TRUE TEMPERATURE
INDICATOR MODEL TTI-10

User Manual/Handbook

Isothermal Technology Limited, Pine Grove, Southport, PR9 9AG, England
Tel: +44 (0)1704 543830 Fax: +44 (0)1704 544799 Internet: www.isotech.co.uk E-mail: info@isotech.co.uk

The company is always willing to give technical advice and assistance where appropriate. Equally, because of the programme of continual development and improvement we reserve the right to amend or alter characteristics and design without prior notice. This publication is for information only

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GUARANTEE

This instrument has been manufactured to exacting standards and is guaranteed for twelve months against electrical break-down or mechanical failure caused through defective material or workmanship, provided the failure is not the result of misuse. In the event of failure covered by this guarantee, the instrument must be returned, carriage paid, to the supplier for examination and will be replaced or repaired at our option.

FRAGILE CERAMIC AND/OR GLASS PARTS ARE NOT COVERED BY THIS GUARANTEE

INTERFERENCE WITH OR FAILURE TO PROPERLY MAINTAIN THIS INSTRUMENT MAY INVALIDATE THIS GUARANTEE

RECOMMENDATION

The life of your **ISOTECH** Instrument will be prolonged if regular maintenance and cleaning to remove general dust and debris is carried out.

ISOTHERMAL TECHNOLOGY LTD.
PINE GROVE, SOUTHPORT
PR9 9AG, ENGLAND

TEL: +44 (0) 1704 543830/544611
FAX: +44 (0)1704) 544799

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⚠ CAUTIONARY NOTE

ISOTECH PRODUCTS ARE INTENDED FOR USE BY TECHNICALLY TRAINED AND COMPETENT PERSONNEL FAMILIAR WITH GOOD MEASUREMENT PRACTICES.

IT IS EXPECTED THAT PERSONNEL USING THIS EQUIPMENT WILL BE COMPETENT WITH THE MANAGEMENT OF APPARATUS WHICH MAY BE POWERED OR UNDER EXTREMES OF TEMPERATURE, AND ARE ABLE TO APPRECIATE THE HAZARDS WHICH MAY BE ASSOCIATED WITH, AND THE PRECAUTIONS TO BE TAKEN WITH, SUCH EQUIPMENT.

HANDLING

General advice

Clean only with a damp cloth. Do not wet or allow moisture to penetrate the unit. Do not use solvents or abrasive materials.

Please store the measuring instrument in a dry and clean place.

Avoid any force like shocks or pressure to the instrument.

Do not use force to connect the probe or interface plugs in.

If no sensor is connected to the instrument while switching on, "open" shows on the display (Please refer to chapter error codes/troubleshooting).

A retractable stand on the back of the instrument allows it to be used as a bench top instrument.

This equipment contains no user-serviceable parts. Refer all repairs to qualified service personnel. Contact Isothermal Technology or one of our appointed distributors for details of approved service outlets

Operation

Before switching on the instrument, connect the probe or probes to the instrument and insert the battery (Please refer to Power supply/changing the battery). The input connectors are labelled "1" and "2".

❶ up and down keys
❷ key [ESC]
❸ key [ENTER/MENU]

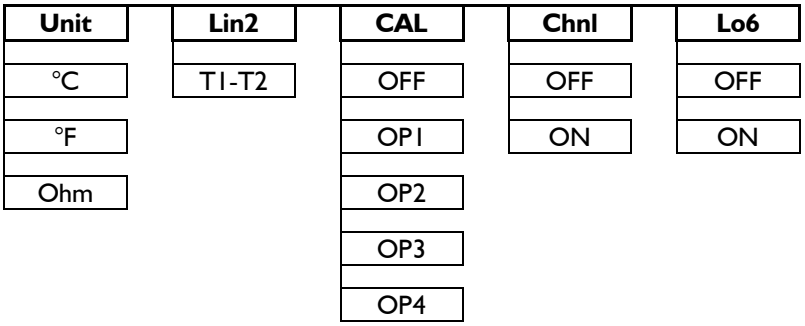
Switching on and off

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

Menu

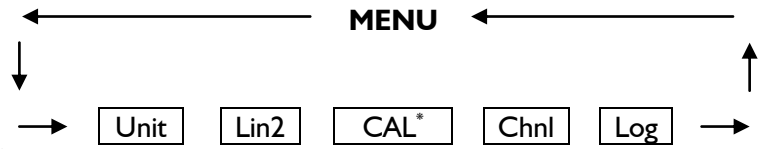
The adjustments of the instruments function such as measurement value, calibration of probes, deactivation of channels are selected from the menu structure. Enter into the main menu by pushing [ENTER/MENU]. Use the up and down keys [↑↓] to select the required menu. Push [ESC] to revert back to the measuring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

