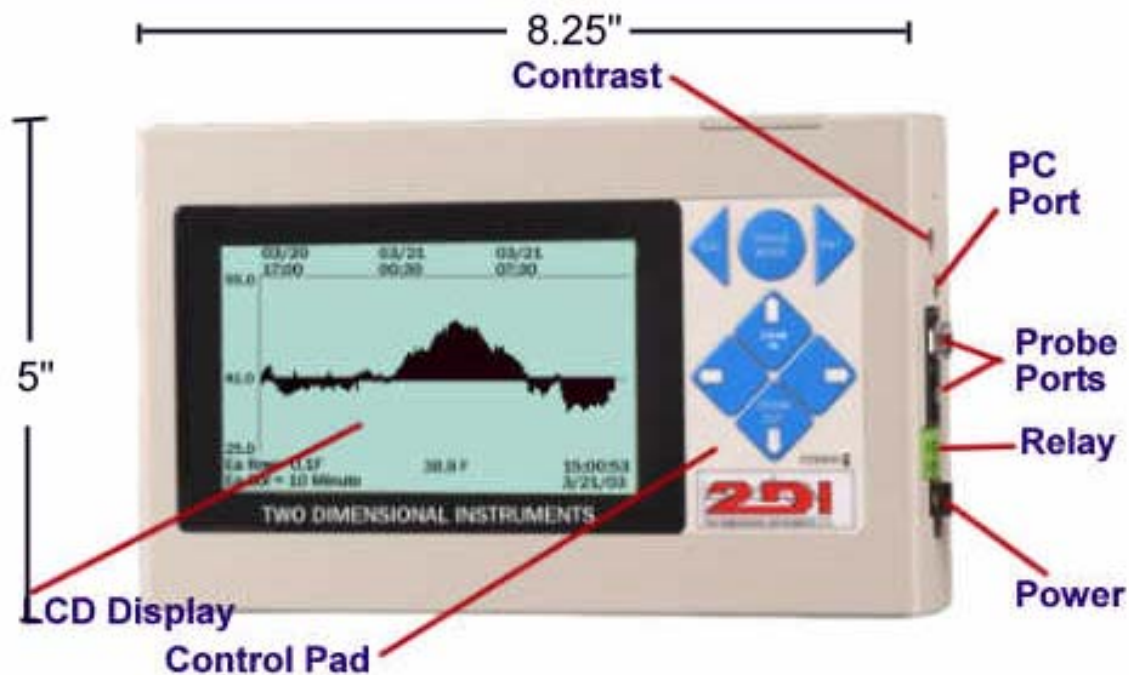


Temperature & Humidity LCD Display Recording & Alarming System

The ThermaRHViewer



The ThermaRHViewer is a combination data logger and chart recorder. It combines the visual aspect of a chart recorder with the storage capacity and flexibility of a data logger.

Like a data logger it continually samples and stores data, **but unlike** a data logger it doesn't require a computer to program or download and view the data.

Like a chart recorder it samples and displays data **but unlike** a chart recorder it stores large amounts of sampled data, doesn't require charts, pens or someone to change the chart every day or so.

The ThermaRHViewer:

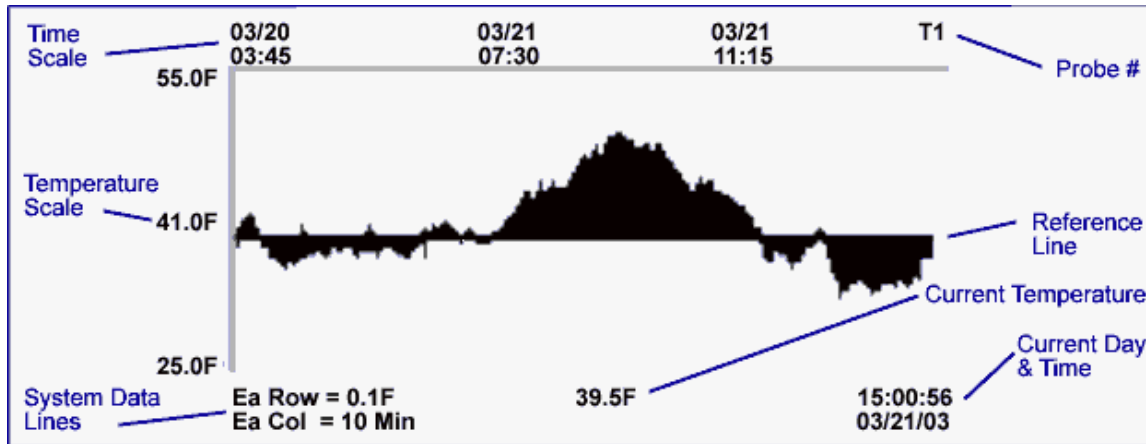
1. Uses 2 remote probes that can collect data 100 feet away from the display.
2. Can be setup and begin collecting data immediately (completely stand-alone).
3. Displays a time-temperature chart that can be read by a 12 year old.
4. Has multiple data displays; Zoom in/out, Scroll back & forth, trace mode.
5. Automatically turns the display off if power fails, but keeps on collecting data.
6. Turns the display back on when power is restored.
7. Has a relay to trigger alerts or dialer in emergencies.
8. Needs no maintenance or supplies (paper, pens, PC, someone to change the chart).

