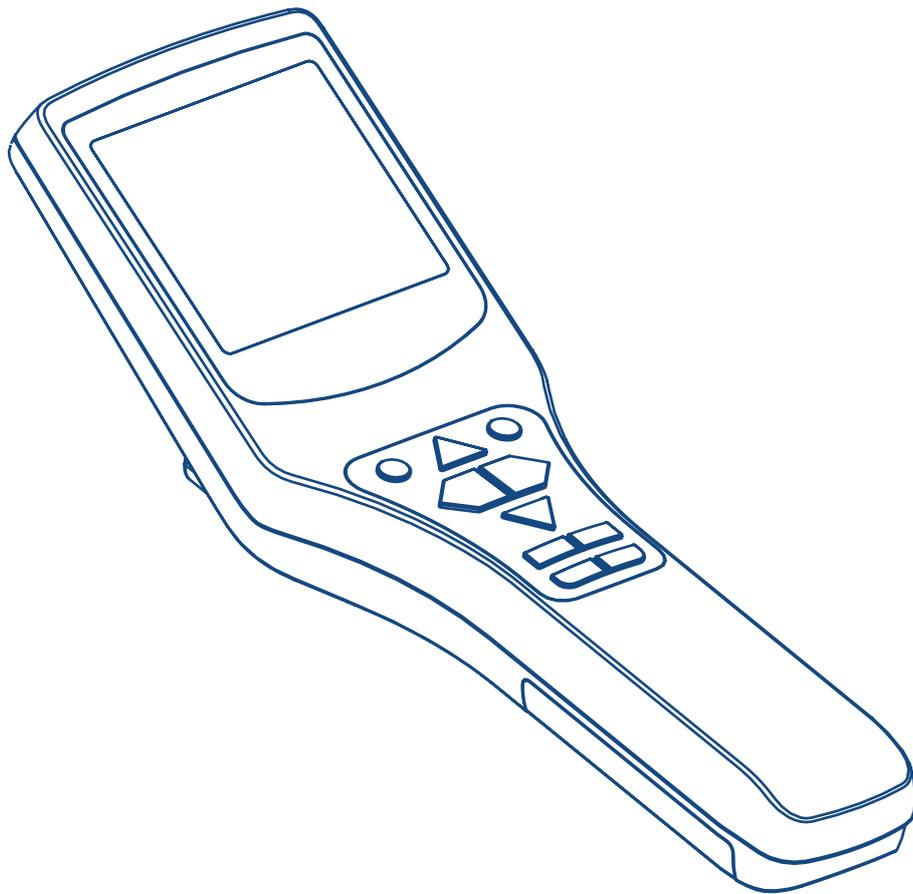


VEROXLABS®

# METRUM 2

DUAL CHANNEL DIGITAL THERMOMETER

USER MANUAL





---

### **Manufacturer and customer service**

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For any inquiry, please always specify the appliance number along with the serial number on the product label of the appliance.

Revision Number: 11.0

Edition 03/2024  
Subject to modifications

# THANK YOU!

Dear User,

Congratulations on your purchase of the 'Dual Channel Digital Thermometer', METRUM2. This user instruction manual is intended to provide you with instructions on how to use the Digital Thermometer, METRUM2 safely and effectively. For further questions on using this product or explanations with regards to its features, please contact VeroxLabs or your local distributor.

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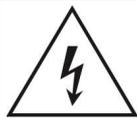
# TERMS AND SYMBOLS USED

To prevent damage to your VeroxLabs product and injury to yourself including others, read the following safety precautions in their entirety, before using this equipment. Provide the safety instructions to all personnel who uses the product. The consequences that could result from failure to observe the precautions listed in this section are indicated by the following symbol.

## Terms Used



**CAUTION** Indicates a hazard with a low level of risk.



**CAUTION** High voltage. Possibility of electric shock.

## Symbols Used

-  - Ok button/Date and time edit Button
-  - Power button/Auto power off time edit button
-  - Toggle display areas button/Up button
-  - Clear minimum, maximum, and average button/Left button
-  - View minimum, maximum, and average button/Right button
-  - Hold button/Down button
-  - Alarm enable button
-  - Alarm set button
-  - °C and °F toggle button
-  - MicroSD card data record button
-  - Low battery indicator
-  - Threshold monitoring alarm indicator
- CAL - Sensor calibration indicator
- °C - Celsius indicator

- °F - Fahrenheit indicator
- MIN - Minimum temperature value indicator
- MAX - Maximum temperature value indicator
- AVG - Average temperature value indicator
- HOLD - Temperature value is on hold indicator
-  - MicroSD card indicator
- TC - Thermocouple probe identification
- RTD - RTD probe identification

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# SAFETY INSTRUCTIONS

The consequences that could result from failure to observe the precautions listed in this section are indicated by the warning symbol. To prevent possible injury, read all warnings before using this VeroxLabs product.

-  Do not handle the sharp tip of the needle probe, as it may prick the user. Exercise caution during use.
-  Do not insert the sensor probes to live culture.
-  Do not remove the battery without powering off the thermometer.
-  Always use a 9V battery from a reputed manufacturer.
-  Always replace the drained battery with a new one.
-  Do not make contact between temperature probes and electrically live objects.
-  Always use the provided sensor probe holder for the needle probe, to hold the sensor probe in place.
-  Do not place the thermometer on unstable surfaces.
-  Do not insert the battery in reverse polarity.
-  Do not apply excessive force to the sensor probe-slots when inserting to the thermometer.
-  Do not use sharp items to press the calibration button.
-  Do not apply excessive force to the thermometer display and the keypad.
-  Do not disassemble the enclosure of the thermometer.
-  Use only the provided power adaptor when powering the thermometer via micro USB cable.
-  Do not remove the microSD card without disabling data recording.
-  Do not connect the thermometer to the power adaptor/PC under lightning conditions.
-  Handle flexible probes with care, as excessive force may cause damage.

# **INTENDED USE**

To measure the temperature of temperature-controlled equipment typically used in a IVF laboratory.

Contraindication: It is not intended that this device come into direct contact with any tissue samples being treated in clinical setting, or with media which is in direct contact with such samples.

# TECHNICAL DATA



If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

## Thermometer Specifications

Parameter	Description
Battery type	9V standard battery
Power supply	Micro USB (PC/power adaptor)
Environment temperature	5°C to 40°C
Display range	-999.99 to +999.99
Display resolution	0.01°C
Connectivity	Micro USB
Dimension (WxDxH)	66mm x 203mm x 54 mm
Net weight	180g
State of the equipment	Portable

## Needle Probe Specifications

Parameter	Description
Sensor type	T-Type thermocouple
Dimensions	Sensor tip $\varnothing$ = 0.34mm Sensor tip length = 12mm Cable length = 1500mm Cable thickness = 2.5mm
Measuring range	-50°C to +200°C
Accuracy	$\pm 0.03^\circ\text{C}$ in the physiological range
Response time	0.13s to 0.25s
Application	Liquid measurement

## Thin Flexible Probe Specifications

Parameter	Description
Sensor type	T-Type thermocouple
Dimensions	Sensor tip $\varnothing = 0.635\text{mm}$ Cable length = 910mm Cable thickness = 0.635mm
Measuring range	-100°C to +150°C
Accuracy	$\pm 0.03^\circ\text{C}$ in the physiological range
Response time	0.5s to 1s
Application	Liquid, surface, incubator, time lapse incubator measurement

## Ultra-Fine Flexible Probe Specifications

Parameter	Description
Sensor type	T-Type thermocouple
Dimensions	Sensor tip $\varnothing = 0.23\text{mm}$ Cable length = 910mm Cable thickness = 0.23mm
Measuring range	-50°C to +70°C
Accuracy	$\pm 0.03^\circ\text{C}$ in the physiological range
Response time	0.02s to 0.04s
Application	Liquid, surface, incubator, time lapse incubator measurement

## Surface Probe Specifications

Parameter	Description
Sensor type	3 wire RTD
Dimensions	Sensor disk $\varnothing = 35\text{mm}$ Disk height = 8.5mm Cable length = 1000mm Cable thickness = 0.8mm
Measuring range	-50°C to +200°C
Accuracy	$\pm 0.03^\circ\text{C}$ in the physiological range
Response time	< 50s
Application	Surface measurement

## Five Well Dish with Integrated Needle Sensor Probe

Parameter	Description
Sensor type	T-Type thermocouple
Dimensions	Sensor tip $\varnothing = 0.34\text{mm}$ Sensor tip length = 12mm Cable length = 1500mm Cable thickness = 2.5mm
Measuring range	-50°C to +200°C
Accuracy	$\pm 0.03^\circ\text{C}$ in the physiological range
Response time	0.13 to 0.25s
Application	Liquid measurement

## Five Well Dish with Integrated Thin Flexible Sensor Probe

Parameter	Description
Sensor type	T-Type thermocouple
Dimensions	Sensor tip $\varnothing = 0.635\text{mm}$ Cable length = 910mm Cable thickness = 0.635mm
Measuring range	-100°C to +150°C
Accuracy	$\pm 0.03^\circ\text{C}$ in the physiological range
Response time	0.5s to 1s
Application	Liquid measurement

## Single Well Dish with Integrated Needle Sensor Probe

Parameter	Description
Sensor type	T-Type thermocouple
Dimensions	Sensor tip $\varnothing = 0.34\text{mm}$ Sensor tip length = 12mm Cable length = 1500mm Cable thickness = 2.5mm
Measuring range	-50°C to +200°C
Accuracy	$\pm 0.03^\circ\text{C}$ in the physiological range
Response time	0.13 to 0.25s
Application	Liquid measurement

## Single Well Dish with Integrated Thin Flexible Sensor Probe

Parameter	Description
Sensor type	T-Type thermocouple
Dimensions	Sensor tip $\varnothing = 0.635\text{mm}$ Cable length = 910mm Cable thickness = 0.635mm
Measuring range	-100°C to +150°C
Accuracy	$\pm 0.03^\circ\text{C}$ in the physiological range
Response time	0.5s to 1s
Application	Surface measurement

## ICSI Dish with Integrated Needle Sensor Probe

Parameter	Description
Sensor type	T-Type thermocouple
Dimensions	Sensor tip $\varnothing = 0.34\text{mm}$ Sensor tip length = 12mm Cable length = 1500mm Cable thickness = 2.5mm
Measuring range	-50°C to +200°C
Accuracy	$\pm 0.03^\circ\text{C}$ in the physiological range
Response time	0.13 to 0.25s
Application	Surface measurement

## ICSI Dish with Integrated Thin Flexible Sensor Probe

Parameter	Description
Sensor type	T-Type thermocouple
Dimensions	Sensor tip $\varnothing = 0.635\text{mm}$ Cable length = 910mm Cable thickness = 0.635mm
Measuring range	-100°C to +150°C
Accuracy	$\pm 0.03^\circ\text{C}$ in the physiological range
Response time	0.5s to 1s
Application	Surface measurement

## Cryogenic Sensor Probe Specifications

Parameter	Description
Sensor type	3 wire RTD
Dimensions	Sensor $\varnothing = 5\text{mm}$ Sensor length = 300mm Cable length = 3m Cable thickness = 3.5mm
Measuring range	-200°C to +200°C
Accuracy	$\pm 0.1^\circ\text{C}$ @ 0°C
Response time	< 60s
Application	Cryo tank measurement

## Fridge Freezer Sensor Probe Specifications

<b>Parameter</b>	<b>Description</b>
Sensor type	3 wire RTD
Dimensions	Sensor $\varnothing$ = 5mm Sensor length = 50mm Cable length = 3m Cable thickness = 3.5mm
Measuring range	-200°C to +200°C
Accuracy	$\pm 0.1^\circ\text{C}$ @ 0°C
Response time	< 60s
Application	Fridge, Freezer measurement

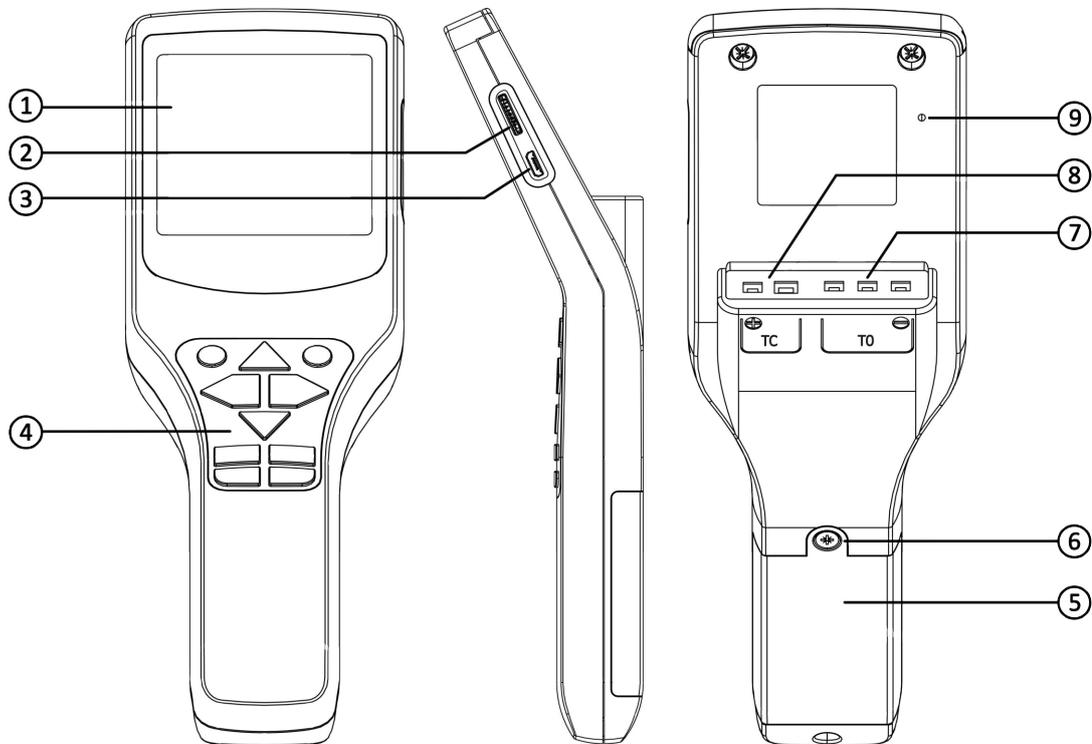
# **NORMAL ENVIRONMENTAL CONDITIONS**

Dual Channel Digital Thermometer has been designed to be used in an environment where it fulfills following criteria.

- Indoor Use
- Altitude up to 2000m
- Temperature 5°C to 40°C
- Maximum relative humidity 80% for temperature up to 31°C decreasing linearly to 50% relative humidity at 40°C.
- Pollution Degree II

# GET TO KNOW YOUR PRODUCT

## Product Description



### ① Display

Segment display

### ② MicroSD card Slot

MicroSD card slot for data recording.

### ③ Micro USB port

Micro USB port to communicate with a PC.

### ④ Keypad

Membrane keypad

### ⑤ Battery cover

Remove this cover to change the battery.

### ⑥ Battery cover screw

Undo the screw to remove the battery cover.

### ⑦ T0 slot

T0 slot.

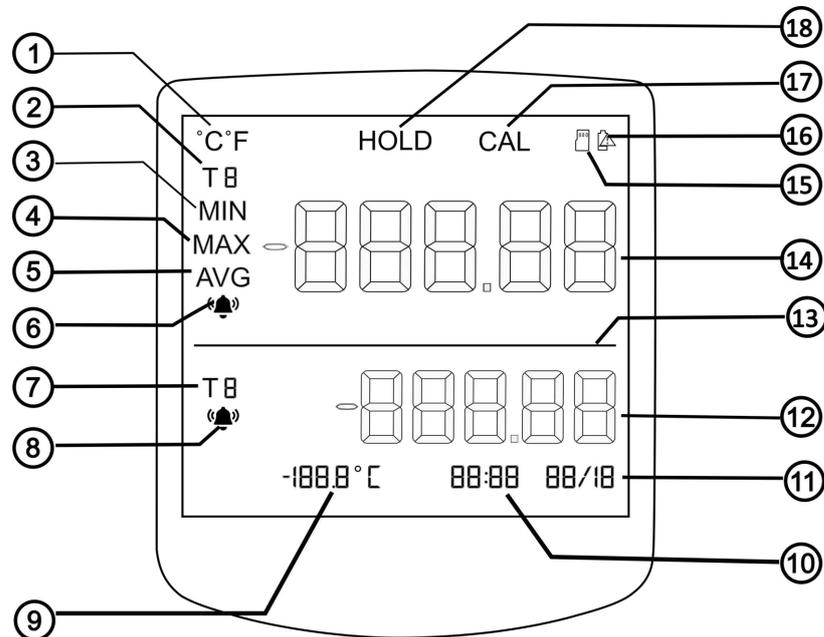
### ⑧ TC slot

TC slot.

