

TRM-608

ADVANCED THERMAL RUNAWAY BATTERY MONITOR INSTALLATION, OPERATION, AND MAINTENANCE MANUAL



This manual provides instructions regarding safety, installation, and operation. Failure to observe the precautions as presented may result in injury and/or damage to TRM-608 unit.

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1. INTRODUCTION

The TRM-608 Advanced Thermal Runaway Battery Monitor is the first IFC 608 dedicated monitoring device designed for easy installation in any new or aftermarket systems of Valve Regulated or Flooded Cell battery systems in Lead Acid, NiCad and Lithium battery systems covering all systems from -60 to 600 Vdc. The user friendly interface is designed with a non-technical battery person in mind to aid in monitoring not just for Thermal Runaway but for signs of the physical health of the battery system and the environment which they are installed. The easy to read colors, icons and large fonts combined with indepth intelligent algorithms give fast and easy status updates that anyone can understand. A single controller can monitor up to six strings using one "string" kit per battery string. An Ambient Temperature Probe is supplied with the controller and 5 more can be added for averaging the room temperatures. Pilot Temperature Probes can be expanded up to 42 points per string. The TRM-608 can be installed on top of a battery cabinet or it can be installed on a 19" or 23" rack with both brackets supplied standard with the system. All cables are terminated at the factory and even items like ty-wraps, extra fuse and other misc items are included so little tooling is required for the installation. The easy to read green and red indicators show when components are installed correctly so installers can move on to the software setup faster when knowing the components are online.

The Dashboard is the home screen of the web interface and displays easy to read parameters and visual graphs that give the user a short history of critical values such as System Voltage, System Current, AC Ripple Currents, Ambient Temperatures and Pilot Temperatures. Users can easily navigate away from the Dashboard to other tabs for setup information, event logs, and detailed data graphs for their selected dates and times. The parameters and events data can also be exported for more detailed reports to be made in Excel for their records or as reports to send to customers/managers.

The TRM-608 Monitor is enabled for network based communication and can be managed in real time from any PC or tablet that is connected to the same network as the TRM-608. The monitor has provisions for 6 destinations where E-mail messages will be sent to in case of an alarm and regular status updates. The data for parameters of System Voltage, System Current, AC Ripple Current, Ambient Temperature and Pilot Temperatures, Systems Restarts and more are stored for many years of service but can be downloaded and imported into spreadsheets for warranty processing.

2. INSPECTION UPON RECEIPT OF GOODS

2.1. General

Special precautions and care have been taken to ensure the TRM-608 monitor arrives safe and undamaged. However, upon receipt, you should inspect the entire shipment, including all boxes for evidence of damage that may have occurred during transit.



2.2. List of Components

2.2.1. TRM-608 Monitor "Main" Package

- Monitor Assembly (1 ea)
- Mounting Bracket, 23" (2 ea)
- Mounting Bracket, 19" (2 ea)
- Ambient Temperature Probe (1 ea)
- Battery Voltage Cable Assembly (1 ea)
- Ground Cable Assembly (1 ea)
- Installation Hardware Kit (1ea)
- Power Supply (1 ea)
- Cross Over Cable, 10' (1 ea)
- USB Cable, 6' (1 ea)
- CAT 5 Cable, 3' (1 ea)

2.2.2. TRM-608 Monitor "String" Package

- Current Transducer Controller Assembly (1 ea)
- Current Transducer Assembly, 600A (1 ea)
- Current Transducer Assembly, 20A (1 ea)
- Pilot Temperature Probe Assembly (1 ea)
- CAT 5 Cable, 14' (1 ea)
- CAT 5 Cable, 7' (1 ea)

Figures 1 and 2 show a physical representation of each of the items listed above:



Figure 1 (TRM-608 Monitor Main Package)



TRM-608 Monitor Main Assembly



Mounting Brackets 19" and 23"



Ambient Temp Probe



Battery Voltage Cable Assembly 600Vdc Max



Ground Cable

- Installation Hardware (bagged):
- USB Flash Drive(1)
 - Spare Fuse, 0.5A (1)
 - Connector, 8P (1)
 - Ground Terminal Ring, #10 (2)
 - Screw, 10-24x3/4, Self Drill (1)
 - Rack Mount Screws, 12-24x3/4, Self Tap (6)
 - Bumper, Self Adhesive (4)

Installation Hardware Kit



Power Supply



Crossover Cable, 10 ft.



USB Cable, 6 ft.



Cat 5 Cable, 3 ft.



Figure 2 (String Package)



Current Transducer Controller



Current Transducer 600A



Current Transducer 20A



Pilot Temperature Probe



CAT 5 Cable, 14 ft.



Cat 5 Cable, 7 ft.



2.3. Visible/Concealed Damage

It is the responsibility of the person receiving the shipment to inventory and fully inspect all materials after receiving monitor. Ensure that all components are accounted for. Reference List of Components 2.3 and Figures 1 and 2 to identify all components necessary. For custom TRM-608 orders, a separate component list will be included in the packages shipped.

2.4. Return of Damaged Goods

A RMA number must be obtained before returning equipment to ESS. Please contact an ESS representative or call the company phone number listed at the end of this muot



3. SYSTEM OVERVIEW

The TRM-608 Thermal Runaway Battery Monitor is the first IFC 608 dedicated monitoring device designed for easy installation into any new or existing battery system of Valve Regulated, Flooded cell systems in both Lead Acid and NiCad batteries -60 to 600Vdc. The user friendly interface is designed with non-battery technical personnel in mind. **Only** a single Controller is used per DC System for up to six strings. The system is completely modular in design and starts with a Controller, an Ambient Temperature Probe and buss voltage sense leads then each string includes a Pilot Temperature Probe, Current Transducer Controller and a Float current and Discharge CT's for monitoring very accurate currents for each string of batteries. Pilot Temperature Probes can be expanded to 250 points per systems. The TRM-608 can be installed on top of a battery cabinet or installed on a 19" or 23" rack with all three mounting options included in each kit. All connections between probes and controllers are standard Ethernet cables that are also supplied with the system. Because the connections in the system are factory made (even the DC Power cables) installation is fast and consistent. If a battery technician or UPS technician is onsite, then you have someone who is qualified to install this system. With the option of pre-ordering the system settings pre-configured the system can be installed in less than 1 hour per string.

When using the TRM-608, the Dashboard display consists of easy to read visual graphs that give the user a short graph history of the main parameters such as System Voltage, System Current, Ambient Temperature and Battery Pilot Temperatures. Users can easily navigate away from the Dashboard display to get detailed graphs on each parameter. These parameters are displayed with easy to read values graphs displayed in simple color codes and for more complex graphs, customers can export the data and build custom reports in Excel.

TRM-608 Monitor is enabled for network based communication and can be managed in real time from any PC or tablet that is connected to the TRM-608's installed network. During setup, the Controller can be given destinations where E-mail messages will be sent to in case of an alarm and regular status updates. The data for parameters of System Voltage, DC and AC System Currents, string currents, Ambient Temperatures and String Pilot Temperatures are stored and can be downloaded and imported into spreadsheets for report processing.

3.1. Technical Specifications

- 3.1.1. Equipment Input Ratings: 15VDC, 1.67 A
- 3.1.2. Measurement Circuit Ratings: -60 to +600VDC, 0.5A

3.2. Environmental conditions

- 3.2.1. This equipment is intended to be used indoors only, at an altitude of up to 2000m, and within a temperature of 5 °C to 40 °C.
- 3.2.2. Maximum relative humidity 80% for temperatures up to 31 °C decreasing linearly to 50% relative humidity at 40 °C.



4. INSTALLATION PRODEDURES

BEFORE PROCEEDING WITH INSTALLATION READ THE FOLLOWING:

4.1. Preparation

4.1.1 Components of TRM-608 Monitor

Reference Figures 1 and 2 to make sure that all equipment is accounted for. Figure 1 shows the standard equipment shipped with one TRM-608 Monitor. Figure 2 shows the components shipped for each string connected to the TRM-608 monitor. One "STRING" kit is shipped for each string that is to be monitored by the TRM-608.

4.1.2 Equipment Inspection

Remove the TRM-608 from its packaging box and inspect for any concealed shipping damage that may have been overlooked upon receipt of goods.

4.1.3 Safety Precautions

IMPORTANT SAFETY INSTRUCTIONS. SAVE THESE INSTRUCTIONS!!

-  **All disconnecting means should be in the open/off position before servicing.**
-  **All installation drawings and schematics should be reviewed and clearly understood before hooking up this system.**
-  **All jewelry, rings and watches should be removed when installing this equipment.**
-  **Do not rest any tools or loose cables on top of batteries when installing this equipment.**
-  **Only install cable terminations shown in the intstallation schematics.**



5. INSTALLATION STEPS

The TRM-608 monitor is externally mounted on top of the battery cabinet. The monitor will be partially installed at the factory when battery cabinets are also being supplied by ESS. The qualified installer will need to locate the TRM-608 monitor on top of the battery cabinet and make the connections necessary to power up the monitor. If the TRM-608 Monitor is completely being installed on site, skip to 5.2 for instructions.



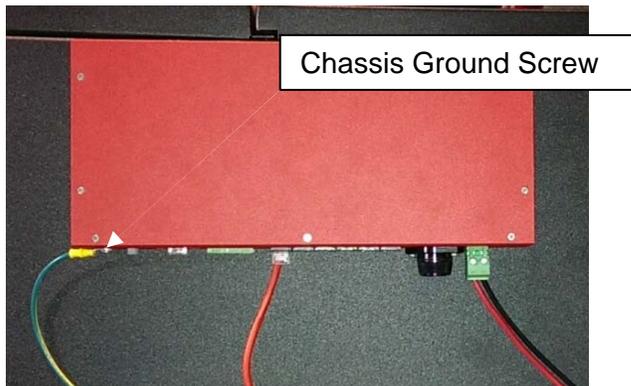
Caution:
All disconnecting means should be in the open/off position before making any connections to TRM-608.