Menu structure



Selecting Display Units °C, °F and Ohms

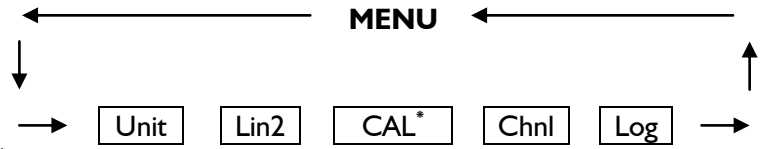
To change the units push [ENTER/MENU]. Use the up and down keys [↑↓] to select **Unit**. Push again [ENTER/MENU]. The display shows either °**C,** °**F** or **o** (for Ohms). Use the up and down keys [↑↓] again to adjust the requested measuring unit and push [ENTER/MENU] to confirm. Push [ESC] to be back in the measuring mode.



The calibration is hidden when the instrument has been calibrated at Isotech, see page 6 for details.

Temperature Difference Mode/ [Line2]

To display the temperature difference between Cannels 1 and 2 push [ENTER/MENU]. Use the up and down keys [↑↓] to select **Lin2**. Push again [ENTER/MENU]. On the right corner of the display appears a **T1-T2.** Use the up and down keys [↑↓] to adjust the requested selection. Push [ENTER/MENU] to confirm. Push [ESC] to revert back to the measuring mode.



The calibration is hidden when the instrument has been calibrated at Isotech, see page 6 for details.

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

Calibration function / [CAL]

The TTI-10 has different calibration options that allow the instrument to be matched a thermometer. When the TTI-10 is a calibrated with a probe or probes at Isotech the calibration options are removed to prevent accidental or unauthorised change. The display will indicated that the calibration is active by showing [CAL] and the calibration option for each Channel, e.g., [CAL]22 indicates that calibration mode 2 is active for both channels.

Should access to the calibration options be required please contact Isotech for details of how to enable the calibration menu.

If the instrument has not been calibrated with a thermometer at Isotech then the calibration options will be accessible.

The instrument offers different calibration options:

1) [OFF]: No corrections are applied. (EN 60751)

2) [OP1]: Calibration by code (2 x four digit code) is equivalent to a 2-point calibration.

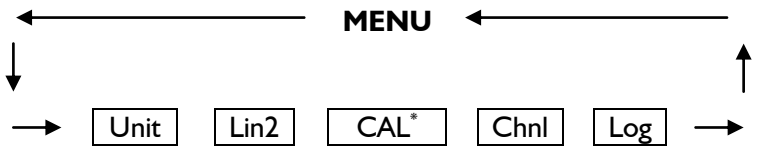
3) [OP2]: Recommended Mode: Calibration by Comparison to a Standard Thermometer (1-point, 2-point or 3-point calibration)

4) [OP3]: Calibration according to Custom Probe Coefficients (EN60751)

5) [OP4]: Reserved for future use

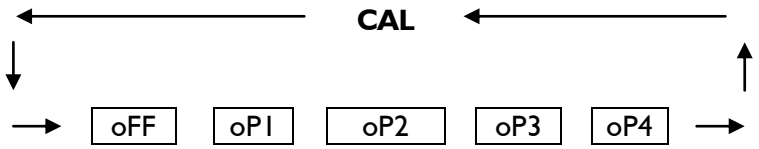
To Change Calibration Mode

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



**The calibration is hidden when the instrument has been calibrated at Isotech, see page 6 for details.*

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



1) Standard calibration according IEC 60751 / [oFF (No Corrections are applied)

Use the up and down keys [↑↓] to select **[oFF**. Push [ENTER/MENU] to confirm.
Push [ESC] to revert back to the measuring mode.

2) Calibration by code / oP1

Use the up and down keys [↑↓] to select **oP1**. Push [ENTER/MENU] to confirm.

On the bottom of the display appears a small **1**, after this number a four-digit number (Hex-Code/0..F) is displayed. For changing the number use the up key [↑]. To step to the next number use the down key [↓]. If the requested number is complete then push [ENTER/MENU] to confirm. At the bottom of the display a very small **2** appears, after which a second four-digit number is displayed. For changing the number please follow the manual as before. Push [ESC] to revert back to the measuring mode.