### ⑨ Calibration activation button

Press this button to initiate the calibration routine.

## Display



### ① Celsius and Fahrenheit indicator

Indicates temperature units of the displayed values.

### ② Primary display area sensor indicator

Indicates the sensor probe (TC/T0) that is being displayed on the primary display area.

### ③ Minimum value indicator

Indicates that the value displayed on the primary display area is the minimum value.

### ④ Maximum value indicator

Indicates that the value displayed on the primary display area is the maximum value.

### ⑤ Average value indicator

Indicates that the value displayed on the primary display area is the average value.

### ⑥ Primary display alarm indicator

Indicates that threshold monitoring function is active for the sensor displayed in the primary display area. This symbol blinks when the measured temperature on the primary display area exceeds the set threshold values.

### ⑦ Secondary display area sensor indicator

Indicates the sensor probe (TC/T0) that is being displayed on the secondary display area.

### ⑧ Secondary display alarm indicator

Indicates that threshold monitoring function is active for the sensor displayed in the secondary display area. This symbol blinks when the measured temperature on the secondary display area exceeds the set threshold values.

### ⑨ Room temperature

Displays the room temperature value.

**10 Time**

Displays the time in 24 hour format.

**11 Month and date**

Displays the month and the date.

**12 Secondary display temperature value**

Displays the measured temperature of the sensor probe (TC/T0) that is assigned to the secondary display area.

**13 Display area separation line**

Line that separates the primary and secondary display areas.

**14 Primary display temperature value**

Displays the measured temperature of the sensor probe (TC/T0) that is assigned to the secondary display area.

**15 MicroSD card indicator**

Indicate that a microSD card is present. This will blink when data recording is active.

**16 Low battery**

Indicates that battery is low.

**17 Calibration indicator**

Indicates that the calibration function is active.

**18 Hold indicator**

Indicates that the temperature value displayed on the primary display area is on-hold.

## Common Display Area

Below figure shows the segments of the display which are related to the entire thermometer unit including the primary and secondary display areas. The common functions are,

- °C°F indicator
- CAL indicator
-  indicator
-  indicator
- Room temperature
- Date and Time

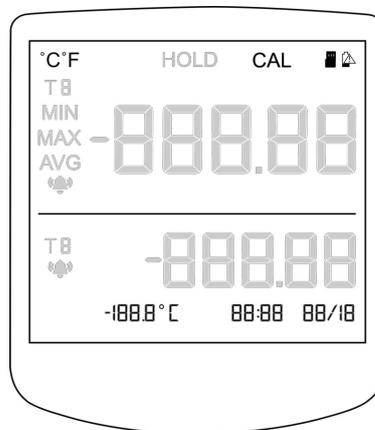


Figure: Common Display Area

## Primary and Secondary Display Area

There are two display areas on the thermometer; the primary display area and secondary display area as illustrated in Figure Primary Display Area and Figure Secondary Display Area respectively.



Figure: Primary Display Area

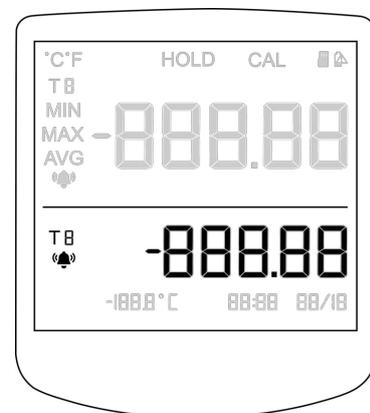


Figure: Secondary Display Area

Thermocouple probe is connected to TC, RTD probe is connected to T0, and temperature values of them are displayed on the locations of the primary and secondary display areas with respect to the sensor probe each display area is reading. User is able

to toggle between the primary and secondary display areas. This is illustrated in the Figure Sensor probe number below.

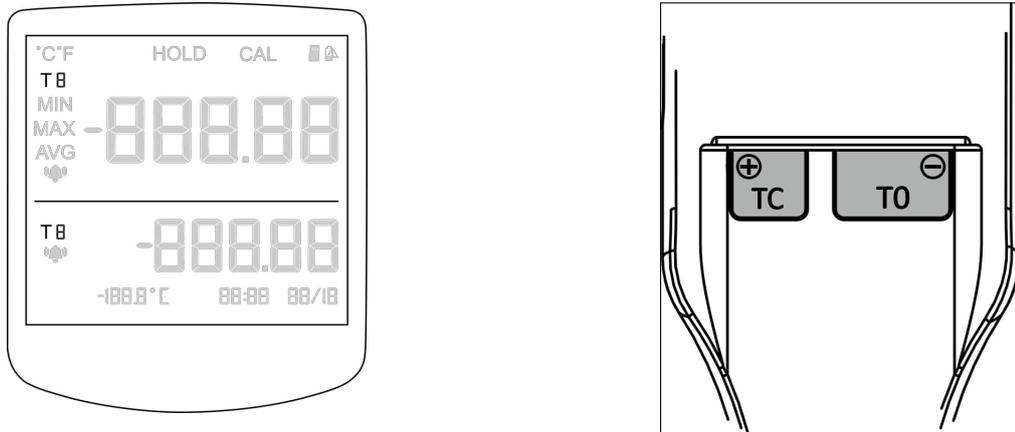
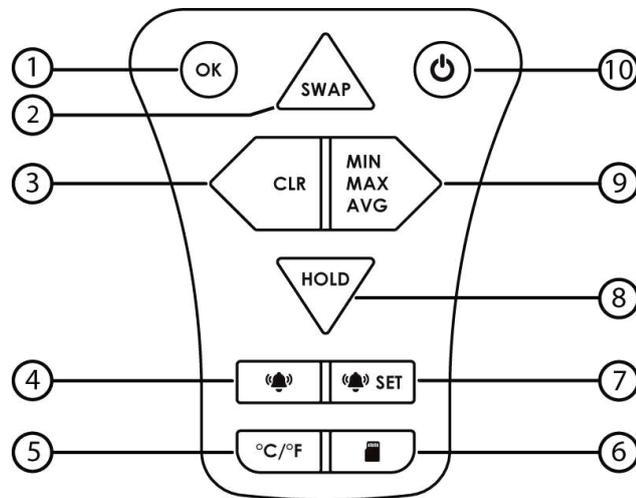


Figure: Sensor Probe Number

In order to activate the thermometer functions, the user must bring the sensor probe displayed in the secondary display area to the primary display area by toggling the sensor probes using the  .

## Keypad



### 1 OK

Accept the edited value. Press this button twice within 1.5 seconds to edit date and time.

### 2 Toggle sensor display area

Toggle the two sensor probes (TC/T0) between primary display area and secondary display area. When editing a value press this button to increase the value.

### 3 Clear

Clear the stored minimum, maximum and average temperature values of the sensor probe displayed on the primary display area. Select the previous editable value when editing date and time.

### 4 Alarm enable/disable

Enable/disable the threshold monitoring function of the sensor that is displayed on the primary display area.

### 5 Toggle Celsius/Fahrenheit

Toggle displayed temperature unit between Celsius and Fahrenheit.

### 6 MicroSD card data recording

Enable/disable data recording on a microSD card.

### 7 Alarm set

Edit high and low threshold values of the sensor probe that is displayed on the primary display area.

### 8 Hold

Hold the temperature value displayed on the primary display area. When editing a value press this button to decrease the value.

### 9 Toggle MIN, MAX, AVG

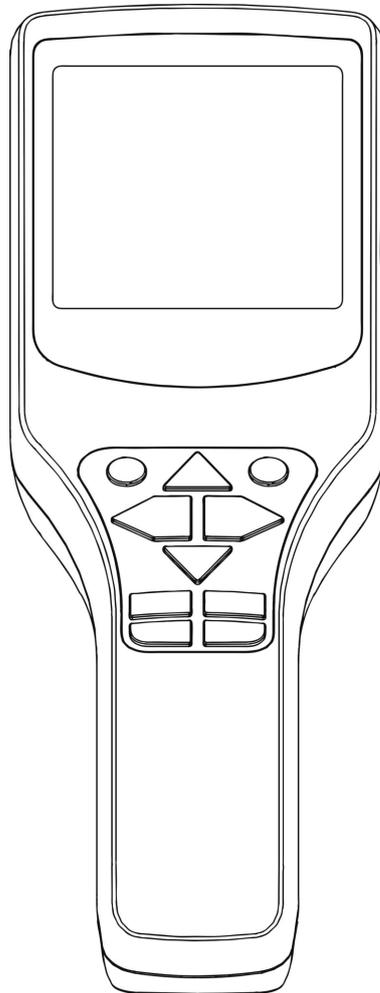
View the stored minimum, maximum and average temperature values of the sensor probe that is displayed on the primary display area. Select the next editable value when editing date and time.

### 10 Power

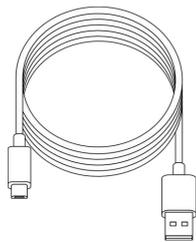
Power on/off the thermometer. To Power off press and hold the button. Edit auto power off timer by pressing twice within 1.5 seconds.

# GET STARTED

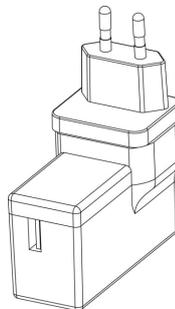
## Package Content



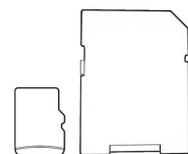
Dual Channel Digital Thermometer



Micro USB Cable



Power Adaptor

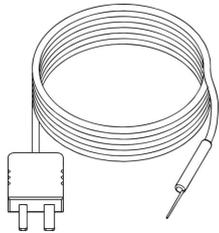


MicroSD Card and Adaptor

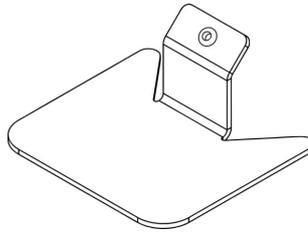
Note: Calibration certificates, calibration stickers and Quick Start Guide are included in the package.

## Package Content - Sensors & Accessories

Note: Sensors may vary according to the purchased configuration.



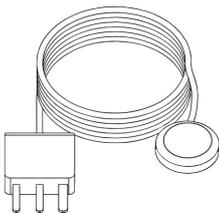
Needle Probe



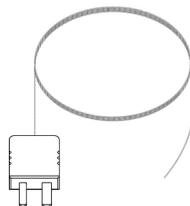
Probe Holder



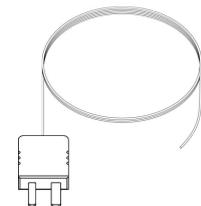
Sensor Guide Tube for Flexible Probes



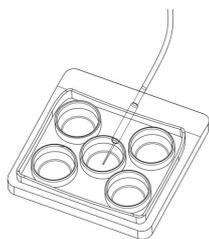
Surface Probe



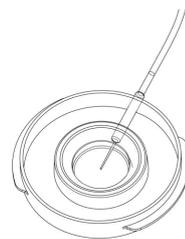
Ultra-Fine Flexible Probe



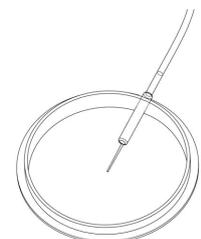
Thin Flexible Probe



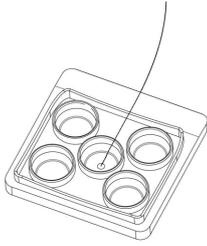
Five Well Dish Integrated with Needle Probe



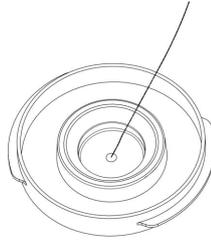
Single Well Dish Integrated with Needle Probe



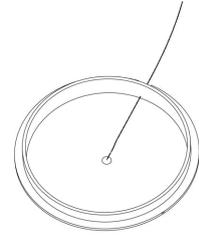
ICSI Dish Integrated with Needle Probe



Five Well Dish Integrated with Flexible Probe



Single Well Dish Integrated with Flexible Probe



ICSI Dish Integrated with Flexible Probe



Cryo Probe



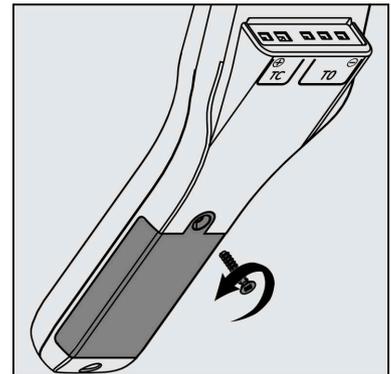
Fridge Freezer Probe

## Installing the Battery

-  Always use a standard 9V battery and care must be taken to place the battery in the correct polarity. Read the safety instructions mentioned under 'SAFETY INSTRUCTIONS' before inserting the battery and using the thermometer.

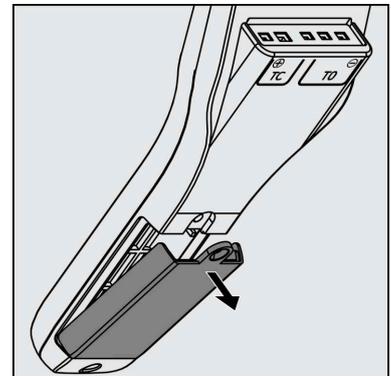
### 1 Undo the screw

- Use a cross head screw driver to undo the battery cover screw.



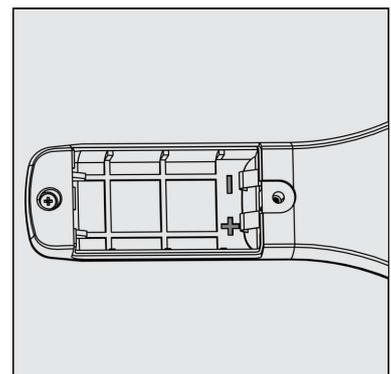
### 2 Remove the battery cover

- Remove the battery cover as demonstrated in the figure.



### 3 Note the correct polarity

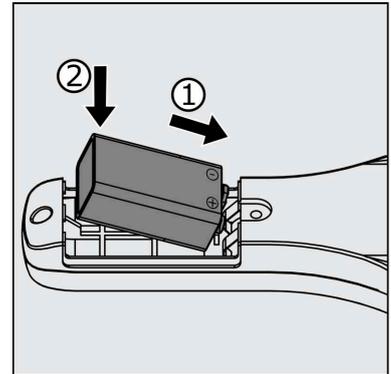
- Note the correct polarity marked inside of the battery compartment before inserting the battery.



---

## 4 Insert the battery

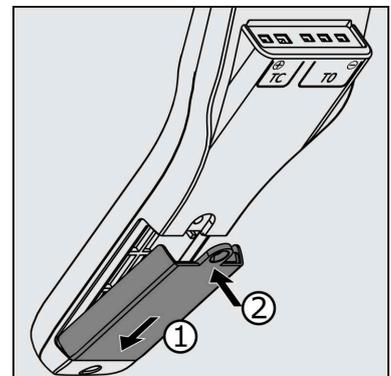
- Insert battery as demonstrated in the figure according to the correct polarity.



---

## 5 Insert the battery cover

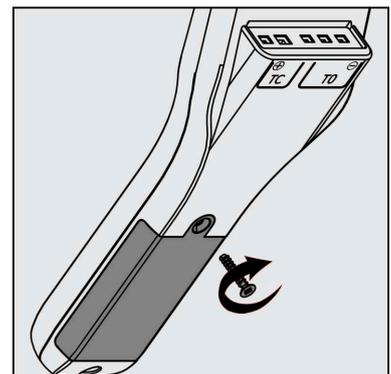
- Insert the battery cover as demonstrated in the figure.



---

## 6 Fasten the screw

- Use a cross head screw driver to tighten the battery cover screw.



## Connecting the Thermometer to Power Adaptor/PC

The thermometer can also be powered by connecting the micro USB port present on the side of the thermometer to the power adaptor or PC via the micro USB cable. Follow the steps below to connect the thermometer to the power adaptor/PC.

Note: If the thermometer is connected to the power adaptor/PC while it is being powered by a battery, the thermometer will only draw power from the power adaptor/PC. Battery is not required when the thermometer is powered via micro USB cable.