Description:

The **ThermaRHViewer™**, is a temperature recorder, about the size of a video cassette tape, that displays days, weeks or months of temperature and/or humidity data on the LCD display.

Once installed, it begins collecting and displaying temperatures at a user-defined rate, typically from once every fifteen seconds to once an hour.

The data can be downloaded to a computer for archiving or printing every six months or so. Archived data is stored in a secure format which can be examined with the 2DI data transfer program or imported into Excel, Word, Access, etc...



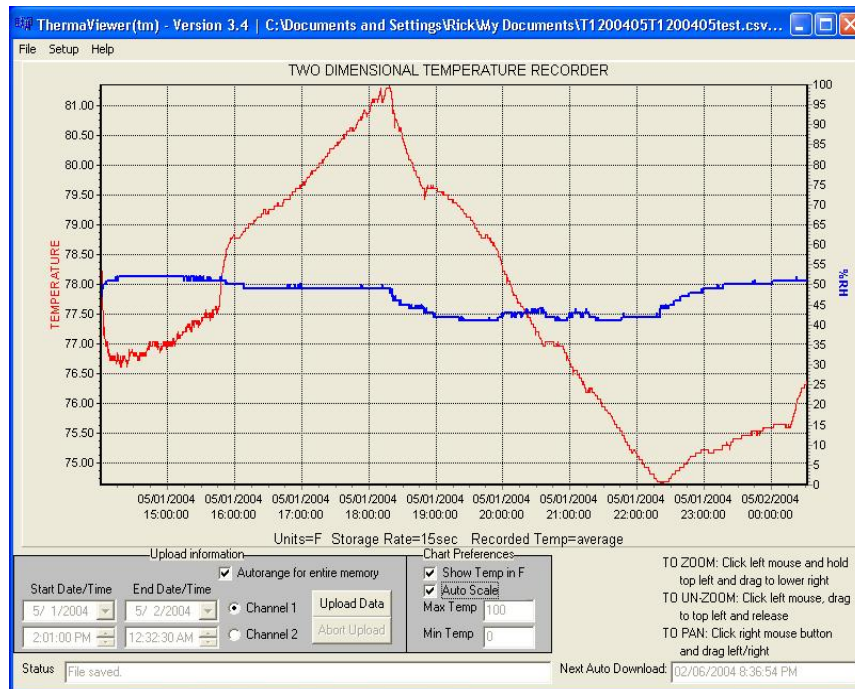
Details:

The **ThermaRHViewer™** stores over **40,000 data samples** for each of its two channels, which means that it will store **ten months of data** for each sensor, if ten minute samples are taken. If samples are taken once a minute, four weeks of data is stored for each sensor, etc....

The **ThermaRHViewer™** displays temperatures from absolute zero to over a fifteen hundred degrees F, although the actual temperatures collected will depend on the probe being used.

A password-protected onboard menu is used to set system and display parameters such as high and low temperatures, sampling intervals, display interval and alarm/relay levels.

The **ThermaRHViewer™** is powered by a 120vac power supply with a 9vdc battery backup. It enters battery mode and the display 'sleeps' if the 120vac power is interrupted. While the display is asleep, the probes continue to collect temperatures for a few days. In the event that power is not restored before the 9vdc battery is depleted, the stored data will still be retained, although the unit will not collect new data. Once power is restored, the display wakes up and the power light comes on.



