SRS Tech Note

Using Pressure Transducers with the BGA244

The BGA244 needs to know the gas pressure to within ± 1 psi (6.9 kPa) to meet its specified accuracy. If the pressure is known and relatively stable, this can be entered from the front panel or over one of the computer interfaces. However in many applications, the pressure may vary over time or operating conditions. These cases will benefit from integrating a pressure transducer with the BGA244, using one of the analog inputs. This provides a simple, integrated solution to provide the best accuracy across a range of operating conditions.

What kind of Pressure Transducer to use?

The BGA244 can interface with a wide variety of pressure transducers. The choice of which one to use largely depends on the application. Transducers come in many different pressure ranges, gas fittings and accuracies. Choose a transducer with good sensitivity and accuracy and that matches the operating pressure of your system. After the appropriate fittings and pressure range are selected, there are two other specifications to consider when choosing a transducer to use with the BGA244.

Gauge Pressure vs Absolute Pressure

The BGA244 uses the absolute pressure of the gas as part of its calculations. However pressure transducers come in both absolute pressure units (relative to vacuum) and gauge pressure units (relative to the ambient pressure outside the gauge). While the BGA244 can be configured to operate with either type of transducer, absolute pressure units are preferred because they are simpler to configure and they eliminate ambient pressure variations.

Loop Power

The BGA244 can interface to most pressure transducers that output a voltage or current within the nominal analog input range. However the simplest interface is a current output pressure transducer that can be powered by the internal loop power supply of the BGA244. This simplifies the installation and eliminates the need for a separate power supply.

Note that the BGA244 must be connected to an external 24 V_{DC} power supply in order to use an external pressure transducer.

Recommended Pressure Transducers

The pressure transducers listed below are examples of devices that are suitable to use with the BGA244. If you are using a transducer that isn't similar to these, it may be useful to consult the BGA244 User Guide for instructions.

Pressures up to 50 psi(a)

The PX309-050AI transducer from Omega[1] is suitable to interface with the BGA244 for applications operating up to 50 psi(a). Because the full scale pressure is 50 psi, the 1.5% error leads to a pressure error of <0.75 psi. It is reasonably priced and widely available.

- 0 to 50 psia operating range, 150 psi(a) over pressure
- 4-20 mA output with 9 – 30 V_{DC} loop power voltage
- ¼-18 male NPT gas fitting
- All stainless steel wetted materials
- < 1.5% total error over the entire operating range

Pressure up to 150 psi(a)

The PX409-150AI transducer from Omega[1] is suitable to interface with the BGA244 for applications operating up to 150 psi(a). To maintain a pressure accuracy of <1 psi, it is necessary to have a maximum error of s <0.7%. The calibration data provided with the PX409 transducer can be used to adjust the nominal set points on the BGA244. The PX409 is somewhat more expensive than the PX309 due to the improved accuracy.

- 0 to 150 psia operating range, 600 psia over pressure
- 4-20 mA output with 9 – 30 V_{DC} loop power voltage
- ¼-18 male NPT gas fitting
- All stainless steel wetted materials
- ±0.08% BSL accuracy
- <0.5% FS span error, <0.5% FS zero error

[1] Omega Engineering Inc® http://www.Omega.com

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Installing the Pressure Transducer

Locate the pressure transducer on the BGA244 side of any restriction to minimize any difference in between the measured pressure and the pressure at the BGA244. Items that restrict include valves, flow controllers, flow meters, orifices, or long lengths of tubing, especially for high flow rates. The transducer can be connected on either the up or down stream side of the BGA244.

Connect the pressure transducer to the gas system following the manufacturer's installation instructions.

Wire the pressure transducer to the BGA244

Connect the pressure transducer leads to IN 1 +/− on the right side of the BGA244.

- Red lead to IN 1+
- Black lead to IN 1-

Unplug the screw terminal section of the terminal block to make it easier to connect the wires.