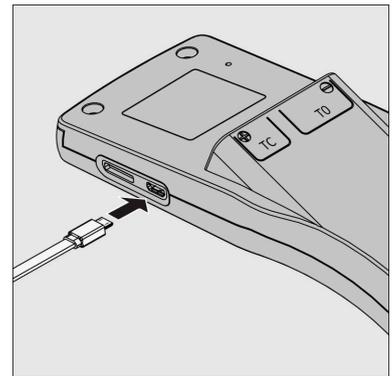
 Use only the provided power adaptor when powering the thermometer via micro USB cable.

 Do not connect the thermometer to the power adaptor/PC under lightning conditions.

---

### **1** Connect micro USB cable

- Connect the micro USB cable as demonstrated in the figure.
- Ensure that the correct orientation is maintained.
- Connect the other end of the cable to the power adaptor/PC.



## Connecting Sensor Probes

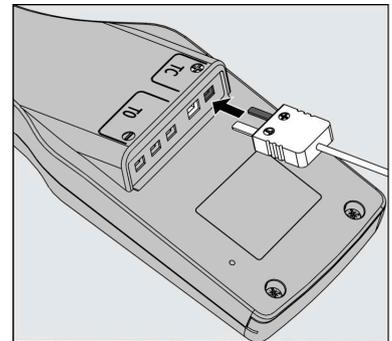
Always use the calibrated probes that are supplied with the thermometer.

⚠ Read the safety instructions mentioned under "SAFETY INSTRUCTIONS" before inserting the sensor probes into the thermometer.

⚠ Handle needle probe with care. The sharp edge can pierce the skin.

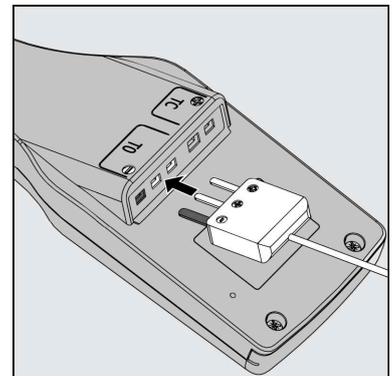
### 1 Connect thermocouple probe (TC)

- Align the positive terminals marked on the thermometer and the probe as demonstrated in the figure.
- Note that one terminal is larger than the other.
- Gently insert the connector.



### 2 Connect RTD probe (T0)

- Align the negative terminals marked on the thermometer and the probe as demonstrated in the figure.
- Note that one terminal is larger than the other two.
- Gently insert the connector.



# TAKING A MEASUREMENT

-  The sensor probes must not come into direct contact with any live samples being treated in a clinical setting, nor with media that is in direct contact with such live samples.
-  The temperature readings may exhibit anomalies when a sensor is inserted, removed, or when there is any disturbance to the connection with the thermometer.
-  To guarantee precise and consistent measurements, ensure that the sensor is firmly connected and that there are no disruptions at the connection slots.

The applications for different sensors are mentioned under the TECHNICAL DATA section.

## Liquid Measurement with Needle Probe

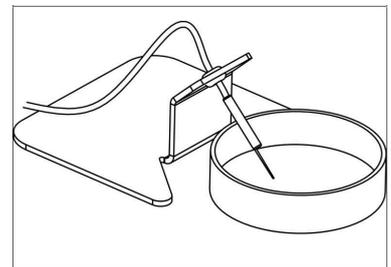
The needle probe is waterproof. It can be immersed in liquid. The following must be adhered to when the needle probe is used for liquid measurement.

- Ensure that the needle probe is held firmly by the provided probe holder.
- Ensure that the sensor's tip is submerged in the measuring liquid by a minimum of 3mm.
- Allow the reading to stabilize before obtaining a temperature reading.

---

### 1 Place the sensor probe

- Place the needle probe holder in place.
- Gently insert the needle probe through the opening in the probe holder.
- Adjust the probe and the cable to hold the sensor probe stable as demonstrated in the figure.



---

### 2 Connect the sensor probe to the thermometer

- Connect the sensor probe connector to the thermometer (TC)

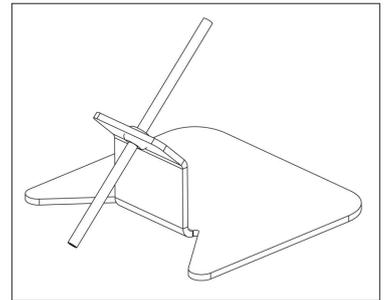
## Liquid Measurement with Flexible Probes

The flexible sensor probes are waterproof. They can be used to measure liquids and surfaces.

- ⚠ Handle flexible sensor probes with care, as excessive force may cause damage.

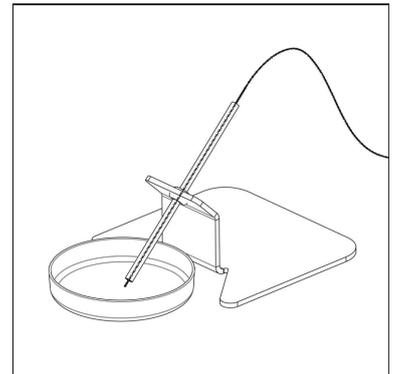
### 1 Prepare probe holder

- Insert the flexible sensor guide tube into the probe holder opening and adjust the height according to your requirements.



### 2 Place the sensor Probe

- Place the prepared probe holder in place.
- Gently insert the flexible probe into the sensor guide tube.
- Adjust the probe height to ensure that the sensor tip is immersed in the liquid that is to be measured.



### 3 Connect the sensor probe to the thermometer

- Connect the sensor probe connector to the thermometer (TC)

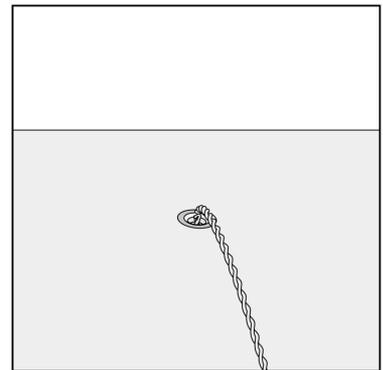
## Incubator Measurement with Flexible Probes

The flexible sensor probes can be used to measure/validate incubators and time lapse incubators.

-  Handle flexible sensor probes with care, as excessive force may cause damage.

### 1 Place the sensor probe

- Place the sensor probe inside the temperature validation hole/slot in the incubator. Ensure that sensor tip is properly inserted.



### 2 Connect sensor probe to the thermometer

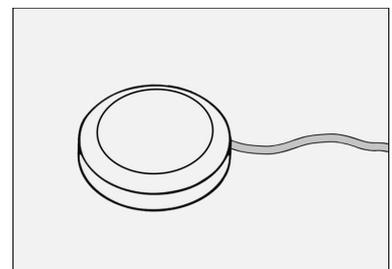
- Connect the sensor probe connector to the thermometer (TC).

## Surface Measurement with Surface Probe

The surface sensor probe is designed to measure surfaces. Temperature sensitive face is 35 mm in diameter and this face must be placed in contact with the measuring surface.

### 1 Place the sensor probe

- Place the sensor probe on the surface to be measured.



### 2 Connect sensor probe to the thermometer

- Connect the sensor probe connector to the thermometer (T0).

## Petri Dish measurement with Dish Probes

Dish sensor probes, essentially Petri dishes with integrated sensor probes, are designed to replicate laboratory operational conditions. These dishes can be filled with culture media and oil, mimicking real scenarios for temperature measurements.

Dish probes are available based on the type of Petri dish, such as the Single Well Dish Sensor Probe, Five Well Dish Sensor Probe, ICSI Dish Sensor Probe, etc.

Dish probes are also categorized based on the type of measurement they can be used for;

- Measuring the liquid temperature inside media/oil.
- Measuring the surface temperature of the Petri dish bottom.

 Do not use the dish sensor probes with live samples!

 Handle the dish sensor probes with care, as excessive force may cause damage.

If a dish is intended to be used with the lid on, then calibrate the dish probe with the lid on. Similarly, if the dish is used without the lid, calibrate the dish probe without the lid.

Include the appropriate quantity of oil as you would in a real-life scenario to ensure accurate results.

Ensure that you use a dish probe from the same manufacturer as you would in the procedure, as the level of contact between the dish and the heated surface may vary from one manufacturer to another.

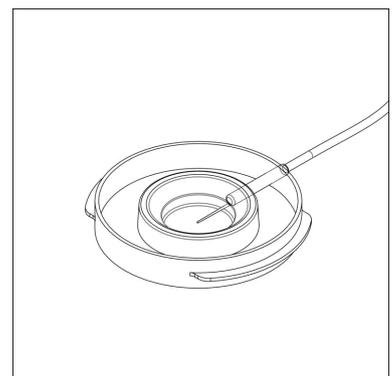
### Liquid Droplet Measurement with Dish Sensor Probes

The needle tip of the sensor is positioned above the bottom surface of the Petri dish without making contact with the bottom of the petri dish. This allows a direct measurement of the liquid content of the petri dish.

---

#### **1** Prepare the dish sensor probe

- Add the media droplet onto the needle tip of the sensor of the dish sensor probe, ensuring that the tip is well covered with culture media.
- Add the amount of oil as you would do in a normal procedure.



---

## **2 Place the dish sensor probe**

- Carefully place the dish sensor probe on the heated surface.

---

## **3 Connect dish sensor probe to the thermometer**

- Connect the sensor probe connector to the thermometer.

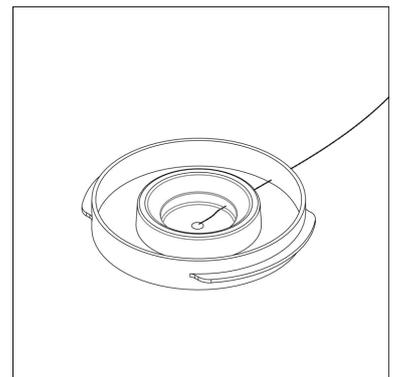
### **Dish Bottom Measurement with Dish Sensor Probes**

The tip of the sensor is glued on the bottom surface of the Petri dish making contact with the bottom of the petri dish. This allows a direct measurement of the Petri dish bottom surface.

---

## **1 Prepare the dish sensor probe**

- Fill the dish of the dish sensor probe with the preferred amounts of culture media and oil as you would do in a normal procedure.



---

## **2 Place the dish sensor probe**

- Carefully place the dish sensor probe on the heated surface.

---

## **3 Connect dish sensor probe to the thermometer**

- Connect the sensor probe connector to the thermometer.

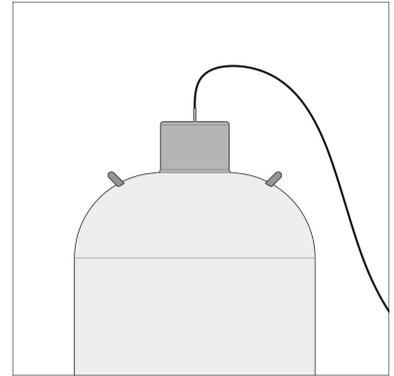
Note: If requested, the flexible probe can be positioned on the bottom surface without gluing.

## Cryo Tank Measurement with Cryo Probe

The cryo probe is designed to measure ultra-low temperatures in cryogenic environments. It can be immersed in a cryo tank to validate optimal storage conditions.

### 1 Place the sensor probe

- Gently insert the cryo probe into the cryo tank, taking care not to damage the probe or the tank.



### 2 Connect sensor probe to the thermometer

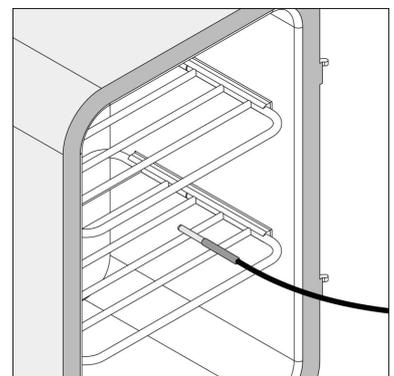
- Connect the sensor probe connector to the thermometer (T0).

## Fridge/Freezer Measurement with Fridge Freezer Probe

The fridge freezer probe is designed for validating temperatures in laboratory refrigerators and freezers. It is intended to be placed inside the fridge or freezer to ensure and verify optimal storage conditions.

### 1 Place the sensor probe

- Carefully place the fridge probe within the refrigerator or freezer, avoiding any interference with the probe or the storage unit.



### 2 Connect sensor probe to the thermometer

- Connect the sensor probe connector to the thermometer (T0).

# OPERATING INSTRUCTIONS

## Powering On/Off the Thermometer

---

### **1** Power on the thermometer

- Ensure the battery is installed correctly or the thermometer is connected to power adaptor/PC correctly via micro USB cable .
  - Power on the thermometer by pressing  .
  - Notice all segments of the display flash once with a short beep.
- 

### **2** Power off the thermometer

- Power off the thermometer by pressing and holding  for more than 1.5 Seconds.
- Notice a long beep.

## Select Sensor Profile

This section is ONLY applicable to the users with more than one thermocouple probe or more than one RTD probe configured to the thermometer. The profile selection screen is not prompted for the users with one thermocouple probe and one RTD probe.

Note 1: User must select correct sensor profile to match sensor label, in order to set the correct configuration for accurate measurements.

Note 2: For users utilizing a thermometer connected to a thermocouple probe alongside a MULTI SENSOR ADAPTOR, it is essential to configure the sensor profile of the thermocouple probe before entering the adaptor mode.

⚠ Failure to choose the appropriate sensor profile can result in inaccurate temperature readings.

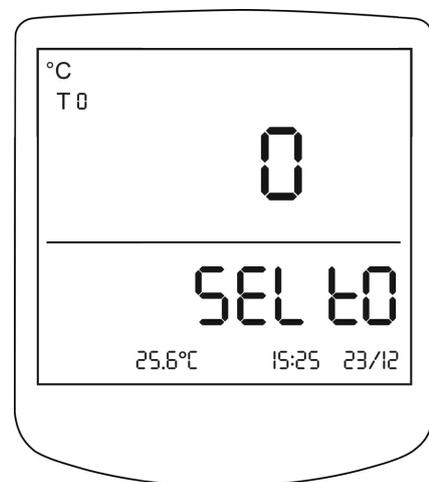
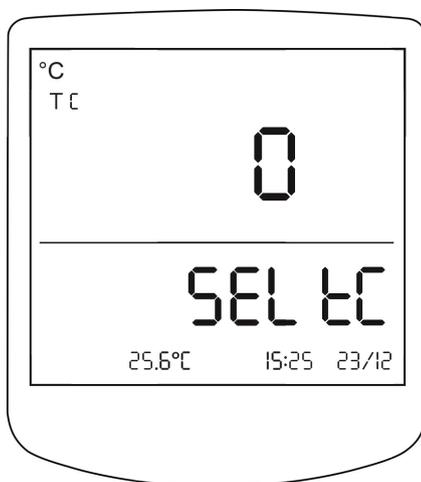
⚠ Notice the sensor probe identification number and secondary display area text to identify the correct sensor type, before setting sensor profile number.

---

### 1 Sensor profile selection screen

- This screen is automatically prompted on plugging a new sensor to TC slot or T0 slot.
- Notice last selected sensor profile number blinking in primary display area.

Note: User can also enter this screen by pressing pressing  and  simultaneously after ensuring that the relevant sensor probe is in primary display area.



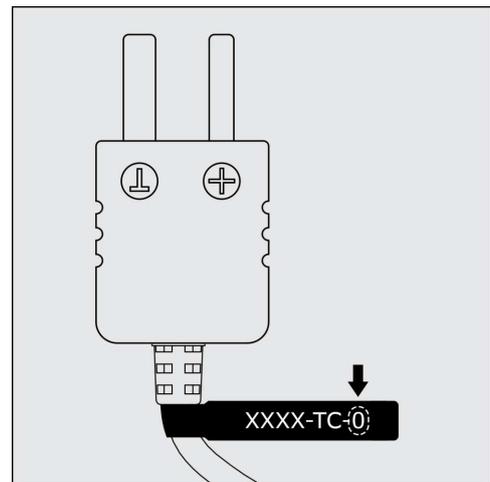
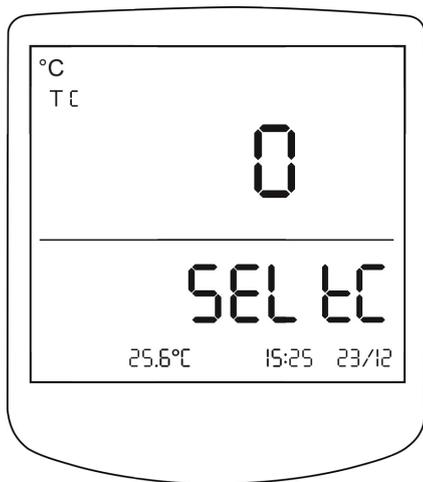
---

## 2 Select sensor profile

- Use  and  to select the correct sensor profile number for the plugged in sensor.