5.1. Installing TRM-608 after partial installation at Factory.

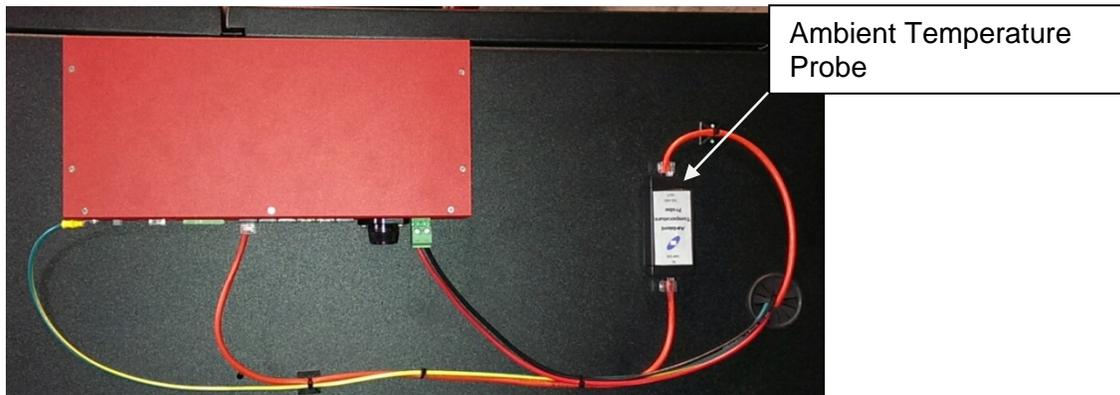
5.1.1. Locate the TRM-608 monitor on top the the battery cabinet that is most central to all strings being connected to the monitor. For example, if there are 5 strings that are being connected to the TRM-608, the monitor should be set on top of the middle cabinet, string 3. The monitor is held in place with Velcro provided in the installation hardware kit provided. The "STRING" kit provided for every string being connected will have standard cables long enough to make the connection. This only applies when the same number of battery cabinets are located on each side of the monitor. Custom "STRING" kits will be available per installer/customer battery cabinets.



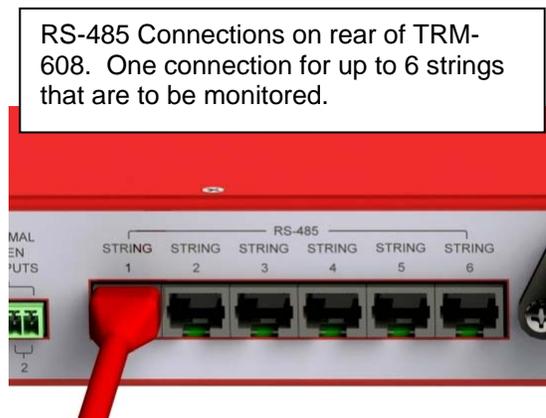
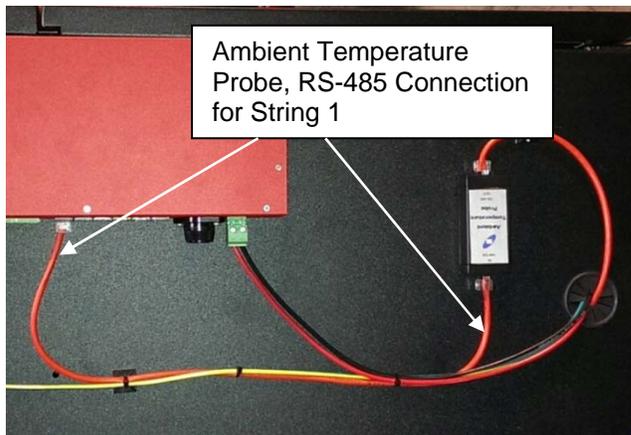
5.1.2. Fasten one end of the green and yellow ground cable to the back of the TRM-608 monitor and ground the unit to building. A self drilling/tapping screw is provided in the hardware kit that is included with the TRM-608 packaging. This screw can be used to screw the ground cable to a clean paint free point that is grounded to the building ground.



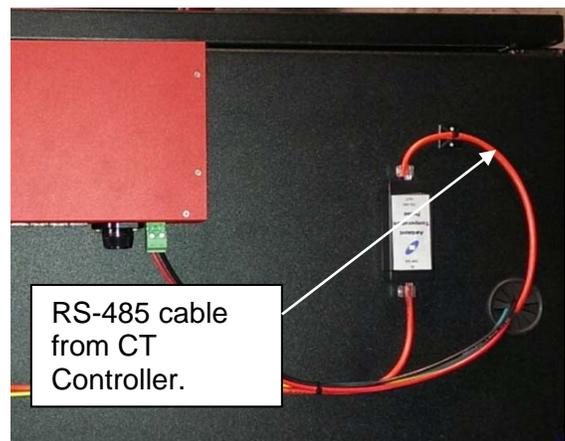
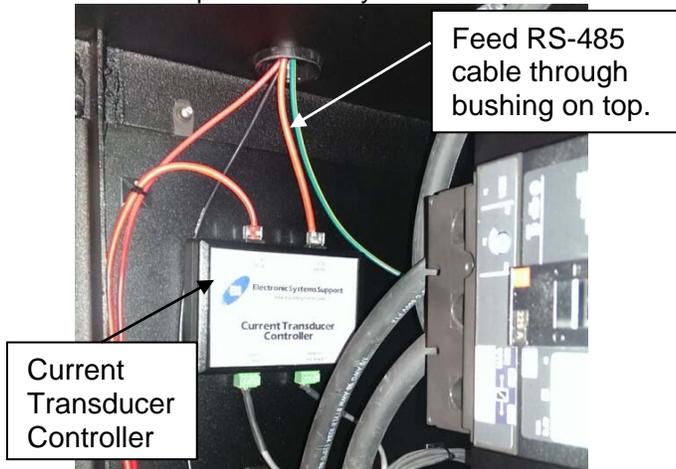
5.1.3. Locate the first Ambient Temperature Probe near the location of the TRM-608 monitor and attach using velcro provided.



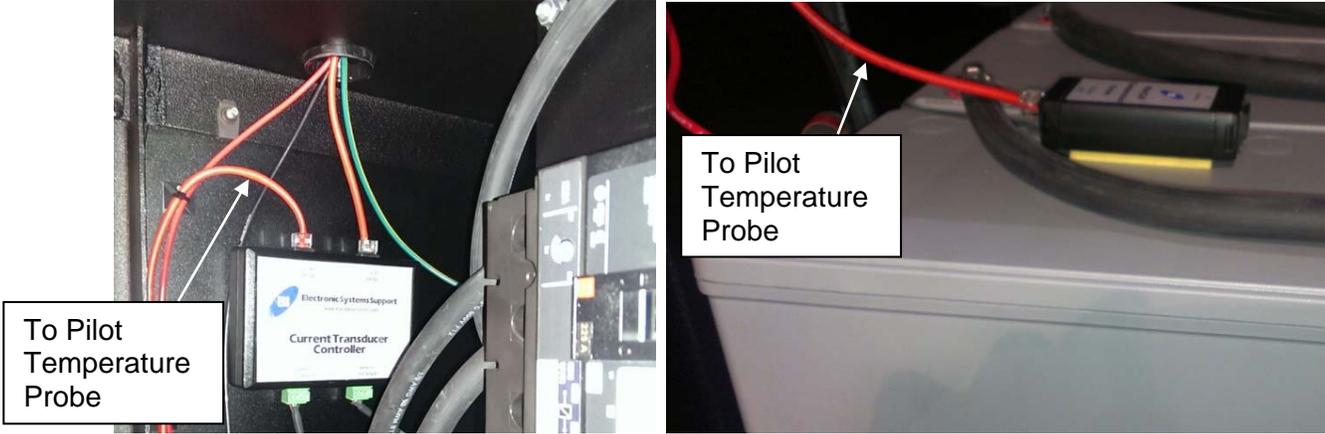
5.1.4. Take the 3 ft. red RS-485 cable provided and connect one end of the cable to the Ambient Temperature Probe output end. Take the other end of the cable and connect it to the String 1 of the RS-485 String connectors on the rear of the TRM-608 monitor. Battery String 1 should be connected to String 1 on the TRM-608 controller, String 2 to String 2 on the TRM-608 controller and so on as strings are added.



5.1.5. Feed the red RS-485 cable coming from Current Transducer Controller through the bushing located on top of the battery cabinet and connect it to the input end of the Ambient Temperature Probe.



5.1.6. Inside the cabinet, locate the Pilot Temperature Probe that is already connected to the Current Transducer controller and place the the Temperature probe on top of outermost positive battery in the string. Multiple Temperature Probes can be daisy chained to get multiple temperature readings within the battery string that is being hooked up.



5.1.7. Do not begin this step until the monitor chassis ground is connected to the building ground. Feed the two pin voltage connector, rated for 600 Vdc through the bushing on top of the cabinet and connect it to the BATTERY GND and BATTERY HOT connector. There is only one of these connections on the TRM-608 monitor regardless of the number of strings connected to the monitor thus all strings monitored must be on the same DC Buss/UPS.

