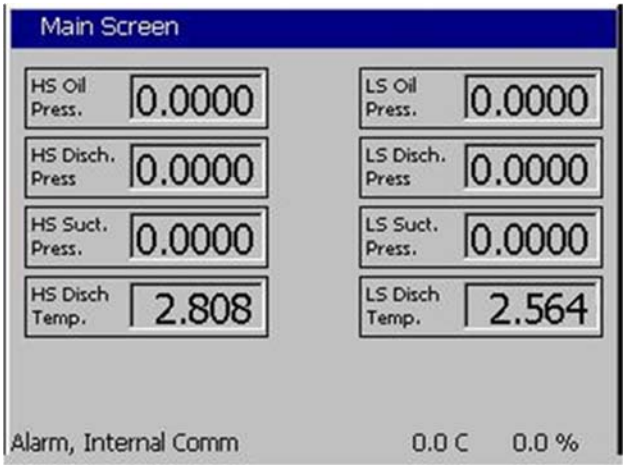


Synergy Controller Pressure Transducer Instrumentation

Introduction

Tidal Engineering's Synergy Controllers, including the Synergy Micro 2, Synergy Quattro, and 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.

This application note describes the Synergy Controller's pressure transducer instrumentation features



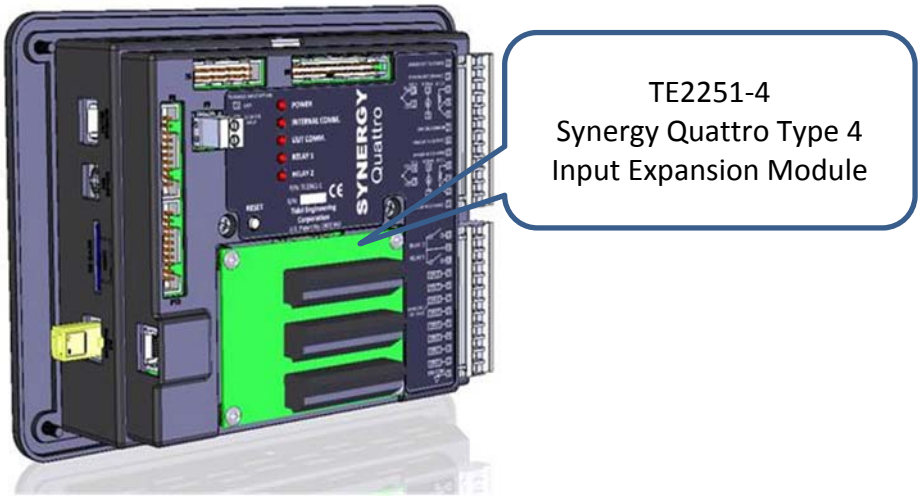
These features include:

- Main Screen Refrigeration Compressor Display.
- Alarms and Safeties
- Pump-down Features
- Logging and Plotting

