TWO DIMENSIONAL INSTRUMENTS, LLC

TV2 Easy Touch Display

Monitors, Alarms, Logs and Charts

Care and Use Guide

For Wired or Wireless Sensors

Two Dimensional Instruments, LLC • P O Box 159 • Crestwood, KY 40014
(877) 241-0042 • (502) 243-0039 fax • (502) 243-0042 international

Congratulations!

Your TV2 with easy touch will provide years of reliable service, collecting, storing and displaying data while monitoring temperature, relative humidity, and differential pressure. Although it is a highly sophisticated instrument it is easy to install and use.

The Display:
The LCD display is a full color easy touch display. With a simple touch you can navigate to the menu screens, a temperature history chart for each sensor, zoom in or out of a chart to see more data, set the alarms, silence an alarm, set the data storage rate, and much more.

Sensor Accuracy:
The TV2 logs and displays information it receives from its sensors. The accuracy of that data depends on the sensors. The digital wired sensors are accurate to ±0.3°C, the wireless thermistor sensors are accurate to ± 0.3°C and our thermocouple sensors are accurate to between ±1.0°and ±2.2°C depending on the type of thermocouple. Humidity sensors have an accuracy of ±3%. (See the chart on page 4). Differential pressure sensors have a degree of uncertainty of ±0.002" w.c.

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Powering the TV2 Display:
The TV2 display is powered via a USB cable, which can be plugged into a computer or the wall plug (100vac-230vac). An optional DC connector is also available which will accept 5-30 volt dc. Lithium backup batteries are installed in the TV2 and will keep it running for over 100 hours if normal power is missing. The batteries are not user serviceable, but like all lithium batteries will gradually lose their ability to be recharged so that after five years they will only have enough charge to power the TV2 for 72 hours. After 7 years the display should be returned to 2di for battery replacement.

Operating on batteries:
If normal USB power fails and the 'Missing AC alarm' is active, the internal buzzer will beep in 1 second intervals for 60 seconds, sleep for 10 minutes, then beep every second for another 60 seconds, etc... At the same time the TV2 will enter a light sleep mode, during which time the display will go dark, to conserve battery power. Once power is restored the display will wake up.

Internal Alarm & Relay:
The TV2 has a dry contact normally open (N/O) relay and piezo buzzer, which are activated when an alarm occurs. (See appendix for alarm types)

Factory Service and Returns:

Please call for a return authorization (RA) prior to sending any instrument for repairs. (see page 39 for warranty information).

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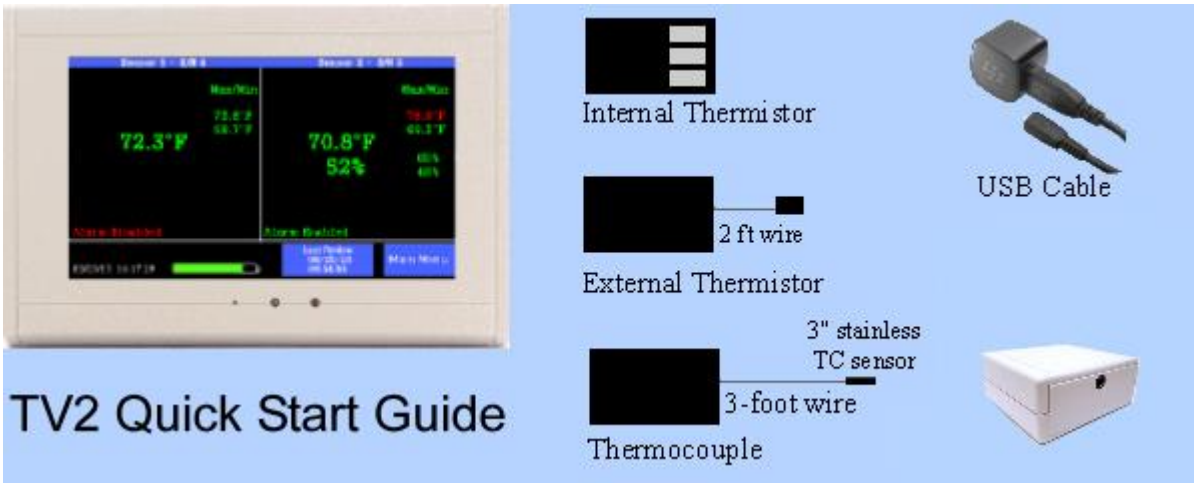
Component and Packing List



Your TV2 monitor should have come with

1. One or more sensors (these could be wired or wireless sensors)
2. A six-foot USB cable
3. A wall transformer
4. A printed quick start guide

If any of these items are missing please contact the factory or the distributor/reseller from whom you ordered the TV2 for a replacement.

ID	Sensor Type	Range	Accuracy	
Temperature Only				
Digital Sensor	Wired	-20 to 75°C	±0.3°C	
Thermistor	Wired or wireless	-20 to 75°C	±0.3°C	
Differential Pressure	Wired	±0.002" w.c.	±0.002" w.c.	
Thermocouple	Wired or wireless			
E		-200 to 870°C	±1.0°C or 5%	±1°C or 1%
J		0 to 760°C	±1.4°C or .75%	
T		-200 to 370°C	±1.0°C or .75%	±1.0°C or 1.5%
K		-250 to 1250°C	±2.2°C or .75%	±2.2°C or 1.5%
Temperature & Humidity				
Thermistor and RH	Wired or wireless	-20 to 75°C, 0 to 100%	±0.3°C, ±3%	

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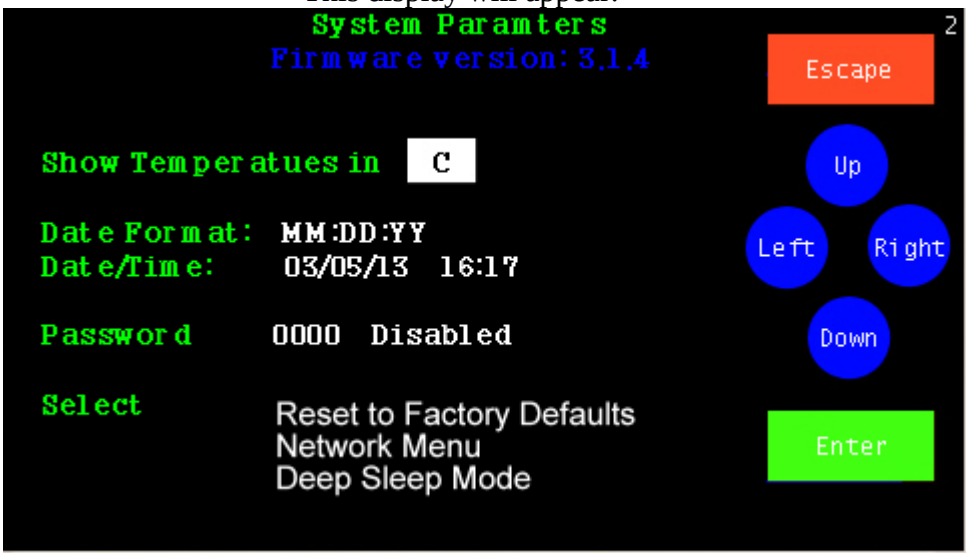
Quick Start

Your TV2 can be installed and operating in just a few minutes by following these simple steps.

1. Connect the TV2 to a power supply (computer or wall plug) and touch the LCD. If the display remains blank press the reset button by inserting a paper clip into the small hole to the left of the green LED on the face of the TV2. (see page 10).

This display will appear.



2. Touch ‘Up’ or 'Down' to select C° or F° and touch ‘Enter’. The highlight will move to the next field.

3. Touch ‘Up’ to select the date format (MM/DD/YY, DD/MM/YY or YY/MM/DD) and then 'Enter'. The date format defaults to the US style (MM/DD/YY) date.

4. Set the day, month, year, hour and minute in the appropriate field by scrolling through the possible values with 'Up' or 'Down' after moving to the appropriate field with 'Enter'.

   (Note: If you move to another field by touching ‘Right’ your changes will ***not*** *be recorded).*

5. Touch ‘Escape’. You will be asked to verify that you want to erase all data. Touch ‘Right’ to highlight YES and touch 'Enter'.

6. Touch 'Escape' to return to the previous menu.

The TV2 is now set and operating.

Next the TV2 will help you setup sensors & alarms

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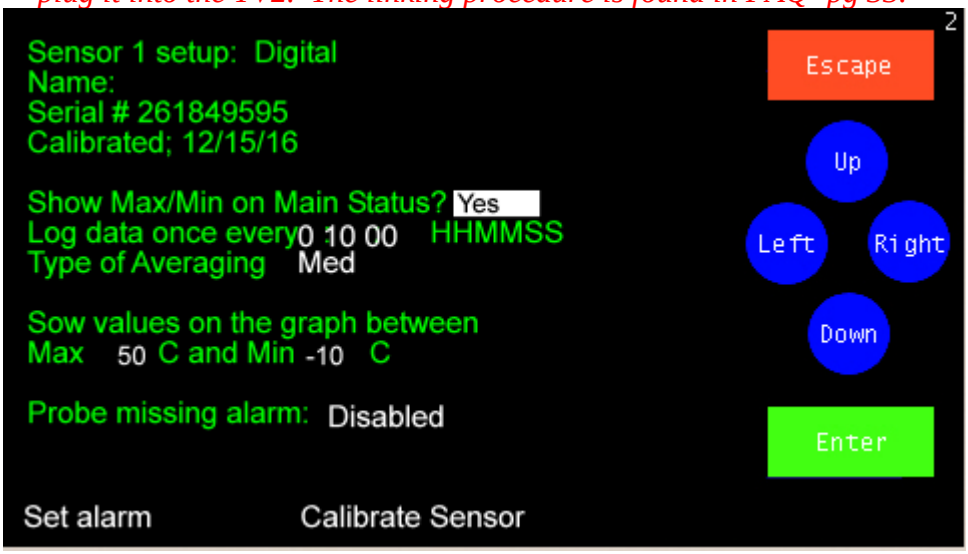
Setting up sensors

1. Plug the wired sensor into the TV2, or if you are using wireless sensor, place a 9vdc battery in the transmitter that is attached to the actual sensor.

