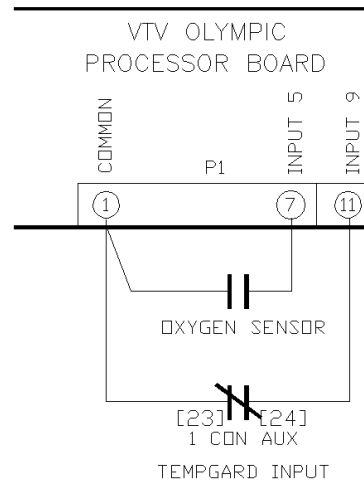## User Alarm System

Overview

The Synergy Controller provides a programmable user alarm system for customer specific warnings and for special applications where the alarm relays are used to operate a system function. This application note explains the user alarm setup procedure using three examples.

The User Alarm screen wizard works like the profile wizard screen. This means that the setup instructions are provided along with the data entry fields and the user follows along, entering information and pressing next or back as required until the alarm specification is complete.

There are 102 inputs that can be used for a user alarm condition (see the table below)
The input options are:

Module	Option1	Option2	Choices
Olympic Board	RTD1&2, Analog 1-4	N/A	6
UUT Module Inputs	UUT Module	Sensor	64
Machine Inputs	Low Resolution Channels 1 thru 8	N/A	8
Digital Inputs	Inputs 1 thru 16	N/A	16
Channels	Channels 1 thru 4	N/A	4
Setpoints	Setpoints 1 thru 4	N/A	4

There are four Comparison options.

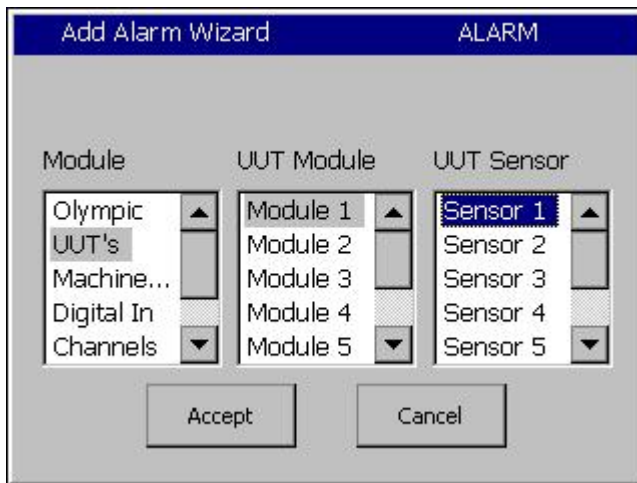| Comparison	Application
Input Open	Digital Inputs only
Input Closed	Digital Inputs only
Greater than Threshold	All inputs except Digital, Raw or Scaled.
Less than Threshold	All inputs except Digital, Raw or Scaled.

To enter a User Alarm, follow the steps of the wizard as shown below:

1. Open the **Setup** Screen and browse to the **User Alarms** folder
2. Select the Sensor, Setpoint or Channel.
3. Define the comparison type and the scaling, i.e. Input Open, Closed, Greater than, etc.
4. Select the Alarm Threshold. (Not required for Digital Inputs).
5. Enter a name for the alarm. This name appears in the alarm screen when the alarm occurs.
6. Select the desired alarm responses.
7. Confirm your choices and finish.
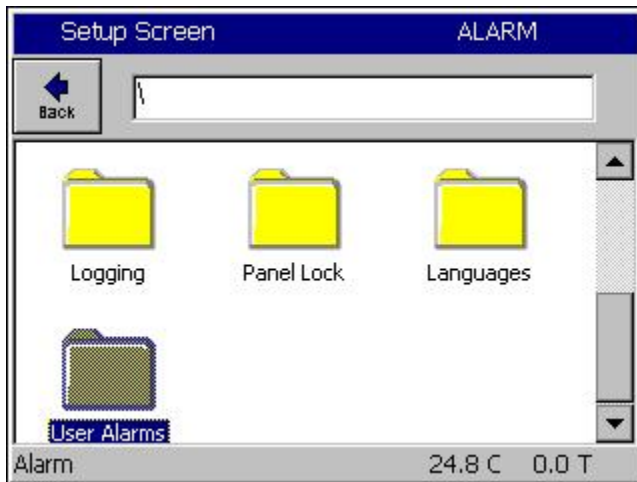
Open the Setup Screen and browse to the User Alarms folder

Select the Sensor, Setpoint or channel.

Define the comparison type and the scaling, i.e. Input Open, Closed, Greater than, etc.

Select the Alarm Threshold.

Note: This step is not required for Digital Inputs.

Enter a name for the alarm. This name appears in the alarm screen when the alarm occurs.

Add Alarm Wizard 8:52:09 AM Click the actions below that you want to occur when the alarm is triggered. ☑ Show Alarm ☐ Activate Relay 1 ☑ Log Alarm ☐ Disable Chamber ☐ Activate Relay 2 **SYNERGY** <- Back Next -> Cancel	Select the desired alarm responses
Add Alarm Wizard When you click Finish, you will have created the following alarm named: oxygen sensor warning Monitoring: Low Res Analog 2 With options: Show Alarm, Log Alarm **SYNERGY** <- Back Finish Cancel	Confirm your choices and finish

Example 1:

