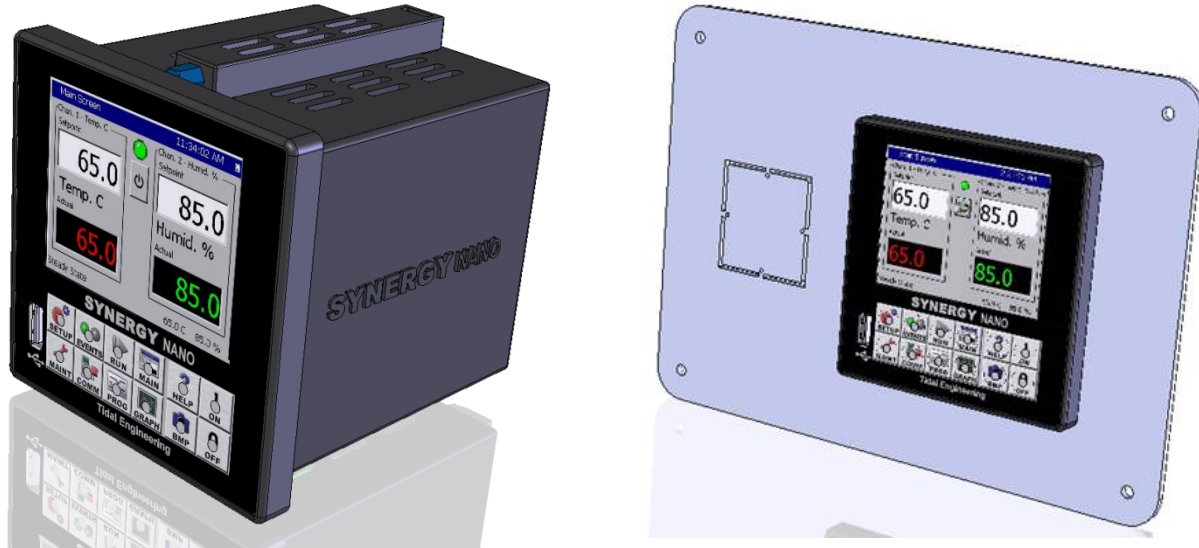


Synergy Nano Retrofit for VersaTenn Controllers



Introduction

Synergy Controller is Tidal Engineering's® Family of process control systems that can drop into virtually any Environmental Test Chamber and provide state-of-the-art usability and operating efficiency.

Synergy Controller features includes:

- Color touch screen
- Ethernet, RS-232 and GPIB communications
- Built in 100 MB Data logger and Data Acquisition, Up to 64 T-type thermocouples
- Built in Web Server for remote control
- Compatible with Synergy Manager software
- Built in USB port compatible with USB Disk drives for data logging and program transfer.

The Synergy Controller family is specifically designed to easily retrofit legacy VersaTenn applications. They can also retrofit chambers from Envirotronics, Thermotron, Blue-M, Cincinnati Sub-Zero, etc.

This Synergy Controller application note describes the steps for a Synergy Nano retrofit installation in a VersaTenn equipped environmental test chamber. This note covers the following steps:

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

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Dangerous voltages are present in this equipment. Disconnect electrical service at source and tag circuit out before servicing or replacing components.

Step I - Removing the existing VersaTenn 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.

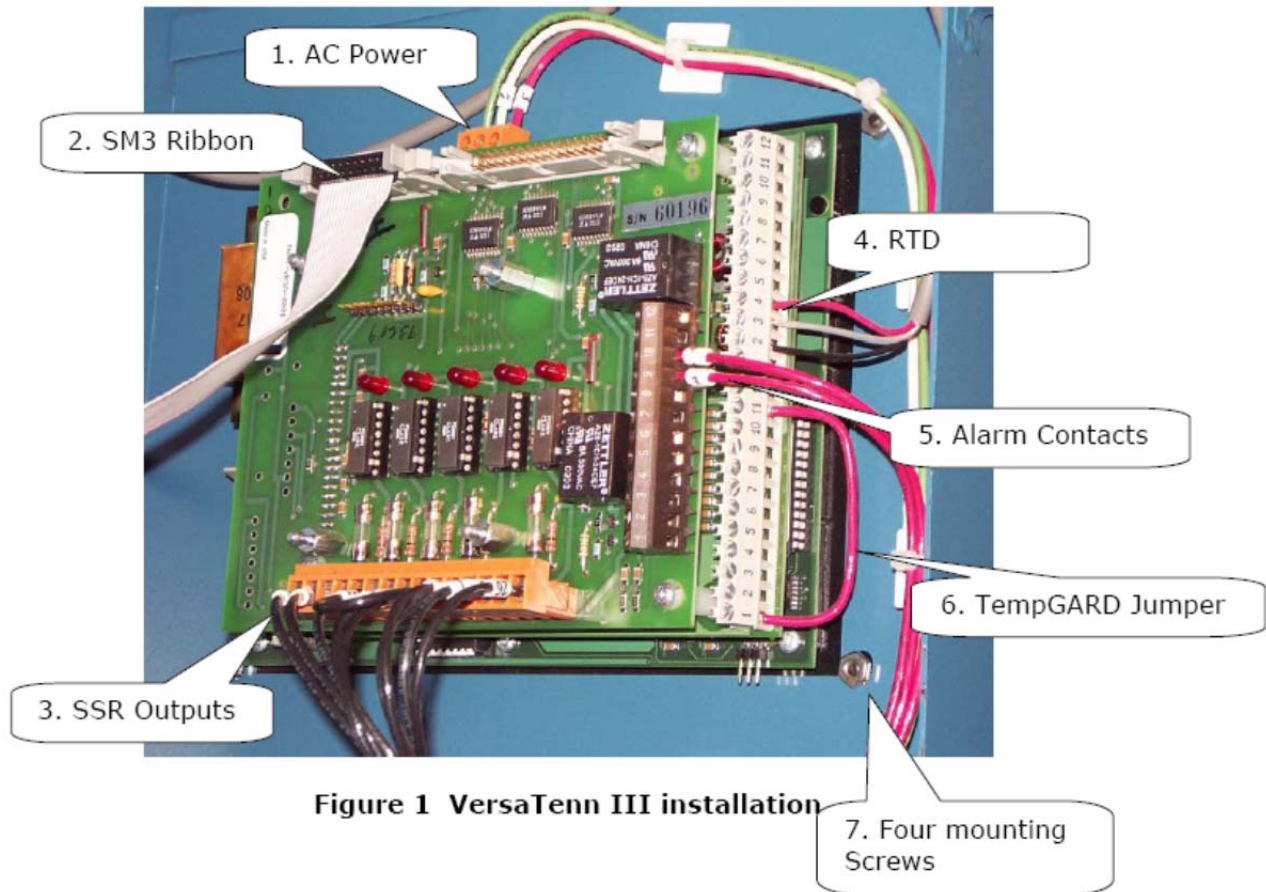
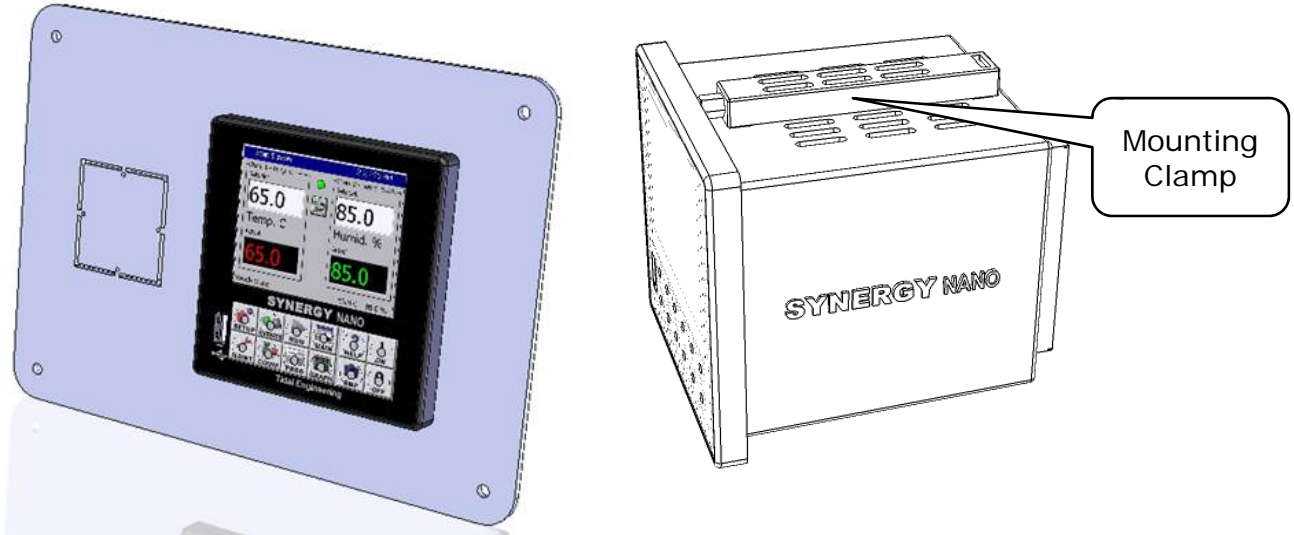


