



ThermaViewerTM

The Best Way to Look at Temperature

Installation Guide

Care and Use Guide



Congratulations!

With your purchase of the ThermaViewer your monitoring and documenting temperature or temperature/RH concerns are over. The ThermaViewer is a high-quality system that is designed to give years of reliable service.

The TDVD-01, 02, and 05 models are used to track temperature in refrigerators, freezers, rooms, incubators and literally anywhere it is necessary to monitor and document temperature. The ThermaViewer display-unit logs and displays temperature information that it receives from the attached sensors. The accuracy of the temperatures displayed on the LCD and stored in the SRAM of the display unit is dependent on the accuracy of the sensors used to collect the temperature data. Sensors are available with accuracies of $\sim \pm 1^{\circ}\text{C}$, $\pm 0.2^{\circ}\text{C}$, $\pm 0.1^{\circ}\text{C}$, $\pm 0.05^{\circ}\text{C}$.

The TDVDR model is used to monitor and document temperature and humidity in rooms, appliances or manufacturing processes. It uses a probe that has both a thermistor and an RH sensor on it so that the same probe collects both variables.

All ThermaViewers are powered from a power adaptor, which plugs into wall power and supplies 12volt 500mA current to the ThermaViewer. Each also has a 9vdc battery backup to run the ThermaViewer if wall power is missing. The length of time the unit will continue to operate, depends on how often it is sampling temperature/RH and whether the display unit is awake or asleep. If the LCD display unit is awake the 9vdc battery will run the ThermaViewer only for a couple of hours. If the display is allowed to go to sleep the instrument will continue to collect temperature/RH data for many hours... even several days depending on how often it is sampling and storing data.

All ThermaViewer models can be used to trigger an alert if your temperature limits are exceeded. The built in dry-contact relay is normally open and will close to complete a circuit under alert conditions. This relay will not normally supply current to drive an alert device but will simply close a circuit, so the alert device must have a way of getting power from a source other than the ThermaViewer.

Should you have the need for parts or service, you may contact us at: Phone (502) 243-0042, (877) 241-0042 Fax: (502) 243-0039 Email: info@e2di.com

Factory Service and Returns:

Please call for a return authorization (RA) prior to sending any instrument for repairs. (see page 29 for warranty information).

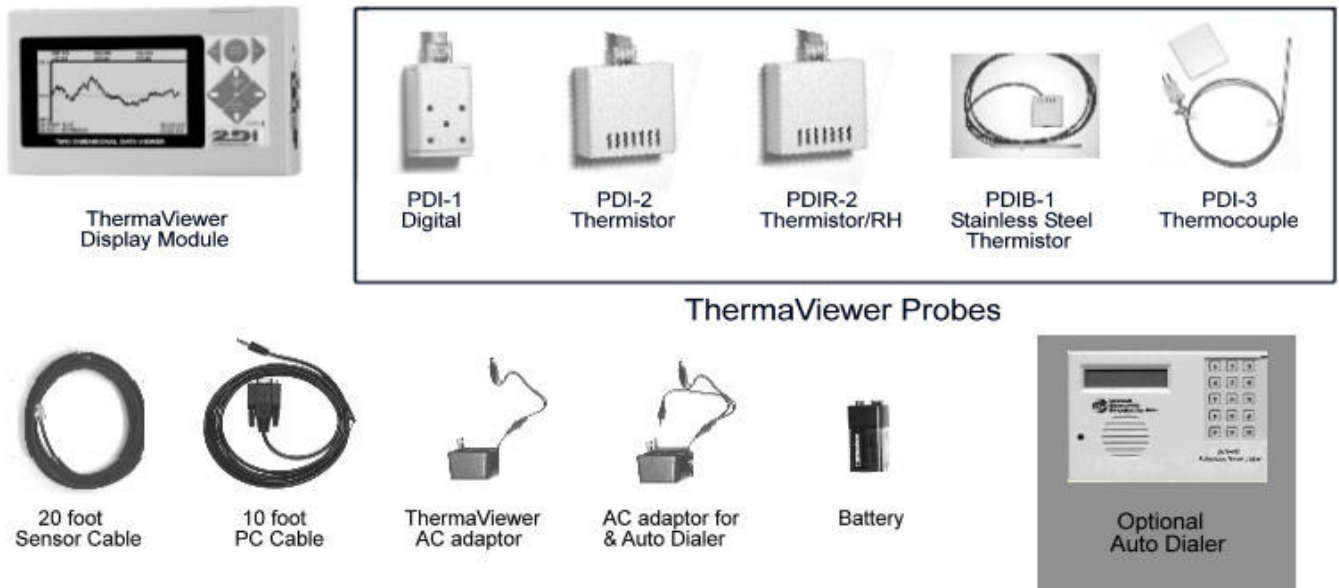


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Components and Packing List



You should have received a display module, two probes (PDI-1, PDI-2, PDIR-2, PDIB-1 or PDI-3), two sensor cables, a PC interface cable, a 9vdc backup battery, and an AC power adaptor. If you ordered the optional Auto Dialer you should also have received it. If any of these items are missing please contact the distributor or reseller from whom you ordered the ThermaViewer immediately.



Quick Start

Your ThermaViewer can be installed and operating in minutes. Factory defaults are set for a refrigerator (21°F. min, 41°F ref, and 55°F max). If you are not installing the ThermaViewer on a refrigerator additional set-up will be required (see page 27).

Once you have unpacked all ThermaViewer components, follow the simple steps below:

- 1. Remove the protective film.**

The ThermaViewer is shipped with a thin protective film over the display, to protect it from being scratched during shipment. Gently peel a corner of the film up and pull it off.

- 2. Install the 9vdc battery.**

Slide the battery cover on the top of the ThermaViewer forward to remove it.

Retrieve the battery wiring harness and attach it to the battery.

Insert the battery into the unit and reinstall the battery cover

- 3. Attach the probes.**

Insert the probe cables into the right side of the unit (see illustration on page 9).

Attach the probes to the other end of the cable

- 4. Position the probes.**

If one or both probes are being installed in refrigerators or freezers, position the probes near the middle of the appliance for most accurate readings. The probes should be positioned in a sheltered area to protect the plastic enclosure.

- 5. Connect the power supply.**

Attach the power cord and insert the plug into a wall socket. The green light on the membrane switch will come on indicating that the unit is receiving power from the wall power adaptor.

