



TI242 Thermometer User Manual

Revision 1.04

Minco's TI242 Thermometer is the most versatile hand-held temperature indicator available today, offering easy but feature-rich monitoring of RTDs and thermocouples in a portable and convenient form factor. The TI242 combines robust capabilities with superior ease-of-use, making it the ideal tool for on-the-fly temperature measurement and the analysis and repair of HVAC, scientific, and other thermal systems. At the same time, its convenience and feature set makes it a valuable tool for engineers in any field.



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Due to continuous improvements, some specifications and graphical styling may differ slightly from what is shown in this manual.

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1. SPECIFICATIONS

1.1 Measurement

Description		Value	
Supported Sensors	RTD	Platinum 100, Platinum 1000, Custom ^(Note 3)	
	Thermocouple	K, J, T, E, B, N, R, S	
Inputs	Channels	2	
	Connector type	Molex 0395000003 (3.50mm 3-position screw terminal block)	
Sample Rate	Real-time	1 sample every 0.4 seconds	
	Data logging	Programmable, 1 sample every 0.4 to 65 seconds	
Resolution	Temperature < 100°	0.01°	
	Temperature < 1000°	0.1°	
	Temperature > 1000°	1°	
Basic Accuracy	Thermocouple ^(Note 1)	± (0.02% t + 0.3) °C	
	RTD, PT100 ^(Note 1,2)	± (0.03% t + 0.3) °C	
	RTD, PT1000 ^(Note 1,2)	± (0.05% t + 0.3) °C	
	Custom Sensors, RO ≤ 500 Ω ^(Note 1,2, 3)	± (0.03% t + 0.3) °C	
	Custom Sensors, RO > 500 Ω ^(Note 1,2, 3)	± (0.05% t + 0.3) °C	
Match-Calibrated Accuracy ^(Note 4)	RTD (custom_sensor), PT100 or RO ≤ 500 Ω ^(Note 4)	-200 °C to -50 °C	± (0.014% t + 0.03) °C (± 0.06 °C)
		-50 °C to 150 °C	± (0.001% t + 0.03) °C (± 0.03 °C)
		150 °C to 850 °C	± (0.001% t + 0.03) °C (± 0.04 °C)
	RTD (custom_sensor), PT1000 or RO > 500 Ω ^(Note 4)	-200 °C to -50 °C	± (0.08% t + 0.03) °C (± 0.19 °C)
		-50 °C to 150 °C	± (0.01% t + 0.075) °C (± 0.09 °C)
		150 °C to 850 °C	± (0.05% t + 0.01) °C (± 0.44 °C)

- Note**
1. For total accuracy, take into account temperature probe error.
 2. Listed accuracy uses platinum RTD curve. Accuracy is when using 3-wire RTD, all leads matched resistance.
 3. Custom sensors are Platinum RTD with user-entered Callendar–Van Dusen coefficients. See [Custom 1 and Custom 2](#).
 4. Match-calibration involved TI242 and sensors calibrated together. See [Matched Calibration](#) for more information.

1.2 Display

Description		Value
Display	Resolution	320 x 240
	Backlit	Yes
	Sunlight readable	Yes
	Color	Yes
	Viewing angle	Very wide 170 degrees

1.3 Bluetooth

Description		Value
Bluetooth	Range	650ft line-of-sight.
	Version	5.0 BLE

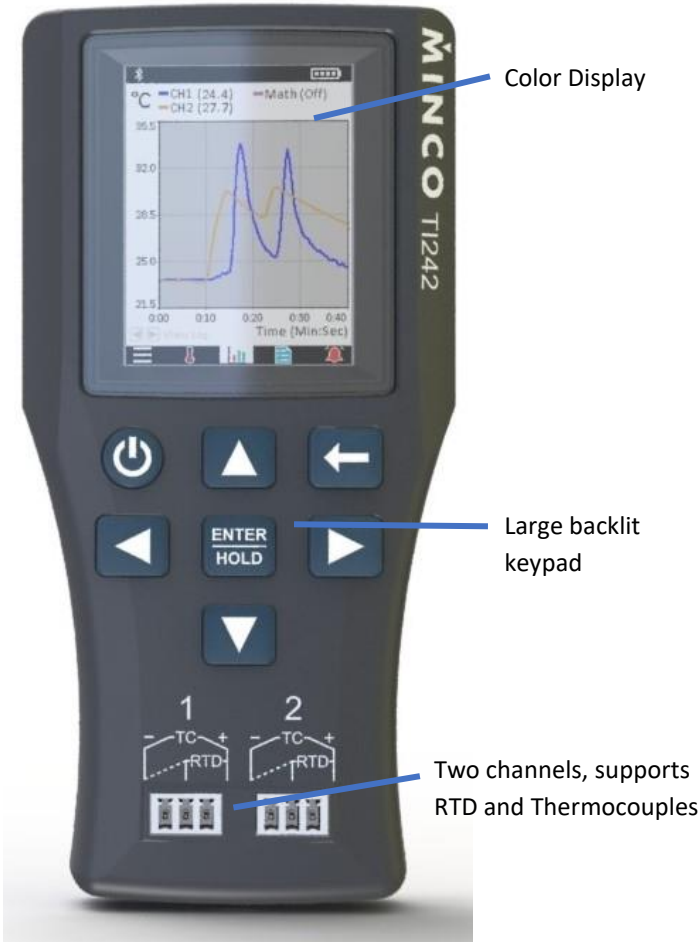
1.4 Electrical Ratings

Description		Value
Battery Life	Default settings	100 hours typical
	Datalogging with screen off, default settings	400 hours typical
Battery Type		4 x AA NiMH rechargeable
Battery charging duration		16 hours
Input power	Voltage	5.0 volts
	Current	500 mA

1.5 Environmental

Description		Value
Operating Temperature	With batteries	0 °C to 50 °C
	Without batteries	0 °C to 70 °C
Storage Temperature	With batteries	5 °C to 30 °C
	Without batteries	-30 °C to 80 °C

2. DEVICE LAYOUT



Front of TI242



Back of TI242



Bottom of TI242

3. SENSOR TYPES

Each channel can be selected individually for a sensor type.

3.1 Thermocouple

3.1.1 Types of thermocouples supported:

- | | |
|------|------|
| 1) K | 5) B |
| 2) J | 6) N |
| 3) T | 7) R |
| 4) E | 8) S |

3.2 RTD Platinum

Only use platinum-type resistance temperature detectors (RTDs) with the TI242.

3.2.1 Types of platinum RTDs supported:

- 1) PT100
- 2) PT1000
- 3) Custom_1 (more info below)
- 4) Custom_2 (more info below)

3.3 Custom_1 and Custom_2

Uses Callendar–Van Dusen coefficients for correct for probe error, and with the optional match-calibration feature.

The user enters this in the Custom Sensors screen (see: [Custom sensors screen](#)), or if the TI242 was purchased with match-calibrated RTD probe(s), these values will already be entered into the Custom_1 and Custom_2 probe types.

Uses include:

- 1) Match-calibrated RTD probes by Minco. See [Matched Calibration](#) for details and measurement accuracy.
- 2) User knows a probes specific R0, A, B and C values. This reduces RTD probe error, allowing the use of lower-cost class RTD's while maintaining high accuracy. The accuracy in this mode is the TI242 basic accuracy.