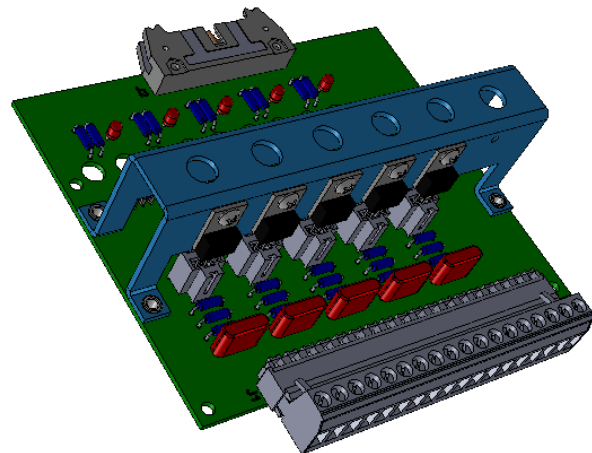
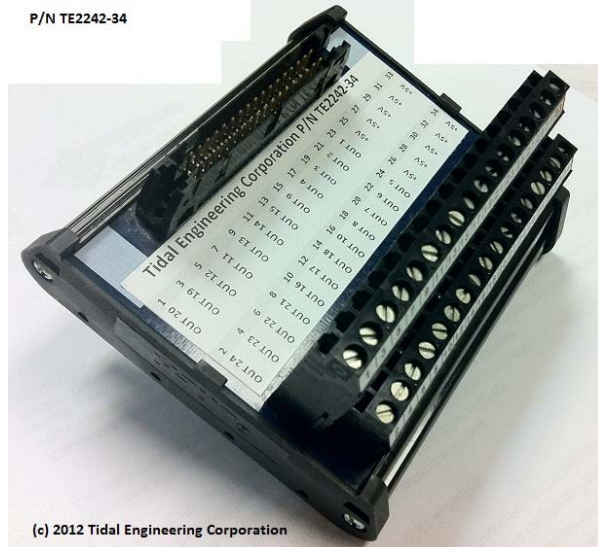
Figure 1 VersaTenn III installation

Step II - Installing the new Synergy Controller

1. Place the Synergy Controller on the front of the chamber through the rectangular opening using the appropriate panel adapter. See appendix B for various panel adapter options.



2. Install top and bottom mounting clamps and tighten 3/32" Allen screw with the wrench supplied in the accessories kit. Turn the screw counter-clockwise to tighten and be careful not to overtighten..
3. Mount the TE2242-34 adapter and the TE1151-5 Triac board, if required, to the panel.



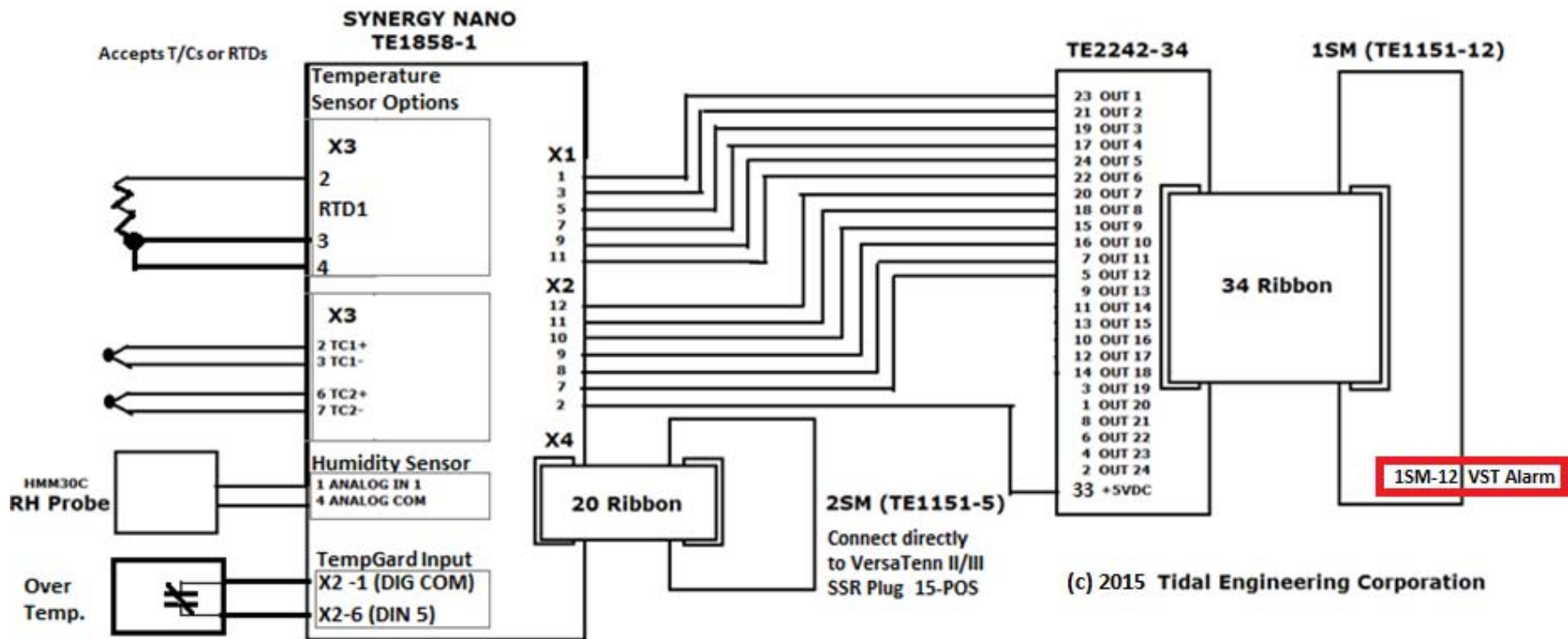
4. Plug the Solid State relay connector into the Triac board J1 connector.
5. Connect the existing 34-position ribbon cable from the 12-Channel Triac board 1SM to TE2242-34 adapter.
6. See the Synergy Nano technical manual for cabling and setup for communications, UUT Thermocouple Modules, and other accessories.

Step III – Wiring

Temperature - Humidity Application Wiring

1. Connect the 13 wires from the X1 and X2 connectors to the TE2242-34 assembly as shown below.
2. Connect the 34 position ribbon cable to the 1SM board.
3. Connect the 20 position ribbon cable from the Synergy Nano X4 connector to the TE1151-5 board.
4. Wire the RTD to Synergy Nano X3 as shown below.
5. Wire the Humidity Sensor to Synergy Nano X3 Analog Input 1.
6. Connect the Temp Guard input to the Synergy Nano X2 Digital Input 5 (X2-1 to X2-6) as shown below.
7. Wire the VersaTenn Alarm (VST ALARM) output to the 1SM board as shown on the following page.

Temperature Humidity (NANO_TH_VERSATENN.CDF)

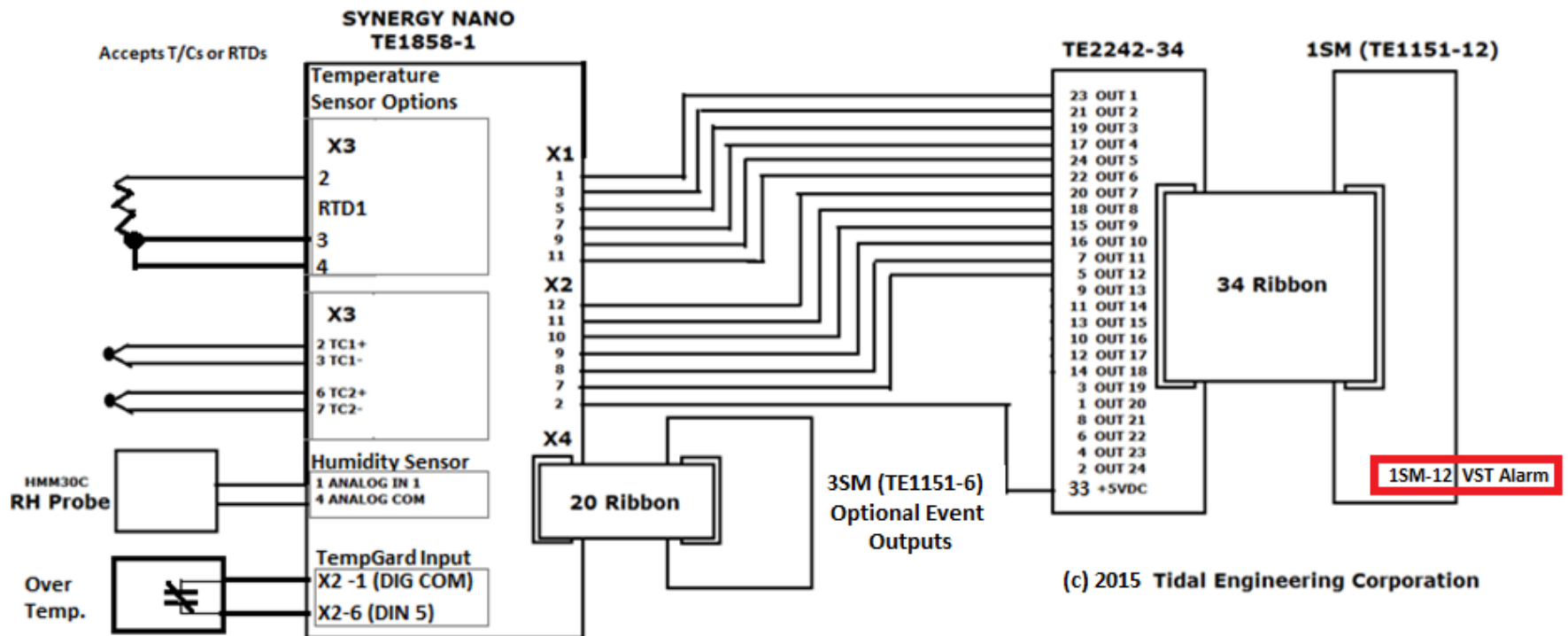


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Temperature Only (Cascade) Application Wiring.

