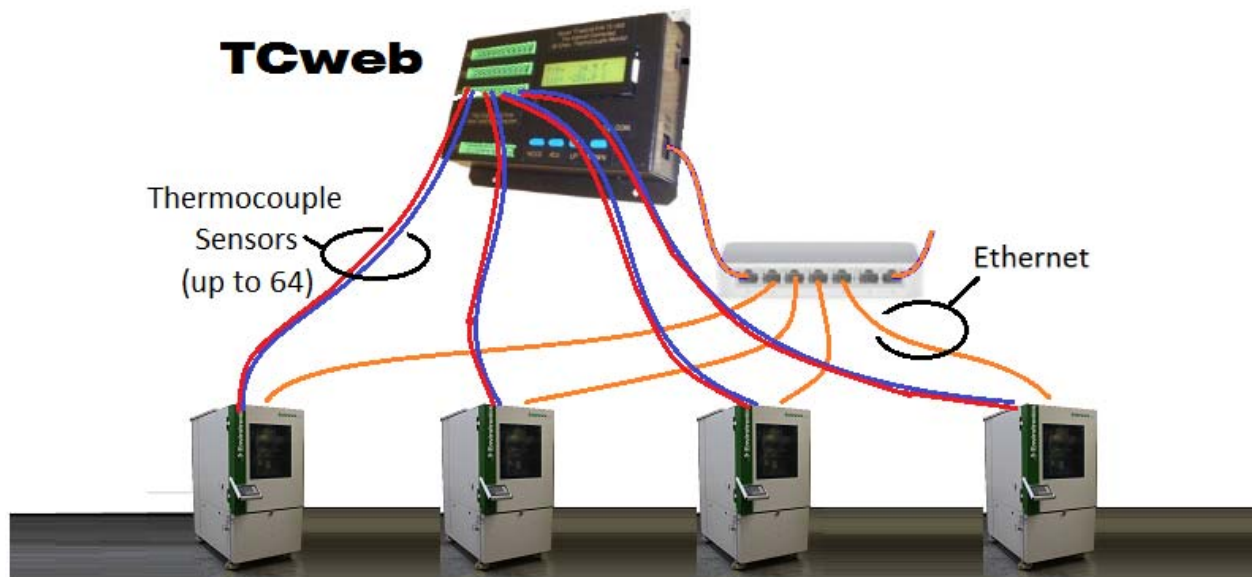


## Thermocouple Data Acquisition with TCweb



(c) 2019 Tidal Engineering Corporation

### Overview

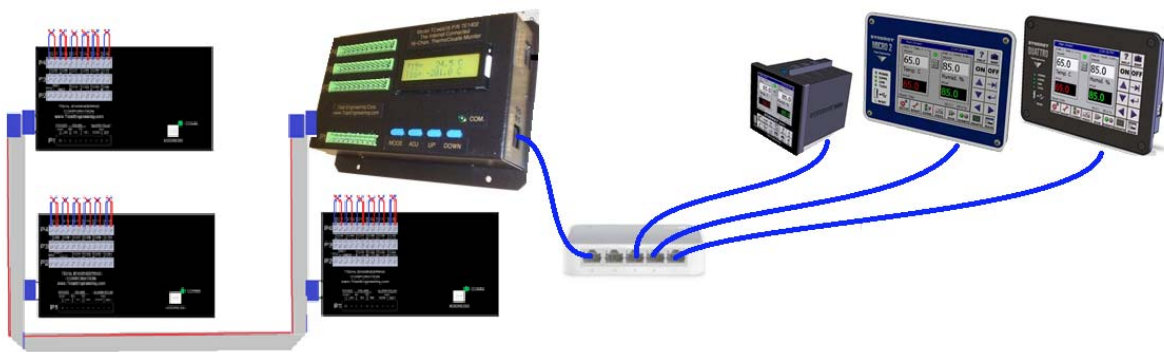
The Synergy Controller now provides the option of connecting to the TCweb Thermocouple Data Acquisition Module, P/N TE1299-1, in place of the UUT Module (Unit Under Test), P/N TE1299-16.

Both TCweb and UUT modules are 16-channel thermocouple data acquisition units designed to expand the input capabilities of the controllers in the Synergy family. Each Module allows engineers to capture and log temperature data from the unit-under-test and other test temperatures. Up to four modules can be attached to each Synergy controller providing up to 64 thermocouple inputs.

The TCweb can be programmed to handle any mix of Thermocouple Types where the UUT Module is designed specifically for T-Type Thermocouples. In addition, a TCweb Data Acquisition Unit can be used by multiple Synergy Controllers but the UUT module can only be used by the Synergy Controller that it is connected to.

### TCweb Features

- ◆ Up to four TCweb Modules can be used with the Synergy Controller.
- ◆ 16 thermocouples per module, up to a total of 64 inputs.
- ◆ Type T, J, K, R, B, E, and S Thermocouples.
- ◆ Ethernet Communications, Web Browser Setup (RS-485 communications to slave modules).
- ◆ Compatible with Synergy Nano, Nano 2, Quattro, Quattro 2, and Synergy Mino.

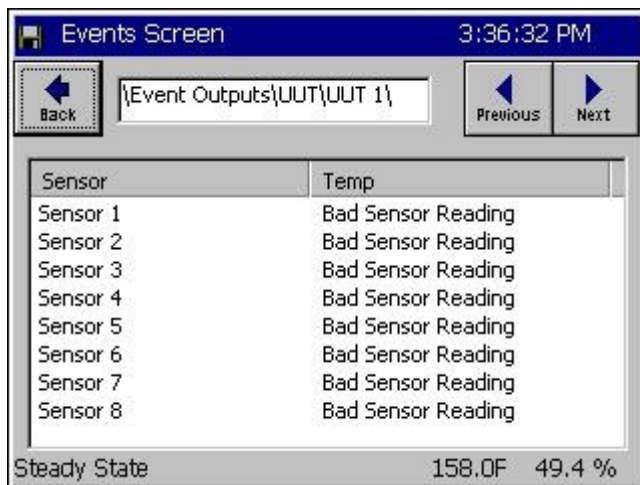


## TCweb Module Uses

The TCweb module can be used to monitor and log multiple air temperatures and multiple product temperatures. The controller can control and alarm any one of these sensor inputs.

TCweb modules are useful when testing products with a large thermal mass whose temperature is slow to change. When used in conjunction with the Synergy Controller's Cascade control feature, the user can program the chamber to ramp to temperature setpoints and **Waitfor** product temperature instead of the chamber's air temperature.

The TCweb Module sensors can also be used to monitor chamber and oven equipment for performance, preventive maintenance, and reliability monitoring; for example, compressor discharge and suction temperatures.



## TCweb Temperatures

For TCweb Modules 1 thru 8, this screen displays temperature readings for Sensors 1 thru 8 for each UUT.

Select UUT 1 thru UUT 8 with Previous and **Next** buttons.

These values may be logged.

## TCweb Module Setup Procedure

This is the installation and setup procedure for one or more UUT (Unit-Under-Test) modules. If your UUT modules are already installed and wired to your controller, go to Step 9 in this procedure for instructions on how to view your thermocouple temperature readings on the Synergy Controller touch-screen. Refer to the UUT Module – Board and Connector Layout Drawing at the end of this section.

## TCweb Setup



Disconnect power to the test chamber before starting. Lock-out / Tag-out your power source.

Follow the steps below to configure the TCweb Slave Module and to make necessary connections.

1. Set up the TCweb Module Address.

Locate the small square selector switch on the TCweb Module labeled Address Switch. Turn the dial on the switch to the proper Module Address setting indicated in the table at right.

16 CHANNEL MODULE ADDRESS SWITCH SELECTION	
MODULE NO	SETTING
Master	N/A
Slave 1	1
Slave 2	2
Slave 3	3

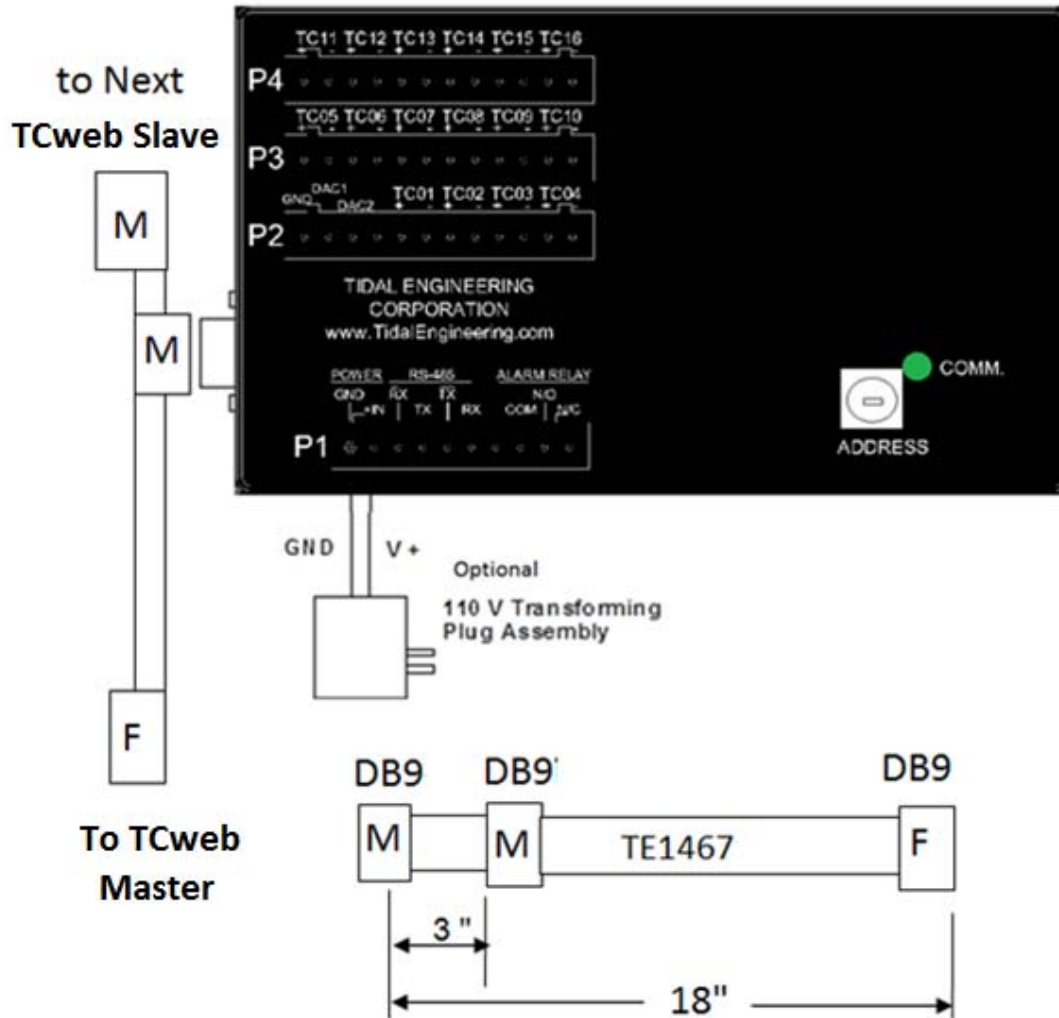


2. Locate the RS-485 DB9 male plug as shown below. The TE1608 cable is provided with Synergy Quattro and Synergy Micro 2 installations and TE1595 is provided for Synergy Nano applications. Plug it into the UUT module. For aftermarket installations, the cable may be mounted on the back of the chamber and labeled RS-485 port or hanging freely behind the panel.