2. After a few seconds, the TV2 will recognize the sensor and change the display to the Sensor Setup menu. The "Show Max/Min on Main Status" will be highlighted. Leave it as yes and touch Enter

3. The hour area of the log <u>data</u> field will be highlighted.

Note: If the TV2 does not 'see' your sensor you will need to link it or plug it into the TV2. The linking procedure is found in FAQ- pg 33.



4. This determines how often the sensor will log or store a temperature. You may scroll to any value between 1 min and 24 hrs with 'Up' or 'Down', touching 'Enter' to move to the next field, or accept the default by touching 'Enter'. The default value is ten minutes (00:10:00).

5. Select the type of averaging with 'UP', or 'Down' and touch 'Enter'. There are three possible selections.
   a. Fast – no averaging occurs. The exact measurement at the time of sampling will be stored and displayed. (Not normally used except during calibration)
   b. Medium- some averaging will take place so that minor temperature fluctuations will be filtered out. *<u>(This is the default value).</u>*
   c. Slow – additional averaging will occur. (Not normally used).

5. Set the chart max & min temperatures (Y axis) with 'Up' and 'Down'. **<u>This does not set the alarm</u>**. Setting these values has no effect on the alarm, what data is collected, or what is stored. <u>It simply sets the upper and lower point of the Y-axis of the temperature chart shown on the TV2.</u> Any temperature that falls outside these limits will show as a point at the top or

the bottom of the display. *Note: These limits can be adjusted at any time without affecting your data.*

Setting the sensor alarms

6. Highlight ‘Set Alarm’ and touch ‘Enter’.

7.

8. The alarm for this sensor is disabled by default. To enable the alarm touch 'Up' and then 'Enter'.

   A. Set the trigger-alarm-time to any value between 0:00 and 99:00. This controls how long the alarm will sound and the relay will be closed.

      Note: If you are using an auto-dialer set it for at least 00:22 (22 seconds) but not longer than 06:00 (Six minutes).

   B. Scroll in the alarm upper limit and delay time and then the alarm lower limit and its delay time with 'Up’ and ‘Down’ touching 'Enter' to move to each field in turn.

      Note: The delay time is how long the temperature must remain above (or below) the set temperature before the alarm occurs. This helps prevent false alarms.

9. You do not need to enter the Calibration Menu at this time. (*For calibration procedures see the document Entitled ‘Calibration Procedures’ found on the support page of the www.e2di.com website. It can also be downloaded from our website here.*

10. Touch 'Escape' until you return to the Status Screen.

You are done!

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Installation tips

1. **Planning -** Position the TV2 display close to an AC power source or your computer. The TV2 receives its power via a USB cable, which can be plugged into a computer or a wall transformer. If you power the TV2 from your computer, you will be able copy data (auto download) from the TV2 as well as send email or text alerts. Auto Downloading copies the logged data stored in the TV2 monitor to your computer every few seconds.

2. **Sensors:**
   a. Wired Sensors. Decide where you are going to place each sensor. Each senor has a 20-foot wire which needs to be run to the TV2 display. (Extension wires are available in fifty-foot lengths).

   b. **Wireless Sensors.** Position the sensors. If the sensors are inside a refrigerator or freezer position the transmitter (the black box) outside the refrigerator or freezer so the signal can be transmitted back to the TV2.

3. **Power for TV2.** Plug the USB cable into the TV2 into a USB port on a computer or into the power cube (wall plug) supplied.

4. **Backup Battery -** A non-user serviceable Lithium ion battery is installed in the display unit to provide temporary power during a power outage. If a power outage occurs, the display will turn off to decrease the load on the battery, however the battery will eventually run out. Fully charged batteries will operate the TV2 in sleep mode for ~ 100 hours, depending on how often you are logging data.

   Frequent power outages should not drain the batteries, although a power outage longer than 100 hours could drain the battery. If the battery is completely depleted your data will still be preserved, since it is saved in non-volatile RAM, but no new data will be logged. The Lithium Ion battery will be automatically recharged once AC power is restored to the TV2.

Operational Tip: *If the power to the TV2 is interrupted, an alarm will sound, and the relay will close. This 'power out' alarm can be disabled on the Main Menu if desired.*

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The TV2

The Status Screen

Current temperature. Updated every few seconds.

Max/Min temperature recorded since the last reset. *Appears in red if the reading is above or below the alarm settings.*

Since the TV2 has an easy touch screen, additional information can be viewed by touching various 'hot spots'.

For example:

1. Touch a temperature to see the logged data for that sensor.
2. Touch a Max/Min area to reset it to zeros.
3. Touch 'Main Menu' to set or change various settings, such as the scale, the data logging rate, high-low alarms for each sensor, etc...

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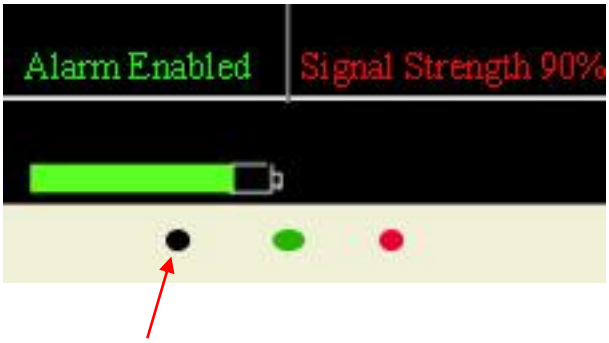
The LEDs and reset button at the bottom center of the display.



The green LED blinks once a second, indicating the display is logging data. During a power outage this LED will continue to blink, indicating that it is collecting and logging data from the sensors

The Red LED blinks when the display is operating on batteries. If an alarm occurs it will glow a steady red.

The small hole on the left of the green and red LEDs is the reset button. Insert the paper clip slowly until you feel the button press down. It will pop back up as soon as you release the paper clip and a system reset will occur. (Your settings and data will be preserved).

Navigating with Easy Touch

Where to touch

Touch any value to see the logged data for that sensor.

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Touch 'Main Menu' to change settings.

Touch a Max/Min temperature to reset it

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The Main Menu

Touch 'Main Menu' at the bottom of the Status Screen to enter the menu system.

When the Main Menu opens, the System Setup field will be highlighted. Touch 'Enter' to enter the System Setup Menu.

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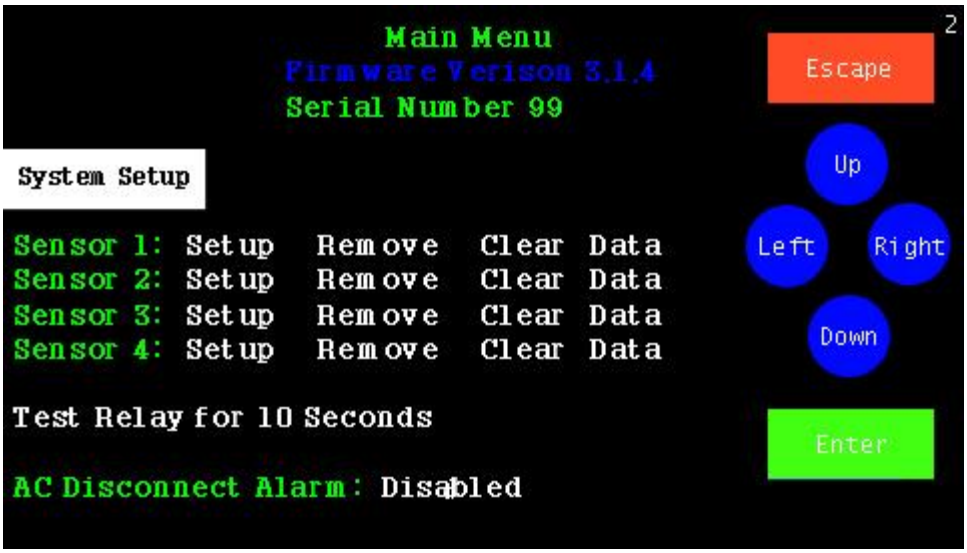

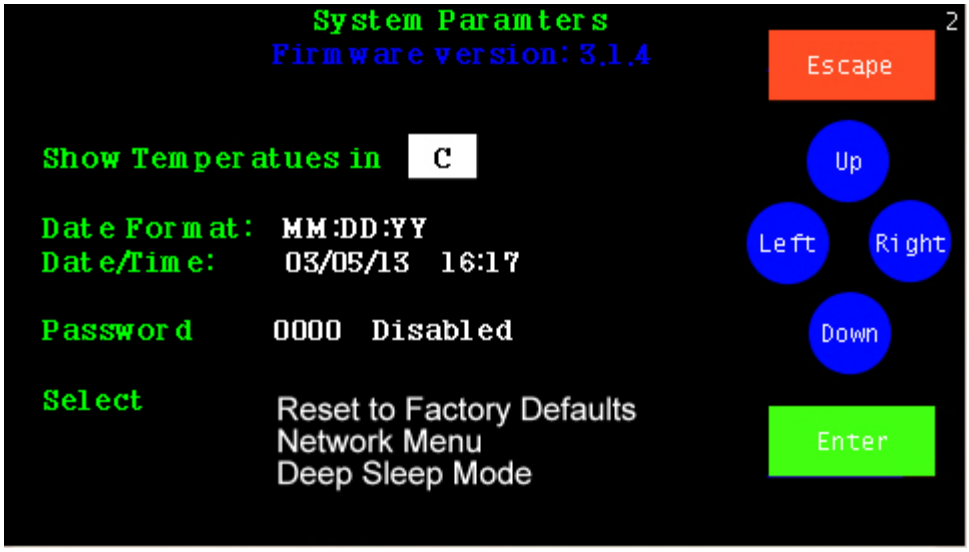

With the System Parameters menu, you can change between °C and °F, the date and time, activate a password to restrict access to the menu system, reset all values to the factory default, use the Network menu, and put the TV2 into a deep sleep mode.

