

Synergy Quattro Retrofit for VersaTenn III Controllers



Introduction

Tidal Engineering's Synergy® Controller is a family of process control systems designed to drop into virtually any environmental test chamber and provide state-of-the-art usability and operating efficiency.

This Synergy Controller application note describes the steps for a Synergy Quattro retrofit installation in a VersaTenn III equipped environmental test chamber.

Synergy Quattro Controller features includes:

- Color touch screen
- Ethernet and RS-232 communications. (GPIB is optional)
- Built in 100 MB Data logger
- Data Acquisition, Up to 64 T-type thermocouples (Optional)
- Built in Web Server for remote control
- E-mail Alarms and test data
- Network printing and PDF charts (Optional)
- Compatible with Synergy Manager Software
- Built in USB port compatible with USB Disk drives for data logging and program transfer.

This note covers the following steps:

- Step I – Removing the existing VersaTenn Controller
- Step II – Mount the new Synergy Quattro Controller
- Step III – Wiring the new Synergy Quattro Controller
- Step IV – Configuring the Synergy Quattro Controller

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Dangerous voltages are present in any environmental test chamber and process oven. Disconnect electrical service at source and tag circuit out before servicing or replacing components.

Step I - Removing the existing VersaTenn III Controller

1. WARNING! Make certain power has been disconnected from the chamber.
2. Mark and remove the cables from the back of the VersaTenn.
3. Remove the four screws holding the controller in place.
4. Pull the controller from the front of the chamber.

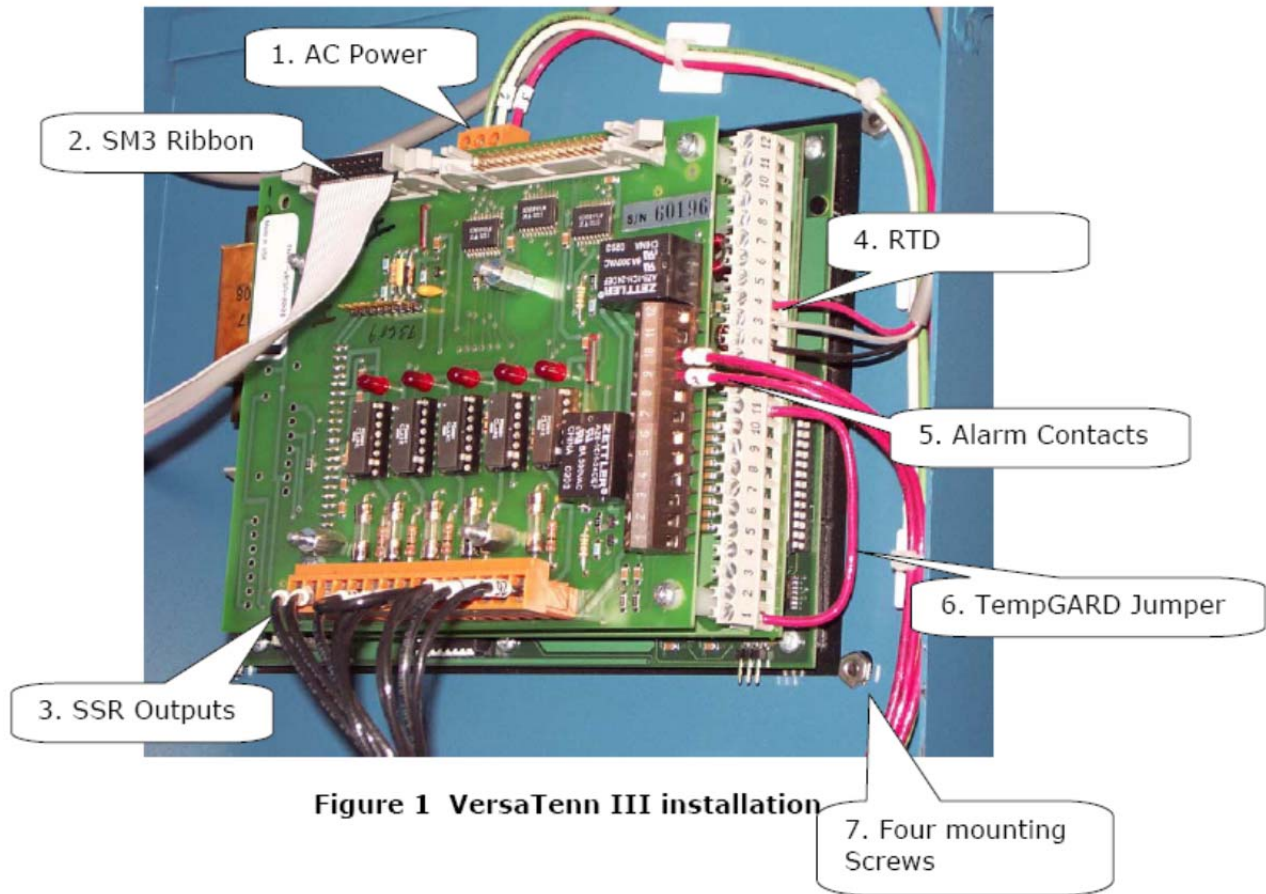
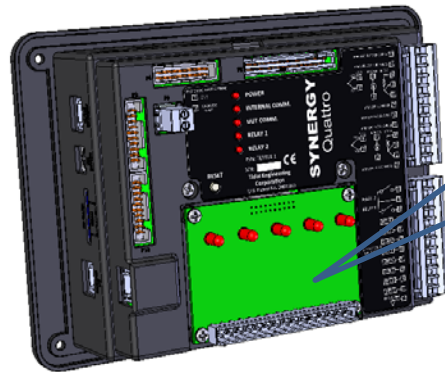


Figure 1 VersaTenn III installation

Step II - Install the new Synergy Quattro Controller

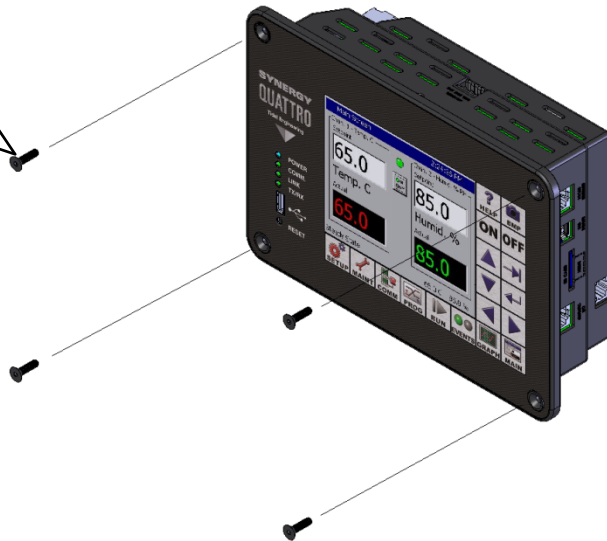
1. Mount the Synergy Quattro Type 5 Expansion module, TE2251-5, if required, to the controller with the supplied screws.