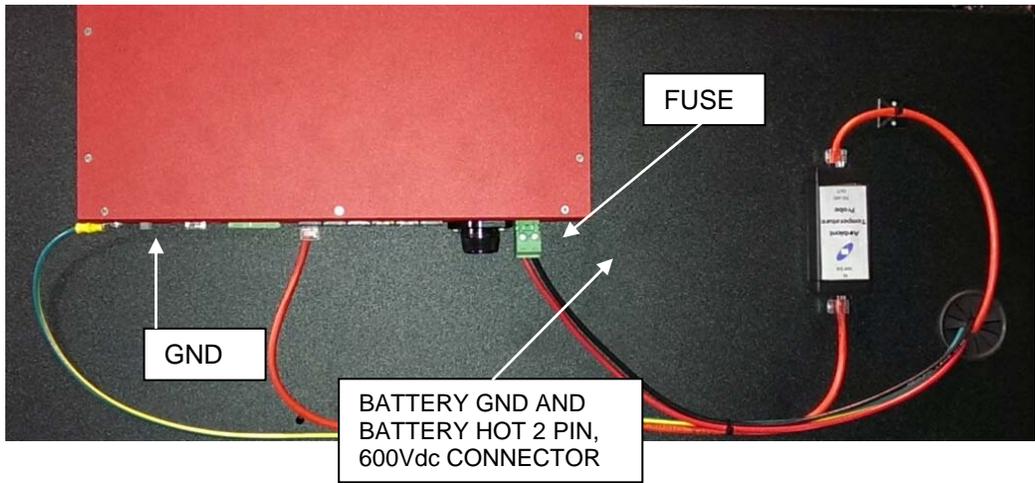
CAUTION: Failure to properly connect the black ground to the battery ground and the red cable labeled "HOT" to the battery system Hot will cause the fuse to blow and possible damage to equipment. 2 PIN, 600 Vdc CONNECTOR NOT A POWER SOURCE

Inputs for "Battery GND" and "Battery HOT" are not to be used for measurements on main circuits.

CAUTION: Most UPS systems are Positive Hot, Negative Ground.

- 48V or -24V systems are Negative Hot, Positive Ground
- 48V or 24V systems are Positive Hot, Negative Ground

Check POS HOT or NEG HOT in rear or TRM-608. Consult with the power equipment manufacturer if you dont know.

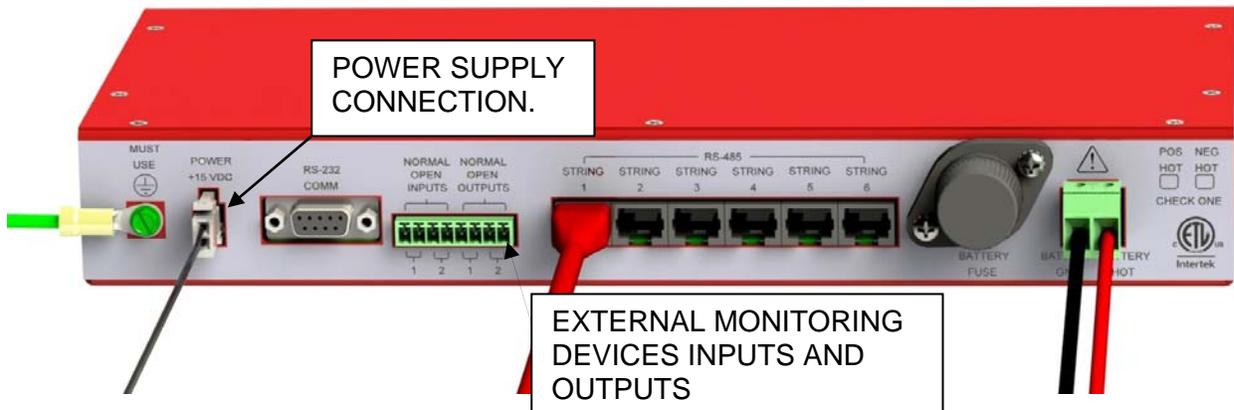




5.1.8. Connect a customer provided network interface cable to the RJ45 connector in the front of the TRM-608 labeled ETHERNET.



5.1.9. Connect the 100-240 Vac input/15V output, Power Supply to the +15 Vdc input connector on the rear of the TRM-608. The Power Supply is then plugged into a 120 Vac source, preferably from the UPS. The lights will scroll through the front of the unit for the boot up process, then a pulsed light under system status will display once the system has booted up.



5.1.10. External monitor device input ports. Using the 8-pin connector provided, the end user is able to connect external devices such as smoke and hydrogen detectors to the two normally open input and outputs. When the relay in the external monitoring device closes, an alarm is triggered, and the "Fault" LED on the front of the TRM-608 will turn on in addition to an email notification. (SEE PICTURE ABOVE)

5.1.11. RS-232 Communications port: NOT USED FOR FIELD USE

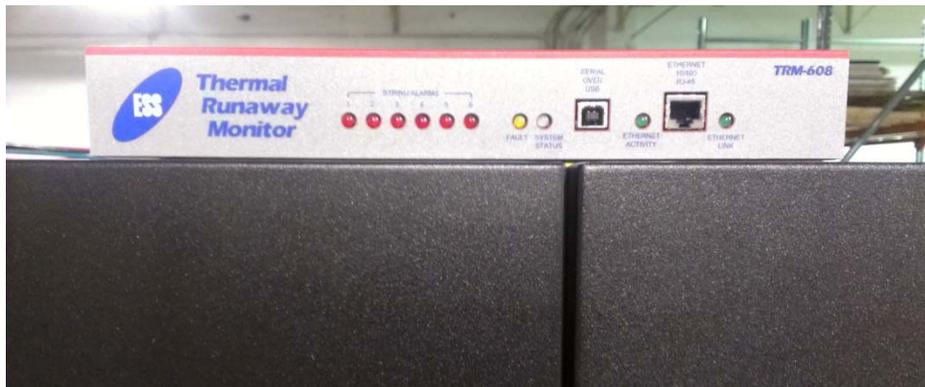




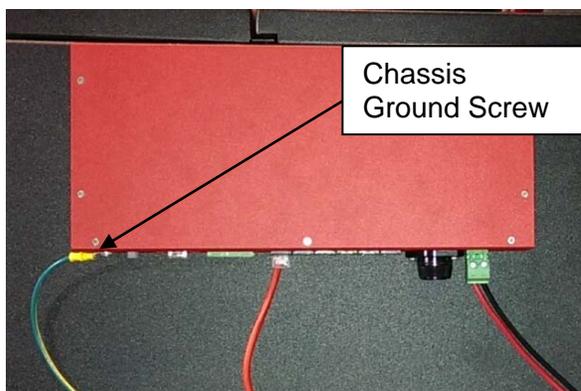
5.2. Complete TRM-608 Install on Site

The instructions for complete installation on site is very simple with only a few additional steps added to the process than if the TRM-608 was partially installed at the factory. This installation should be performed by only qualified technical personnel.

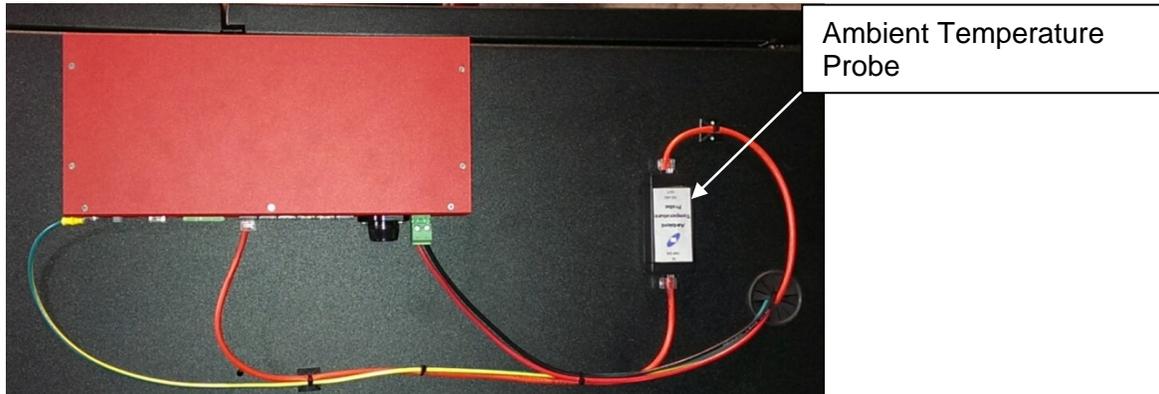
- 5.2.1.** Locate the TRM-608 Monitor on top of the the battery cabinet that is most central to all strings being connected to the monitor. For example, if there are 5 strings that are being connected to the TRM-608, the monitor should be set on top of the middle cabinet, string 3. The monitor is held in place with Velcro provided in the installation hardware kit provided. The "STRING" kit provided for every string being connected will have standard cables long enough to make the connection. This only applies when the same number of battery cabinets are located on each side of the monitor. Custom "STRING" kits will be available per installer/customer battery cabinets.



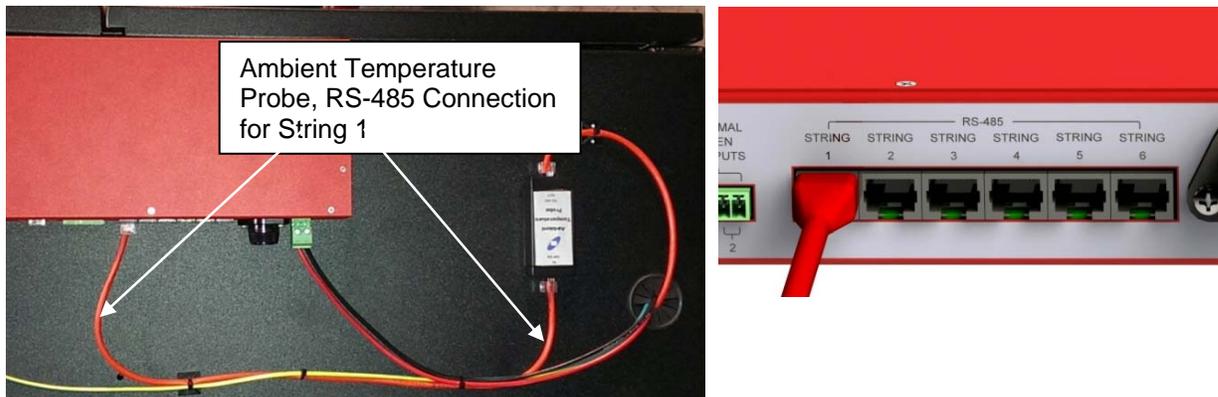
- 5.2.2.** Fasten one end of the green and yellow ground cable to the back of the TRM-608 monitor and ground the unit to building ground. A self drilling/tapping screw is provided in the hardware kit that is included with the TRM-608 packaging. This screw can be used to screw the ground cable to a clean paint free point that is grounded to the building ground.



