



RST INSTRUMENTS LTD.

TH2016B
Thermistor Readout
Instruction Manual

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TH2016B Thermistor Readout Instruction Manual

Although all efforts have been made to ensure the accuracy and completeness of the information contained in this document, RST Instruments reserves the right to change the information at any time and assumes no liability for its accuracy.

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Installation Manual

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Table of Contents

1	OVERVIEW	4
2	QUICK START INSTRUCTIONS	5
3	POWERING ON/OFF	5
4	TH2016B FRONT PANEL CONTROLS.....	7
4.1	Startup.....	7
4.2	Setting the Date & Time	8
4.3	Connecting Single Field Instruments	8
4.4	Multi-Channel Connection.....	9
5	MONITOR SETTINGS.....	9
5.1	Import From Loc. Option	9
5.2	Custom Setup.....	10
6	MANUAL READINGS	12
7	STORING READINGS IN MEMORY	12
7.1	Creating Memory Locations in the Field	12
7.2	Reviewing Data.....	16
7.3	Datalogging.....	17
7.4	Deleting.....	20
8	TH2016B INTERNAL BATTERY.....	21
9	SOFTWARE & FIRMWARE UPDATES	22
10	CONTACT US.....	22
11	APPENDIX A – TH2016B MENU FLOW CHART.....	23
12	APPENDIX B – EXPANSION CONNECTOR PIN-OUT.....	24
13	APPENDIX C – SPECIFICATIONS	25

Table of Figures

Figure 1 – TH2016B Readout 4

Figure 2 – Manual Power Off 5

Figure 3 – Auto Off Screen 5

Figure 4 – Auto Power Off Time 6

Figure 5 – Auto Backlight Off 6

Figure 6 – TH2016B Readout Details 7

Figure 7 – Readings Screen 7

Figure 8 – Set Time 8

Figure 9 – Date/Time Set 8

Figure 10 – Monitor Settings 9

Figure 11 – Monitor Settings Options 9

Figure 12 – Predefined Monitor Options 10

Figure 13 – Predefined Correction Parameters 10

Figure 14 – Sensor Number 10

Figure 15 – Thermistor Type 11

Figure 16 – Thermistor Units 11

Figure 17 – Memory Screen 13

Figure 18 – Create Location 13

Figure 19 – New Location 13

Figure 20 – Thermistor Type 14

Figure 21 – Select Location 14

Figure 22 – Storing a Reading 14

Figure 23 – Accepting Reading 15

Figure 24 – Select a Location 16

Figure 25 – Reviewing Data 16

Figure 26 – Datalogging Screen 17

Figure 27 – Select a Location 17

Figure 28 – Datalogging Interval 17

Figure 29 – Datalogging Number 18

Figure 30 – Logging Screen 18

Figure 31 – Logging Completed 19

Figure 32 – Delete 20

Figure 33 – Delete Options 20

Figure 34 – Battery Door 21

Figure 35 – Battery Voltage 21

Figure 36 – TH2016B Menu Flow-Chart 23

1 OVERVIEW

The RST TH2016B Thermistor Readout represents the next generation in thermistor readout devices. It's lightweight, yet extremely rugged design is perfectly suited for harsh environmental conditions often encountered in the field. Furthermore the TH2016B is extremely easy to use with a USB interface for downloading data. The readout uses 3 standard AA alkaline batteries which are field replaceable, negating the need to return the readout to the factory for battery replacement. The use of standard AA batteries eliminates the need for a charger.



Figure 1 – TH2016B Readout

- | | |
|--------------------------------|--|
| 1. USB Connector | 6. Scroll Down |
| 2. Large Character LCD display | 7. Enter |
| 3. Backlight | 8. Terminal Strip (for single sensor connection) |
| 4. ESC (navigates back a menu) | 9. Expansion Port (16 sensor connection) |
| 5. Scroll Up | |

2 QUICK START INSTRUCTIONS

The instructions for performing a manual reading on a Thermistor (i.e. not storing to memory) are simple and straightforward:

1. Connect the Thermistor to the terminal block (Figure 1)
2. Turn display on (press any key)
3. Wait a few moments for unit to startup
4. Record the displayed reading.

Note

Step 4 (above) is assuming the Monitor Settings are set to *default*. The TH2016B has the ability to custom configure the readout settings so Celsius or Fahrenheit units can be displayed, as well as sensor resistance.

