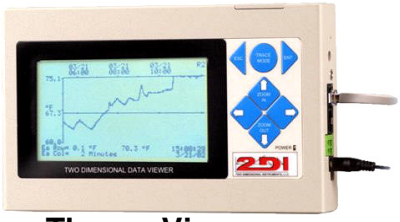
APPLICATON NOTE: 331

Monitoring and Documenting Refrigerator/Freezers

Hospitals, laboratories, doctor's offices, and even National Guard Units store materials in home type refrigerators and freezers because they are inexpensive and readily available. These units are not built to maintain the close temperature tolerances of expensive laboratory units. Because fluctuations in temperature can be so critical to the viability and effectiveness of many of the stored products, international regulatory bodies require laboratories to constantly monitor the temperature variation during the storage process.

The time-honored method of manually monitoring the refrigerator with a piece of paper stuck to the side of the unit is not adequate. It is necessary to continuously monitor and keep a permanent record of the temperature twenty-four hours a day, seven days a week. It is all to easy for a unit to malfunction, warm up and then cool down while no one is around. Were this to happen, it wouldn't be noticed with the manual system where temperature is recorded only once a day. And, of course, with the manual system there is no way to tell what happened over the weekend.

The ThermaViewer is an ideal instrument for monitoring the temperature refrigerator/freezers storing your inventory. It is accurate and automatic, providing continuous monitoring, even indicating trends so that corrective action can be taken. Its two probes create a temperature history graph for two different units, which is displayed on the large LCD display. No special training is required to read or interpret the graph and a trace mode lets you highlight high temperatures and zoom in for a closer look if something does not look quite right. Data can be downloaded to your computer for printing or archiving on the hard disk.



ThermaViewer

Using a ThermaViewer is simple, with minimum set-up time required. It needs no programming, maintenance, paper or pens to record the data. Simply plug the ThermaViewer into a wall socket and begin collecting temperature information immediately.

Installation of the ThermaViewer is a simple five step process:

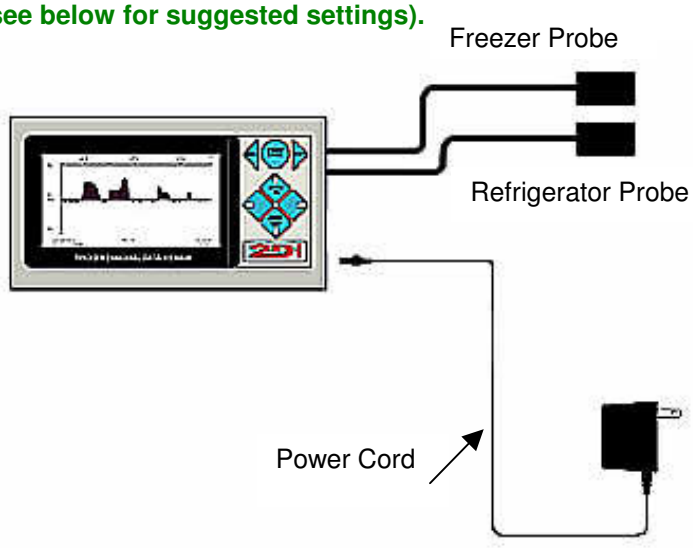
1. **Position each of the two sensor modules in the refrigerator or freezer to be monitored.**
2. **Route and Plug in the two 20 foot cables (longer cables are available as an option).**
3. **Plug the power adaptor into a wall.**
4. **Attach the auto dialer (if purchased).**
5. **Set the time and monitoring frequency (see below for suggested settings).**

What to Order:

- TDVD-01 (± 1.5°C) $ 579.00

Optional Items:

- TDVD-02 (± .2°C) $ 679.00
- Auto-dialer with cable $ 189.00
- Local alarm (siren & strobe) $ 50.00
- Extra long cable .50/foot
- International power supply (100-240vac, 50-60hz) $ 30.00



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APPLICATON NOTE: 331

TWO DIMENSIONAL INSTRUMENTS, LLC

Installation and Setup

Mount the ThermaViewer display unit near the refrigerator and/or freezer to be monitored. Position one probe in each unit. The probes are normally placed about ½ way up from the floor and about ½ way back inside the unit to monitor the average temperature. Do not place a freezer probe near the top of the freezer, as this is where warm air accumulates during the defrost cycle. This will produce inaccurate readings and could trigger the alarm.

The following are suggested settings. (If your standards call for positioning the probes in other locations you should follow those guidelines.)

