

Thermocouple Data Acquisition with Synergy UUT Modules



Overview

The Tidal Engineering P/N TE1299-16 UUT Module (Unit-Under-Test) is a 16-channel thermocouple data acquisition unit designed to expand the input capabilities of the controllers in the Synergy family. Each UUT 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 T-Type thermocouple inputs. The UUT data can optionally be logged and the log file may be used for analysis, graphing and reporting.

UUT Module Specifications

- ◆ Up to four UUT Modules can be used with the Synergy Controller.
- ◆ Each module can accept up to 16 thermocouple inputs for a total of 64 inputs.
- ◆ The UUT module uses Type T Thermocouples.
- ◆ Synergy Controller uses RS-485 communications to query each UUT Module.

UUT Module Uses

The UUT module can be used to monitor and record multiple air temperatures and multiple product temperatures and can control from any one of these.

UUT modules are particularly useful when testing products with a large thermal mass whose temperature is slow to change. When used in conjunction with the Synergy Controllers 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.



UUT Module

UUT Module Setup Procedure

This is the installation and set up 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.

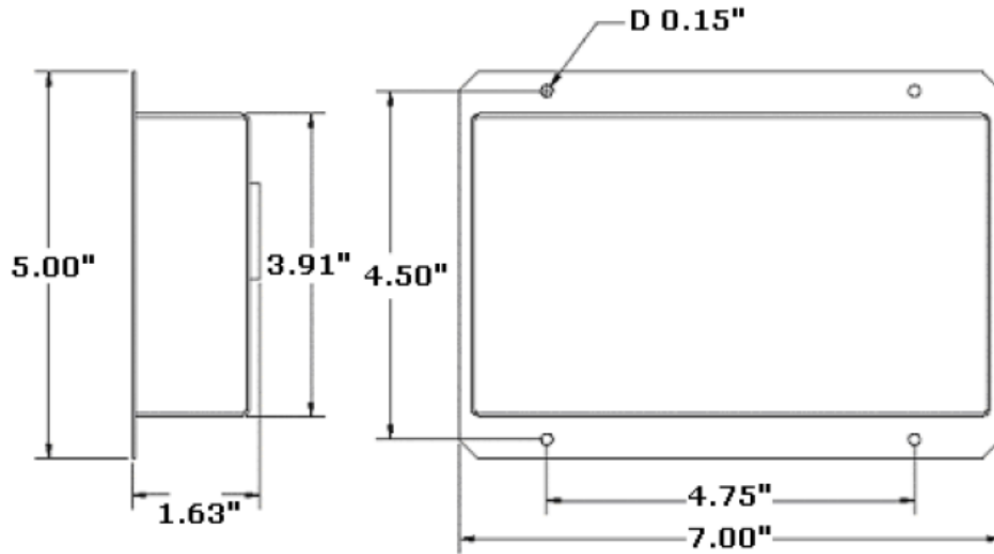
Hardware Connections



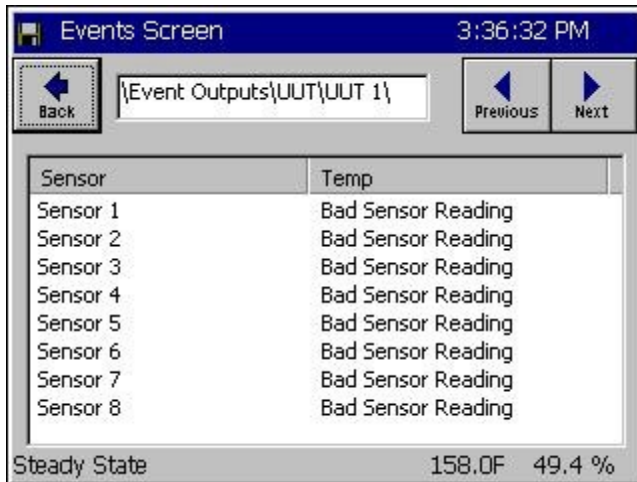
Disconnect power to the test chamber before starting. Lock-out / Tag-out your power source.

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

- ◆ Power Supply Cord: Black 2-wire cord with plug-in transformer, connected to Terminal Block P1.
- ◆ RS-485 Interconnect 9-conductor ribbon cable, connected to Connector P6.



UUT Module Mechanical Drawing



UUT Temperatures

For UUT 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.