3 POWERING ON/OFF

The TH2016B readout can be powered on anytime by pressing any key. The unit can be powered off manually or automatically. To power off manually, use the up/down arrows to scroll to the following screen:

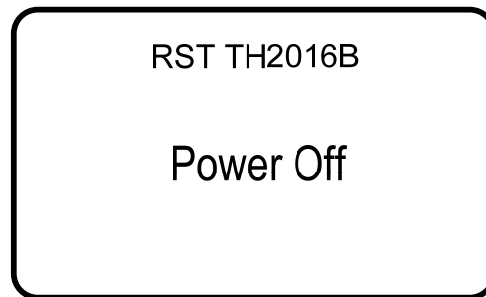


Figure 2 – Manual Power Off

- Press *Enter* and the unit will turn off.
- To adjust the automatic power off settings, navigate to the *Auto Off* screen as shown below:

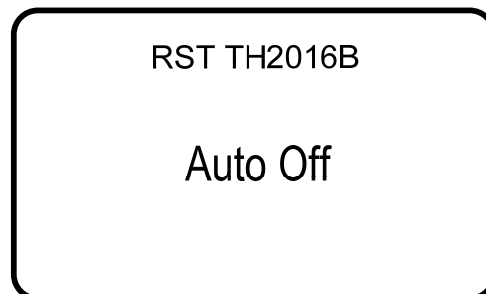


Figure 3 – Auto Off Screen

- Press *Enter* and the following screen will appear:

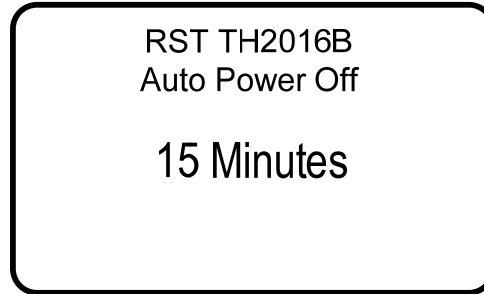


Figure 4 – Auto Power Off Time

Use the arrow keys to scroll to the desired auto power off time. Please note that the auto power off feature is always active and cannot be disabled. This is to conserve battery life. The default is 5 minutes. The next screen prompts to set the Auto Backlight Off:

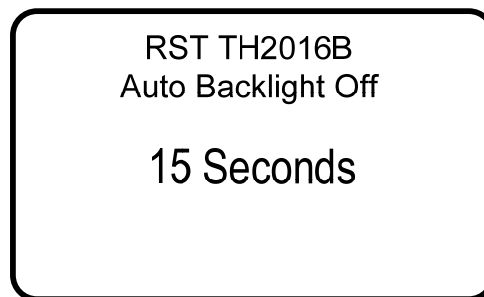


Figure 5 – Auto Backlight Off

Use the up/down scroll buttons to adjust. Press *Enter* and you will be returned to the previous menu.

4 TH2016B FRONT PANEL CONTROLS

4.1 Startup

Upon powering on the unit (by pressing any key), an opening screen will appear showing the RST Instruments logo. If the user wishes to view the details of the readout *press any key* immediately and the following will appear:

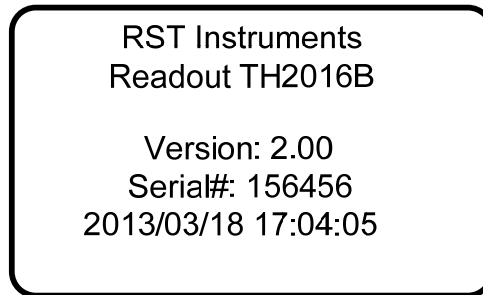


Figure 6 – TH2016B Readout Details

This displays the model, version number, serial number and the current date/time settings. It is always a good idea to ensure that the date and time are correct, as this may affect any readings being stored in memory on the unit. Refer to section 0 for setting the date and time.

If no keys are pressed after power on, the unit will default to readings screen as shown below.

RST TH2016B		°C
23.52	23.52	23.52
24.56	24.56	24.56
21.56 >	21.56	
23.43	23.43	
24.76	24.76	
24.67	24.67	

Figure 7 – Readings Screen

The readings screen displays the current reading on the thermistor (assuming an instrument is connected). The default units are degrees Celsius. Temperature units can be changed if desired (section 5). The time interval between subsequent sensor readings can be changed using Multireadout Host Software shipped with TH2016B readout. The default sampling delay is 0.2 seconds.

Note

In Monitor mode, press the Enter key on keypad to skip the sampling delay and move on to read next sensor.

Note

Hold down both arrow keys to toffle between reading units: °C, F, Ohms.

4.2 Setting the Date & Time

Keeping the date and time current ensures that you have accurate historical records of your temperature data. Whenever a reading is taken and stored in the units' memory, an associated date/time stamp is always included.