(Warning – Do not use deep sleep mode unless you intend the TV2 to be in this mode for a long time. You will lose some or all of your data).

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To make a change:

1. Make sure the proper field is highlighted by touching ‘Left' or 'Right' until the desired field is reached. If the last field on the page is highlighted touching 'Right' will move the highlight to the first field on the page.

2. Once the field is highlighted, change the value by touching 'Up' or 'Down'. The appropriate values will be scrolled through.

3. Touch 'Enter' after selecting the proper value.

Note: It is possible to move to the next field by touching 'Right' but your change ***will not*** *be saved.* The change is only finalized by touching 'Enter'.

Operational Tip: *Keeping your finger on ‘Up’ or “Down’ scrolls through possible values at a fast rate. The longer you hold your finger on the screen, the faster it scrolls.*

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The Current Status Display

The TV2 main display (current status) will change depending on how many sensors you are receiving data from. If you have one sensor plugged into or linked to the TV2, the display will look like the one below.

Once you plug a second sensor into the TV2 the current status screen will change to show both sensors, (see below).

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Once a third sensor is plugged into or linked to the TV2 display the current status screen will change to a screen divided into quadrants, one quadrant for each sensor as illustrated below.

TV2 with four sensors

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Operational Modes

The TV2 has three operational modes: ***Main; Chart; and Sleep.***

Main Mode

The screen is divided into sections showing each sensor's current reading along with the maximum and minimum temperature recorded for that sensor.

Elements of the display:

1. A current temperature and relative humidity if appropriate, is displayed in large green letters. The max/min readings are also shown in green, unless one of the sensors violated an alarm condition, in which case it will be red.

   Note: It is possible a max or min temperature was too high or low but an alarm was not triggered. This would happen if the violation was shorter than the delay time.

2. If a wireless sensor is not linked to the TV2, a message stating "Sensor Not Installed' will be displayed in that quadrant.

3. If a wireless sensor has been linked to the display but no signal is being received, a message stating "Sensor out of Range" is displayed.

4. If wireless sensors are being used the battery strength for that sensor is shown. If the battery level drops below 20% the number turns red, rather than the normal green color. (No battery strength is shown for wired sensors).

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5. The battery icon shown at the bottom of the current status display is for the TV2 internal rechargeable backup-battery.

To see a history chart for a sensor, touch that sensor's temperature on the display.

Chart for sensor #2

Hot Spots to switch sensors

1. The temperature scale which appears as the Y-axis of the chart, is set in the sensor setup menu. (There could be temperatures above or below the Y-axis limits)

2. The number in the upper right-hand corner of the display indicates which sensor's chart is being shown (sensor 2 in this example).

3. The time line along the top of the chart, the X-axis, indicates when the values, in this case temperature, were collected. The dates on this line will change if you scroll left or right, or zoom out or in to view additional data.

4. The bottom two rows of the display show the current day and time along with the most recent reading from each sensor. Also shown, at the bottom right of the screen, is the zoom level. (See FAQ on page 35 for an explanation of this feature)

Use the hotspots to switch charts. Lightly touching any of the four temperatures on the bottom of the display will immediately change the screen to show that sensor's temperature history chart.

Note: *The TV2 stores a lot of data but eventually it fills up. Once it does, the newer data rolls over the oldest data. If you are sampling data every 10 minutes the last 1.5 years of data will be stored and can be viewed.*

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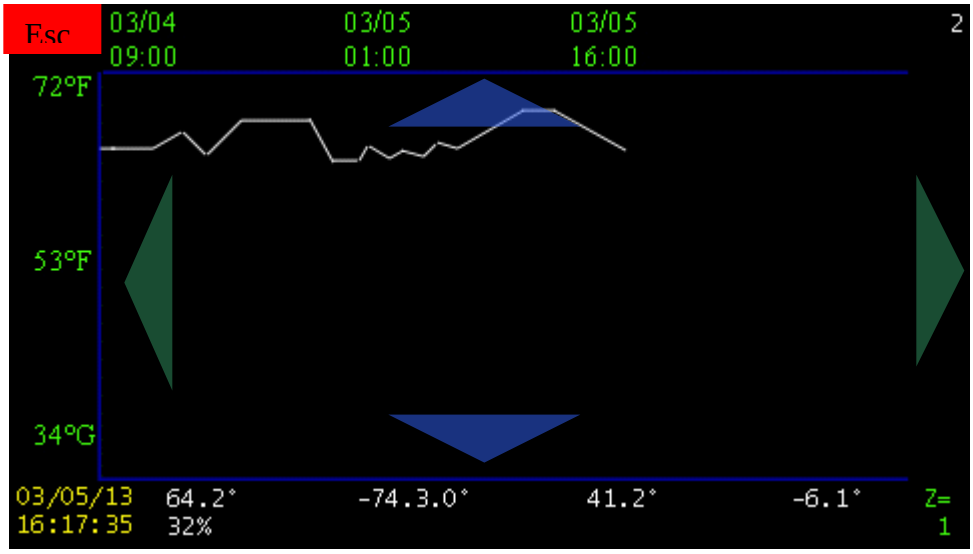
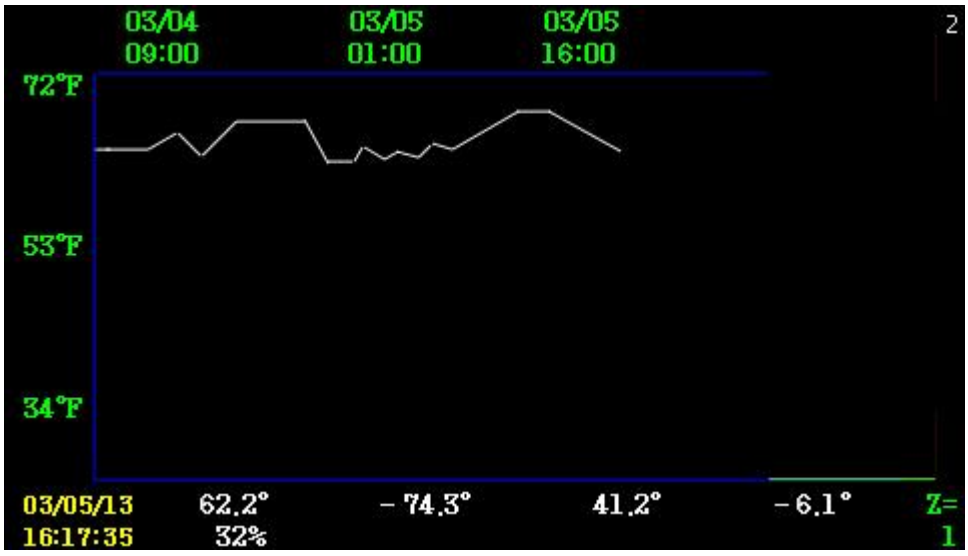
Touching anywhere in body of the chart adds four navigation buttons as shown below so you can view additional information.

Touching the bottom blue triangle doubles the amount of data displayed on the chart (see zoom in FAQ). The top blue triangle zooms into the display, so less data is displayed. The green triangle on the left scrolls backward, showing older data, while the green triangle on the right shows more recent data. To return to the status screen touch 'Escape'.





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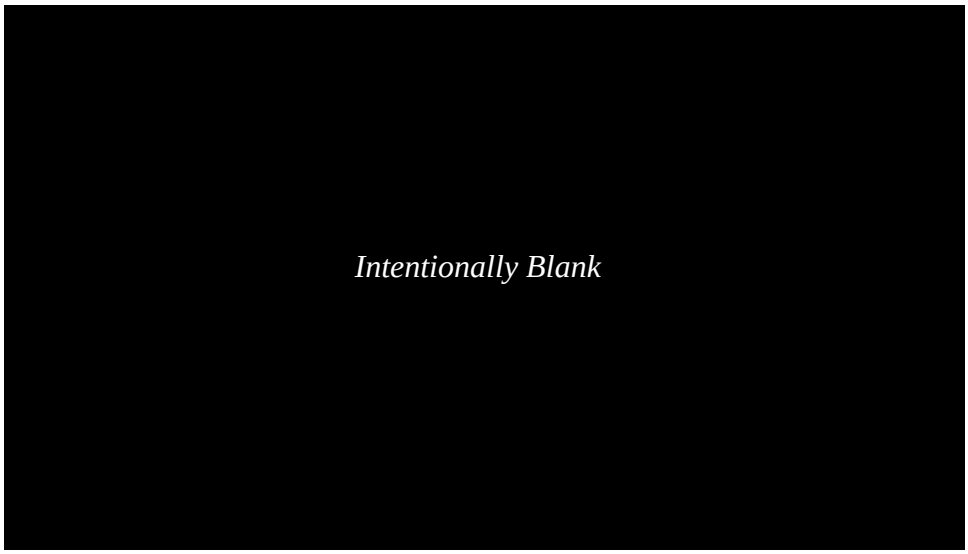
Sleep Mode



1. In *Sleep Mode*, the display is blank. The TV2 automatically enters sleep mode after power to the TV2 is cut, to preserve the battery. *The TV2 will still collect data and perform all other functions while in sleep mode.*

2. The TV2 operates normally while running on batteries performing all normal functions, including, taking and storing temperatures, sounding alarms and downloading data if auto downloads are setup.