Pressure Transducer Wiring

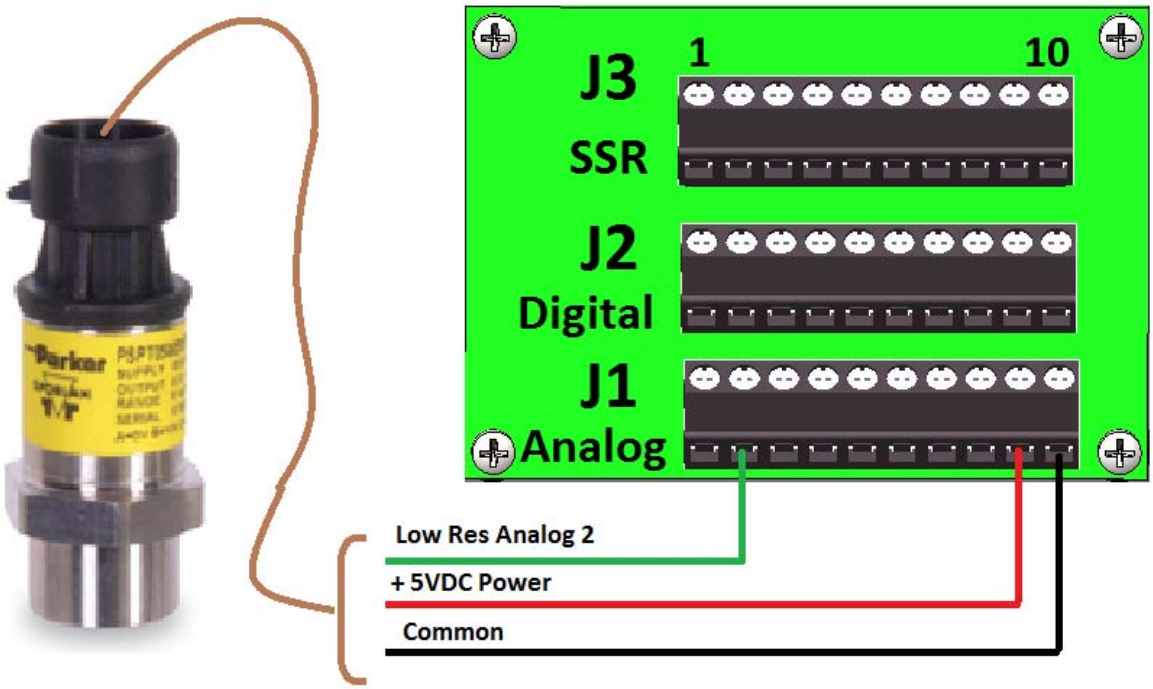
All Synergy Controllers have analog inputs that can be configured and scaled to display pressure in any unit of measure including Torr, mbar, PSIG and PSIA.

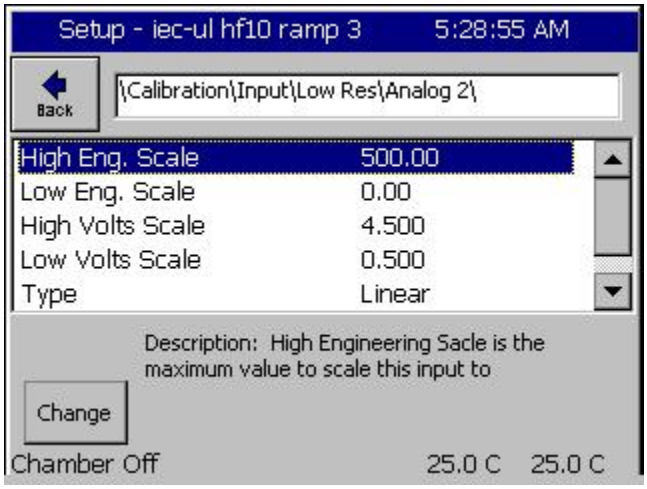
For example, for Synergy Quattro and Quattro 2 controllers, the Input/Output Expansion option, P/N TE2251-4, can handle up to eight transducers. This optional board provides 5 VDC to power the sensors.