### Notes:

Although the supplied ribbon cable makes all the connection between the controller and the UUT module required, the P1 connector can also be used to wire the RS – 485 connections if the ribbon cable connection is not long enough or if another cabling type is specified.

If necessary, connect additional UUT Modules using the supplied TE1467 Daisy Chain Cable.



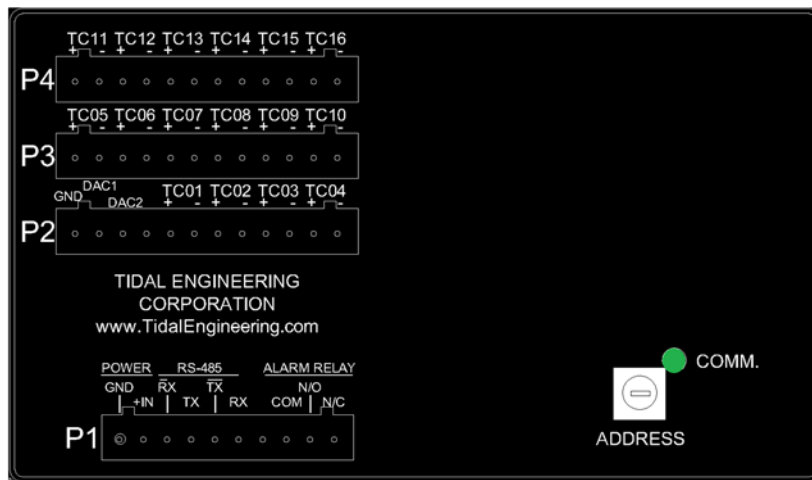
3. Connect the power supply to the P1 connector. Verify that the green LED on all TCweb Modules are illuminated. They should be on steadily.

- Connect your Thermocouple sensor wires to the appropriate terminal blocks P2 thru P4 on the TCweb Module. Consult the Thermocouple Connection Tables on the Module drawing for proper terminations.

Pin	P1
1	GND
2	+Power (9-24VDC)
3	/RX
4	TX
5	/TX
6	RX
7	Not Used
8	Not Used
9	Not Used
10	Not Used

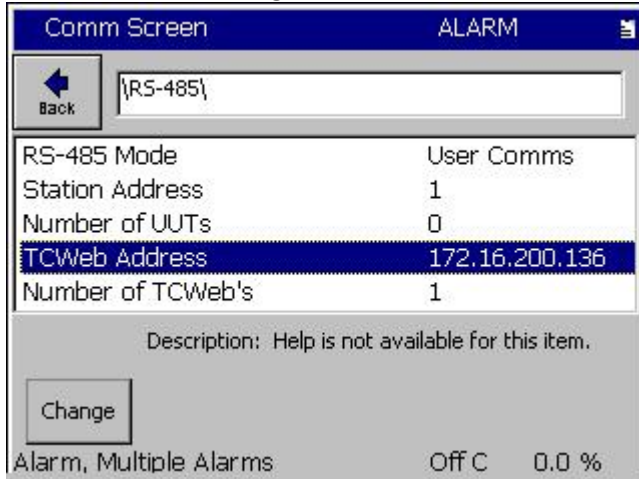
UUT Terminal Wiring Table							
Pin	P2		P3		P4		
1		GND	T/C 05	TC05+	T/C 11	TC11+	
2		Not Used		TC05-		TC11-	
3		Not Used	T/C 05	TC06+	T/C 12	TC12+	
4		Not Used		TC06-		TC12-	
5	T/C 01	TC01+	T/C 05	TC07+	T/C 13	TC13+	
6		TC01-		TC07-		TC13-	
7	T/C 02	TC02+	T/C 05	TC08+	T/C 14	TC14+	
8		TC02-		TC08-		TC14-	
9	T/C 03	TC03+	T/C 05	TC09+	T/C 15	TC15+	
10		TC03-		TC09-		TC15-	
11	T/C 04	TC04+	T/C 05	TC10+	T/C 16	TC16+	
12		TC04-		TC10-		TC16-	

Be careful to route the thermocouple wires and the power supply cord safely through the appropriate opening to avoid pinching.



- Turn on power to your test chamber. Once the Synergy Controller completes the boot-up procedure, press the **COMM** Navigation key. Open the RS-485 folder to arrive at the screen below.

Configure RS-485 Mode and Station Address to the values displayed in the screen below by pressing on each item. Make the changes in the screens that follow. Configure the Number of TCwebs using the chart on the right.



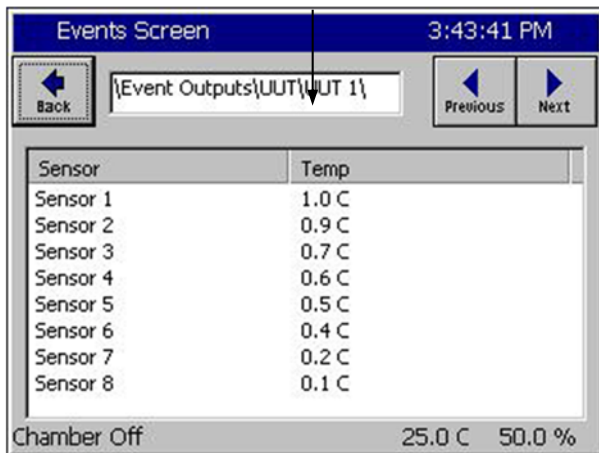
Number of Thermocouples	Number of TCwebs
1 - 16	2
1 - 32	4
1 - 48	6
1 - 64	8

- Cycle power to the chamber but leave the UUT power supply plugged in to the 120 V outlet.

After the Synergy Controller boots up successfully, verify that the green LED on the TCweb Module is blinking. This indicates that data communications have been established between the Synergy Controller and the TCweb Module.

When you have more than one UUT Module, verify that the green LED blinks on each module. Each module is queried sequentially as the Synergy Controller gathers the temperature data from each of the modules.

- Verify thermocouple temperature readings.** Press the **EVENTS** Navigation key on the Synergy Nano. Open the UUT Temperature folder to display the screen below

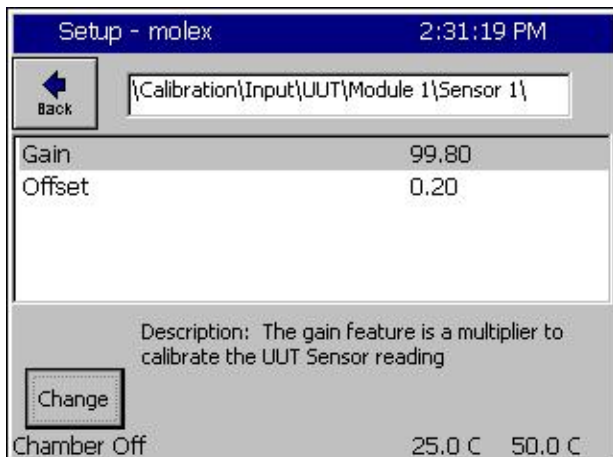
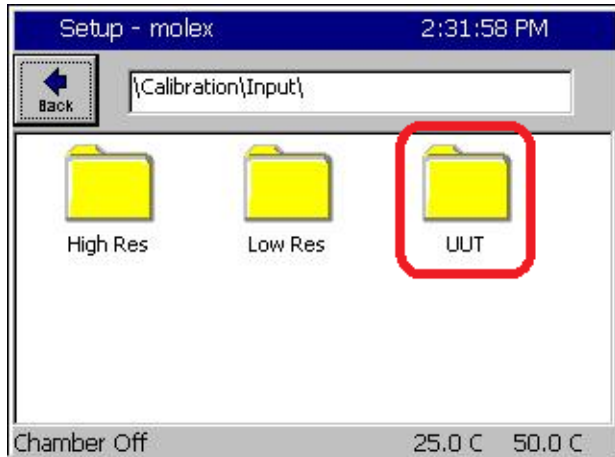


- ◆ Each UUT Module can accept up to 16 T/C inputs.
- ◆ Each screen displays 8 sensors labeled Sensor 1 thru Sensor 8.
- ◆ Press the **Next** button to view the next set of eight sensors for the first UUT Module. The path display changes from UUT1 to UUT2. The UUT2 screen will show the readings for sensors No.'s 9 – 16.
- ◆ To view sensor inputs for UUT Modules. 2, 3 and 4, continue pressing the **Next** button.

**Important Note:** If your screen shows "x.x" for sensor "Temp", go back to Step 7 and verify the Number of UUTs entered. X.x indicates that the module isn't being queried by the Synergy Controller.

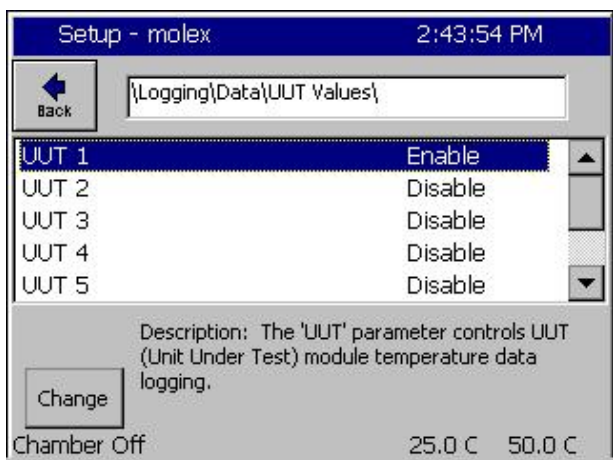
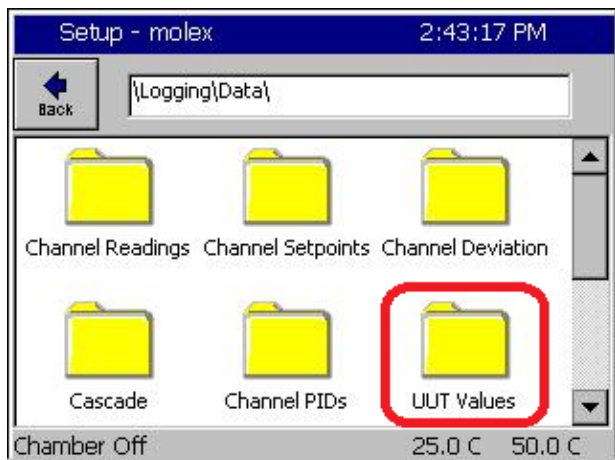
## Calibration

To calibrate a UUT module, enter a Gain (Span) and Offset for each UUT Sensor from the Setup\Calibration\UUT\Module n\Sensor screen. These factors are easily calculated using a spreadsheet by entering two known temperature values along with the corresponding Synergy Controller readings. See Application note 40 on the [www.tidaleng.com](http://tidaleng.com) website for details. <http://tidaleng.com/appnotes/SCAP40.pdf>