Create an alarm that senses Digital Input 5 and Displays "Oxygen Sensor Warning" when the input is Open.
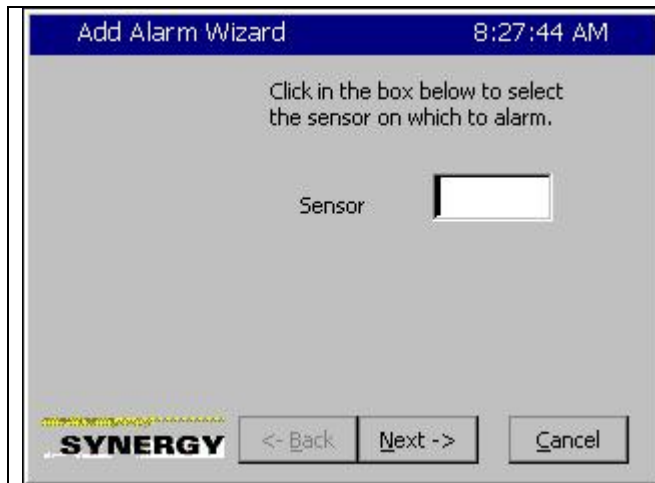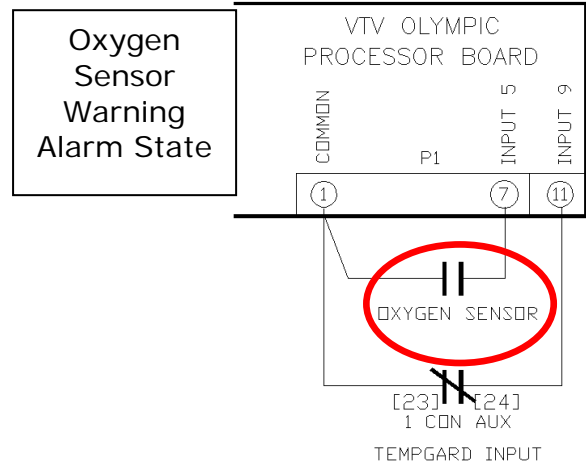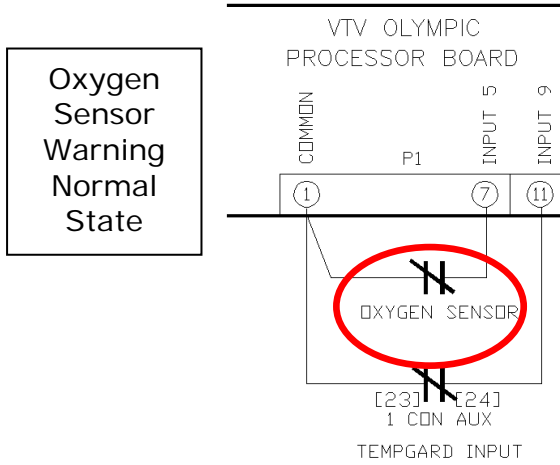
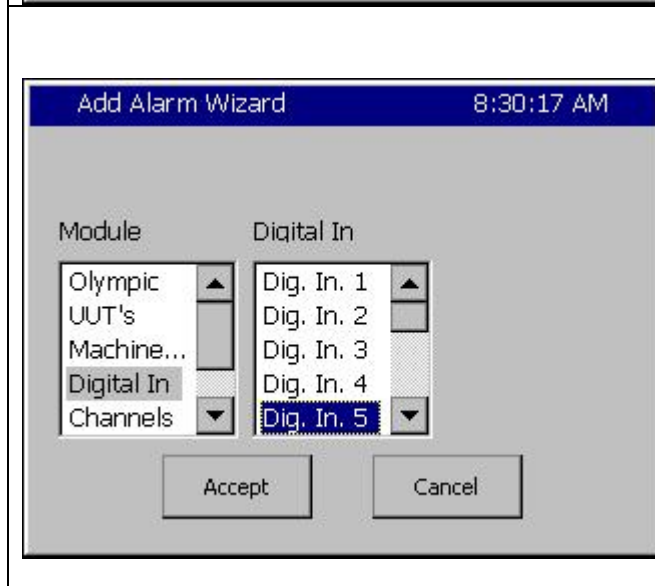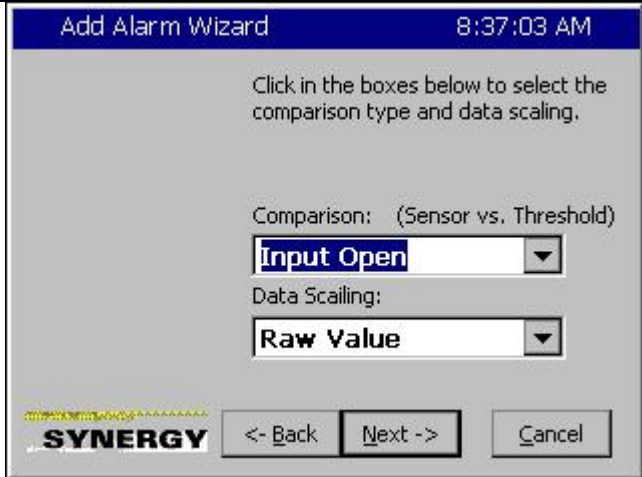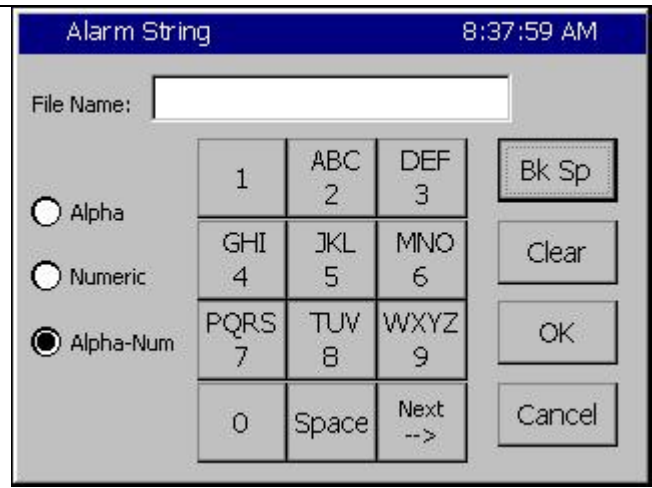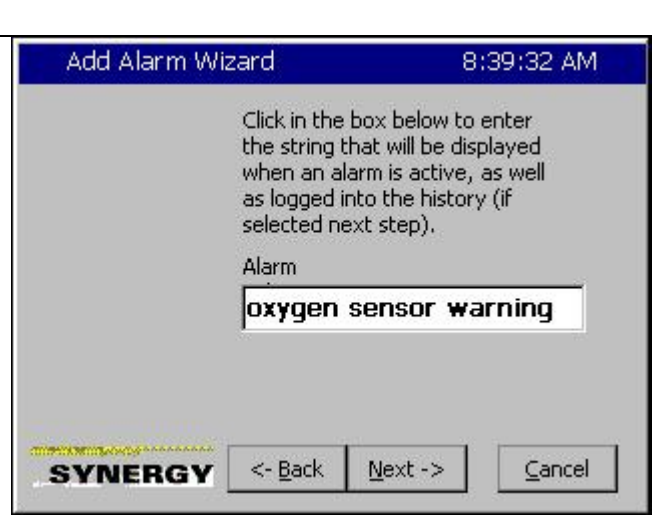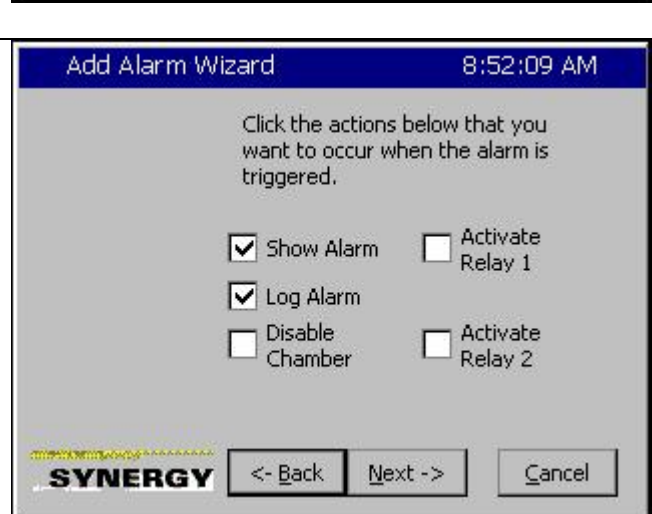|	
	Select the Sensor, Setpoint or channel. Begin by pressing in the Sensor text box.
	Select Digital Input 5 Then press Accept.
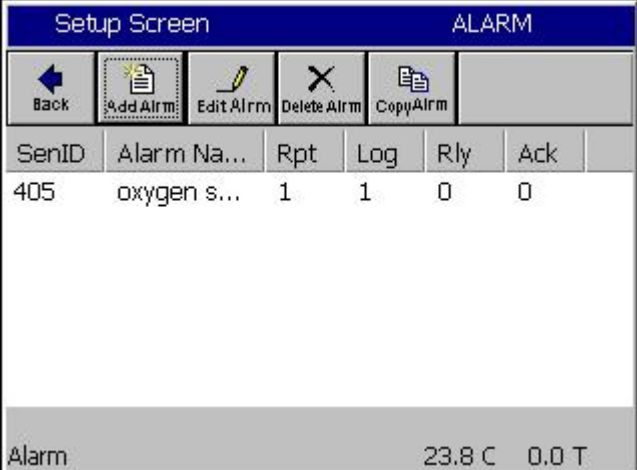
Add Alarm Wizard 8:36:37 AM Click in the box below to select the sensor on which to alarm. Sensor 405 **SYNERGY** <- Back Next -> Cancel	The wizard displays the code for this alarm. Then press Next ->
Add Alarm Wizard 8:37:03 AM Click in the boxes below to select the comparison type and data scaling. Comparison: (Sensor vs. Threshold) **Input Open** ▼ Data Scaling: **Raw Value** ▼ **SYNERGY** <- Back Next -> Cancel	Select the Comparison. In this case Input Open. Then press Next -> Note: Data Scaling doesn't apply for digital inputs
Add Alarm Wizard Click in the box below to enter the string that will be displayed when an alarm is active, as well as logged into the history (if selected next step). Alarm [_____] **SYNERGY** <- Back Next -> Cancel	Enter a name for this alarm. Begin by pressing in the Alarm text box.