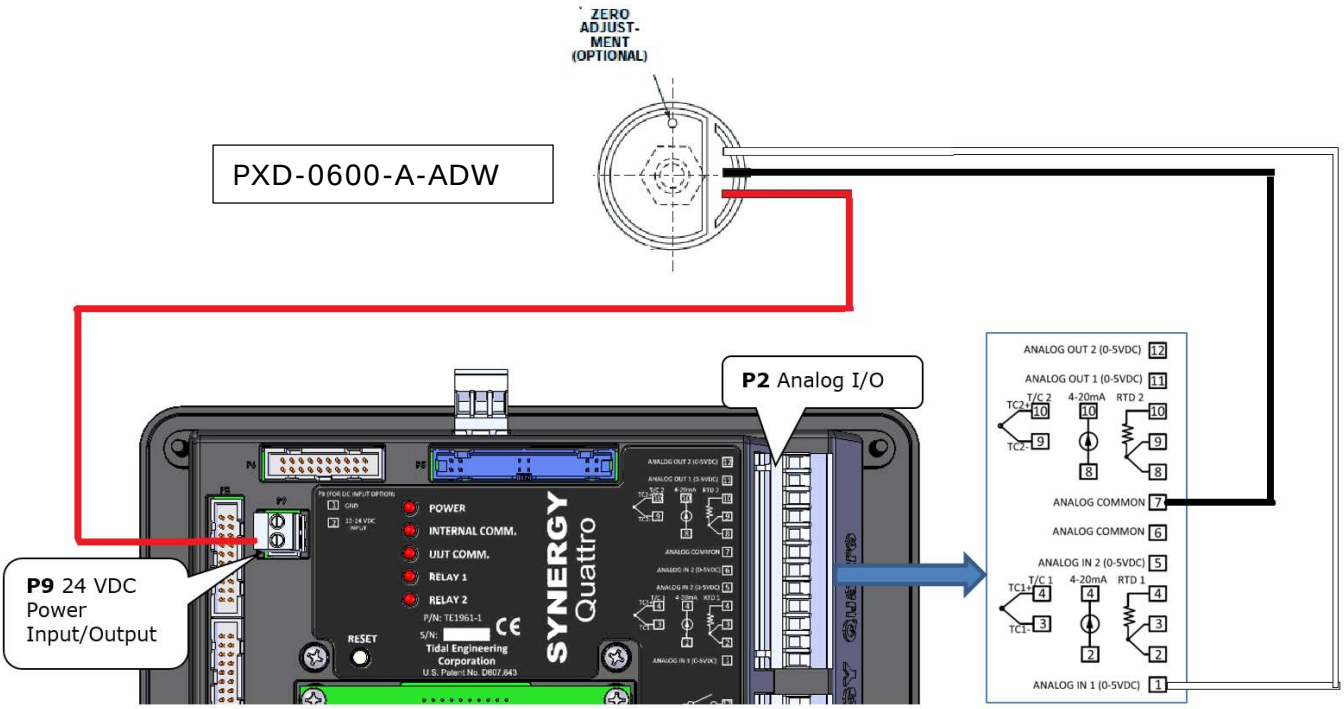
J1 Terminal	Signal	Description
J1-1	Low Res Analog 1	0-5 VDC, +/- 2 mV
J1-2	Low Res Analog 2	0-5 VDC, +/- 2 mV
J1-3	Low Res Analog 3	0-5 VDC, +/- 2 mV
J1-4	Low Res Analog 4	0-5 VDC, +/- 2 mV
J1-5	Low Res Analog 5	0-5 VDC, +/- 2 mV
J1-1	Low Res Analog 6	0-5 VDC, +/- 2 mV
J1-7	Low Res Analog 7	0-5 VDC, +/- 2 mV
J1-8	Low Res Analog 8	0-5 VDC, +/- 2 mV
J1-9	+5 VDC	100 mA to power sensors.
J1-10	Common	Common

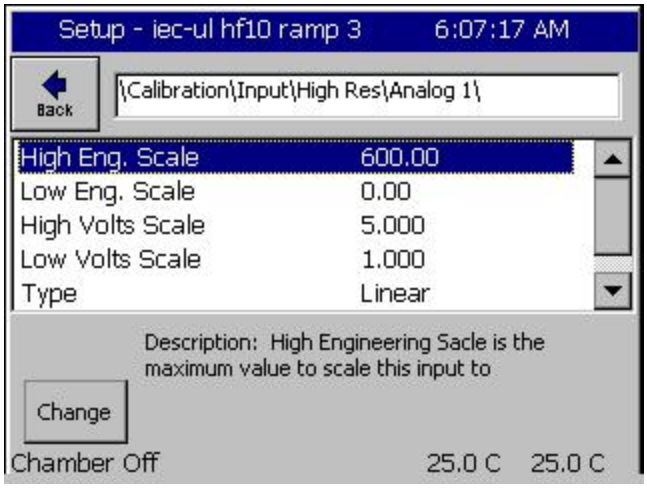
The figure below shows the Input Expander P/N TE2251-4 setup for Sporlan sensor P/N PSPT0500SVSP-S (0-500 PSIG).