Suggested settings:

Refrigerator Probe	
Sample Data every	15 seconds
Store Data every	10 minutes
Recorded Temperature	Average
Temperature Scale	C°
Maximum Display Temperature	10°
Minimum Display Temperature	0°
Reference Line	4°
Relay	Enabled[1]
Activate Relay for	0:60 (min:sec)
When Temp >	8° for 4 stored temperatures
When Temp<	2° for 5 stored temperatures

Freezer Probe	
Sample Data every	15 seconds
Store Data every	10 minutes
Recorded Temperature	Average
Temperature Scale	C°
Maximum Display Temperature	0°
Minimum Display Temperature	-20°
Reference Line	-15°
Relay	Enabled[1]
Activate Relay for	0:60 (min:sec)
When Temp >	-10° for 6 stored temperatures
When Temp<	-20° for 10 stored temperatures

Setting the probes to sample data every 15 seconds and store data every 10 minutes causes the ThermaViewer to take forty samples then plot and store the average of those forty readings. This causes the graph to more accurately reflect the internal temperature of the stored materials rather than the air temperature of the refrigerator or freezer. Momentary dips and rises of the air temperature, which occur when the door is opened are not enough to affect the actual medicine or vaccine temperature and can safely be averaged over the 10 minute period between readings.

Downloading data:
The ThermaViewer will hold ten months of temperature data for each probe with the settings listed above. A regular schedule for downloading data from the ThermaViewer should be established so that a back up copy of the data is maintained in your computer if required. You can also print out a copy of the graph with the same program that downloads data to your computer (TView), which can be downloaded from our Internet site and run on your computer. There is no license, so the software can be installed on multiple computers if needed. Downloading data is as simple as plugging the PC cable into the ThermaViewer and a serial port on your computer and clicking on the 'Upload' button.

[1] Enable the relay only if you have an alarm or the optional auto-dialer wired to the relay.

APPLICATON NOTE: 102

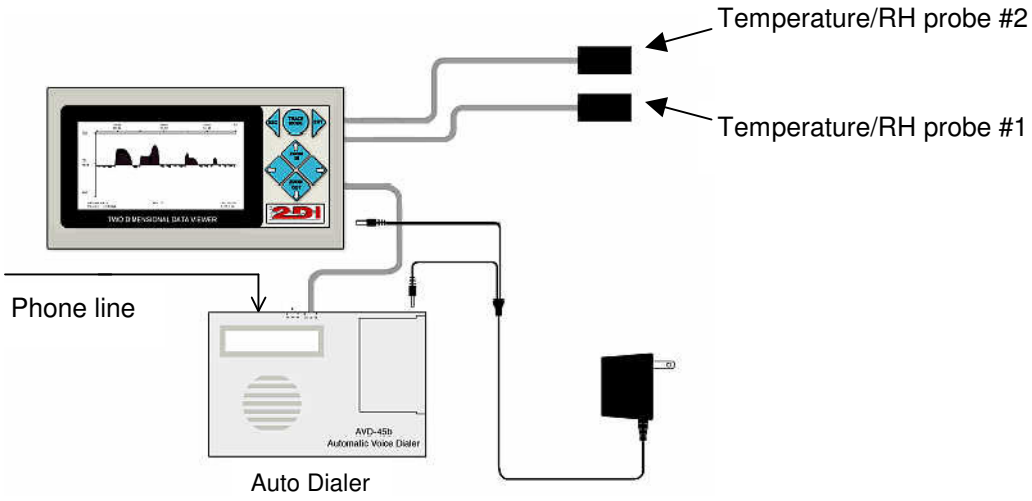
TWO DIMENSIONAL INSTRUMENTS, LLC

Optional Auto-Dialer

The ThermaViewer comes equipped with a dry-contact relay that can be used to trigger an alarm or auto dialer. Each probe has its own high and low trigger point. The relay will be closed when temperature rises above 80°F for more than 60 minutes or falls below 60°F for more than 40 minutes, if the suggested settings above are used. Once the relay has been triggered, the alert clock is reset. Therefore in this example, after the relay is triggered, the temperature will have to rise above 80°F for more than 1 hour or falls below 60°F for more than 40 minutes before the relay will be triggered again.

If you need faster response time you can decrease the number of stored temperatures in the probe menus. Setting this value for 1 instead of 6 will result in triggering the relay if one measurement is above or below the set values.

If an auto dialer is ordered with a ThermaViewer, a power supply with two leads is supplied to provide power for both the ThermaViewer and the auto-dialer. The auto dialer will call four phone numbers (i.e. phone, pager, answering machine or service) and leave a 16 second message when triggered by the ThermaViewer. It will keep calling the four numbers until someone picks up and the message is delivered.



The auto dialer should be set as follows:

60 second exit delay
20 second entry delay
N.O. (meaning that the relay is normally open).
MOM (meaning that it only takes a momentary activation from the relay to trigger the dialer).

A relay test function on the System Parameter of the ThermaViewer causes the relay to be immediately triggered. Entering 'yes' in this field causes the ThermaViewer causes the auto dialer to immediately call the four phone numbers stored in its memory. Allow 90 seconds to elapse between the time you exit the programming mode of the auto dialer and you activate the relay.

Technical support for Auto Dialer only (858) 413-0149

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