Alarm String — 8:37:59 AM File Name: [_____] ○ Alpha ○ Numeric ● Alpha-Num Keypad: 1, ABC 2, DEF 3, GHI 4, JKL 5, MNO 6, PQRS 7, TUV 8, WXYZ 9, 0, Space, Next --> Buttons: Bk Sp, Clear, OK, Cancel	Enter a name for this alarm using the T-9 pad.
Add Alarm Wizard — 8:39:32 AM Click in the box below to enter the string that will be displayed when an alarm is active, as well as logged into the history (if selected next step). Alarm [oxygen sensor warning] SYNERGY <- Back Next -> Cancel	When the name is complete, Then press Next -> to continue.
Add Alarm Wizard — 8:52:09 AM Click the actions below that you want to occur when the alarm is triggered. ☑ Show Alarm ☐ Activate Relay 1 ☑ Log Alarm ☐ Disable Chamber ☐ Activate Relay 2 SYNERGY <- Back Next -> Cancel	Select the desired alarm actions as shown at left, Then press Next -> to continue.

Add Alarm Wizard 8:52:26 AM When you click Finish, you will have created the following alarm named: oxygen sensor warning Monitoring: Digital Input 5 With options: Show Alarm, Log Alarm **SYNERGY** <- Back Finish Cancel	Confirm your choices and press Finish to complete the User Alarm entry process and close the Add Alarm Wizard.
Setup Screen ALARM Back Add Alrm Edit Alrm Delete Alrm CopyAlrm 	SenID	Alarm Na...	Rpt	Log	Rly	Ack
---	---	---	---	---	---
405	oxygen s...	1	1	0	0 | Alarm 23.8 C 0.0 T	The User Alarm screen will list the new User Alarm entry as shown at list.

In operation, the Alarm Screen in the Maintenance folder indicates a normal state when the Input is closed as shown in the figures below:
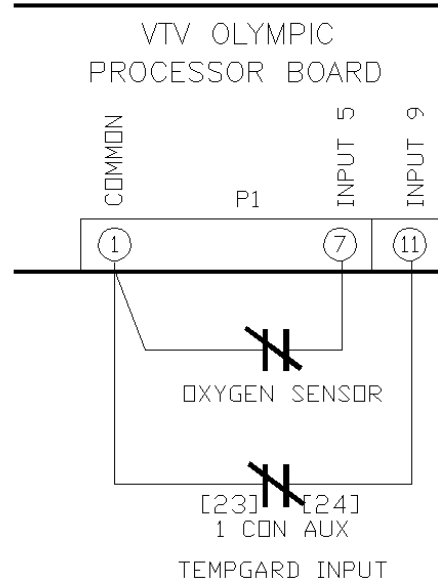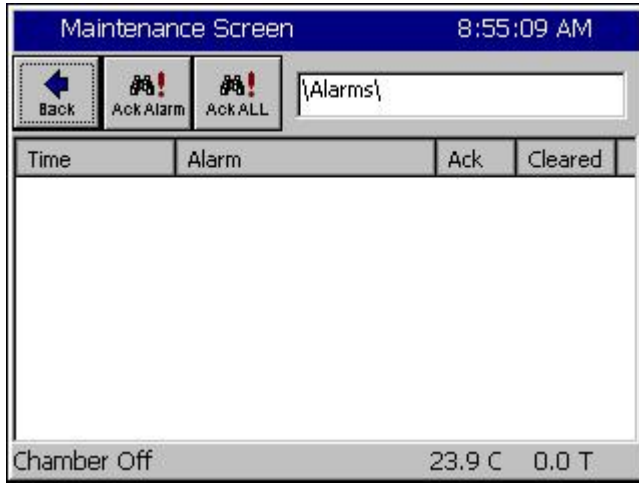
The Alarm Screen in the Maintenance folder indicates the alarm condition when the input is open as shown in the figure below:
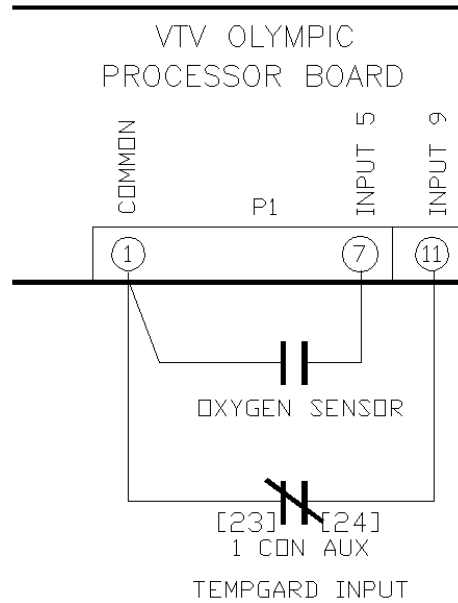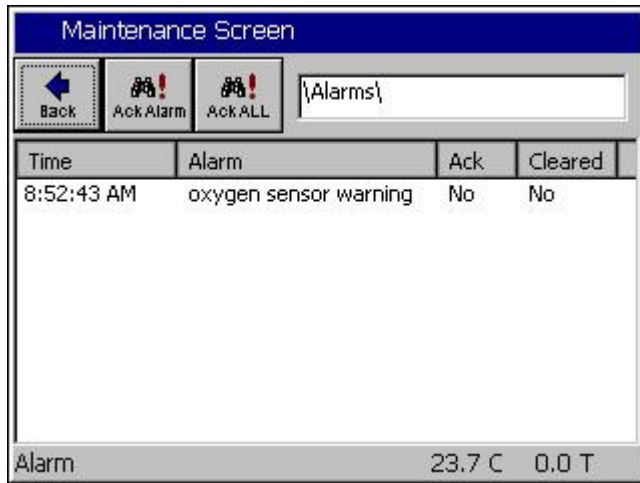

User alarms in the Maintenance/Alarm screen operate just like the High and Low limit alarms. The alarm entry displays "Yes" in the "Ack" column after an alarm is acknowledged. This can be done before or after it has cleared. The alarm is removed from the list only after the alarm condition has cleared and it has been acknowledged by the operator.