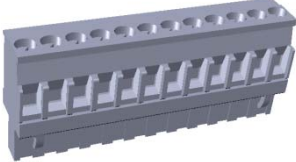


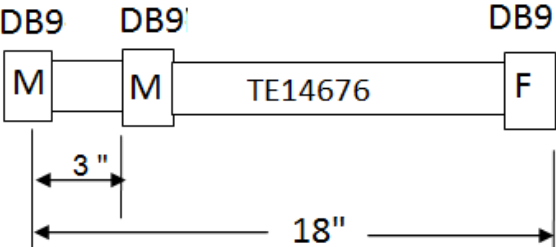


## Logging


The UUT sensors are frequently used to monitor additional temperatures on the Unit-Under-Test or on the oven or chamber equipment (for example). The Synergy Controller can log the UUT Sensors for use in the test or for equipment performance monitoring. UUT sensor logging is enabled in groups of 8 sensors (2 groups per module) from the Setup\Logging\Data\UUT Modules folder. See Application note 85 on the [www.tidaleng.com](http://tidaleng.com) website for more information regarding the logging system setup and applications. <http://tidaleng.com/appnotes/SCAP85.pdf>



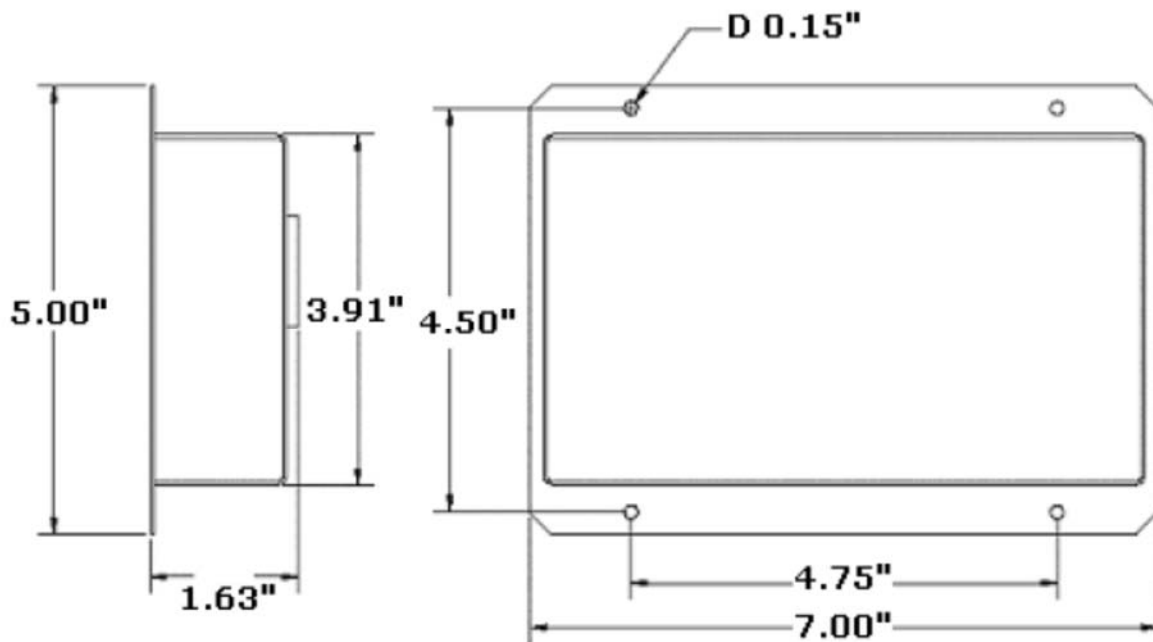
## TE1299-16 Parts List

Part Number	QTY	
<b>TE1435</b> <b>Wall Power Supply With Plug P1</b> <b>PLUG, 10 POSITION, 5 MM</b> <b>9 VDC, 500 mA</b>  <b>Note: This plug and wall transformer are not required for Synergy Micro and Synergy Quattro applications for 1 module.</b>	1	
<b>Spare 120-D-121/12</b> <b>PLUG, 12 POSITION, 5 MM</b>	3	
<b>TE1299-1</b> <b>TCweb Master Module</b>	1	
<b>TE1299-4</b> <b>TCweb Slave Module</b>	1	
<b>TE1467</b> <b>Daisy Chain Cable</b>	1	



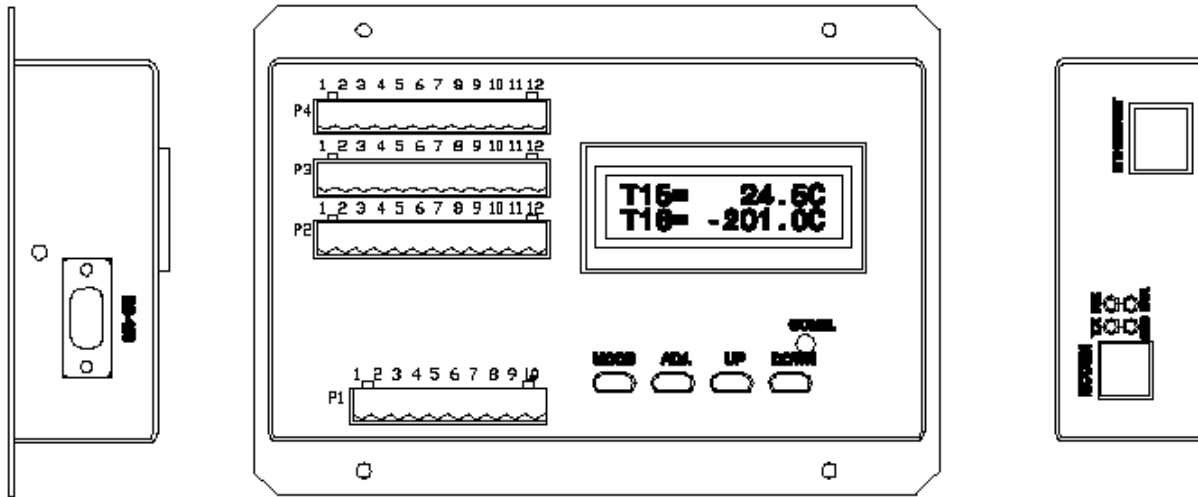
<b>TE2198-12</b> <b>DIN Rail Power Supply</b> <b>12 V, 1.25 A</b>	<b>Optional</b>	
-------------------------------------------------------------------------	-----------------	------------------------------------------------------------------------------------

Specifications	
Sensor Type	T-Type Thermocouples
Sensors	16 per module. Up to 64 per controller (4 Modules)
Scan Rate:	All sensors are scanned 1/sec
Accuracy	+/- 2C including Thermocouples
Communications:	RS-485
Power:	9-24 VDC
Dimensions:	5" x 7" x 1.63"
Mounting:	Panel
Controller Compatibility	VersaTenn V Synergy Nano Synergy Compact Synergy Micro Synergy Micro 2 Synergy Quattro



UUT Module Mechanical Drawing

## TCweb Master Layout



**Figure 1: Diagram of TCweb Master**

This diagram indicates the different physical features of the TCweb, including buttons, ports, indication lights, and the LCD Screen.

The RJ-45 Ethernet cable plugs into the "Ethernet" port, and the RS-485 Serial cable plugs into the "RS-485" port. The four multi-sockets on the front of the unit are where the power, thermocouples, communication lines, and relays connect to the unit.

### 3.2 Port Assignments

The four pluggable headers are numbered from the bottom up, with the 10-slot socket at the bottom labeled "P1" for Port 1. See Figure 1. Going up, the next three are "P2," "P3," and "P4." Within the sockets, the connections are numbered from left to right, so the leftmost connection is "1," the next is "2," and so on. Each connection is identified in the manual by the Plug identifier and connection identifier: "P1-1" is the bottommost, leftmost socket. The following tables define the TCweb connections by signal and by plug number:

### 3.2.1 Thermocouple (TC) Connection Table:

Sensor	Positive Lead	Negative Lead	Description
TC 1	P2-5	P2-6	Thermocouple 1
TC 2	P2-7	P2-8	Thermocouple 2
TC 3	P2-9	P2-10	Thermocouple 3
TC 4	P2-11	P2-12	Thermocouple 4
TC 5	P3-1	P3-2	Thermocouple 5
TC 6	P3-3	P3-4	Thermocouple 6
TC 7	P3-5	P3-6	Thermocouple 7
TC 8	P3-7	P3-8	Thermocouple 8
TC 9	P3-9	P3-10	Thermocouple 9
TC 10	P3-11	P3-12	Thermocouple 10
TC 11	P4-1	P4-2	Thermocouple 11
TC 12	P4-3	P4-4	Thermocouple 12
TC 13	P4-5	P4-6	Thermocouple 13
TC 14	P4-7	P4-8	Thermocouple 14
TC 15	P4-9	P4-10	Thermocouple 15
TC 16	P4-11	P4-12	Thermocouple 16

### 3.2.2 Power Connection Table:

Signal	Connection	Description
Ground	P1-1	TCweb Power Return
Power	P1-2	TCweb Power, 12 to 28 VDC

### 3.2.3 RS-485 Connection Table:

Signal	Connection	Description
COMM RX+	P1-6	Communications Receive: Positive Lead
COMM RX-	P1-3	Communications Receive: Negative Lead
COMM TX+	P1-4	Communications Transmit: Positive Lead
COMM TX-	P1-5	Communications Transmit: Negative Lead

### 3.2.4 Relay Connection Table:

Signal	Connection	Description
Common	P1-8	Alarm Relay Common
Normally Open	P1-9	Alarm Relay contact opens under normal conditions
Normally Closed	P1-10	Alarm Relay contact closes under alarm conditions

The following tables list connections by plug number

### 3.2.5 Connector P1:

Connection	Signal	Description
P1-1	Ground	TCweb Power Return
P1-2	Power	TCweb Power, 12 to 28 VDC
P1-3	COMM RX-	RS-485 Receive: Negative
P1-4	COMM TX+	RS-485 Transmit: Positive
P1-5	COMM TX-	RS-485 Transmit: Negative
P1-6	COMM RX+	RS-485 Receive: Positive
P1-7	Not Connected	
P1-8	Relay: Common	Alarm Relay: Common Line
P1-9	Relay: NC	Alarm Relay: Normally Closed
P1-10	Relay: NO	Alarm Relay: Normally Open

### 3.2.6 Connector P2:

Connection	Signal	Description
P2-1	Signal Return	Isolated return for DAC voltages
P2-2	DAC1	Digital to Analog Converter 1, 0 to 5 VDC
P2-3	DAC2	Digital to Analog Converter 2, 0 to 5 VDC
P2-4	No Connection	
P2-5	TC 1 +	Thermocouple 1, Positive
P2-6	TC 1 -	Thermocouple 1, Negative
P2-7	TC 2 +	Thermocouple 2, Positive
P2-8	TC 2 -	Thermocouple 2, Negative
P2-9	TC 3 +	Thermocouple 3, Positive
P2-10	TC 3 -	Thermocouple 3, Negative
P2-11	TC 4 +	Thermocouple 4, Positive
P2-12	TC 4 -	Thermocouple 4, Negative

### 3.2.7 Connector P3

Connection	Signal	Description
P3-1	TC 5 +	Thermocouple 5, Positive
P3-2	TC 5 -	Thermocouple 5, Negative
P3-3	TC 6 +	Thermocouple 6, Positive
P3-4	TC 6 -	Thermocouple 6, Negative
P3-5	TC 7 +	Thermocouple 7, Positive
P3-6	TC 7 -	Thermocouple 7, Negative
P3-7	TC 8 +	Thermocouple 8, Positive
P3-8	TC 8 -	Thermocouple 8, Negative
P3-9	TC 9 +	Thermocouple 9, Positive
P3-10	TC 9 -	Thermocouple 9, Negative
P3-11	TC10 +	Thermocouple 10, Positive