TE2251-5
Synergy Quattro Type 5
Expansion Module
5-Channel SSR Module

2. Place the Synergy Controller on the front panel of the chamber.

Flat Head Screws
8-32 x 4
Supplied



3. Plug the Solid State Relay (SSR) connector into the TE2251-5 SSR board J1 connector.

SSR Connector

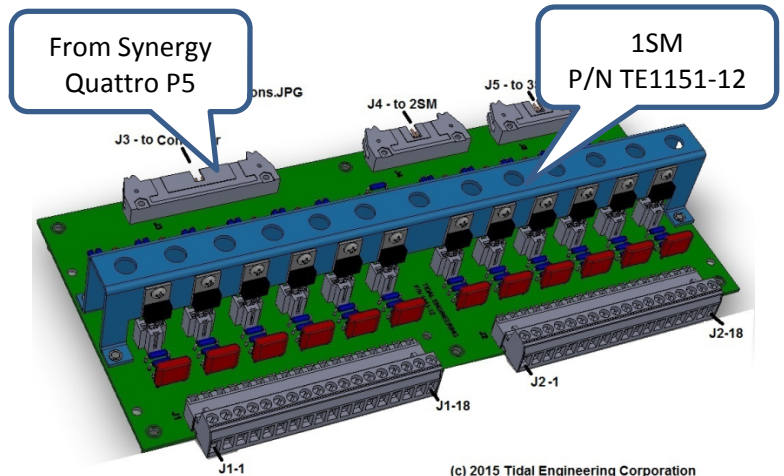
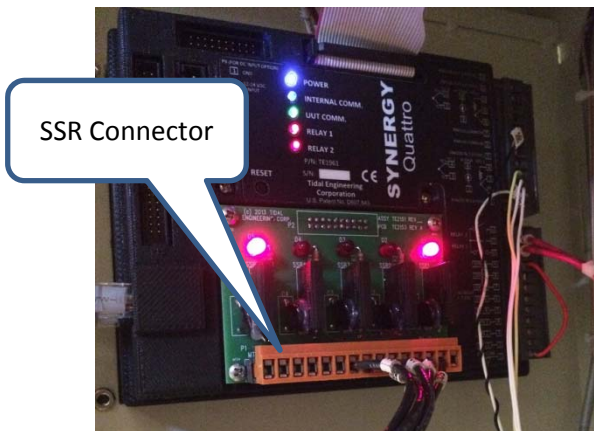
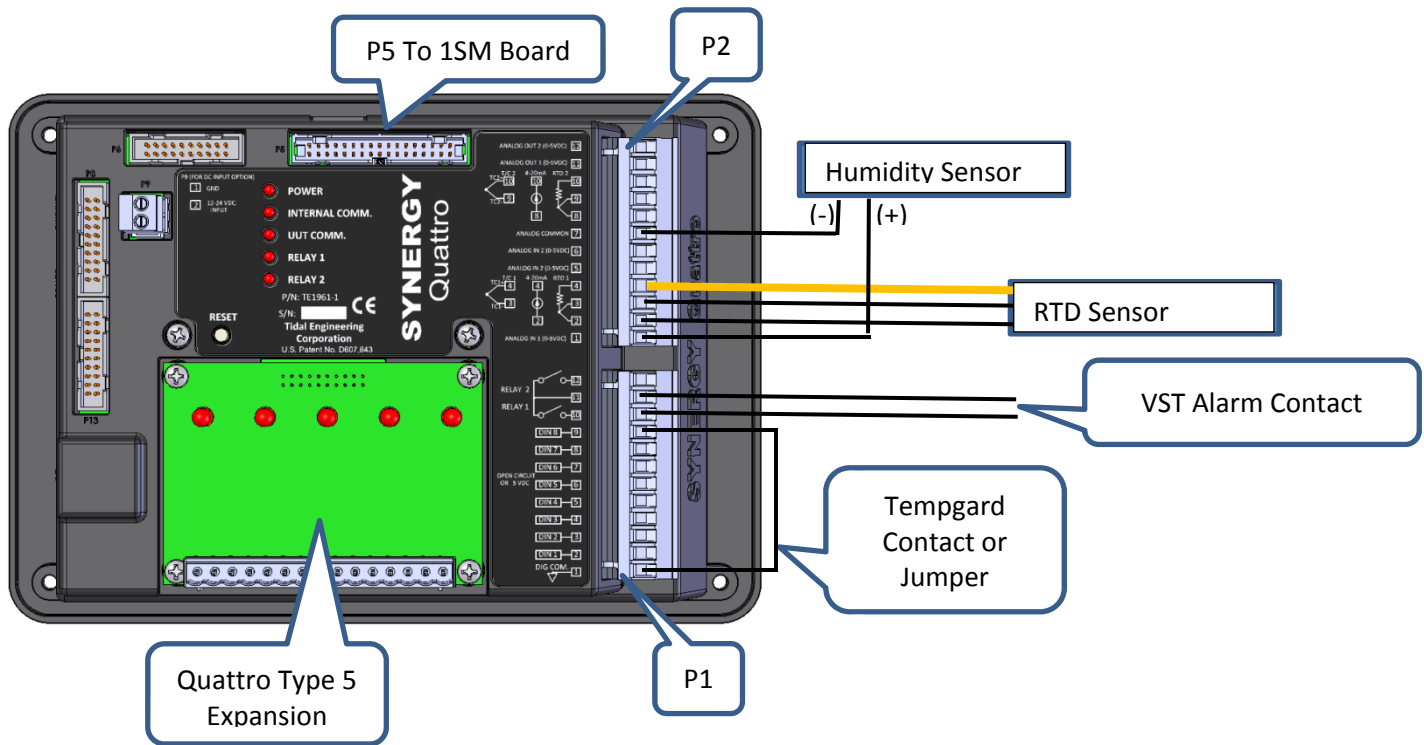


4. See the Synergy Quattro technical manual for cabling and setup for communications, UUT Thermocouple Modules, and other accessories.