1. Connect the 13 wires from the X1 and X2 connectors to the TE2242-34 assembly as shown below.
2. Connect the 34 position ribbon cable to the 1SM board.
3. Connect the 20 position ribbon cable from the Synergy Nano X4 connector to the optional TE1151-6 board for events.
4. Wire the RTD to Synergy Nano X3 as shown below.
5. Connect the Temp Guard input to the Synergy Nano X2 Digital Input 5 (X2-1 to X2-6) as shown below.
6. Wire the VersaTenn Alarm (VST ALARM) output to the 1SM board as shown on the following page.

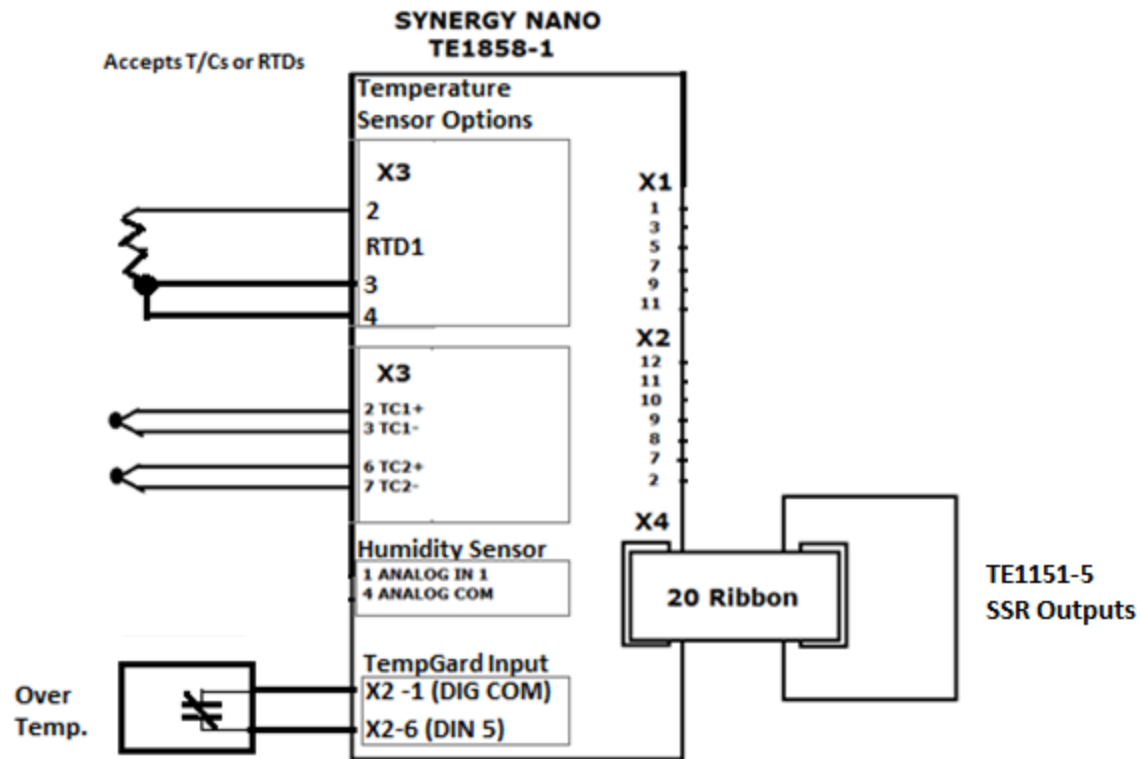
Temperature Only for Cascade Chambers (NANO_TO_VERSATENN_CASCADE.CDF)



Temperature Only Application Wiring.

1. Connect the 20 position ribbon cable from the Synergy Nano X4 connector to the TE1151-5 board.
2. Plug the 15 position cable from the VersaTenn into the TE1151-5 board.
3. Wire the RTD to Synergy Nano X3 as shown below.
4. Connect the Temp Guard input to the Synergy Nano X2 Digital Input 5 (X2-1 to X2-6) as shown below.
5. Wire the VersaTenn Alarm (VST ALARM) output to the 1SM board as shown on the following page.

Temperature Only for Single Stage Chambers (NANO_TO_VERSATENN.CDF)

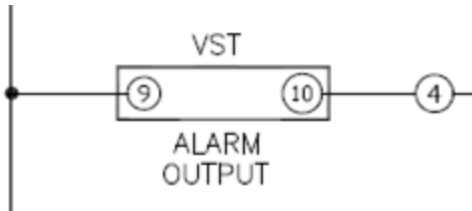


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VersaTenn Alarm Output

In most legacy application, the VersaTenn controller VST Alarm Output is wired to shut down the chamber in case of an alarm condition such as over temperature.

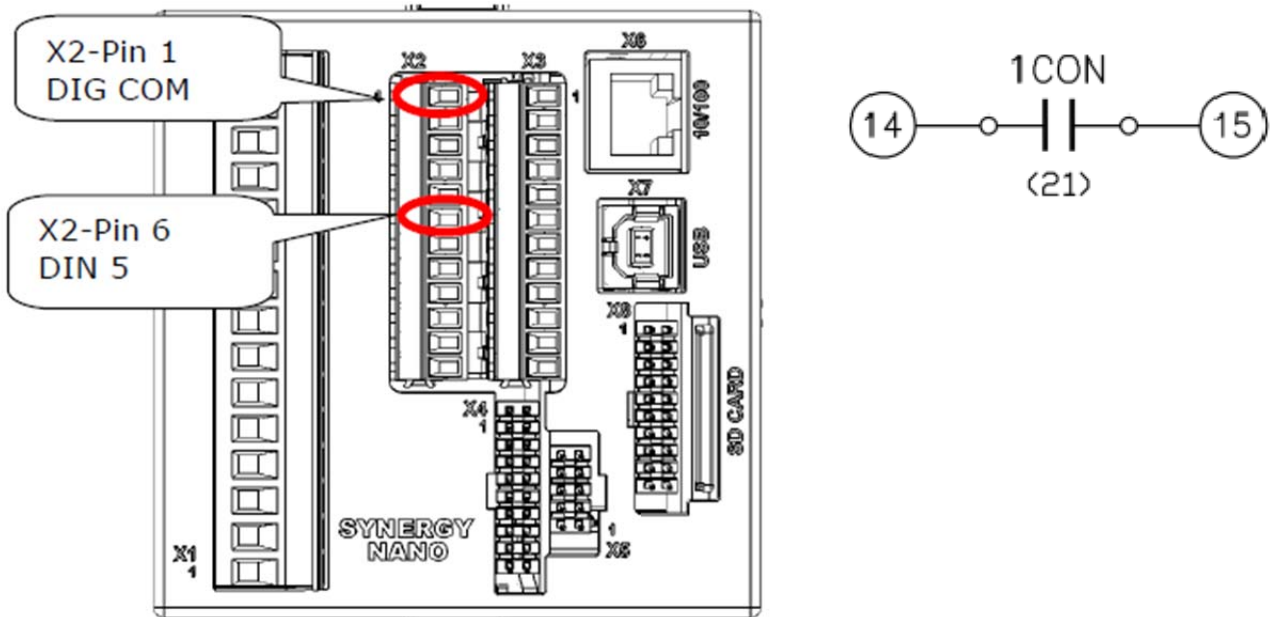
The Synergy Nano doesn't have a dedicated VST output but the unused output 1SM-12 is assigned this function in NANO_TH_VERSATENN and NANO_TO_VERSATENN_CASCADE Chamber Definition Files.