P3-12	TC 10 -	Thermocouple 10, Negative
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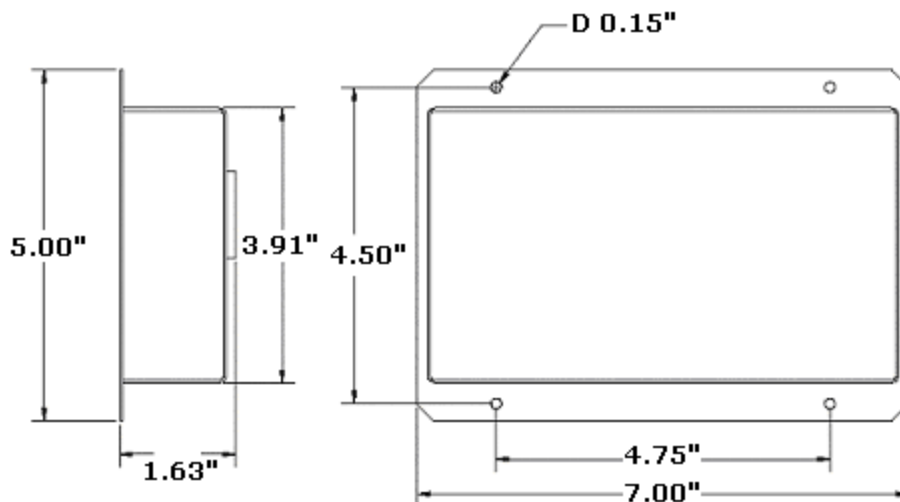
### 3.2.8 Connector P4:

Connection	Signal	Description
P4-1	TC 11 +	Thermocouple 11, Positive
P4-2	TC 11 -	Thermocouple 11, Negative
P4-3	TC 12 +	Thermocouple 12, Positive
P4-4	TC 12 -	Thermocouple 12, Negative
P4-5	TC 13 +	Thermocouple 13, Positive
P4-6	TC 13 -	Thermocouple 13, Negative
P4-7	TC 14 +	Thermocouple 14, Positive
P4-8	TC 14 -	Thermocouple 14, Negative
P4-9	TC 15 +	Thermocouple 15, Positive
P4-10	TC 15 -	Thermocouple 15, Negative
P4-11	TC 16 +	Thermocouple 16, Positive
P4-12	TC 16 -	Thermocouple 16, Negative

Connecting the thermocouples to the TCweb is described the chapter "Unit Operation."

### 3.3 Unit Mounting

The TCweb is mounted by the four holes in its backplate as shown in the figure below. The TCweb measurements and the mounting holes are indicated.

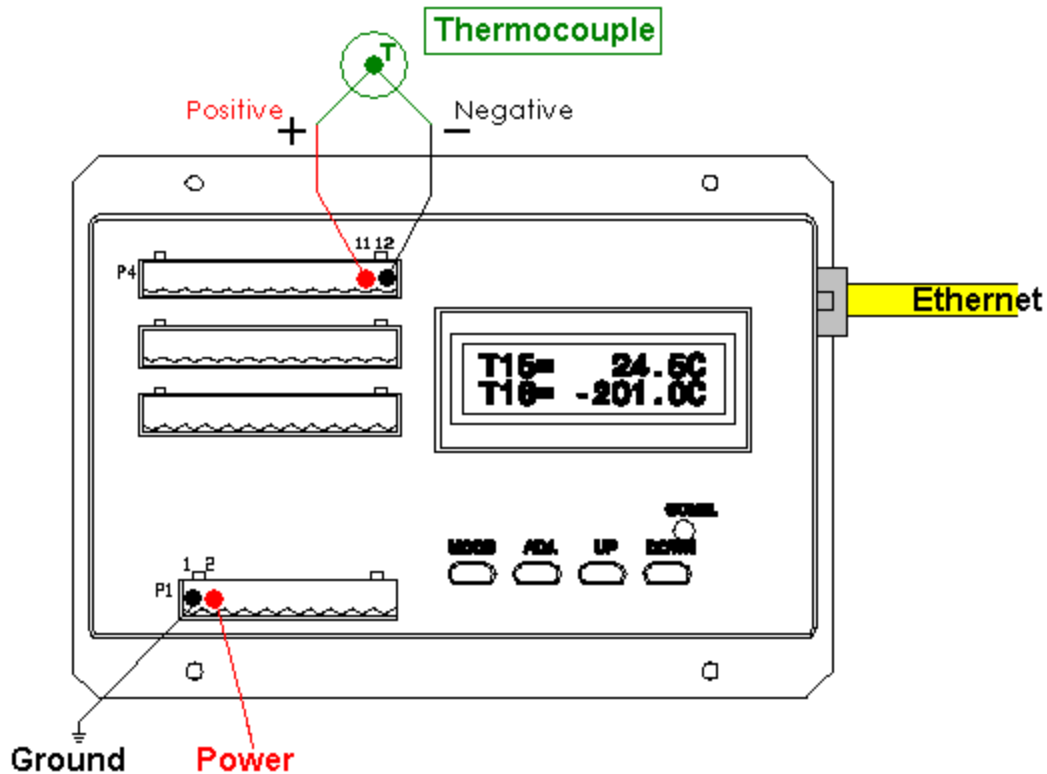


**Figure 2 TCweb Mounting Dimensions**

The unit may be mounted in any orientation.

## 4 Preparation for Use/Quick Start

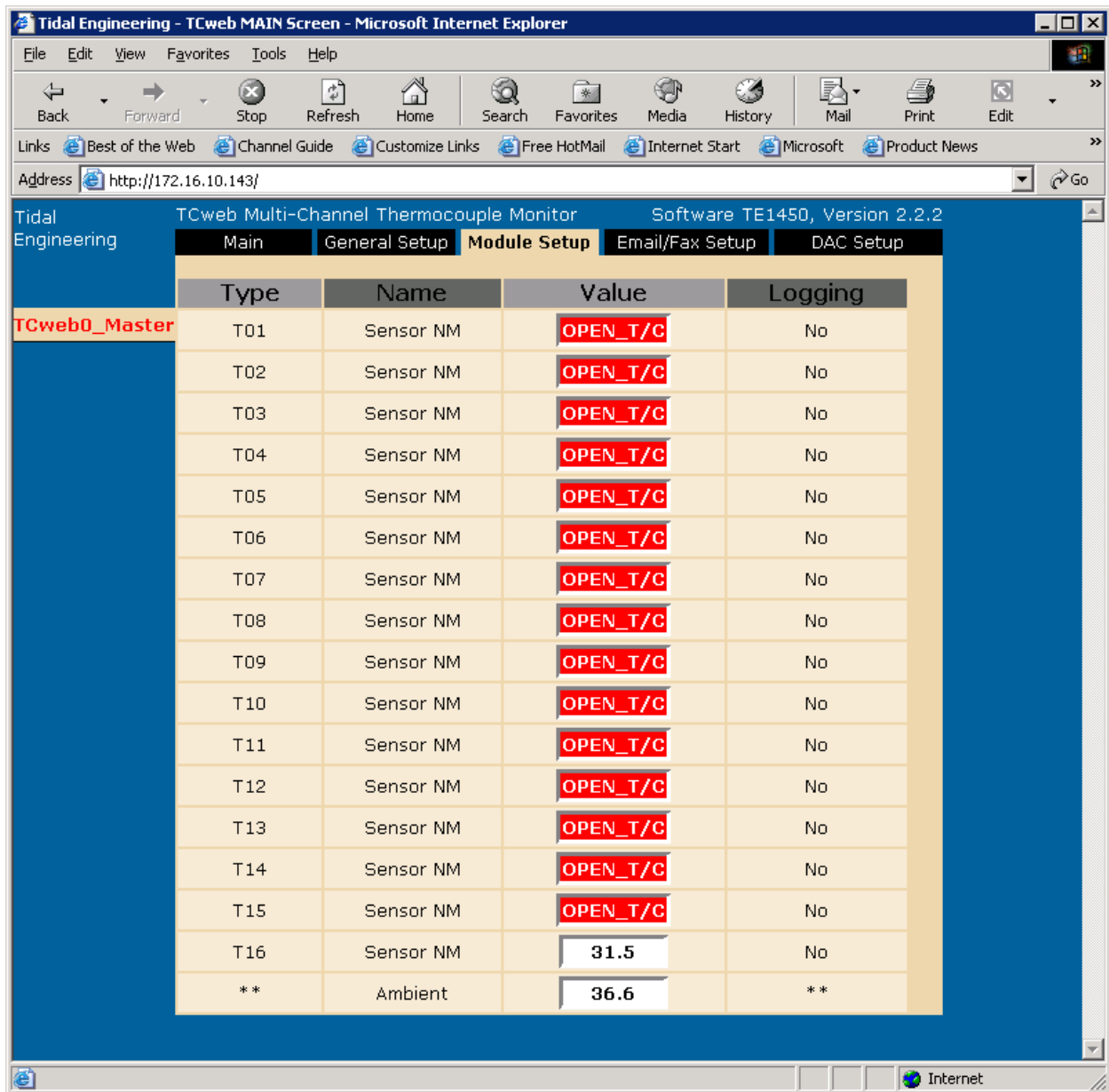
This Quick Start Guide will guide you through the fundamentals of the TCweb, setting up the unit and connecting to the unit via the Internet.



**Figure 3 Quick Setup Connections**

1. Plug the supplied 10 position terminal plug into the socket on the front of the unit labeled "P1." Plug one of the 12 position terminal plugs into the socket labeled "P4."
2. Plug in an RJ-45 Ethernet cable into the socket on the side of the unit and plug the other end of the cable into an Ethernet Hub. Alternatively, you can connect the TCweb directly to a PC's Ethernet jack using an Ethernet "Crossover cable".
3. Connect the negative terminal of the DC power source into the P1-1, the left-most slot in the P1 terminal plug. Insert the positive terminal of the power cable into the P1-2 and tighten the holding screws on both positions.
4. Insert the negative wire of the thermocouple into P4-12, the right-most slot of the P4 terminal plug, and the positive wire into P4-11. Tighten the holding screws.

5. Press the MODE button on the front of the unit twice, or until the first line of the LCD reads "DHCP/Static." This screen allows you to set the type of IP address the unit will use: one assigned automatically by a DHCP server or a static IP address that you will input into the unit. If the second line of the screen displays the correct setting, proceed to step eight. If not, go to the next step.
6. To change the setting, press the ADJ button to change from viewing to editing. Press UP or DOWN until the correct setting is displayed, then ADJ again to save the value.
7. Press MODE to go the next menu. The next three screens operate similarly, and together, they are used to specify the TCP/IP Network configuration for the unit. They are IP Address, Net Mask, and Gateway, respectively. If you have set the IP type to "Static," you can edit the values. If you have selected "DHCP," you can only view the values. Whether you input the IP address, or it is assigned by a DHCP server, take note of the IP address, because you will need it to access the unit over the Internet. To edit the values: press the ADJ button to put the TCweb into edit mode. The editor goes digit by digit as you adjust it, and the digit being adjusted blinks. While editing, UP and DOWN do just that to the value. MODE advances to the next value, and ADJ saves the changes and goes to the next screen. However, when editing the last value, pressing MODE will cancel the edit mode and restore the prior value. To save the changes, press the ADJ button. Pressing MODE at the last value is the only way to cancel any mistakes. To go from menu to menu without editing, press MODE.
8. When you are done with the IP address, go to a computer connected to the same LAN that the TCweb is on or the one connected directly to the TCweb with a cross over cable, Open a browser window, and on the URL address line, type in the IP address that you read from the TCP/IP address menu on the front of the TCweb unit.
9. In the browser window that comes up, you should be able to see what temperature the thermocouple is detecting in the box labeled "T16." See Figure 4 below.