Note 1: Sensor profile number must match with sensor profile number on the sensor label.

Note 2: Only the calibrated profiles will be shown for selection.



---

## 3 Confirm selection

- Press  to confirm the sensor profile selection.

## Edit Date and Time

 During 'Date and Time' editing, all the other thermometer functions are disabled.

When a value is selected using  or  the value starts to blink and it can be changed by pressing  or .

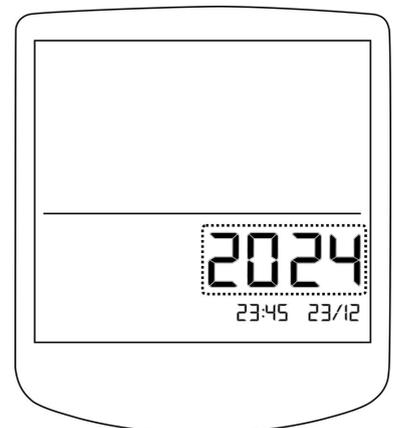
### 1 Enter edit screen

- Press  twice.



### 2 Edit year

- Use  and  to set the year.
- Press  to select hour.



---

### 3 Edit hour

- Use  and  to set the hour.
- Press  to select minute.



---

### 4 Edit minute

- Use  and  to set the minute.
- Press  to select date.



---

### 5 Edit date

- Use  and  to set the date.
- Press  to select month.



---

## 6 Edit month

- Use  and  to set the month.
- Press  to save the new date and time.



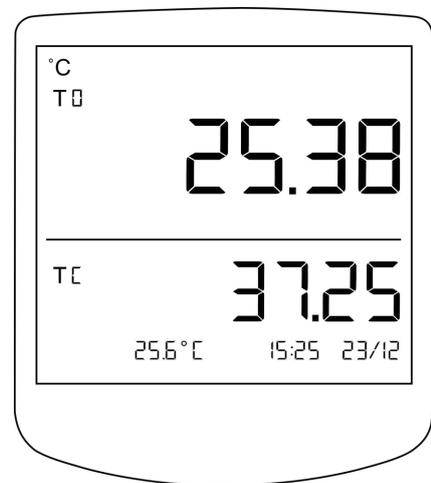
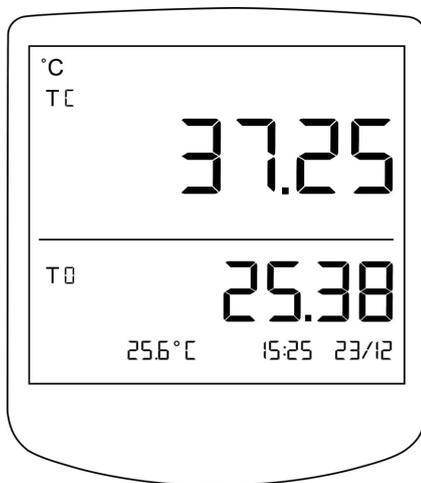
## Toggle Between Primary and Secondary Display Areas

User can toggle the sensor probes between the primary and secondary display areas when both sensor probes are connected.

---

### 1 Swap the two sensors

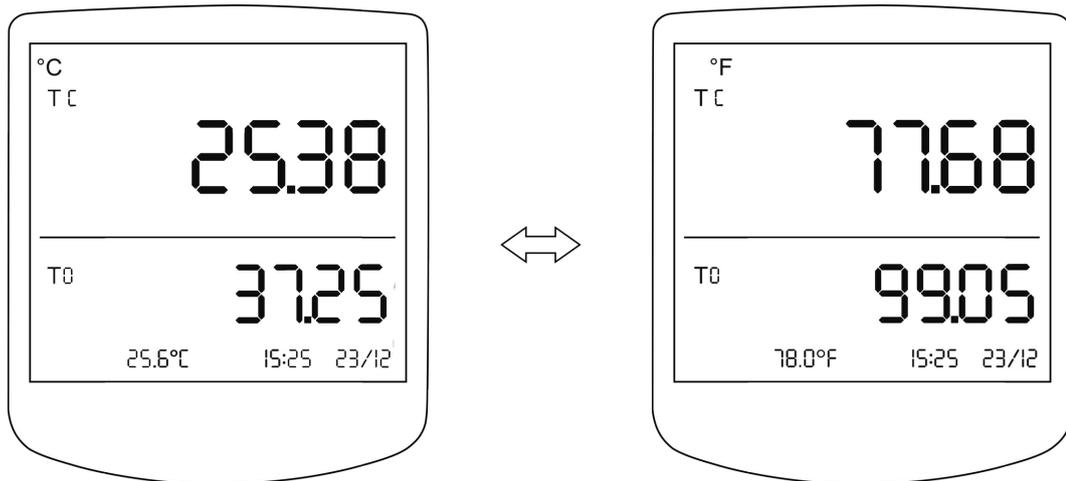
- Press  to swap between two sensors.
- Notice that sensor probe identification numbers change accordingly.



## Change Temperature Units

### 1 Toggle temperature units between °C and °F

- Press  to toggle the units between °C and °F.

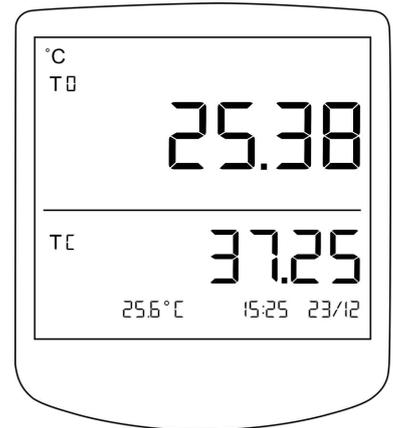


## View Minimum, Maximum and Average

-  Minimum, maximum and average values calculation for a sensor will start after 3 seconds from the point of powering on or attaching the sensor.

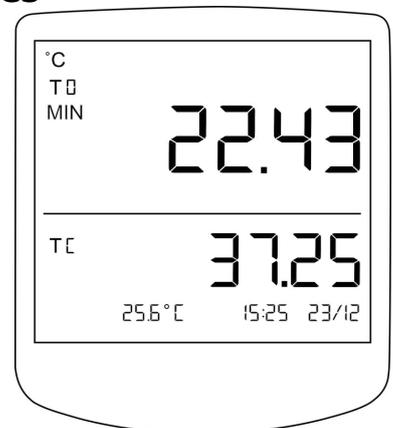
### 1 Select a sensor probe

- Using  ensure that the required sensor probe (TC/T0) for minimum, maximum and average calculation is displayed in the primary display area. (This is not required if only one sensor probe is connected to the thermometer).



### 2 View minimum, maximum and average values

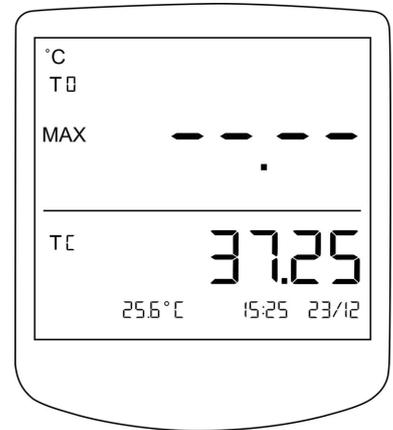
- Press  button to scroll through minimum, maximum and average values respectively.
- MIN, MAX or AVG symbols will be lit accordingly.
- Press  button again when viewing average values to return to viewing real time values.



## Clear Minimum, Maximum and Average

### 1 Clear the values

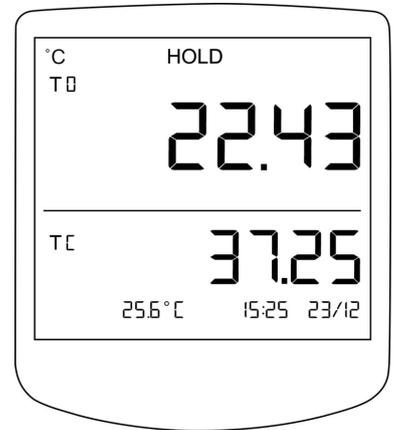
- Press  to clear stored minimum, maximum and average values for the primary channel.
- Once cleared, the thermometer starts to store these values again.



## Hold the Temperature Value on Primary Display Area

### 1 Hold sensor probe temperature

- Press  to hold the sensor probe temperature.
- Notice that **HOLD** is lit in the display.



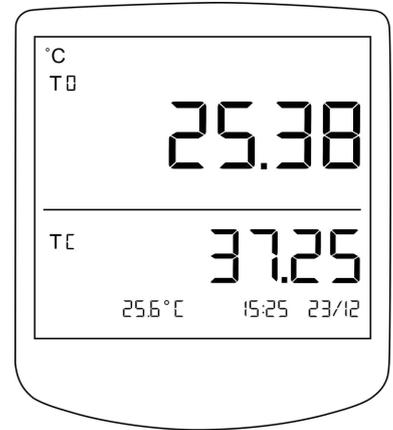
### 2 Unhold sensor probe temperature

- When the temperature is held, press  to unhold the temperature value.
- Notice that **HOLD** is unlit in the display.

## Edit Alarm Thresholds

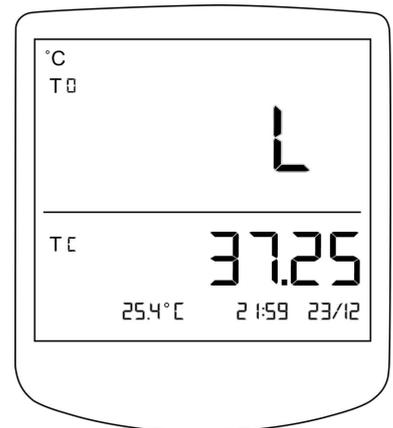
### 1 Select a sensor probe

- Using  ensure that the sensor probe required (TC/T0) for editing alarm thresholds is on the primary display area. (This is not required if only one sensor probe is connected to the thermometer).



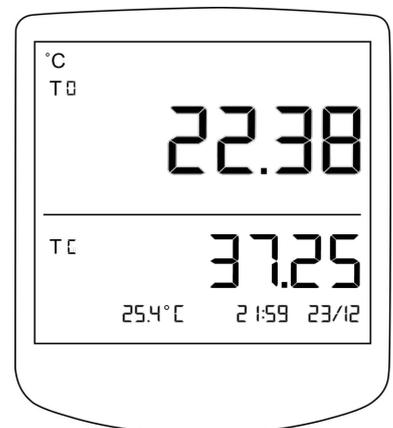
### 2 Enter to the alarm threshold edit screen

- Press .
- Lower threshold value is presented (notice **L** and value toggles).



### 3 Edit the lower threshold value

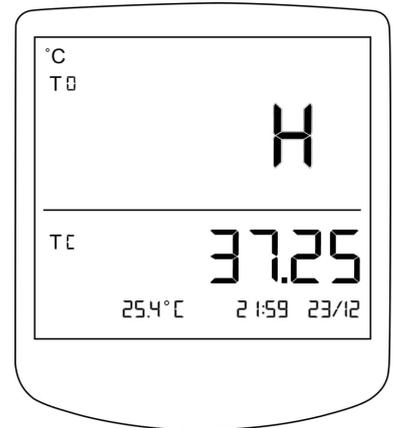
- Use  or  to increase or decrease the value.



---

## 4 Confirm low value and proceed

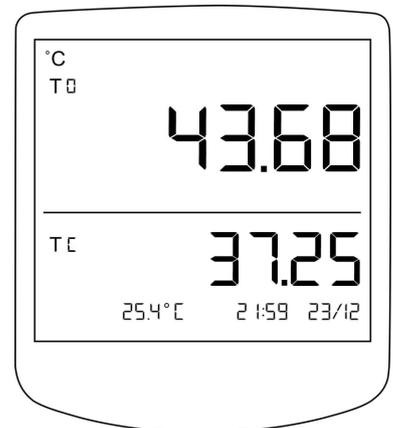
- Press **OK** to save the new lower threshold and enter editing higher threshold.
- Higher threshold value is presented (notice **H** and value toggles).



---

## 5 Edit the higher threshold value

- Use **SWAP** or **HOLD** to increase or decrease the value.



---

## 6 Confirm high value and proceed

- Press **OK** to save the new higher threshold.

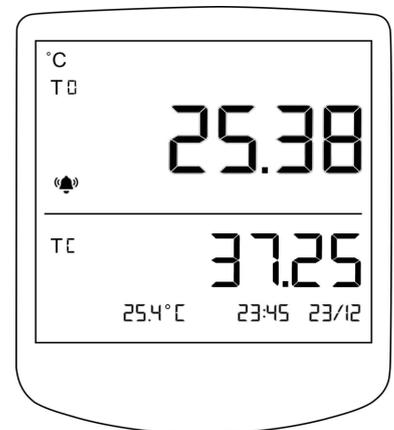
## Enable/Disable Alarm Threshold Monitoring

### 1 Select a sensor probe

- Using  ensure that the sensor probe required (TC/T0) for alarm monitoring is on the primary display area. (This is not required if only one sensor probe is connected to the thermometer.)

### 2 Enable alarm monitoring

- Press  to enable the alarm for sensor probe displayed in the primary display area.
- The  will be lit.



### 3 Disable alarm monitoring

- Using  ensure that the sensor probe required (TC/T0) for disabling alarm monitoring is on the primary display area. (This is not required if only one sensor probe is connected to the thermometer.)
- Press  to disable the alarm for the sensor probe displayed in the primary display area.

Note: To stop a ringing alarm, disable the alarm threshold monitoring for that sensor probe as mentioned above.

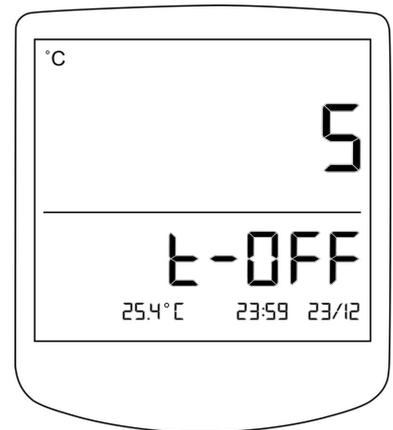
## Edit Auto Power Off Time

The thermometer provides an Auto power off feature where the thermometer shuts down after a period of inactivity defined by the user. The time out value is in minutes.

Setting the value to 0 will disable this feature.

### 1 Enter edit timeout screen

- Press  two times within 1.5 seconds.



### 2 Edit the value

- Use  or  to increase or decrease the value.

### 3 Accept the value

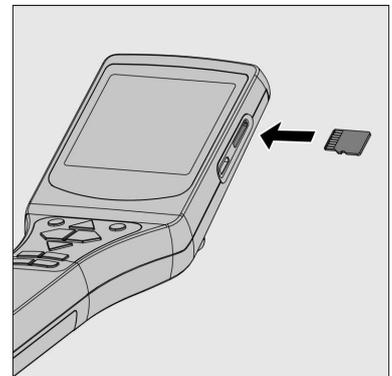
- Press  to accept the value.

## MicroSD Card Data Recording

- ⚠ Please ensure that the microSD card is FAT/FAT32 formatted before inserting into the thermometer.
- ⚠ Maximum storage capacity of microSD card that is compatible with the thermometer is 16GB.
- ⚠ Do not eject the microSD card when data recording is enabled.

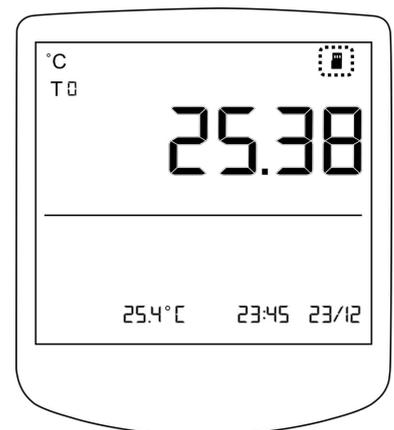
### 1 Insert the microSD card

- Insert the microSD card as demonstrated in the figure.
- Insert the microSD card into the slot and gently push down until it clicks into place.
- The  should be lit on the display upon successful insertion.



### 2 Start microSD card data recording

- Press  to start new recording.
- Blinking  indicates faultless microSD card data recording.



---

### **3 Stop microSD card data recording**

- Press  to stop data recording to the microSD card.
- The symbol  will stop blinking to indicate that data is not recorded.
- After disabling SD recording it is now safe to eject the microSD card.

# FEATURES AND FUNCTIONS

## Monitoring Threshold Alarms

A threshold monitoring feature is available in the thermometer that allows the user to monitor low & high threshold values of the connected sensor probes.