- Turn on the readout by pressing any key.
- Using the arrow keys, scroll down to the *Set Time* screen and press *Enter*:

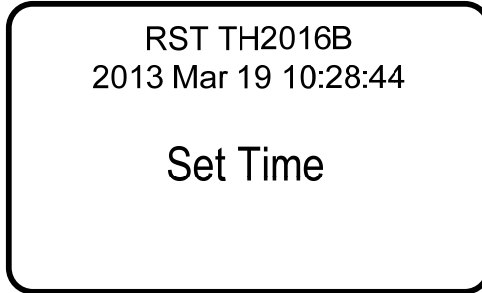


Figure 8 – Set Time

- The current editable data field will have an underline, use the arrow keys to modify the field and press enter when complete (pressing enter cycles through each field).

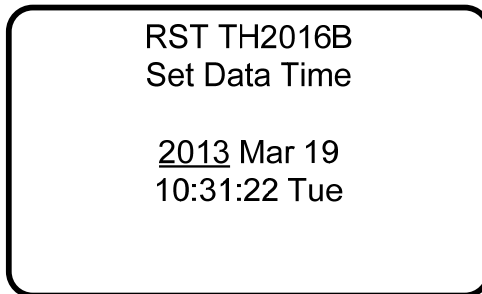


Figure 9 – Date/Time Set

- When complete the program will exit to the main menu screen.

4.3 Connecting Single Field Instruments

The standard wiring for an individual thermistor consists of one pair of wires plus an additional shield. The following table outlines the color codes:

Green	Therm +
White	Therm -
Bare	Shield

Flip up the gates on the quick connect terminal strip (Figure 1) and insert the stripped ends of the cable matching color for color. Close each gate to secure the wire. If needed, RST can supply a cable with alligator clips for instrument connection.

Note

Applying solder to the bare ends of the cable aids in reducing fraying over time. All RST sensors are pre-tinned from the factory.

4.4 Multi-Channel Connection

The TH2016B contains an internal multiplexer allowing it to be connected to multi-channel instruments through its *Expansion* connector. Appendix B – Expansion Connector Pin-out provides the pin-out of this connector. Mating halves of the connectors are available through RST if your current sensors are not equipped with the appropriate connector.

During location setup, the number of sensors can be specified. Please refer to sections 5 & 7.

5 MONITOR SETTINGS

Various parameters of the TH2016B readout can be adjusted by selecting the *Monitor Settings* menu as shown below:

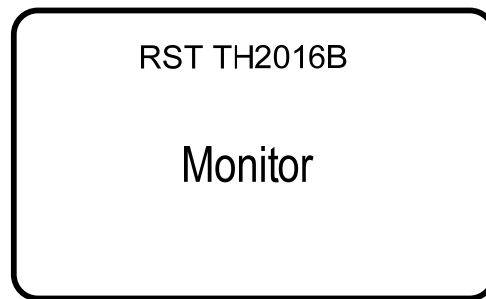


Figure 10 – Monitor Settings

- Press *Enter* to choose whether a custom or predefined setting is required.

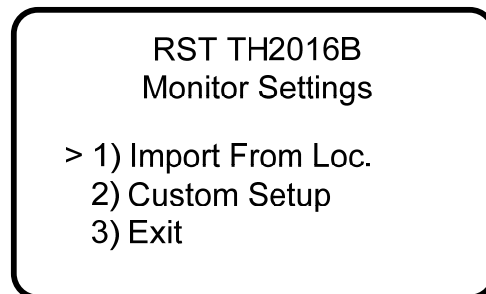


Figure 11 – Monitor Settings Options

5.1 Import From Loc. Option

If the *Import From Loc.* option is chosen (selecting option 2 and pressing *enter*), the screen will advance to the location screen (i.e. Figure 21), assuming at least one location was defined. If no memory locations currently exist in the readout's memory, a screen will appear stating "No Locations". Each location has its own specific settings such as: number of sensors; thermistor type and temperature correction parameters. Use the arrow keys to scroll to the location which you would like to set the monitor settings to. Press *enter* when complete. The location label will appear at the top of the screen indicating location settings currently in use.

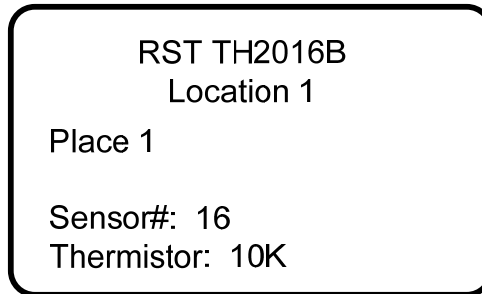


Figure 12 – Predefined Monitor Options

- Use the up/down arrows to select the location to copy the settings from and press *Enter*. The unit will display the Correction Parameters for chosen location.