**Figure 4 TCweb - Main Screen**

## TCweb Setup

The TCweb has four buttons: MODE, ADJ (Adjust), UP, and DOWN. These buttons are used in conjunction with the Liquid Crystal Display to set the TCweb's Display Parameters and the IP Parameters. The following table is an overview of the functions of each button in the different modes:

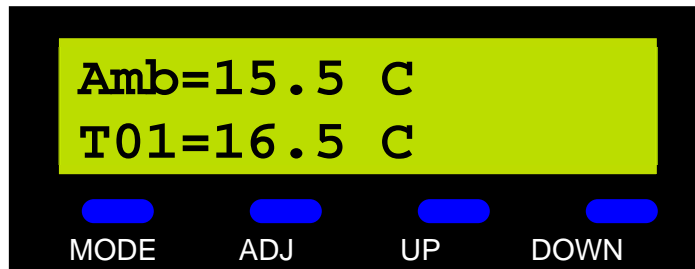
Button	Menu Mode		Scan Mode
	View Menu	Edit Menu	
Mode	Advance to next menu	Advance to next field	Enter Menu Mode
Adjust	Enters Edit Menu	Save Menu setting	Display Sensor Name



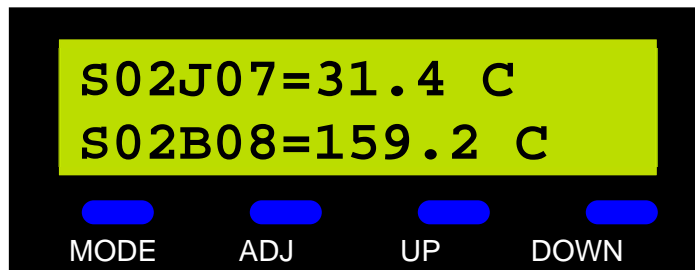
Mode & Up	Returns to Scan Mode	Cancel Edit Menu & Return to View Menu	Switch display to next unit
Mode & Down			Switch display to previous unit
Up	Advance to next menu	Increment value or switch to next selection	Advance to next sensor. Briefly display a sensor name.
Down	Return to previous menu	Decrement value or switch to next selection	Advance to previous sensor. Briefly display a sensor name.

A few general guidelines: ADJ, when in a parameter display screen, toggles between editing and viewing. That is, to edit a value displayed on the screen, press the ADJ button. Then, when you have finished editing the value, hit ADJ again to save the value. The MODE button cycles through the different menus, and when you are editing, acts as a “cancel” button that will exit the edit mode and restore the former value, disregarding changes you made while editing. UP and DOWN will cycle through values while editing, and shift the part of the menu displayed in the screen for large menus. The asterisk displayed in the top right of the screen indicates that the value is Read-Only and can't be manually changed, as in a DHCP assigned IP address. The exclamation point indicates that the value can be changed manually. And finally, the question mark means that the value is currently being edited. When a value is being edited, it will either be in parenthesis or blink.

### 5.1.2 Scan Mode

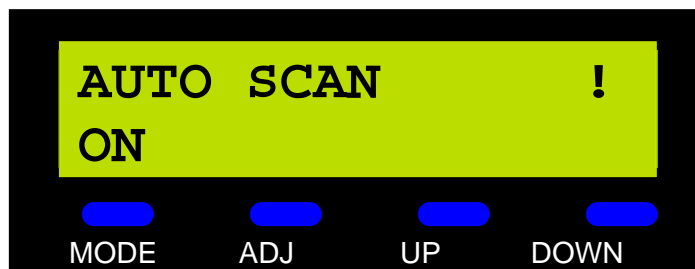


When powered the TCweb display starts in the Scan Mode, stepping through all the sensor readings from the Thermocouples, as well as the ambient temperature of the module. An examples screen from this mode is shown above. The letter before the number of the channel is the type of thermocouple. Use UP and DOWN to cycle through the values. This will also temporarily display the name of the sensor that you have set or will set through the web interface. To see the names without cycling, or for a longer duration, press and hold the ADJ button. If **AutoScan** is turned on, the values will cycle automatically at three-second intervals. You can use UP and DOWN in Auto Scan mode to manually select a sensor. In that case, the scanning will pause for ten seconds before resuming the **AutoScan**. If there are any slaves attached to the master, their values can be viewed by holding MODE and pressing either UP or DOWN. **AutoScan** and manual cycling work the same when viewing the slaves as they do for the master. The letter “S” for slave prefaces each channel of the display, followed by the unit number, then the Channel information:

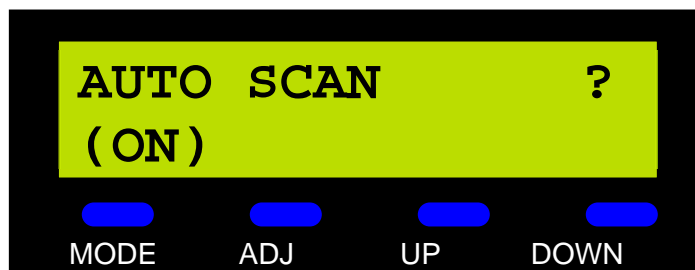


**5.1.3 Menu Mode: AutoScan**

To enter the Menu Mode, depress the MODE button to go to the **AutoScan** Set menu. The current value of **AutoScan** is displayed, either On or Off.



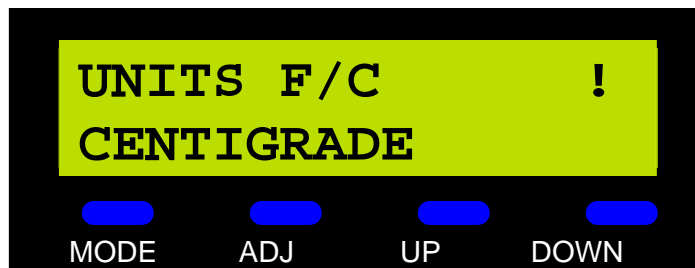
To toggle the value, hit ADJ and then UP or DOWN. While editing, ADJ will save the settings, and MODE will cancel and advance to the next menu.



If you have saved the value with ADJ, MODE will advance to the next menu.

**5.1.4 Menu Mode: Displayed Units**

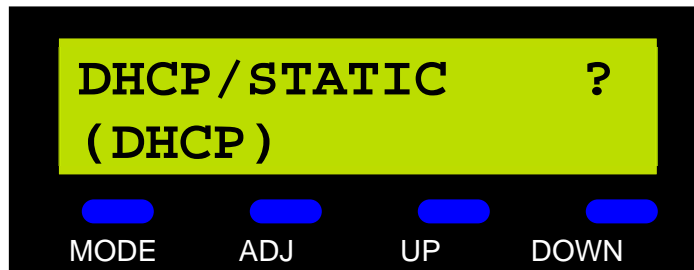
The next menu is the Units Set menu, selecting either "C" for Celsius or "F" for Fahrenheit. This menu acts like the **AutoScan** Set menu, ADJ to edit, UP and DOWN to toggle, MODE to advance.



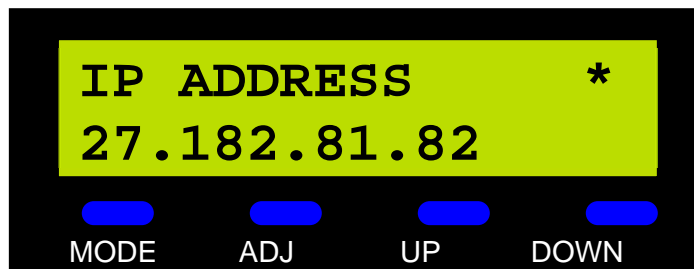
## 5.1.5 Menu Mode: IP Settings

DHCP/Static Set is next. This allows you to choose whether the unit's IP address will be set by a DHCP server or by your static IP address input. This is another toggle function and works like the Auto Scan selection.

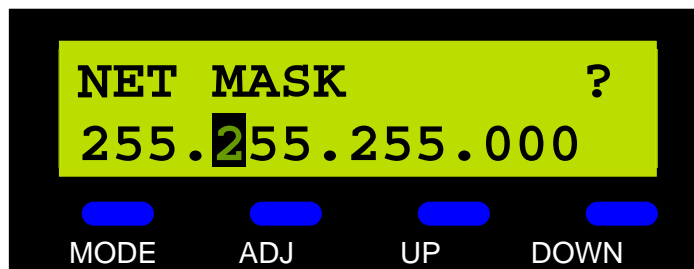
NOTE: Logging stops when the TCweb is searching for a DHCP server. This occurs when the unit switches from "Static" to "DHCP."



The next three screens operate similarly. They are TCP/IP Address, Net Mask, and Gateway, respectively. If the DHCP/Static is set to "Static," an exclamation point is displayed, and you have the option of editing the values. In DHCP mode an asterisk is displayed, and you can only view the values.



Here too, ADJ accesses editing. The editor goes digit by digit as you adjust it, and the digit being adjusted blinks. While editing, UP and DOWN increment and decrement the value. MODE advances to the next value, and ADJ saves the changes and goes to the next screen. However, when editing the last value, MODE, will cancel the editing and restore the prior value. To save the changes, you must press ADJ. Pressing MODE at the last value is also the only way to cancel any mistakes.



The next screen brings you back to the first digit, enabling you to start again.

## 5.2 Alarm Relay Operation

The TCweb has an alarm relay contact that will trigger in the event of an alarm condition on any or all the units. This feature is set up in the section “Web Interface: Module Setup.” The Form C relay contact can be used to activate an annunciator, buzzer, light, or signal another system when there is an alarm.

Common	P1-8
Normally Open	P1-9
Normally Closed	P1-10

Reprinted here is the Relay Connection Table. To set up the buzzer, connect the corresponding leads to the buzzer to the appropriate channels. The “Normally Closed” line will open when the unit turns off, as in the event of a power failure. The “Normally Open” line is closed when the unit detects an alarm condition, as you’ve set them in the web interface, and wants to communicate the alarm.