The Liquid Crystal Display is a black & white, non-backlit, graphic display, controlled by a microprocessor. 180 columns of data are displayed at all times, which means that three hours of data is displayed if data is being recorded once a minute, or thirty hours of data is displayed if data is being recorded once every ten minutes.

It is possible to view more than 180 temperature values on the display. Each time the display is '**zoomed out**' the amount of displayed data doubles. In a zoomed out mode a solid black vertical **data bar** (High-Low Bar or HL Bar) is drawn in each column showing delta temperature. The top of the data bar is the high temperature for the interval and the bottom end of the data bar shows the low temperature. (This is the same as the bar graph used by the monthly stock market recaps, where each column represents each day's prices. The top of the bar is the high price for the day and the bottom of the bar represents the low for the day.)

To view previous temperatures, the user scrolls backwards through the data using the '*left arrow button*'. Continuing to scroll beyond the left margin of the LCD will cause additional data to scroll into view. As the user scrolls backwards and forwards through the temperatures, the date and minute lines will change to show when the temperatures were collected.

The bottom two rows of the display are system-data-lines showing the scale for both row and column values as well as the current temperature, date, and time.

The Numbers:

Number of Channels: 2

Sample Interval: User selectable: 15 sec - 60 min.

Data Storage Interval: User selectable: 15 sec - 60 min, (Can be different from the sample rate).

Data Storage Value: Average, Maximum, Minimum, Most Frequent

Data Storage: 40,000 samples/channel.

Display: Programmable, graphical & numeric.

Display Resolution: .1 Degree on LCD display .0001 on PC. (stored as a 14 digit number)

Temperatures Range: Digital sensor: -20°F to 180°F (± 2.0 °C Typical)

Thermistor: -40°F to 180°F (± 0.2 °C Typical) (± 1 °C available)

K Thermocouple: -273°F to 1500°F (± 1.5 °F CJC Typical).

CJC = *cold junction compensation*

The type K TC is :

-330 to -165°F $\pm 2\%$

-270 to +545°F $\pm 4^\circ$

+545 to +1500°F $\pm .75\%$

Humidity Range: 2% to 95%, ($\pm 2\%$ RH at 73°F).

Calibration Characterization: Optional NIST traceable.

On Board RAM: 256k

Storage Technique: Battery Backed-Up SRAM.

Power: 120vac (wall transformer) with emergency 9vdc battery backup.

Battery Backup: 100 hours with auto sleep mode.

Output to PC: RS 232 (Com port) via custom cable (DB9 to Audio plug).

Software: Included real-time data acquisition & data download.

Indicators: LCD & LED.

Controls: Seven buttons on membrane switch.

User Settings: Via ThermaViewer menu system.

LCD Pixels: 180 Horizontal, 90 Vertical.

Measurement Range: Based on the probe being used to collect data (see Above)

LCD Temperatures: 32°F to 122°F operating. -4°F to 154°F non-operating.

LCD: Size - 2.5" x 4.5" (128x240 pixels), Graphic Display.

LED: Green – indicates AC power present.

Size: 8 3/8" x 5" x 1 3/8"

Weight: 1 lb.

Relay: Passive 2 terminal < at 30 volts, (fused for .1 amp).

Alarm Conditions: min, max, rate of change

Backing up ThermaRHViewer™ data to your computer !

Several different version of TView, the PC backup software are available. You must use the one that corresponds to the software installed on your **ThermaRHViewer™**. To determine which version you have, go to the main system menu on latter models (*press the 'enter' key*) or press the reset button with a paperclip on earlier models, the version number will be in the format **n.n.n**.

To download data, plug in the supplied cable to a COM port on your computer,

1. Check the 'Aurorange for entire memory' button or type in a date and time range in the four data windows in the lower left hand portion of the screen.
2. Select which probes data you want to save by clicking on 'Channel 1' or 'Channel 2'.
3. Click the 'Upload Data' button.

As data is captured by the PC it will be displayed in the PC window. You can manipulate the data on screen by using the mouse (*see instruction on screen in lower right hand portion*). Should your data disappear from the screen while you are manipulating it click the "Auto Scale" button and it will reappear. This could happen if you pan through data and then un-zoom. The data is still there but it's not on the part of the graph that you are seeing.