5.2.3. Locate the Ambient Temperature Probe near the location of the TRM-608 monitor and hold down using velcro provided.



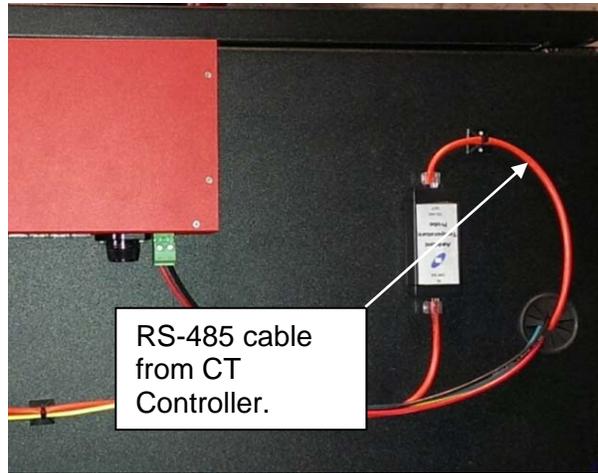
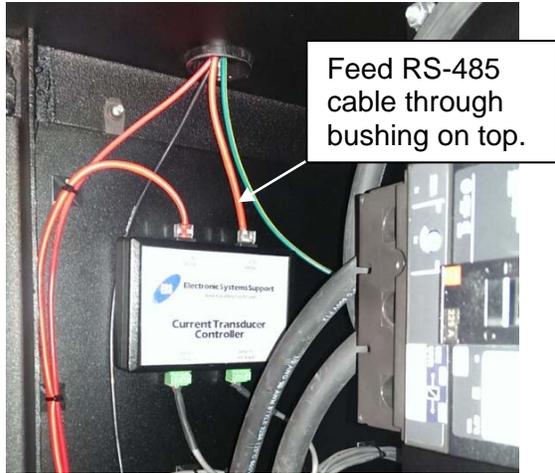
5.2.4. Take the 3 ft. red RS-485 cable provided and connect one end of the cable to the Ambient Temperature Probe output end. Take the other end of the cable and connect it to the String 1 of the RS-485 String connectors on the rear of the TRM-608 monitor. Battery String 1 should be connected to String 1 on the TRM-608 controller, String 2 to String 2 on the TRM-608 controller and so on as strings are added.



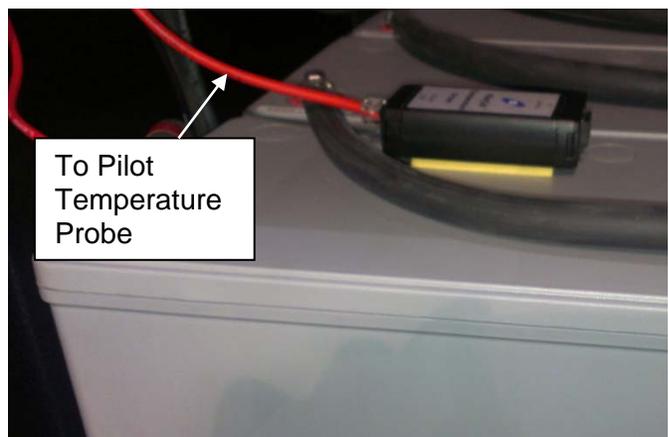
5.2.5. Place the Current Transducer Controller inside the cabinet on an open area near the top. Hold the CT Controller down to the side wall of the cabinet using Velcro strips provided.



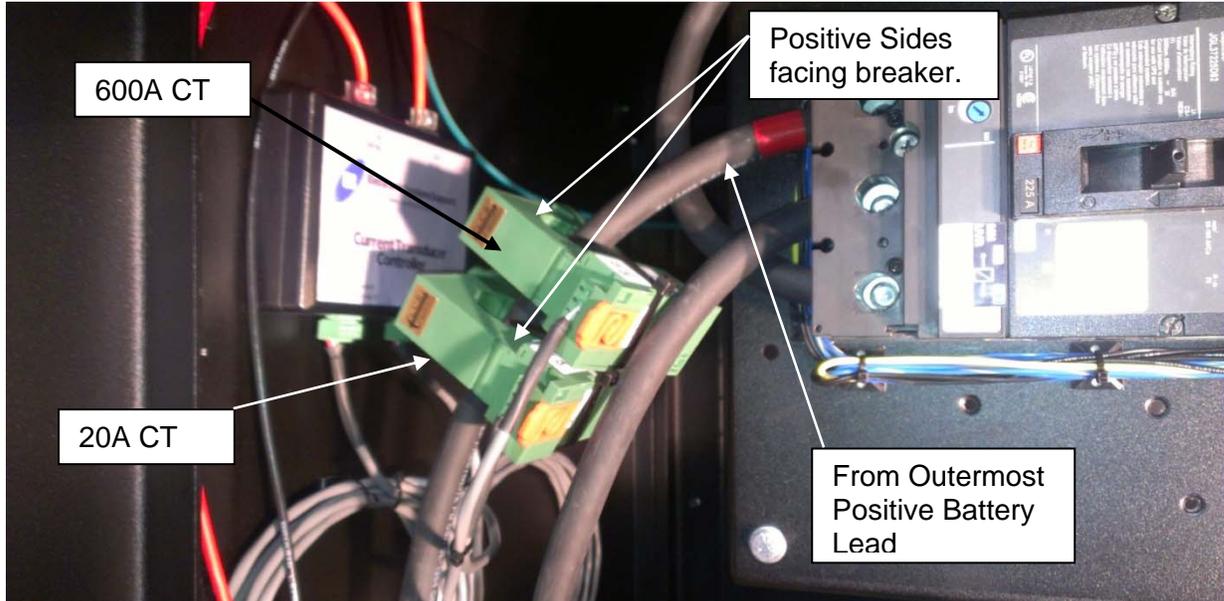
5.2.6. Connect the 7ft. red RS-485 cable to the RS-485 connector on the Current Transducer Controller labeled "RS-485 OUT". Feed this cable through the bushing located on top of the battery cabinet and connect it to a RS-485 connector on the Ambient Temperature Probe labeled "RS-485 IN".



5.2.7. Inside the cabinet, place the Pilot Temperature Probe on top of one the the batteries in the string. Route the 7 ft. red RS-485 cable from the CT Controller and connect it to RS-485 connector on the Pilot Temperature Probe labeled "RS-485 OUT". Take the other end of the 7 ft. cable and connect it to the RS-485 connector on the CT Controller labeled "RS-485 IN". Use the ty-wrap mounts with adhesive backs and ty-wraps included in the installation kit to secure the red RS-485 cables. Multiple Temperature Probes can be daisy chained in the same manner to get additional temperature readings within the battery string. The standard "STRING" kit only comes with one Pilot Temperature Probe.



5.2.8. Take the green 600 Amp Current Transducer and open it by turning the red knob to the unlock position. Install the 600A CT on the positive lead cable coming into the breaker. The sensor has to be installed with the positive (+) side facing the breaker. Turn the red knob back to the locked position and make sure that the CT is locked. Take the 4-Pin lead already connected to the 600A CT and connect it to the 4-Pin female terminal strip on CT Controller labeled “Sensor 1, 600 Amp CT.”

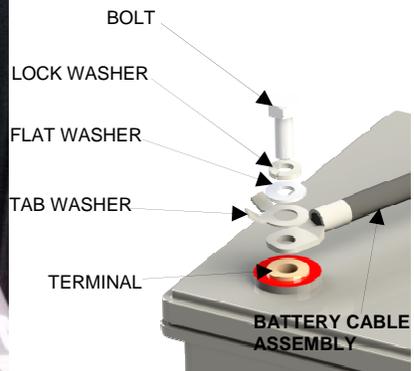
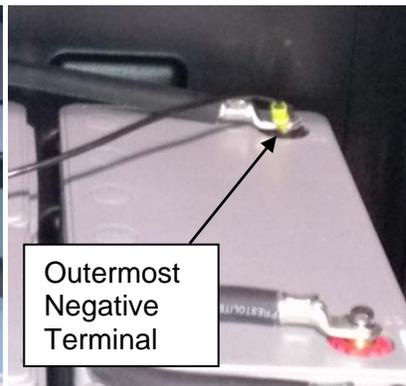
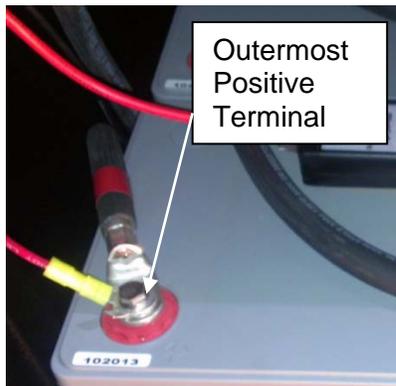


5.2.9. Take the green 20 Amp Current Transducer and open it by turning the red knob to the unlock position. Install the 20A CT on the positive lead coming into the breaker. Just like the 600A CT, the 20A CT has to be installed with the positive (+) side facing the breaker. Turn the red knob back to the locked position and make sure that the CT is locked. Take the 4-Pin lead already connected to the 20A CT and connect it to the 4-Pin female strip terminal on CT Controller labeled “Sensor 2, 20 Amp CT.” If these CT’s are installed backwards, a Negative Float Current will appear and the controller will not function properly. (**SEE PICTURE ABOVE**)

5.2.10. Install a tab washer on the outermost positive output battery post and the outermost negative output battery post of the battery string. See pictures below for installation of tab washers.