The alarm in the screenshot below has been acknowledged but the alarm condition still exists since the Ack column reports "Yes" and the Cleared column reports "No".
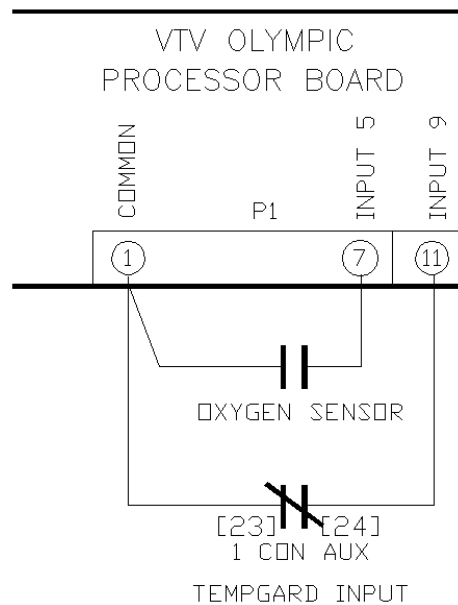
In the screenshot below, the alarm has been acknowledged and the alarm condition has cleared so the alarm entry has been removed from the list
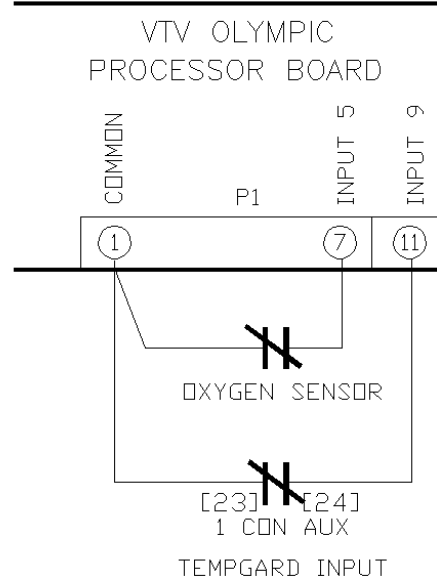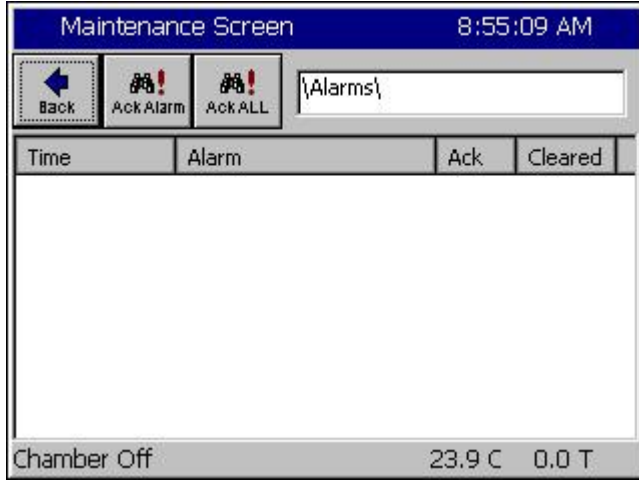
Example 2

At low atmospheric pressures, the heaters in most altitude chambers are turned off so they don't overheat when convection cooling capacity is reduced at low pressures. In this example we will create an alarm that senses Hi Res Input 3 (Torr) and opens Relay 2 when the value is less than 30 Torr. This alarm displays "Heater Safety Shutoff" when the input is Open.
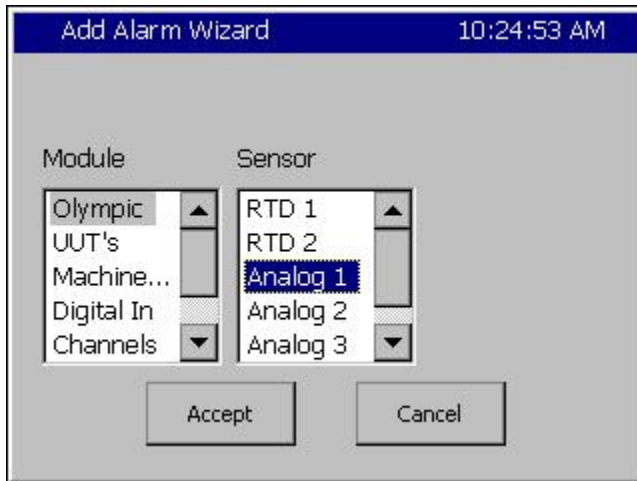
Select the Olympic Module and Analog input 1, then press **Accept**.

This screen at left shows the Sensor code for the Olympic Module and Analog input 1.

then press Next -> to continue.

Since we want the alarm to trigger when the pressure is less than 30 Torr, we select the "Less Then" comparison type. We also select the Scaled Value for Data Scaling because we want to compare the scaled Torr value as opposed to the Raw 0-5 Volt input.

Add Alarm Wizard	10:31:20 AM

Click in the box below to enter the alarm threshold.

Alarm Threshold: 0

SYNERGY   <- Back   Next ->   Cancel

Next we enter the Alarm Threshold.

Press the Alarm Threshold text box.

Add Alarm Wizard	10:31:45 AM

Alarm Value

Valid Range: -500   to   1010

Present Value   0

New Value   30

1	2	3	4	Clear
5	6	7	8	Cancel
9	0	.	-	Accept

Then we enter the Alarm Threshold using the number pad and press Accept.

Add Alarm Wizard	10:32:08 AM

Click in the box below to enter the alarm threshold.