The data displayed on the PC screen can be saved as a file by clicking on the 'Save data' button and typing a file name. The data will be saved with a CSV extension, so that it can be imported into other MS programs (Excel, Word, Access, etc..). Previously saved data can viewed by clicking on the 'Load data' button and entering the file name.

Data is saved on the PC hard drive as a text (*csv*) file which can be imported into Excel, Word, Access or any other program that will read a text file

Frequent Ask Question :

1. How many channels does the ThermaRHViewer™ have ?

The ThermaViewer has two ports or channels, which means that you can have two sensors attached to one ThermaViewer. For example, one ThermaViewer can monitor one refrigerator and one freezer, or two freezers, or one incubator and one freezer, etc, etc,.....

However, if you are monitoring both temperature and relative humidity you can get both measurements from one sensor. This makes it look like the ThermaViewer is actually using four sensors. It only appears to be so because the same sensor tracks temperature and humidity.

It is generally not possible to mix sensors on the same ThermaViewer. You could not have one digital temperature sensor and one K-Type thermocouple on the same ThermaViewer.

However you can use one thermistor and one thermistor/RH sensor on the same unit (since the RH sensor unit uses a thermistor).

If this gets confusing, you can give us a call and tell us what you need to do and we will recommend a configuration for you.

2. Can I use an alarm with the Two Dimensional ThermaRHViewer ?

The Two Dimensional **ThermaRHViewer™** is equipped with a passive relay which can be used to trigger an alarm, a buzzer, a bell, a light, a phone dialer (Sample wiring), or other warning device when user set conditions are exceeded.

Since the relay is a dry contact relay only, (no power is supplied to the alarm) the cable between it and the alarm device can be up to several hundred feet in length. Several **ThermaRHViewer™** can even share the wire so that any one of them will trigger the alarm. The relay is fused to 30vdc and .1amps.

Two Dimensional Instruments offers an auto dialer that will dial four different numbers (phone, pager, cell) and leave a message when triggered. However any auto dialer that can be triggered with a dry contact relay will work equally well.

If the United Security auto dialer is used with the **ThermaRHViewer™**, a special power supply is provided which will power both the **ThermaRHViewer™** and the auto dialer.

3. How does a ThermaRHViewer™ differ from a Data Logger and a Chart Recorder ?

The **ThermaRHViewer™** performs the functions of both a data logger and a chart recorder since it both logs data **and** displays a chart of the collected data.

It displays data like a chart recorder
and
It stores data like a data logger.

It has both the immediacy of a chart recorder with the storage ability of a data logger. *However*, unlike a chart recorder it stores lots of data, doesn't require charts, pens or someone to change the chart every day and unlike a data logger it doesn't require a computer to view the data.

The **ThermaRHViewer™** has the following advantages:

1. It's remote probes can be positioned up to a hundred feet away from the display.
2. It uses a digital signal to transmit data through the probe cable for accuracy.
3. It can be setup and begin collecting data immediately (Completely stand-alone).
4. The simple graphic data display can be read by a 12 year old.
5. It has multiple data displays: Zoom in/out; Scroll back & forth; trace mode.
6. It automatically turns the display off to save power if power is interrupted.
7. It continues to collect data during power outage.
8. It is equipped with a dry contact relay to trigger alerts or dialer in emergencies.

9. It requires no maintenance or supplies (paper, pens, PC, someone to change the chart).

	ThermaRHViewer™ w/ 2 probes	Data Logger/w 1 thermocouple probe & software	6” Chart Recorder/w 2 probes
Initial Cost	Low Cost	Low Cost	High Cost
Additional Expense	No	No	Yes-Charts/Pens
Data Samples Stored	40,000 points	32,500 points	none
Data Sampling Rate	15 sec-60 min	10 sec – 24 hrs	Continuous
Data Storage	Yes	Yes	No
Displays Data	Yes - LCD/Graph	No	Paper chart/Line
Remote Probes	2-Digital, Thermistor, RH or Thermocouple	1 - Thermocouple	2 - Thermocouple
Probe Cable Length	1 inch – 100 feet	6 ft	10 ft
Signal in probe cable	Digital	Analogue	Analogue
Battery Backup	Standard	Battery Operated	Optional
Alert Relay	Standard	Extra	Extra
Temperature Ranges	-273° to 1500°F	-238° to 2000°F	0° - 185°
Requires computer	No	Yes	No
Ongoing Maintenance	None	Must be reprogrammed	Daily/Weekly Change Chart & pen
Technology	Electronic	Electronic	Mechanical
Multiple data displays	Yes	No/Requires PC	No
Stand-Alone	Yes	No/Requires PC	Yes

Comparison of the **ThermaRHViewer™** with a typical data logger and chart recorder!