Note: A deep sleep mode can be selected on the main menu, to turn off the TV2. In this mode only the clock continues to run. To exit from deep sleep mode, touch the TV2 after supplying power. If the TV2 needs to be shut-off for a long period of time it should be placed in deep sleep mode to conserve the batteries. **(Warning: You will lose some or all of your data)**

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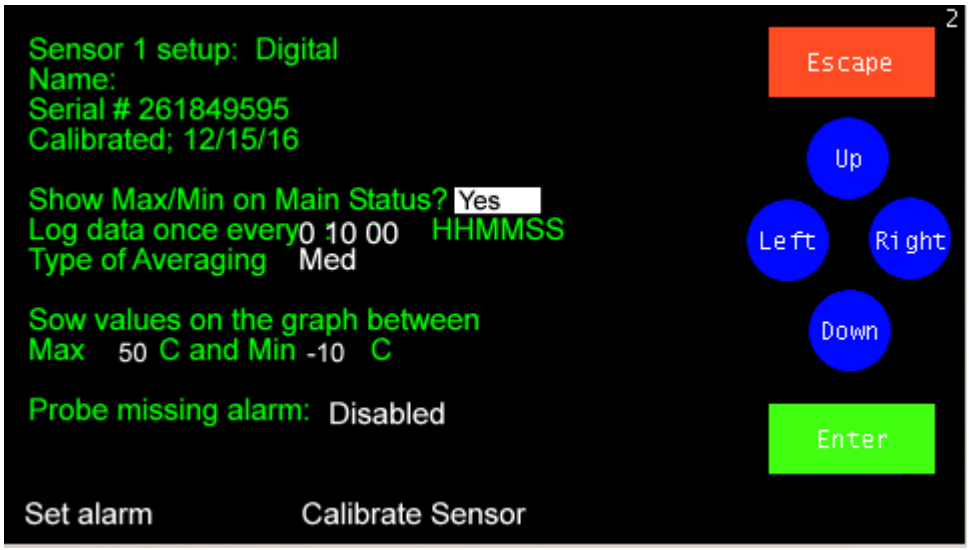
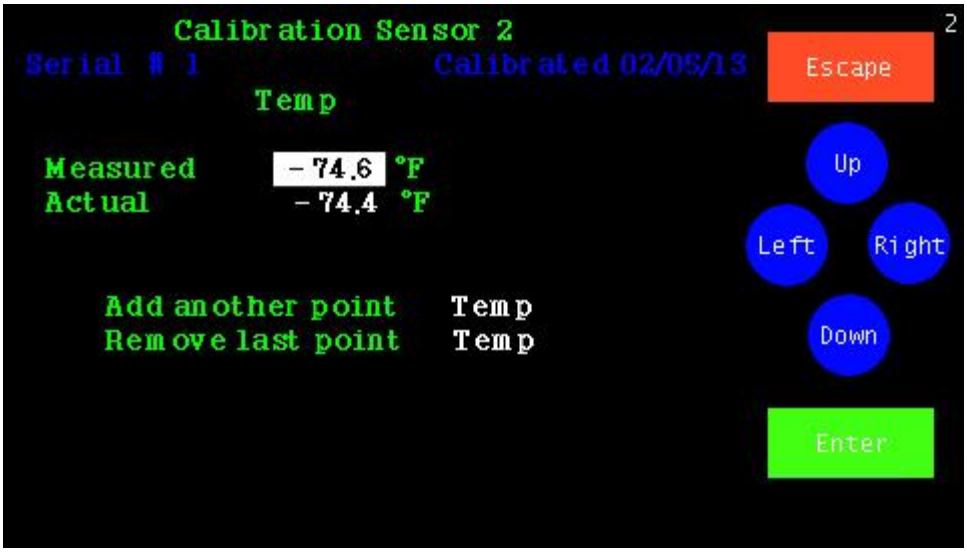
Calibrating sensors

To calibrate a sensor, access the sensor setup menu by touching 'Main Menu' and 'Right' until the sensor setup area is highlighted. Touch Enter to see the sensor setup menu.



Touch 'Left' to highlight Calibrate Sensor and touch 'Enter". The calibration table for that sensor will be shown.

Calibration Table



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Calibration data entered here will be stored in TV2 monitor for wireless sensors. The calibration data of wired sensors is stored on the sensor itself.

Each sensor can have up to three different calibration points. When the calibration screen first opens, only one point is listed, but you can add two additional points or remove points.

The 'measured value' is the temperature shown on the status screen, and the 'actual value' is what it should be reading. This 'actual value' is most often obtained from another very accurate comparison instrument.

How TV2 applys the calibration to the sensors:

1. One point – Any temperature will be offset from the measured value.

2. Two Points – Any temperature will be adjusted by the offset equal to the point on a line drawn between the two points.

3. Three Points – Any temperature will be adjusted by the offset equal to the point on a line drawn between the three points. The line could be straight, or the slope between point 1 and 2 could be different than the slope between point 2 and 3.

   Note: Once either an actual value has been entered into one of these fields the values displayed in these fields will not change. Even if the TV2 sensor is showing some very different value on the current status screen, the measured and actual values shown on the calibration menu will remain fixed.

(Suggested calibration procedures can be copied from the support page on the 2di web site under support). *Link*

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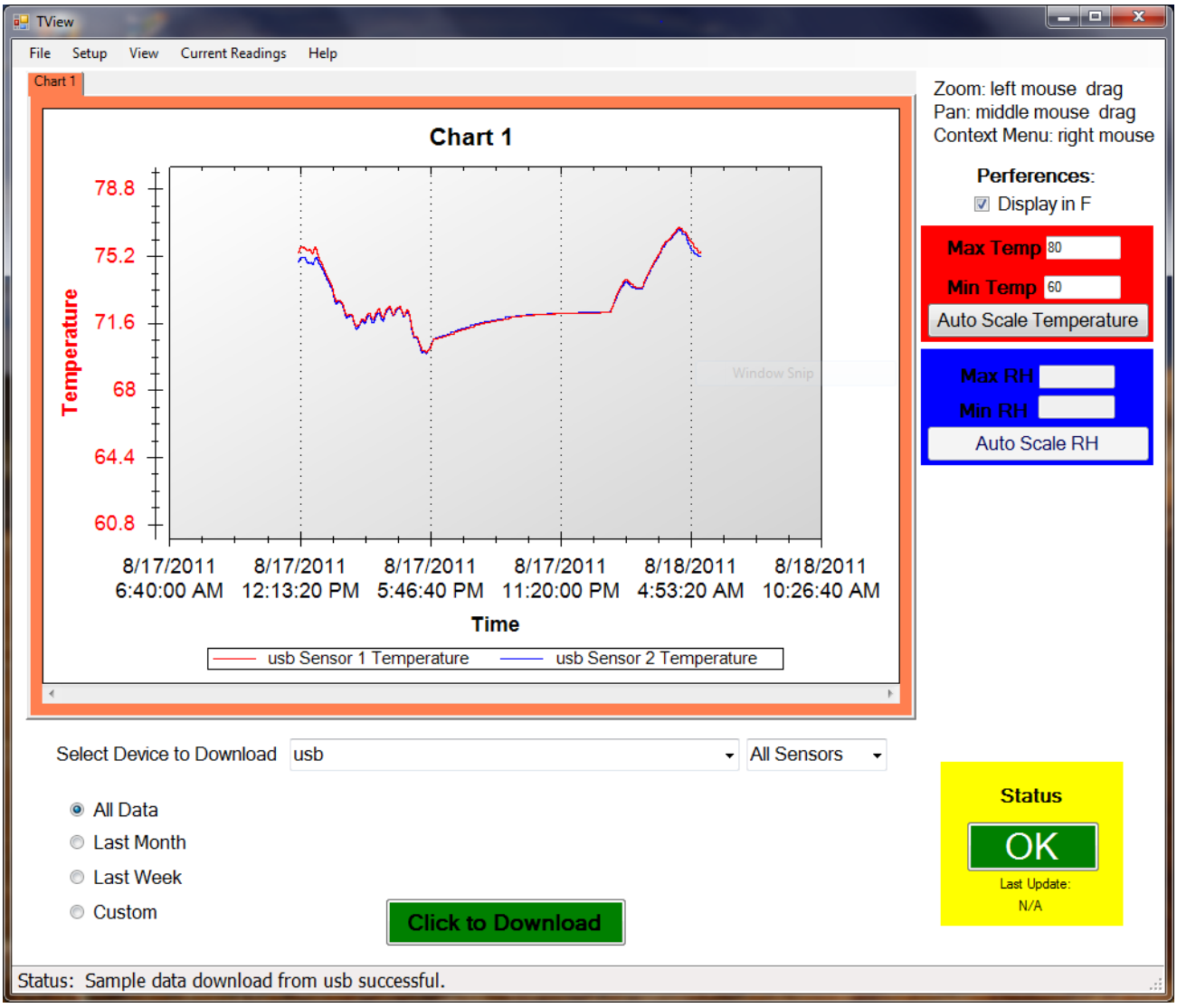
TView Software

Copying data from the display

Downloading, or copying data from a TV2 to a personal computer is done via the USB cable or from your local area network, if a TV2 is present on the LAN. You can unplug the USB cable from the power cube and plug it into a USB socket on your computer. This will not affect the data you have already collected.