Step III – Wiring

Temperature - Humidity Application Wiring (Quattro Temp Humidity)

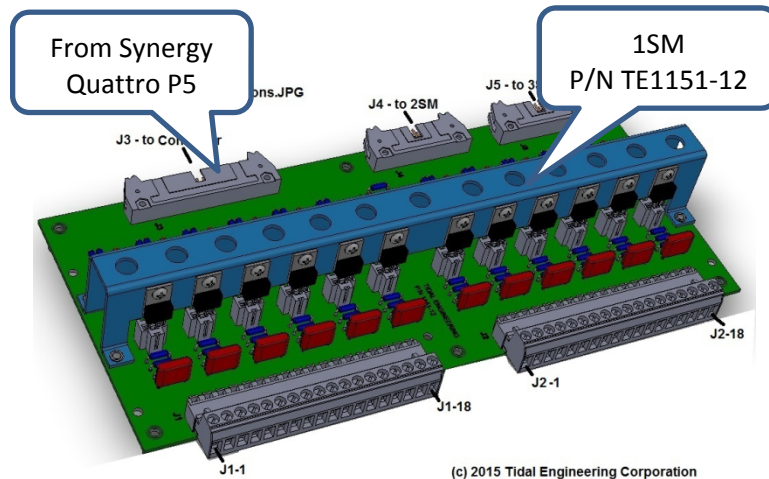
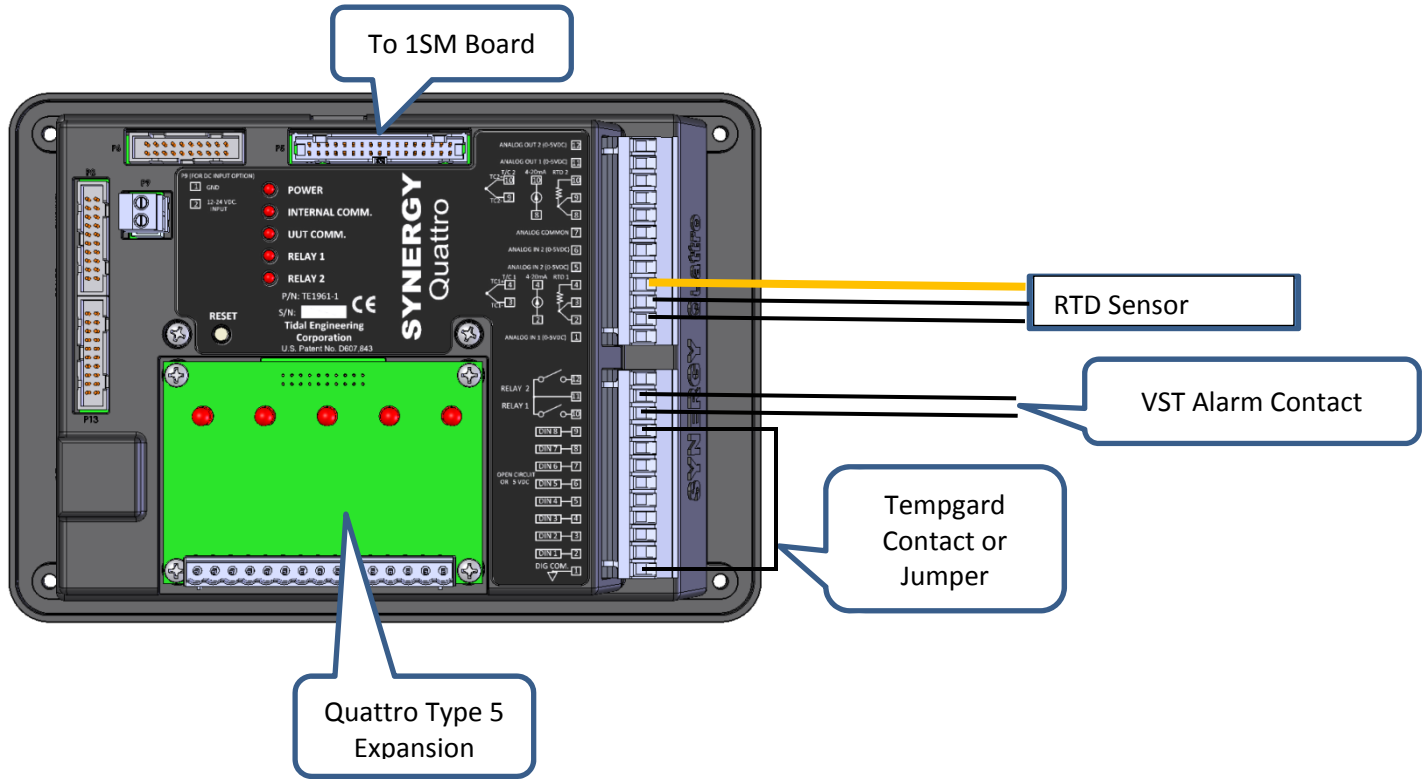
1. Connect the 34 position ribbon cable from the 1SM board to P5 on the Synergy Quattro.
2. Wire the RTD to Synergy Quattro P2 as shown below. (P2-2, P2-3, P2-4)
3. Wire the Humidity Sensor to Synergy Quattro P2 Analog Input 1. (P2-1 to P2-7)
4. Connect the Temp Guard input to the Synergy Quattro Digital Input 8 (P1-1 to P1-9) as shown below.
5. Wire the VersaTenn Alarm (VST ALARM) to the Synergy Quattro Alarm Relay 1 (P1-10 to P1-11).
6. Plug the orange SSR plug into the Synergy Quattro Type 5 Expansion module.



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Temperature Only (Cascade) Application Wiring (Quattro Temp Only)