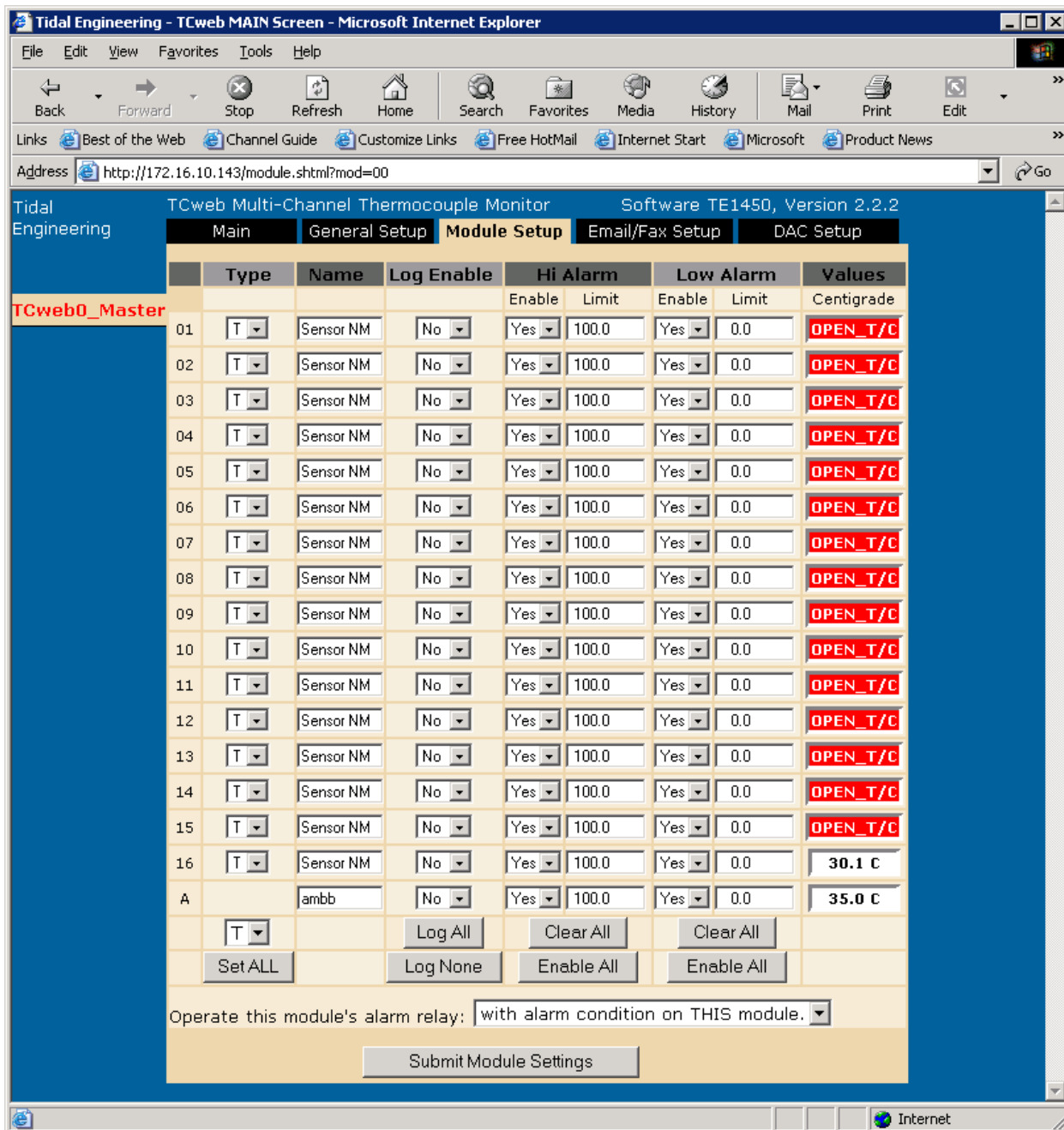
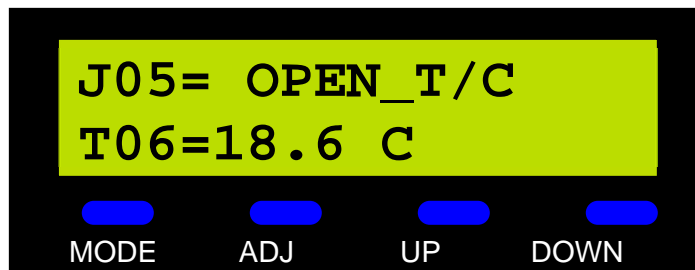


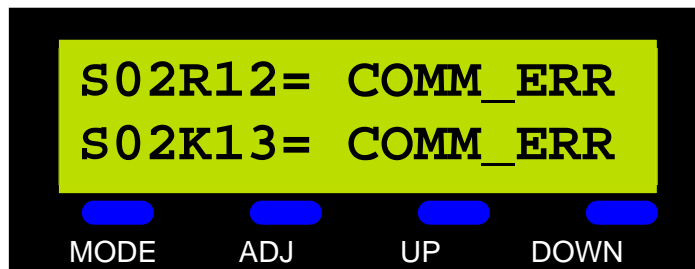
Figure 5 Module Setup Page

## 5.3 Error Messages

If there an open thermocouple is detected, an error message will be displayed.



The "Open T/C" message is displayed when the channel opens. This indicated that there is an open circuit on a thermocouple. This can occur if there was no thermocouple there, if the thermocouple has come unplugged, or if the thermocouple has been broken. This condition will trigger an alarm if the channel that is open has a "Low Limit" Alarm enabled.



The Communications Error message is generated if communication with a slave, via the serial connectors, is corrupted. This can occur if the lines are severed, if the lines are crossed, if the slave is unplugged, or if there is noise on the communication line. A condition that causes a communication error will always affect all the channels for that unit.

## 5.4 Attaching Wires to the Unit

Thermocouples, power lines, relay contacts, and others all connect to the TCweb through the four multi-connection plugs on the front of the TCweb. The supplied terminal plugs are 5mm spacing. The "P1" socket is a 10-position connector, and the other three, "P2," "P3," and "P4," are 12 position connectors.

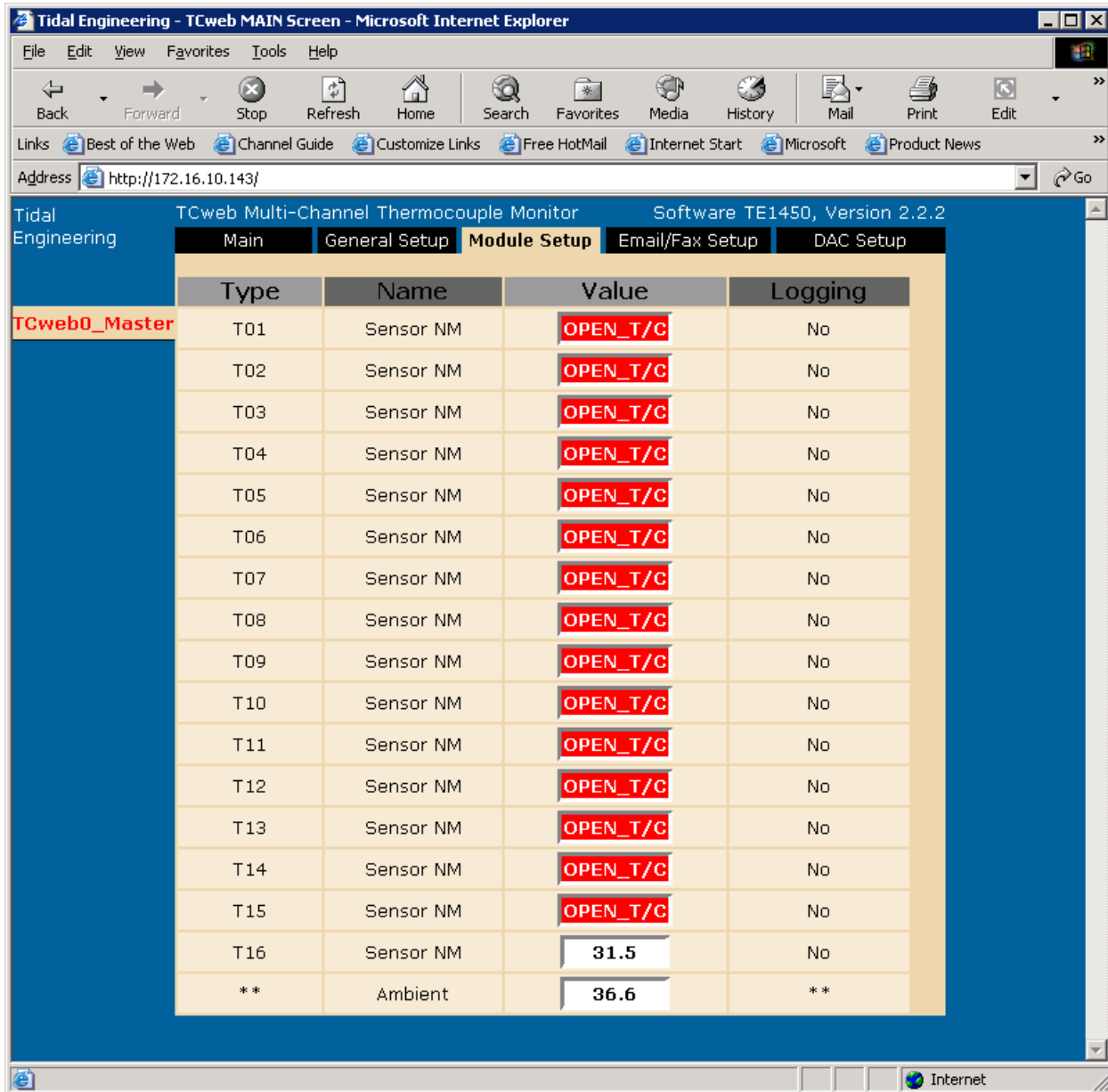
To attach a wire, first strip approximately 3/16 of an inch of the insulation off the wire, exposing the conductor. Then, insert the wire into the exposed cavity in the terminal plug, and tighten the locking screw.

## Web Interface

The TCweb's myriad functions can be accessed on a local area network or from the Internet if the network is setup appropriately. To reach the Web Interface, open a browser, and in the address line, type the IP address of the unit. This address is either the static IP address set using the web interface or the one assigned by the DHCP server if you selected the DHCP option. In either case, the address can be viewed in the IP menu on the unit, as described in the "Unit Operation" section above. There are five screens that constitute the online interface: Main, General Setup, Module Setup, Email/Fax Setup and DAC Setup. You can switch between these screens using the tabs at the top of each TCweb window.

In all the screens, there is a tab along the left side of the window that indicates the number of slaves that are configured and the currently selected unit. On some pages, there is a "Submit" button. This button will save the changes that you have made, send them to the unit, and return to the same screen.

## 6.1 Main



**Figure 6: TCweb Main Screen**

The Main Screen is the first to come up when the TCweb is addressed by the browser. This screen displays the temperature from each of the Sensors, the ambient temperature of the unit, the units that the temperatures are in, whether logging is taking place or not, and if there are any alarms.

Also, on this screen, you can select which unit to view, if there are Slave units are connected to the master.



