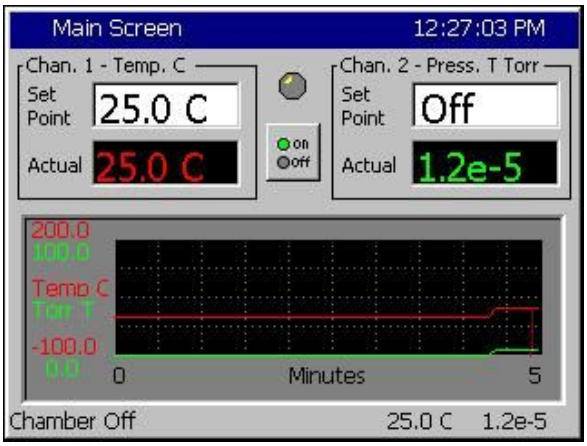
-Space Chamber Setup

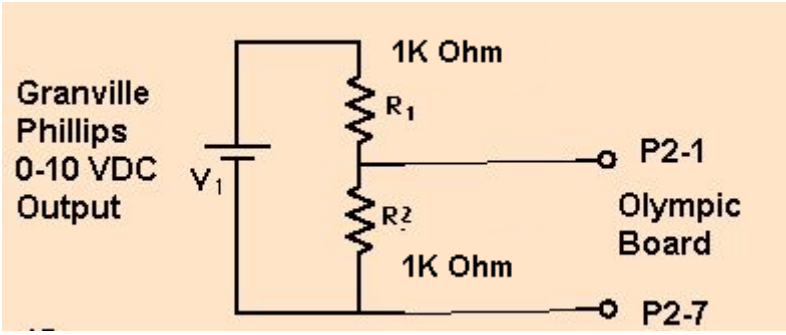


Overview
The Synergy Controller supports Space Chamber applications with Granville Philips ION Vacuum gauges. This application note explains the setup procedure and provides examples for these installations.

Note that this application note is based on controller software 2.7.9 and may not apply for all previous versions. Consult the factory for upgrade information.

CAUTION! : The Analog inputs on the controller will be damaged if the 10 V transducer output is attached without a voltage divider.

1. Wire the Granville Philips 10 Volt output thru a 2:1 voltage divider as shown below. (Analog inputs 2, 3 or 4 may also used) Note: 1K/1K ohm resistor divider must be used. A precision 1% metal film resistor suitable for this application is the Panasonic ERO-S2PHF1001 available from Digikey.

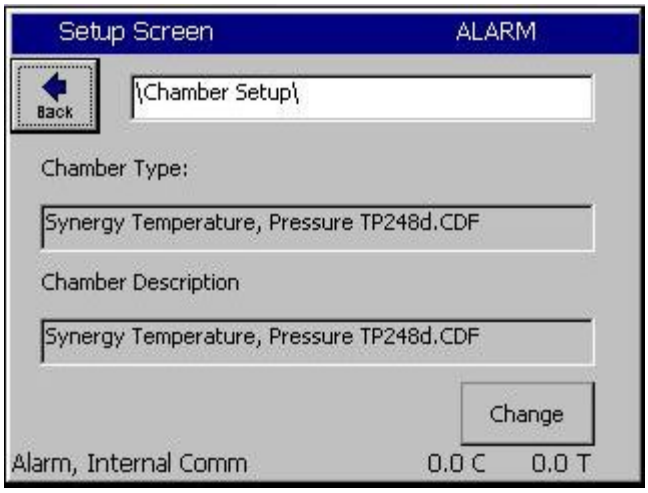


Signal	Olympic Board Connector-Pin	Reference
Analog Input 1	P2-1	P2-7
Analog Input 2	P2-5	P2-7
Analog Input 3	P2-6	P2-7
Analog Input 4	P2-11	P2-7