Configuring the BGA244

Configure the Analog Input

- Go to [SETUP] [CONTROL PANEL] (page down) [ANALOG IO] [INPUT 1]
- Set Type to "Current w/ Loop Power"
- Set the Loop Power Voltage to 12.0 V
- Be sure the Input is enabled

At this point, the Input should display a measured current value between 4 & 20 mA. If the current is outside this range or an error is displayed, check that the wires are properly connected.
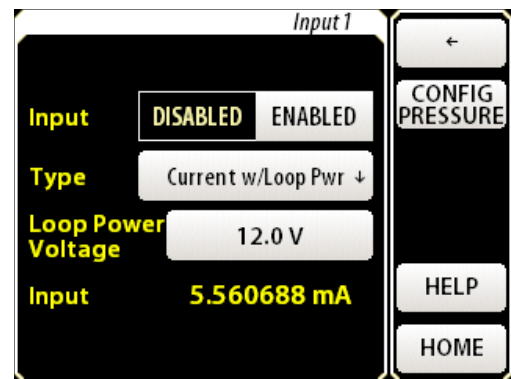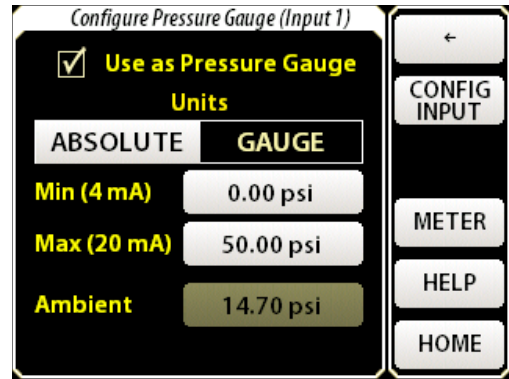
Configure the Pressure Gauge

- Press [CONFIG PRESSURE]
- Check the "Use as Pressure Gauge" check box
- Set the Units to [ABSOLUTE]
- Set Min to 0 psi
- Set Max to the maximum pressure for the transducer (50 psi for the PX309, 150 psi for the PX409). The setting for the PX309 is shown here.
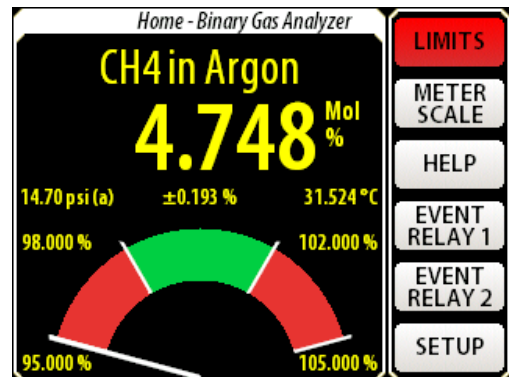
Set the BGA244 to use the pressure transducer

- Press [HOME]
- Press [SETUP] [PRESSURE]
- Set Use for analysis to "ANALOG INPUT 1"
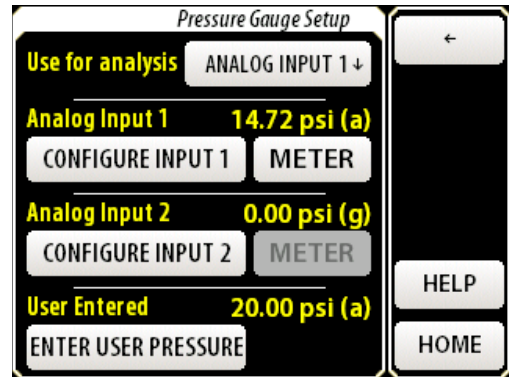
At this point the pressure transducer is reporting the transducer pressure to the BGA244. Press [Home] and verify that the pressure reading is in psi(a). If the transducer is open to air it should read the local atmospheric pressure (14.7 psi(a) at sea level).

Conclusions

The BGA244 needs to know the gas pressure to within ± 1 psi (6.9 kPa) to meet its specified accuracy. Fortunately this can easily be accomplished by interfacing a pressure transducer to the BGA244.

Contact

Visit our web site at http://www.thinksrs.com/products/BGA244.htm for additional information.

Or call us at 408-744-9040 to discuss your application.

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