Tempgard Alarm Input

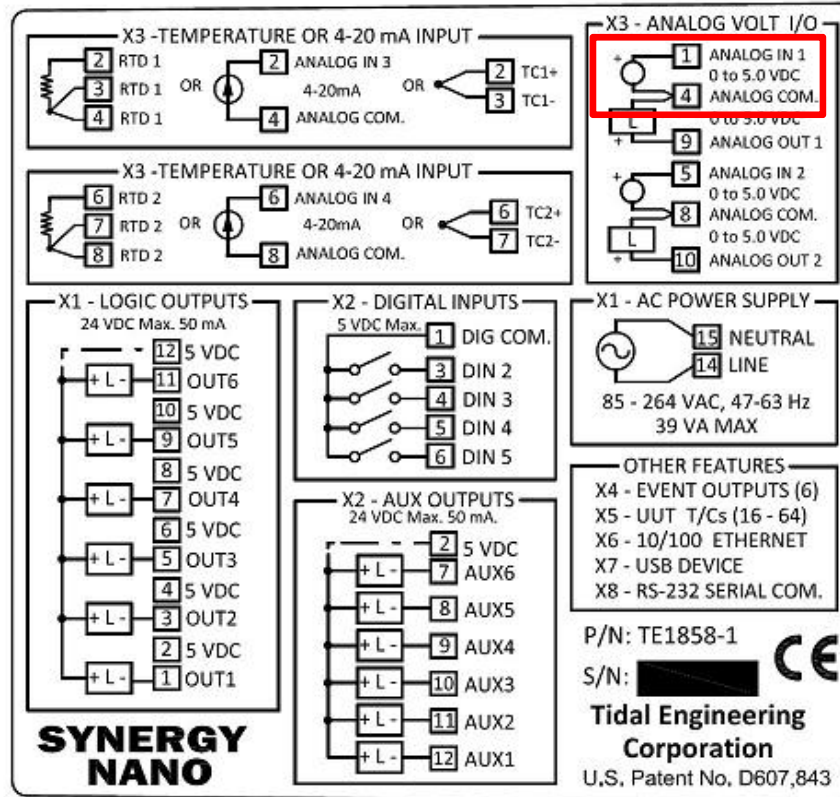
The Tempgard Alarm input from the Over-Temperature Protection (OTP) allows the Synergy Controller respond to an Over-Temperature condition and to shut down the chamber and record the fault in the Synergy controller log. The auxiliary alarm contact (the contact opens on fault) should be wired to X2, Pins 1 and 6. This feature can be jumped out to get the controller to run, however, the controller's compressor algorithms will not provide the short cycle timing features designed to protect the compressor(s).

Note that the 1CON auxiliary contact is used in VersaTenn applications that aren't equipped with a TempGard OTP.



Humidity Sensor Wiring

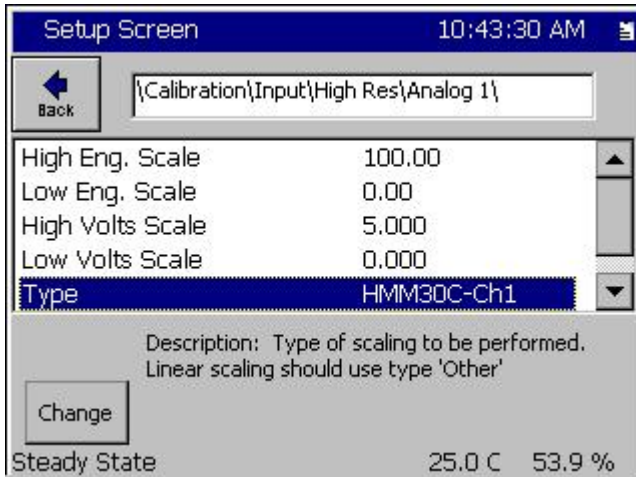
Connect the Humidity sensor to Analog In 1 as shown below:



Note regarding humidity sensors.

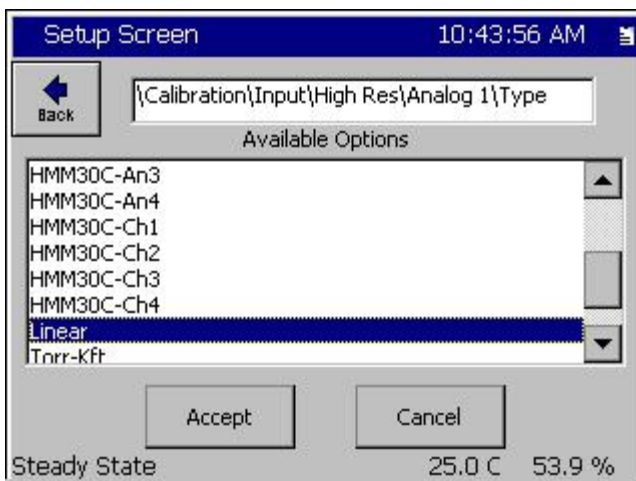
The Vaisala HMM30C was a popular Relative Humidity Sensor for environmental test chamber applications but it is now obsolete. The HMM30C is not temperature compensated. The Vaisala replacement for this sensor, the HMM100 is temperature compensated.

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



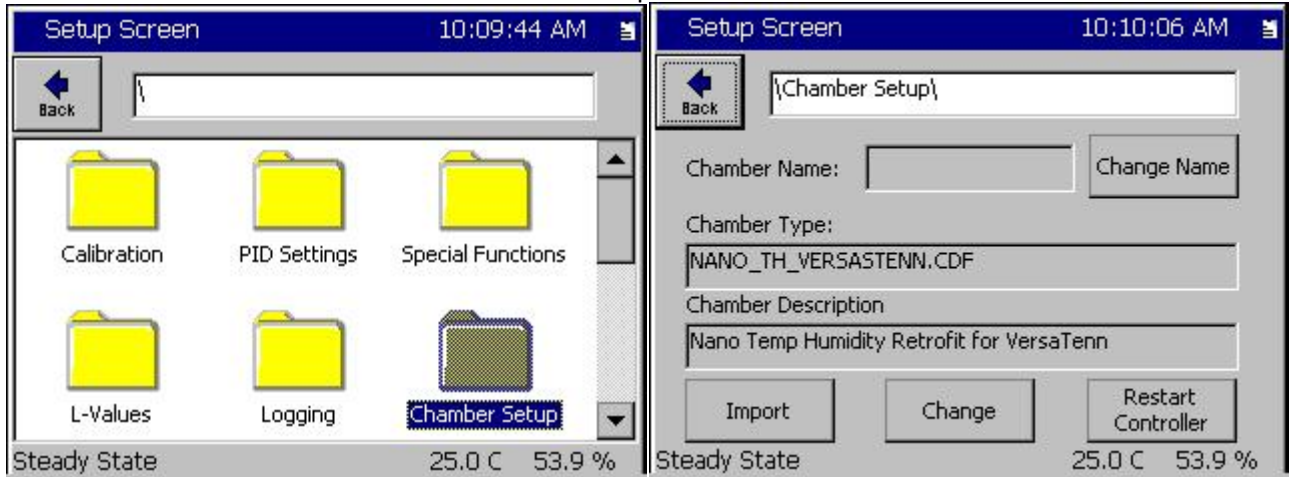
Some software versions will identify the “HMM30C-Ch1” option as “VSLA-Ch1”. These are equivalent.

For HMM100 sensors setup the analog input as “Linear” shown below. Some software versions will identify this option as “Other”. These are equivalent.