Alarm Threshold: 30.0

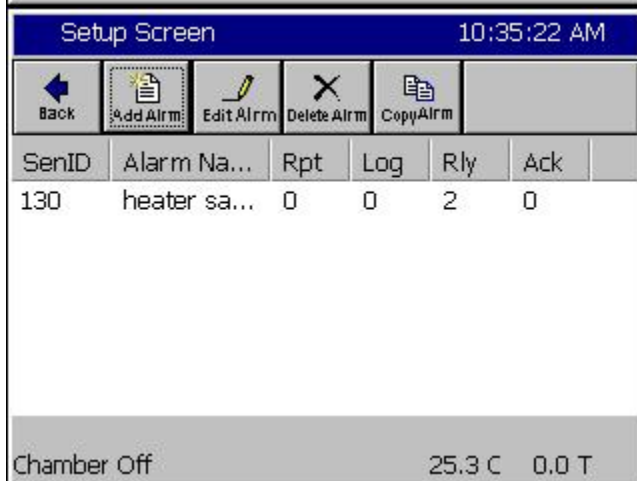SYNERGY   <- Back   Next ->   Cancel

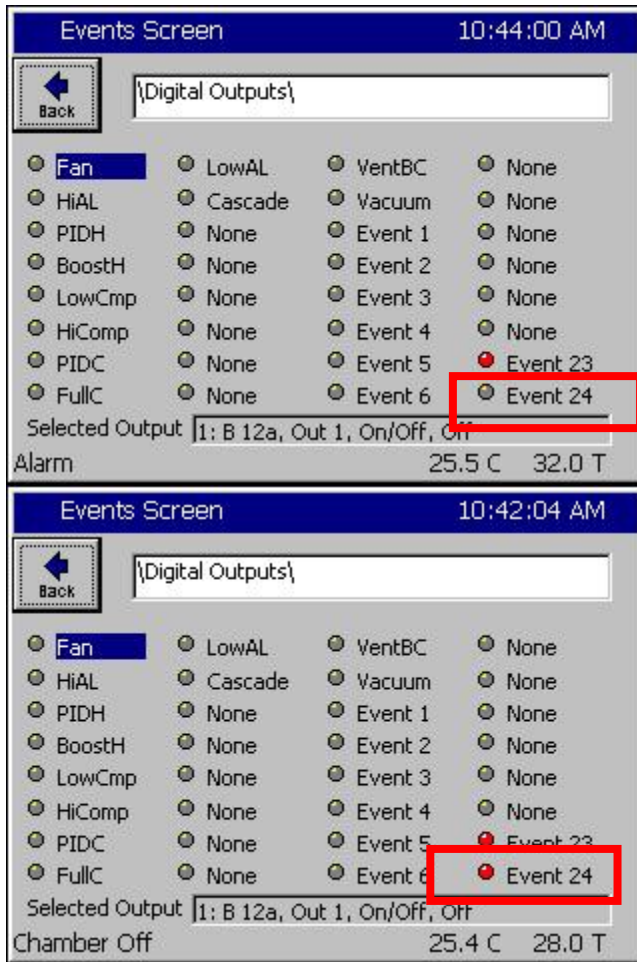Next we confirm the Alarm Threshold and press Next-> to continue.

Next we select the Alarm Actions and press Next-> to continue..

And finally, we confirm our settings and press Finish to close the Add Alarm Wizard.

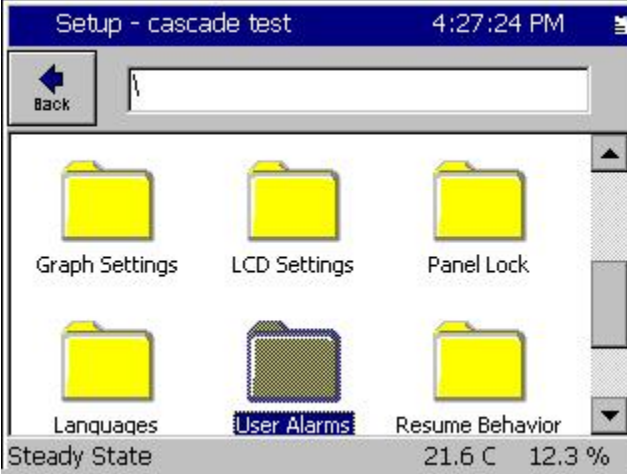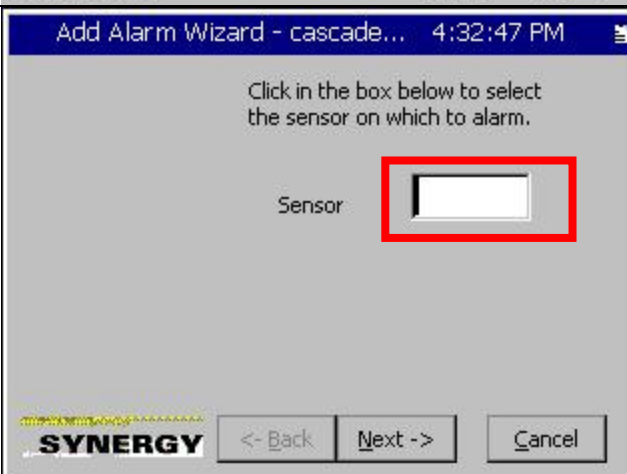The Setup/User Alarm screen shows our new alarm.