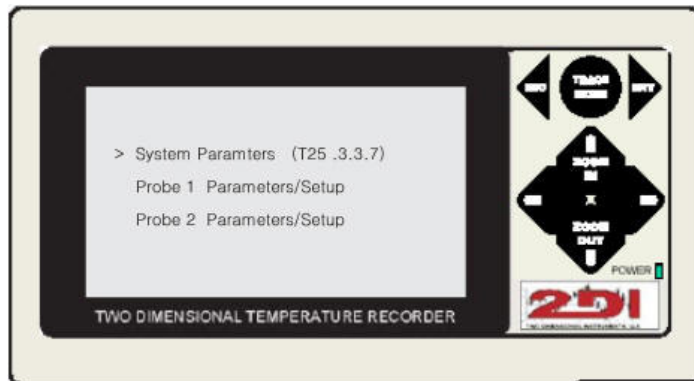
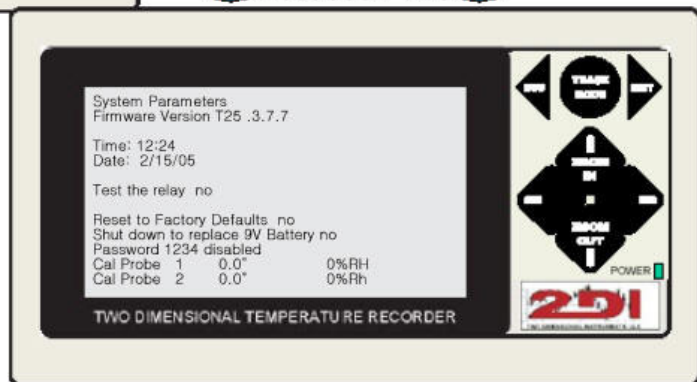


Illustration One

Illustration Two



6. Reset the display.

The unit will go through a power-up self-test during which time several messages will be displayed on the LCD display. During this time the memory is cleared, the microprocessor and all circuits are initiated and checked. A small 'counter' will appear in the lower right hand corner that will rotate in a clockwise direction indicating that the test is running.

If the display is blank after supplying power, insert a straightened paper clip into the small hole on the right side of the unit to reset it. (See illustration on page 9).

7. Set the date and time.

- Press Enter Key  to access the 'Menu' system. (See illustration one above).
- Press the Enter Key  again to access the System Parameters menu (See illustration two above). The cursor will highlight the 'hour' field.



- c. Use the Up  Down  arrow keys to set the hour (24:00 time) and press the Enter Key  Pressing the Enter Key enters the hour into memory and moves the cursor to the next field.
 - d. Set the minute by using the Up  Down  arrow keys. Press the Enter Key  to enter the minutes and move to the next field.
 - e. Set the month (1-12) and press the Enter Key  to enter the current month into memory and move to the next field. (US date format=mm/dd/yy, European date format=dd/mm/yy). If you use an European date format these two fields are reversed so that you enter the day first and then the month.
 - f. Use the Up  Down  keys to set the day (or month) and press the Enter key  to enter the value and move to the next field.
 - g. Next use the Up  Down  arrow keys to scroll in the correct year and press the Enter Key to enter it and move to the next field. Press the Enter key  twice to move to the seconds part of the display sleep field (00:00) and use the Up arrow key to scroll in 30 seconds.
- Leave the minute field blank. This will cause the display to sleep after 30 seconds any time the wall power supply is interrupted. This is critical and will insure that the battery will operate the ThermaViewer if wall power is missing. If you leave these two fields blank the display will never sleep and the 9vdc battery will run down very quickly if you have a power failure.
- h. These are all the field that need to be filled in at this time, so exit this menu (see i. below) and return to the main menu,
 - i. To exit the menu press the Esc key , which will back the cursor up field by field until exiting to the previous menu. You can also press the Enter key , which will move the cursor from field to field until the menu is exited and you return to the main menu display.



Installation

Some advanced preparation, prior to installation will assure you of many years of reliable and accurate service. Here are a few installation tips.

1. Planning

Decide where to position the ThermaViewer display unit and to ensure adequate probe cable length, measure the distance from the display location to the ideal temperature probe location. Be sure to consider the routing of the cable around door-jams and dressing the cable around obstacles.

2. Temperature Probes and Cables

The ThermaViewer is shipped with a 20 foot cable for each probe. If this is not adequate and you need additional cable you can order it from Two Dimensional Instruments (877) 243-0042 or from your distributor. You can also make an extension cable. The best cable to use is Silver Satin 8 conductor phone cable with an RJ45 connector on each end. This cable is un-twisted single strand cable. You should avoid using twisted pair cable, such as is found in Cat 5 network cable as the twisted pairs can cause the signal to fall off over distances whereas the straight through cable will insure the signal remains strong over a long distance.

The cable can easily be lengthened by 100 feet or more without sacrificing accuracy. The instrument was designed so that only a digital signal is carried through the probe cables to help preserve the signal reliability. If an extension cable is added to the probe cable run couple it to the supplied cable and position the supplied cable in the refrigerator or freezer. It is built to withstand cold temperatures down to -20°F , whereas the ends of the silver satin cable will oxidize over time in that temperature.

An AC power source is required at the desired ThermaViewer display module location. The AC adaptor is supplied with the ThermaViewer with a 10 foot cord.

2. Temperature Probes Positions

For suggested probe positions in refrigerators, freezers, cold rooms, etc... see application notes at <http://www.e2di.com/appnotes.html> .

3. PC Interface Cable

The ten-foot cable with the nine-pin (DB9) connector on one end and a stereo plug on the other is used to download data from the ThermaViewer to a computer. The nine-pin connector is compatible with a computer serial port. *(If your computer only has a USB port you will need a USB to Serial converter).* If the ThermaViewer is not located near a computer it can be unplugged (insure that the 9vdc battery is fully charged first) and



carried to the computer for downloading. The display must be awake for data to be downloaded. Normally if the Display unit is unplugged from wall power the display will go to sleep, so you will need to turn off the sleep mode if you are downloading data while operating the ThermaViewer on its 9vdc battery.

Power, Probes, and Data Connections

1. PC Interface

PC interface cable socket for downloading data.

2. Thermal Probe One

Jack for probe # 1.

3. Thermal Probe Two

Jack for probe # 2.

4. Power Receptacle

Wall adaptor supplies 12vac 500mA or 12vdc 500mA. Polarity does not matter if a dc adaptor is used.

5. Reset Switch

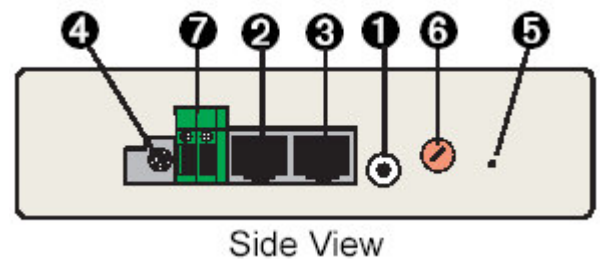
The reset switch may be pushed with a straightened-out paper clip. There are several cases where this may be required.

- a. When you first receive the ThermaViewer it may not wake up when plugged into the wall power adaptor.
- b. If the ThermaViewer is unplugged from wall power and the 9vdc battery is allowed to completely discharge the display may not wake up when wall power is restored or a new 9vdc batter is inserted.
- c. If a power spike occurs it may 'scramble' the displayed data.

In each of these cases a momentary pressing of the reset switch is usually sufficient to restart the ThermaViewer. If it does not wake up by pressing the reset switch supply wall power and change the 9vdc battery and then press the reset switch.

6. Contrast Control

The contrast control for the LCD may be adjusted using a small flat bladed screwdriver.