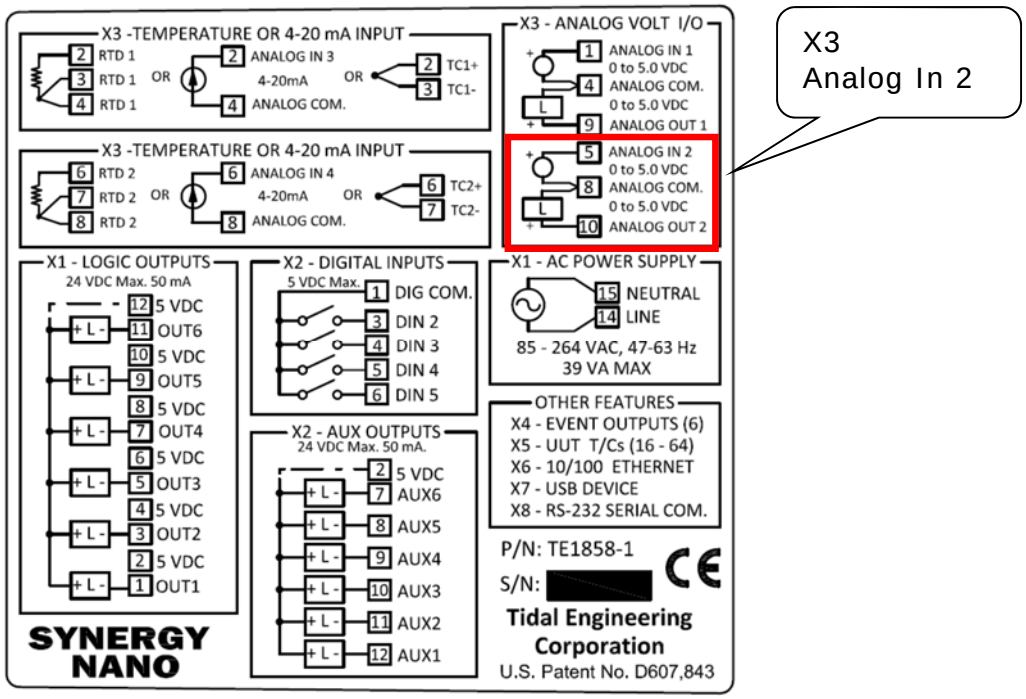


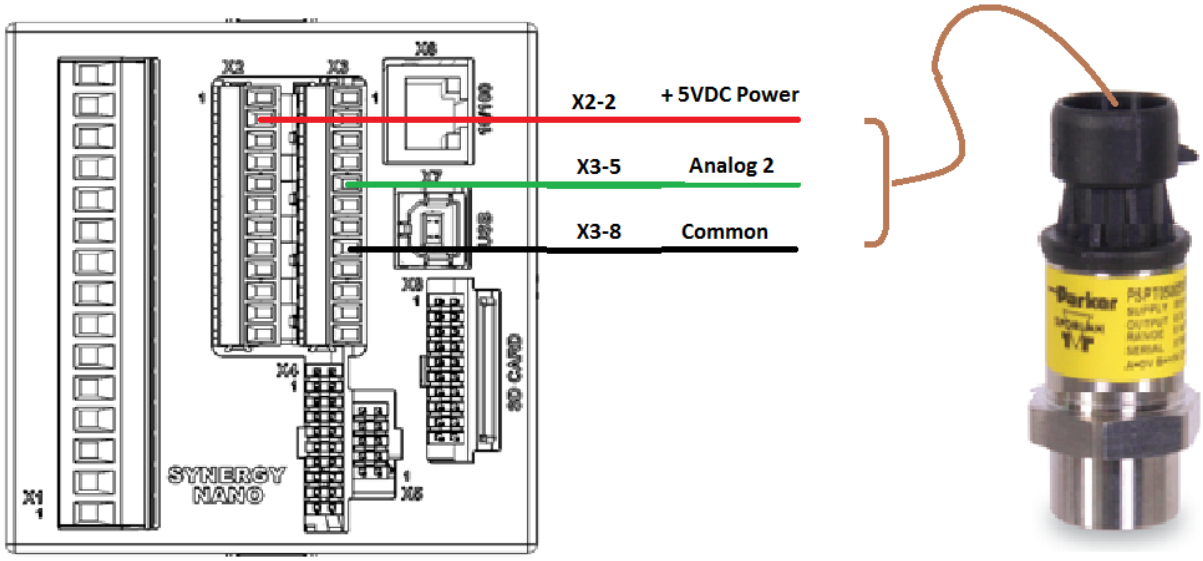
The figure below shows the Ametek Sensor P/N PXD-0600-A-PDW (0-600 PSIG) connected to Analog Input 1 on the Synergy Quattro. In this application, 24 VDC sensor power is supplied by the controller.