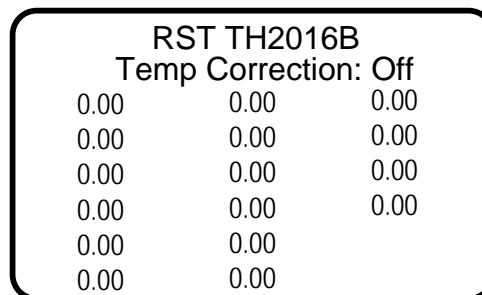


Figure 13 – Predefined Correction Parameters

- Press the up/down arrow keys to turn temperature correction feature on or off. Press *Enter* when complete. The unit will return to the previous menu.

5.2 Custom Setup

If the *Custom Setup* is chosen (option 1 and pressing *enter*), the screen will advance and prompt for the number of sensors.

- Press *Enter* to select the number of sensors connected. This will be set to 1 if using terminal strip connector or any number between 1 and 16 if connecting sensors to expansion connector.

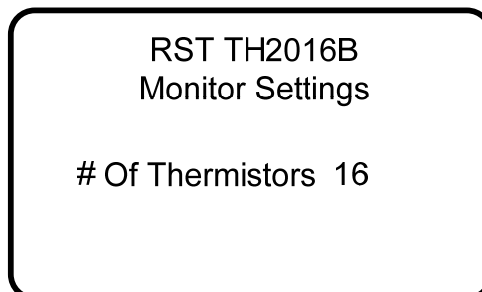


Figure 14 – Sensor Number

- Press *Enter* choose the *Thermistor Type*:

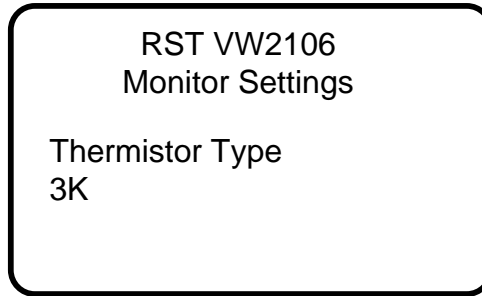


Figure 15 – Thermistor Type

- Use the up/down arrows to select the appropriate thermistor. Options include 2252, 3K, 10K and RTD. For most cases, the default “5K” thermistor should be chosen. Press *Enter* when complete.
- Select the desired display units (Centigrade/Fahrenheit):

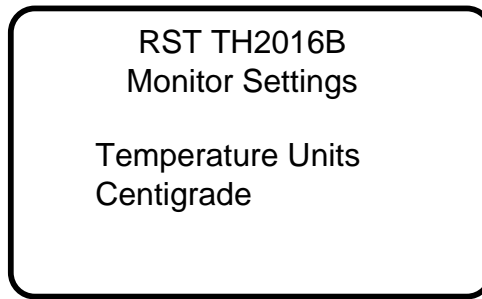


Figure 16 – Thermistor Units

- Press the up/down arrow keys to select and press *Enter* when complete. The unit will return to the previous menu.

6 MANUAL READINGS

The following instructions outline the basic steps needed to take a manual reading with the TH2016B readout:

- Connect the Thermistor leads to the quick-connect terminals. Match the wires color for color.
- Turn on the readout by pressing any key.
- The readout will go through its startup procedure, and automatically default to the reading screen.
- The temperature reading will appear ($^{\circ}\text{C}/^{\circ}\text{F}$).
- Record the reading and move onto the next instrument.
- Manual readings on sensors which contain multiple thermistors are performed by connecting the instrument to the *Expansion* port with the appropriate connector (section 4.4).

Note

In Monitor mode, press the Enter key on keypad to skip the sampling delay and move on to read next sensor..

For memory functions, please refer to section 7.

7 STORING READINGS IN MEMORY

The TH2016B has 128k of internal memory allowing it to store over 3018 time-stamped thermistor readings. The current memory usage is displayed on *Memory* screen, as shown in Figure 17. Data can be reviewed either on-board or downloaded to a host computer via the USB connector. Individual locations can be preconfigured in the office via the Multireadout Host Software or by creating locations on the unit itself (section 7.1).

7.1 Creating Memory Locations in the Field

The TH2016B Readout has the ability to be either pre-configured in the office (through Host Software), or taken directly to the field. If taken directly to the field, each location will be assigned a generic name which is editable once back in the office and connected to a host computer. In most cases it is recommended that the TH2016B be pre-configured in the office prior to taking readings in the field. In this manner, site location names can be setup ahead of time allowing the field personnel to be able to arrive at instrument locations, and store readings without needing to create a location in the units' memory.

If the TH2016B has not been pre-configured in the office, the following instructions explain how to create new locations. Please refer to Figure 36 (flow chart) for a graphical representation of the steps outlined below:

- Turn on the readout by pressing any key.
- Using the arrow keys, scroll to *Memory* and press *Enter*.