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TView Software Users Guide

To obtain TView software:

1. Click on the 'Support' link on any page of the 2di web site: *http://www.e2di.com.*

2. Click the link for the PC Download software and select the version you need.

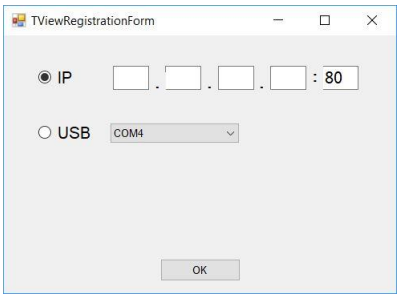
3. Save it to your computer.

4. Unzip the file and click on Setup. ***(If you have an older version of the software already installed on your computer you must uninstall it first).***

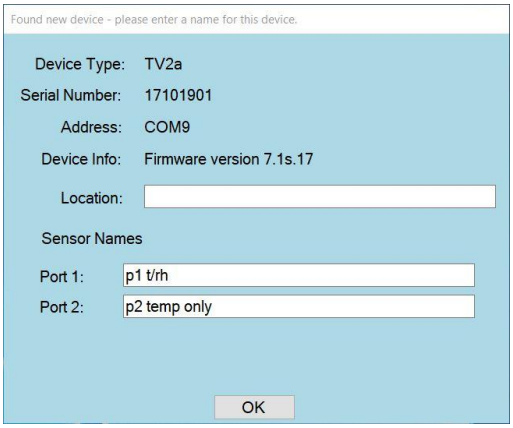
5. During the install process, a directory will be created and files will be written to your computer. Make sure you have rights to do so. You will also be given an opportunity to install the software in a directory other than the default directory. We recommend that you accept the default directory. *This works just like any other Windows installation process.*

6. Once the software is installed, click on the TView icon to open the program. The icon will be in the Two Dimensional Instruments folder. You can, of course, copy the TView icon to your desktop for convenience.

7. You must ADD a TV2 to the TView program before you can download data to it. Click on 'Setup' and then 'Add TV2'.



   a. Key in the IP address if the TV2 is on your LAN, or click on the USB radio button if the TV2 is plugged into your computer with a USB cable.
   b. Click 'OK'
   c. You will see a popup screen where you can name the TV2(Location:) and its sensors.



d.

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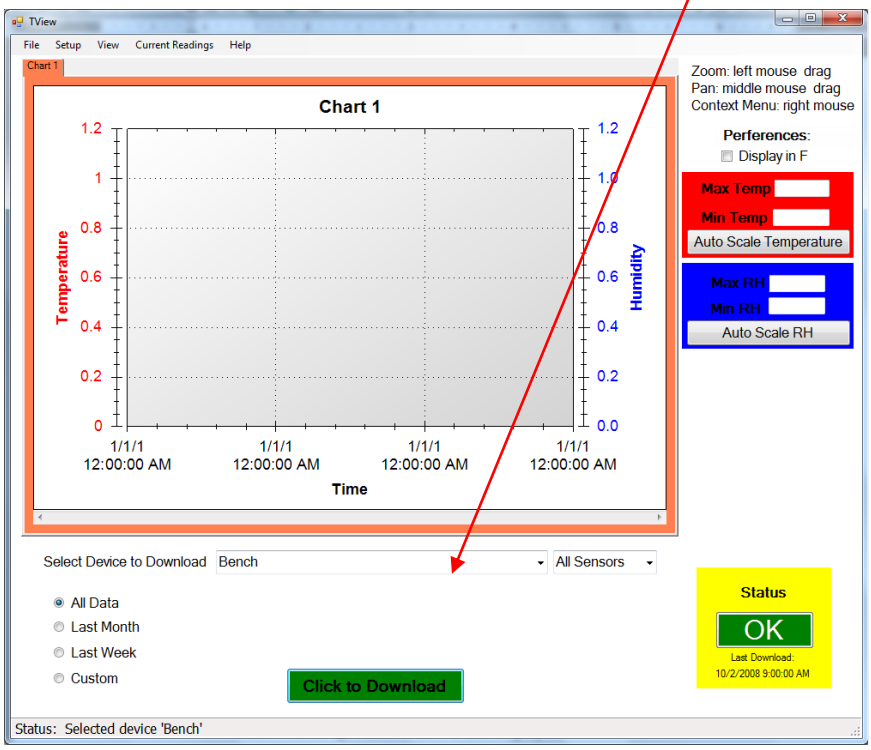
To Copy Data from the TV2

You can copy data either automatically (by setting up auto-download) or manually from any TV2 which has been added to TView

Once you have identified your TV2s, you are ready to copy data from them.

1. To copy data from a TV2 you must first select it. Click the small arrow on the right side of the box entitled 'Select Device to Download'. All known TV2s will be listed by name. Select the one you want to download data from.



   a. Select the device to download by left clicking it.

   b. Select the date range you want to download by clicking one of the buttons to the left of the green download button. The 'All Data' button is selected by default, so that all stored data for the selected sensor(s) will be downloaded and displayed. Clicking on last month, last week, or custom and setting a date range will cause only that data to be copied to the PC and displayed. *This can be tricky and may not work the way you think it should if the date on the TV2 is different than the one on the PC.*

   c. Click the 'Click to Download' button.

i. If there is already data from the same TV2 on your screen you will be asked if you want to replace the existing data. If you answer yes, the displayed chart will be erased. If you do not want to erase the data, click 'no' and save the existing data before downloading additional data. You could also move the chart with existing data to another tab, by right-clicking on the chart.

2. By default, the TView will set the scale of the display so that the downloaded data will be positioned vertically in the center of the chart. If you type a value in the Max or Min boxes to the right of the display, the scale will be adjusted accordingly.

3. Once the chart has been copied to your computer, the actual data can be moved around or zoomed into, to highlight a particular area. Since you can control the chart once displayed on your screen it is recommended that you download 'all data' instead of specifying a particular date range.

   a. To zoom into an area of the chart, draw a box around it with the mouse: Position the cursor at the top left hand corner of the area and while holding down the left mouse button move the cursor toward a lower right position. When the mouse button is released the chart will be rescaled to show only those logged values within the box you have drawn. To return to the entire chart click the right mouse button and select 'Undo all Zoom/Pan'.

   b. To move a plot to a different chart right click the mouse on the chart and select 'Move a Plot to another graph'.

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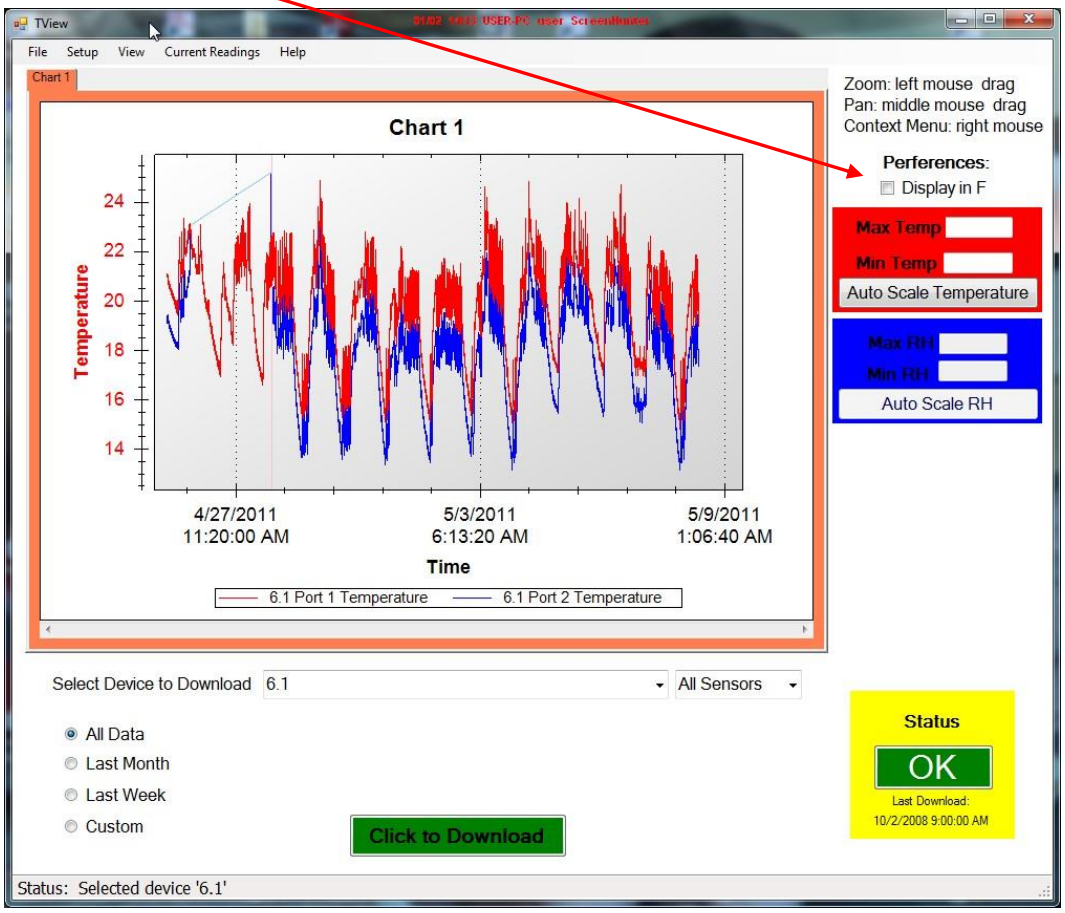
Working with Charts

1. When TView is opened, a blank chart is displayed. It is listed as Chart 1 on the tab at the top of the chart and as the title of the chart. You can rename this by double-clicking on the tab and typing a description in the text box. This will rename the chart and the tab.