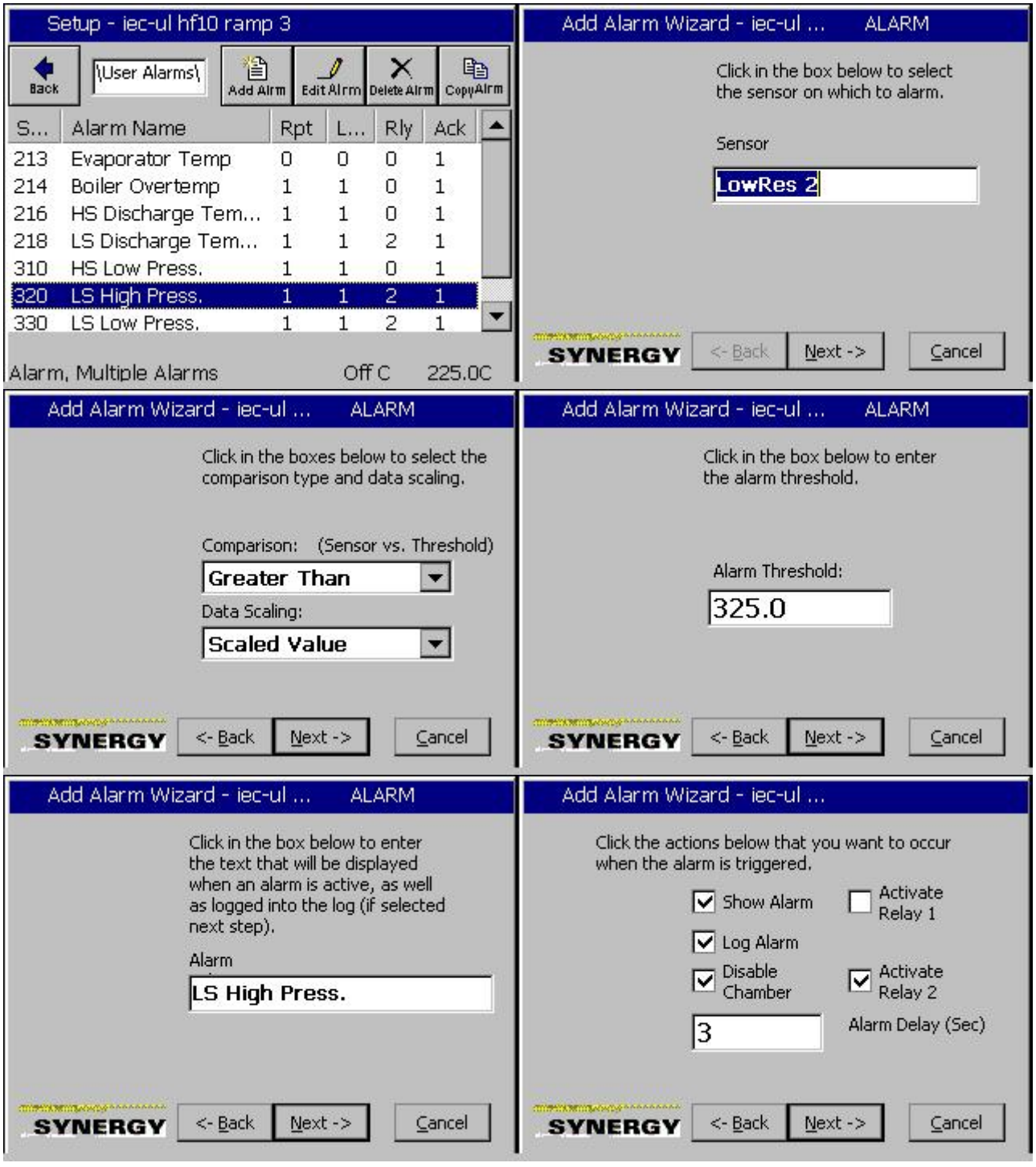
The figure below shows the Sporlan sensor P/N PSPT0500SVSP-S (0-500 PSIG) connected to Analog Input 2 on the Synergy Nano. In this application, 5 VDC sensor power is supplied by the controller.