2. Install Software version 2.4.81 or higher.

3. Select the chamber setup for Temperature Pressure as shown below and reboot as instructed.

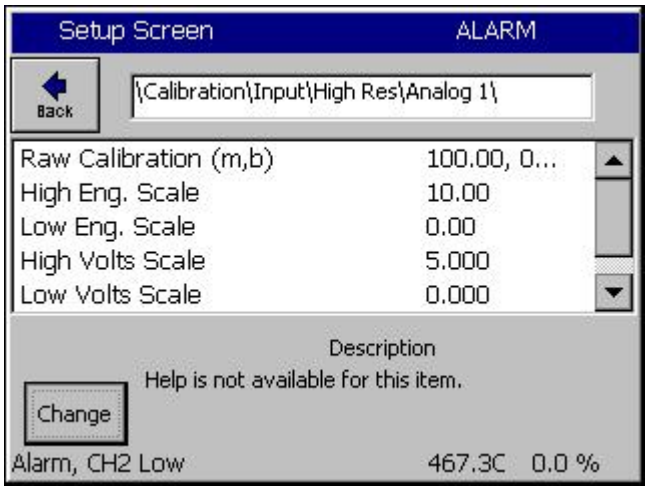
SETUP/Chamber Setup/ Select Generic Temperature, Pressure



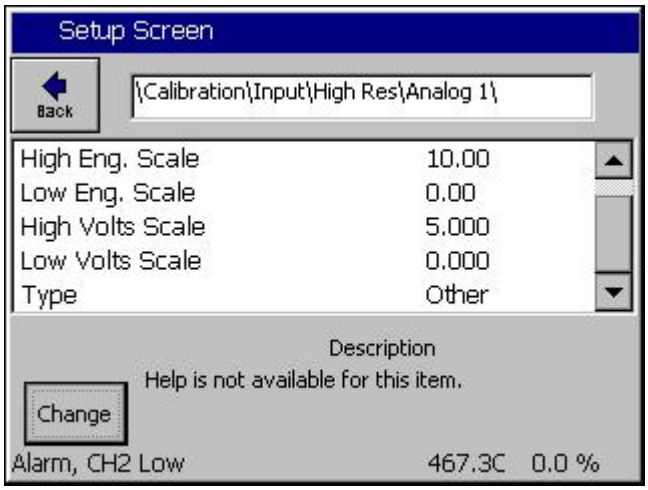
4. Setup the Hi Res input calibration for the input used as shown below.

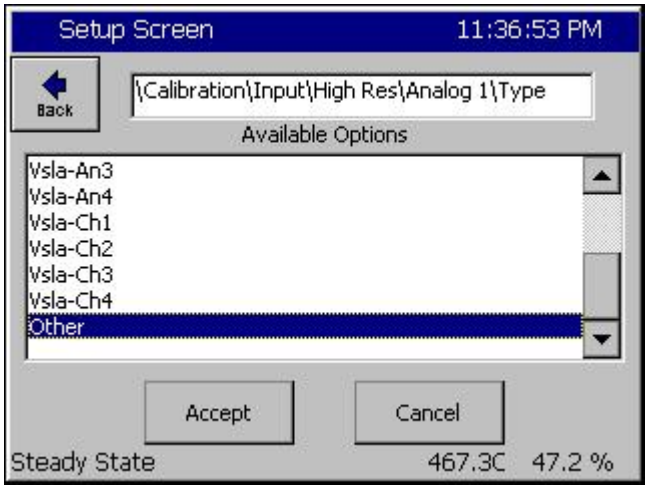
SETUP\Calibration\Input\Hi Res\Analog 1 (P2-1 to P2-7)

Set High Eng. Scale to 10 Volts
Set Low Eng. Scale to 0 Volts
Set High Volts Scale to 5 Volts
Set Low Volts Scale to 0 Volts



Setup the Type to “Other” as shown below. Selecting a Temperature or Vaisala type would obviously be inappropriate and would create erroneous readings.