3.4 Temperature Ranges

Thermocouple ranges per ASTM E230

Type	Min	Max	Units
RTD Platinum 100	-200	850	°C
RTD Platinum 1000	-200	850	°C
Thermocouple Type K	-270	1372	°C
Thermocouple Type J	-210	1200	°C
Thermocouple Type T	-270	400	°C
Thermocouple Type E	-270	1000	°C
Thermocouple Type B	0	1820	°C
Thermocouple Type N	-270	1300	°C
Thermocouple Type R	-50	1768	°C
Thermocouple Type S	-50	1768	°C

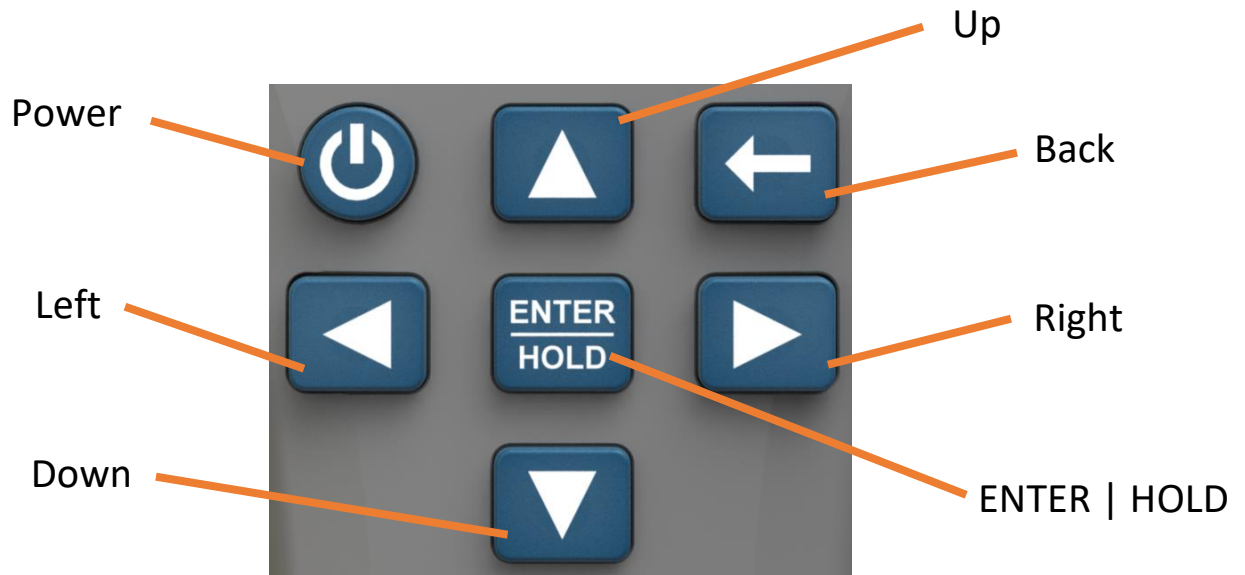
4. MATCHED CALIBRATION

The TI242 features a matched calibration option. This calibrates a Minco RTD probe to a TI242. This is used when TI242 is ordered with an RTD probe, and the matched calibration option is selected during purchase.

Features:

- Matched-calibration reduces RTD probe error, and TI242 basic accuracy error.
- Match-calibration accuracy shown in [Specifications](#).

5. KEYPAD



5.1 Power

- Turns unit on or off. Press and hold for 1 second to toggle auto-off.
- If datalogging is in progress, you will get a confirmation on-screen before powering off.

5.2 Enter | Hold

- Press to choose options that are displayed on-screen.
- Press to HOLD measurement reading if on the Home screen or Graphing screen.
- Note: Hold function is disabled during datalogging.

5.3 Back

- If in a settings screen, this cancels any changes and goes back to previous screen.
- If on any screen other than the Home screen, this returns you to the Home screen.
- If on Home screen, press and hold to clear math session.

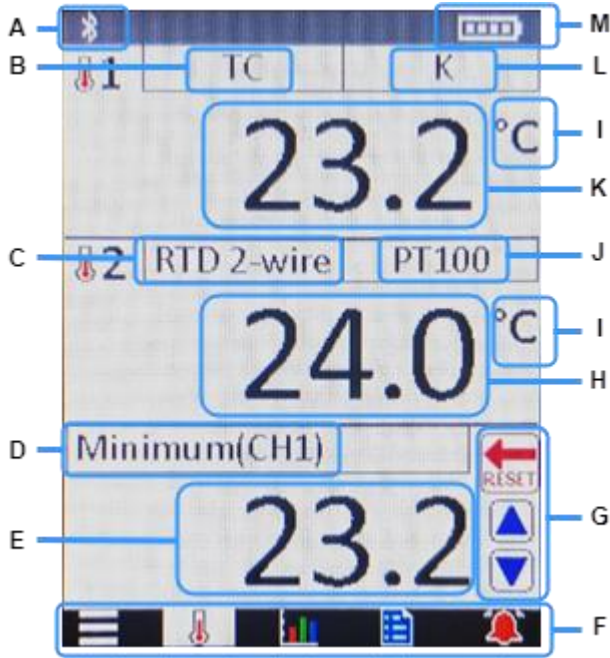
5.4 Up/Down/Left/Right

- Navigate device screens and menus.
- Up/Down: If on home screen, this cycles through the various math options.

6. DISPLAY

The display is a color display with large viewing angles, and adjustable backlight. It is readable in direct sunlight (when brightness set to max). There are multiple screens you can view: home screen, graphing screen, data log screen, alarm screen, and various option screens. These are described in [Screens](#). Figure 5.1 and Figure 5.2 show the layout of screens that show data to the user.

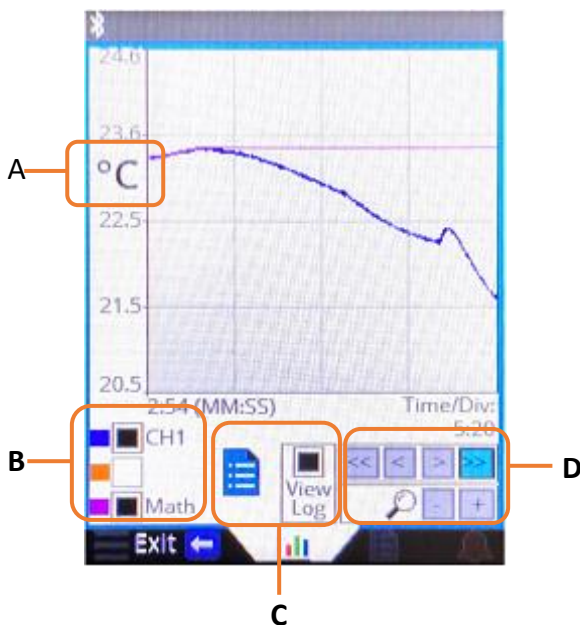
6.1 Home screen layout



- A. Bluetooth status
- B. Channel 1 probe selection (TC/RTD)
- C. Channel 2 probe selection (TC/RTD)
- D. Math statistics setting
- E. Math statistics result
- F. Menu bar
- G. Math statistics control button hints
- H. Channel 2 temperature
- I. Temperature units
- J. Channel 2 probe type
- K. Channel 1 temperature
- L. Channel 1 probe type
- M. Battery level indicator

Figure 5.1: home screen layout

6.2 Graphing screen layout



- A. Temperature units
- B. Legend. You can select which channels are shown here.
- C. View Log option lets you see data log on graph screen. When viewed, the blue paper icon is shown.
- D. Scroll and zoom options.