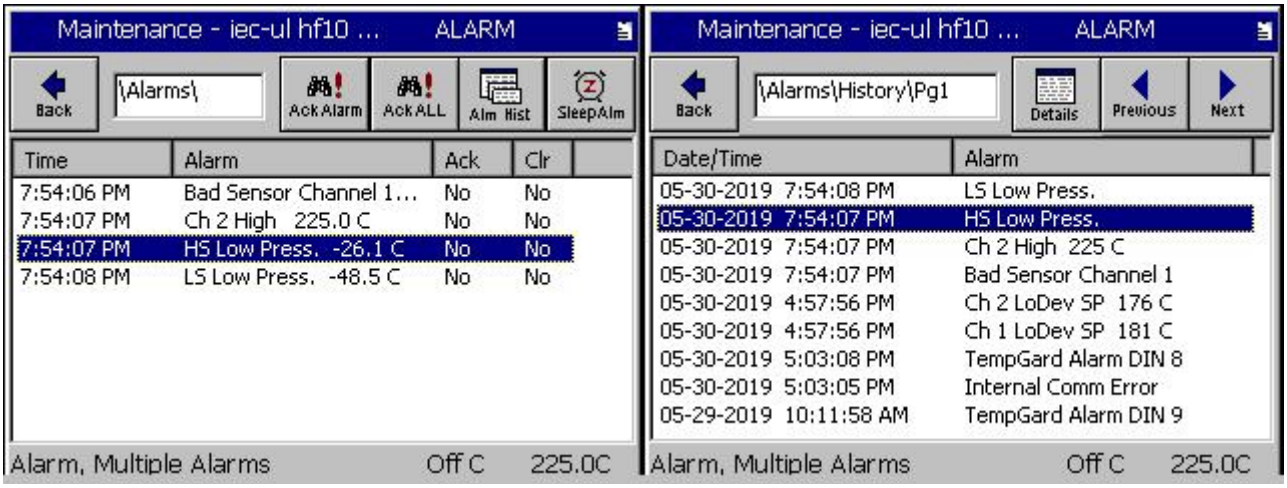


User Alarm Example for Low Stage Compressor Discharge Over-Pressure

The User Alarm Wizard screenshots below show the setup for a user-programmable alarm for the Low Stage Compressor, High Pressure shutdown at 325 PSIG.



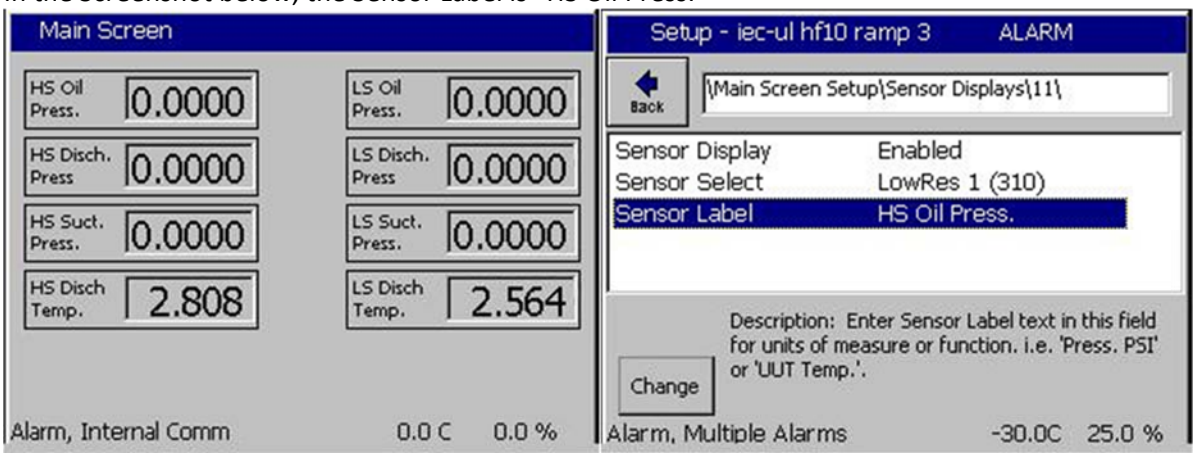
In this setup, this User Alarm will trigger after a 3 second delay and will shut down the chamber and put the Alarm Relay 2 into the alarm state. The Alarm screen will display the Alarm message and the pressure value recorded. The Alarm History screen can be sorted to show the history of prior occurrences of any alarm.