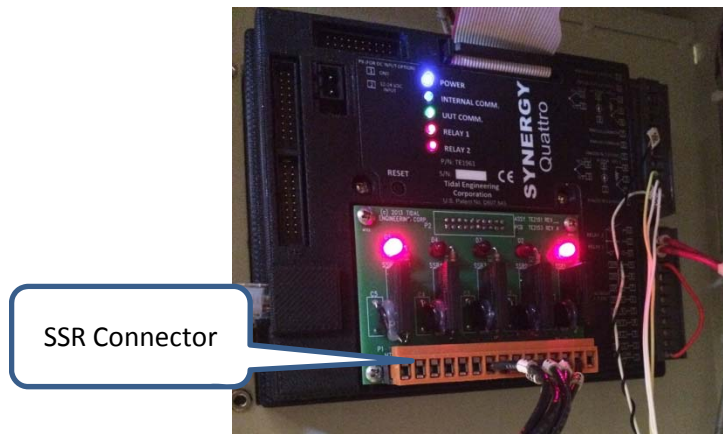
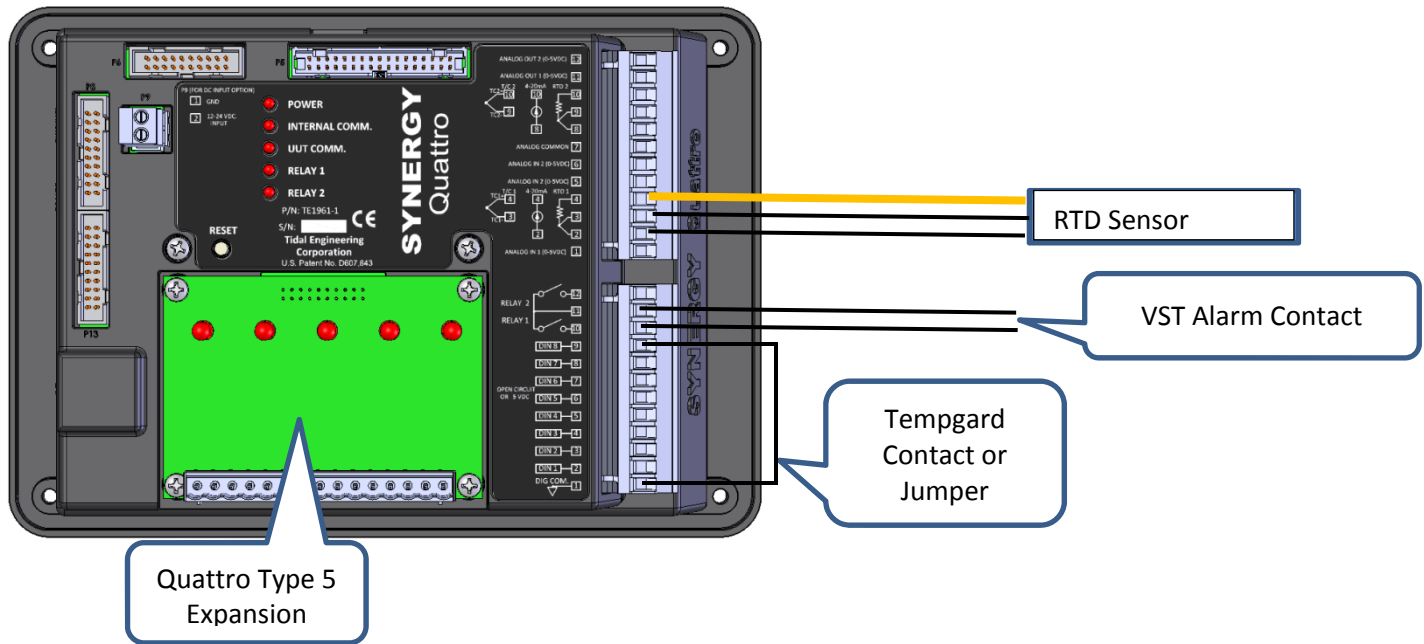
1. Connect the 34 position ribbon cable from the 1SM board to the P5 plug.
2. Wire the RTD to the Synergy Quattro P2 connector as shown below. (P2-2, P2-3, P2-4).
3. Connect the Temp Guard input to the Synergy Quattro Digital Input 8 (P1-1 to P1-9) as shown below.
4. Wire the VersaTenn Alarm (VST ALARM) output to Synergy Quattro Alarm Relay 1 (P1-10 to P1-11).



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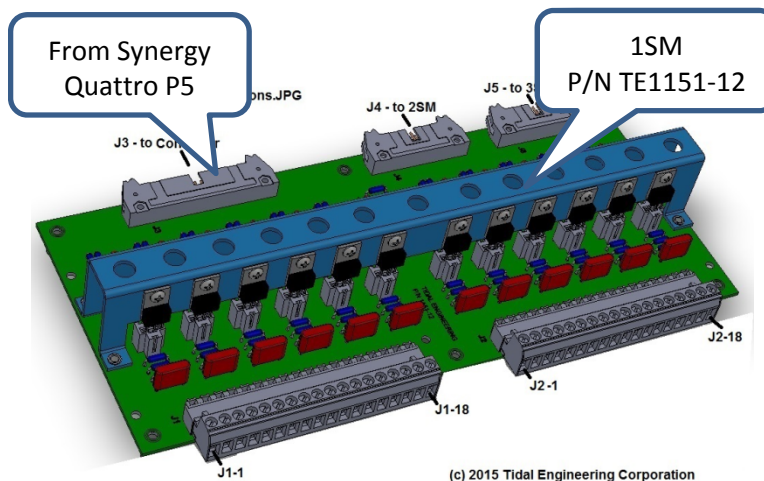
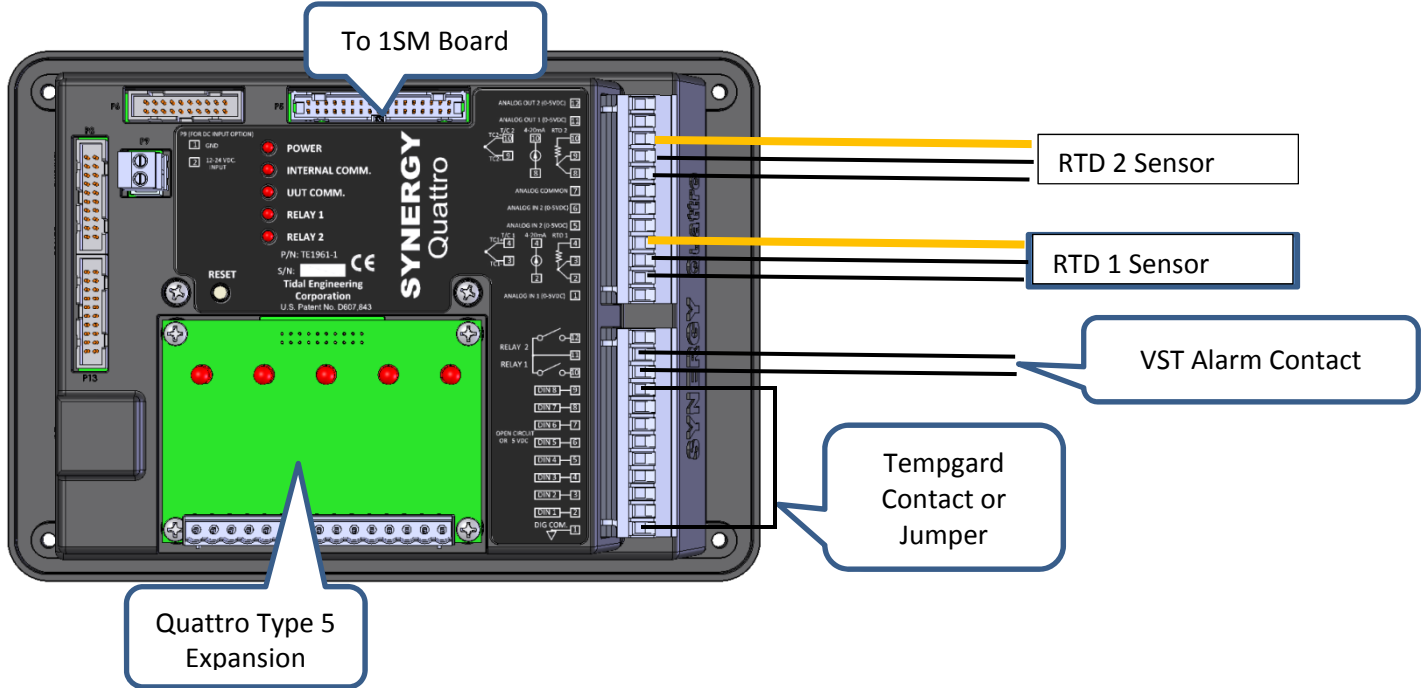
Temperature Only Retrofit Application Wiring (Quattro Retro Temp Only).