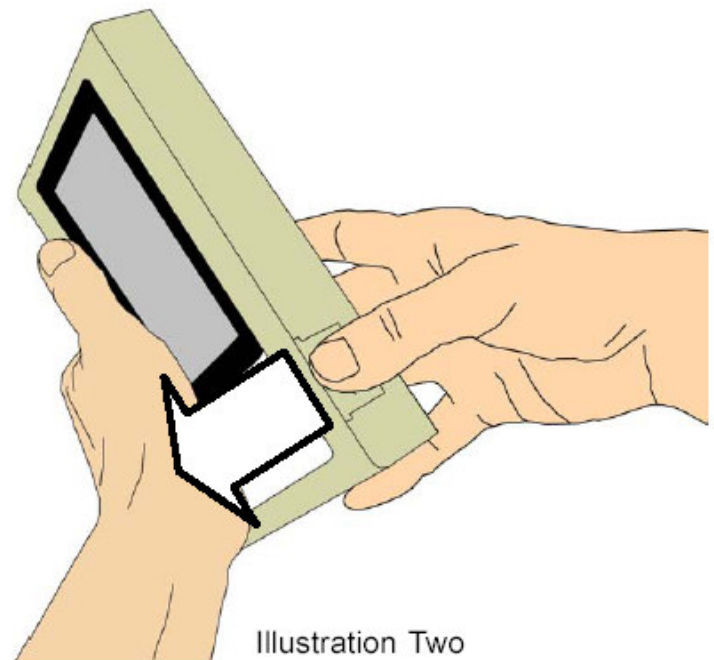
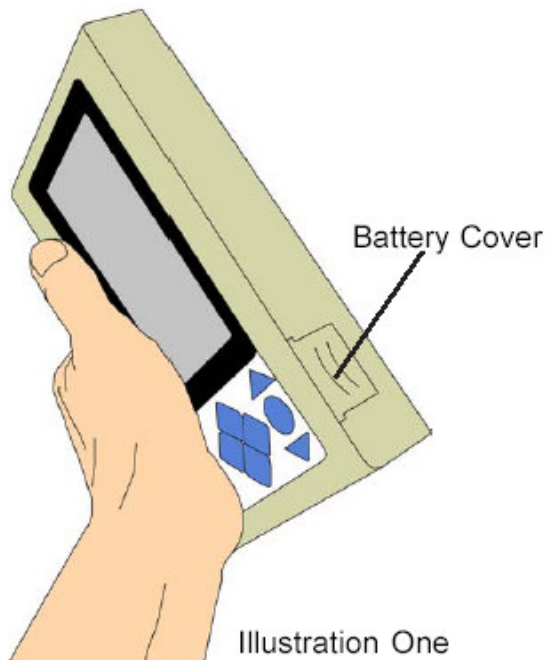


Side View

7. Relay

Screw type connectors for the dry contact relay, should be tightened down on the wire which connects to the alarm device to insure a good connection. This relay is normally open and closes whenever the user-defined preset conditions are met (set on each probe's menu).

The relay does not supply power or current, but simply closes when alarm conditions are met. It is used to trigger an auto dialer, bell, horn or whistle but the alert device must have its own source of power. The relay is protected by a .1amp fuse, and should not be subjected to more than 30volts or more than 1/10th of an amp.





Battery Installation

The ThermaViewer has two different batteries. One is a small ‘button’ type battery that is not user accessible, which ensures accurate date and time. The second battery is a nine-volt, user-accessible battery requiring periodic replacement. This 9vdc battery supplies temporary backup power during a power outage.

If the wall power is interrupted, the green power light on the front of the ThermaViewer will go out, and the display will go to sleep after 30 seconds (assuming that you set the sleep mode for 30 seconds during the quick start procedure). Once wall power is restored, the green light will be illuminated and the display will ‘wake-up’. While the display is blank or ‘asleep’ you can ‘wake’ it up for 30 seconds at a time to view the graph by pressing the Enter Key . It will awaken for 30 seconds each time the Enter Key  is pushed, assuming that you set the auto-sleep mode for 30 seconds during the quick start procedure. This will allow you to view the graph and verify that the unit is working properly, however, the battery will be quickly depleted under these circumstances.

Frequent power outages will quickly deplete the 9vdc battery. The small icon in the upper left hand corner of the display indicates the remaining battery life. If the icon is less than ½ full the 9vdc battery should be replaced. It should also be replaced at least once a year.

Access to the 9vdc battery is gained through the small door on the top of the ThermaViewer (see above). The door is opened by pressing gently and pushing it forward as indicated above. The door will separate from the ThermaViewer so the battery can be changed. Gently remove the old battery by pulling out the two wires (red & black) and unsnapping the connector from the battery. Snap the connector onto a new 9vdc battery, insert it into the compartment, and replace the battery door.

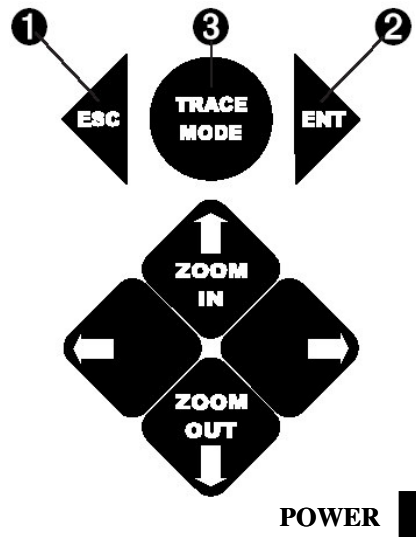


Operational Tip: Never replace the battery with the wall-power supply disconnected, as data loss will occur.



Operational Modes

The ThermaViewer has four modes of operation: *Active*; *Menu*; *Sleep*; and *Trace*. Detailed descriptions of each of these modes begin on page 19.



User Controls

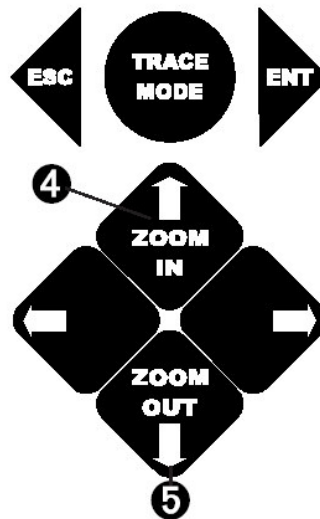
The Buttons

1. The **ESC** key performs several functions depending on the ThermaViewer mode.
 - In the *Active Mode* the **ESC** key toggles the display mode between probes.
 - In the *Menu Mode* the **ESC** key moves the cursor back one field without saving entered data.
 - In the *Trace Mode*, the **ESC** key exits the *Trace Mode*.
 - In the *Sleep Mode* the **ESC** key is inoperable and does nothing.
2. The **ENT** key performs several functions depending on the ThermaViewer mode.
 - In the *Active Mode* the **ENT** key causes the unit to enter the *Menu Mode*.
 - In the *Menu Mode*, the **ENT** key moves the cursor to the next field saving any data entered into the active field.
 - In the *Trace Mode* the **ENT** key zooms into the data pointed to by the trace carats. This allows the user to see the maximum amount of detail available with the individual entry pointed to by the trace carats in the exact center of the displayed information.
 - In the *Sleep Mode* the **ENT** key awakens the display for a 30 seconds, assuming that you set the auto-sleep time for 30 seconds during the quick start procedure.