Threshold monitoring can be activated for both sensor probes independently. Threshold monitoring will be operational for an alarm enabled sensor probe, even when that sensor probe is in the secondary display area.

When the sensor probe temperature exceeds the threshold specified by the user, that is **lower than the lower threshold or higher than the higher threshold**, an audible alarm is activated while the  remains flashing in the relevant display area. Refer to section Edit Alarm Thresholds and Enable/Disable Alarm Threshold Monitoring

## Minimum, Maximum and Average

The thermometer can measure minimum, maximum, and average temperatures of the connected sensor probes and the thermometer starts storing minimum, maximum and average values of a sensor reading, 5 seconds after the sensor probe is connected.

User must follow the steps described under section View Minimum, Maximum and Average to view minimum, maximum and average values of the sensor probe.

To clear the data, user can do **one** of the followings,

- Power off the thermometer.
- Press  .
- Disconnect the sensor probes.

The temperature values for the sensor probes displayed in the secondary display area are monitored. User must swap the relevant sensor probe to the primary display area to view the minimum, maximum and average values.

## MicroSD Card Data Recording

The thermometer provides a feature to record data on a microSD card. The sensor probe temperatures, room temperature and alarm statuses of each sensor probe are stored along with a timestamp. The data is saved in a CSV format.

Figure below illustrates file and folder structure of data stored in microSD card.

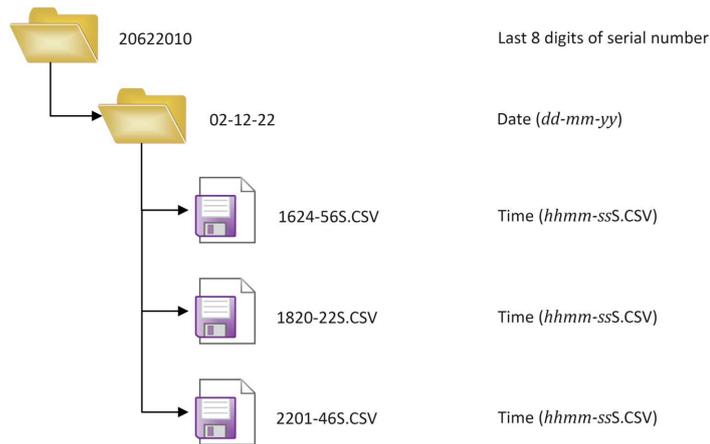


Figure: File and Folder Structure of microSD Card Data Recording

The data format is given below.

$hh : mm : ss, T_{thermocouple\_probe-n}, T_{rtd\_probe-n}, T_{room}, a_{thermocouple\_probe}, a_{rtd\_probe}$   
*Ex* : 14 : 22 : 58, 26.78, 26.57, 27.71, 0, 1

where,

- $hh$  - Hours
- $mm$  - Minutes
- $ss$  - Seconds
- $T_{thermocouple\_probe-n}$  - Temperature of the thermocouple probe (TC) assigned with sensor profile number n.
- $T_{rtd\_probe-n}$  - Temperature of the RTD probe (T0) assigned with sensor profile number n.
- $T_{room}$  - Room temperature.
- $a_{thermocouple\_probe}$  - Alarm status of the thermocouple probe (TC).
- $a_{rtd\_probe}$  - Alarm status of the RTD probe (T0).

Alarm status of a sensor can have values 0, 1 and 2.

Alarm status	Definition
0	Alarm disabled
1	Alarm enabled
2	Alarm ringing

Note 1: The sensor profile number for the thermocouple probe and RTD probe are appended on the file header as TC-n and RTD-n respectively where n is the profile number between 0 to 9.

Note 2: Temperature reading of a sensor probe that is not connected will be logged as 'NULL'.

Temperature values are recorded at 1 second intervals.  
For best performance, it is highly recommended to use a microSD card with good writing performance.

Note 3: The measured sensor probe readings are recorded in the MicroSD card regardless of the active function (Eg. HOLD, MIN, MAX, AVG).

## Visualize Data Using a PC

The thermometer provides a feature to transmit data to a PC. User can view the data using the provided 'METRUM 2 Data Visualizer' software.

Refer to the software user manual.

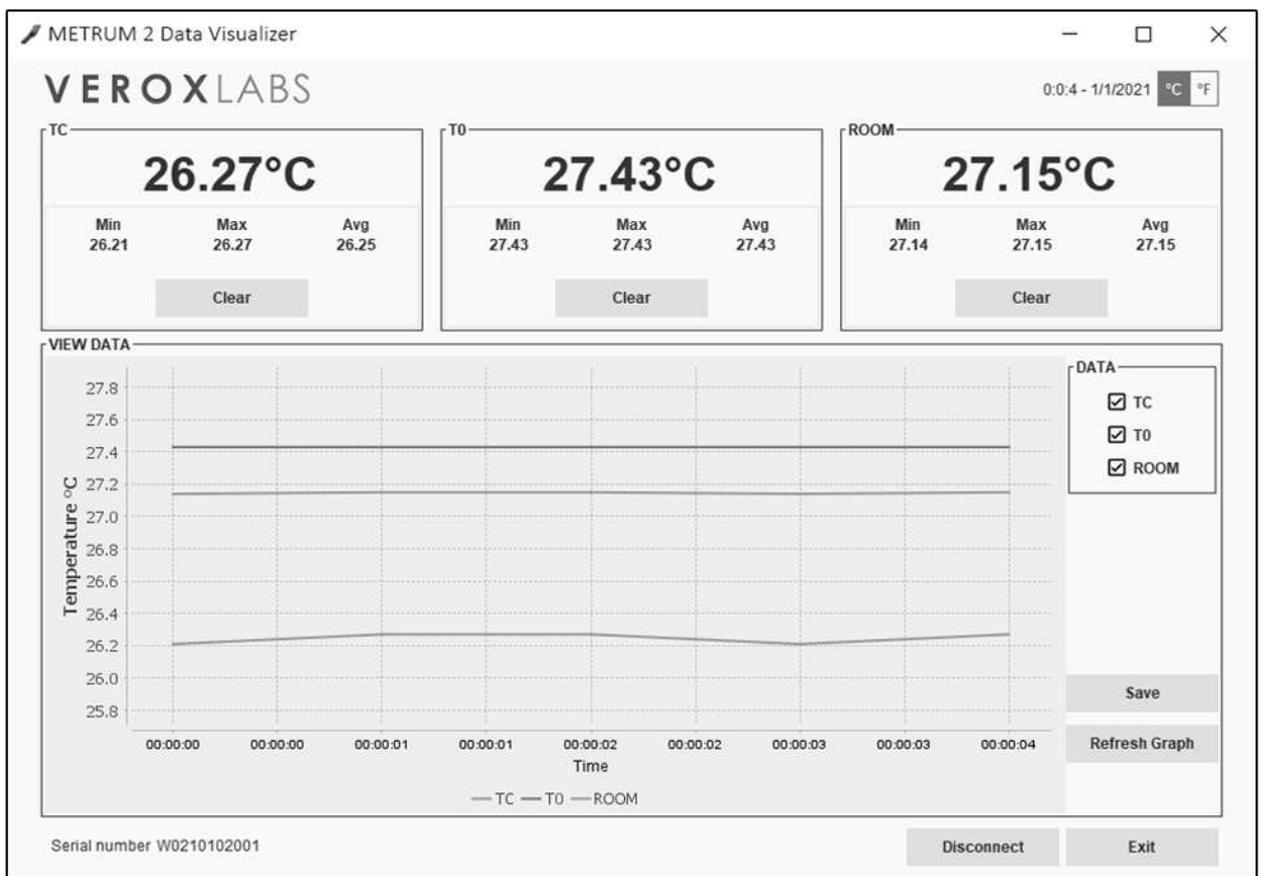


Figure: Screenshot of 'METRUM 2 Data Visualizer' Software

# MAINTENANCE

## Calibration

- ⚠ The calibration must be carried out by a trained personnel and in a certified calibration facility.
- ⚠ The information provided in this section is for the use of qualified personnel only.

METRUM2 dual channel digital thermometer is capable of storing calibration constants for each sensor probe. By using this feature, it is not required to manually add the calibration constants to the reading. It is recommended to calibrate the thermometer along with the sensor probes at least once a year.

To activate the inbuilt calibration correction feature, the following steps must be followed by the calibration technician. The calibration process of the thermometer consists of a three-point calibration. The recommended calibration points can be referred from the original calibration certificate issued for a sensor probe by Veroxlabs.

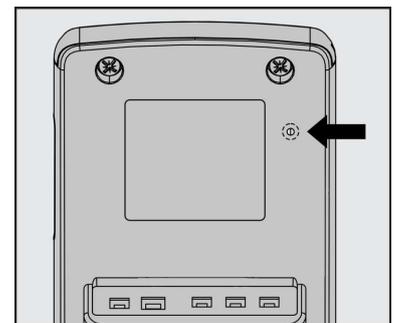
Once the calibration process is started, the sensor probe must be placed in stable temperature mediums (dry block, oil bath, iso-thermal liquid bath etc.) starting from the lowest temperature to the highest temperature.

### 1 Prepare the thermometer

- Plug only the sensor probe that is to be calibrated.
- Press  to power on the thermometer.
- Press OK at the sensor profile selection screen **if prompted**.
- Temperature readings from the connected sensor probe will be displayed.

### 2 Start calibration routine

- Press the calibration button that is located on the rear of the thermometer using a plastic needle. (Refer to Product Description)

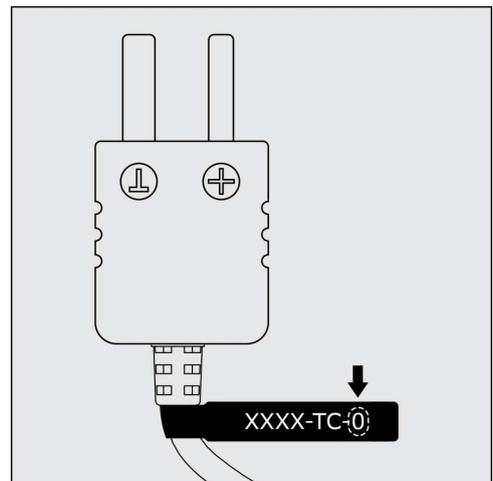
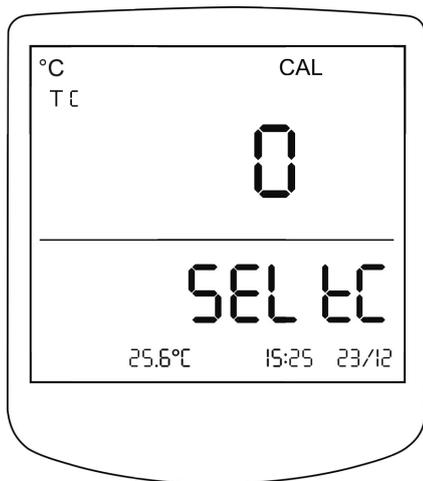


- ⚠ Do not use sharp items to press the button. It may cause permanent damage to the thermometer.

---

### 3 Selecting Calibration Profile

- Display shows sensor profile selection screen for the plugged in sensor type with last saved profile number blinking on primary display area.
- Note that CAL is lit.
- Use  and  to select the correct sensor profile number to match the last digit on sensor probe label.
- Press  to set the sensor profile number.

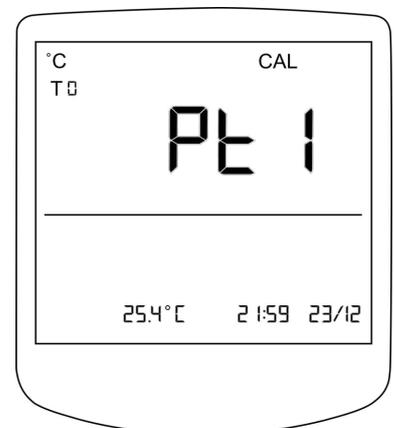


 Selecting an incorrect sensor profile number will permanently erase the calibration data associated with the sensor profile you have selected.

---

### 4 First data point

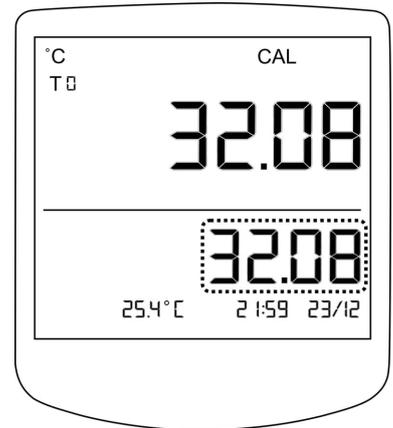
- Display shows 'Pt1' indicating that this is the first data point along with the beep.
- Note that CAL is lit.
- Place the sensor probe in a 32°C medium (oil bath, iso-thermal liquid bath etc.).
- Press  to set the first data point.



---

## 5 Set the first data point

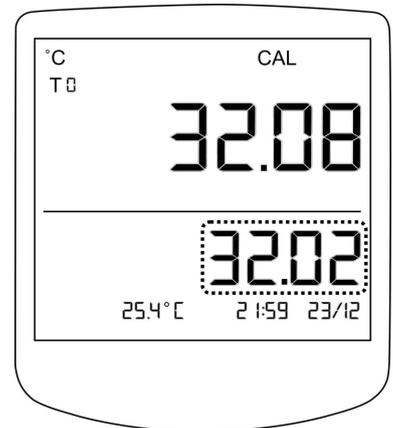
- Primary display area shows the sensor probe reading.
- Secondary display area keeps blinking the reference temperature that is to be set to the actual temperature of the medium.
- Let the thermometer to stabilize at this temperature.



---

## 6 Enter the temperature of the medium

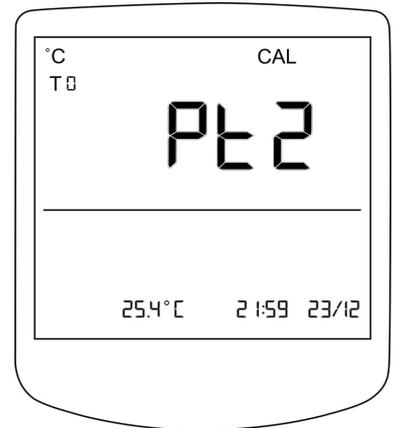
- Adjust the value in the secondary display area to be equal to the actual temperature of the medium using  and .
- Press  to confirm the value and save it.
- Primary display area shows 'LOAD' for 5 seconds.
- Thermometer enters the next data point.



---

## 7 Second data point

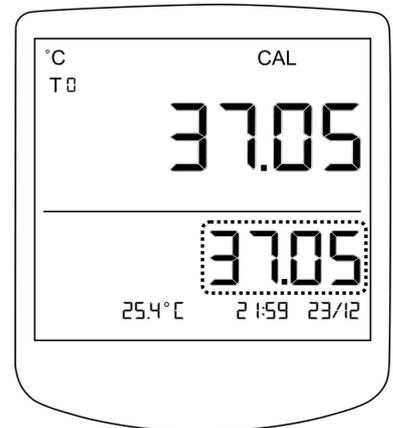
- The thermometer shows 'Pt2' indicating that next one is the second data point.
- Place the sensor probe in a 37°C medium (oil bath, iso-thermal liquid bath etc.).
- Press  to set the second data point.



---

## 8 Set the second data point

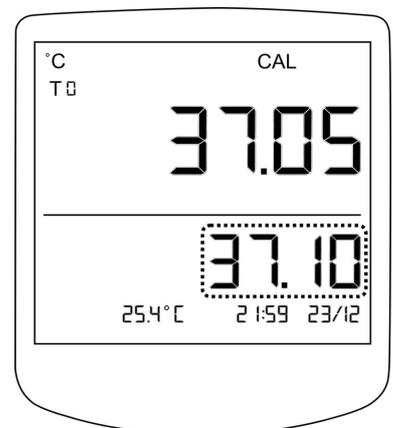
- Notice the blinking reference temperature value in secondary display area.
- Let the thermometer to stabilize at this temperature.



---

## 9 Enter the temperature of the medium

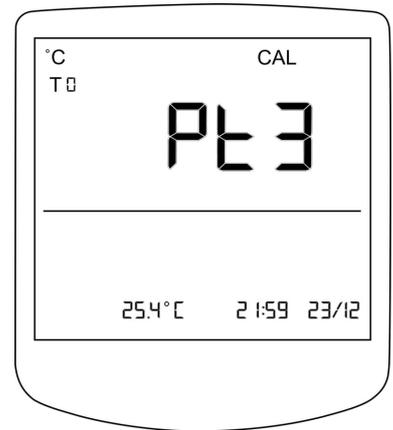
- Adjust the value in the secondary area to be equal to the actual temperature measured in the medium using  and .
- Press  to confirm the value and save it.
- Primary display area shows 'LOAD' for 5 seconds.
- Thermometer enters the next data point.