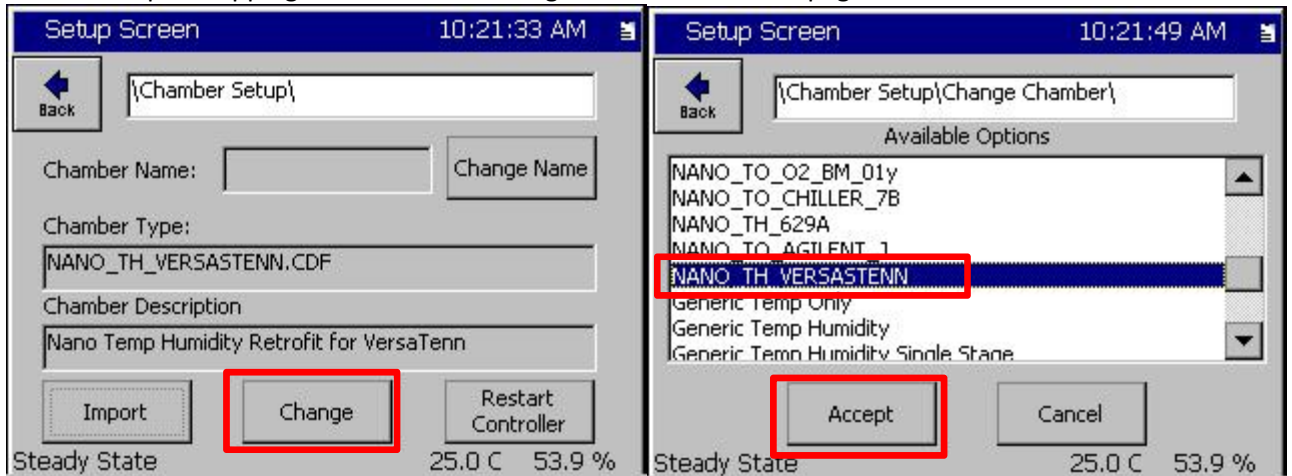


Step IV - Configuring the Synergy Nano Controller

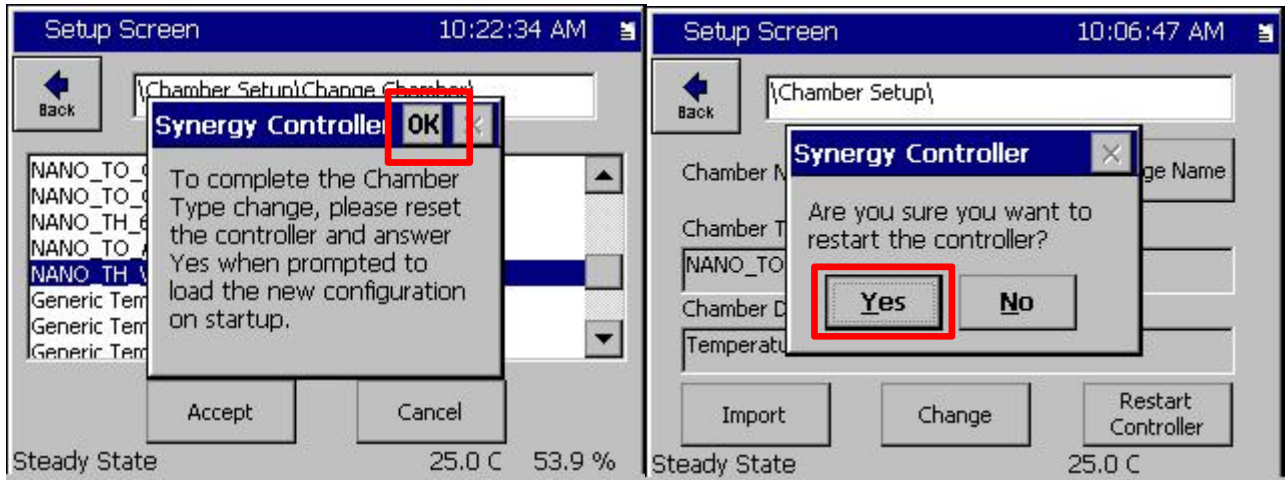
1. Confirm all connections are correct and secure.
2. Connect power to the chamber.
3. Confirm that the Synergy Controller LCD displays the boot process, the Synergy Nano logo and finally the MAIN screen.
4. Go to the SETUP screen and select the Chamber Setup folder as shown below.



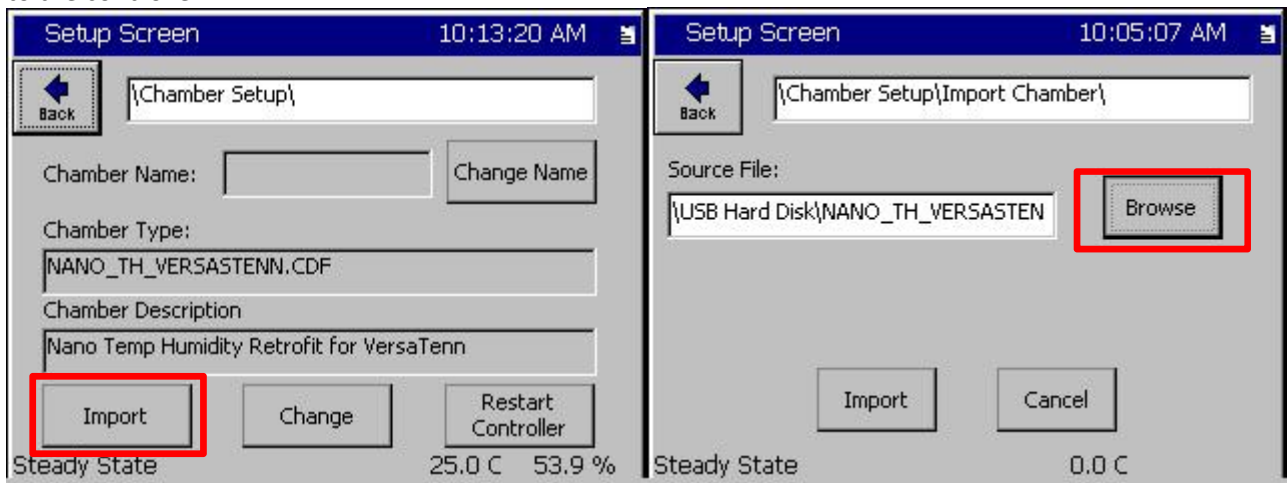
5. Tap **Change** and choose the appropriate chamber definition.
For VersaTenn Temperature/Humidity Chambers, select the NANO_TH_VERSATENN.
For VersaTenn Temperature Only configurations select NANO_TO_VERSATENN.
For VersaTenn Temperature Only configurations for Cascade refrigeration applications, select NANO_TO_VERSATENN_CASCADE.
See the Output mapping table for these configurations on the next page.



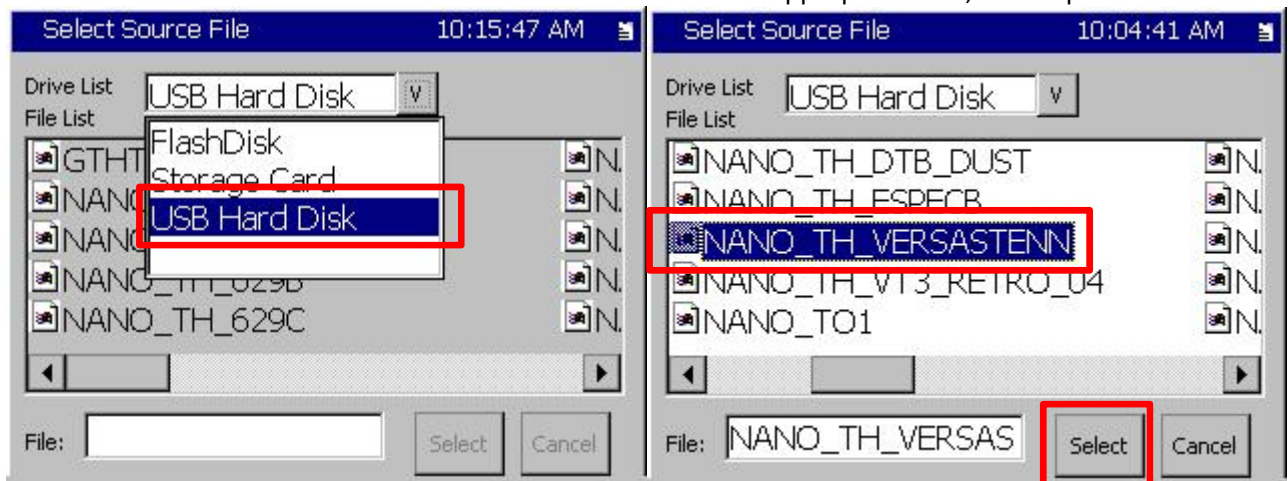
The Dialog will ask you to reset the controller and tap yes when the controller reboots.



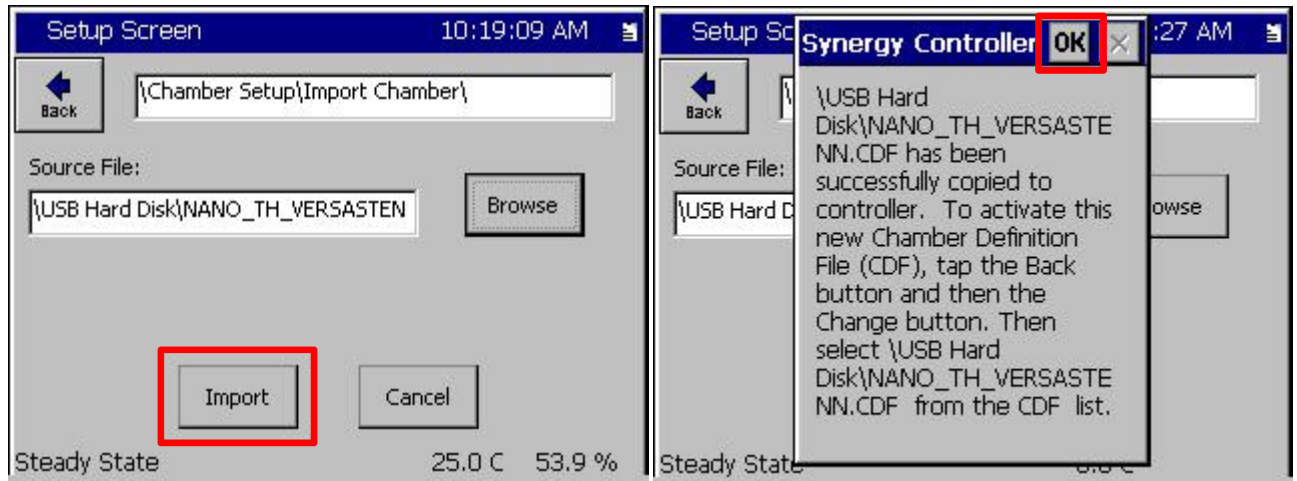
If the required Chamber Definition is not in the list, contact Tidal Engineering for an updated Chamber list, then use the Import function on the Chamber Setup screen to copy the required CDF to the controller:



Select the USB Hard Disk from the Drive List and then select the appropriate CDF, then tap **Select**.