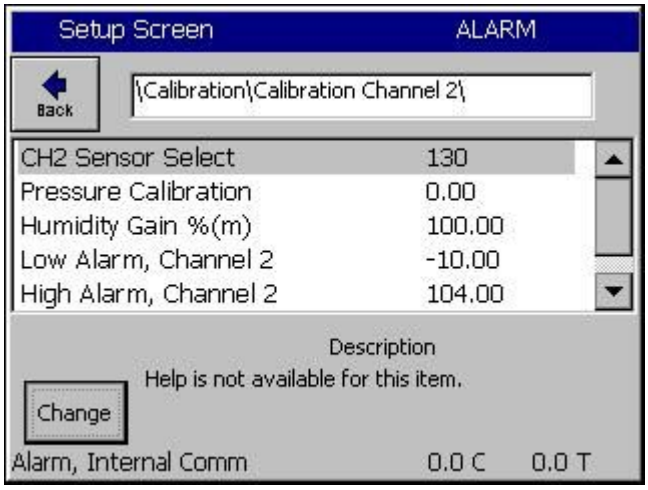




4. Select the channel sensor

SETUP\Calibration\Calibration Channel 2

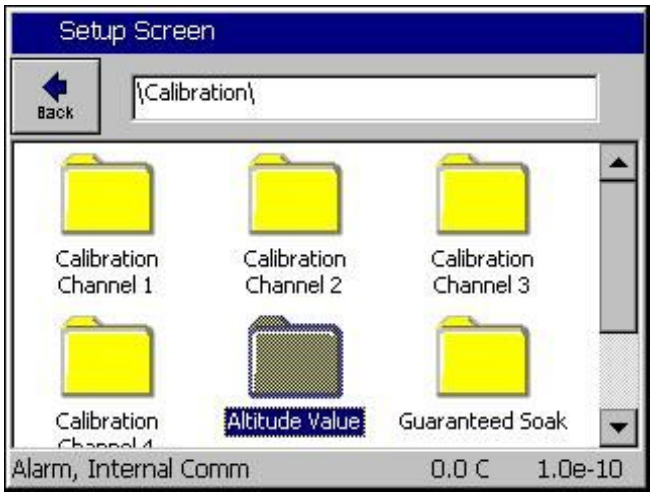
Select Analog 1 for sensor (CH2 Sensor Select code 130)



5. Setup the Altitude calibration constant based on the Emission setting for the Granville Philips ION gauge as follows:

n = 12 for 10 mA
n = 11 for 1 mA
n = 10 for 0.1 mA

SETUP/Calibration/Altitude Value



The UHV electrometer option (307016) switches in a preamplifier as pressure decreases at an ion (collector) current of 10^{-10} A. For example, this corresponds to a pressure of 10^{-9} Torr with 10 mA emission current. When this switching occurs, there will be a brief (about 2 s duration) drop in the analog output signal. After the electrometer has settled out, the signal is, again, proportional to the common logarithm of pressure as shown by the UHV ONLY area of Figure 2-4.

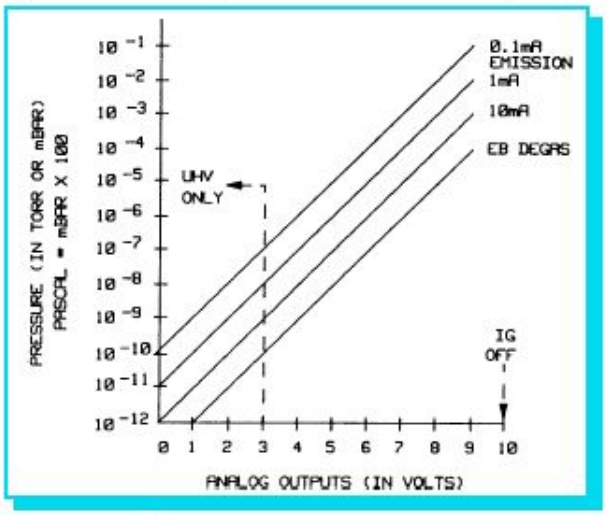


Figure 2-4 *Ion Gauge Pressure Analog Output.*

A standard 1/8 in. miniature phono jack connector and plug are supplied.

The characteristics of this type of analog output voltage are ideal for applications requiring closed loop control. The voltage signal is smooth and continuous throughout all the decades of pressure measurement. This format is useful for computerized data acquisition because a simple equation (finding the common antilogarithm) may be programmed to calculate pressure from the voltage output.