---

## 10 Third data point

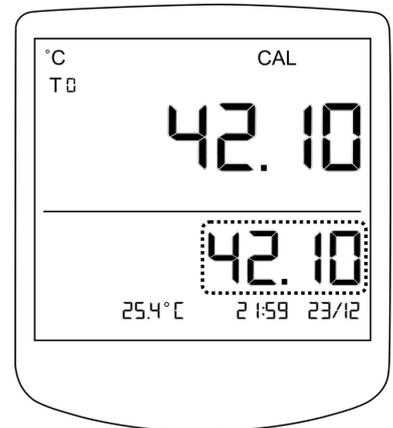
- The thermometer shows 'Pt3' indicating that next one is the third data point.
- Place the sensor probe in a 42°C medium (oil bath, iso-thermal liquid bath etc.).
- Press  to set the third data point.



---

## 11 Set the third data point

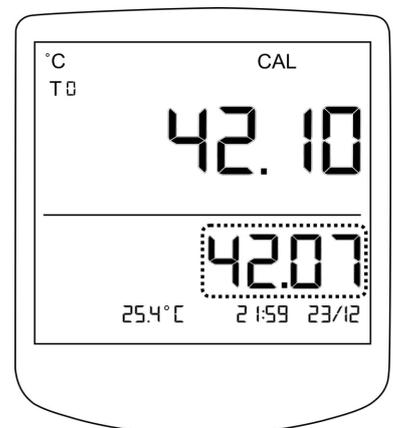
- Notice the blinking reference temperature value in secondary display area.
- Let the thermometer to stabilize at this temperature.



---

## 12 Enter the temperature of the medium

- Adjust the value in the secondary area to be equal to the actual temperature measured in the medium using  and .
- Press  to confirm the value and save it.
- Primary display area shows 'LOAD' for 5 seconds.
- Thermometer exits the calibration routine.



# TROUBLESHOOTING

Condition	Reasons	Solution
Flashes E01 on primary display area with a beep and restarting.	Internal hardware error.	Remove the battery and unplug the micro USB cable. Power the thermometer again by inserting the battery or plugging the micro USB cable. If the error continues, contact technical support.
Display E02 on primary display area with a beep.	Internal memory error.	<u>Reset the thermometer</u> by pressing  and  simultaneously*. If the error continues, contact technical support.
Display E03 on primary display area with a short beep.	Calibration failure.	Re-calibrate the respective temperature probe according to the correct sequence mentioned under Calibration.
Abnormal readings.	Damages in sensor probe. Improperly connected sensor probe	Ensure that sensor probe is connected properly as instructed in the manual. If the error continues, contact technical support.
Blank display with 4 beeps at the thermometer startup.	Internal hardware error.	Restart the thermometer. If the error continues contact technical support.



\* *Thermometer Reset will clear all the programmed values to default including calibration factors. It is required to perform a calibration after resetting the thermometer.*

<b>Condition</b>	<b>Reasons</b>	<b>Solution</b>
MicroSD card data recording failed.	Wrong format of the microSD card. MicroSD card memory full.	Format microSD card in FAT/FAT32 format.
Date time values keep resetting.	Internal hardware failure.	Contact technical support.
Thermometer keeps restarting with flashing display.	Thermometer battery dead.	Replace the battery. If the error continues, contact technical support.
Thermometer keeps restarting with flashing display.	Micro USB cable connection failure.	Check the cable connection. Use a recommended micro USB cable to power the thermometer.
Battery low symbol appears while the thermometer is powered with micro USB cable.	Usage of an improper micro USB cable/power adaptor.	Use a recommended micro USB cable with the power adapter provided. If the issue continues, contact technical support.

# CLEANING INSTRUCTIONS

Wipe the probes using either distilled water or an alcohol solution, and then wipe the probe with a lint-free soft cloth.

-  Always handle the sensor probes with care during cleaning, Excessive force may result in damage to the probes.

Specific cleaning guidelines are given for particular probes.

## Sterilization of Needle Sensor Probe

### Cleaning Before Sterilization

Wipe with alcohol or cleaning solution.

**Autoclaving** Sterilize at,

- 134°C for 3 minutes at 2.2 bar
- 121°C for 15 minutes
- 115°C for 30 minutes

### Sterilizing

It is recommended to follow the below sterilization procedure.

Preconditioning	4 Hours at 38°C +11/-5°and a minimum of 50% relative humidity
Pre-Vacuum	A minimum of 10 to 12 inches of mercury
Vacuum Dwell	N/A hour
Conditioning	A minimum of 30% relative humidity
Sterilant concentration	12% Ethylene Oxide and 88% Freon – 12 at 500 to 600 milligrams per liter E.O.
Pressure	10 +/- 2 P.S.I.
Temperature	49 +/- 3°C
Exposure	6 hours
Post-Vacuum	A minimum of 10 to 12 inches of mercury
Air-Wash	1

# MULTI SENSOR ADAPTOR

## Safety Instructions

The consequences that could result from failure to observe the precautions listed in this section are indicated by the warning symbol. To prevent possible injury, read all warnings before using this VeroxLabs product.

Note : Thermometer SAFETY INSTRUCTIONS should always be adhered when using the Multi Sensor Adaptor.

-  Use a recommended micro USB cable to power the Multi Sensor Adaptor.
-  Always cross check the sensor label with the sensor channel map on Multi Sensor Adaptor before plugging.
-  Use only the provided power adaptor when powering the Multi Sensor Adaptor.
-  Do not interchange the sensor probes. This may cause invalid/inaccurate readings.
-  Do not plug other devices except the thermometer to the USB port of Multi Sensor Adaptor. This can cause permanent hardware damages.
-  Do not plug surface sensor probe to the thermometer T0 slot while using the Multi Sensor Adaptor. Its functionality is disabled in the Adaptor Mode.

## Technical Data



If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

### Multi Sensor Adaptor Specifications

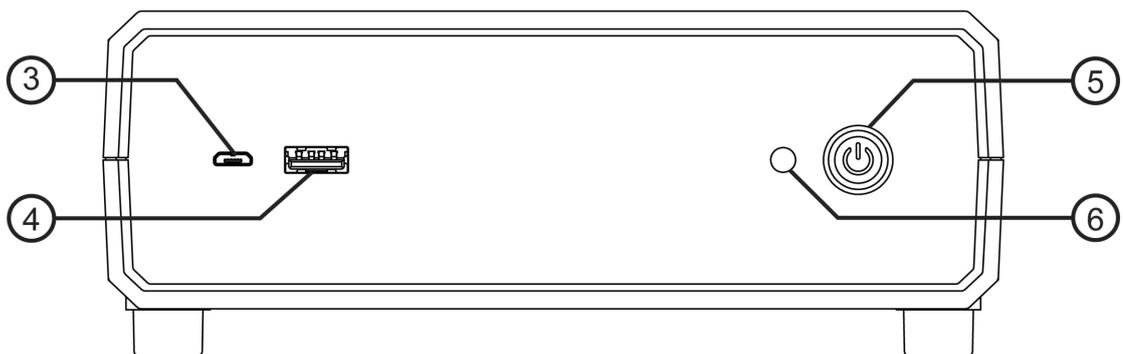
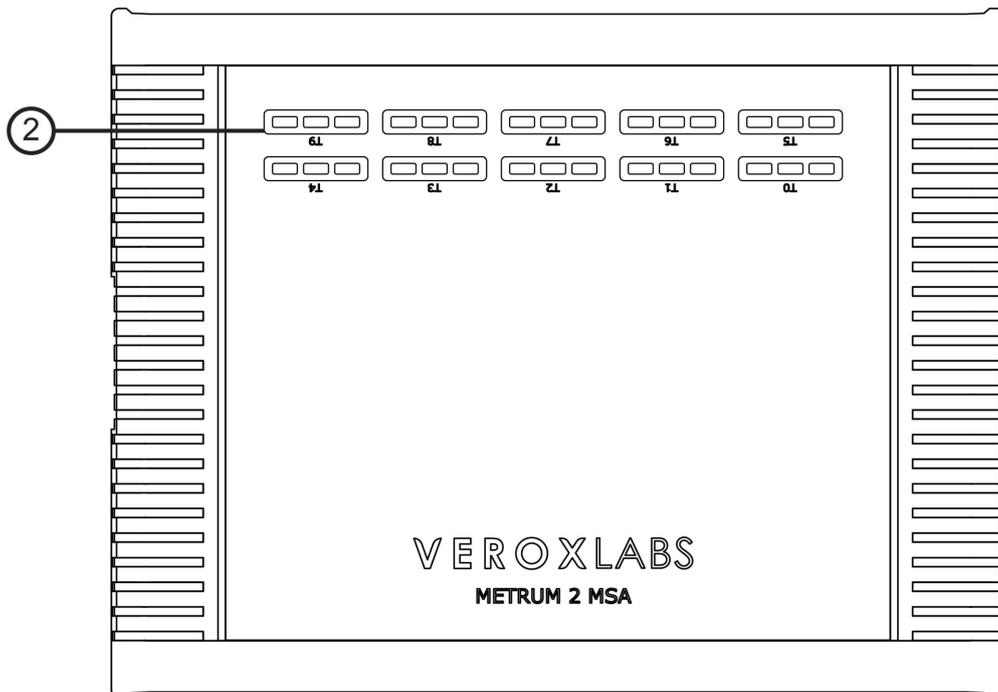
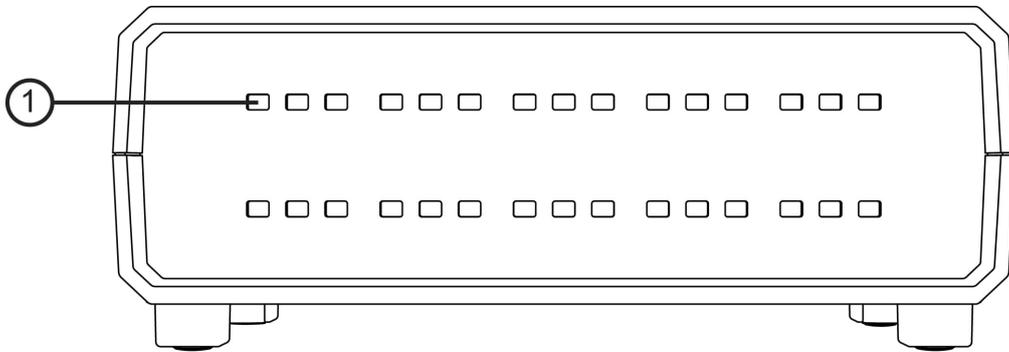
Parameter	Description
Power supply	Micro USB (PC/power adaptor)
Environment temperature	5°C to 40°C
Connectivity	Micro USB
Dimension (WxDxH)	180 mm x 140 mm x 71 mm
Net weight	565g

### Surface Probe Specifications

Parameter	Description
Sensor type	3 wire RTD
Dimensions	Sensor disk $\varnothing = 35\text{mm}$ Disk height = 8.5mm Cable length = 1000mm Cable thickness = 0.8mm
Measuring range	-50°C to +200°C
Accuracy	$\pm 0.03^\circ\text{C}$ in the physiological range
Response time	< 50s

## Product Description

Note : Multi Sensor Adaptor will be referred as **MSA** from this point onward in this document.



### ① Connector slot

Surface probe connector slots.

### ② Sensor channel map

Sensor channel map for 10 surface sensor probes of the MSA.

### ③ Micro USB port

Micro USB port to power and communicate with a PC.

### ④ USB port

USB port to connect the thermometer.

### ⑤ Power button

Power button of the MSA. This button illuminates in amber color after the MSA is switched on.

### ⑥ Status LED

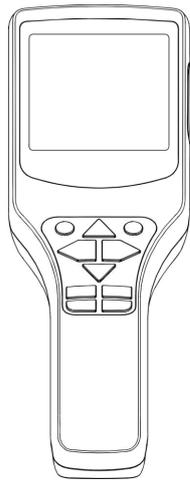
This LED shows the status of the Multi Sensor Adaptor.

- Blink once in RED : MSA starting.
- Blink in RED (1s interval) : MSA error.
- Blink in BLUE (1s interval) : USB port connected and ready to work with the thermometer.
- Blink in GREEN (5s interval) : MSA in operation with the thermometer.

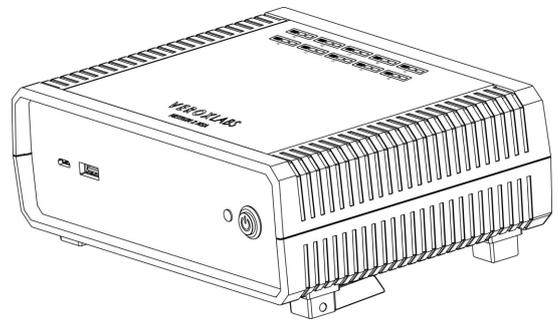
## Get Started

### Package Content

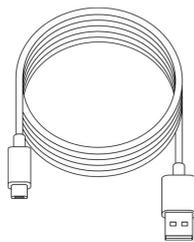
Note : Thermometer package content is also included below. The content may vary depending on the purchased configuration.



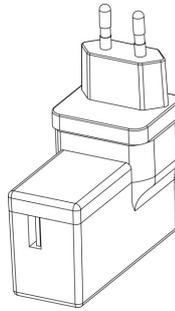
Dual Channel Digital Thermometer



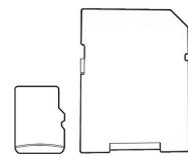
Multi Sensor Adaptor (MSA)



Micro USB Cable x 2



Power Adaptor

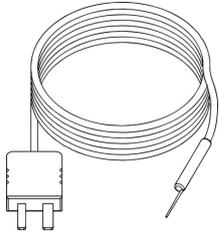


MicroSD Card and Adaptor

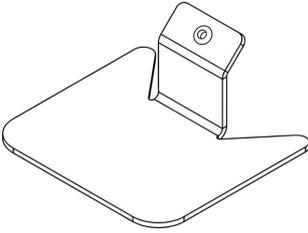
Note: Calibration certificates, calibration stickers and Quick Start Guides are included in the package.

**Package Content - Sensors & Accessories**

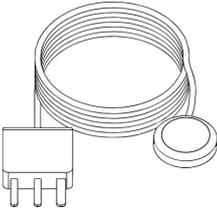
Note: Sensors may vary according to the purchased configuration.



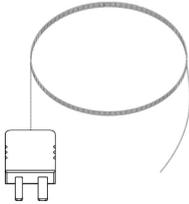
Needle Probe



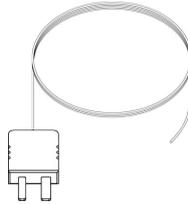
Needle Probe Holder



Surface Probe



Ultra-Fine Flexible Probe



Thin Flexible Probe

## Connecting the MSA to Power Adaptor/PC

The MSA is powered by connecting its micro USB port to the power adaptor or PC via the micro USB cable. Follow the steps below to connect the MSA to the power adaptor/PC.



Use only the provided power adaptor when powering the MSA.

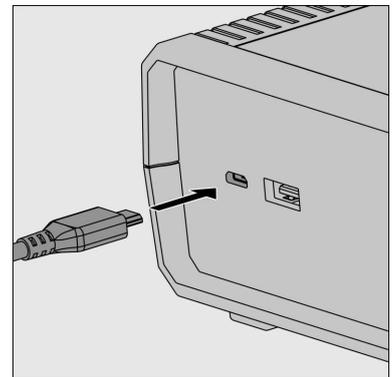


Do not connect the MSA to the power adaptor/PC under lightning conditions.

---

### 1 Connect micro USB cable

- Connect the micro USB cable as demonstrated in the figure.
- Ensure that the correct orientation is maintained.
- Connect the other end of the cable to the power adaptor/PC.



## Connecting Sensor Probes

Always use the calibrated probes that are supplied with the MSA.

- ⚠ Read the safety instructions mentioned under "Safety Instructions" before inserting the sensor probes into the MSA.
- ⚠ T0 slot on the thermometer will be disabled while using the MSA.
- ⚠ TC slot on the thermometer will continue to be enabled while using the MSA.

---

### 1 Align the surface probe

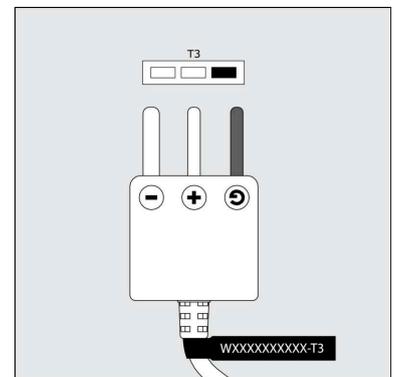
- Match the sensor probe label to the correct connector slot of the MSA.