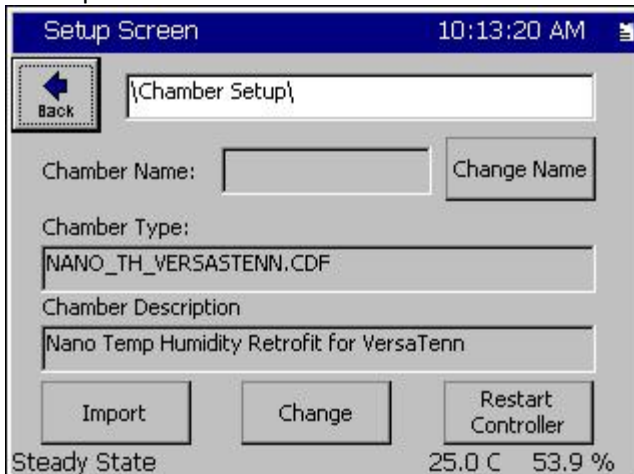


Tap the Import button and then Acknowledge the Dialog as shown below.



Now that the new CDF is loaded on the controller, go back to the beginning of step 5 to select it.

6. Tap the **Restart Controller** button in the Chamber Setup Screen.



7. When the controller reboots, acknowledge the two dialogs confirming the change by taping OK.

Synergy Nano Chamber Definition Mappings for three popular VersaTenn Configurations

NANO_TH_VERSATENN Temperature Humidity	NANO_TO_VERSATENN_CASCADE Temperature Only (Cascade Refrigeration)	NANO_TO_VERSATEN Temperature Only (Single Stage)																																				
<p>X1 - Main Outputs</p> <table border="1"> <tr><td>Out 1</td><td>Fan</td></tr> <tr><td>Out 2</td><td>High AL</td></tr> <tr><td>Out 3</td><td>PID Heat</td></tr> <tr><td>Out 4</td><td>Boost Heat</td></tr> <tr><td>Out 5</td><td>Low Comp</td></tr> <tr><td>Out 6</td><td>High Comp</td></tr> </table>	Out 1	Fan	Out 2	High AL	Out 3	PID Heat	Out 4	Boost Heat	Out 5	Low Comp	Out 6	High Comp	<p>X1 - Main Outputs</p> <table border="1"> <tr><td>Out 1</td><td>Fan</td></tr> <tr><td>Out 2</td><td>High AL</td></tr> <tr><td>Out 3</td><td>PID Heat</td></tr> <tr><td>Out 4</td><td>Boost Heat</td></tr> <tr><td>Out 5</td><td>Low Comp</td></tr> <tr><td>Out 6</td><td>High Comp</td></tr> </table>	Out 1	Fan	Out 2	High AL	Out 3	PID Heat	Out 4	Boost Heat	Out 5	Low Comp	Out 6	High Comp	<p>X1 - Main Outputs</p> <table border="1"> <tr><td>Out 1</td><td>Event 1</td></tr> <tr><td>Out 2</td><td>Event 2</td></tr> <tr><td>Out 3</td><td>Event 3</td></tr> <tr><td>Out 4</td><td>Event 4</td></tr> <tr><td>Out 5</td><td>Event 5</td></tr> <tr><td>Out 6</td><td>Relay 1</td></tr> </table>	Out 1	Event 1	Out 2	Event 2	Out 3	Event 3	Out 4	Event 4	Out 5	Event 5	Out 6	Relay 1
Out 1	Fan																																					
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Out 3	Event 3																																					
Out 4	Event 4																																					
Out 5	Event 5																																					
Out 6	Relay 1																																					
<p>X2 - Auxiliary Outputs</p> <table border="1"> <tr><td>Aux 1</td><td>PID Cool</td></tr> <tr><td>Aux 2</td><td>Full Cool</td></tr> <tr><td>Aux 3</td><td>Low AL</td></tr> <tr><td>Aux 4</td><td>Cascade</td></tr> <tr><td>Aux 5</td><td>Vent</td></tr> <tr><td>Aux 6</td><td>Relay 1</td></tr> </table>	Aux 1	PID Cool	Aux 2	Full Cool	Aux 3	Low AL	Aux 4	Cascade	Aux 5	Vent	Aux 6	Relay 1	<p>X2 - Auxiliary Outputs</p> <table border="1"> <tr><td>Aux 1</td><td>PID Cool</td></tr> <tr><td>Aux 2</td><td>Full Cool</td></tr> <tr><td>Aux 3</td><td>Low AL</td></tr> <tr><td>Aux 4</td><td>Cascade</td></tr> <tr><td>Aux 5</td><td>None</td></tr> <tr><td>Aux 6</td><td>Relay 1</td></tr> </table>	Aux 1	PID Cool	Aux 2	Full Cool	Aux 3	Low AL	Aux 4	Cascade	Aux 5	None	Aux 6	Relay 1	<p>X2 - Auxiliary Outputs</p> <table border="1"> <tr><td>Aux 1</td><td>None</td></tr> <tr><td>Aux 2</td><td>None</td></tr> <tr><td>Aux 3</td><td>None</td></tr> <tr><td>Aux 4</td><td>None</td></tr> <tr><td>Aux 5</td><td>None</td></tr> <tr><td>Aux 6</td><td>None</td></tr> </table>	Aux 1	None	Aux 2	None	Aux 3	None	Aux 4	None	Aux 5	None	Aux 6	None
Aux 1	PID Cool																																					
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<p>X4</p> <table border="1"> <tr><td>Event 1</td><td>Ambient</td></tr> <tr><td>Event 2</td><td>PID Humid</td></tr> <tr><td>Event 3</td><td>Dehumid Coil</td></tr> <tr><td>Event 4</td><td>Event 3</td></tr> <tr><td>Event 5</td><td>None</td></tr> <tr><td>Event 6</td><td>Event 6</td></tr> </table>	Event 1	Ambient	Event 2	PID Humid	Event 3	Dehumid Coil	Event 4	Event 3	Event 5	None	Event 6	Event 6	<p>X4</p> <table border="1"> <tr><td>Event 1</td><td>Event 1</td></tr> <tr><td>Event 2</td><td>Event 2</td></tr> <tr><td>Event 3</td><td>Event 3</td></tr> <tr><td>Event 4</td><td>Event 4</td></tr> <tr><td>Event 5</td><td>Event 5</td></tr> <tr><td>Event 6</td><td>Event 6</td></tr> </table>	Event 1	Event 1	Event 2	Event 2	Event 3	Event 3	Event 4	Event 4	Event 5	Event 5	Event 6	Event 6	<p>X4</p> <table border="1"> <tr><td>Event 1</td><td>PID Heat</td></tr> <tr><td>Event 2</td><td>PID TO/TT Cool</td></tr> <tr><td>Event 3</td><td>Compress</td></tr> <tr><td>Event 4</td><td>Multifunction</td></tr> <tr><td>Event 5</td><td>Fan</td></tr> <tr><td>Event 6</td><td>None</td></tr> </table>	Event 1	PID Heat	Event 2	PID TO/TT Cool	Event 3	Compress	Event 4	Multifunction	Event 5	Fan	Event 6	None
Event 1	Ambient																																					
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Event 1	Event 1																																					
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Event 3	Compress																																					
Event 4	Multifunction																																					
Event 5	Fan																																					
Event 6	None																																					

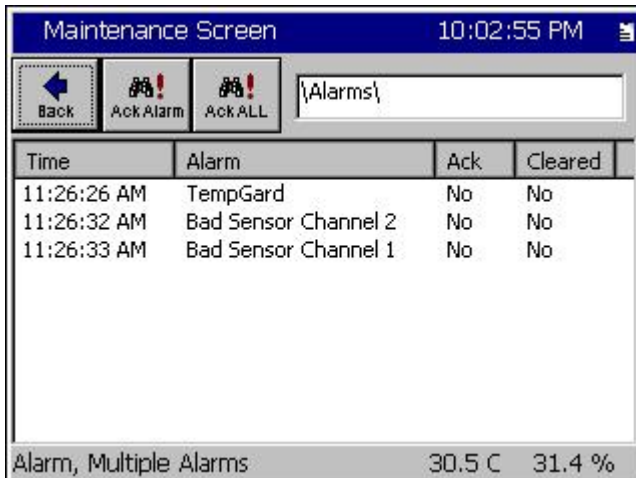
For further information concerning the operation of the Synergy Controller please consult the Tidal Engineering website at <http://www.tidaleng.com>.

Once there, please download the free SimpleComm and Synergy Manager applications at <http://www.tidaleng.com/download.htm>.

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.