3. The **TRACE MODE** key is used as follows.

- In the *Active Mode* the **TRACE MODE** key enters the *Trace Mode*.
- In the *Menu Mode* the **TRACE MODE** key has no function.
- In the *Trace Mode* the **Trace Mode** key has no function.
- In the *Sleep Mode* the **Trace Mode** key has no function.



4. **UP ARROW** or **ZOOM-IN** key

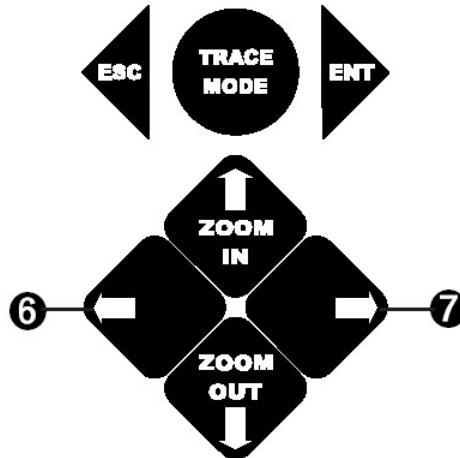
- In the *Active Mode* and the *Trace Mode*, the **UP ARROW** zooms in the display. This causes the amount of displayed data to be cut in half. For example, if the current chart is displaying 9 days of information, pushing the **UP ARROW** key once will cause the display to show 4.5 days. Pushing it again will change the graph to display 2 ¼ days. If the display is zoomed-in all the way it will wrap around.
- In the *Menu Mode* the **UP ARROW** scrolls through the possible choices in each field highlighting each in turn.
- In the *Sleep mode* the **UP ARROW** performs no function.

5. **DOWN ARROW** or **ZOOM-OUT** key

- In the *Active Mode* and the *Trace Mode* the **DOWN ARROW** key has the opposite effect of the **UP ARROW**. It doubles the amount of displayed data each time it is pressed. For example, if the display is showing 30 hours of temperatures, pressing the **DOWN ARROW** will cause 60 hours of history to be displayed. Press it again and 120 hours, or 9 days of information is displayed, etc... It also wraps around once the display is completely zoomed out.



- In the *Menu Mode* the **DOWN ARROW** scrolls through the possible choices of a field highlighting each in turn.
- In the *Sleep mode* the **DOWN ARROW** performs no function.



6. **LEFT ARROW** key

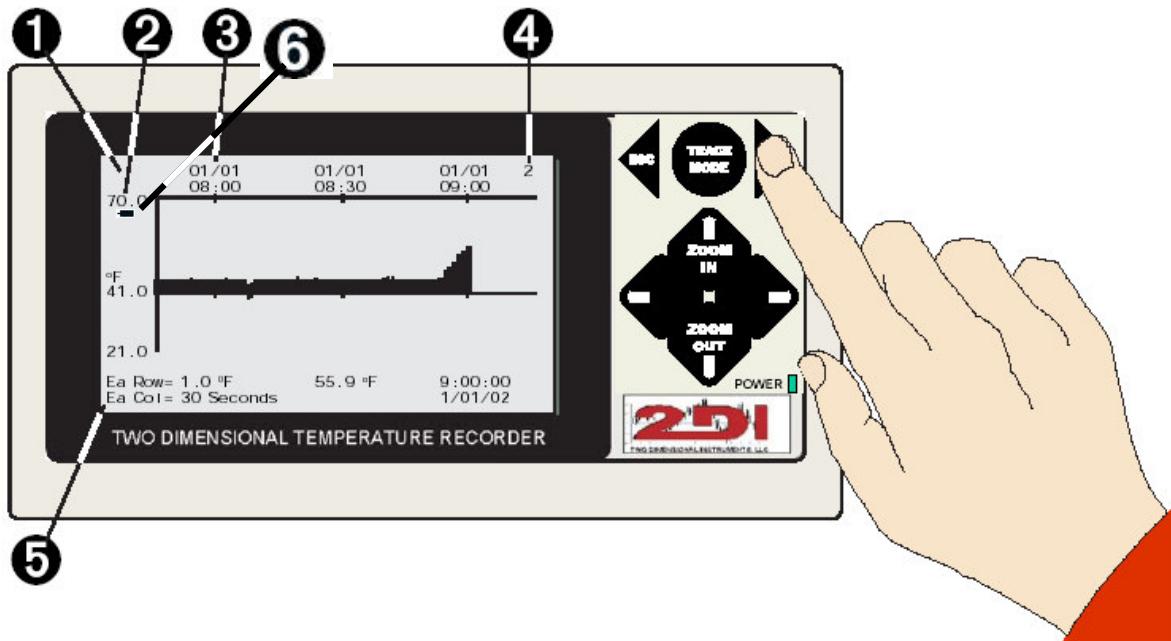
- In the *Active Mode* the **LEFT ARROW** causes the displayed data to scroll one screen to the left, displaying older data. If a full screen of old data is being displayed an 'R' will be prefixed to the sensor number displayed at the upper right of the display.
- In the *Trace Mode*, pushing the **LEFT ARROW** key causes the double-headed arrow at the bottom of the display to move to the left and highlight a different measurement. If the arrow scrolls past the left edge of the display, it will shift cause the display xone screen to the left, and an 'R' will be prefixed to the sensor number displayed at the upper right of the display.
- In the *Menu Mode* **LEFT ARROW** is disabled.
- In the *Sleep Mode* the **LEFT ARROW** is disabled.

7. **RIGHT ARROW** key

- In the *Active Mode* the **RIGHT ARROW** causes the displayed data to scroll one screen to the right showing newer data. If the newest collected information is already displayed on the LCD the screen will blink and refresh. (If there is no 'R' prefixed to the sensor number at the upper right of the display, you are looking at the most recently collected data.)
- In the *Trace Mode*, pushing the **RIGHT ARROW** key causes the double-headed arrow at the bottom of the display to move to the right and highlight a different measurement. If the arrow scrolls past the right edge of the display the display will



- shift to newer data unless the most recently collected measurements are already displayed and then the double headed arrow will not move.
- In the *Menu Mode* the **RIGHT ARROW** is disabled.
- In the *Sleep Mode* the **RIGHT ARROW** is disabled.