Caution:
5.2.10 must be performed by qualified technical battery personnel. Failure to do so may result in injury and or damage to equipment.





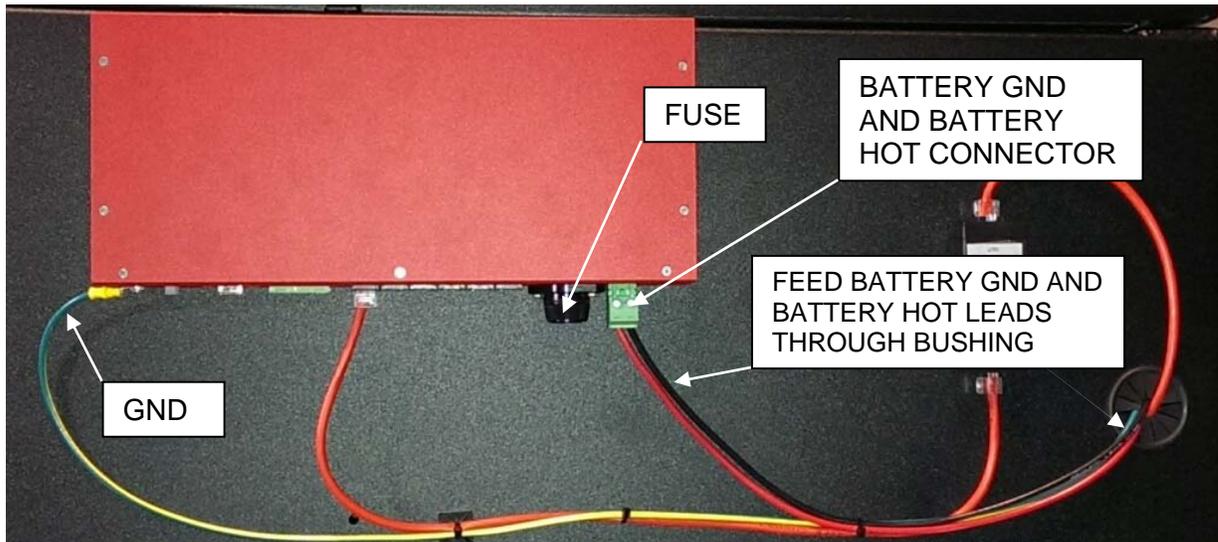
5.2.11. Feed the two pin High Voltage Cable Assembly lead through the bushing on top of the cabinet and connect it to high voltage green connector in the rear of the TRM-608 monitor labeled "BATTERY GND and BATTERY HOT" connector. (If cabinet does not have a hole in the top, the installer will need to drill a 3/4" hole and use the snap in bushing provided to make a cable entry path.) Connect the red lead wire labeled "Battery Hot" coming off the High Voltage Cable Assembly to the tab washer on the polarity that is the DC Buss Hot. Connect the black lead to the tab washer on the polarity of the battery system for the "BATTERY GROUND." Each lead has been terminated with the proper female terminal. However, if the leads need to be shortened, extra terminals have been provided. There is only one of these connections made to the TRM-608 monitor regardless of the number of strings connected to the monitor.
*If the polarity of the DC Buss system is not known, stop installation and ask the power equipment manufacturer.

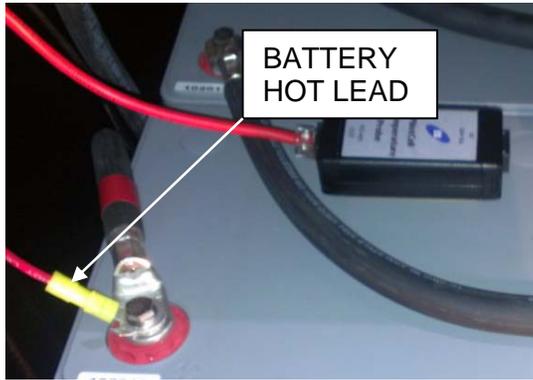
	Failure to properly connect the black ground to the battery ground and the red cable labeled "HOT" to the battery system Hot will cause the fuse to blow and possible damage to equipment.
	Inputs for "Battery GND" and "Battery HOT" are not to be used for measurements on main circuits.

CAUTION: Most UPS systems are Positive Hot, Negative Ground.

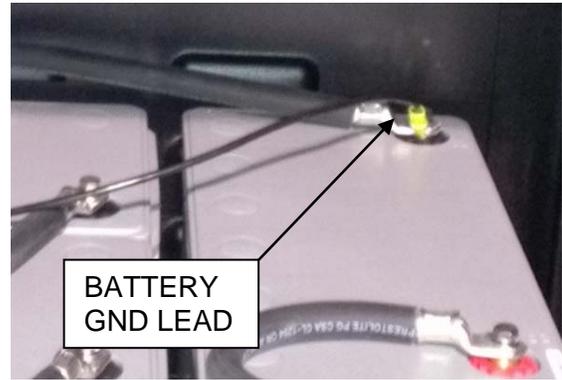
- -48V or -24V systems are Negative Hot, Positive Ground
- 48V or 24V systems are Positive Hot, Negative Ground

Check POS HOT or NEG HOT in rear or TRM-608. Consult with the power equipment manufacturer if you dont know.





BATTERY
HOT LEAD



BATTERY
GND LEAD

5.2.12. Connect a network interface cable to the RJ45 connector in the front of the TRM-608 labeled ETHERNET 10/100 if TRM-608 will be monitored through the end user's network. If the TRM-608 monitor will be monitored through a PC, connect using the supplied crossover cable supplied.



ETHERNET
CONNECTION

5.2.13. Connect the Power Supply to the +15 Vdc input connector on the rear of the TRM-608. The Power Supply is then plugged into a 120 Vac source, preferably from the UPS.



POWER SUPPLY
CONNECTION. LABEL NOT
SHOWN IN THIS PICTURE



6. TRM-608 MONITOR SETUP

The TRM-608 Monitor can be connected to a Network Switch or it can be locally connected to a PC (the second option does not allow for email alerts and remote monitoring). A standard CAT 5 network cable (not supplied) is used to connect the TRM-608 to the customer's network switch. A 10 ft. Cat 5 crossover cable (supplied) is used when connecting the TRM-608 directly to a PC. The customer is also supplied with a software package which has a terminal emulator to allow the customer to communicate with the monitor via serial connection using the supplied USB cable.

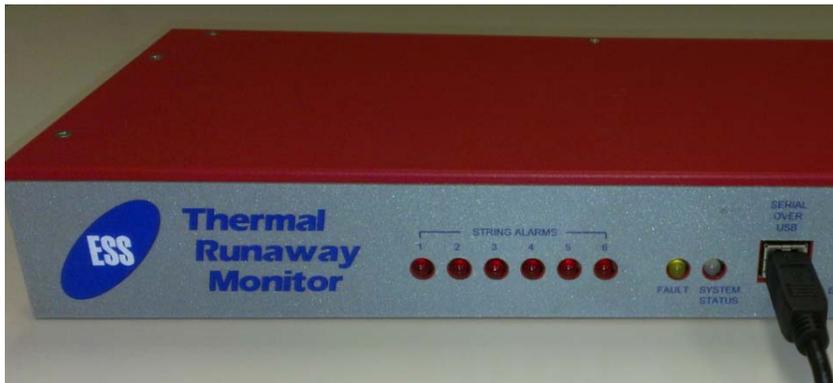
6.1. TRM-608 Setup on Network

NOTE: The TRM-608 monitor is shipped with a default IP address of **xxx.xxx.x.x** and a Subnet Mask of **xxx.xxx.x.x**. A single TRM-608 monitor will monitor up to six strings. The number of strings are defined and setup during this initial programming via a web browser. The Network settings below will be provided by the endusers IT department for the setup of the TRM-608 Monitor on the enduser's network:

- IP Address (only one address needed for up to 6 strings)
- Netmask
- Gateway address
- DNS address

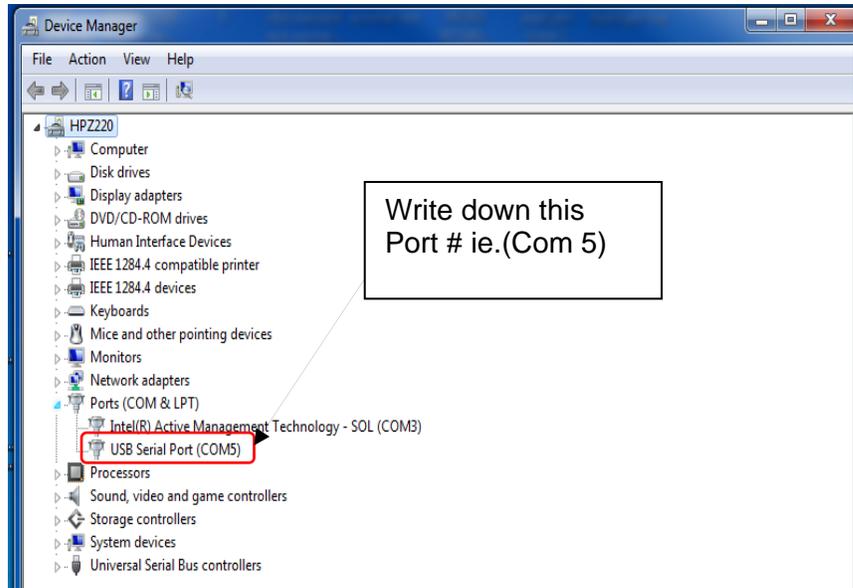
6.1.1. Make sure that the TRM-608 monitor has been properly installed and that the power supply is plugged into a power source and has been connected to the monitor. You will see lights on the front of the TRM-608 if it has power.

6.1.2. Connect the supplied USB cable to the USB connection on the front of the TRM-608 Monitor labeled "SERIAL OVER USB." Allow time for the drivers to be automatically installed into your PC. If the computer begins to search for an update, allow for this update to take place if the computer/laptop being used has an internet connection. If no internet connection, skip the updates. Once the drivers are installed, exit out of the drivers installation window.