*Note: T0 probe will have 2 labels, one with the thermometer serial number and the other with the MSA serial number.*

- Align the terminal 'G' of the surface probe correctly with the sensor channel map on the MSA as demonstrated in the figure.

*Note: T3 probe alignment is demonstrated in the figure.*

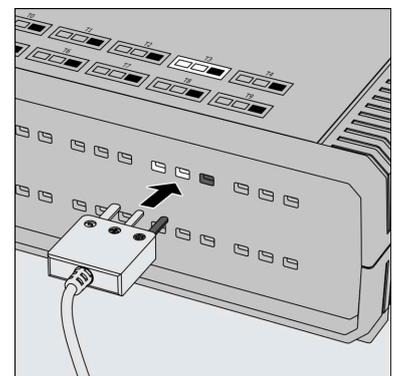
- Note that one terminal is larger than the other two.



---

### 2 Connect surface probe

- Gently insert the terminals of surface probe to the respective connector slot in correct alignment.



## Taking a Measurement

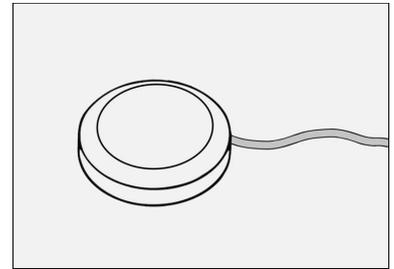
-  The sensor probes must not come into direct contact with any live samples being treated in a clinical setting, nor with media that is in direct contact with such live samples.

### Surface Measurement

The surface sensor probes are designed to measure surfaces. Temperature sensitive face is 35 mm in diameter and this face must be placed in contact with the measuring surface.

#### **1** Place the sensor probes

- Place the sensor probes on the surfaces to be measured.



#### **2** Connect sensor probes to the MSA

- Connect the sensor probe connectors to the MSA.

## Operating Instructions

### Powering On/Off the MSA

---

#### **1** Power on the MSA

- Ensure the MSA is connected to power adaptor/PC correctly via micro USB cable .
- Power on the MSA by pressing the Power Button.
- Notice that power button illuminates in amber color and status LED blink once in red color.

#### **2** Power off the MSA

- Power off the MSA by pressing the Power Button.
- Notice that power button illumination turns off.

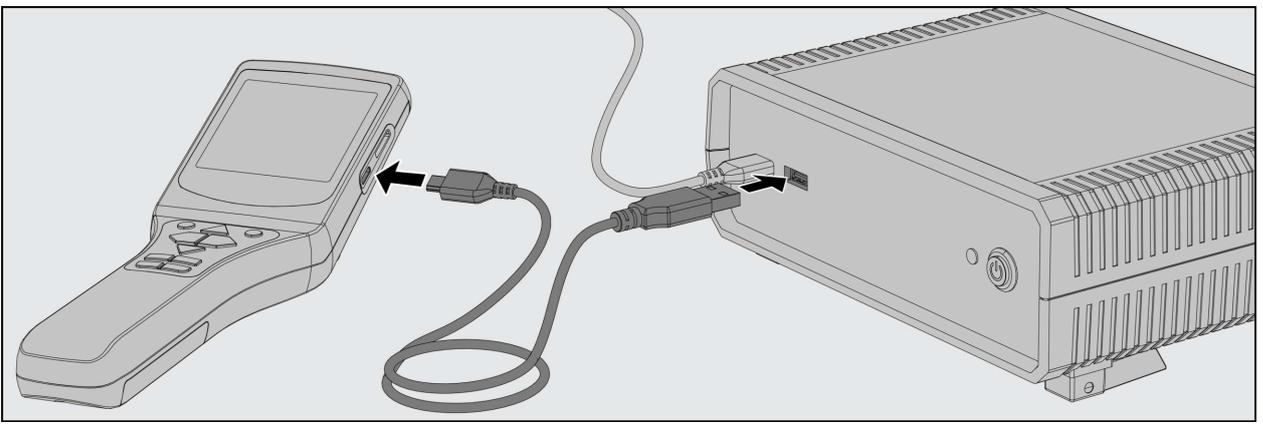
## Enter the Adaptor Mode

MSA must be connected to the thermometer and the thermometer must enter to the Adaptor Mode before taking measurements through the MSA.

### 1 Connect the MSA to the thermometer

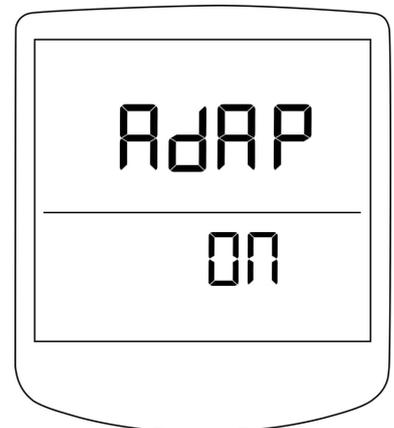
- Connect the MSA to the thermometer using the second micro USB cable.
- Power on the MSA.

Note: In this configuration, the thermometer will be powered via the MSA. A battery is not required for the thermometer.



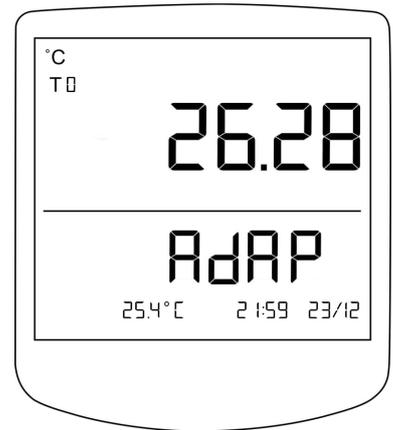
### 2 Initializing the Adaptor Mode

- Power on the thermometer.
- Notice the thermometer initiating the "Adaptor Mode" after 3 short buzzer beeps.
- Notice the text "AdAP" appear on the primary display area of the thermometer. The text "on" will appear blinking on the secondary display area.
- Notice the status LED of the MSA blinking in blue color once every second.



### 3 Switching to the Adaptor Mode

- Press **OK** to enter the "Adaptor Mode".
- Notice the temperature reading of the connected probe with the smallest probe number displayed on primary display area.
- Notice the channel number of the respective probe displayed on the top left corner of the primary display area.
- Notice the status LED of the MSA blinking in green color once every 5 seconds.



Note: The text "AdAP" will always appear on the secondary display area when the thermometer is in the "Adaptor Mode".

## Exit the Adaptor Mode

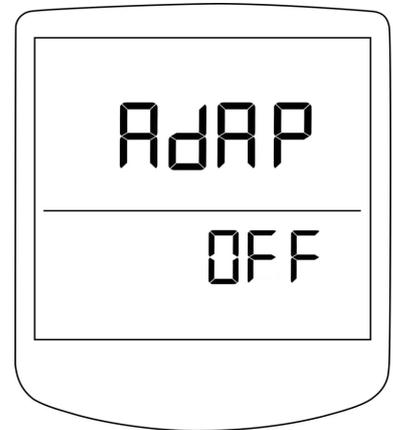
---

### 1 Disconnect the MSA from the thermometer

- The MSA can be disconnected from the thermometer by **any** of the following actions.
  - Unplugging micro USB cable connecting the thermometer and the MSA.
  - Powering off the MSA.

### 2 Enter the Standard Mode

- Notice text "AdAP" appear on the primary display area of the thermometer while the text "off" will appear blinking on the secondary display area with a continuous buzzer beep.
- Press  to enter back to the "Standard Mode" by Exiting from the "Adaptor Mode".



Note: Thermometer will completely turn off without displaying "AdAP off" screen if a battery with sufficient charge is not present in the thermometer.

## Scroll Between Sensors

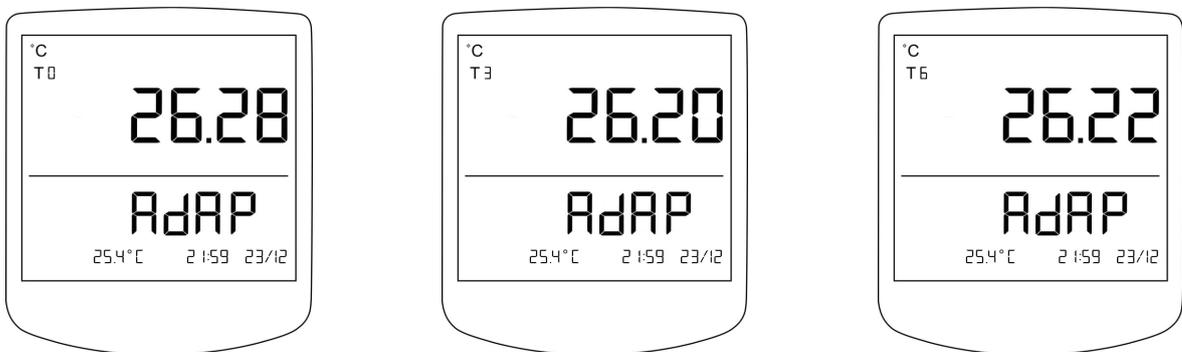
User can scroll through the surface probes plugged into the MSA and the thermocouple probe plugged into the thermometer.

---

### 1 Scroll between sensors

- Press  to scroll to the temperature reading of the next sensor that is plugged in.
- Notice that sensor probe identification numbers change accordingly.

The example below shows the transitions that take place when the  is pressed while surface probes are connected to T0, T3 and T6 slots.



Note:

1. The sensor identification names on the thermometer displayed during all the operations under the Adaptor Mode, corresponds to the sensor channel map marked on the MSA.
2. Operating instructions for the Adaptor Mode are similar to that of the Standard Mode as mentioned under OPERATING INSTRUCTIONS unless specified otherwise in this chapter.

## Features and Functions

### Monitoring Threshold Alarms

A threshold monitoring feature is available in the Adaptor Mode of the thermometer that allows the user to monitor low & high threshold values of all connected sensor probes.

Threshold monitoring can be activated for thermocouple probe of the thermometer and surface probes of the MSA independently. Threshold monitoring will be operational for an alarm enabled sensor probe, even when that sensor probe is not in the primary display area.

When the sensor probe temperature exceeds the threshold specified by the user, that is **lower than the lower threshold or higher than the higher threshold**, an audible alarm is activated and alarming sensor probe reading will be displayed immediately in primary display area with flashing  and audible alarm. **When alarm is ringing in one or more sensor probes, scrolling is only possible between alarming sensor probes.** In order to enable scrolling through all connected sensor probes and to disable the audible alarm, user must disable alarm monitoring in all the alarming sensor probes. Refer to section Edit Alarm Thresholds and Enable/Disable Alarm Threshold Monitoring

### Minimum, Maximum and Average

The thermometer can measure minimum, maximum, and average temperatures of the thermocouple probe of the thermometer and surface probes of the MSA. Thermometer starts storing minimum, maximum and average values of a sensor reading, 5 seconds after the sensor probe is connected.

The temperature values for the sensor probes that are not in the primary display area are monitored in the background. User must bring the relevant sensor probe to the primary display area to view the minimum, maximum and average values. Refer to section View Minimum, Maximum and Average.

To clear the data in the Adaptor Mode, user can do **one** of the followings,

- Power off the thermometer.
- Power off or disconnect the MSA.
- Press  .
- Disconnect the sensor probes.

### MicroSD Card Data Recording

The thermometer provides a feature to record data on a microSD card including the readings from the MSA when the thermometer is in the Adaptor Mode. The thermocouple probe temperatures of the thermometer, surface probe temperatures of the MSA, room temperature and alarm statuses of each sensor probe are stored along with a timestamp. The data is saved in a CSV format.

Figure below illustrates file and folder structure of data stored in microSD card, when the thermometer is in the Adaptor Mode.

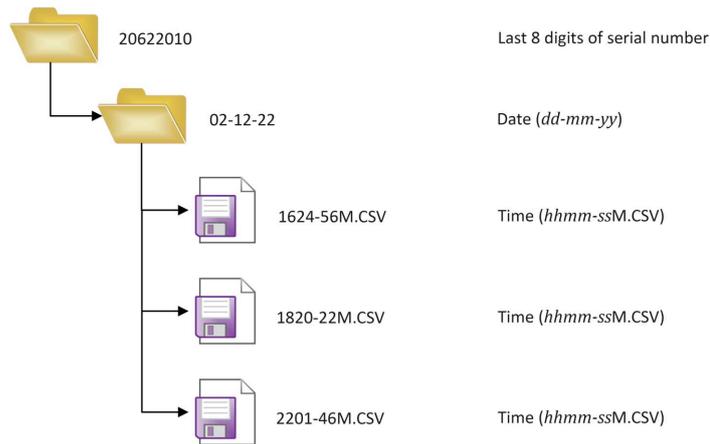


Figure: File and Folder Structure of microSD Card Data Recording in the Adaptor Mode

The data format is given below.

$hh : mm : ss, T_{thermocouple\_probe-n}, T_{t0\_probe}, \dots, T_{t9\_probe}, T_{room}, a_{thermocouple\_probe}, a_{t0\_probe}, \dots, a_{t9\_probe}$

Ex : 14 : 22 : 58, 26.78, 26.47, 27.98, 29.67, 26.52, 28.43, 27.82, 35.74, 27.01, 26.69, 25.14, 27.71, 0, 1, 0, 0, 1, 1, 1, 2, 0, 0, 0

where,

- $hh$  - Hours
- $mm$  - Minutes
- $ss$  - Seconds
- $T_{thermocouple\_probe-n}$  - Temperature of the thermocouple probe (TC) assigned with sensor profile number n.
- $T_{t0\_probe}$  - Temperature of the T0 surface probe of the MSA (T0).
- .
- .
- .
- $T_{t9\_probe}$  - Temperature of the T9 surface probe of the MSA (T9).
- $T_{room}$  - Room temperature.
- $a_{needle\_probe}$  - Alarm status of the thermocouple probe (TC).
- $a_{t0\_probe}$  - Alarm status of the T0 surface probe of the MSA (T0).
- .
- .
- .
- $a_{t9\_probe}$  - Alarm status of the T9 surface probe of the MSA (T9).

Alarm status of a sensor can have values 0, 1 and 2.

Alarm status	Definition
0	Alarm disabled
1	Alarm enabled
2	Alarm ringing

Note 1: The sensor profile number for the thermocouple probe is appended on the file header as TC-n where n is the profile number between 0 to 9.

Note 2: Temperature reading of a sensor probe that is not connected will be logged as 'NULL'.

Temperature values are recorded at 1 second intervals.

For best performance, it is highly recommended to use a microSD card with good writing performance.

Note 3: The measured sensor probe readings are recorded in the MicroSD card regardless of the active function (Eg. HOLD, MIN, MAX, AVG).

### Visualize Data Using a PC

The thermometer provides a feature to transmit data to PC including the temperature readings from the MSA, when the thermometer is in the Adaptor Mode. User can view the data using the provided 'METRUM 2 Data Visualizer' software.

Refer to the software user manual.