Features and Operation

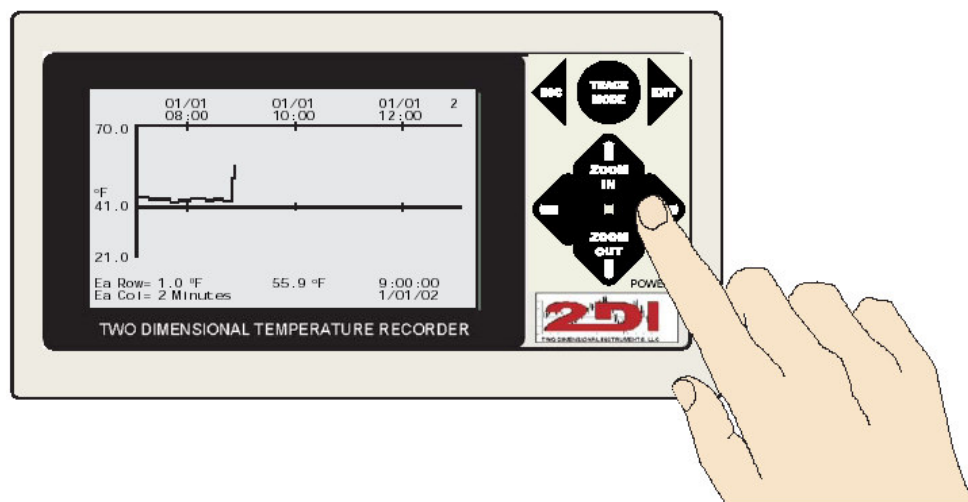
Active (or Awake) Mode

1. The probes are sampling data and a chart is displayed on the LCD. The left side of the display shows the user-defined parameters for the probe being monitored.
2. The maximum, minimum and reference line temperatures are displayed. It is possible that no reference line is displayed. This will occur if the reference line is set to the same value as the maximum or minimum line.
3. The time period displayed across the top of the LCD can range from three hours to five years depending on how often you are storing data and the zoom factor. Collected data is displayed in two different ways.
 - a. The one-to-one display shows data as a filled-in line graph. Each collected temperature appears as a point on the chart and the space between that point and the reference line is filled in. For example: If the reference line is set for 40°F and a temperature of 50°F is collected and stored, the entire space in the column between the point representing 50°F and the reference line will be filled in. Each temperature stored in memory is plotted on the LCD chart. If you are storing



temperatures every 10 minutes the display will show 180 temperatures or three hours.

- b. The **ZOOM-OUT** key causes more than 180 points to be displayed so that up to 75 days of information can be seen on one display if you are collecting information every ten minutes. (see number seven on the following page).
4. The probe and condition (i.e. T, RH or TH), currently being monitored, 1 or 2, is displayed in the top right corner of the display. If the measurements being displayed are not the most current (you have scrolled back to look at previous data), an 'R' will be prefixed to the probe and condition number. (see page 35)
5. The bottom two rows of the display show the chart legend, the current measurement and the data and time.
6. Battery icon showing the amount of charge left in the 9vdc battery. (The 9vdc battery should be replaced annually or when ½ of the charge is left).
7. The memory rolls over the oldest data so that only the last 43004 measurements for each probe are displayed and stored in the ThermaViewers SRAM memory. There is one temperature sensor on each of two probes if the ThermaViewer is collecting temperature data but one temperature & one RH sensor on each of the two probes if the ThermaViewer is tracking temperature/RH information. If the ThermaViewer is monitoring temperature and RH it will store 43004 temperature and RH measurements for each probe. Or a total of 172,016 measurements.





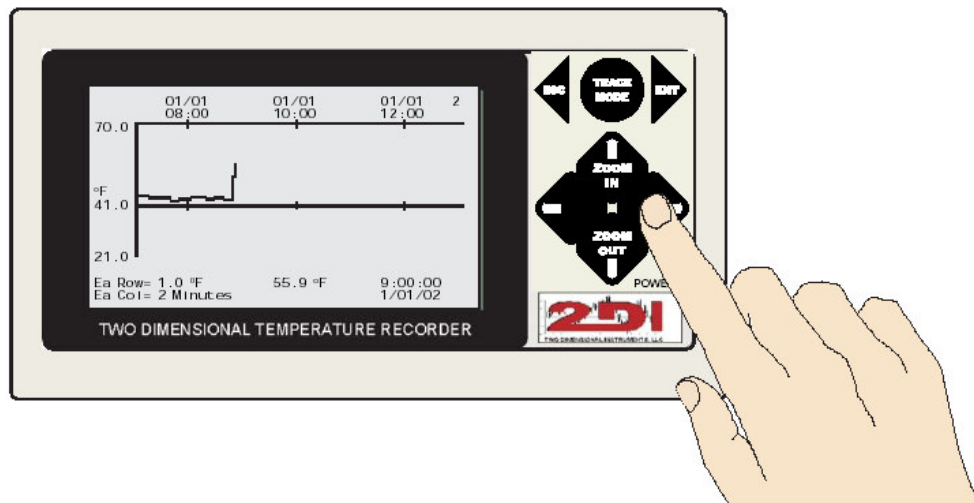
Display modes

If the **ZOOM-OUT** button is pressed in the *Active Mode* or the *Trace Mode* the amount of information displayed doubles. In any zoomed-out mode more than one collected measurement appears in each column. The recorded measurements are displayed as a high-low vertical bar in each of the 180 columns of data displayed on the LCD. So, for example, if the ThermaViewer is set to store temperature data once a minute and the scale is set to “each column=2 minutes,” then each column will have a vertical high-low line with the high temperature as the top of the line and the low temperature as the bottom of the line (see illustration above).

Further, if the graph is zoomed out so that ‘each column=64 minutes,’ the represented temperatures (in this case all 64 of them) will appear as a single vertical high-low line with the highest recorded temperature during this time frame being the top of the line and the lowest recorded temperature of the sixty-four being the bottom of the line. The ThermaViewer can display columns with from 1 to 128 measurements in them. Once the **ZOOM-OUT** button is pressed seven times it will wrap around to the zoom-in position.

This method of displaying multiple measurements in the same column allows the ThermaViewer to display a very large amount of data in the same way that stock prices are displayed with high-low bars covering a period every hour during a trading day.

A few minutes of experimenting zooming out and in with the displayed chart will make this second nature to the user.





Sleep Mode

In the *Sleep Mode* the display (LCD) is asleep or blank. The ThermaViewer goes into this mode only after wall-power has been missing for 30 seconds, assuming that you have set the auto-sleep mode for 30 seconds during the quick start. The display can be ‘awakened’ for thirty seconds by pressing the **ENT** key. If the display is left asleep while operating on the 9vdc battery the unit will continue to operate for several hours (up to 48 hours depending on the settings). If the display is awake while running on the 9vdc battery it will quit within a couple of hours, perhaps resulting in loss of stored information.

Trace Mode

The *Trace Mode* retrieves detailed data about a specific event, essentially providing the user with a ‘snapshot’ of the conditions at a certain time. When the **TRACE Mode** key is pressed a double arrow appears at the bottom of the LCD. This arrow can be moved left or right with the arrow keys. Just as in the *Active Mode* the **ZOOM-IN** and **ZOOM-OUT** keys reveal more or less information. Pressing the **ENT** key in this mode will zoom into the data with the highlighted entry centered on the chart. This is a shortcut so that the user doesn’t have to keep pressing the **ZOOM-IN** key.