2. You can hover over any point of the curve with the mouse cursor to see the value, the date and the time it was saved.

3. A value scale is on the left of the chart and a RH scale, if humidity has been downloaded, is the right side of the chart. You can change the temperature scale to Fahrenheit by clicking the box to the right of the chart under preferences. You can also set the Y-axis for temperature and humidity by typing a value into the boxes provided.



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Drop-Down Tabs

1. The 'File', 'Setup', 'View, 'Current Readings', and 'Help' tabs:

   a. File

   i. New Chart. This creates an empty chart with new tab to the right of any already displayed tabs. The tab and chart description can be changed by double clicking on the tab and typing the new name in the text box. Multiple charts, each with its own tab can be created.

   ii. Open Chart. This command allows the user to open a file previously saved and stored on a computer. You will be prompted for a file name. Only files with a file extension of TXV can be opened. You must enter a Username and Password if the chart was originally saved with a Username and Password (see iii below).

   Note: It is not possible to load the same file into more than one chart or to change any part of a file displayed in TView.

   iii. Save Chart. This saves the active chart to your computer. The saved chart will be encrypted and have a TXV suffix. It is encrypted with the username and password you entered when the program was opened.

   iv. Export Chart to .XLS. This exports the chart shown on the active tab to an XLS file that can be opened with Microsoft's Excel. Each sensor's data will be transferred to a separate worksheet on the Excel chart. It is possible to change this data in Excel.

   v. Print Chart. Sends the active chart to a printer. If there is more than one plot on the chart, you should use a color printer so you can tell the plots apart from each other. The chart looks better in landscape mode that portrait mode.

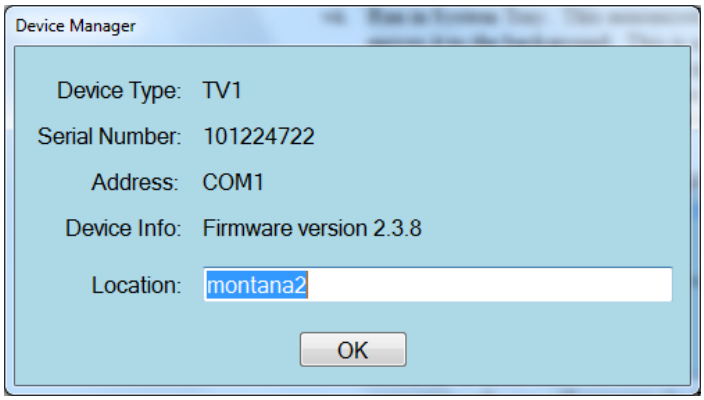
   vi. Close chart. This immediately erases the selected chart and deletes it from your computer. You will be given a chance to save the displayed chart.

   vii. Run in System Tray. This minimized the TView program and moves it to the background. This is useful if you are auto-downloading to your computer and want to leave the program running without seeing it on your desktop.

   viii. Exit. This closes the program and stops any further activity.

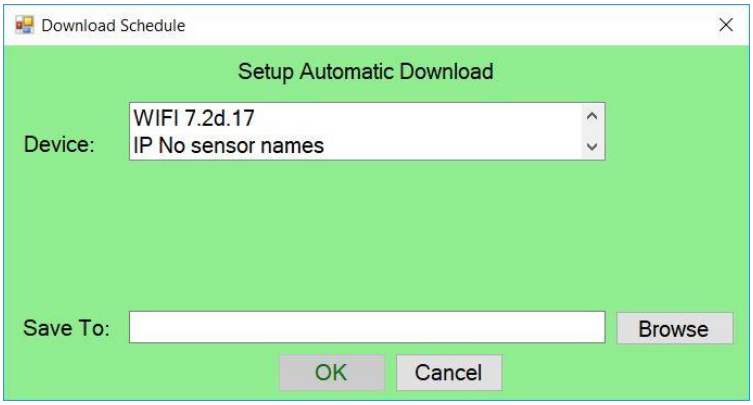
b. Setup tab:

i. Manage TV2s. Used to rename a TV2 and determine which port it is attached to. *You can view the available ports on your computer with Device Manager found in the hardware section of Properties of the 'My Computer' program.*



ii. Schedule Download. Once scheduled, data will automatically be written to your file every few minutes.

1. Select the TV2 to be downloaded by clicking 'Add New Device' and selecting the one you want.

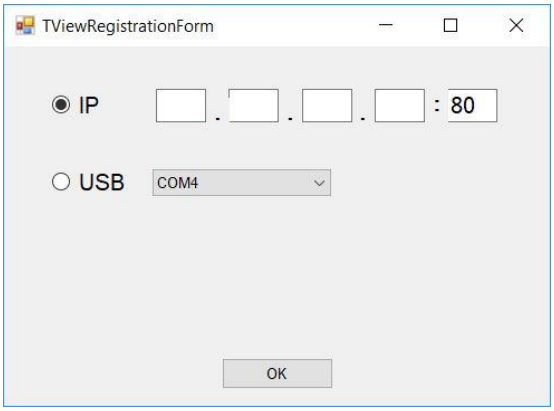


2. Type in the file name and specify the location on your computer where you want the data stored. The file name will be proceeded by a year, month.

Note: You must have rights to create and to write files on your computer when you schedule an auto download.

iii. Add ThermaViewer. Allows you to add a TV2 that is connected to your LAN or a computer via a USB cable.

iv. Setup mail alerts. Information for this can be found on our website under 'Support'.



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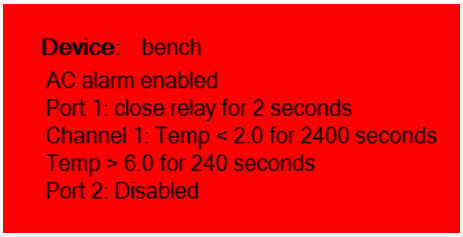
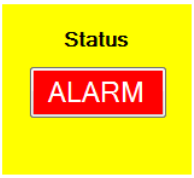
c. View tab:

To view alarm settings or logs, the TView software must be Auto-Downloading the TV2 for which you want to view the settings.

i. Alarm setting. Shows alarm setting for a particular TV2. When you select this, TView queries all registered TV2s which are auto-downloading for their alarm settings.



ii. Alarm log. Shows a record of all alarms for all TV2s being auto-downloaded. This display is accessed when the user clicks on the status button at the lower right of the TView program. If a registered TV2 which is auto-downloading goes into alarm mode, the status button will indicate that an alarm has occurred by displaying the word 'Alarm' in red letters to alert the user. By double clicking this button the alarm log will be shown. After reviewing the alarm, click 'Mark as Reviewed' to hide it or right click an alarm and delete to remove the alarm from this list.



iii. Email alerts. A log of all emails sent can be seen for any registered TV2 which is auto-downloading.

d. Current Readings: This screen displays real time data from TV2's sensors. Data does not have to be auto-downloading but the TV2 must have been registered in the TView software.

1) When this window opens it will be blank. To add a sensor, click the 'Add' button and select the TV2 to which the sensor is attached. A popup will list the sensors attached to that TV2. Select one or more of them by clicking on it. The last 100 readings will be displayed in the chart along with the current sensor reading. You can add additional sensors to this page. Clicking the

'Hide chart' button will hide the chart and display only the numeric reading. The charts are updated every few seconds.

(Note: These temperatures are the actual temperatures taken by the sensor, which may or may not be the same as the logged temperatures, depending on how you are averaging data.)

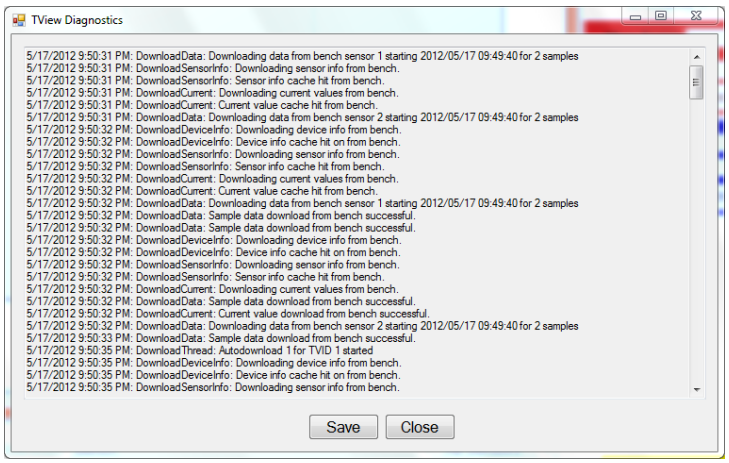
2) A plot can be removed by clicking on the X in the upper right area of the chart.

3) If a plot is displayed and an alarm occurs for that sensor, the temperature will turn red and the alarm status button on the main page will be updated.

e. Help:

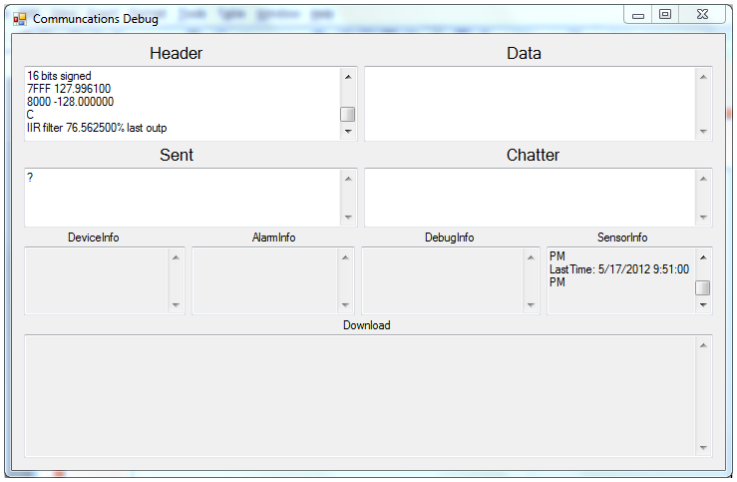
1. 'User guide'.