1. Wire the RTD to Synergy Quattro P2 as shown below. (P2-2, P2-3, P2-4)
2. Connect the Temp Guard input to the Synergy Quattro Digital Input 8 (P1-1 to P1-9) as shown below.
3. Wire the VersaTenn Alarm (VST ALARM) to the Synergy Quattro Alarm Relay 1 (P1-10 to P1-11).
4. Plug the orange SSR plug into the Synergy Quattro Type 5 Expansion module.



Temp - Temp (i.e. Thermal Shock) Application Wiring (Quattro Temp Temp).

1. Wire the RTD 1 to Synergy Quattro P2 as shown below. (P2-2, P2-3, P2-4)
2. Wire the RTD 2 to Synergy Quattro P2 as shown below. (P2-8, P2-9, P2-10)
3. Connect the Temp Guard input to the Synergy Quattro Digital Input 8 (P1-1 to P1-9) as shown below.
4. Wire the VersaTenn Alarm (VST ALARM) to the Synergy Quattro Alarm Relay 1 (P1-10 to P1-11).



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Tempgard Alarm Input

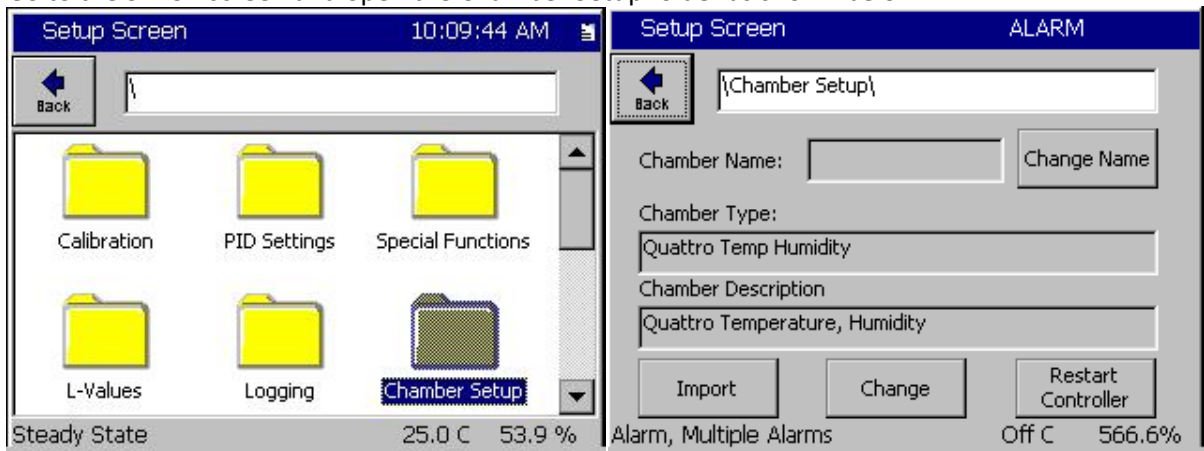
The Tempgard Alarm input from the Over-Temperature Protection (OTP) controller allows the Synergy Controller respond to an Over-Temperature condition. The controller will respond as follows:

1. Shut down the controller outputs.
2. Record the fault in the Synergy Controller log.
3. Generate an Alarm entry on the Alarm Screen and generate an e-mail or text message alert.

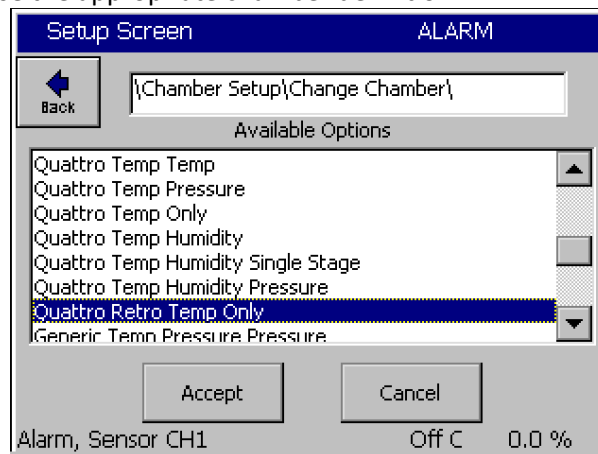
Note: A TempGard OTP controller is always recommended for safety reasons. The 1CON auxiliary contact is used in VersaTenn III applications that aren't equipped with a TempGard OTP.

Step IV - Configuring the Synergy Quattro Controller

1. Confirm all connections are correct and secure.
2. Connect power to the chamber.
3. Confirm that the Synergy Controller LCD displays the boot process, the Synergy Quattro logo and finally the MAIN screen.
4. Go to the SETUP screen and open the Chamber Setup folder as shown below.