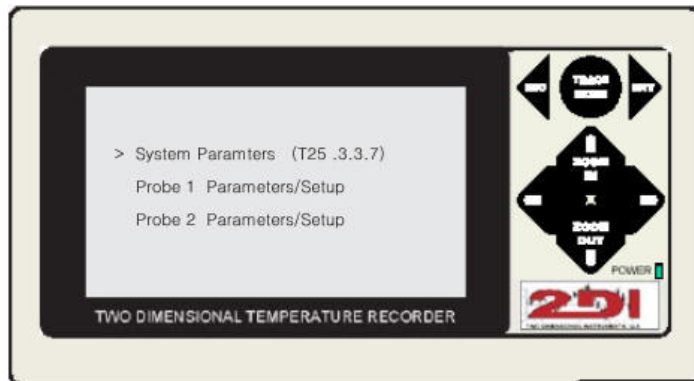
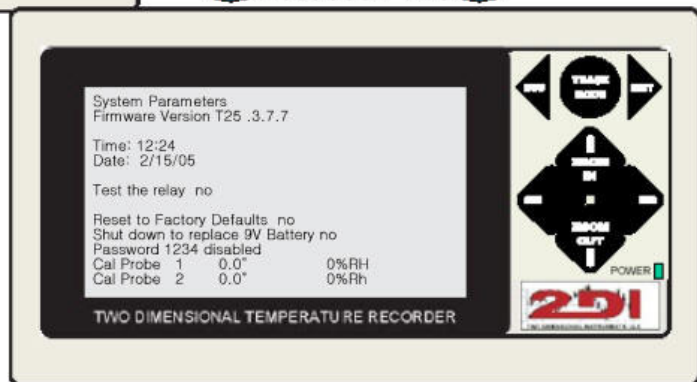


Illustration One

Illustration Two



Menu Mode

When the **ENT** key is pressed during the *Active Mode* the ThermaViewer enters the *Menu Mode* (see illustration one above). The main menu screen shows the firmware version with three sub-menu selections. By using the **UP** or **DOWN** arrow keys, one of three menu options can be selected. Press the **ENT** key to enter the selected menu.

System Parameters Menu

The System Parameters Menu is used to set the date, the time, a system password, and to enter a one point offset value for each sensor during calibration (see illustration two above). Additionally, the user can test the relay or reset all values to the factory default that erases all stored entries from the memory.

The owner may change the fields with the selection keys. The **UP** and **DOWN** arrow keys are used to scroll through possible settings for each field. The **ENT** key is used to save data and advance from one field to the next. The **ESC** key will back up to the previous field without saving the value of the current field.



Continually pressing the **ENT** or **ESC** key will eventually exit the Systems Parameters Menu.

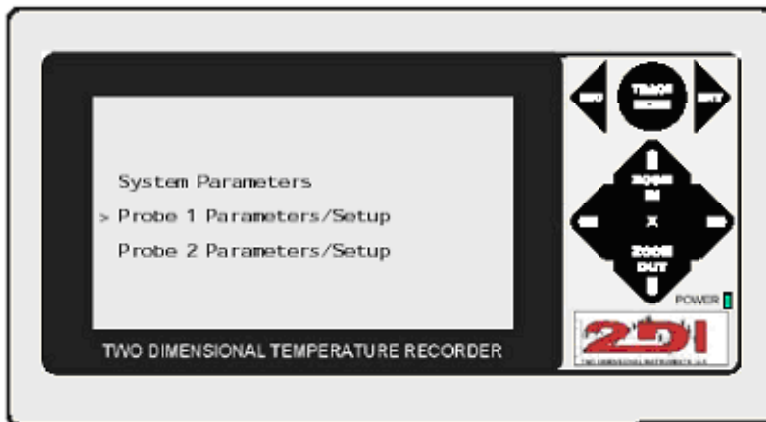
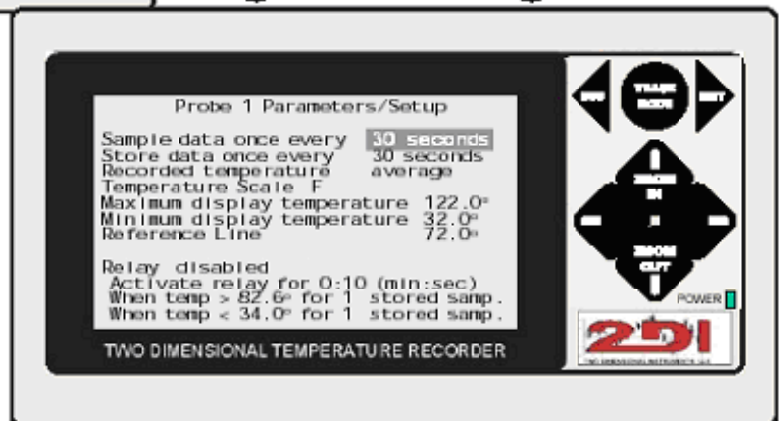


Illustration One

Illustration Two



Probe one (or probe two) Parameters/Setup Menu

The Probe one and Probe Two Parameters/Setup Menus are identical. This menu is accessed via the *Menu Mode* (see illustration one above). Use the **DOWN ARROW** key to position the cursor next to the desired menu and press the **ENT** key.

These menus allow the customization of the ThermaViewers. The user can set the sample and store rate, the scale and the display parameters of the Chart that is drawn on the LCD. The relay parameters are also set from this menu.

The owner may change the fields with the selection keys. The **UP** and **DOWN** arrow keys are used to scroll through possible settings for each field. The **ENT** key is used



to save data and advance from one field to the next. The **ESC** key will back up to the previous field without saving the current field.

Continually pressing the **ENT** or **ESC** key will eventually exit this Probe Menu.



Operational Tip: In order for a change in a field to take effect the **ENT** key must be pressed.

The following Probe One/Probe Two Parameters/Setup files may be changed by the owner.

Data sample rate, once every: 15 sec, 30 sec, 1 min, 5 min, 10 min, 30 min 60 min

Data storage rate, once every: 15 sec, 30 sec, 1 min, 5 min, 10 min, 30 min 60 min

Store: Average, Minimum reading, Maximum reading, Exact Middle, Most Frequent.

(This lets you sample data many time and store and display the average, minimum, maximum, exact middle or most frequent of the readings.)

Temperature scale: F° or C°

Chart display parameters: Maximum limit of the chart

Minimum limit of the chart

The Reference line of the chart

Relay parameters: Enable/Disable

How long the relay is closed when it is activated

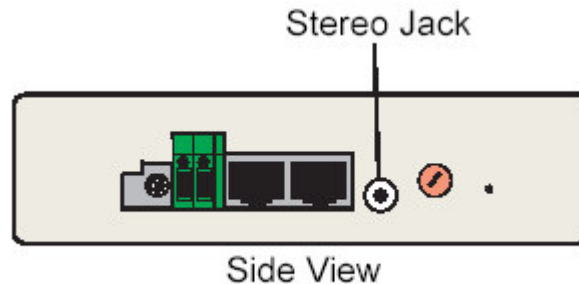
Upper temperature limit

Lower temperature limit.