The equation is:

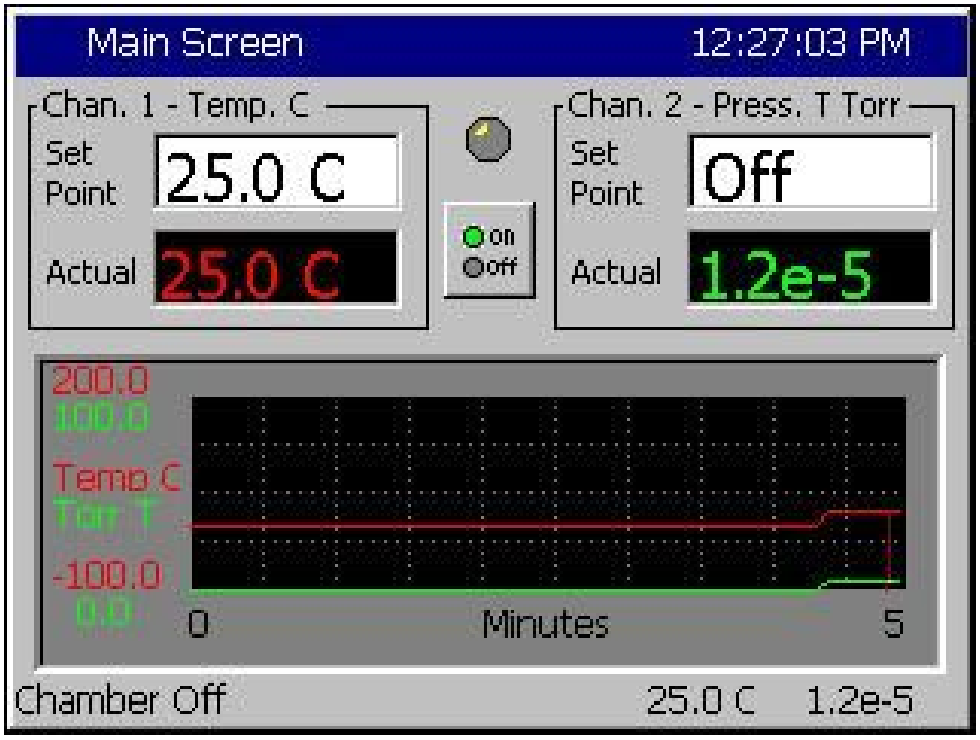
$$P = 10^{(V-n)}$$

Where V = analog output voltage;
n = 12 for the 10 mA emission current range;
n = 11 for the 1 mA emission current range;
n = 10 for the 0.1 mA emission current range.

For example, if emission current is set to the 1 mA range and the analog output voltage is 3.25 volts, the pressure (in units selected) may be determined by raising 10 to the power (V-11) or

$$P = 10^{(3.25-11)} = 1.8 \times 10^{-8} \text{ (Torr, for example)}$$

5. Pressure is displayed on Chan. 2 in scientific notation as shown below.



6. The log file also records pressure in scientific notation in units of Torr.

7. Now that the controller is setup, confirm displayed values using the table below.

Output in Torr is 10^((Vhires*2)-n)

With n =12 and 5 volts on the Olympic board input, the controller will show 1.0e-2
With n =11 and 5 volts on the Olympic board input, the controller will show 1.0e-1
With n =10 and 5 volts on the Olympic board input, the controller will show 1.0e-0

With n =12 and 0 volts on the Olympic board input, the controller will show 1.0e-12
With n =11 and 0 volts on the Olympic board input, the controller will show 1.0e-11
With n =10 and 0 volts on the Olympic board input, the controller will show 1.0e-10

With n =12 and 2.1 volts on the Olympic board input, the controller will show 1.6e-8
With n =11 and 2.1 volts on the Olympic board input, the controller will show 1.6e-7
With n =10 and 2.1 volts on the Olympic board input, the controller will show 1.6e-6

This concludes the Space Chamber Setup demonstration. For more information concerning Space Chamber Setup, consult the Synergy Controller Technical Manual on our website and/or contact technical support at the factory.

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. Tidal's products are available exclusively through ADI American Distributors Inc., an ISO-9002 certified distributor of electronic and electromechanical components and assemblies.

Tidal Engineering Corporation
2 Emery Avenue
Randolph, NJ 07869
Tel: 973/328-1173
Fax: 973/328-2302
www.TidalEng.com
info@tidaleng.com