For more information on graphing capabilities and functions, see [Graphing](#) section.

Figure 5.2: graphing screen layout


7. SCREENS

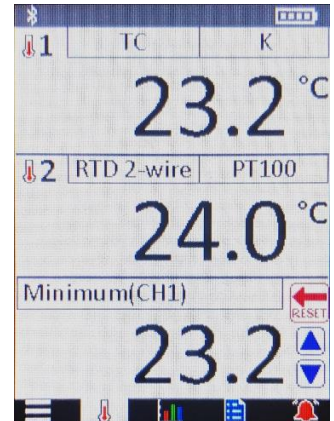
7.1 Menu bar screens

7.1.1 Main screen

This is the default screen on power-up.




This screen shows temperature data and the selected math option.




If you need to get back to this screen quickly, simply press  repeatedly until the screen is shown again.



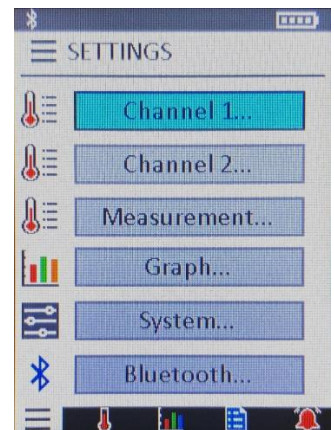
7.1.2 Settings screen

You enter this screen by using the   keys to navigate the lower menu bar to highlight the settings icon.



You can select an option to change using the   keys. The selected option is highlighted in BLUE. Press  key to enter the selected option screen.


To exit screen: You exit this screen using the   keys or the  key.


To see all option screens, go to [#Settings Screens:](#)



7.1.3 Graphing screen

You show this screen by using the   keys to navigate the lower menu bar to highlight the graph icon.

To enter screen: Press the  key. You can then use the keypad to navigate to the various buttons and checkmarks on the screen.

To exit screen: press  key.

The graph can show two different sets of data:

- 1) Live data
- 2) Log data (in progress or stored data)



7.1.3.1 Live data

Live data is visible on the graph when “View Log” is unchecked on the graph screen.

The last two (2) minutes of data is available to view on the graph. You can use the zoom and scroll buttons on the lower-right corner of the graph screen to customize your view of this data.

This includes all math options: to view the last 2-minutes of any of the math options, select which math option on the home screen. All math data is captured, even if not selected, so that it can be viewed at your leisure.

7.1.3.2 Log data

Log data is visible on the graph when “View Log” is checked on the graph screen.

7.1.3.2.1 LOGGING IN PROGRESS

If logging is currently in progress, and the graph has the newest datapoint visible, then the graph will update continuously with new data automatically and allow you to view extended sessions.

You can zoom out and scroll as needed to get the desired view. If the newest datapoint is visible on the graph, then the graph will shift as needed to keep new data visible on the graph at the current zoom level. Hint: You can click the “>>” button on the lower right corner of the graph screen to scroll to the latest datapoint.

If the latest datapoint is NOT visible on the graph, then new datapoints will still be collected and saved, but it will not be shown on the graph. Hint: You can click the “>>” button on the lower right corner of the graph screen to scroll to the latest datapoint.

7.1.3.2.2 STORED LOG DATA

Viewing stored data is the same process as when logging in progress.





7.1.3.3 Scrolling through data

- 1) Use the “<<” button to scroll so the first datapoint is shown on far-left side of graph.
- 2) Use the “>>” button to scroll so the last/newest datapoint is shown on far-right side of graph.
- 3) Use the “<” button to scroll to the left (older data)
- 4) Use the “>” button to scroll to the right (newer data)

7.1.3.4 Zooming in and out



At maximum zoom-out, the graph can show the entire data set, including all the samples stored from data logging. This means that you can view all 261,067 data log samples on the graph screen at once.

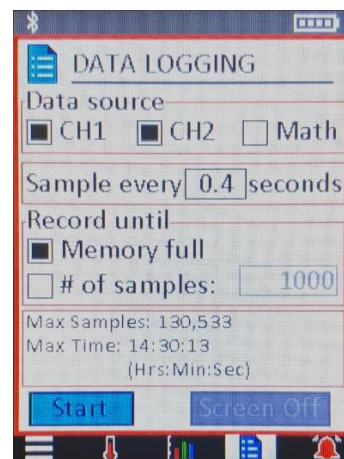
7.1.4 Data Logging screen

You show this screen by using the   keys to navigate the lower menu bar to highlight the Data Log icon. You enter the screen using the  key or by pressing the  key.





This allows you to configure, start, and stop data logging.

Once data logging is started, you can click “Screen Off” to conserve battery. Note: The screen will automatically turn off after the “auto-off” time has elapsed, but the unit will remain powered.



To exit screen: You exit this screen using the  key until exit, or the  key.

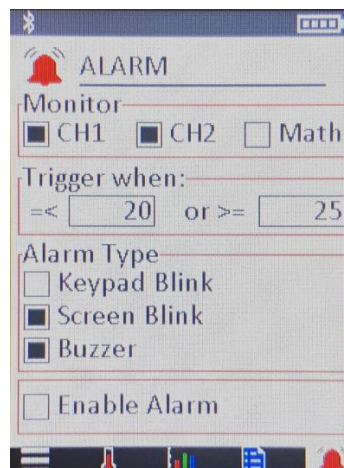


7.1.5 Alarm screen

You show this screen by using the   keys to navigate the lower menu bar to highlight the alarm bell icon. You enter the screen using the  key or by pressing the  key.

This configures the alarm option, if you choose to use it.

To exit screen: You exit this screen using the  key until exit, or the  key.



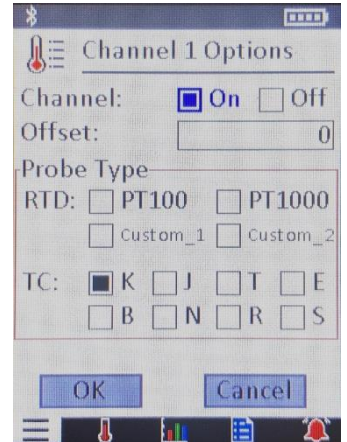
7.2 Settings Screens

7.2.1 Channel options screen

You show this screen by navigating to Settings Screen (see: [#Settings screen](#)) and selecting Channel 1... or Channel 2...

This configures all settings for a particular channel.


To exit screen: Click Cancel or press  key.

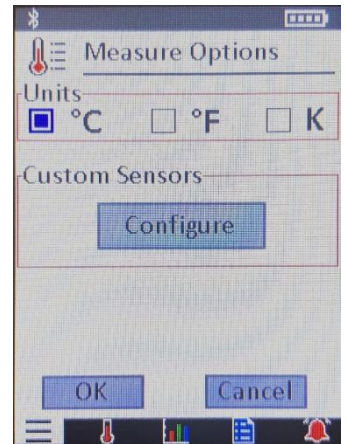


7.2.2 Measurement option screen

You show this screen by navigating to Settings Screen (see: [#Settings screen](#)) and selecting Measurement...


This configures what units to use, and to configure custom sensors. See: [#Custom Sensors](#)

To exit screen: Click Cancel or press  key.