TView Software Operation

Downloading data



Downloading data from the ThermaViewer to a PC for archiving, data analysis or printing is done with the PC interface cable, which connects the Stereo Jack on the ThermaViewer with a 9 pin serial port of a computer, in place. If the cable will not reach the computer from where the ThermaViewer display unit is positioned it can be taken to the computer for the download. Insure that the 9vdc battery is in place and fully charged and unplug the sensor cables, the

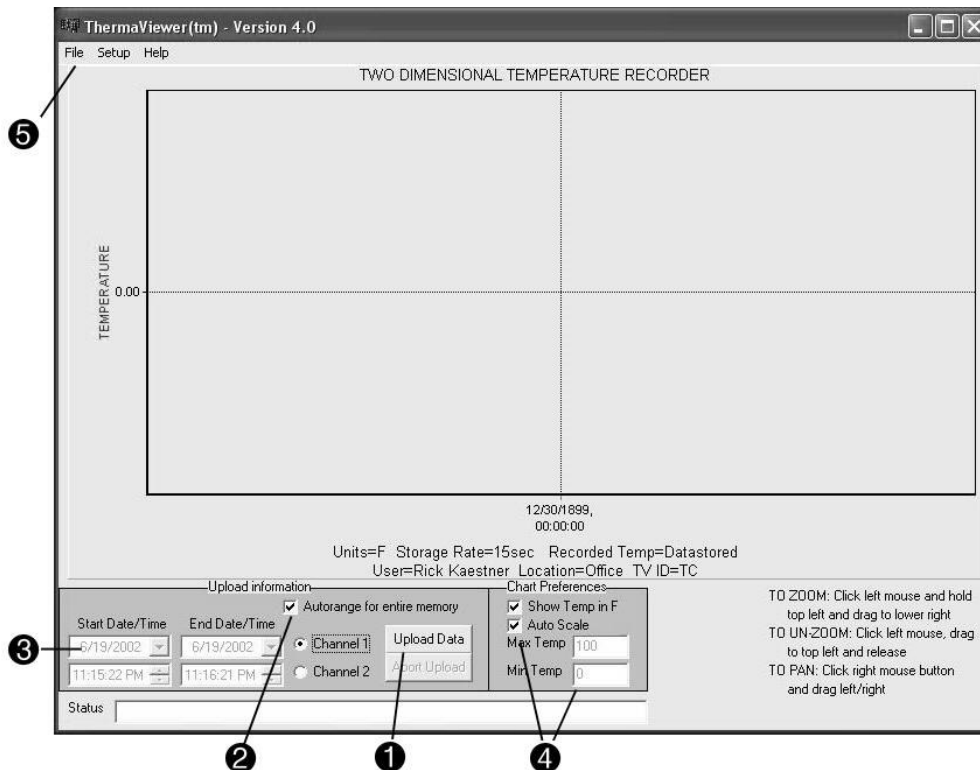
relay wires and the power supply. The display will go to sleep after 30 seconds, assuming that you have set the auto-sleep time to 30 seconds in the quick start procedure. In order for the ThermaViewer to communicate with the computer it must be awake so either the wall power adaptor will have to be taken with the ThermaViewer to the computer or you will have to turn off the auto-sleep mode. To keep the unit awake, enter the menu system and the system parameters submenu and change the auto-sleep time to 00:00. This will prevent the unit from going to sleep during the time it is running off the battery. (Once the download is completed the auto-sleep time should be restored to 00:30.

The downloading process required that you use the TView software program. It should be downloaded from the 2DI web site and installed on the computer to which the ThermaViewer is being downloaded. The most recent PC interface software (TView) can be downloaded from the 2DI web site at: http://www.e2di.com/PC-software/PC_software.html. You will need the users name and a password supplied on a separate sheet of paper that came you're your ThermaViewer.

Download the TView software and install it on your desktop. The first time this program runs it creates four small files in the same directory from which it is run. The TView program uses these four files to store setup and configuration settings.



Operational Tip: This software must be run from the directory in which it is installed the first time it is run. Do not create a shortcut pointing to a different directory and run the program from this shortcut the first time you run it.



1. Downloading data from the ThermaViewer is as simple as clicking on the *Upload Data* button. All information stored in the ThermaViewer for sensor #1 will be graphed onto the TView screen. To upload the information collected from sensor #2 first click the Channel 2 button and then click the *Upload Data* button.
2. The autorange button is checked by default so that all stored data for the selected probe will be uploaded to the PC and displayed.
3. Unclicking the autorange button and setting a date and time will cause only that range of data to be uploaded to the PC and displayed.



4. By default, the TView will scale the display so that the highest value uploaded will be at the top of the chart and the lowest value uploaded will define the bottom of the chart. If the *Auto Scale* button is un-clicked the graph will be redrawn with the Max and Min temperatures that appear in the temperature boxes below the check box as the upper and lower limits of the display. Each time this check box is checked or unchecked the temperature graph will be redrawn.

Once the chart has been drawn it can be moved around, zoomed into to highlight a particular measurement or set of measurements or zoomed out of, to display the entire collected data set.

To highlight a particular set of temperatures position the cursor at the top left hand portion of the area and while holding down the mouse button draw a box toward the lower right hand corner. When the mouse button is released the chart will be rescaled to highlight the temperatures within the box. To return to a full chart draw a box from the lower right corner to the upper left corner and release.

Software menus

1. The 'File', 'Setup', and 'Help' menus have additional functions:
 - a. File menu
 - i. The Uploaded data can be saved to a file. The file can be saved to any directory on the computer or network that the user has rights to. If you want other users to have access to the file designate it as a shared file with windows. The TView program can be distributed to other users so they can view it as a chart and/or print it out as a chart.
 - ii. A previously saved file can be loaded into the TView program for viewing.
 - iii. The displayed graph can be printed.

Files are always saved as a CSV file and may be also saved as an encrypted file (see ii security below). CSV files can be loaded into Excel, Word, Notepad, etc... and viewed as a table of five or six columns of data points. Temperature is displayed as an F°, C°, and K° value and RH as a percentage when viewed this way.

- b. Setup menu:
 - i. Port: The user selects the computer com port that the ThermaViewer is attached to.. i.e. Com1, Com2...Com8. (If a USB to serial converter is used, the converter software will reassign



the USB port to a COM6-8). Insure that the correct com port is selected so the TView program can see the ThermaViewer.

- ii. Security: If the encrypted button is checked the TView program will save an encrypted file with a TVX extension, in addition to a CSV file when data is saved to disk. A file with the TVX extension can not be read, written to, or printed except with the TView program. This insures that data cannot be changed once it is downloaded from the ThermaViewer and saved as a file. An encrypted file can only be loaded into TView for viewing or printing.
- iii. Auto Download: If the TView program is running on the PC it can automatically download data at several user specified intervals. This downloads data from both ports and writes the information to two different files on the computer. The file names are prefaced with the month and year of the download with a new file starting automatically at the beginning of each month.
- iv. Date Format: The user can select the format for the date to match that used by the computer or country. The date format must agree with that being used by the computer for the download to occur.



Operational Tip: Set the date format under the ‘setup’ menu to agree with the date format being used by the computer for proper downloading.

- v. Edit user information: Header information is stored with downloaded data when it is saved as a file. This includes user name, location and ThermaViewer id.
- c. Help: This menu gives access to a diagnostic mode for troubleshooting purposes. It also shows the raw data as it is downloaded from the ThermaViewer.