2. Email Alert Setup. This word document contains a step-by-step guide to implementing the Email Alert Setup.



3. 'TView Diagnostics Menu' will be used when requested by a 2di technician. All activity of the TView software is archived. This information can be saved to a file and emailed to 2di.

4. 'TView Communications Diagnostics' Menu archives all communications between TView and TV2s for support and troubleshooting.



5. 'Save Diagnostics file to send to 2di'. This will save the diagnostic file to your computer so that it can be emailed to 2di for help in troubleshooting.

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FAQ

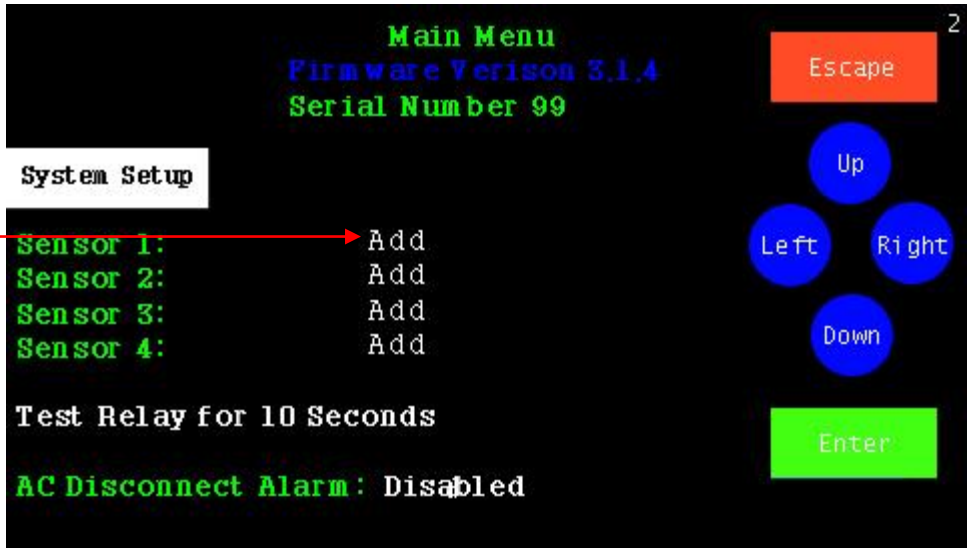
1. Can I tell if a temperature high/low alarm occurred by looking at the TV2 display?
   Yes – If an alarm was triggered an upper-case "A" is placed on the chart at the time the alarm began and a lower-case "a" at the time the alarm was silenced or expired.

2. How can I tell if a wireless sensor is linked to the TV2?
   If the current status display shows a numeric value that sensor is linked to the base station. If it is not linked, a message indicating that will be displayed instead of a numeric value.

3. How to Link wireless Sensors

   If a sensor is not linked, touch 'Enter'. Highlight 'Add' for the sensor you want to add and touch 'Enter'. The display will then change.

   Attach a 9vdc battery to the sensor . The display will present the sensor setup screen so you can configure the sensor.



4. What should I do if a wireless sensor quits transmitting data?
   Reposition the sensor, replace the battery, and as a last resort, re-link the sensor (see 3 above).

5. What do I need to know about wireless sensors?
   a. Battery - The 9-volt battery shipped with sensors will power the transmitter for the sensors for approximately 1 year. This could vary depending on where the sensor is located and how often you logging data. For example, sensors placed inside a refrigerator will have much less battery life.

Note: Use Alkaline batteries for wireless sensors. Rechargeable Lithium batteries, can cause unexpected results.

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b. The battery charge for each sensor is displayed on the TV2 Status screen. Once the battery drops below 20% a 'change battery in sensor X' message will be shown on the Current Status display.

c. Range - The unobstructed range for the sensors is ~ 100 feet. If the sensor is used indoors, the range could be less. If there are walls or partitions between the sensor and the TV2 the range will definitely be less.

d. Accuracy – The accuracy of a temperature sensor is dependent on the accuracy of the sensor being used.
   i. Internal or external Thermistors ±0.3°C
   ii. Relative Humidity sensors ±3.0%.
   iii. Standard thermocouple accuracy. Depends on the type. (see page 4 above)
   iv. Digital wired sensors ±0.3°C
   v. Differential Pressure ±0.002" w.c.

6. Can the wireless sensors be calibrated?
   Yes. The calibration data is, however, stored in the TV2 display to which the sensor is linked, so if you unlink a sensor and link it to a different display you will need to reenter the calibration data. A sample calibration procedure can be obtained from our web site www.e2di.com. It is just a sample procedure. Your calibration service or QC department may have a different procedure.

7. How is the data transmitted from the sensor to the TV2?
   The sensor is attached to a transmitter which sends a signal to the TV2, which has a built-in base-station that receives data. This transmission uses 433mhz.

8. What is the purpose of the Zoom-out and Zoom-in buttons on the TV2 chart display?
   a. The amount of data displayed by the chart on the TV2 changes according to the Zoom setting. One data point is plotted in each column if the chart is zoomed in completely (Zoom =1X).

   b. Touching the '**ZOOM-OUT'** button (green triangle at the bottom of the chart display) causes more than one data point to appear in each column. The data on the TV2 can be zoomed out 10 times (Zoom =10X). This means that the user can see between 4 months and 256 years of data on one screen, depending on how often the sensor is collecting data. In any zoomed-out mode more than one collected measurement appears in each vertical column. The recorded measurements are displayed as a high-low vertical bar.

1. So, for example, if the TV2 is set to Zoom=2X then each column will show two temperatures connected by a vertical line whose top is the higher temperature and whose bottom is the lower temperature.
2.

3. If the chart is zoomed out further than 2X to say Zoom = 6X, the measurements (in this case all 32 of them) will appear as a single vertical line with the highest of the 32 temperatures being the top of the line and the lowest of the 32 temperatures as the bottom of the line. The TV2 can display between 1 and 512 measurements in each column. The **ZOOM-OUT** green triangle can be touched ten times (Zoom=10X), which will show the maximum amount of data. This method of displaying multiple measurements in the same column allows the TV2 to display large amounts of data in the same way that stock prices are displayed with high-low bars covering a period of time.(Not sure where you actually wanted this cut off)

9. Can I use wireless sensors inside fridges and freezers?
   a. Sensors with internal Thermistors can be used within a fridge but the range is dramatically shortened, and the cold temperature will shorten the battery life of the sensor. They will not work from within walk-in refrigerators or freezers.

   b. Sensors with external Thermistors or thermocouples are made to be used with freezers and refrigerators. All external sensors have two parts. The transmitter (the black box with the battery) that is placed outside the fridge or freezer, and the actual sensor which is attached to the transmitter by a thin wire. Only the actual sensor should be placed inside the freezer.

10. What is the purpose of the sensor serial number?
    The sensor serial number shown on the Sensor Setup menu and the current status screen is a channel number between 1 and 256. ***Do not link sensors with the same channel number to the same TV2.*** Each sensor linked to a TV2 must have a unique channel number. If you do have two sensors with the same serial number return one of them to the factory for reprogramming.

11. What type of wireless sensors can be used with TV2?
    a. Interior thermistor – The thermistor is mounted inside the black sensor pod along with the transmitter. These are most often used inside rooms or containers kept at room temperature.

    b. Interior thermistor & humidity – Thermistor and RH sensors are mounted directly on the board inside the black sensor pod along with the transmitter. These sensors are normally used to measure room temperature and humidity.

c. Exterior thermistor – A thermistor on a wire is plugged into the black transmitter. This is the same type of thermistor used for the interior thermistor sensor, and is used to monitor cold storage units, such as refrigerators or freezers.

d. Thermocouple – K, J or T type thermocouples that plugs into the black transmitter and are used for extreme temperature conditions. Each type has its own temperature range which can go from cryogenic temperatures to as high as 1250°C.

12. Can I change the date and time of a TV2 without losing data?

If you set the date or time **back**, the data stored in the monitor will be cleared (You will be warned before any data is actually cleared). You can move the time forward **1 hour or less** without losing data. A data gap will appear in the logged data. If you move the time forward more than one hour the old data will be erased.

13. How much data can be exported to Excel with the TView program?

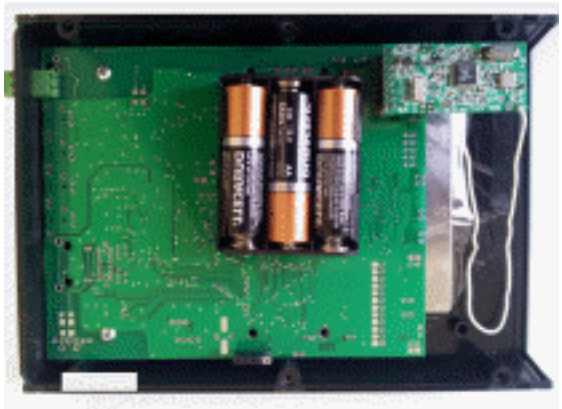
When you open a file with Excel that has been saved with TView only the first 65000 data points will be saved. (This is a limitation of the Excel program not the TV2 or TView). The TView program has no such limitation and will save and display all data.

14. Can I move TV2 to a new location without losing data?

Yes and no. If you just unplug the TV2 and move it your data will be kept. If you put the TV2 into 'Deep Sleep Mode' you will lose some or all of your data. Go to the Main menu by touching 'Enter' twice and touch 'Left' to highlight 'Deep Sleep Mode'. Touch 'Enter'. The monitor will go into a deep sleep mode during which the clock will continue to run but no data will be logged. Once TV2 is repositioned and power supplied, touch the screen and it will reboot. If the display does not immediately wake up press the 'Reset' button with a paper clip. This may also cause the clock to lose some time.