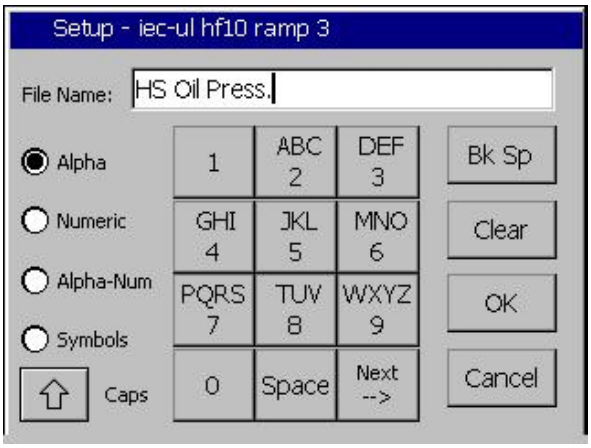


Main Screen Setup for Pressure Transducers

The Synergy Controller can display pressure transducers on the primary as well as secondary Main screens. The following screenshots show six compressor pressure transducers and two compressor temperature transducers setup to display on the secondary Main screen. Press the Main Screen button to cycle from the primary Main screen thru all the secondary Main screens. The controller will cycle thru all the screens that have Sensor Displays and then return to the primary Main Screen.

In the Screenshot below, the Sensor Label is “HS Oil Press.”





When setting up multiple Sensor Displays, it can be more convenient to add the Sensor Labels in Notepad or another text editor on a PC. Backup the controller settings to a USB Flash Disk, edit, and then restore the settings.

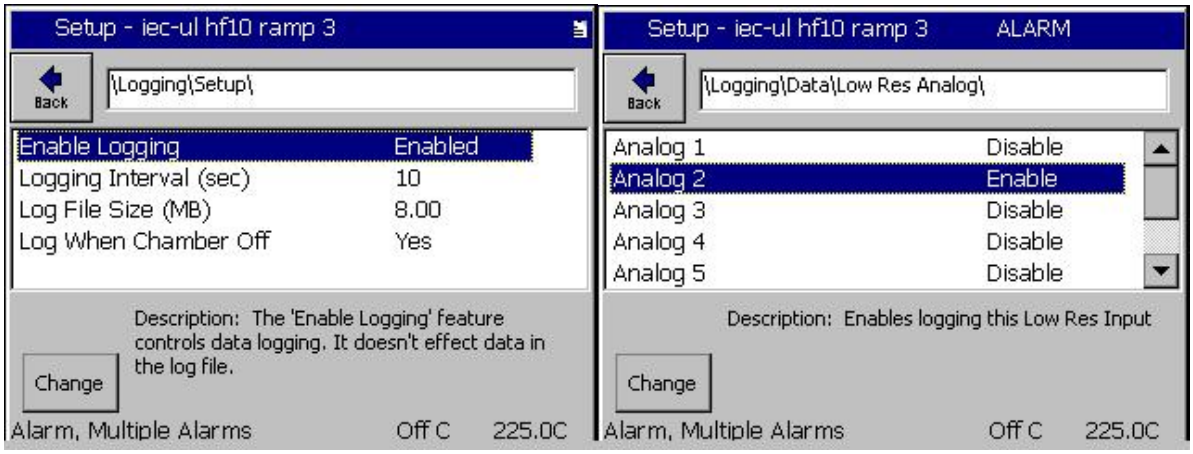
The setup for the HS Oil Pressure Sensor in the example at the left are as follows:

= DSPCH11_ENABLED 1.000000 1 ""
= DSPCH11_SENSOR 310.000000 1 ""
= DSPCH11_UOM 0.000000 1 "HS Oil Press."