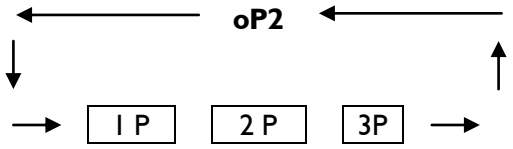
Note: After confirming **oP1** by pushing [ENTER/MENU] the function **oP1** (calibration by code) is activated, even though you leave the menu by pressing [ESC].

Display-indication with active calibration code (OP1):

The **CAL**-segment and the small **1** indicates to the user that **oP1** is activated.

3) Calibration by Comparison to a Standard Thermomter / oP2

Use the up and down keys [↑↓] to select **oP2**. Push [ENTER/MENU] to confirm.
On the bottom of the display appears **1 P**. For changing between a 1-Point **1 P**, 2-Point **2 P** or 3-Point **3 P** - calibration use the up and down keys [↑↓].



Example of a 1-Point calibration:

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

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

Now the algebraic sign is blinking**„-„**. Use the up key [↓] to toggle for positive or negative number. Change the number using the up and down keys [↑↓].

Note:
Up key ↑ is changing the blinking segment
Down key↓ is jumping to the next segment
Push [ENTER/MENU] to confirm, revert back to the measuring mode.

Important: A break of the physical calibration cannot be done by the [ESC]-button.

Display-indication with active calibration code (OP2):

The **CAL**-segment and the small **2** indicates to the user that **oP2** is activated.

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

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

Use the up and down keys [↑↓] to select **oP3**. Push [ENTER/MENU] to confirm.

Now the calibration option 3 is activated. Push [ESC] to revert back to the measuring mode.

Note: After confirming **oP3** by pushing [ENTER/MENU] the function **oP3** (calibration by code) is activated, even though you leave the menu by pressing [ESC].

Display-indication with active calibration code (OP3):

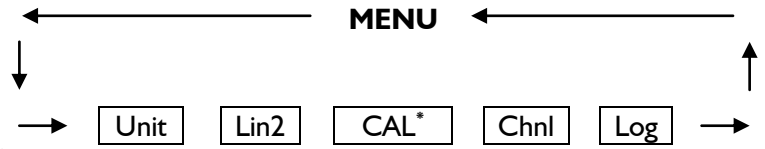
The **CAL**-segment and the small **3** indicates to the user that **oP3** is activated.

5) oP4 Reserved for future use, not currently implemented

Channel Activation / [Chnl]

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

Note: As a minimum one channel is active!



The calibration is hidden when the instrument has been calibrated at Isotech, see page 6 for details.

Memory Setup/Lo6

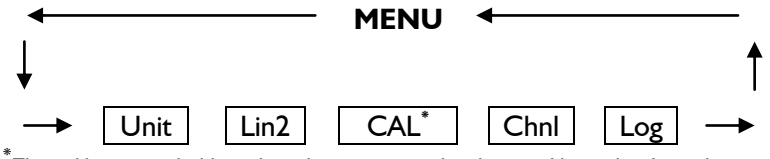
The TTI-10 can log up to 4000 measurements in memory and report the maximum, minimum and average values of the logged data.

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

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

By selected manually operated storage you are able to save the measurement by pressing ESC by each time.

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



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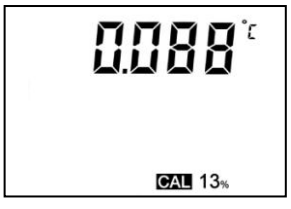
E.g. of the instrument's LCD by activated logging mode:



On the bottom you can see the percentage of the occupied memory (0..99%). If a calibration option is activated the display is alternating between displaying memory status and calibration information.

Recalling the memory data (HOLD MAX MIN AVE)

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

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

Clearing the memory (MAX MIN AVE)

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

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

The instrument has three different response times to select:

Normal-Mode:	high resolution (0,001 from -199,999 to +199,999)
Fast-Mode:	reduced resolution (0,01 from -199,99 to +199,99)
Filter-Mode:	high resolution (0,001 from -199,999 to +199,999)

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

By using the Filter-Mode the instrument is performing a moving average to stabilize the displayed measurements.

After turning on the instrument it is in the Normal-Mode. After pressing once the [FAST/🡻] key the instrument switches to the Fast-Mode. Pressing the same key once again the instrument switches to the Filter-Mode.

E.g. Display with activated Filter-Mode:

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

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

AUTO-OFF-function

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

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

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

TARE-Function (ZERO-Mode F1)

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

E.g. Display with activated Zero-Mode:
The arrow on the left indicates that the instrument is working in the Zero-Mode [F1].
Note: After switching off the instrument, this function is automatically deactivated.