15. How do I change the TV2 batteries?

Older TV2s have 3 AA batteries inside the enclosure. Unscrew the six Phillips-head screws and lift the back of the enclosure off. Hold the black plastic battery holder with your hand while you push the batteries against the small tension spring and lift out the batteries one at a time. Replace the batteries and replace the back of the enclosure and retighten the six Philips-head screws **Newer model TV2s** have a re-chargeable non-user replaceable battery which does not require replacement.



16. Will an email alert identify the sensor the alert came from? Yes. It sends a message like this:

<User message>

<device name> Alarm on sensor <sensor port>, [High|Low] limit violated, started between <start time> and <start time>, ended between <end time> and <end time>.

It ends with a text description of the alarm settings.

```
i.e. TView detected a new alarm during auto-download: Ubidots TV2
7.3d.21d-f4.

Alarm reported from ThermaViewer "Ubidots TV2 7.3d.21d-f4" (s/n
18041601), sensor 1 [Temperature] > 8 Degrees for 00:02:00.

Alarm started 6/25/2013 7:40 AM.


There is a problem with the freezer.
```

The device name is the name the user gave to the TV2 when it was first identified by TView. To change the device name go to ‘Setup’ and click on ‘Manage TV2s’

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Appendix

:::Disclaimers:::----------

1. Although Two Dimensional Instruments, LLC has made operational tests on our software "TView", we cannot guarantee that all operations will work properly under all conditions.

2. Two Dimensional Instruments, LLC shall not accept any responsibility for any damage whether direct or indirect that results from the usage of the TView software of the TV2 Easy Touch monitor.

3. Specifications of “TView software” may be subject to change and service may be terminated without advance notice to the user. In such a case Two Dimensional Instruments, LLC shall not be responsible for any damages whether direct or indirect from the inability to use “TView software”.

4. Two Dimensional Instruments, LLC has no obligation to correct any defects found in “TView software”.

5. If the TV2 firmware is modified in any way it will be rendered inoperable and non-responsive. It is not possible for firmware that has been changed to be upgraded in the field. In this case the TV2 display must be returned to Two Dimensional Instruments, LLC for reprogramming for which service additional charges may be incurred.

Disclaimers

:::Copyright:::----------

1. All copyrights “TView software”, including all of the programs and all related documents, are the sole property of Two Dimensional Instruments, LLC.

2. “TView software” with Email notification is for use free of charge. Redistribution is permitted as long as it is to others for non-profit. In this case, all terms and conditions as written in the above disclaimers automatically transfer and hold true and valid for the party to which the program was redistributed. Please note that if you wish to commercially redistribute the program please contact Two Dimensional Instruments, LLC directly.

3. The reprinting or redistribution for commercial purposes whether in part or in whole, in magazines or as a part of any product is strictly forbidden without the expressed consent of Two Dimensional Instruments, LLC. Any inquires concerning commercial redistribution should be directed to the Sales Department of Two Dimensional Instruments, LLC.

4. Please do not attempt to make any changes or modifications to “TView software”.

TWO DIMENSIONAL INSTRUMENTS, LLC

Warranty

The TV2 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 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)

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

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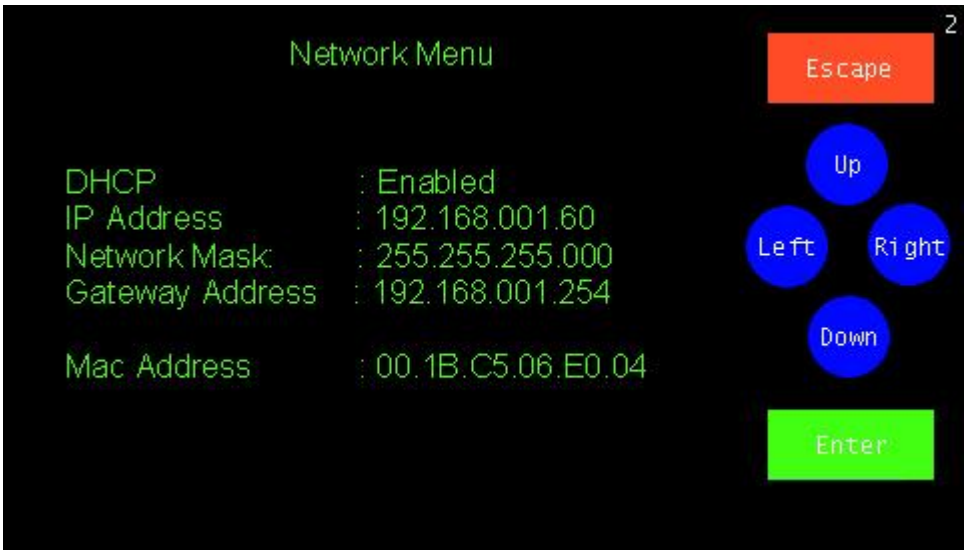
Addendum for adding a TV2 with the Wired Ethernet Option

If your TV2 has a wired Ethernet network option it will need an IP address, so it can be identified on your Local Area Network (LAN). Each TV2 has a unique MAC address. When you use TView to download data it identifies the TV2 by its MAC address.

When the TV2 is plugged into a hub or switch the TV2 will be assigned an IP address by the DHCP server on your network. Access the 'Network Menu' on the System Setup page on the TV2.



To assign a static IP address disable the DHCP first and then enter the IP address into the IP Address position.

Whether you enable DHCP or assign a static IP address make a note of it so you can enter it into the communication setup area of TView so you can download data.

Exit this menu by touching 'Escape'. This menu can be accessed at any time through the 'System Setup' menu.

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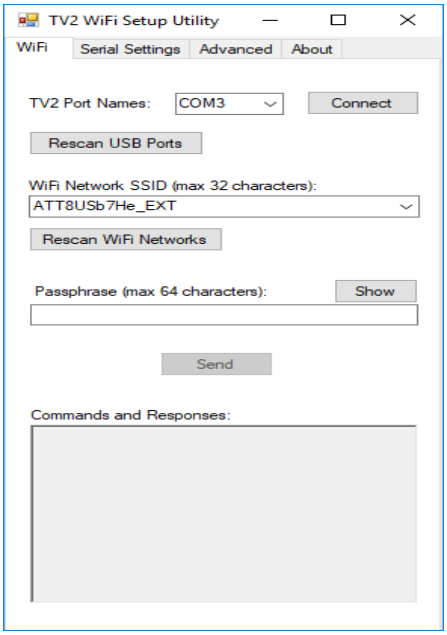
Addendum for adding a TV2 with the WIFI Option

Steps

1. Plug the TV2 into a USB port on the computer with the TV2_WIFI-Network_Setup_utility installed (This utility can be downloaded from the e2di website under the 'Support' tab). This utility works best if only one TV2 is plugged into the computer and if the computer has a WIFI card installed.

2. Open TV2_WIFI_network_setup_utility.
   a. You may see a small popup window if the computer does not have a wireless network card and/or if no TV2 is plugged into a USB port on the computer. If the window does popup, verify that a TV2 is plugged into a USB port on the computer.
   b. If a TV2 is plugged into the PC with a wireless network card all wireless networks that the computer 'sees' will be listed in the 'WiFi Network SSID' box.



3. Select the correct com port from the drop-down menu by clicking on **'Connect'**
   a. If a TV2 is plugged into a USB port the 'TV2 Port Names' box will be populated with a port name. If there is nothing in that box plug a TV2 into a USB port on the computer and click **'Rescan USB Ports'.**

4. Select the wireless network device that the TV2 will connect to from the drop-down menu.
   a. If no network SSID appears in the box click '**Rescan WiFi Networks'**
   b. If you do not have a wireless network card installed in the PC this box will be empty. If this is the case, type in the network SSID (network name) you want to connect to.

5. Enter the password for that network, typing it into the 'Passphrase box'. (To see what you are typing click the 'Show' button), and click 'Send'.

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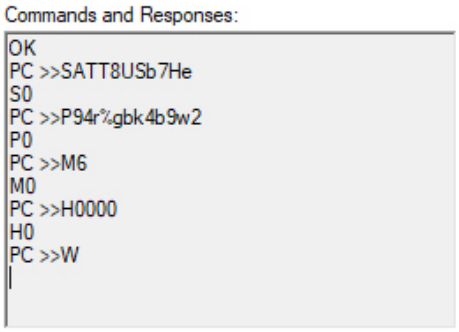
a. Once ‘Send’ is clicked you should see some text in the ‘Commands and Responses’ field.



7. It can take up to one minute for the TV2 to connect to the network. Once it does, the red X will disappear from the icon at the bottom of the TV2 main display.

Connected to LAN

Not connected to a LAN

TWO DIMENSIONAL INSTRUMENTS, LLC

Viewing the Temperature over the Internet

To access the TV2 from outside the LAN a static IP address will need to be used and port forwarding will need to be setup by your IT department. Enable port forwarding to your TV2 on your router. Forward port 80 (HTTP Port) to your TV2's IP address.

The TV2 will serve up a web page when accessed by a browser so the current conditions can be seen from anywhere with internet. Your IT department will provide the IP address to access the web page below with a browser.

You will be able to view the information below but you can not make changes to the TV2 or go to the chart display remotely.

Notes:

1. You can copy the temperature history from the TV2 via the USB cable plugged into a PC or over the LAN, but these are mutually exclusive. You may not do both simultaneously.
2. If you are using the port forwarding technique to access the TV2 over the internet with a browser or to copy data with TView, only one TV2 can be accessed unless you have assigned unique port numbers to each IP address.

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