Logging Setup for Pressure Transducers

The following screenshots show an example of the log file setup for pressure transducers.

Note that if the chamber is setup for automatic pump-down, the “Log When Chamber Off” can be set to “Yes” if the pump-down process needs to be recorded since pump-down will occur when the chamber is Off (not running).



Appendix A Refrigeration Pressure Transducers

Sensor Manufacturer	Sensor Model number	Power Supply	High Eng. Scale	Low Eng. Scale	High Volt Scale	Low Volt Scale	5 inhg Output Note (1)	10 inhg Output Note (2)
US Gauge (Ametek)	PXD-0200-A-ADW	9..28 VDC	200 PSIG	0 PSIG	5.0 VDC	1.0 VDC	0.950 VDC	0.900 VDC
US Gauge (Ametek)	PXD-0600-A-ADW	9..28 VDC	600 PSIG	0 PSIG	5.0 VDC	1.0 VDC	0.983 VDC	0.967 VDC
Cavlico (Sensata)	P528-500-A-C3A	4.5..5.5 VDC	500 PSIA	0 PSIA	4.5 VDC	0.5 VDC	0.598 VDC	0.578 VDC
Sensata	2CP5-71-48	4.5..5.5 VDC	500 PSIS	0 PSIS	4.5 VDC	0.5 VDC	0.480 VDC	0.461VDC
Sensata	2CP5-71-46	4.5..5.5 VDC	150 PSIA	0 PSIA	4.5 VDC	0.5 VDC	0.825 VDC	0.761 VDC
American Sensor Technologies Inc.	AST4100B00150P3A0117	10..28 VDC	150 PSIG	0 PSIG	5.0 VDC	1.0 VDC	0.933 VDC	0.869 VDC
American Sensor Technologies Inc.	AST4100B00500P3A0117	10..28 VDC	500 PSIG	0 PSIG	5.0 VDC	1.0 VDC	0.980 VDC	0.961 VDC
Omega Engineering	PX209-30V135G5V	7..35 VDC	135 PSIG	-14.7 PSIG	5.0 VDC	0.0 VDC	0.407 VDC	0.327 VDC
Omega Engineering	PX209-300G5V	7..35 VDC	300 PSIG	0 PSIG	5.0 VDC	0.0 VDC	N/A	N/A
Ametek	ECPT10-C-G-V135-03-B00-4	12..36 VDC	135 PSIG	-14.7 PSIG	5.0 VDC	0.0 VDC	0.407 VDC	0.327 VDC
Ametek	ECPT10-C-G-500-03-B00-4	12..36 VDC	200 PSIG	0 PSIG	5.0 VDC	0.0 VDC	N/A	N/A
Sporlan	PSPT0150AVSP-B	4.5..5.5 VDC	150 PSIA	0 PSIA	4.5 VDC	0.5 VDC	0.825 VDC	0.761 VDC
Sporlan	PSPT0150SVSP-S	4.5..5.5 VDC	150 PSIS	0 PSIS	4.5 VDC	0.5 VDC	0.433 VDC	0.369 VDC
Sporlan	PSPT0300SVSP-S	4.5..5.5 VDC	300 PSIS	0 PSIS	4.5 VDC	0.5 VDC	0.467 VDC	0.435 VDC
Sporlan	PSPT0500SVSP-S	4.5..5.5 VDC	500 PSIS	0 PSIS	4.5 VDC	0.5 VDC	0.480 VDC	0.461 VDC
Notes								
(1) 5 inhg/-2.5 PSIG/12.2 PSIA								
(2) 10 inhg/-4.9 PSIG/9.8 PSIA								
PSIS sensors are Sealed and calibrated to read 0 PSIG at 14.7 PSIA. Generally the same as PSIG sensors at sea level.								

Appendix B Reference Materials

Download the Synergy Quattro data sheet, technical manual, and installation guide here:
https://tidaleng.com/datasheets/Synergy_Nano_2_data_sheet.pdf
https://tidaleng.com/techmans/Synergy_Nano_2_Installation_Manual.pdf
https://tidaleng.com/techmans/Synergy_Controller_Unified_Technical_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 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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