6.2 General Setup

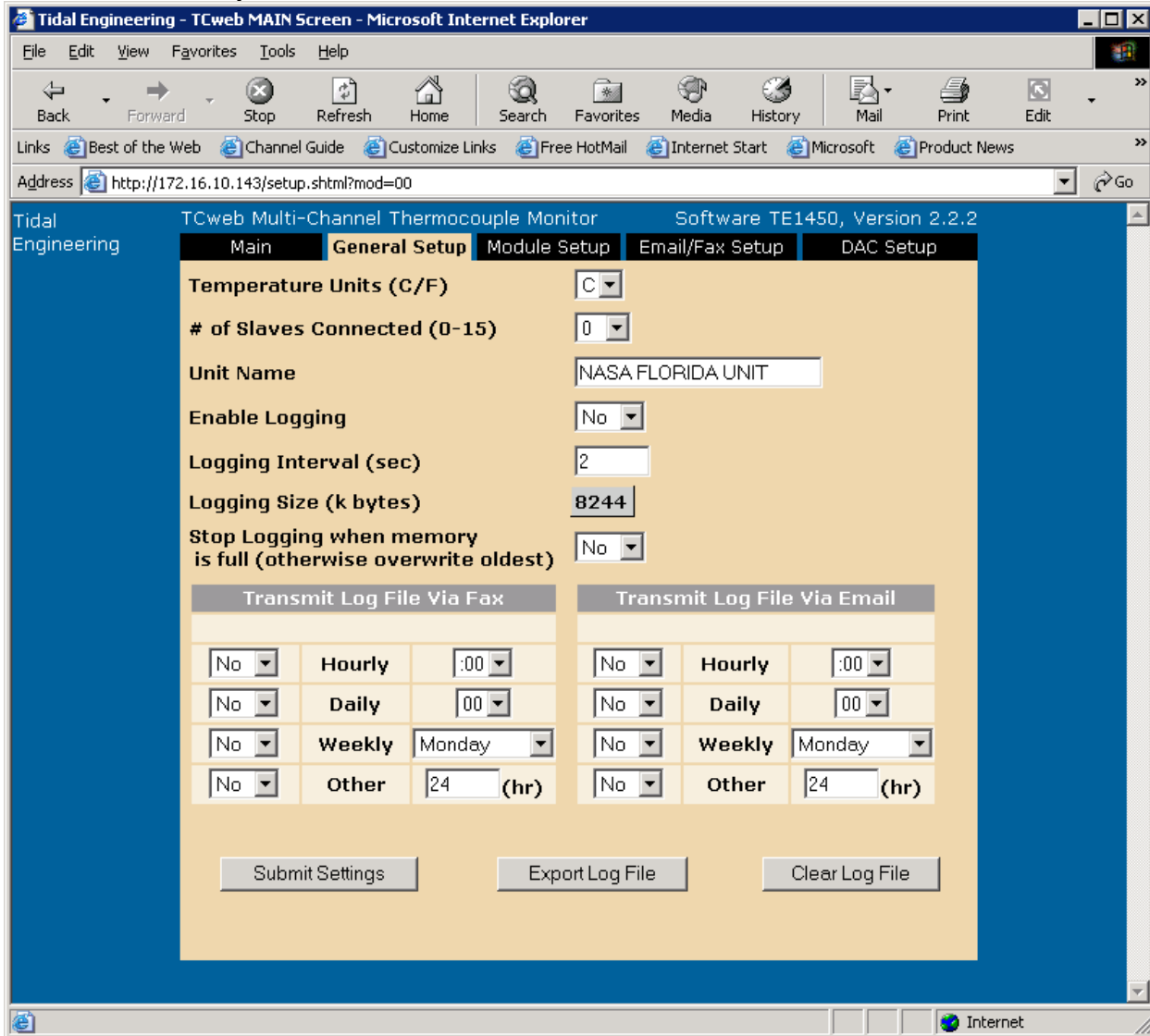


Figure 7: TCweb General Setup Screen

The General Setup screen allows you to set general parameters for the TCweb. Drop-down menus allow you to choose the units the temperature is displayed in, either Celsius or Fahrenheit, and the number of slaves connected. In the box labeled “Unit Name,” you can enter a descriptive name for the unit. This name will be included in alarm e-mails and faxes and will also appear in data logs.

This screen controls the logging features of the TCweb, allowing you to record the values of specific channels over time into a data file, and then download the file or send it to another location.

Each module channel has its own check box to select it for logging. In addition, the “Enable Logging” check box on the General Setup screen is the overall enable to turn all logging on or off. The “Logging Interval” is the time between successive sampling of the selected channels.

The log file can be transmitted via e-mail or fax at regular intervals. Select the interval, and the method. The e-mail address(es) and fax number(s) that the device will transmit to are set in the E-mail/Fax screen.

To save the settings, click "Submit Settings." If "Enable Logging" is checked, logging will begin immediately.

Recall from above that Logging will be momentarily halted if, on the master unit, the mode of IP addressing is switched from "Static" to "DHCP."

To download the data file, press the "Export Log File" button, and a dialog will come up allowing you to save the file to your computer. The format of the file is discussed below the description of the different screens. Pressing "Clear Log File" erases the TCweb's flash data log memory.

## **6.2 Module Setup**

The Module Setup Screen is used to configure each module. You can set the type of thermocouple in each position for each module, enter a Sensor name, enable logging and set Hi and Lo alarm limits. In addition, you can set the operation mode for the Alarm relay on each module. To save the settings, press the "Submit" button. To check or edit the settings for another unit, select the tab for the unit on the left side of the screen.

### **6.2.1 Set All**

At the bottom of the Type Column, there is a drop down and a "Set All" button that can be used to set all the sensors on the selected module to one type.

### **6.2.2 Log All**

At the bottom of the Log Enable Column, there is a "Set All" button that can be used to enable logging on all the sensors on the selected module. Similarly, there is a "Set None" button that can be used to disable logging on all the sensors on the selected module.

### **6.2.3 Clear All Alarms**

At the bottom of the Hi Alarm and Lo Alarm Columns, there is a "Clear All" button that can be used to Disable alarms on all the sensors on the selected module. Similarly, there is a "Set All" button that can be used to enable alarms on all the sensors on the selected module.

Tidal Engineering - TCweb MAIN Screen - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites Media History Mail Print Edit

Links Best of the Web Channel Guide Customize Links Free HotMail Internet Start Microsoft Product News

Address http://172.16.10.143/module.shtml?mod=00 Go

Tidal Engineering TCweb Multi-Channel Thermocouple Monitor Software TE1450, Version 2.2.2

Main General Setup **Module Setup** Email/Fax Setup DAC Setup

Type	Name	Log Enable	Hi Alarm		Low Alarm		Values
			Enable	Limit	Enable	Limit	
							Centigrade
TCweb0_Master							
01	T Sensor NM	No	Yes	100.0	Yes	0.0	OPEN_T/C
02	T Sensor NM	No	Yes	100.0	Yes	0.0	OPEN_T/C
03	T Sensor NM	No	Yes	100.0	Yes	0.0	OPEN_T/C
04	T Sensor NM	No	Yes	100.0	Yes	0.0	OPEN_T/C
05	T Sensor NM	No	Yes	100.0	Yes	0.0	OPEN_T/C
06	T Sensor NM	No	Yes	100.0	Yes	0.0	OPEN_T/C
07	T Sensor NM	No	Yes	100.0	Yes	0.0	OPEN_T/C
08	T Sensor NM	No	Yes	100.0	Yes	0.0	OPEN_T/C
09	T Sensor NM	No	Yes	100.0	Yes	0.0	OPEN_T/C
10	T Sensor NM	No	Yes	100.0	Yes	0.0	OPEN_T/C
11	T Sensor NM	No	Yes	100.0	Yes	0.0	OPEN_T/C
12	T Sensor NM	No	Yes	100.0	Yes	0.0	OPEN_T/C
13	T Sensor NM	No	Yes	100.0	Yes	0.0	OPEN_T/C
14	T Sensor NM	No	Yes	100.0	Yes	0.0	OPEN_T/C
15	T Sensor NM	No	Yes	100.0	Yes	0.0	OPEN_T/C
16	T Sensor NM	No	Yes	100.0	Yes	0.0	30.1 C
A	ambb	No	Yes	100.0	Yes	0.0	35.0 C
			Log All	Clear All	Clear All		
			Set ALL	Log None	Enable All	Enable All	

Operate this module's alarm relay: with alarm condition on THIS module.

Submit Module Settings

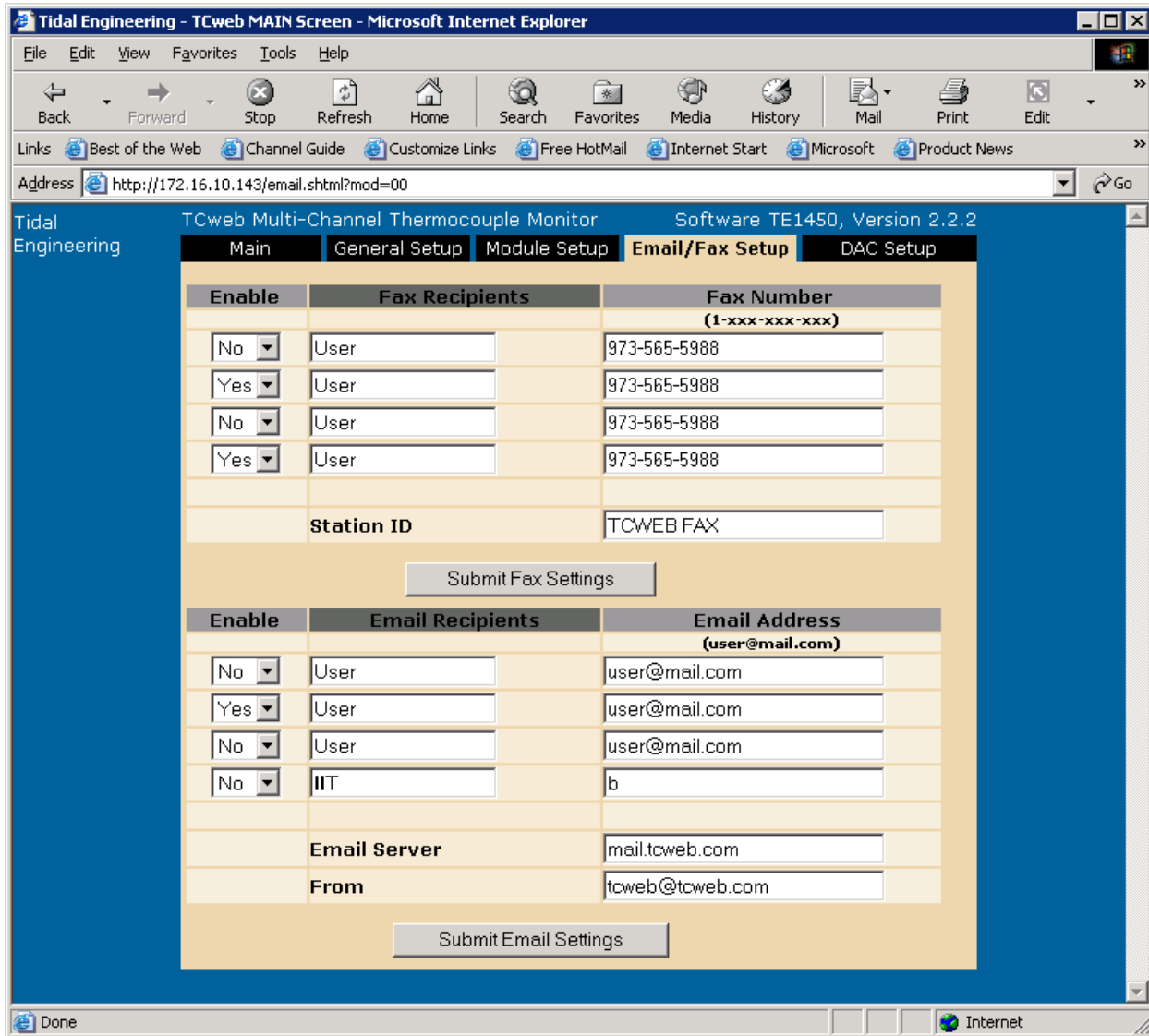
Internet

This screen allows you to set which channels will trigger alarms, and at what temperatures those alarms will go off. For each channel, a text box allows entry of the alarm limit for both high and low temperatures, and the "Enable" check box to turn that high or low alarm on or off.