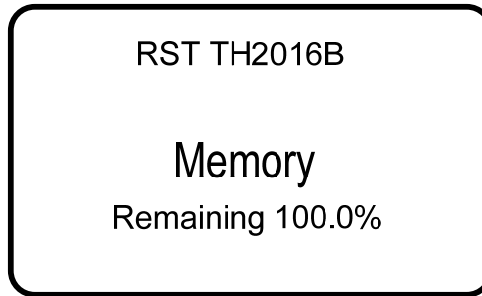


Figure 17 – Memory Screen

- Press *Enter* to advance to the next screen.
- Using the arrow keys, scroll to *Create Location* and press *Enter*.

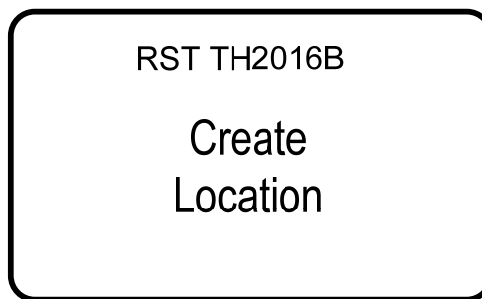
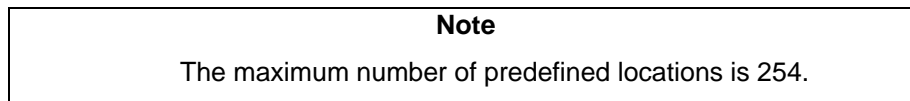


Figure 18 – Create Location

- The readout unit will automatically create a site called *Location X* where 'X' is the next storage location available in the units' memory. Please note that when creating new sites in the field, you can only name them *Location X*. Make note of the real location name in your field notebook and its relation to the *Location* number. When connecting to the Host Software back in the office, a custom name can be entered at that time. This replaces the site name assigned by the readout.

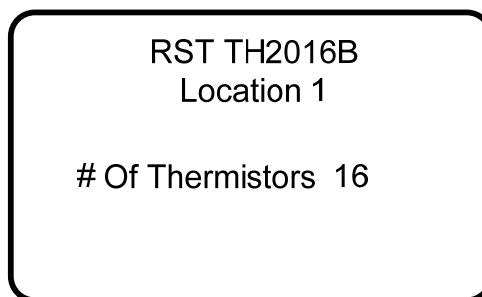


Figure 19 – New Location

- The TH2016B automatically increments the new location to the next number available.

- Use the arrow keys to select the number of thermistors associated with that location. Valid entries are between 1 and 16 thermistors.
- Next, choose the type of Thermistor. The default is "5K". Press Enter when complete.

RST TH2016B
Location 1

Thermistor Type
3K

Figure 20 – Thermistor Type

- Once the thermistor type has been chosen, press *Enter* and the unit will return to the previous menu. Use the arrow keys to scroll to *Store Data* and press *Enter*. The following screen will appear:

RST TH2016B
Location 1

Location 1

Sensor#: 16
Thermistor: 3K

Figure 21 – Select Location

- Use the arrow keys to select the location you just created. When the desired location is found, press *Enter* to select it. The following will appear:

2013/03/18 17:25:48 °C		
23.52	23.52	23.52
24.56	24.56	24.56
21.56 >	21.56	
23.43	23.43	
24.76	24.76	
24.67	24.67	

Figure 22 – Storing a Reading

Note

In Store Data mode, press the Down Arrow key on keypad to skip the sampling delay and move on to read next sensor..

Note

Hold down both arrow keys to toffle between reading units: °C, F, Ohms.

- Figure 22 illustrates a location that has 16 sensors associated with it. Press *Enter* to store the reading.
- The TH2016B will prompt you with the question: *Accept?*, press *Enter* to store the reading.

			Accept?
23.52	23.52	23.52	
24.56	24.56	24.56	
21.56 >	21.56		
23.43	23.43		
24.76	24.76		
24.67	24.67		

Figure 23 – Accepting Reading

- After storing the reading, the TH2016B will return the user to the previous screen.

7.2 Reviewing Data

To review any reading on the TH2016B unit itself, please follow these instructions:

- Power on the readout by pressing any key.
- Using the arrow keys, scroll down to *Memory*, press *Enter*.
- Scroll to *Review Data* and press *Enter*.
- Scroll to the desired location (using arrow keys) and press *Enter*.

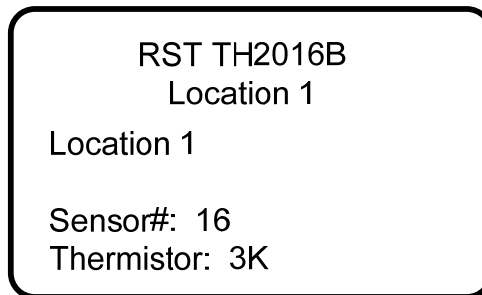


Figure 24 – Select a Location

- If the location contains more than one reading, these readings can be scrolled through using the arrow keys. The date and time of each reading will appear to differentiate each reading.