When the Torr value is greater than 30 Torr, as shown at left, the Relay (Event 24) is Inactive (Grey).
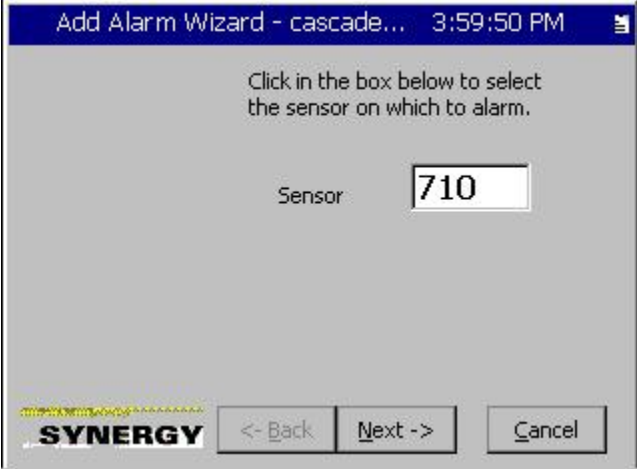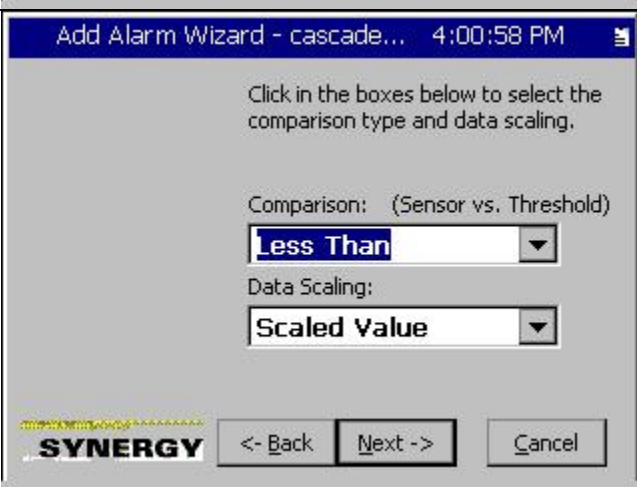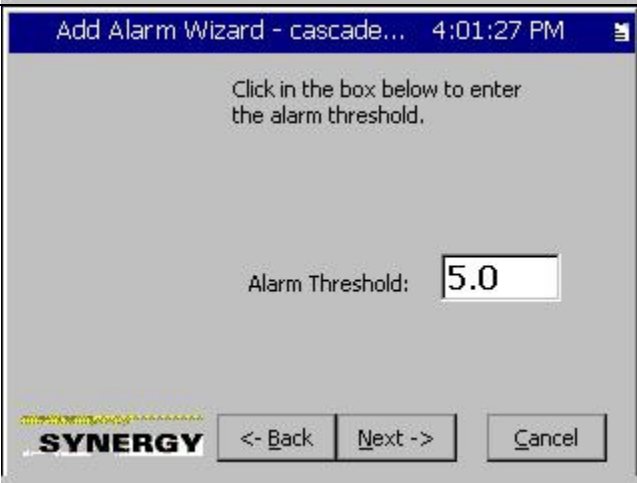

When the Torr value is less than 30 Torr, as shown at left, the Relay (Event 24) is active (Red).
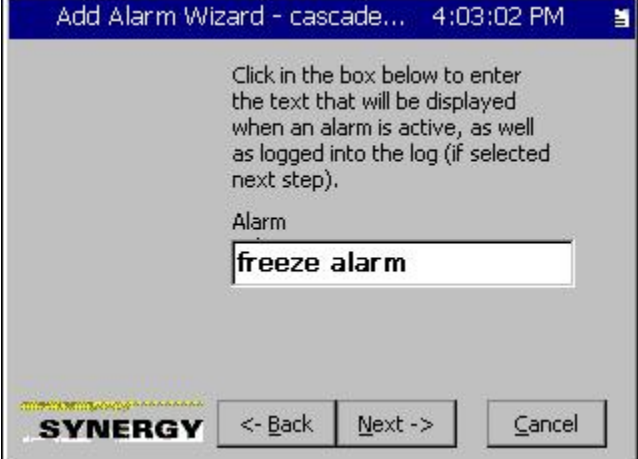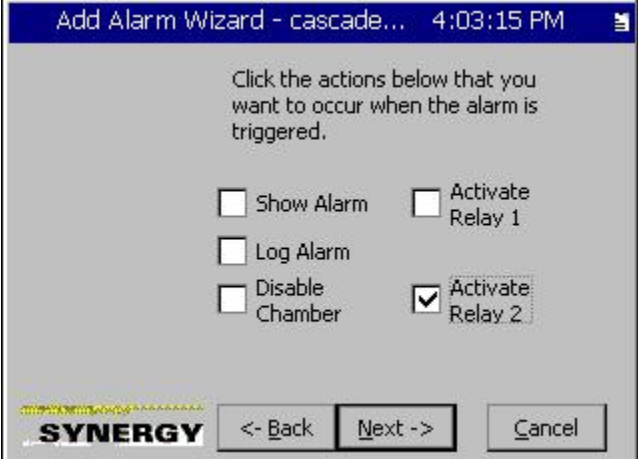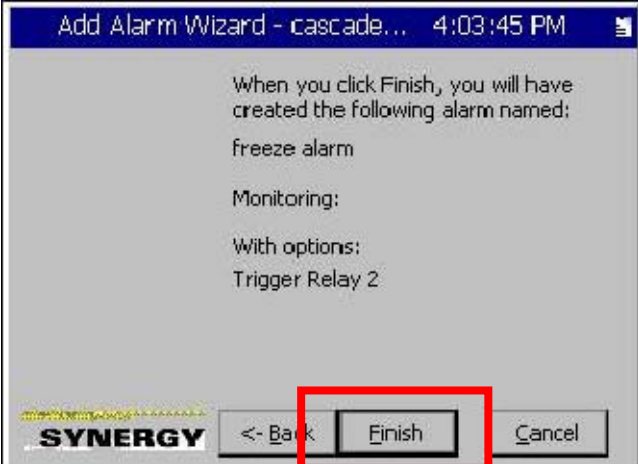
Note that this alarm only operates Relay 2 as defined by our entries in the Add Alarm Wizard. It doesn't appear in the title bar, in the alarm screen or in the log file.