The screenshot shows the 'Maintenance Screen' at 10:02:55 PM. It features a navigation bar with 'Back', 'Ack Alarm', and 'Ack ALL' buttons, and a search field containing '\Alarms\'. Below is a table of active alarms:

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

At the bottom, a status bar displays 'Alarm, Multiple Alarms', '30.5 C', and '31.4 %'.

1. TempGard.

This is the input for the Over-Temperature Protection (OTP) controller. The OTP auxiliary alarm contact (the contact should open on fault) should be wired to X2, Pins 1 and 6. This feature can be jumped out, however, the controllers compressor protection algorithms will not be functional; i.e. short cycle timers, etc.

2. Bad Sensor Channel 1

Connect a three wire 100 Ohm pt. RTD to P3 Pins 2, 3 and 4. 3 and 4 are common.

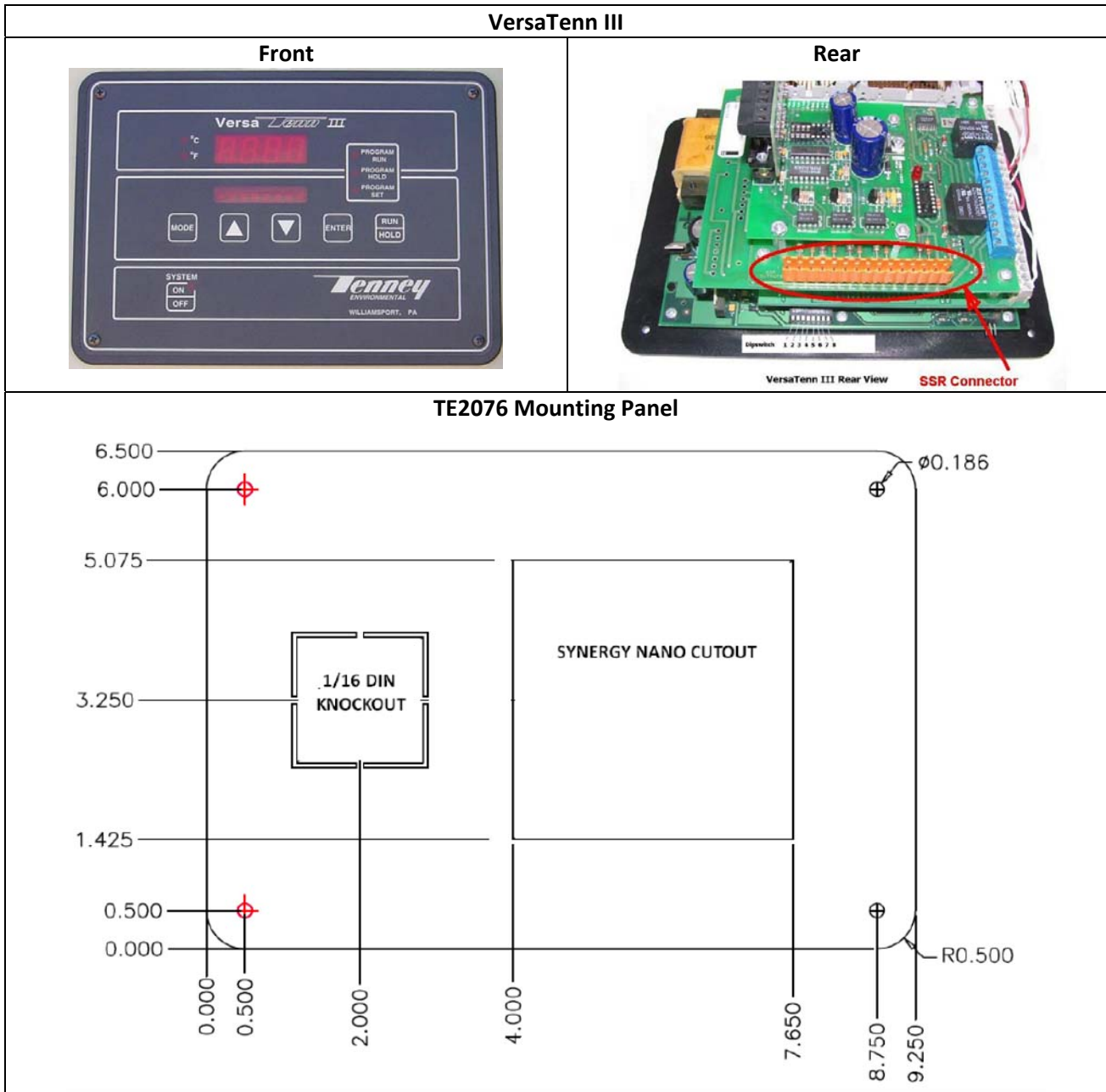
3. Bad Sensor Channel 2

Connect a 0-5 V humidity Signal, or a jumper if humidity is not monitored, between P3, Pins 1(Input 1) and 4(Gnd).

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

Appendix B Identify your VersaTenn Controller and pick a panel

Synergy Controllers easily upgrade the following legacy VersaTenn Controllers; VersaTenn, VersaTenn II, VersaTenn III, and VersaTenn IV.



VersaTenn

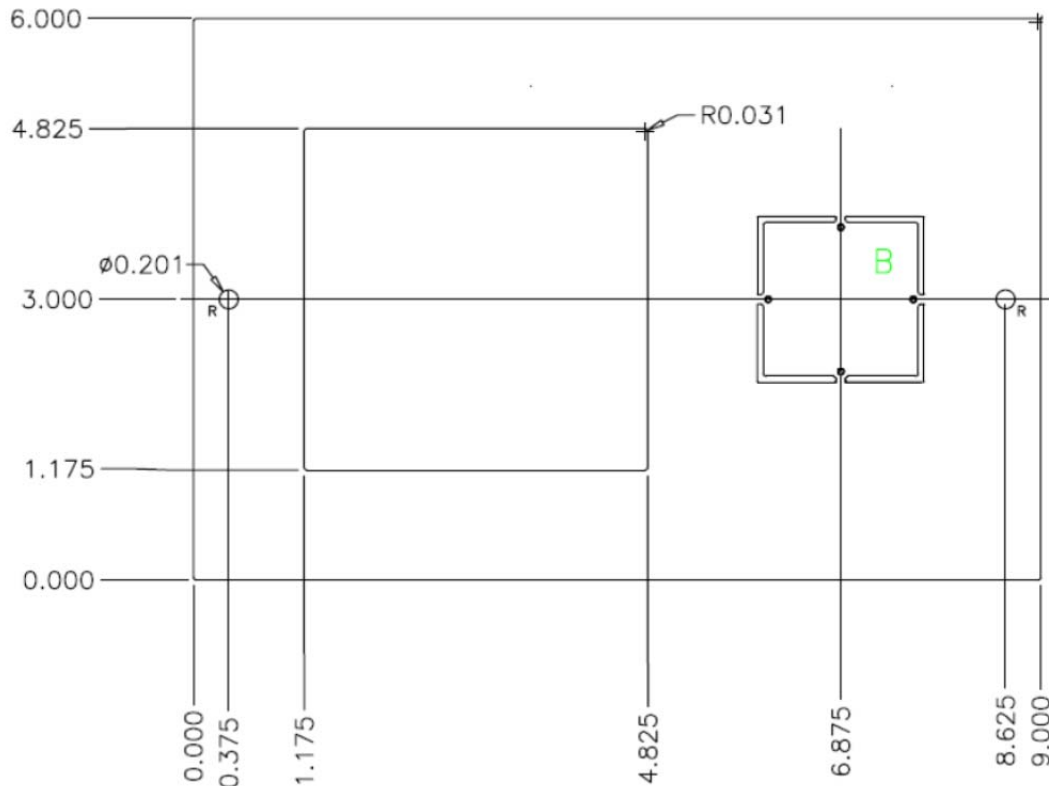
Front



Rear



TE2094 Synergy Nano VersaTenn Panel Adapter, 6" x 9"