A screenshot of the RST TH2016B readout interface showing a list of sensor readings. The header line is "2013/03/18 17:25:48 °C". Below it are several rows of numerical values, some with a greater-than sign (>) between them, indicating a scrollable list.

2013/03/18 17:25:48 °C		
23.52	23.52	23.52
24.56	24.56	24.56
21.56 >	21.56	
23.43	23.43	
24.76	24.76	
24.67	24.67	

Figure 25 – Reviewing Data

- Figure 25 illustrates 16 independent sensors associated with a single location.
-

Note

Hold down both arrow keys to toffle between reading units: °C, F, Ohms.

7.3 Datalogging

The TH2016B has a basic datalogging function where the user is able to set the datalogging interval and the number of iterations. Datalogging can function on either the single or multiple channel features of the readout.

- From the TH2016B main reading screen scroll to *Memory* and press *Enter*.
- Use the arrows to scroll to the datalogging screen as shown below and press *Enter*.

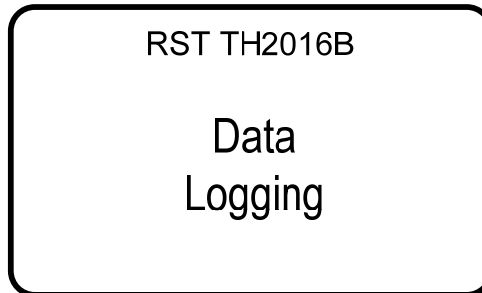


Figure 26 – Datalogging Screen

- Choose a location you wish to record data to by using the arrow keys. If no locations are currently set-up, the readout will respond with "No Locations". Proceed to setup a location as described in section 7.1.

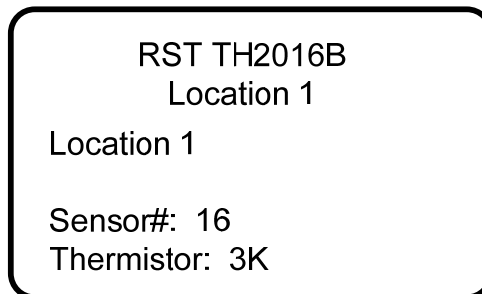


Figure 27 – Select a Location

- Then set the *Interval* using the arrow keys. Holding down the arrow keys make the digits scroll faster. Press *Enter* when complete.

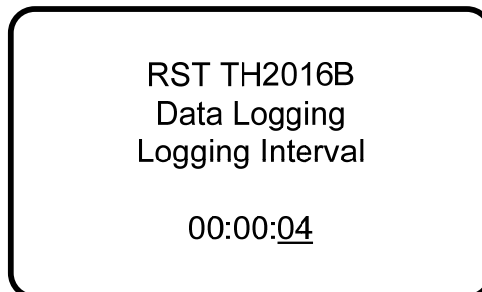


Figure 28 – Datalogging Interval

- Once the interval is set, press *Enter* and the following screen will appear:

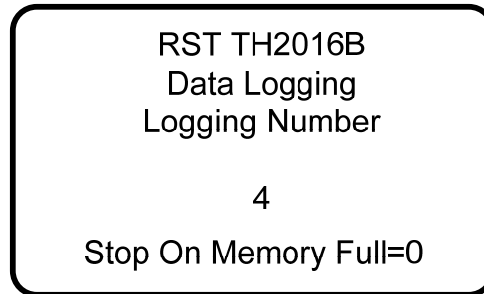


Figure 29 – Datalogging Number

- Use the arrow keys to select the number of iterations you wish the readout to datalog (in the above case, it will take 4 readings at a 4 second interval). To continuously datalog until the memory is full, select 0. After pressing *enter* the readout will start the datalogging process and will end with “logging completed”. ESC can be pressed at any time to abort the datalogging process.
- Datalogging can also be accessed through the *Store Data* screen (once the intervals have been created as described above). Scroll to *Store Data* and select the location were you would like to datalog. Press *Enter*.
- Press and HOLD the enter button to commence datalogging. The screen will appear as follows:

Logging 1		15:37:31
		°C
24.81	24.81	24.81
24.81	24.81	24.81
24.81	24.81	24.81
24.81	24.81	24.81
24.81	24.81	
24.81	24.81	

Figure 30 – Logging Screen

- During datalogging, the logging number will increase with the corresponding time stamp being updated in the upper right-hand corner of the screen.

Note

In Data Logging mode, press the Down Arrow key on keypad to skip the sampling delay and move on to read next sensor..