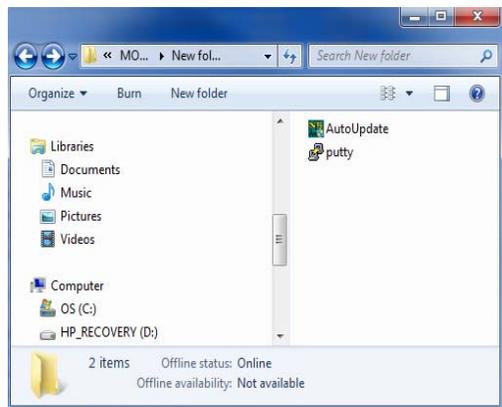
6.1.3. Before programming of the monitor can begin, there are a few computer settings that need to be noted from the PC/Laptop that is being used to program the monitor. It is recommended that the computer that is being used to program the monitor has Windows Vista, Windows 7 or Windows 8.

6.1.4. Click on the START Button, Control Panel, System, Device Manager. Under Device Manager, expand the "Ports (COM & LPT) section and write down the (COM#) next to the "USB Serial Port (COM#)".

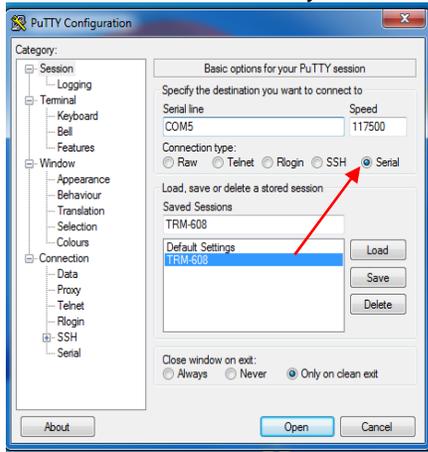


6.1.5. In the TRM packaging, there is a Thumb Flash Drive that contains a software package that is used to communicate with the TRM-608 Monitor. Insert flash drive to an open USB port on the computer that is being used.

6.1.6. In Windows Explorer, open the flash drive. Double click the putty.exe file and click Run. (The PuTTY file will not install itself into the computer automatically. It runs directly from the location that the file is stored in, in this case it is the flash drive.) Programming the TRM-608 unit can begin at this point.

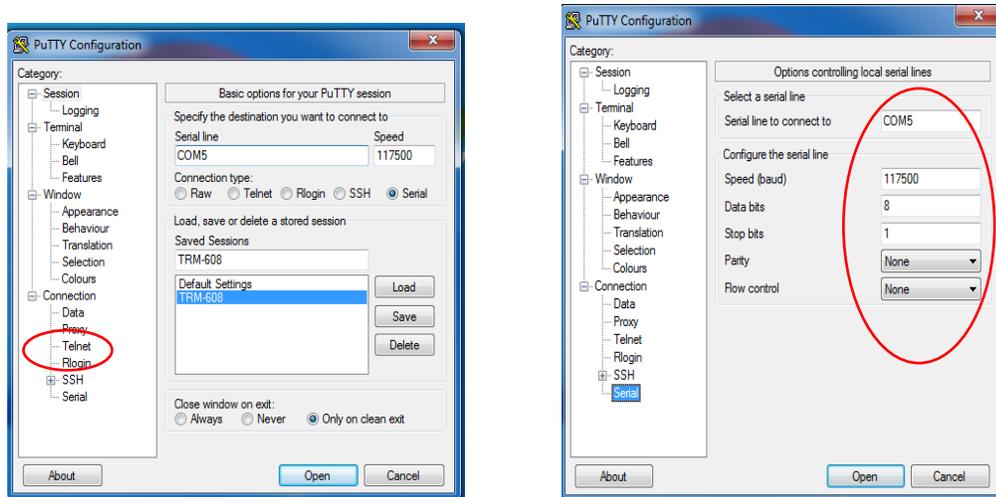


6.1.7.When PuTTY opens, a PuTTY Configuration dialogue box opens. PuTTY opens in the Session window automatically. Under “Connection Type” choose "Serial".



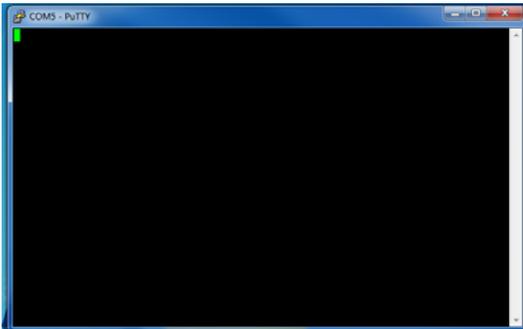
6.1.8.Under Category on the left side of the window, click Serial in the bottom left. On the right side of the window, next to "Serial line to connect to" type in the COM# that was written down from the Device Manager Screen previously. To configure the serial line please use the following settings:

- Speed (baud): 117500
- Data bits: 8
- Stop bits: 1
- Parity: None
- Flow control: none

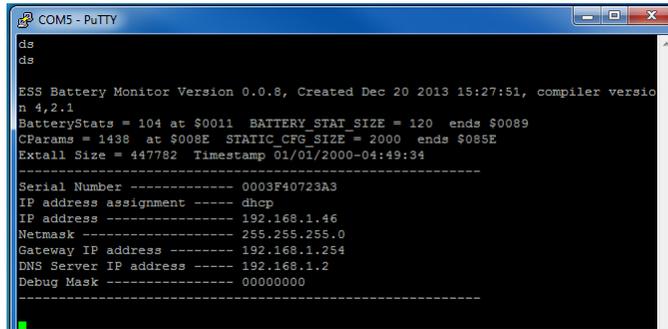




Once the above data has been filled in, click open. A DOS command screen appears with the COM# - PuTTY in the menu bar.



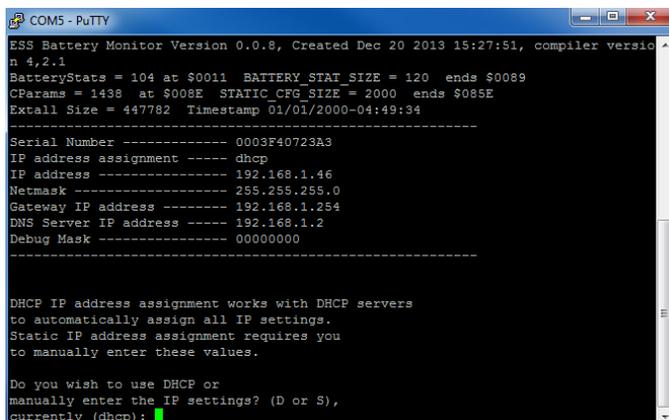
- 6.1.9. Type ds then press enter. If the connection wasn't ready yet when the "ds" command was typed, you will not get a response. Simply type "ds" again and press enter. The TRM-608 stored values display. These values for network settings will need to be changed to match the settings provided by the end users IT department to set up the TRM-608 on the network.



It is strongly advised to use a Static (fixed) IP address so that the TRM-608 is always found without having to follow the steps above and display the new IP that your server will assign to the unit each time the power is cycled.

6.1.10. Performing Setup

- Type setup and hit enter. The TRM-608 will now walk you through step by step for configuring the network settings.

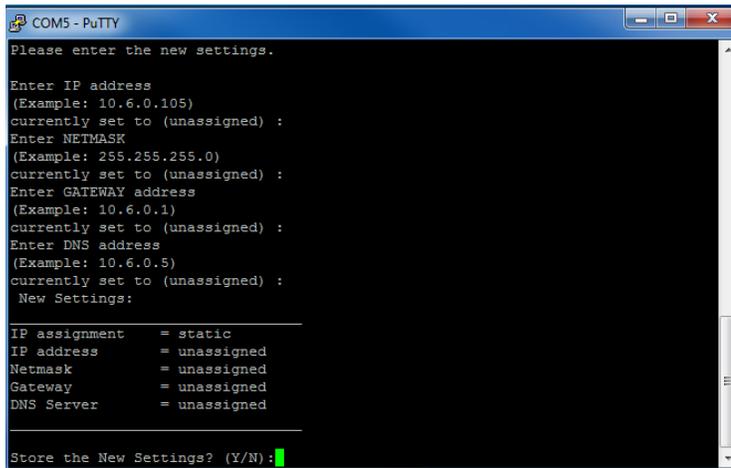


- Do you wish to use DHCP or Manually enter the IP settings?: (D or S) Type s then press enter.



- Enter IP address (Example: 192.168.1.155) Enter an IP address then press enter.
- Enter NETMASK (Example: 255.255.255.0) Enter NETMASK Address then press enter.
- Enter GATEWAY address (Example: 192.168.1.2) Enter GATEWAY address then
- press enter.
- Enter DNS address (Example: 10.6.0.5) Enter DNS address then press enter. This is optional and if not needed type 0.0.0.0 then press enter to not use it.

The unit then displays the 5 values that were entered for review. Displayed is the question: Store the New Settings? (Y/N): If the information listed above is correct, type Y then press enter. If the unit displayed settings that were typed incorrectly, type N and hit enter. The unit does not save the settings. Type setup and press enter. Re-enter all network settings again.



*If you make a mistake typing the data into the prompts when asked, you cannot use backspace. You will simply click “enter” to move forward in the process. At the end you can press to save the settings even if they are wrong, then at the command prompt type Setup again to start over. This time press enter for the fields that are correct to keep the same settings you typed in and only change the field(s) that was typed incorrectly.

- 6.1.11.** Once the network settings are saved, use a computer that is already on the local network (it could be the same as the one that was used for the network setup) to go to a web browser and type in the IP address given to the TRM-608 monitor during Setup. If the setup was correctly performed, the TRM-608 Dashboard Page will appear. It will be necessary to log into the TRM-608 monitor to program the monitor's settings. TRM-608 monitor settings setup begins at 6.3



6.2. T0RM-608 Setup on off-line PC

This setup is used when the TRM-608 monitor will not be connected to the end user's network.