Controller Setup

1. Set up the UUT Module Address.

Locate the small square selector switch on the UUT 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
Module 1	1
Module 2	3
Module 3	5
Module 4	7

2. Locate the RS-485 9-pin female plug, which is either plugged into the back of the RS-485 port on the Data Communications panel, or is hanging freely behind the panel.
3. Locate the RS-485 Interconnect 9-conductor ribbon cable connected to the UUT Module.
4. Connect your T-Type Thermocouple sensor wires to the appropriate terminal blocks P2 thru P4 on the UUT Module. Consult the Thermocouple Connection Tables on the UUT Module drawing for proper terminations.

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

- Plug in the UUT Module wall power transformer to a 120 Volt outlet.

Verify that the green LED on the UUT Module is illuminated. It should be on steadily.

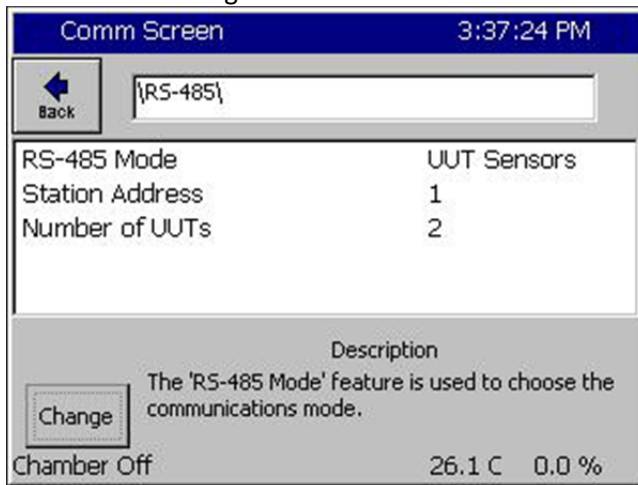
Notes:

- The table at the right shows the board power supply connections to the P1 connector.
- The additional RS – 485 terminals labeled COMM shown in the table on the right are not required for normal wiring since the DB-9 connector provides these connections.

BOARD PWR SUPPLY and RS-485 CONNECTION TABLE P1 CONNECTOR	
DESIGNATION	TERMINAL
Board GND.	P1 - 1
Board POWER	P1 - 2
COMM RX – Note 1	P1 - 3
COMM TX +	P1 - 4
COMM TX -	P1 - 5
COMM RX +	P1 - 6

- 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 UUTs using the chart on the right.



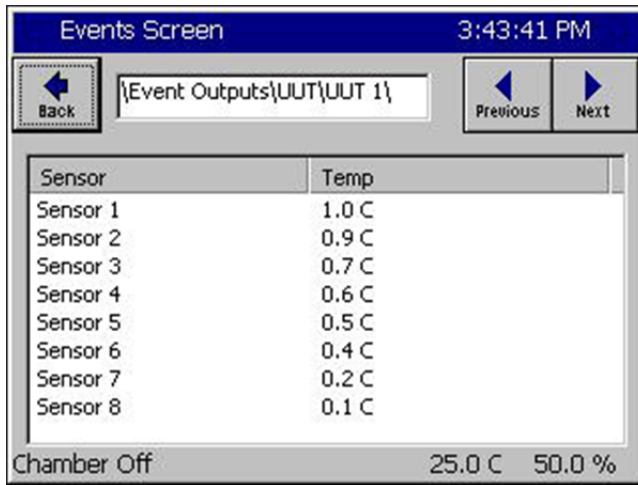
Number of Thermocouples	Number of UUTs Value to be Entered
1 - 16	2
1 - 32	4
1 - 48	6
1 - 64	8

- 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 UUT Module is blinking. This indicates that data communications have been established between the Synergy Controller and the UUT 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



The screenshot shows the 'Events Screen' with a time of 3:43:41 PM. The path is '\Event Outputs\UUT\UUT 1\'. The table displays the following data:

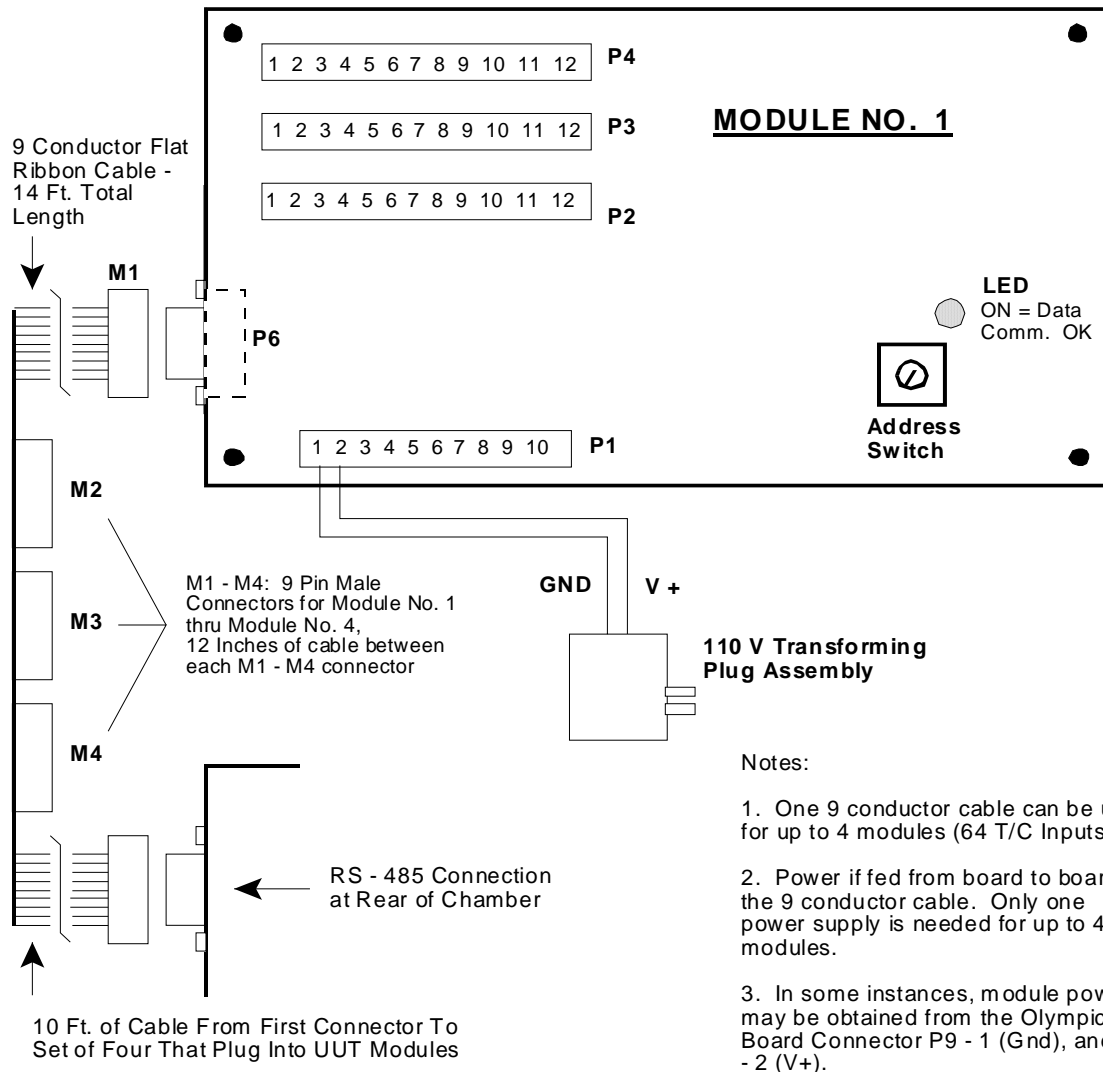
Sensor	Temp
Sensor 1	1.0 C
Sensor 2	0.9 C
Sensor 3	0.7 C
Sensor 4	0.6 C
Sensor 5	0.5 C
Sensor 6	0.4 C
Sensor 7	0.2 C
Sensor 8	0.1 C

At the bottom of the screen, it shows 'Chamber Off', '25.0 C', and '50.0 %'. Navigation buttons for 'Back', 'Previous', and 'Next' are visible.

- ◆ Each UUT Module can accept up to 16 T/C inputs.
- ◆ Each screen displays 8 sensors labeled Sensor 1 thru Sensor 8. You can view all 16 inputs of a module with 2 screens.
- ◆ 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. UUT Module No. 2 data will be displayed by UUT3 / UUT4, module by No. 3 UUT5 / UUT6, etc.

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.

UUT MODULE - Board and Connector Layout



About the Synergy Controller Family

Tidal Engineering's Synergy Controllers, both the Synergy Micro 2 and the ¼ DIN Synergy Nano provide state-of-the-art usability and connectivity for environmental test control and data acquisition and 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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