- Once logging has finished, the following will appear:

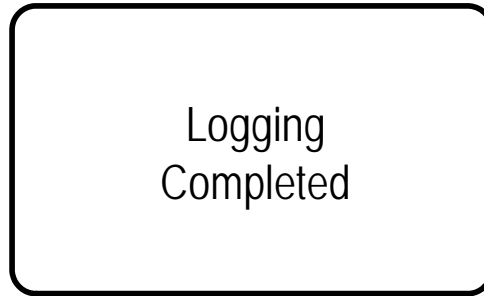


Figure 31 – Logging Completed

- Once datalogging is complete, the readout will automatically turn off according to the *Auto Off* setting (section 3).

7.4 Deleting

All location information can be deleted from the TH2016B readout or via the Host Software. This is done by the following:

- Power on the display by pressing any key.
- Using the arrow keys, scroll down to *Memory*, press *Enter*.
- Using the arrow keys, scroll to *Delete* and press *Enter*.

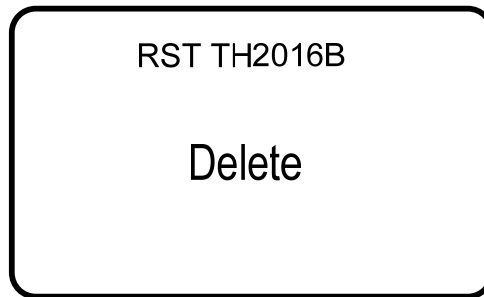


Figure 32 – Delete

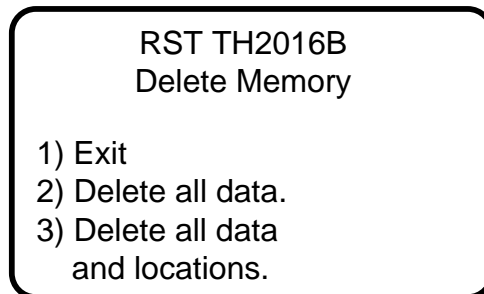


Figure 33 – Delete Options

Using the *arrow keys*, scroll to the desired delete option and press the *Enter* key to select. Press *Enter* to confirm, press *ESC* to exit back to the main menu.

8 TH2016B INTERNAL BATTERY

The RST TH2016B operates on 3 alkaline AA batteries. Access to the batteries is done through a port on the side of the unit. Use a flathead screwdriver or a coin to access the batteries (see Figure 34). The unit ships standard with regular AA batteries. If the unit is being used consistently in cold environments, the user may replace the alkaline batteries with lithium batteries which are also readily available.



Figure 34 – Battery Door

The status of the battery can be checked by:

- Turning on the readout by pressing any key.
- Using the arrow keys, scroll to the battery voltage screen.
- The readout will display the *battery voltage* as shown below:

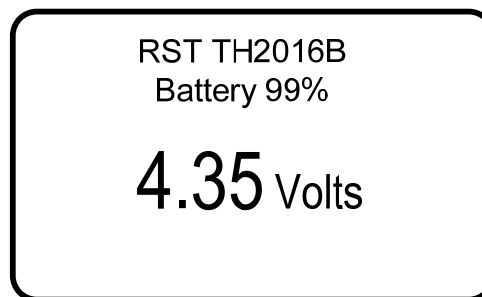


Figure 35 – Battery Voltage

Note

If the battery voltage drops below 3.5 volts a low battery warning will be displayed in the form of "BATT" in the upper right of each screen. Change the batteries at this time.

9 SOFTWARE & FIRMWARE UPDATES

The TH2016B readout is designed such that the unit's software and firmware can be easily updated by the customer through the USB port. Please regularly visit: <http://www.rstinstruments.com> for product updates.

10 CONTACT US

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Facsimile: 604-540-1005
Toll Free: 1-800-665-5599
Website: <http://www.rstinstruments.com>

11 APPENDIX A – TH2016B MENU FLOW CHART

The following flow chart outlines all functions of the TH2016B front panel controls:

