from the actual measured value. So if the measurement does not change zero appears on the instrument's display. If you press the [F1] key once again the instrument move to the Normal-Mode.

E.g. Display with activated Zero-Mode:



The arrow on the left indicates that the instrument is working in the Zero-Mode [F1].

Note:

After switching off the instrument, this function is automatically deactivated.

2. Power supply

- For the power supply of the instrument a 9 Volt dry battery is used. To exchange the battery switch of the instrument and open the rear battery cover. Remove the battery from the instrument and replace with a new battery.
- The "BAT" symbol in the display indicates that the battery needs to be exchanged. After displaying the "BAT" symbol, the instrument allows app. 1 hour of further operation.
- The battery symbol indicates according to the battery status between 1 to 3 segments.

Attention:

Please do not dispose of old electronic devices and empty batteries in household waste. To protect the environment, take them to your retail store or to appropriate collection sites according to national or local regulations.

3. Error Codes

By displaying the following error codes the instrument support the operation of the instrument:

Error	Meaning
oPEn	no probe or wrong probe is connected
LoLo	„too low“ underflow of the measuring range
LoHi	„too high“ exceeding of the measuring range
TEr1	temperature of the cold junction above the measuring range
TEr2	temperature of the cold junction above the measuring range
E15	low battery (battery is completely exhausted)
E19	low battery (battery is completely exhausted)
E1d	low battery (battery is completely exhausted)
E16	time out / auto-off-function
E1o	time out / auto-off-function
E1e	time out / auto-off-function
E23	EE-prom destroyed or EE-prom index is wrong
E25	EE-prom destroyed or EE-prom index is wrong
E31	temperature of cold junction out of range
LoLi	internal buffer battery (CR2032) empty (for changing the battery the housing must be unscrewed)

TS 975

Precision Handheld Thermometer



Operation Manual