APPLICATON NOTE: 305

Monitoring and Documenting Cryo Tanks and Freezers

Many biological samples are stored in cryo freezers with temperatures at or below –80℃. Some of these samples are irreplaceable and must be maintained for many years or even in perpetuity. Because of the value of the stored inventory they should be constantly monitored and alarmed for protection.

Although these freezers are normally very reliable, it is possible for them to have problems. Recognizing this, many regulatory and certifying agencies now require that freezers be monitored twenty-four hours a day, seven days a week and be equipped with an alert device that will warn them if the temperature rises.

There have been cases where a freezer got stuck in the defrost cycle for several hours and then unexplainably came out of the cycle to cool back down. No one ever knew that the tissue samples were compromised because the problem occurred over the weekend when the lab was empty. Chart recorders and data loggers have monitored these units in the past but they each have drawbacks that make them a less than ideal solution.

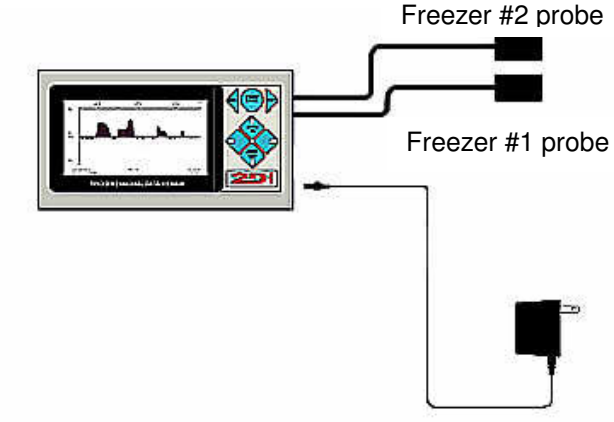
Chart recorders require frequent maintenance and data loggers don't have a visual display so the data is not visible to the very people who can prevent problems if they know about them.

The Easy Freezer Alarm is an ideal instrument for monitoring and documenting cryogenic freezers. It is accurate and automatic. It not only shows the current temperature and a temperature history graph of conditions over a ten month period for two different freezers, it also has a relay that will trigger an alarm or auto dialer in the event of an emergency.

No special training is required to read or interpret the graph, which means that anyone that comes near the Easy Freezer Alarm will automatically get a quick update on the temperature. Using an Easy Freezer Alarm is simple, with minimum set-up time required. It needs no programming, maintenance, paper or pens. Simply plug the it into a wall socket, position the probes and begin collecting temperature information immediately.

Installation of the Easy Freezer Alarm is a simple five-step process:

1. Position the thermocouples in each freezer to be monitored.
2. Route and Plug in the two 20 foot cables (100 foot cables are available as an option).
3. Plug the power adaptor into a wall socket and into the Easy Freezer Alarm.
4. Attach the auto dialer (if purchased).
5. Set the time and monitoring frequency (see below for suggested settings).



What to Order:

- TDVD-05 (2-thermocouple probes) $ 649.00
- TDVD-05-1 (1 thermocouple) $ 579.00

Optional Items:

- APD-10 (Auto-dialer with cable) $ 169.00
- AV10 Local Alarm (siren & strobe) $ 50.00
- CL-100 (100 foot cable) $ 45.00
- International power supply (100-240vac, 50-60hz) $ 30.00

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TWO DIMENSIONAL INSTRUMENTS, LLC

Installation and Setup

Mount the Easy Freezer Alarm display unit near the two cryogenic freezers to be monitored. Position one probe in each freezer to be monitored. The probes are normally placed about ½ way up from the floor or about ½ way back inside the unit to monitor the average temperature maintained within that appliance.

Do not place the probe near the roof of the freezer. This is where the hot air accumulates during the defrost cycle. A probe in this area will give false measurements and could even give you a phone call in the middle of the night when the relay trips. (If your standards call for positioning the probes in other locations you should follow those guidelines.)

The following are suggested settings.

Suggested settings for –80°C Freezer:

Freezer Probe #1	
Sample Data every	15 seconds
Store Data every	10 minutes
Recorded Temperature	Average
Temperature Scale	F°
Maximum Display Temperature	-20°
Minimum Display Temperature	-100°
Reference Line	-80°
Relay Enabled[1]	
Activate Relay for	0:10 (min:sec)
When Temp > -30° for 6 stored temperatures	
When Temp< -100° for 6 stored temperatures	

Freezer Probe #2	
Sample Data every	15 seconds
Store Data every	10 minutes
Recorded Temperature	Average
Temperature Scale	F°
Maximum Display Temperature	-20°
Minimum Display Temperature	-100°
Reference Line	-80°
Relay Enabled[1]	
Activate Relay for	0:10 (min:sec)
When Temp > -30° for 6 stored temperatures	
When Temp< -100° for 6 stored temperatures	

Note: Setting the probes to sample data every 15 seconds and store data every 10 minutes causes the Easy Freezer Alarm 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 stored materials and can safely be averaged over the 10 minute period between readings.

Downloading data: The Easy Freezer Alarm will hold ten months of temperature data for each probe with the settings listed above. A regular schedule for downloading data from the Freezer Alarm should be established so that a back up copy of the data is maintained in your computer. You can also print out a copy of the graph with the same program that downloads data to your computer (TView).

[1] Enable the relay only if you have an alarm or the optional auto-dialer wired to the relay. Application note 102.

APPLICATON NOTE: 102

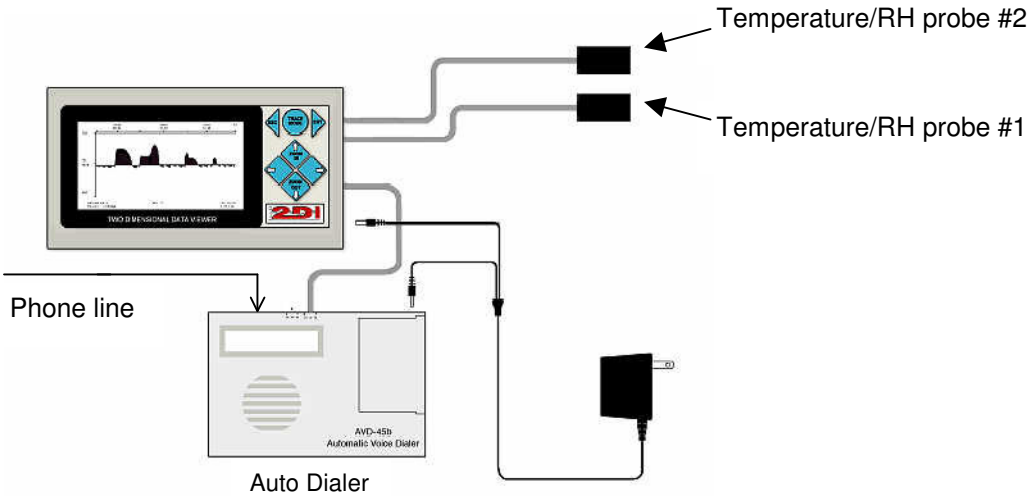
TWO DIMENSIONAL INSTRUMENTS, LLC

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.