6.2.1. Follow steps 6.1.1 thru 6.1.8 exactly.

6.2.2. Type "ds" then press enter (see picture 6.1.9). If the connection wasn't ready yet when the "ds" command was typed, you will not get a response. Simply type "ds" again and press enter. The TRM-608 stored values display. These values for network settings will need to be changed to match the settings provided by the end users IT department to set up the TRM-608 on the network.:

- IP address:
- Netmask:
- Gateway
- DNS

6.2.3. Connect one end of the supplied crossover cable to the RJ-45 connector in front of the TRM-608 Monitor labeled Ethern-et 10/100 RJ-45. Connect the other end to the PC Ethernet connection. (see picture in 6.1.2)

6.2.4. Go to the internet browser on the PC connected to the TRM-608 monitor. Enter IP address: xxx.xxx.x.xxx on the the adress field. This address is already loaded into the TRM-608 monitor from the factory and will not need to be reconfigured. The Dashboard page of the monitor will appear. (see picture in 6.1.11)



6.3 TRM-608 Monitor Interface

The following tabs are displayed in the main menu across the top of the Dashboard front page.

System Status	Displays the real time status of System Voltage, System Current, Ambient and Pilot Temperatures, Battery Cycles, and External Alarms.
String Details	Displays the details of strings 1 through 6. Each string will have its own tab. Here each Sensor's reading can be seen and if the sensor is functioning properly.
Data Viewer	Displays graphs with all functions defined in simple color codes. System Voltage, String Currents, String Ripple Currents, String Ambient and String Pilot Temperatures for up to 6 strings are all represented on this page.
Event Log	Displays the last 100 events with a priority and description of each event and a time stamp.
Site Information	Displays the customer's address and contact info as well as the Battery Service Company's contact info and address. This data is included when exporting and is used for custom reports to present end users.
System Settings	Displays general information on the battery and strings that are being monitored. Thresholds, email recipients, external alarms and miscellaneous information is entered in this page.
Network Settings	Displays the network settings that have been entered. This is also where the e-mail server is setup for sending alarms.
Password Settings	Used to update passwords settings. Must be logged into the monitor to change password settings.



6.4. Programming TRM-608 Monitor

6.4.1. Log into TRM-608

- Type in the IP address of the TRM-608 you wish to view in the browser to bring up the Dashboard page. Click the Log In button on the top right corner of the page. Log into the monitor with the following credentials:

User: intaller

Password: installer

***Note:** If you click the refresh button in the browser it will log you out before the automated timed logout.

String ↑	Current	Ripple	Ambient	Pilot Temp	Thermal	Comment
1	0.10 A	0.05 A	65.5 F	65.8 F		Top Test String HX400's



6.4.2. System Settings

The screenshot shows the 'System Settings' tab of the Thermal Runaway Monitor web interface. The interface is organized into several sections:

- System Description:** A text input field for entering a system description.
- Battery Strings:** Three dropdown menus for 'Strings in System' (set to 1), 'Batteries per String' (set to 4), and 'Cells per Battery' (set to 6).
- Thresholds:** A list of numerical input fields for various limits: Cell High Voltage Multiplier (-2.5), Cell Low Voltage Multiplier (-2.13), Battery High Temperature Limit (90), Battery Low Temperature Limit (60), Battery Temperature Delta Limit (5), Battery Current Delta Limit (20), Battery Current Delta Minimum (0.1), Battery Ripple Current Delta Limit (10), Battery Ripple Current Delta Minimum (0.5), Battery Float Current Threshold (0.8), and Battery Charge Time (72).
- Email Alert Recipients:** Six text input fields for email addresses (Email 1 through Email 6).
- Miscellaneous:** A 'Time Zone' dropdown menu (set to 'Central Standard Time') and three buttons: 'Reset Battery Stats', 'Debug 0', and 'Restart'.
- External Alarm Descriptions:** Two text input fields for 'Input 1' (set to 'Hydrogen Detector') and 'Input 2' (set to 'Smoke Detector').

At the bottom right of the interface are 'Reset' and 'Save' buttons.

- System Description: Enter a system description on the top left that will help identify the system to refer to later if there is any maintenance needed in the future. If you have multiple controllers, we recommend naming them after the equipment they are on. i.e. "Google Dallas 5, Module 2, UPS A"
- Battery Strings:
 - Strings in System: Enter the number of strings that are going to be monitored by the TRM-608 monitor. This step must be done before starting String Details tab.
 - Batteries per String: Enter the number of batteries (Jars) per string.
 - Cells per Battery: Enter the Cells per battery (Jar.)
- Thresholds:
 - Cell High Voltage Multiplier: Enter the Cell High voltage Multiplier. i.e. 2.35 for Lead Acid Batteries
 - Cell Low Voltage Multiplier: Enter the Cell Low Voltage Multiplier. i.e. 2.25 for Lead Acid Batteries. For NiCAD and Lithium batteries, use the manufacturers recommended thresholds.
 - Battery High Temp Limit: Enter the high temperature (in Fahrenheit) to which the High Temperature Alarm will be launched. i.e. 79 for Lead Acid Batteries
 - Battery Low Temp Limit: Enter the low temperature (in Fahrenheit) to which the Low Temperature Alarm will be launched. i.e. 70 for Lead Acid Batteries
 - Battery Temperature Delta Limit: This is the difference between the ambient and the batteries which is allowable. In a controlled environment it should be a narrow margin such as 3 degrees.
 - Battery Current Delta Minimum: This is the alarm for notifying a difference between strings. If a string has a bad battery(s), the current will be different during recharge or during discharge. This can identify if there is a issue with a battery in the system and to what string it is located.
 - Battery Ripple Current Delta Limit: If a string has a bad battery(s), the AC Ripple will lower, this will alarm is it drops lower than other strings by using the highest string reading as a baseline to go by.
 - Battery Ripple Current Delta Minimum: If a battery completely opens the AC Ripple will drop to or almost 0 amps. Having a baseline creates an alarm point to know when a battery has opened enough to cause damage.



- Battery Float Current Threshold:
- Battery Charge Time: This is the limit that batteries should be recharged by. If the batteries are still recharging after this point, an alarm will be triggered because the batteries could be bad and not holding a charge which could become Thermal Runaway.
- Email Alert Recipients: Enter the predetermined E-mail addresses for the people that are to receive alerts regarding that battery system that is being monitored.
- Miscellaneous:
 - Choose the time zone in which the TRM-608 is being installed.
 - Reset Battery Stats:
 - Debug (For Factory use only.)
 - Restart – A remote restart of the system after making network or other changes.
- External Alarm Descriptions
 - Describe Input 1 External Alarm – i.e. Hydrogen Sensor, Smoke Sensor, Other
 - Describe Input 2 External Alarm – i.e. Hydrogen Sensor, Smoke Sensor, Other
- Once all System Settings have been entered, click save at the bottom right of the page.

6.4.3. Network Settings

The screenshot shows the 'Network Settings' page of the Thermal Runaway Monitor. The browser address bar shows '192.168.1.155/INDEX.HTM'. The page title is 'Thermal Runaway Monitor' with the ESS logo and 'Electronic Systems Support' text. The navigation menu includes: System Status, String Details, Data Viewer, Event Log, Site Information, System Settings, Network Settings (selected), Password Settings, and Log In. The 'Network' section has 'Configuration Type' set to 'Static' (selected over DHCP). Fields include: IP Address (192.168.1.155), Netmask (255.255.255.0), Gateway (192.168.1.254), DNS (unassigned), and MAC Address (0003F406ABA7). The 'SMTP' section includes: SMTP Server, Port (25), User, Password (masked with asterisks), and 'From' Address. A 'Send Test Email' button is located below the SMTP fields. At the bottom right, there are 'Clear Data' and 'Save' buttons.

- If the Setup of the TRM-608 monitor was setup for the network using the PuTTY software provided with the TRM-608, then the Network settings should already be filled out.
- The SMTP server ID needs to be entered so that the TRM-608 is enabled to send Email alerts to the pre-determined email recipients.
- User and Password....
- A "From" address needs to be entered.
- Once all SMTP and Network information has been entered, click save.
- Still on the same page, click the "Send Test Email" button. If all of the SMTP settings have been properly entered, the TRM-608 monitor will send out a test email to all of the email recipients that were entered in the System Settings tab. If no email is received, re-enter all SMTP settings, save and click "Send Test Email" button again.



6.4.4. Site Information

- Fill in all of the fields in the Customer's information box. The Battery Service Company section should also be filled out completely so that there is a record of the company that installed the system. Both sections will display on the reports issued for reference for the customer to have available to call for issues and to detail which site and system the monitor is for.

TRM
192.168.1.155/INDEX.HTM
Electronic Systems Support

Thermal Runaway Monitor

System Status | String Details | Data Viewer | Event Log | **Site Information** | System Settings | Network Settings | Password Settings | Log In

Customer
Contact Name, Phone: 999-888-7777 1245 Lost My Way
Address: Somewhere over the Rainbow
Fargavie
City, State, Postal Code: NC 12345-9876 US of A
Country: BillyBob's Service

Battery Service Company
Contact Name, Phone: 548 Found your Doggie Left by the big tree
Address: Muleshoe
TX
City, State, Postal Code: 99999-8888 USA unless we secede
Country:

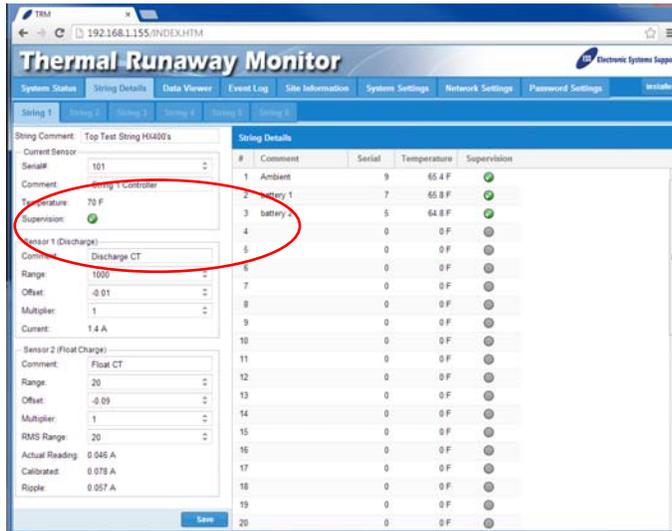
Reset Save

- Click Save before leaving page.