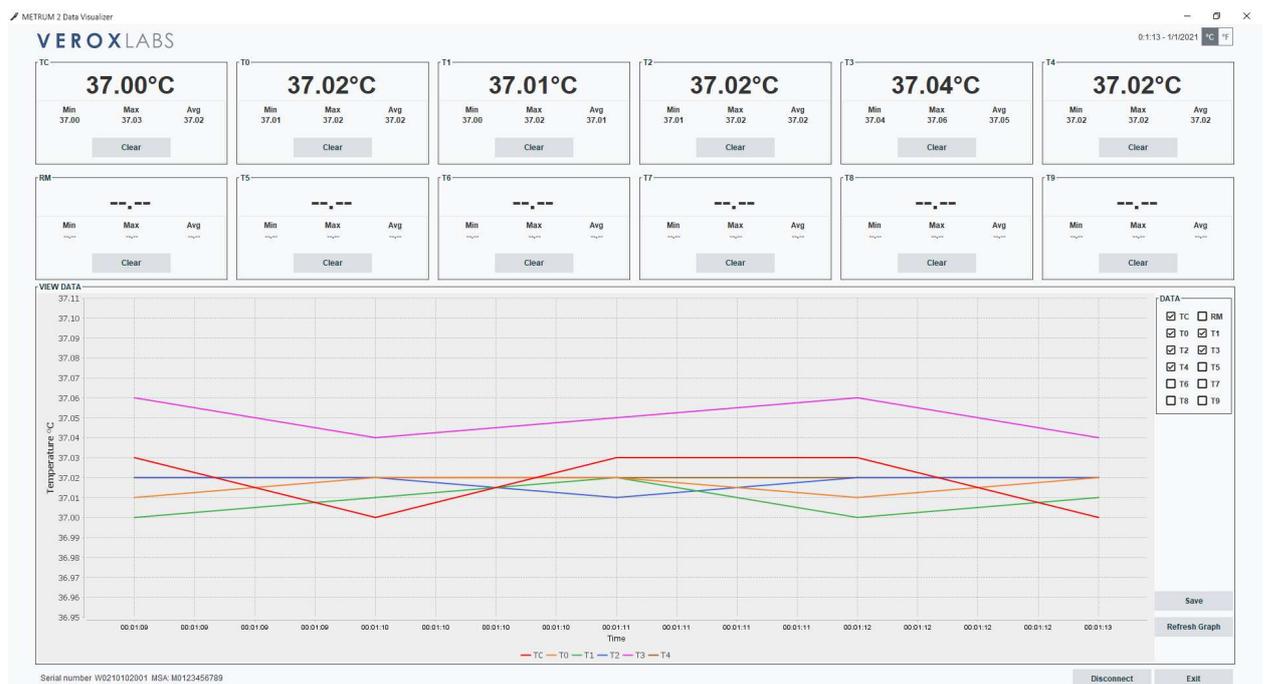


Figure: Screenshot of 'METRUM 2 Data Visualizer' Software in the Adaptor Mode

## Maintenance

### Multi-Calibration

-  The calibration must be carried out by a trained personnel and in a certified calibration facility.
-  The information provided in this section is for the use of qualified personnel only.
-  Only plug the surface probes that need to be calibrated. All the sensors that are plugged to the MSA will be calibrated in multi-calibration.
-  In multi-calibration, all 10 sensor probes of the MSA can be calibrated at once. But, the number of sensor probes that can be calibrated in a single calibration routine is limited by the capacity of the medium container (oil bath, iso-thermal liquid bath etc.).
-  Do not plug or unplug any sensor once the multi-calibration has started. This can terminate the multi-calibration process.
-  Only the temperature probes of the MSA can be calibrated in multi-calibration.

METRUM2 Multi Sensor Adaptor is capable of storing calibration constants for each sensor probe. By using this feature, it is not required to manually add the calibration constants to the reading. It is recommended to calibrate the MSA along with the sensor probes at least once a year.

To activate the inbuilt multi-calibration correction feature, the following steps must be followed by the calibration technician. The calibration process of the MSA consists of a three-point calibration. The recommended calibration points are 32°C, 37°C and 40°C. Once the calibration process is started, the sensor probe must be placed in stable temperature mediums (oil bath, iso-thermal liquid bath etc.) starting from the lowest temperature to the highest temperature.

---

### **1** Prepare the MSA

- Unplug all the sensors from the MSA.
- Plug only the surface probes that need to be calibrated.
- Connect the MSA to power adaptor/PC via micro USB cable.
- Press the power button to turn on the MSA.

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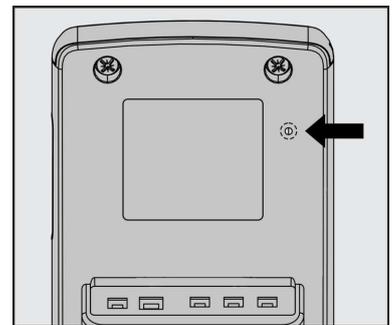
## 2 Prepare the thermometer

- Unplug all the sensors from the thermometer.
- Connect the thermometer to the MSA using the micro USB cable.
- Press  to power on the thermometer.
- Adaptor on screen will be displayed on the thermometer.
- Press  to enter the Adaptor Mode in the thermometer.
- Temperature readings from the connected sensor probes of the MSA will be displayed on the thermometer.

---

## 3 Start calibration routine

- Press the calibration button that is located on the rear of the thermometer using a plastic needle. (Refer to Product Description)

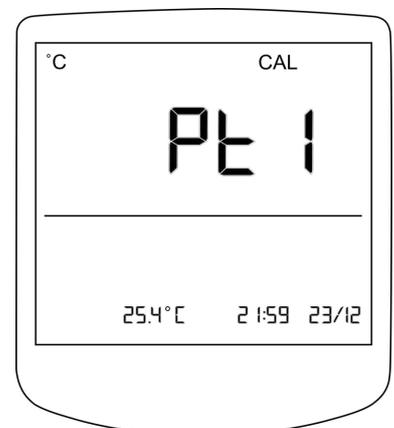


-  Do not use sharp items to press the button. It may cause permanent damage to the thermometer.

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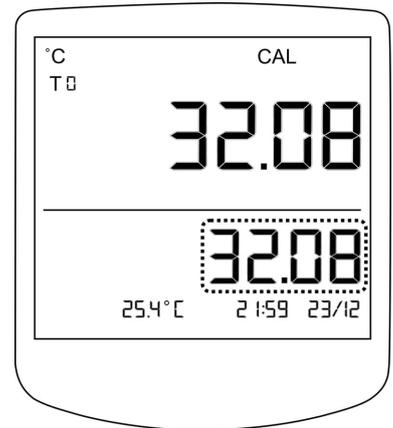
## 4 First data point

- Display shows 'Pt1' indicating that this is the first data point along with the beep.
- Note that CAL is lit.
- Place the sensor probes in a 32°C medium (oil bath, iso-thermal liquid bath etc.).
- Press  to set the first data point.



## 5 Set the first data point

- Primary display area shows the sensor probe reading.
- Secondary display area keeps blinking the reference temperature that is to be set to the actual temperature of the medium.
- Let the thermometer to stabilize at this temperature.



## 6 Scroll through sensors

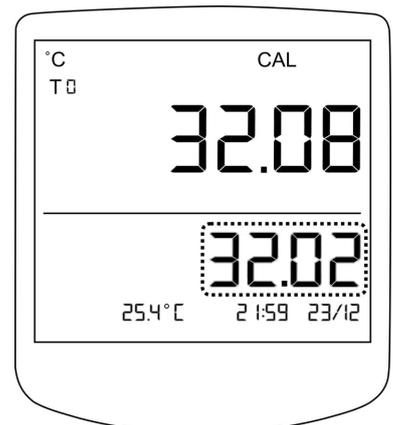
- Press  and  on the thermometer to scroll through the temperature readings of all the calibrating probes.
- Scroll through the sensors to verify whether all sensor probe readings have stabilized.

Note: The example below shows the transitions of surface probe readings from T0 to T1 to T0 upon pressing  and  respectively.



## 7 Enter the temperature of the medium

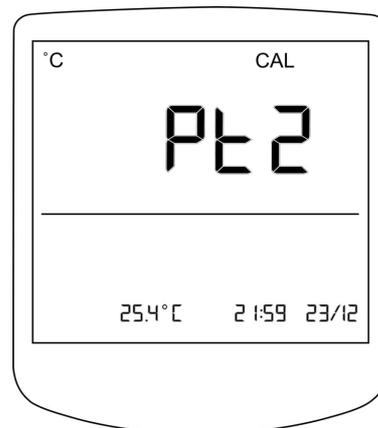
- Adjust the value in the secondary display area to be equal to the actual temperature of the medium using  and .
- Press  to confirm the value and save it.
- Primary display area shows 'LOAD' for 5 seconds.
- Thermometer enters the next data point.



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## 8 Second data point

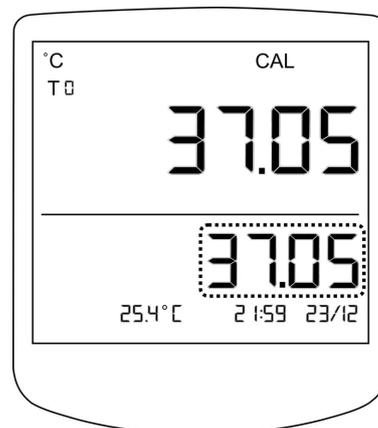
- The thermometer shows 'Pt2' indicating that next one is the second data point.
- Place the sensor probes in a 37°C medium (oil bath, iso-thermal liquid bath etc.).
- Press  to set the second data point.



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## 9 Set the second data point

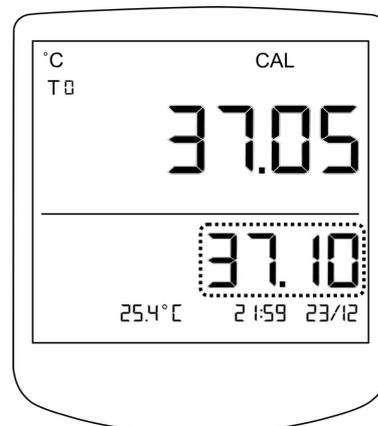
- Notice the reference temperature blinking in the secondary display area.
- Let the thermometer to stabilize at this temperature.
- Scroll through the sensors to verify whether all sensor probe readings have stabilized.



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## 10 Enter the temperature of the medium

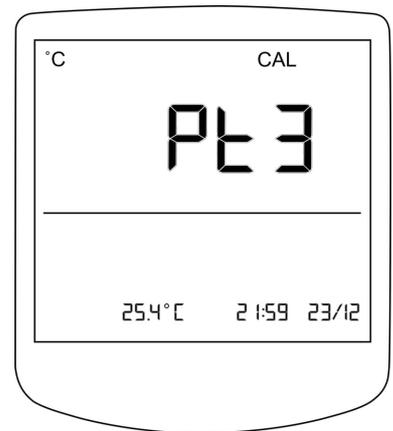
- Adjust the value in the secondary area to be equal to the actual temperature measured in the medium using  and .
- Press  to confirm the value and save it.
- Primary display area shows 'LOAD' for 5 seconds.
- Thermometer enters the next data point.



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## 11 Third data point

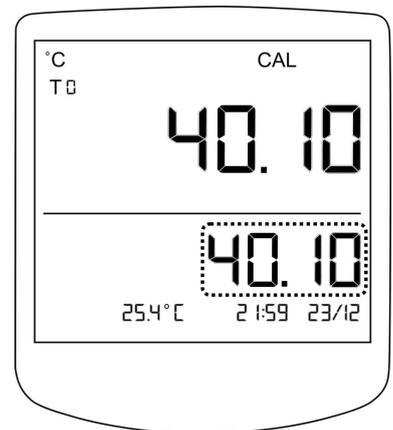
- The thermometer shows 'Pt3' indicating that next one is the third data point.
- Place the sensor probes in a 40°C medium (oil bath, iso-thermal liquid bath etc.).
- Press  to set the third data point.



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## 12 Set the third data point

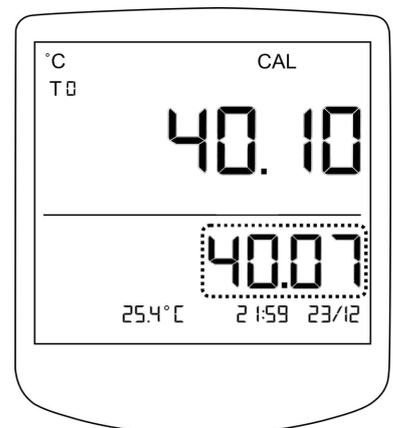
- Notice the reference temperature blinking in the secondary display area.
- Let the thermometer to stabilize at this temperature.
- Scroll through the sensors to verify whether all sensor probe readings have stabilized.



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## 13 Enter the temperature of the medium

- Adjust the value in the secondary area to be equal to the actual temperature measured in the medium using  and .
- Press  to confirm the value and save it.
- Primary display area shows 'LOAD' for 5 seconds.
- Thermometer exits the multi-calibration routine.



## Troubleshooting

This section refers to troubleshooting information for the MSA. Refer to TROUBLESHOOTING under the thermometer section as well.

Condition	Reasons	Solution
Display EA01 on primary display area with a beep.	Internal hardware error in the MSA.	Press  in the thermometer. Re-enter the Adaptor Mode. If error continues, restart the thermometer and the MSA. Re-enter the Adaptor Mode. If the error still prevails, contact technical support.
Display EA02 on primary display area with a beep.	Internal memory error in the MSA.	<u>MSA automatically resets*</u> . Press  in the thermometer. Re-enter the Adaptor Mode. If the error continues, contact technical support.
Display EA03 on primary display area with a beep.	Multi-calibration failure.	Re-calibrate the temperature probes of the MSA that were being calibrated, according to the correct sequence mentioned under Multi-calibration.
Display EA04 on primary display area with a beep.	Multi-calibration failure.	Re-calibrate the temperature probes of the MSA that were being calibrated, according to the correct sequence mentioned under Multi-calibration.



\* MSA Reset will clear all the programmed values to default including calibration factors. It is required to calibrate the MSA after resetting.

Condition	Reasons	Solution
Adaptor on screen is not displayed after connecting the MSA to the thermometer.	Communication error between the thermometer and the MSA. Hardware error.	Power off the thermometer and the MSA. Unplug and re-plug both ends of the micro USB cable connecting the thermometer and the MSA. Power on the thermometer and the MSA. If the error continues contact technical support.
Adapter off screen displayed unexpectedly.	Hardware failure.	Press  in the thermometer. Re-enter the Adaptor Mode. If error continues, restart the thermometer and the MSA. Re-enter the Adaptor Mode. If the error still prevails, contact technical support.
Thermometer restarts unexpectedly.	Hardware failure.	Power off and on the thermometer and the MSA. If the error continues contact technical support.

Note: All of the above troubleshooting instructions are given, assuming that micro USB cables and power adaptor used are either the ones provided with the package or from a reputed manufacturer.

# SUPPORT AND RETURNS

## Technical Support

For troubleshooting refer to the section 'TROUBLESHOOTING'. If you require any further assistance contact your distributor or VeroxLabs directly for prompt resolution.

## Warranty Support

VeroxLabs warrants that the product will be free from defects in materials and workmanship for specified warranty period from the date of sale. If VeroxLabs determines that the product fails to conform to that warranty during the warranty period, VeroxLabs will repair or replace the product, at its discretion, free of charge.

To return the product to VeroxLabs, a customer must comply with VeroxLabs's Returned Goods Policy described in this manual and the warranty requires the customer to return the product to VeroxLabs or to its distributors. VeroxLabs will return products (that it repaired or replaced under warranty) to the same customer who returned those products, at VeroxLabs's expense F.O.B. the customer's facility. Under all other circumstances, VeroxLabs will return products to the same customer who returned those products at the customer's expense.

The warranty does not cover damage caused by misuse, improper care, improper use of chemicals or cleaning methods, loss, theft, use of non-authorized parts, servicing by non-authorized personnel, or negligent or intentional conduct on the part of the owner or user of the product, nor do they cover normal wear and tear or general maintenance. Any modifications or changes to a product will void that product's warranty.

VeroxLabs is not responsible for, and the owner and operator of the product shall defend, indemnify and hold harmless VeroxLabs from and against, all claims, damages, and other losses resulting from the improper servicing, maintenance, repair, use, or operation of the product or the owner or operator's negligence or willful misconduct, and use of inadequate packing and packaging when returning the product for repair.

The above warranties are in lieu of, and VeroxLabs hereby disclaims, all other warranties, express or implied, written or oral, with respect to VeroxLabs products, including the warranties of merchantability and fitness for a particular purpose. No terms, conditions, understandings, or agreements that purport to modify the above warranties or that make any additional warranties for any VeroxLabs product shall have any legal effect unless made in writing and signed by an authorized VeroxLabs corporate officer.

VeroxLabs shall not under any circumstances be liable for lost profits, damages from loss of use or lost data, or indirect, special, incidental, or consequential damages under its warranties or otherwise for any claim related to VeroxLabs products, even if VeroxLabs has been advised, knew or should have known of the possibility of such damages. VeroxLabs's liability with respect to a product covered by a warranty or otherwise shall be limited in all circumstances to the purchase price of that product.

To return a product, please contact Customer Service for a Returned Merchandise

Authorization (RMA) number. Items will not be accepted without an RMA number. Please have the following information:

1. Reason for returning the goods.
2. Quantity, description, part number, the serial number of the goods.
3. Date of receipt of order.
4. Customer's purchase order and the VeroxLabs/ distributor invoice number.

# DISPOSAL

This product is subject to the Directive 2002/96/EC on Waste Electrical Electronic Equipment (WEEE) of the European Parliament and of the EU Council of Ministers. This appliance has been brought to market after August 13th, 2005 in countries that have already integrated this directive into their national laws. It may not be disposed of in the normal household waste. To dispose of, please contact your dealer or manufacturer.



Any appliances that are infected, infectious, or contaminated with materials that are a hazard to health are excluded from being taken back.

Please observe all other regulations in this context.

The appliance may not be left at public or communal recycling or collection points.

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