VersaTenn II

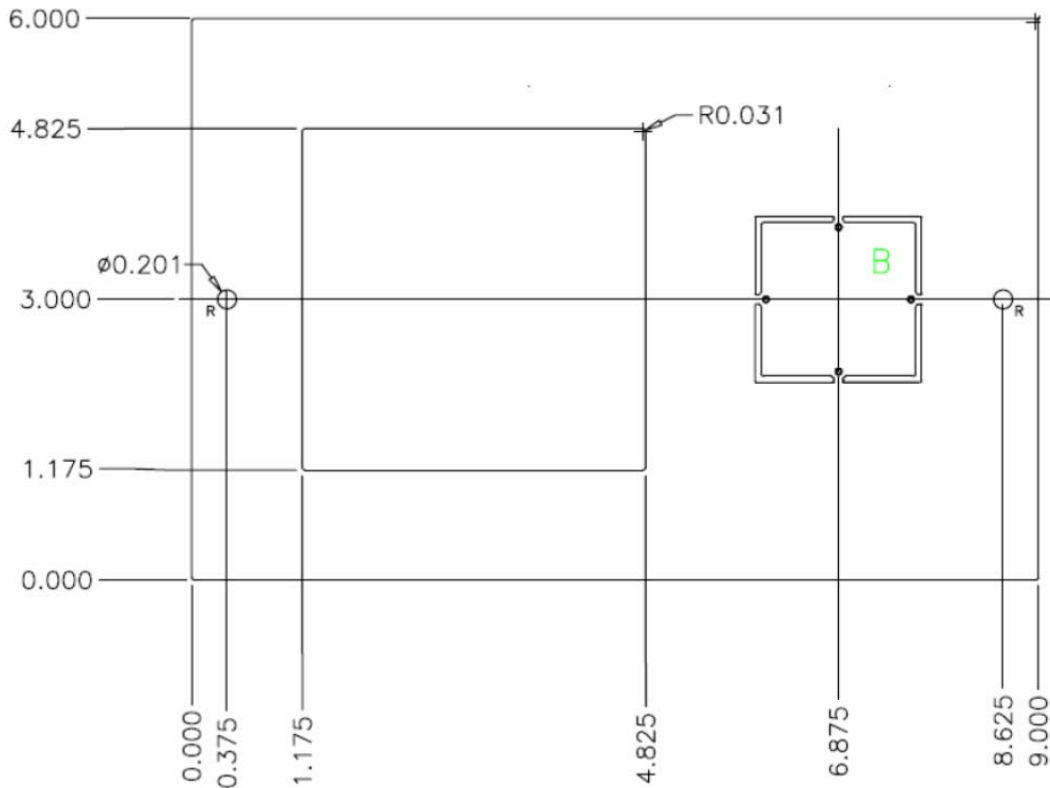
Front



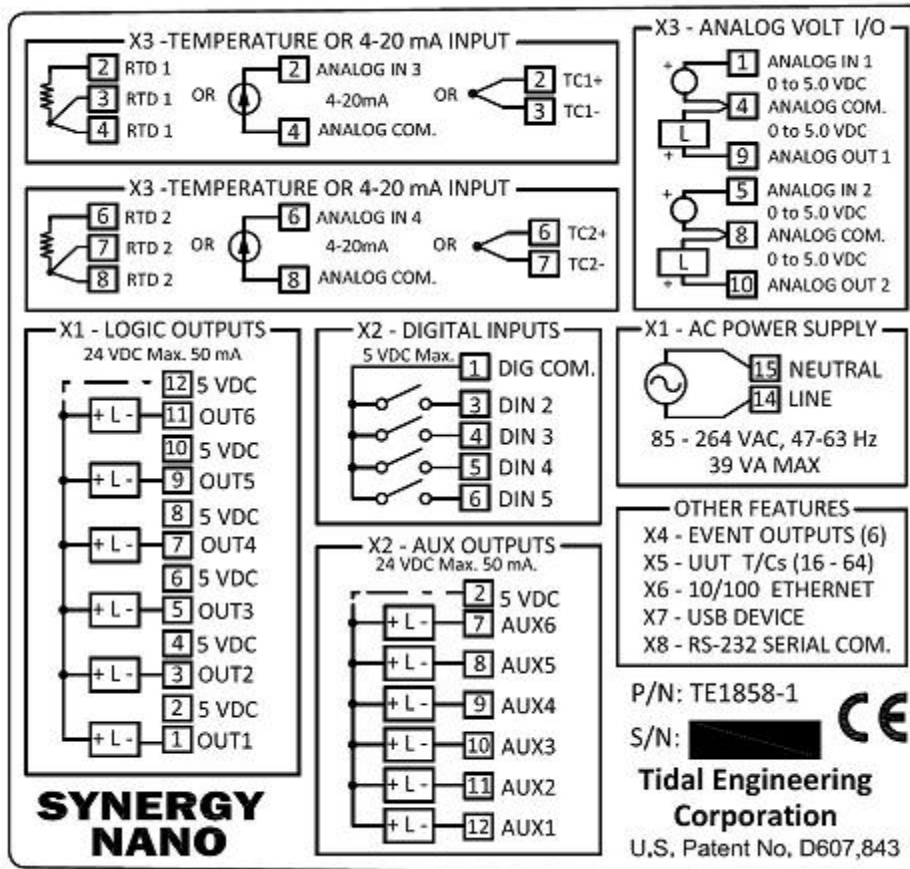
Rear



TE2094 Synergy Nano VersaTenn Panel Adapter, 6" x 9"4

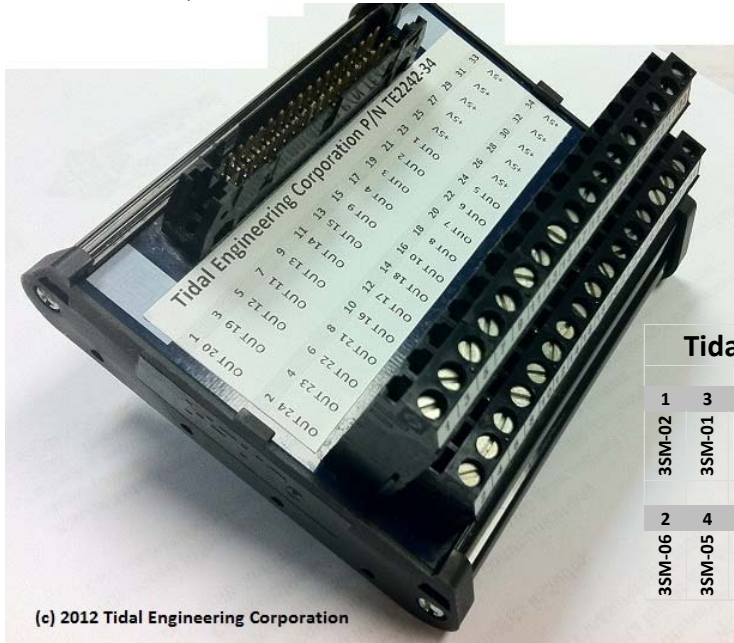


Appendix C Synergy Nano Product Label



Appendix D Identifying Parts

TE2242-34 Adapter and Label



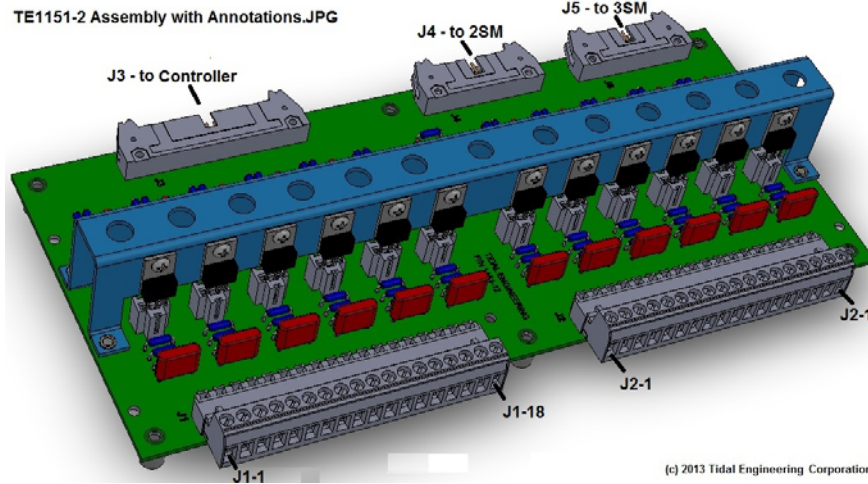
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Tidal Engineering Corporation P/N TE2242-34

ALL OUTPUTS ARE OPEN COLLECTOR, 24 VDC, 50 mA MAX

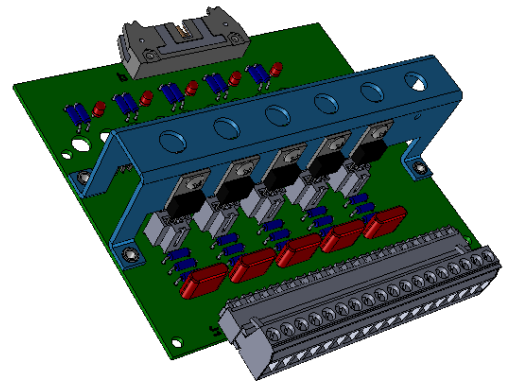
1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33
3SM-02	3SM-01	1SM-12	1SM-11	2SM-01	2SM-02	2SM-03	1SM-09	1SM-04	1SM-03	1SM-02	1SM-01	+5V	+5V	+5V	+5V	+5V
2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34
3SM-06	3SM-05	3SM-04	3SM-03	2SM-04	2SM-05	2SM-06	1SM-10	1SM-08	1SM-07	1SM-06	1SM-05	+5V	+5V	+5V	+5V	+5V

TE1151-12, 1SM Output Board



(c) 2013 Tidal Engineering Corporation

TE1151-5 Output Board



Appendix E Reference Materials

Download the Synergy Nano 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.](#)

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About the Synergy Controller Family

Tidal Engineering's Synergy Controllers; the Synergy Micro 2, Synergy Quattro, 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 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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