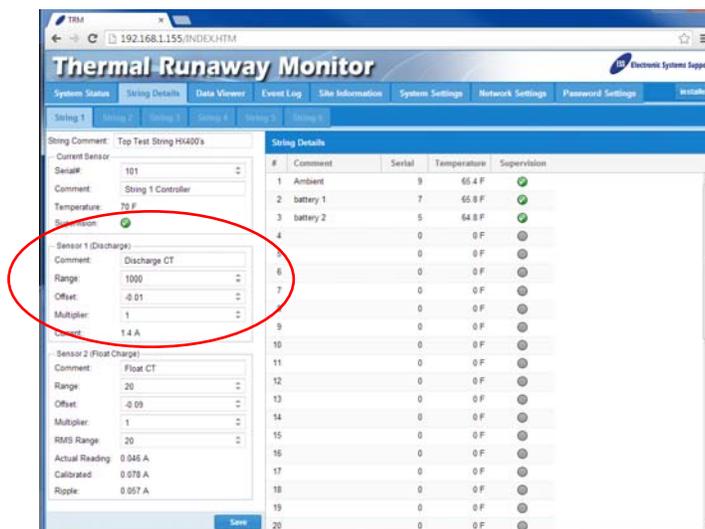


6.4.6.String Details

- Click on the "String Details" tab. In this page, the user will be able to register the CT Controller as well as the temperature sensors. The CT controller is serialized. The serial number of the CT controller needs to be correctly entered in the Current Sensor field as shown. The user has the option to make a comment or simply name the CT controller.

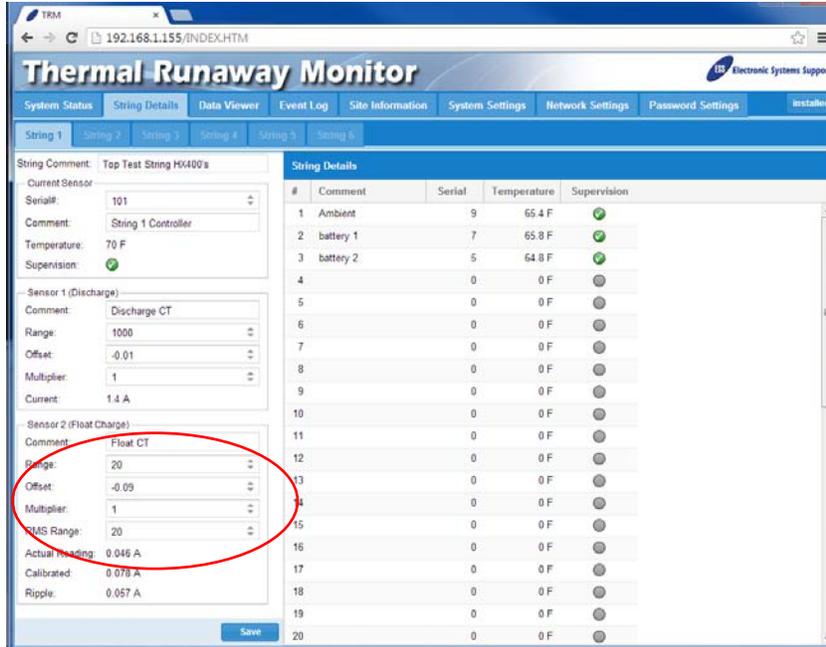


- Define the Discharge CT sensor in the comment section. The Discharge CT sensor has a range of up to 600 Amps per conductor. Offset.....Multiplier is used when there are multiple conductors going to the breaker. Because the CT sensor cannot be installed on multiple large conductors, a multiplier can be used in this case.

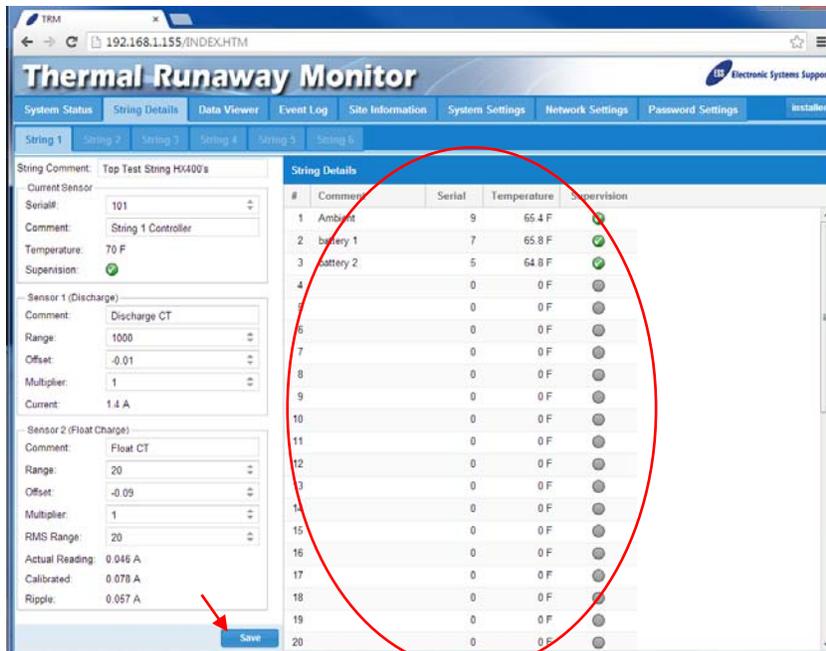




- Define the Float CT sensor in the comment section. The Float CT sensor has a range of up to 20 Amps per conductor. Offset.....Multiplier is used when there are multiple conductors going to the breaker. Because the CT sensor cannot be installed on multiple large conductors, a multiplier can be used in this case.



- Define the Ambient and Pilot temperature sensors on the right side of the String Settings page. The Temperature sensors are serialized. The Ambient Temperature Sensor should be entered as #1 with the rest of the sensors following. The pilot sensors are numbered as they are daisy chained. The serial numbers should match the particular order in which they are connected. The TRM-608 monitor can handle up to 252 Pilot Temperature points per string.

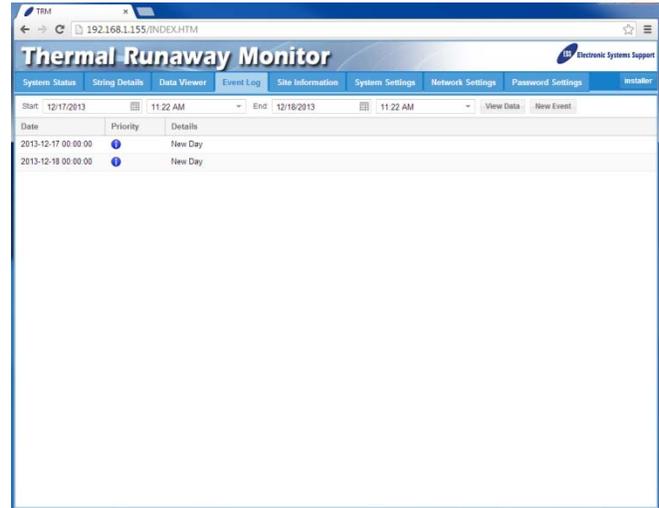
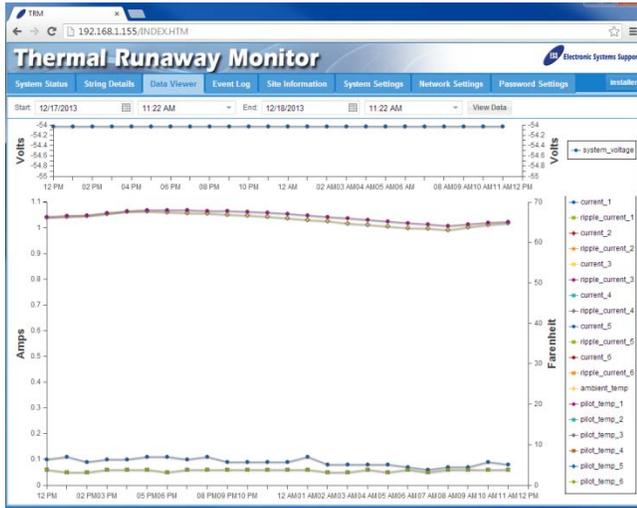


- Click Save on the bottom of the screen.



6.4.7.Data Viewer and Event Log

- There is nothing to update on these two tabs as they only display data based on the parameters and equipment that has been installed on the
- TRM-608 monitor. Reference the beginning of 6.2.5 for further descriptions of the Data Viewer and Event Log tabs.



6.4.8.Password Settings

- The user interface does not require a password and can not be changed.
- The Installer Password can be changed in the field.

7. MAINTENANCE AND SERVICE

7.1 Replacing blown fuse:

7.1.1. The fuse is located in the rear of the TRM-608 monitor inside a fuse holder as shown in the picture below. To replace the fuse, the cap of the fuse holder needs to be twisted off. A spare midget fuse, 0.5 Amps is provided in the original packaging in case the fuse is blown during installation or at any other time.



Caution:
All disconnecting means should be in the open/off position before making any connections to TRM-608.



FUSE HOLDER WITH 0.5A FUSE INSIDE.



NOTES