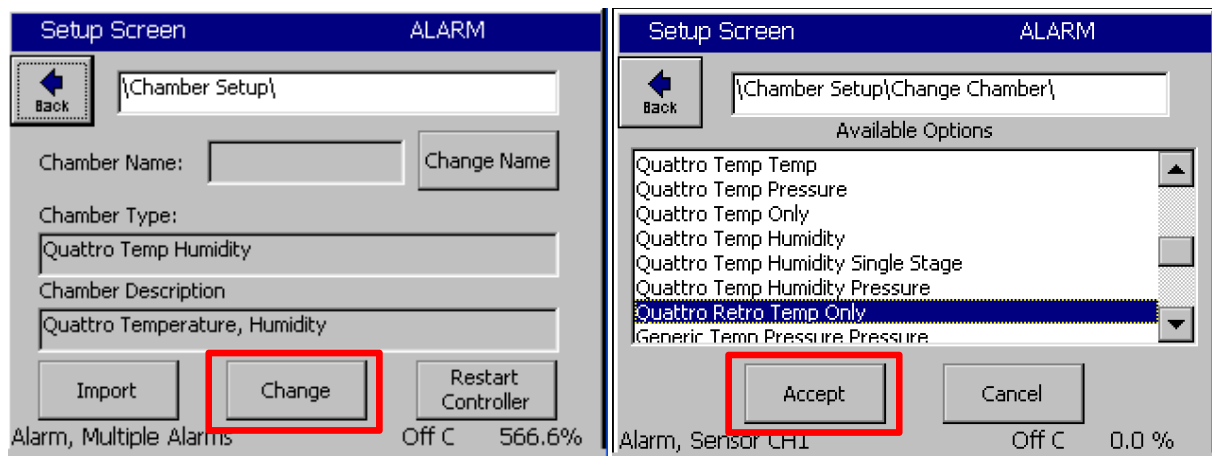


5. Tap **Change** and choose the appropriate chamber definition.

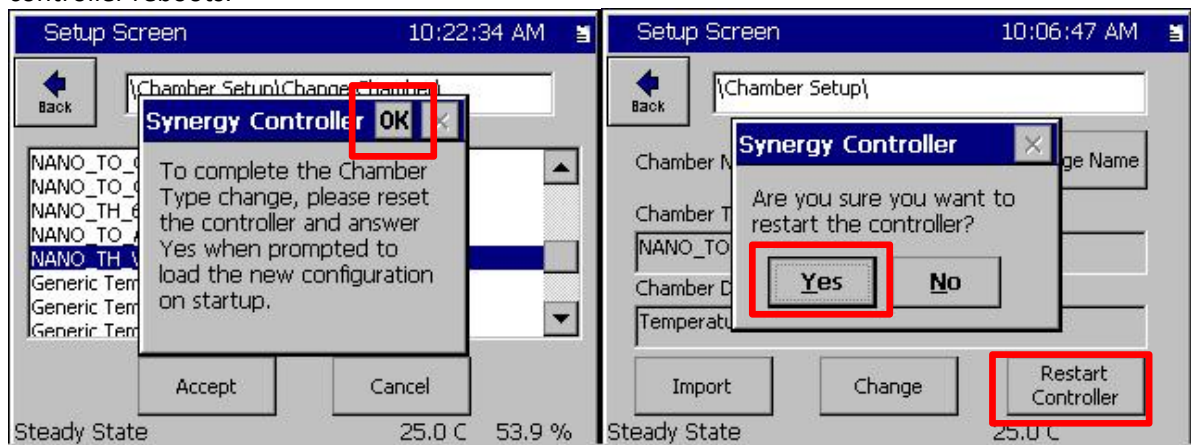


6. Select the Chamber type from the list
Temperature-Temperature, Thermal Shock configurations select **Quattro Temp Temp**.
Temperature-Altitude Chambers, select **Quattro Temp Pressure**.
Temperature-Only configurations with Cascade Refrigeration, select **Quattro Temp Only**.
Temperature/Humidity Chambers, select **Quattro Temp Humidity**.
Temperature-Humidity-Altitude Chambers, select **Quattro Temp Humidity Pressure**.
Temperature Only configurations with single stage refrigeration, select **Quattro Retro Temp Only**

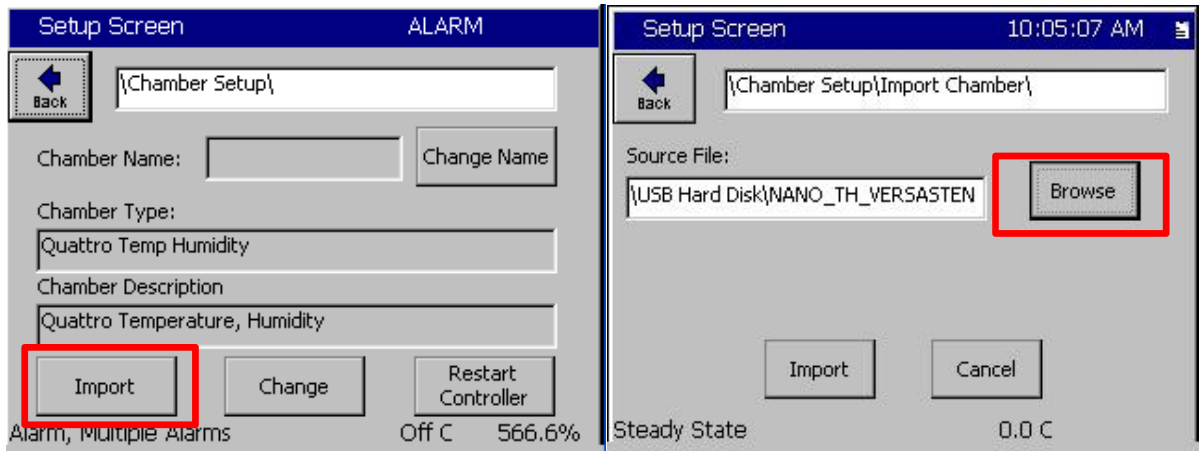
Note: If the required Chamber Definition is not in the list, contact Tidal Engineering for an updated Chamber list, then use the Import function on the Chamber Setup screen as shown in Step 8 below.



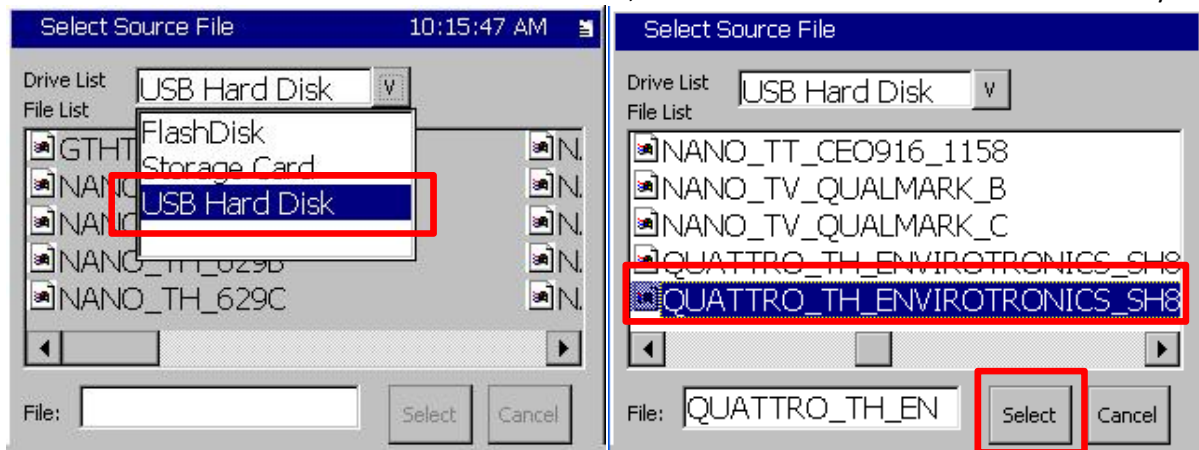
7. The dialog will require your OK to complete the Chamber Type Change and ask you to reset the controller. Tap Restart controller and Yes to continue. Then acknowledge the change when the controller reboots.