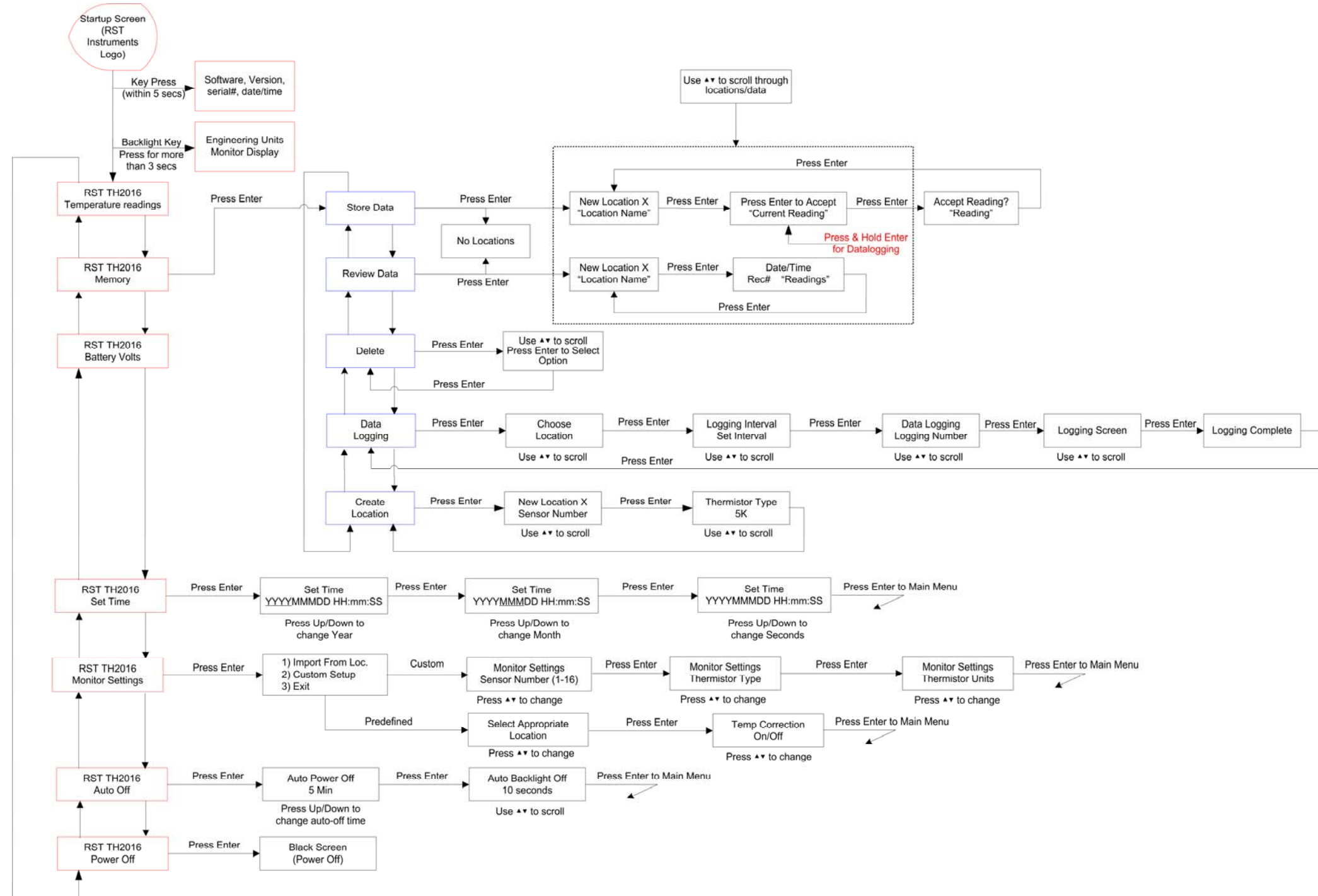


Figure 36 – TH2016B Menu Flow-Chart

12 APPENDIX B – EXPANSION CONNECTOR PIN-OUT

Trident Connector Pin	Signal
A	Therm 1 +
B	Therm 2 +
C	Therm 3 +
D	Therm 4 +
E	Therm 5 +
F	Therm 6 +
G	Therm 7 +
H	Therm 8 +
J	Therm 9 +
K	Therm 10 +
L	Therm 11 +
M	Thermistor -
N	Therm 12 +
P	Therm 13 +
R	Therm 14 +
S	Therm 15 +
T	Therm 16 +
U	NC
V	NC

TH2016B Connector ITT: **Trident Part No. = 192900-0039**

Mates with: **Trident Part No. = 192922-1280**

13 APPENDIX C – SPECIFICATIONS

<i>Description</i>	<i>Specification</i>
Supported Temperature Readout Sensors	NTC3000 (standard), NTC2252, NTC10K, RTD, NTC 5K
Thermistor Accuracy	±0.01°C
Thermistor Range	-50 °C to 80 °C
Display	Graphic 128 x 64 pixels large character display
Display Backlight	High efficiency LCD with auto off
Memory	128 kB
Max Instrument Locations	254
Memory Capacity	3018 custom labeled points
Location Identification String	Up to 20 characters
Download Speed	15 seconds (full memory)
Battery	3 "AA" alkaline
Battery Indicator	On-screen low battery indicator
Operating Temperature	-20 °C to 60 °C
Dimensions	W 22cm x D 19cm x H9.5cm (8.75 x 7.5 x 3.75in.)
Weight	1.1 kg (2.4 lbs)