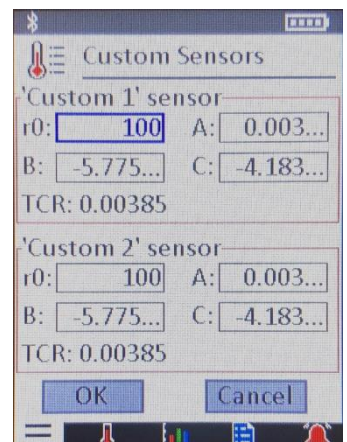
7.2.3 Custom sensors screen

You show this screen by navigating to Settings Screen (see: [#Settings screen](#)) and selecting Measurement... and the selecting Configure.

This configures the Custom Callendar–Van Dusen coefficients for match calibration. Select which coefficient you would like to change, then press  key. Then enter the coefficient value.

Note: these values can also be entered by using your iPhone with the “Minco TI242 Utilities” app.


To exit screen: Click Cancel or press  key.



7.2.4 Graph option screen

You show this screen by navigating to Settings Screen (see: [#Settings screen](#)) and selecting Graph...


This configures the graphing screen.

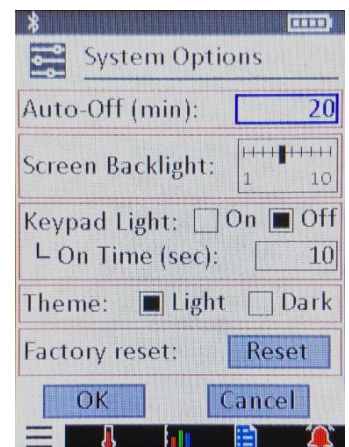
To exit screen: Click Cancel or press  key.

7.2.5 System Options screen

You show this screen by navigating to Settings Screen (see: [#Settings screen](#)) and selecting System...

This configures the system options.

To exit screen: Click Cancel or press  key.



7.2.6 Bluetooth Options screen





You show this screen by navigating to Settings Screen (see: [#Settings screen](#)) and selecting Bluetooth...

This configures the Bluetooth options.

To exit screen: Click Cancel or press  key.






SCREEN NAVIGATION

The TI242 is easy to navigate using the keypad. You change screens using the  or  array keys, and enter screens using the  key. The screens that don't require being entered into using the  key are the settings screen and the main screen.

7.3 To exit any screen

Press  key. Continue to press the  key to get back the main screen.



7.4 To change screens

First, exit any screen you are on (see [#To exit a screen back to the menu bar](#)). Then, press  or  key. Press  key to return to main screen.



7.5 To change a selection

Press the  button. If on the main screen or graphing screen, the  button will toggle Hold measurement acquisition.


7.6 To change math option

On the main screen, press the  or  keys to cycle through the various math options. This also changes which math is shown on the graphing screen, if you have chosen the math as a 'Data to Show' in the Graph Options screen.

7.7 To enter a screen from the menu bar

The menu bar is the bar on the bottom of the screen. Press  or press the UP button. The screen will be highlighted in a red outline. Press  to exit back to navigating the menu bar again.

7.8 To exit a screen back to the menu bar

Press the  button repeatedly until the main screen appears.

8. MATH AND STATISTICS

The math and statistics feature allow the user to see in real-time certain statistics of the temperature data.

Feature include:

- Calculates all math options simultaneously in the background.
 - This allows you to cycle through each math option and get historical data immediately.
- You can view the last 2 minutes of samples on the graph screen for the selected math option.
 - Simply change it on the home screen, and it will be updated on the graph using the last 2 minutes of samples.

8.1 Math statistics list

This list applies to both channel 1 and channel 2.

- | | |
|----------------------|-----------------------|
| 1) Off | 5) Maximum |
| 2) Ch1-Ch2 | 6) Minimum |
| 3) Ch2-CH1 | 7) Average |
| 4) Range (Max – Min) | 8) Standard Deviation |



8.2 Viewing math on the graph

Navigate to the Graph screen and make sure that Math is selected in the legend area.

The math data shown on the graph is the math option selected on the home screen.

All math options are calculated at the same time and available to view at any time by changing the math option on the home screen.

8.3 Clearing math session:

- 1) On the home screen, press and hold the  key. You will see an animated slider appear (figure 7.3).
- 2) Once the slider completes the animation, release the  key. Math session has now been reset and cleared.

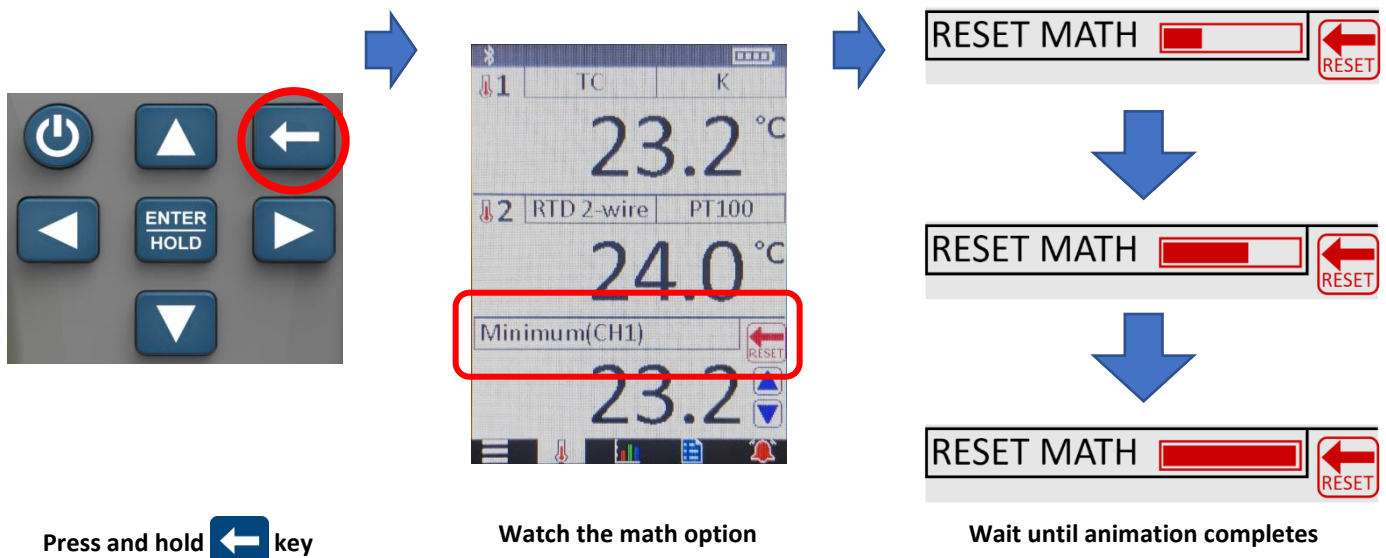


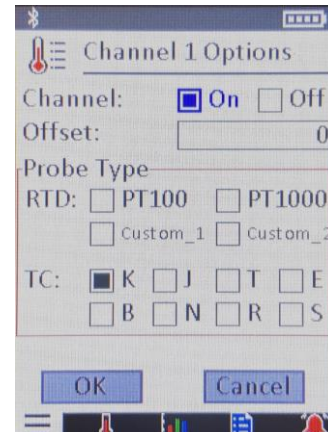
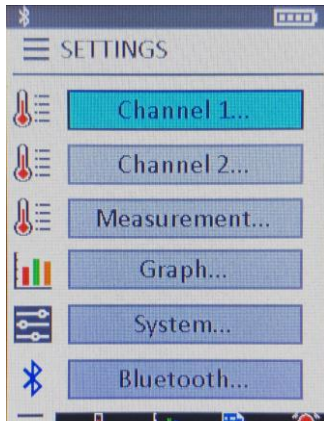
Figure 7.3: clearing math session.