At the bottom is the setting for the Alarm Relay. You can choose which situations will trigger the relay on the unit indicated by the flyout in the top left.

The "Submit Module Settings" button saves the values to the TCweb. Like the Main Screen, the tabs on the left controls which unit – master or one of the slaves – you are setting the alarm conditions.

## 6.5 E-mail/Fax



**Figure 8: TCweb E-mail/Fax Screen**

These two sections allow you to input where the alarm notifications and log files will be set. For each entry, you can select whether the alarm notification will go to that entry by checking or unchecking the “Enable” box, entering a name for that recipient, and entering the address of the recipient, either a fax number or e-mail address. Here too, clicking Submit will send your changes to the TCweb and save them.

6.6 Data File

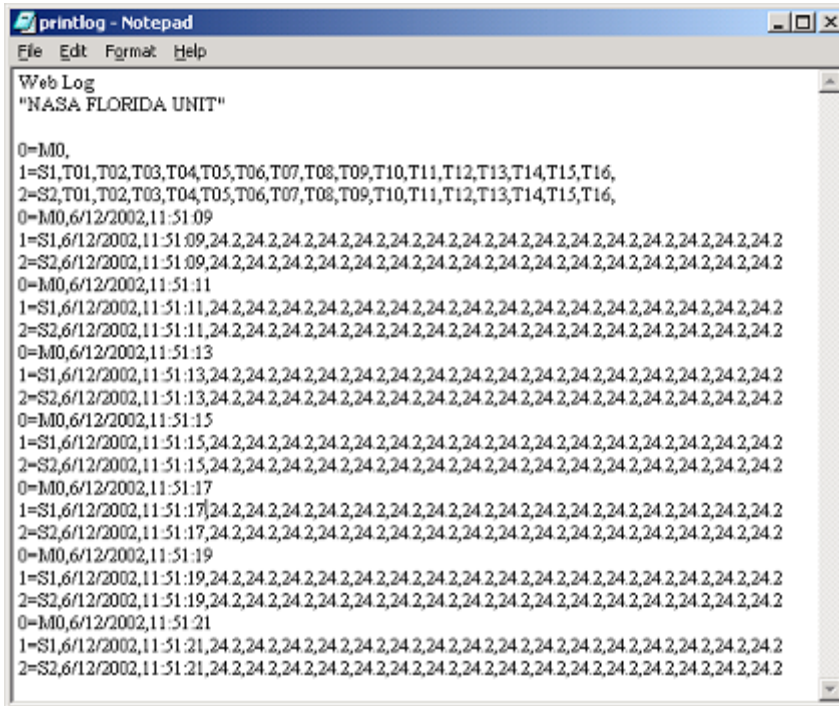


Figure 9: Example Log File

This is a sample data file. The file is a text document, and the format is as follows:

The first line carries the words “Web Log.”

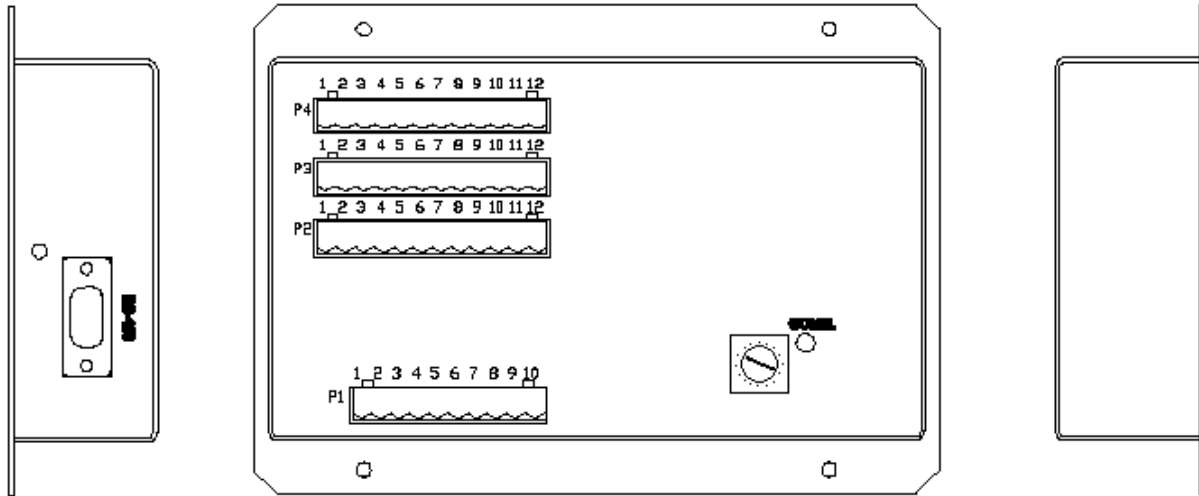
The second line has the name of the unit you defined, on the “General Setup” screen, in quotes, and then an empty line.

The next block is the header or “definition” block, which repeats the channels that are being recorded, as you set them in the “Logging” screen. The unit number is followed by an equal sign “=”, then the unit type identifier, either “M” for master or “S” for slave. The unit number is repeated, and then a comma follows. Then there is a list of all the channels selected to record for this logging from that unit, separated by commas. In the example file here, the master has zero channels being recorded, and the two slaves have all their channels being recorded.

Then the data begins. At each sample, the block format is repeated, again beginning with unit number, equal sign, unit type identifier, unit number, and comma. Then the date is displayed, followed by a comma, and the time, also followed by a comma. The next set of entries on each line is values for the channels indicated by the header block.

**Master/Slave Setup**

One of the powerful and unique features of the TCweb is its ability to link multiple units together, increasing the channel capacity to a maximum of 256 sensors. The slave units resemble the master switch, but rather than the screen and buttons, they have a hexadecimal selector switch.



**Figure 10: Diagram of TCweb Slave**

**8.1 Setting the Slave Identifier**

Set the slave’s number using the hexadecimal Slave Address switch. Set the first slave to value “1,” the second slave to value “2,” and so on. As this is a hexadecimal switch, the tenth slave is set to “A,” the eleventh to “B,” up to the fifteenth to “F.”

**8.2 Connecting the Slaves**

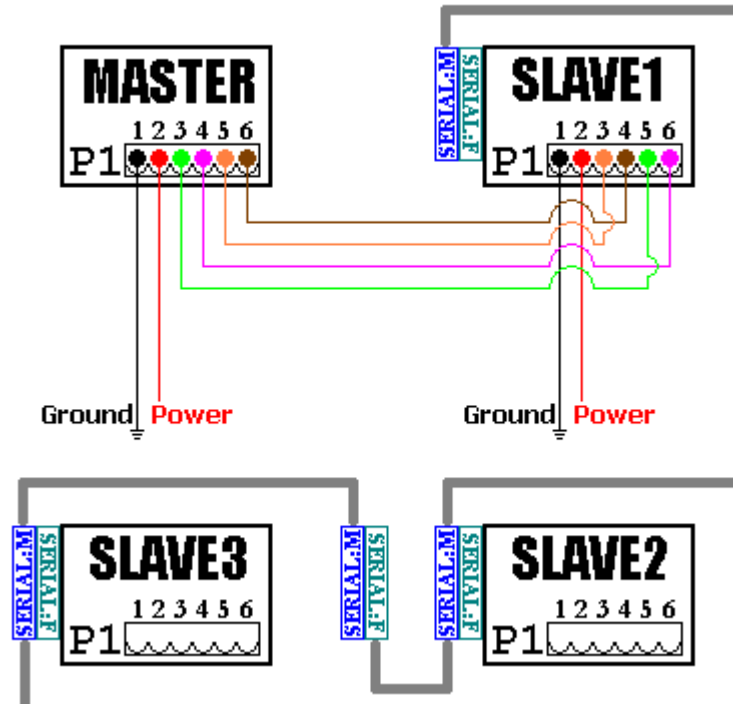
COMM RX+	P1-6
COMM RX-	P1-3
COMM TX+	P1-4
COMM TX-	P1-5

Refer to the diagram below for a graphical depiction of the connection scenario. The first slave is connected to the master through the P1 connectors on the front of the two units.

Reprinted here is an excerpt the slot assignment table from above, referring to the Communications Port slots in the first socket. The T in the TX stands for “Transmit,” and the R in RX stands for “Receive.” This table is the same for both the master and the slave. However, the master’s transmit must be connected to the slave’s receive, and the slave’s transmit must be connected to the master’s receive. Using a four-wire cable, connect the slots according to the following chart.

Master		Slave	
RX-	P1-3	P1-5	TX-
TX+	P1-4	P1-6	RX+
TX-	P1-5	P1-3	RX-
RX+	P1-6	P1-4	TX+

To connect the second slave and every other slave, you use the serial port on the side of the units. Each subsequent slave can be connected from Slave1 using a straight through ribbon cable assembly. Generally, this consists of a ribbon cable with D-sub crimp connectors spaced along its length. As they are all connected essentially in parallel, the order that they are plugged does not matter; the selector switch on the front determines the number of each slave.



**Figure 11 Master Slave Connection Diagram**

In this diagram, the successive slaves are connected using the TCweb Slave Cable (P/N TE 1467), which is arranged like this:



The "Serial: M" plug is a 9 pin D-sub serial male (P/N AMP 747321-4) that can connect to the serial port on the unit, and the "Serial: F" plug is a 9 pin D-sub serial female (AMP P/N 747318-4) that is used to connect successive cables.

When you are done setting up the slaves, remember to set the number of slaves to the correct number on the web interface, as described above in "Web Interface: General Setup."





## About the Synergy Family

Tidal Engineering's Synergy Controllers, the ¼ DIN Synergy Nano, Synergy Micro 2 and the Synergy Quattro provide state-of-the-art usability and connectivity for environmental test control and data acquisition. They combine the functions of a chamber controller and a data logger and are designed to improve test efficiency by supporting both factory automation and test and measurement protocols and standards.

Synergy Controller feature highlights includes:

- ➔ Color touch screen
- ➔ Ethernet, RS-232 and GPIB communications
- ➔ Built in 100 MB Data logger with USB drive support
- ➔ Data Acquisition, up to 64 T-type thermocouples (Optional)
- ➔ Built-in Web Server for remote control; WebTouch Remote™
- ➔ Compatible with Synergy Manager for PC based control, monitoring and programming.
- ➔ Built-in FTP Server for factory automation and test and measurement applications

For more information regarding these controllers please see the full Synergy Controller Technical Manual on our website at <http://www.tidaleng.com/synergy.htm>

## About Tidal Engineering

Headquartered in Randolph, NJ, Tidal Engineering Corporation has been designing and building award-winning embedded hardware and software for test and measurement and data acquisition applications since 1992. The company is recognized for technical expertise in such areas as Embedded IEEE 488, and turnkey SCADA (Supervisory Control and Data Acquisition) systems.

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