Power supply

For the power supply of the instrument a 9 Volt dry battery is used. To exchange the battery switch of the instrument and open the rear battery cover. Remove the battery from the instrument and replace with a new battery.

For operation without a battery the TTI-10 can be powered from via the supplied USB Cable.

The „BAT"symbol in the display indicates that the battery needs to be exchanged. After displaying the "BAT" symbol, the instrument allows app. 1 hour of further operation.

The battery symbol indicates according to the battery status between 1 to 3 segments.

We recommend the use of high capacity alkaline batteries such as the Duracell Procell or rechargeable capacity NiMH Cells of 250mAh.

Note: For protection of our environment please don't put the battery into general household waste, but use a local authority approved disposal method.

Error Codes

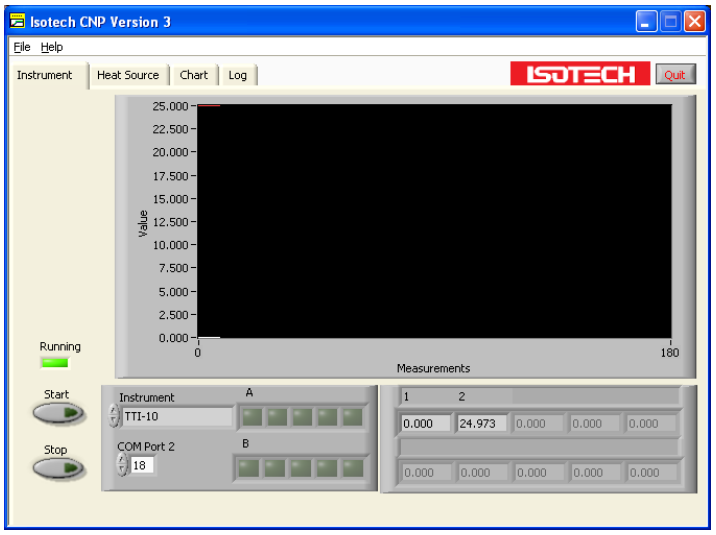
Error	**Meaning**
Open	no probe or wrong probe is connected

Use with Cal Notepad

The TTI-10 can be used with Cal Notepad software. First download the Driver and the Cal Notepad Software from http://isotech.info/TTI-10 Unzip the driver and making a note of the file location.

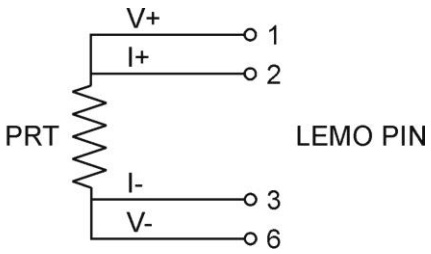
Connect the TTI-10 to the PC with the USB lead and when prompted point the Device manager to the location of the driver files. The PC will then assign a Com Port number to the instrument, this number can be found from the Device Manager.

Next install Cal Notepad, start the application and in the instrument tab set the Com Port to the value as above. Click start and the TTI1-10 can be monitored and the data logged as required. The TTI-10 will log in whatever units have been selected from the Units menu; see Selecting Display Units on page 6.



PRT Connections

For best accuracy use only four wire PRT probes. The type of connector need for the probes is Lemo Connector: FGG.1B.306.CLAD52 (Isotech Part Number: 935-16-10)



Three wire probes can be connected, link pins 1 and 2.

Specifications

Input Channels	Two: 100 Ohm PRT, EN 60751 (Pt100), Four Wire
Range	-200°C to +850°C
Units	^{0}C, ^{0}F and Ohms
Resolution	0.001°C from -199.999°C to +199.999°C remaining range 0.01°C
Accuracy: Instrument Only	±0.01°C from -80°C to 199.999% ±0.02°C ±0.0015°C reading from 200°C to 660°C
Logging	Record Average, Min and Max over 4000 measurements
Measuring interval	Adjustable: 1 second to 30 minutes
PC Interface	USB – Cable Included
Connectors	High Quality Latching Metal: Lemo
Working temperature	0°C to +40°C
Display	2-line LCD Display Single Channel or Dual Channels Simultaneously
Housing	Plastic (ABS) supplied with protective rubber boot
Dimensions	200 x 85 x 40 mm (LxWxH)
Weight	300g
Power Supply	9V battery PP3 (or via USB Cable)
Battery Life	Typically 20 Hours