9. CHANNEL SETTINGS

There are two channels that can be individually configured for RTD and thermocouple.

To change channel settings:

- 1) Go to the settings screen (see: [Channel options screen](#)):
- 2) Click Channel 1... or Channel 2...
A new screen showing channel settings appears:



9.1 Channel On/Off:

Turns channel off. This will cause all screens that show temperatures, to show "OFF" for the selected channel.

9.2 Offset:

Applies a user-selected offset in the units the user selected (°C, °F, or K)

9.3 Probe Type

Choose RTD or thermocouple. For explanation of the various types, go to [Sensor Types](#).

10. MAKING MEASUREMENTS

10.1 Thermocouples

When plugging in a thermocouple into the TI242, wait a few minutes to allow the probe connector temperature to stabilize. If moving the TI242 to a location with a large change in ambient (room) temperature, allow enough time to for the TI242 to reach room temperature before using (30-60 minutes). This will reduce measurement errors.

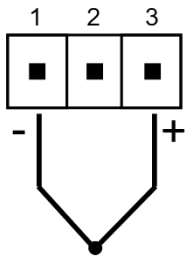
Caution: • Do not connect USB if using grounded thermocouples. The sensor inputs are not isolated.

Caution: • Do not apply more than 200mV across the thermocouple input connectors, or damage to the TI242 may result.

10.1.1 Thermocouple wiring diagram

Sensor connector viewed from the top of the TI242. See figure 9.1.1.

Note: When you select a thermocouple type in the options menu (see: [Channel options screen](#)), the TI242 will show you the wiring diagram on-screen.



Pin description:

- 1 – Negative end of thermocouple.
- 2 – Not connected.
- 3 – Positive end of thermocouple.

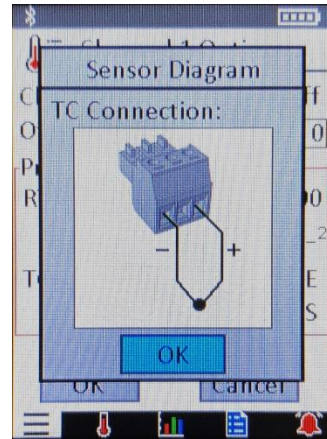


Figure 9.1.1: thermocouple connection

10.2 RTD

The TI242 accepts, and automatically detects 2- and 3-wire platinum RTDs.

- To reduce error, use a 3-wire RTD with matched resistance wires.
- To minimize probe error, you have the option of using the Custom Sensors feature to input the specific probe's R0, A, B, and C coefficients.

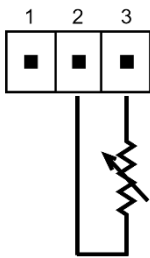
Note: the total error is the TI242 basic accuracy + probe error. Removing probe error by using Custom Sensors reduces the error total error, and the TI242 basic accuracy will be the accuracy of the measurement.

10.2.1 RTD wiring diagram

Sensor connector viewed from the top of the TI242. See figure 9.2.1.1 and figure 9.2.1.2.

Note: When you select an RTD type in the options menu (see: [Channel options screen](#)), the TI242 will show you the wiring diagram on-screen.

10.2.1.1 2-wire RTD:



Pin description:

- 1 – Not connected.
- 2 – RTD connection 1
- 3 – RTD wire 2

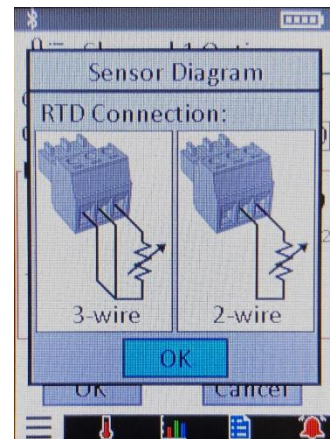
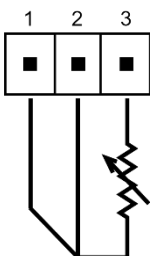


Figure 9.2.1.1: 2-wire RTD connection

10.2.1.2 3-wire RTD:



Pin description:

- 1 – Lead Resistance
- 2 – Lead Resistance
- 3 – RTD element

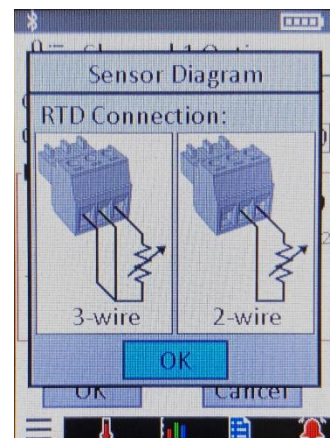


Figure 9.2.1.2: 3-wire RTD connection

11. CHANGING UNITS (°C/°F/K)

This is changed in the Measure Options screen (see: [Measurement option screen](#)).

Whenever the units are changed:

- All offsets in channel settings are converted to the selected unit.
- Alarm trigger levels are converted to the selected unit.
- Math session is cleared.

12. BATTERIES

The TI242 is battery powered from 4x AA rechargeable batteries and a USB port. If the batteries are fully discharged or removed, all settings and logged data are saved safely in non-volatile memory.

WARNING: Do not recharge non-rechargeable batteries. Only HR6 NiMH rechargeable batteries can be recharged.







12.1 Battery Installation

The TI242 uses four (4) AA rechargeable batteries (included). The batteries must first be installed before use.

Caution:	<ul style="list-style-type: none">• Disconnect all temperature probes from the TI242 before replacing the batteries.• Turn off TI242 before replacing the batteries.• Do not mix different battery types or capacities.• Use only NiMH rechargeable batteries.• Do not charge non-rechargeable batteries.
-----------------	---


12.1.1 How to install or replace batteries

Due to the powerful magnet in the battery compartment cover, following the below steps will optimize the battery installation process.

<p>Step 1:</p> <p>Remove battery compartment cover by removing screw, then insert the included batteries. Make sure polarities are correct.</p> 	<p>Step 2:</p> <p>Slide the battery cover from the bottom of the batteries, while pressing the battery compartment cover onto the batteries to keep them from sticking to the magnet.</p> 	<p>Step 3:</p> <p>Continue to slide the compartment cover up while lightly pushing against the batteries.</p> 
<p>Step 4:</p> <p>Continue to slide the compartment cover up while lightly pushing against the batteries.</p> 	<p>Step 5:</p> <p>Finish by sliding the battery compartment cover tab into the hole at the top of the T1242 enclosure. Push down cover to be flush with T1242 enclosure and re-install the screw.</p> 	<p>Battery installation is complete!</p> 

12.2 Rechargeable Batteries (included)

The unit comes included with rechargeable AA NiMH batteries, rated at 2500mAh, and are recommended to use. Other similarly-rated NiMH batteries can also be used. Do not mix different battery types or capacities.