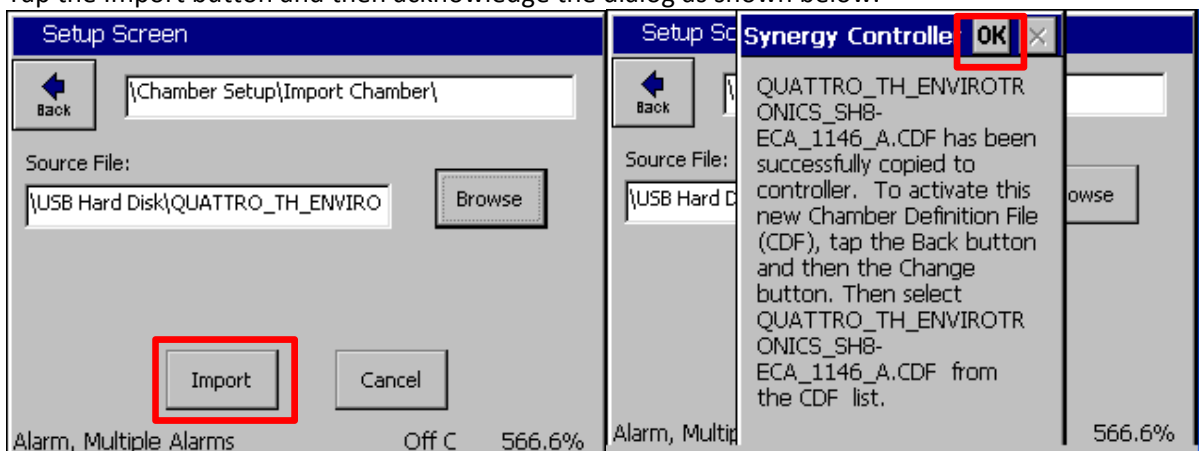
- If the required Chamber Definition (CDF) is not in the list of Available Options and you have received a new CDF from Tidal Engineering, use the Import function on the Chamber Setup screen to copy the CDF to the controller:



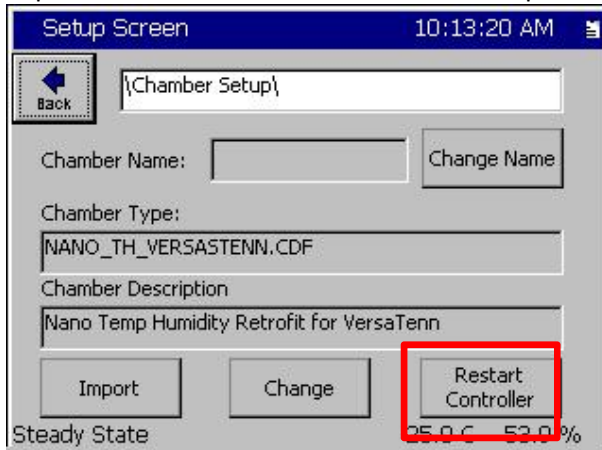
- Select the USB Hard Disk from the Drive List, select the appropriate CDF, then tap **Select**.
Note: Put the CDF on the root of the USB Flash drive, the controller won't see it in a sub-directory



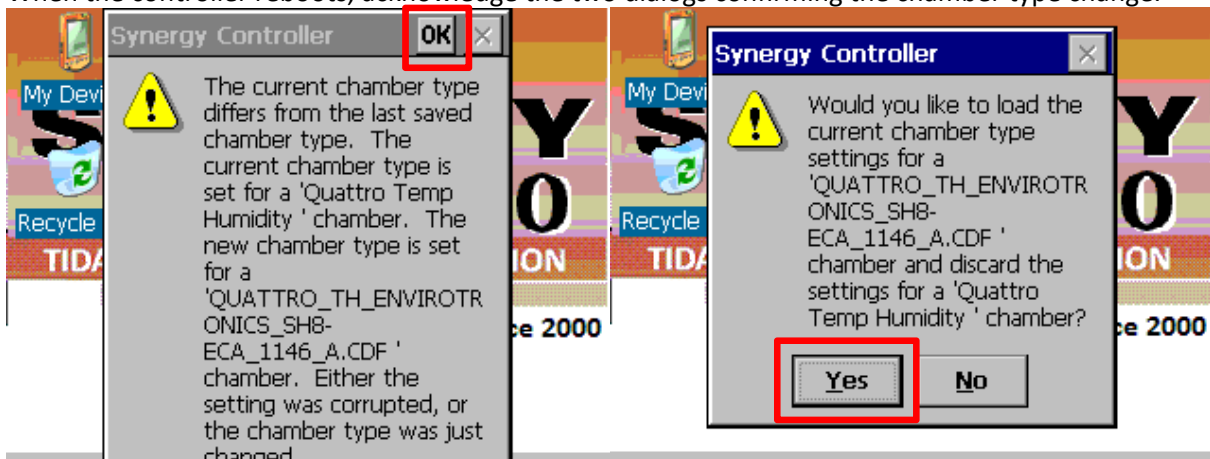
- Tap the Import button and then acknowledge the dialog as shown below.



11. Now that the new CDF is loaded on the controller, go back and follow step 5 thru step 8 to select it.
12. Tap **Restart Controller** in the Chamber Setup Screen.



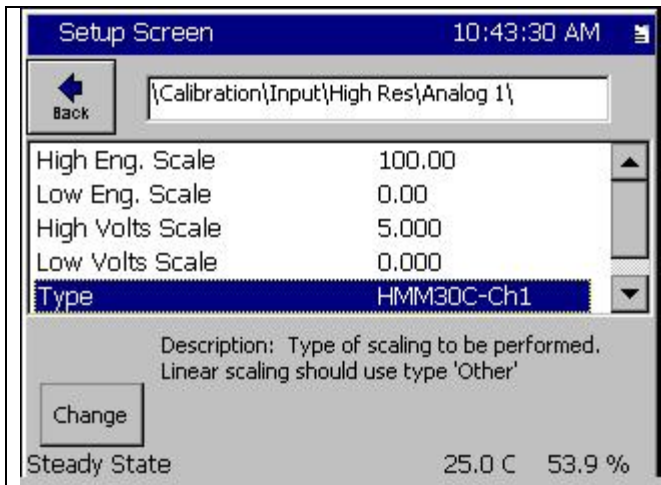
13. When the controller reboots, acknowledge the two dialogs confirming the chamber type change.



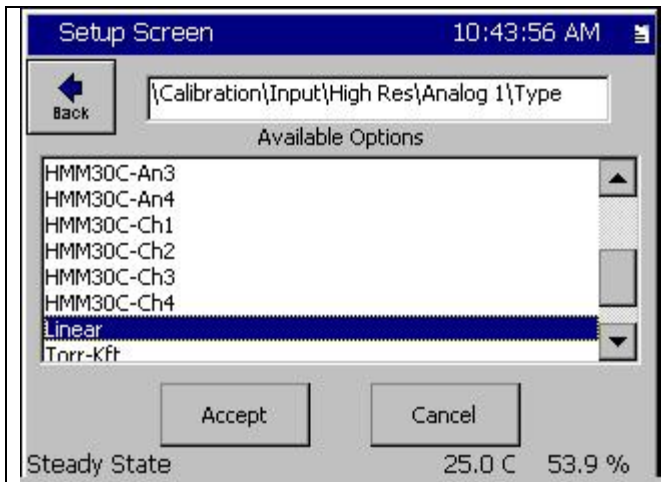
Vaisala HMM30C vs. Vaisala HMM100 Humidity probes

The Vaisala HMM30C was a popular Relative Humidity Sensor for environmental test chamber applications but it is now obsolete. The HMM30C is not temperature compensated. The Vaisala replacement for this sensor is the HMM100 sensor which is temperature compensated.

The Synergy Controller should be setup to compensate the HMM30C sensors as follows.