4. Can I get a paper copy of my data.

The **ThermaRHViewer™** stores 40,000 data points per sensor. This means that if you are using two sensors to collect both temperature and RH you will store 160,000 data points. Once the memory is full, the data will begin to roll-over the oldest data, so that only the latest 40,000 readings for each sensor are available on the **ThermaRHViewer™** itself.

Of course, this can be many months of history, (10 months of readings if you are collecting a sample every 10 minutes), but this may not be sufficient if you need to save data for years. To save data in a file or as a printed

record it must be periodically downloaded (maybe once every six months) to a computer, where it is saved or printed out as a paper record. (How to save data).

To save or print a copy of the data collected by the **ThermaRHViewer™** it must first be moved to a PC. The cable supplied with the optional TView PC-download-software plugs into a COM port of any PC (laptop or desktop), and is used to copy the data to your computer. Once the TView software moves a copy of the stored data to your computer, it can be saved to a file or printed out as a graph.

5. How do I get the data into a PC for archiving or printing ?

In order to download data from the **ThermaRHViewer™** it must be able to communicate to the serial port of a computer. This can be done with:

1. The serial cable supplied by 2DI with the PC interface package.
2. Using a serial to USB adaptor, if your computer doesn't have a serial port. The supplied cable is plugged into the adaptor which is plugged into the USB port on your laptop or computer.
3. Using a wireless cable. This can be done by connecting a bluetooth device to the DB9 end of the supplied cable and an additional bluetooth device to the COM port of your computer PC. Bluetooth devices can communicate wirelessly with each other within a 10m range. There are wireless cables available which allows communication up to 30m. Wireless cables can be supplied by a number of different suppliers. 2DI has verified that the Air Cable, Serial from AIRcable works properly with the **ThermaRHViewer™** within the 10m (apx 30 feet) range they guarantee.
4. Modems. Since the **ThermaRHViewer™** communicates over a serial connection it can also communicate through modems. An external modem plugged into the DB9 connector of the ThermaViewer cable and set to auto-answer can be called from a PC with a serial modem setup as COM1. Once the modem on the ThermaViewer answers, data can be downloaded using the PC software supplied.
5. IP. There are products available that will convert a serial connection to an IP address. As long as the PC side of the connections is using the COM address, any computer could have access to that PC and be able to download data stored in the **ThermaRHViewer™**. Precidia and Lantronix have products to do this. (We have not verified these products).

6. How accurate is the ThermaViewer ?

The accuracy of the **ThermaRHViewer™** depends on the accuracy of the sensor being used, since there is negligible instrument error.

The **ThermaRHViewer™** can be used with three different types of sensors; digital, thermistor, and thermocouple. Each of which has its own accuracy characteristics.

1. PDI-1 (Digital Sensor- Analog Devices TMP04)

If the digital probe is used to sample data, the typical accuracy depends on what temperature is being measured. The probe is typically $\pm 0.5^{\circ}\text{C}$ around room temperature with the accuracy decreasing to around $\pm 1.5^{\circ}\text{C}$ at the lower limits of the probe (-40°C and 185°C). The **ThermaRHViewer™** uses the TMP04 chip from Analog Devices.

2. PTM-2 (Temperature/RH sensor)

There are three different thermistor probes available. We normally supply a $\pm 0.2^{\circ}\text{C}$ thermistor but also have

thermistors that are $\pm .1^{\circ}\text{C}$ or $\pm .05^{\circ}\text{C}$. These probes can be used to collect temperature only, or temperature and RH. The RH sensor is supplied by Honeywell and is $\pm 2\%$, from 0%Rh to 100%RH.