When the TI242 is plugged into a USB charger or USB port on a computer, the TI242 will attempt to charge the batteries. If a blinking  icon is shown on the TI242, then a charge error has occurred and must be rectified before charging can continue. The causes of charge errors are shown in Table 12.2.

If a charge error is detected, unplug the USB cable until the error is corrected.

Table 12.2: Causes of charge errors

Possible cause of error	Solution
No batteries detected	Confirm batteries are installed and with correct polarity.
Non-rechargeable batteries detected	Confirm using NiMH rechargeable batteries
Defective battery detected	Replace with functioning NiMH rechargeable batteries
Temperature is too hot or too cold	TI242 must be between -10°C to 50°C (14°F to 122°F) for batteries to charge

12.3 Battery Level Meter

This is an estimated battery level. When the meter is at zero bars, recharge or replace batteries.

Icon					
Battery Level	Less than 20%	20% to 40%	40% to 60%	60% to 80%	80% to 100%

12.4 Runtime

Battery runtime depends on several factors, including which batteries are used, backlight brightness, Bluetooth enable/disable, keypad backlight enabled/disabled, and datalogging with screen off. Typical battery life with default settings is listed in [Specifications](#).

12.5 Charging

The TI242 has a built-in charger that uses power from any USB charger using a mini-B connector, shown in Figure 12.5. Charging time is approximately 16 hours.

A USB charger or computer USB port that is capable of supplying 5V at 500mA is required to charge the TI242 batteries.


When charging is in progress, the battery indicator icon on the TI242 will be animated. Once the battery is fully charged, the battery meter will change to  and the battery will be given a trickle charge to keep it topped-off. It can remain plugged in if needed to keep the batteries fully charged.



Figure 12.5: USB/charging port

12.6 Included Batteries

Included batteries are four AA Duracell® DX1500H 2500mAh.

These batteries...

- Come pre-charged
- Will hold a charge for up to 1 year when not in use

13. GRAPHING






The TI242 can graph channel 1, channel 2, and math results. This can be helpful to identify trends and rate of changes over time. The graph is also used to view previously logged data that is stored on the devices.

13.1 Graph Settings

Graph settings can be changed by going to Graph Options screen (see: [Graph option screen](#))

13.2 Graphing Data

The graph can show:

- 1) Live data (see Figure 12.2.a)
 - a. This is the default view when viewing the graph screen
- 2) Previously logged data stored in memory (see Figure 12.2.b). See: [Viewing logged data while logging is still in progress.](#)
 - a. To view logged data, press  to enter the graph screen. The screen will be outline in red. Press  or  keys to browse through the data.  shows older data,  shows newer data. Example in Figure 12.2.b.

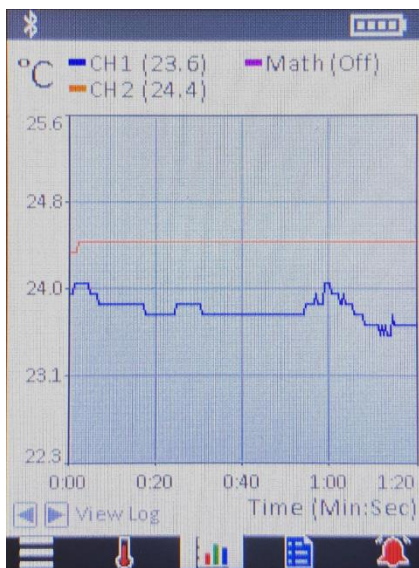


Figure 12.2.a: showing live data

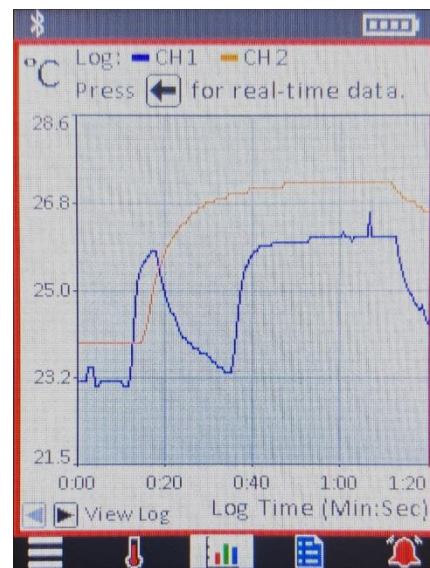


Figure 12.2.b: showing log data

What data can be graphed (one or more, user-selectable):

- 1) Channel 1
- 2) Channel 2
- 3) Math

13.3 Selecting which data is shown on graph

To customize which data is shown on the graph, go to the Graph Options screen and change the settings under “Data to show”.

If the channel or math is OFF, then data for that is not displayed on the graph and the legend says “Off”.

The Graph Settings option screen lets you customize which data is shown on the graph. Note: If the channel is disconnected, or turned off, the graph simply doesn’t show data for that channel, and the legend will read “Off” or “Open”.

13.4 Axis scaling

13.4.1 Y-axis scaling:

The Y-axis can be scaled in 3 ways:

- 1) Auto
- 2) Auto and Keep Center
- 3) Manual

13.4.2 Auto, Keep Center not enabled

The y-axis will scale automatically to keep all data in view. Y-axis grows only, it will not shrink, as data is viewed on the graph.





13.4.3 Auto, Keep Center enabled.

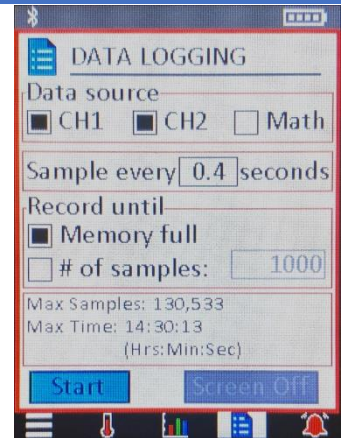
The Keep Center option while in Auto mode allows the Y-axis to grow and shrink continuously to keep y-axis scaled only for the data currently visible on the graph.

13.4.4 Manual

You can select the Ymax and Ymin of the graph, and the graph will lock those values, even if data is not visible on the graph.

14. DATA LOGGING

Navigate to the data logging screen by pressing the  or  keys until the blue paper icon is selected in the menu bar. The data logging screen is entered by pressing the  key or  key.



14.1 Data Source

You can choose which data source to record. If any of the data sources are turned off, then that option is greyed-out and cannot be selected.

14.2 Sample rate

The default sample rate is 2.5 samples/second (or 1 sample every 0.4 seconds). This sample time can be increased up to 65 seconds.

14.3 Record until

This determines when the unit will stop recording data.

14.3.1 Memory full

This will keep logging data until the data log memory is full. Depending on how many data sources (CH1, CH2, Math) you select, the number of samples that can be recorded

When recording in this mode, datalogging can safely be stopped at any time by pressing the “Stop” button in the Data Logging screen. Data is saved when stopped using this method.

The Maximum number of samples that can be recorded:

- 1) With one data source selected: 261,067 samples
- 2) With two data sources selected: 130,533 samples
- 3) With three data sources selected: 87,022 samples

14.3.2 # of samples

This will keep logging data until the number of samples have been collected.

When recording in this mode, datalogging can safely be stopped at any time by pressing the “Stop” button in the Data Logging screen. Data is saved when stopped using this method.

14.4 To start data logging

- 1) Select which data sources you want to record
- 2) Select sample rate (default is 0.4seconds/sample)
- 3) Select number of samples to record
- 4) Press "Start"

After pressing "Start", the data logging will start in the background, and a timer on the top of the screen will display the datalogging duration.