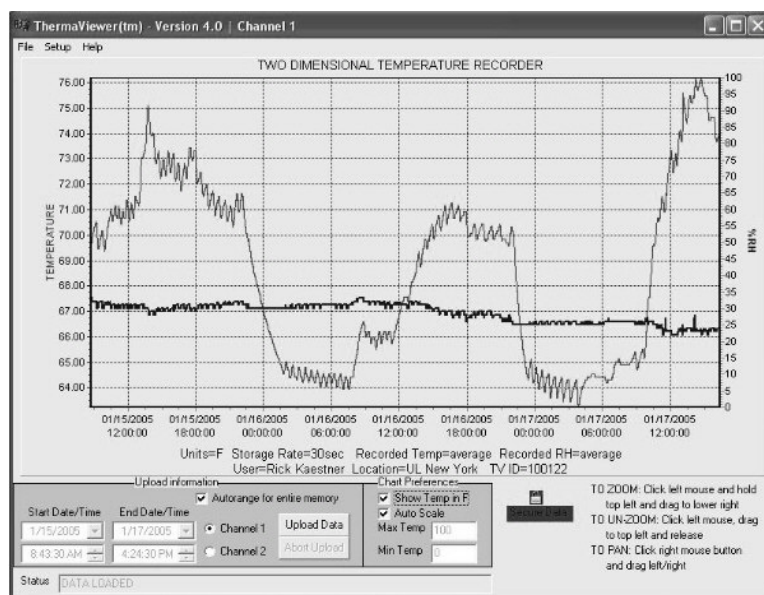
International Customers: Your data will be downloaded and displayed with the TView program. If you save your chart it will be saved in a US format. (i.e. Number separators will be ‘period’ for a decimal point and a ‘comma’ for the 1000s separators). To import your file into ‘Excel’ you should use the “Import text file’ under ‘Get External Data’ under the data menu of Excel



and change the number format under 'advanced' in the import wizard. For more information see: <http://office.microsoft.com/en-us/assistance/HA010552851033.aspx>.

	A	B	C	D	E	F
1	10/16/2007	6:05:30	AM,	22.51753044	C	
2	10/16/2007	6:05:45	AM,	22.58419609	C	
3	10/16/2007	6:06:00	AM,	22.58419609	C	
4	10/16/2007	6:06:15	AM,	22.68419647	C	
5	10/16/2007	6:06:30	AM,	22.68419647	C	
6	10/16/2007	6:06:45	AM,	22.55086327	C	
7	10/16/2007	6:07:00	AM,	22.65086365	C	
8	10/16/2007	6:07:15	AM,	22.68419647	C	
9	10/16/2007	6:07:30	AM,	22.61752892	C	
10	10/16/2007	6:07:45	AM,	22.55086327	C	
11	10/16/2007	6:08:00	AM,	22.61752892	C	
12	10/16/2007	6:08:15	AM,	22.38419724	C	
13	10/16/2007	6:08:30	AM,	22.48419571	C	
14	10/16/2007	6:08:45	AM,	22.48419571	C	
15	10/16/2007	6:09:00	AM,	22.38419724	C	
16	10/16/2007	6:09:15	AM,	22.31752968	C	
17	10/16/2007	6:09:30	AM,	22.28419685	C	
18	10/16/2007	6:09:45	AM,	22.31752968	C	
19	10/16/2007	6:10:00	AM,	22.41753006	C	

Temperature data in tabular format



Temperature/RH data in TView program

Viewing the chart on the LCD display

Upper right hand corner of the display

Data for probe #1 is displayed on the LCD of the ThermoViewer by default (Press the ESC key to page between displays). The small letter and/or number in the upper right hand corner of the LCD indicates what data is being displayed.

To change the display, press the **ESC** key. The display will cycle through each possible data display.

- 1 You are monitoring temperature or temperature/RH and looking at a chart for probe #1.
- 2 You are monitoring temperature or temperature/RH and looking at a chart for probe #2..



- T1 You are monitoring temperature/RH and are looking at temperature data for probe #1.
T2 You are monitoring temperature/RH and are looking at temperature data for probe #2.
H1 You are monitoring temperature/RH and are looking at RH data for probe #1.
H2 You are monitoring temperature/RH and are looking at RH data for probe #2.
R1 You are reviewing older data for probe #1. Newer data is to the right of the chart.
R2 You are reviewing older data for probe #2. Newer data is to the right of the chart
T1R You are monitoring temperature/RH and are seeing probe #1 older temperature data.
Newer temperature data is to the right of the display and can be viewed by scrolling right.
T1R You are monitoring temperature/RH and are seeing older probe #2 temperature data.
Newer temperature data is to the right of the display and can be viewed by scrolling right.
H1R You are monitoring temperature/RH and are seeing older probe #1 RH data. Newer RH data is to the right of the display and can be viewed by scrolling right.

T1R You are monitoring temperature/RH and are seeing older probe #2 RH data. Newer RH data is to the right of the display and can be viewed by scrolling right.

Upper left hand corner of the display

The small battery icon in the upper left hand corner of the display indicates how much voltage is left in the 9vdc battery. When wall power is interrupted the ThermaViewer will switch over to battery power automatically after 30 seconds, assuming that you have set the auto-sleep time to 30 seconds during the Quick Start. As the power in the battery is consumed the icon will change to show the discharge. When the icon shows ½ charge remaining you should insert a new 9vdc battery.



Operational Tip: Never change the 9vdc battery unless wall power is present and the green light on the front of the unit is illuminated.

Warning: If the battery is allowed to completely discharge the LCD will not wake up from the sleep mode until a new battery is installed. You could lose your collected data in the event of a lengthy power failure.



Operational Tip: Never allow the 9vdc battery to completely discharge. Data loss may result.



Warranty

The ThermaViewer line of instruments is warranted by the manufacturer to be free from defects in material and workmanship for a period of twelve months after delivery. In the event of a claim under this warranty, the product or part must be returned to the factory for repair or replacement (shipping prepaid) with a Return Authorization Number. It will be repaired or replaced at the factory's option without charge to the user. Any freight charges incurred may, at the factory's option, be passed on to the user.

This warranty does not cover routine calibration or battery replacement. The forgoing warranty and remedy are exclusive and in lieu of all other warranties either expressed or implied.

The manufacturer shall under no circumstances, be liable for consequential or incidental damages resulting from failure or malfunction of its products. The manufacturer makes no warranty for products not manufactured by itself or for any products modified by the buyer or subjected to misuse or neglect.

Under no circumstances shall the manufacturer be liable for consequential or incidental damages to any other products or inventory as the result of the use or misuse of its products.

FCC and CE Mark Verifications

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules.

This equipment conforms with the Australian and New Zealand EMC requirement for generic products to be used in residential, commercial and light industrial environments. AS/NZS 4251.1.1:1999 (AUS/NZ Class B verified)

This equipment is CE mark-Verified as Class B using EN 61326:1997 +A1:1998 + A2:2001, EN61000-3-2:200 Class A and EN 61000-3-3:1995 +A1:23001 standards.



Declarations of Conformity and Certificates of compliance can be download from our web site at: <http://www.e2di.com/doc.htm>

ThermaViewer patents pending

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