Example 3

The User Alarm system can be used to remove power from a steam generator on temperature/humidity chambers when the controller temperature set-point is below freezing. The example below uses Alarm Relay 2 to interrupt power to the steam generator SSR when the temperature set-point is below 5 ^{o}C. The User Alarm is setup as follows.

	Open the **Setup** screen and browse to the **User Alarms** folder.
	Press the **Add Alarm** button and then press the **Sensor** text box to open the sensor select tool.
	Select **Setpoints** Module and **Setpt CH 1** and then press **Accept.**

Add Alarm Wizard - cascade... 3:59:50 PM Click in the box below to select the sensor on which to alarm. Sensor 710 **SYNERGY** <- Back Next -> Cancel	The **Sensor** id will indicate 710 for Temperature Setpoint. Press **Next** to continue.
Add Alarm Wizard - cascade... 4:00:58 PM Click in the boxes below to select the comparison type and data scaling. Comparison: (Sensor vs. Threshold) **Less Than** Data Scaling: **Scaled Value** **SYNERGY** <- Back Next -> Cancel	Select **Less Than** from the Comparison drop down list and select **Scaled Value** from the Data Scaling list. Then press **Next->**
Add Alarm Wizard - cascade... 4:01:27 PM Click in the box below to enter the alarm threshold. Alarm Threshold: 5.0 **SYNERGY** <- Back Next -> Cancel	Set the **Alarm Threshold** to 5.0 (or the required Alarm Threshold temperature) as shown on the left and then press **Next->**

Add Alarm Wizard - cascade... 4:03:02 PM Click in the box below to enter the text that will be displayed when an alarm is active, as well as logged into the log (if selected next step). Alarm freeze alarm SYNERGY <- Back Next -> Cancel	Enter a name for the **Alarm** such as "freeze alarm" as shown at left.
Add Alarm Wizard - cascade... 4:03:15 PM Click the actions below that you want to occur when the alarm is triggered. ☐ Show Alarm ☐ Activate Relay 1 ☐ Log Alarm ☐ Disable Chamber ☑ Activate Relay 2 SYNERGY <- Back Next -> Cancel	Check the **Activate Alarm Relay 2** box as shown at left and then press **Next->**
Add Alarm Wizard - cascade... 4:03:45 PM When you click Finish, you will have created the following alarm named: freeze alarm Monitoring: With options: Trigger Relay 2 SYNERGY <- Back **Finish** Cancel	Press **Finish.**

	Verify Alarm parameters as shown on the left.
Setup - cascade test 4:03:55 PM Back / Add Alrm / Edit Alrm / Delete Alrm / CopyAlrm SenID · Alarm Na... · Rpt · Log · Rly · Ack 710 · freeze al... · 0 · 0 · 2 · 1 Steady State 21.4 C 12.6 %	

Wire the Alarm Relay 2 contact to disable the steam generator (Humidifier) as shown in the example below.

WARNING: Make sure that the current and voltage requirements for Alarm Relay 2 are sufficient to handle the load.
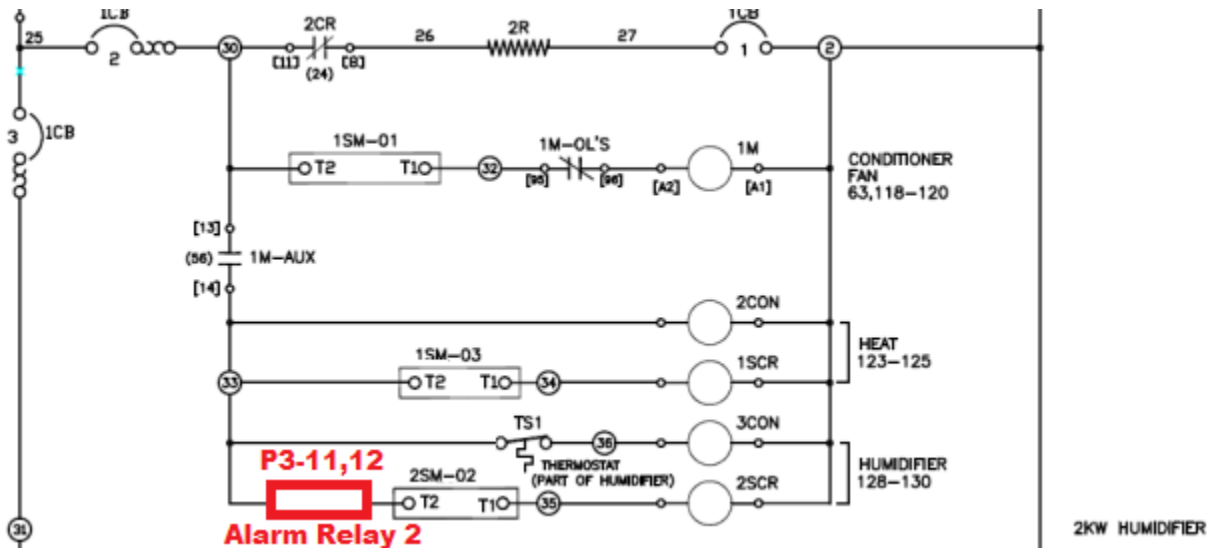
About the Synergy Controller Family
Tidal Engineering's Synergy Controllers, both the Synergy Micro 2 and the ¼ DIN Synergy Nano provide state-of-the-art usability and connectivity for environmental test control and data acquisition. They combine the functions of a chamber controller and a data logger 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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