While datalogging:

You can...






- 1) View temperatures of CH1, CH2, and Math on the home screen
- 2) View live or logged data on the graph screen
- 3) Set the alarm

You can't...

- 1) Change device settings
- 2) Change the Data Log options
- 3) Change the math selection
- 4) Download the log data to your phone

14.5 Viewing logged data while logging is still in progress

To view the data:

- 1) Navigate to the graphing screen
- 2) Press the  key. The graphing window will be highlighted with a red box.
- 3) Press the  key to show older data. You can press and hold to scroll through larger datasets.
- 4) Press the  key to show newer data. You can press and hold to scroll through larger datasets.
- 5) Press the  or  key to return to the live view.
- 6) Example is shown in Figure 13.5 to the right.

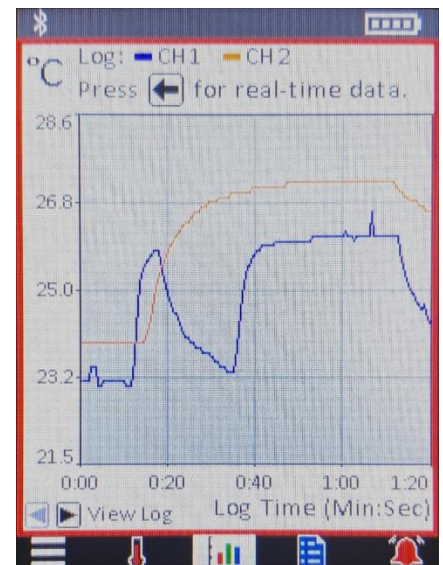


Figure 13.5

14.6 Viewing logged data when logging not in progress

The steps are identical to “Viewing logged data while logging is still in progress”


14.7 Turn screen off for extended data logging

- To conserve battery, the display backlight will automatically sleep while data logging if the unit isn't used for a set amount of time.
- This can also be achieved immediately with the “Screen Off” button on the data logging screen.
- The TI242 will continue to log data during this time.
- You can wake up the screen by pressing any key.

14.8 To stop data logging

Press the “Stop” button. You will get a confirmation window asking to stop.

14.9 Turning unit off while data logging

If you press the  button while data logging, you will get a confirmation window asking to confirm stop logging and turn off.

14.10 If the batteries fail while datalogging

If the batteries are too discharged to continue operating the TI242, the TI242 will automatically stop and safely save the data logging session before shutting down.

14.11 Downloading log data off the TI242

- You can use the Minco TI242 Utilities iPhone app to download the data over Bluetooth. See: [Bluetooth](#)
- You can download the data over USB using the Minco TI242 Utilities Windows application. See: [USB](#)

14.12 Data format

The data format is exported as a comma-separate-file (.csv). The information provided in the .csv file:

- 1) Sensor types used
- 2) Sensor offsets
- 3) Math type used
- 4) Sample rate
- 5) Time stamp (starting from 0 seconds)

14.13 Sample format of data file

Below is a sample of downloaded log data. The ... are placeholders where your temperature and timestamp data would be.

Channel Settings:			
Channel	Enabled	Type	Offset
CH1	TRUE	TC Type K	0
CH2	TRUE	RTD PT100	0
Math	TRUE	Difference (CH1 - CH2)	
Configuration:			
Seconds/Sample	Units		
0.4	C		
Data:			
Time (Seconds)	CH1	CH2	Math
0
0.4
...

15. ALARM

The alarm triggers based on the below settings.

Note: The alarm also functions normally while data logging. Data logging is not affected by using the alarm feature.

15.1 Monitor

What channel/math to monitor for levels going too low or too high. Monitors only the latest samples taken (older data is not used to trigger the alarm).

You can select multiple channels/math at the same time.

15.2 Trigger when

Trigger the alarm when the selected channel/math is outside of the range specified between the \leq and \geq values.

For example, if the temperature drops at or below the \leq value, or, if the temperature rises at or above the \geq value, then the alarm will trigger.

15.3 Alarm Type

Once the alarm is triggered, select how you want to be notified. You can select one or more type at the same time.

- 1) Keypad blink: This blinks the keypad backlight
- 2) Screen Blink: This will make the screen blink 1 time per second. The screen will turn off, then back on at full backlight brightness, repeatedly.
- 3) Buzzer: This will emit an audible buzzer that goes on and off 1 time per second.

15.4 Enable Alarm

Select this to enable the alarm. Deselect to disable the alarm.

15.5 When the alarm is triggered

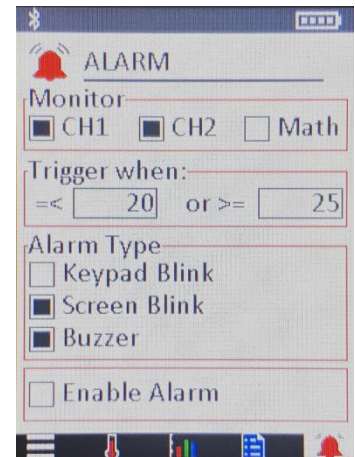
A message will pop up on the screen indicating an alarm trigger happened. In addition to that message, if you selected any alarm type(s), those will also happen. If you have a connected iPhone running the Minco TI242 Utilities app, you will receive an alarm notification on that as well.

15.6 How to stop an active alarm

Press any key on the device to stop the alarm. The Enable Alarm will automatically be deselected, disabling the alarm. You will have to select the Enable Alarm to enable the alarm again.

15.7 Remote notification

Once the alarm triggers, the alarm is also sent to a connected iPhone that is running the Minco TI242 Utilities App for remote monitoring of the alarm.




16. HOLD FUNCTION

While hold is active:

- Stops data acquisition.
- Graph data remains unchanged.
- You can still cycle through the math options
- “HOLD” is displayed in the top middle of the screen.

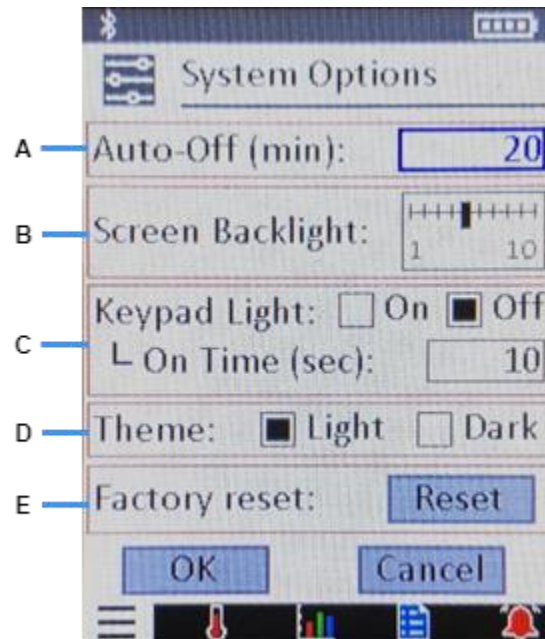
16.1 Activating/De-activating Hold:

On the home screen or the graphing screen, press  to toggle hold.

Hold function is disabled during data logging.