	<p>Some software versions will identify the “HMM30C-Ch1” option as “VSLA-Ch1”. These are equivalent.</p>
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The Synergy Controller should be setup for no compensation when using the HMM100C sensors as follows.

	<p>For HMM100 sensors setup the analog input as “Linear” shown below. Some software versions will identify this option as “Other”. These are equivalent.</p>
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Appendix A Troubleshooting

When starting up the controller for the first time you may see one or more alarms if there is any problem with the sensor wiring.

To identify the issues, open the Maintenance screen and browse to the Alarms folder as shown below.

Time	Alarm	Ack	Cleared
11:26:26 AM	TempGard	No	No
11:26:32 AM	Bad Sensor Channel 2	No	No
11:26:33 AM	Bad Sensor Channel 1	No	No

Alarm, Multiple Alarms 30.5 C 31.4 %

1. TempGard.

This is the input for the TempGard Over-Temperature Protection (OTP) controller. The OTP auxiliary alarm contact (the contact should open on fault) should be wired to P1, Pins 1 and 9. This feature can be jumped out, however, the controller's compressor protection won't engage if the TempGard hardware shuts down the chamber and it then its reset; i.e. short cycle timers, etc. If the TempGard feature is not used, shut of the controller if the chamber is shut down.

2. Bad Sensor Channel 1

Check RTD connections. Connect the 3-wire 100 Ohm Pt. RTD to P2 Pins 2, 3 and 4. Pins 2 and 3 are common.

3. Bad Sensor Channel 2

Connect a 0-5 V humidity sensor or a jumper if humidity is not monitored, between P2-Pin 1(Analog 1) and P2-Pin 7, (Gnd). Alternatively, the Synergy Quattro can accommodate a 4-20 mA sensor.

Once these inputs are verified, tap the **Ack ALL** button to acknowledge the alarms.

Appendix B Identifying Parts

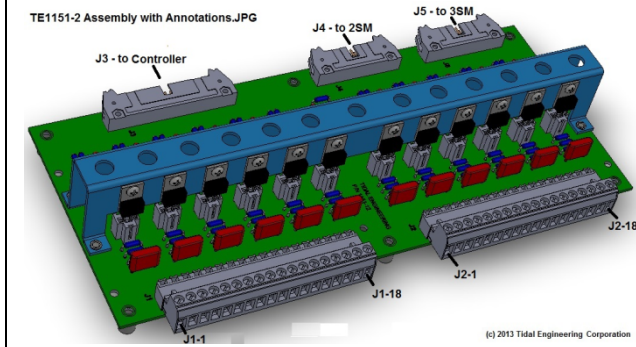
TE1961-3, Synergy Quattro



TE2351-1 Accessories



TE1151-12, 1SM Output Board (Note 1)



TE2253-5, Type 5 Expansion Board



Note 1. The TE1151-12, 1SM board is standard equipment in Tenney chambers that require it. It is shown in this table for reference only and is available as a spare part.

Appendix C Reference Materials

Download the Synergy Quattro data sheet, technical manual, and installation guide here:

http://www.tidaleng.com/datasheets/Synergy_Nano_data_sheet_0945_web.pdf

http://www.tidaleng.com/Synergy_Nano_Technical_Manual_Rev_A08.pdf

http://www.tidaleng.com/techmans/TE2258_REV_A_Synergy_Nano_Installation_Manual.pdf

You can access our YouTube channel to see some of the unique features and benefits of our controllers here: <https://www.youtube.com/channel/UCxJF1O5aUDzcpdlCCoCKh6w>

The application notes on these topics can be accessed using the links below.

[AppNote 1 - Replacing a VersaTenn III Controller](#)

[AppNote 2 - Synergy Controller Data Logging Capacity Calculations](#)

[AppNote 3 - Retrofitting a Qualmark HALT/HASS Chamber :](#)

[AppNote 4 - Configuring the Synergy Controller to Read from a Bar Code scanner :](#)

[AppNote 5 - Synergy Controller vs. VersaTenn III :](#)

[AppNote 7 - Synergy Controller WebTouch Remote Feature](#)

[AppNote 8 - Using SimpleComm application to communicate with the Synergy Controller](#)

[AppNote 10 - Synergy Controller Retransmit Signal Conditioner :](#)

[AppNote 20 - Using the TE1908 Single Channel Thermocouple Signal Conditioner.](#)

[AppNote 25 - Using the Synergy Controller with Space Chamber applications.](#)

[AppNote 26 - Using the programmable User Alarms with the Synergy Controller.](#)

[AppNote 40 - Two Point Calibration.](#)

[AppNote 45 - Using the Synergy Controller's ftp server.](#)

[AppNote 49 - Synergy Controller Security Enhancements.](#)

[AppNote 56 - Using the Synergy Controller Watchdog Timers.](#)

[AppNote 58 - Synergy Controller Wet-Bulb/Dry-Bulb Humidity Measurements.](#)

[AppNote 59 - Synergy Controller Wireless Network Setup.](#)

[AppNote 60 - Graphing Synergy Log Files in Microsoft Excel.](#)

[AppNote 67 - Synergy Controller Mounting Options.](#)

[AppNote 71 - Synergy Controller PWM Retransmit Feature](#)

[AppNote 72 - Synergy Controller Thermocouple Data Acquisition with Synergy UUT Modules](#)

[AppNote 74 - Synergy Controller LED Backlight Retrofit Kit](#)

[AppNote 77 - Synergy Controller Remote Start/Stop Feature](#)

[AppNote 84 - Synergy Controller E-Mail Feature](#)

[AppNote 85 - Synergy Controller Logging Features and Applications](#)

[AppNote 89 - Synergy Controller Loop-Back Setup](#)

[AppNote 90 - Synergy Controller Network Printing Feature](#)

[AppNote 91 - Synergy Controller Built-In Alarms](#)

[AppNote 95 - Synergy Controller Kft and other Pressure Display](#)

[AppNote 96 - Synergy Controller Analog Retransmit Applications](#)

[AppNote 99 - Synergy Server Feature](#)

[AppNote 102 - Synergy Certified OEM and Installer Training](#)

[AppNote 106 - Synergy Controller Cascade Loop \(Part Temperature\) Control Feature](#)

[AppNote 107 - Synergy Controller Programming with Python](#)

[AppNote 109 - Synergy488 Kit Setup for Synergy Nano and Synergy Quattro GPIB](#)

[AppNote 112 - General Purpose Logic Programming for OEMS and Integrators](#)

[AppNote 113 - Main Screen Display Setup Options](#)

[AppNote 116 - Synergy Controller Pressure Applications](#)

[AppNote 117 - Synergy Controller Help System Video QR Codes.](#)

[AppNote 121- Synergy Controller Ramp Rate Control](#)



About the Synergy Controller Family

Tidal Engineering's Synergy Controllers; the Synergy Micro 2, Synergy Quattro, and the 1/4 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 visit <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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