3. PTC-5 (K-Type Thermocouple interface)

The accuracy of the measurement using a thermocouple, is dependent upon the accuracy achieved by the K type thermocouple. The limits of error for a K-type thermocouple are typically 2.2°C or 0.75% above 0°C and 2.2°C or 2.0% Below 0°C but could vary depending on the thermocouple.

7. Can the ThermaRHViewer™ be field calibrated ?

The **ThermaRHViewer™** can easily be calibrated in the field by comparing it to a known value. It also has a one point characterization table built into it's menu system. Under the 'system' menu the user can scroll in an offset value which will add or subtract a numeric constant to each measurement.

A NIST traceable calibration or SAMM traceable calibration can be provided for an additional fee. Please contact **SCIENSCOPE SDN BHD** at 603-80624943 or email support@scienscope.com.my directly for information on this option.

8. Data security (21 CFR Part 11)

Once a temperature sample has been taken and stored in the onboard RAM it can not be changed. The time and temperature display *parameters* can be changed if the user has the proper password, but the underlying data can not be touched.

If the collected data is downloaded to a computer with the **ThermaRHViewer™** program it can be examined and/or printed out. It can also be stored as a text (.csv) file on your computer. This file, which can be reopened with the TView program can also be imported into Excel, Word, Access or other computer programs. If the data is imported into a program other than the TView program it can be manipulated. It is the responsibility of the user to protect access to the PC in accordance with the measures required under 21 CFR part 11 so that the data will be secure.

9. Password protecting the ThermaRHViewer™ data.

The **ThermaRHViewer™** normally sits out where everyone can see it and examine the data. This allows anyone with interest in the data to zoom in/out of the data, enter a trace mode, or scroll back to data collected last week. This is desirable since it makes each person a part of the effort to monitor and control temperature.

The **ThermaRHViewer™** has a password system which will prevent any unauthorized personnel from entering the menu system and changing any operational parameters. As long as the password system is active, anyone can push any button or look at any data value without changing/deleting/adding to it. Only those with the correct password will have access to the menu system and change parameters or settings, (but still not the data).

Even with access to the menu system, the data itself is secure because it can't be changed, deleted or added to. The temperature history is completely protected and unchangeable.

10. How do I downloading data from the ThermaViewer™ to a computer.

The **ThermaRHViewer™** collects large amounts of data, which can be backed up or copied to a computer at any time. A regular schedule for downloading data should be established so that on a periodic basis, say - once every six months, data is copied to a computer for archiving. The **ThermaRHViewer™** can be unplugged from its sensors and the power cord, assuming that a good 9VDC battery is installed, carried over to a computer, plugged into the serial cable and the data copied with the 2DI data transfer program (**ThermaRHViewer™**).

The TView program can automatically download data from the **ThermaRHViewer™** to your computer once every: 5 minutes, 8 hours, 7 days or 30 days.

In this mode the program writes a file on your computer to which it appends data each download until the end of the calendar month is reached, when a new file is started. To use this feature the serial cable between the **ThermaRHViewer™** and the archive computer must be in place and the TView program left running on that computer. A 10 foot serial cable is supplied with the TView program. You can lengthen the cable by adding a 'straight through' three wire cable terminating in a DB9 connector. Wires 2, 3, & 5, are the critical ones.

11. Is there a way to access the ThermaViewer data remotely ?

This questions has several answers:

1. Once the **ThermaRHViewer™** data is saved to a computer with the TView program it is just like any other file. If the file's attributes are set to 'shared', or the computer is acting as a server, anyone with access to that computer, either from the local area network or the internet can access it.
2. If you need real time data, simply install a cable between the **ThermaRHViewer™** and a computer and set the TView program to automatically download data at a regular interval. The TView program will add the new data to the file on that computer and anyone who has access to that file will have data current as of the last auto download. For example, if a **ThermaRHViewer™** is collecting temperature and RH data in a laboratory in New York and is auto downloading to a server every five minutes, you could access that file even if you were in Hong Kong. And the data would be less than five minutes old.
3. The ThermaViewer's data is download through its serial port, which can be accessed:
 - a. Directly by using the cable supplied with the TView software program,
 - b. Through a modem plugged into the ThermaViewers serial port,
 - c. Through the internet by plugging the ThermaViewer into a device server,
(Also called a serial to Ethernet adaptor- ie Lantronix UDS-10).