17. DEVICE SETTINGS

Device settings are changed in the System Options screen (see: [System Options screen](#))



- A** Sets how long after no button presses to turn off the TI242. Time is in minutes. Default is 20.
- B** Changes the brightness of the screen backlight. Levels adjustable from 1 to 10. Default is 5.
- C** The keypads are backlit. User can turn this feature on or off and set the on-time (in seconds). Default is Off, and 10 seconds.
- D** Select Light or Dark. Default is Light.
 - Light uses a white background on all the screens.
 - Dark uses a black background on all the screens.
- E** Clears data log memory and resets all devices settings to their values from the factory.

18. AUTO-OFF

The TI242 will turn itself off automatically to conserve battery. The default time is 20 minutes.

During datalogging, auto-off is automatically disabled.

To toggle the auto-off feature on or off, press and hold the  button until a message is displayed on-screen indicating the change (about 1.5 seconds).

Note: Auto-Off is re-enabled after a power cycle.

19. COMMUNICATION

The TI242 can be communicated to over Bluetooth using the Minco TI242 Utilities iPhone app, and over USB with the Minco TI242 Utilities Windows software.

19.1 Bluetooth

You can see live data on your iPhone using the Minco TI242 Utilities app.

Features of using Bluetooth:

- See live data from up to 650ft line-of-sight on your iPhone.
- View TI242 screen or graph on your iPhone.
- If you use the Alarm on the TI242, the alarm will be forwarded to your iPhone.
- Configure the Custom Sensors coefficients on your iPhone.
- Change the math statistics from your iPhone.
- Download data log to your iPhone.

While connected to Bluetooth:

- The TI242 will disable the auto-off and remain on until Bluetooth is disconnected.
- The screen backlight will go to sleep after a set amount of time to conserve battery. The backlight will wake up by pressing any key.

19.1.1 Bluetooth Connection Status Icon

The Bluetooth status icon is located in the upper-left corner of the screen, in the status bar. It is circled in the figure 18.1.1.

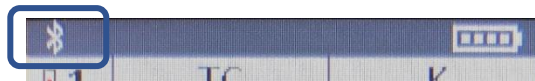


Figure 18.1.1: Bluetooth connection status icon

Appearance	Meaning
Icon not visible:	Bluetooth turned off
Icon color is white:	Bluetooth turned on, not connected.
Icon color is blue:	Bluetooth turned on, connected.

19.2 USB

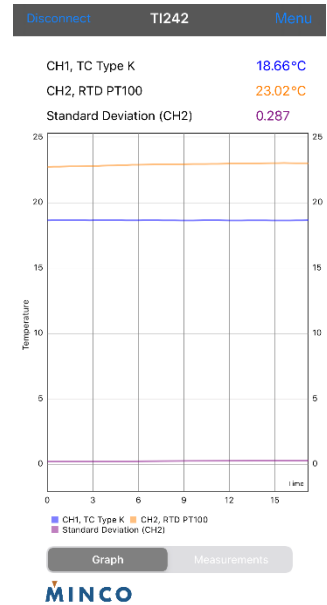
Communicates with a PC for reading stored data using the Minco TI242 Utilities Windows application

20. IPHONE APP

Get the Minco TI242 Utilities on the iPhone App Store.

App Features:

- See live data from up to 650ft line-of-sight on your iPhone.
- View TI242 screen or graph on your iPhone.
- If you use the Alarm on the TI242, the alarm will be forwarded to your iPhone.
- Configure the Custom Sensors coefficients on your iPhone.
- Change the math statistics from your iPhone.
- Download data log to your iPhone.

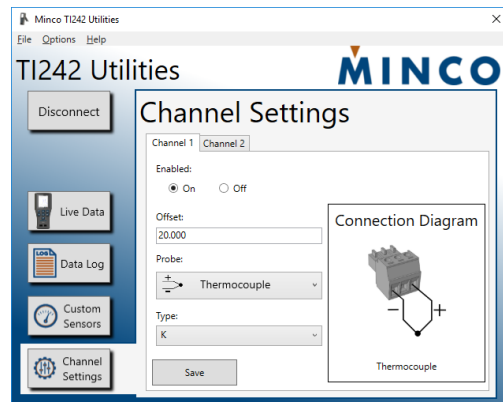
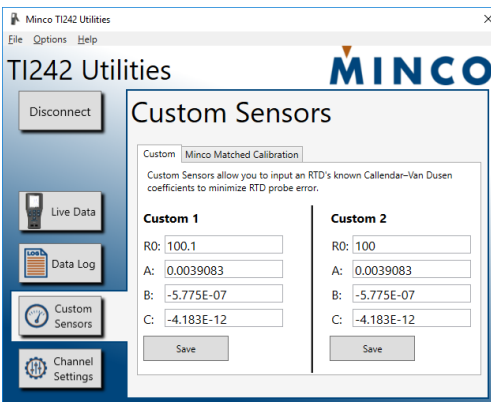
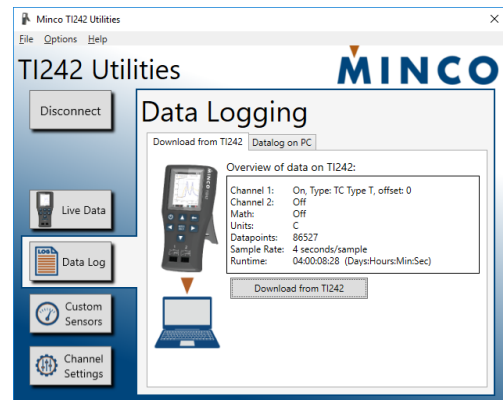
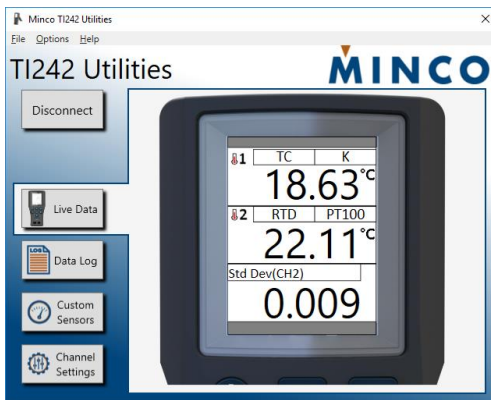


21. WINDOWS SOFTWARE

Minco TI242 Utilities Windows software is available for download on the Minco website (www.minco.com).

Features:

- See live data on your computer screen.
- Configure the Custom Sensors coefficients.
- Configure channel settings
- Download data log directly to your computer.
- Data log directly to your computer, so that data is stored on the computer in real-time.



22. CAUTIONS

For safe operation, and to prevent electrical shock or damage to equipment, consider these cautions:

- Caution:**
- Disconnect all temperature probes from the TI242 before replacing the batteries.
 - Turn off TI242 before replacing the batteries.
 - Do not mix different battery types or capacities.
 - Use only NiMH rechargeable batteries.
 - Do not charge non-rechargeable batteries.
- Caution:**
- Do not connect USB if using grounded thermocouples. The sensor inputs are not isolated.
- Caution:**
- Do not apply more than 200mV across the thermocouple input connectors, or damage to the TI242 may result.

23. COMPLIANCE



Contains FCC ID: QQQBGM13P

Contains IC: 5123A-BGM12P

23.1 Electromagnetic Compatibility (EMC):

Intended for basic environment, with performance criterion A performance as listed below:

“Level of performance expected in an EMC environment shall be such that the temperature readouts from the device will not deviate more +/- 5.0 degrees C.”