

Procedure for Field Calibration Check of Digital Pressure Gauge (Using a DG-500, DG-700 or DG-1000 as the Reference Standard)

Overview

This is a procedure that compares your gauge to a **Reference Standard** to confirm that your gauge is still within the manufacturer's calibration specification. The **Reference Standard** is a gauge that should be recalibrated by The Energy Conservatory once every 12 months for DG-1000 and every 6 months for DG-700 and DG-500. The **Reference Standard** gauge should only be used for calibration checks of other pressure gauges. In lieu of having a separate in-house **Reference Standard**, it is acceptable to test your gauges against another DG-500, DG-700 or DG-1000 that has just been returned from calibration at The Energy Conservatory. We strongly recommend that you use our TECLOG4 software for this procedure for the following reasons:

- The software recognizes and records the gauge serial number and the date of last calibration.
- The software graphs the calibration check procedure
- Once you get to a target pressure you can create a 10 second average period of record
- You can view the stats for each period of record
- When a gauge auto-zeros (the click-click noise) the pressure will drop slightly. The software will auto-zero all of the gauges at the same time and you have the ability to adjust the time period between auto-zeros.
- The TECLOG4 test file is your record for your Field Calibration Check.

1. Pressure Testing Apparatus

The syringe used for this check should be no larger than 1 mL and you should use 30' of tubing as shown below or you may damage the pressure sensor of the gauges. Set up the **Reference Standard** and the gauge to be tested as shown in the diagram below. Always start with the plunger of the syringe depressed all the way in the cylinder before connecting the tubing to the digital gauges. The tubing to the digital gauges should be connected to the **Reference** taps.



2. Comparing Pressure Measurements to the Reference Standard

This procedure will involve comparing pressure readings at a number of different pressures. These pressures will be created by adjusting the syringe. At each comparison point (called a **Pressure Station**) the difference in the pressure reading between the two gauges will be determined and compared with the maximum acceptable difference for that **Pressure Station** shown in Table 1. If the difference in readings is greater than the maximum acceptable error shown in Table 1 for any of the Pressure Stations, the digital gauge being tested should be returned to The Energy Conservatory for recalibration.

a. Procedure for Checking Calibration of DG-500, DG-700 or DG-1000 Gauge:

1. Turn on the gauges to be tested and the **Reference Standard** so they will auto zero (the click-click noise) at the same time and leave them both in the **PR/PR** mode.
2. First attach the tubing to the pressure gauges and then to the syringe. When you attach to the syringe, you will notice a negative number displayed on the Standard Gauge.
3. Grasp the flange of the syringe and **SLOWLY** pull “**out**” on the syringe until you move past zero to a positive number. If you grasp the body of the syringe or the tubing you will notice a decrease in pressure caused by the temperature change in the tubing. Adjust the syringe until **Channel A** on the **Reference Standard** reads about +500 Pa (+/- 30 Pa).
4. Wait for the pressure readings to stabilize, determine the difference in the pressure reading between the **Reference Standard** and both **Channel A** and **Channel B** on the gauge being tested. (**Note:** If the pressure readings are dropping too quickly to make an accurate comparison between the 2 gauges, there is a leak somewhere in the pressure testing apparatus. First check the tubing connections, the syringe, and the tubing itself for leaks. If you are unable to eliminate the air leak, it may be located in the gauge being tested, or possibly the **Reference Standard**. Call TEC at 612-827-1117 for further help in diagnosing the problem.)

Table 1: Maximum Acceptable Gauge Error

Pressure Station (Pa)	Max Acceptable Difference (Pa)
+500	5
+50	0.5
-500	5
-50	0.5

5. Compare the pressure difference found with the maximum acceptable difference shown in Table 1 above for the +500 Pressure Station. (**Note:** If the difference is less than or equal to the maximum allowable error, the gauge is still within its calibration specification.)
6. Slowly push “**in**” the syringe until the **Reference Standard** reads approximately +50 Pa (+/- 5 Pa). After the pressure readings have stabilized, determine the pressure difference between the **Reference Standard** and both channels on the gauge being tested. Now compare this difference with the maximum acceptable difference found in Table 1 for the +50 Pressure Station.
7. Remove the tubing from the digital gauge being tested. Reconnect the clear tubing to both **Input** taps on the gauge being tested.
8. **SLOWLY** pull “**out**” on the syringe. Adjust the syringe until the **Reference Standard** is at about +500 Pa (+/- 30 Pa). The pressure readings on the digital gauge being tested will display a negative sign.

9. After the pressure readings have stabilized, determine the difference in the pressure reading between the **Reference Standard** and both channels on the gauge being tested. (**Note:** When determining the reading difference, ignore the negative sign on the gauge being tested.)
10. Compare the pressure difference found with the maximum acceptable difference shown in Table 1 for the -500 Pressure Station.
11. Slowly push “**in**” the syringe until the **Reference Standard** reads approximately +50 Pa (+/- 5 Pa). After the pressure readings have stabilized, determine the pressure difference between the gauges. Now compare this difference with the maximum acceptable difference found in Table 1 for the -50 Pressure Station. The calibration check procedure is complete.

b. Procedure for Checking Calibration of DG-3 or DG-2 Gauge:

1. Set up the DG-3 or DG-2 gauge to be tested by turning the **CHANNEL** knob to “**A**”, push the **RANGE** switch up to **2000 Pa** (High Range – 1 Pa resolution), and turn the gauge on in the **PRESSURE** mode with 1 second average readings.
2. Set up the **Reference Standard** by turning the gauge on and leaving it in the **PR/PR** mode.
3. SLOWLY pull “**out**” on the syringe. The pressure readings should increase on both digital gauges. Adjust the syringe until **Channel A** on the **Reference Standard** reads about +500 Pa (+/-30 Pa). Place the syringe on the table.
4. After the pressure readings have stabilized, determine the difference in the pressure reading between the **Reference Standard** and the gauge being tested. (**Note:** If the pressure readings are dropping too quickly to make an accurate comparison between the 2 gauges, there is a leak somewhere in the pressure testing apparatus. First check the tubing connections, the syringe, and the tubing itself for leaks. If you are unable to eliminate the air leak, it may be located in the gauge being tested, or possibly the **Reference Standard**. Call TEC at 612-827-1117 for further help in diagnosing the problem).
5. Compare the pressure difference found with the maximum acceptable difference shown in Table 1 below for the +500 Pa Pressure Station.
6. Slowly push “**in**” the syringe until the **Reference Standard** reads approximately +50 Pa (+/- 5 Pa). Set the **RANGE** switch on the DG-3 or DG-2 gauge being tested down to **200.0 Pa** (Low Range – 0.1 Pa resolution). After the pressure readings have stabilized, determine the pressure difference between the gauges. Now compare this difference with the maximum acceptable difference found in Table 1 for the +50 Pa Pressure Station.
7. Remove the clear tubing from the digital gauge being tested. Push the syringe completely “**in**”. Reconnect the clear tubing to the **Channel A Input** tap on the gauge being tested.
8. Set the **RANGE** switch on the gauge being tested back up to **2000 Pa**.
9. SLOWLY pull “**out**” on the syringe. Adjust the syringe until the **Reference Standard** is at about +500 Pa (+/- 30 Pa). The pressure reading on the digital gauge being tested will display a negative sign. Place the syringe on the table.
10. After the pressure readings have stabilized, determine the difference in the pressure reading between the **Reference Standard** the gauge being tested. (**Note:** When determining the reading difference, ignore the negative sign on the gauge being tested.)
11. Compare the pressure difference found with the maximum acceptable difference shown in Table 1 for the -500 Pa Pressure Station.
12. Slowly push “**in**” the syringe until the **Reference Standard** reads approximately +50 Pa (+/- 5 Pa). Set the **RANGE** switch on the DG-3 or DG-2 gauge being tested down to **200.0 Pa**. After the pressure readings have stabilized, determine the pressure difference between the gauges. Now compare this difference with the maximum acceptable difference found in Table 1 for the -50 Pa Pressure Station.
13. If the difference in readings is greater than the maximum acceptable error shown in Table 1 for any of the Pressure Stations, the digital gauge being tested should be returned to The Energy Conservatory for recalibration.

3. General Maintenance for Energy Conservatory Digital Pressure Gauges

- Operating temperature range: 32 F to 120 F.
- Storage temperatures - 4 F to 160 F (best to keep it warm during cold weather).
- Avoid conditions where condensation could occur, for example taking a gauge from a hot humid environment into a cool environment or from a cool environment into a hot humid environment.
- Do not store gauge in the same container as your chemical smoke. The smoke can and does cause corrosion.
- Use alkaline or rechargeable batteries in the DG3, DG-500 and DG-700.
- Avoid exposing the gauge to excessive pressures, such as caused by tubing slammed in a door.
- Check the tubing (used to connect the digital gauge to the fan, outdoors and/or duct system) for air leaks. Inspect both ends of the tubing to make sure they are not stretched out or split. Periodically trim off a small piece from each end of the tubing. To check the remainder of the tubing for leaks, connect one end of the tube to your gauge and connect the other end to the 1 mL syringe. Apply a pressure of about 200 Pa and see if it holds pressure. If the pressure drops rapidly, replace the tubing.

Calibration Check Form For Digital Pressure Gauges

Company: _____

Gauge Serial # _____ Date _____ Technician _____

Last Factory Calibration Date _____

Pressure Station (Pa)	DG Standard (Pa)	Channel A DG Being Tested (Pa)	Channel B DG Being Tested (Pa)	Channel A Difference (Pa)	Channel B Difference (Pa)	Maximum Allowable Difference (Pa)
+500						5 Pa
+50						0.5 Pa
-500						5 Pa
-50						0.5 Pa

Gauge Serial # _____ Date _____ Technician _____

Last Factory Calibration Date _____

Pressure Station (Pa)	DG Standard (Pa)	Channel A DG Being Tested (Pa)	Channel B DG Being Tested (Pa)	Channel A Difference (Pa)	Channel B Difference (Pa)	Maximum Allowable Difference (Pa)
+500						5 Pa
+50						0.5 Pa
-500						5 Pa
-50						0.5 Pa

Gauge Serial # _____ Date _____ Technician _____

Last Factory Calibration Date _____

Pressure Station (Pa)	DG Standard (Pa)	Channel A DG Being Tested (Pa)	Channel B DG Being Tested (Pa)	Channel A Difference (Pa)	Channel B Difference (Pa)	Maximum Allowable Difference (Pa)
+500						5 Pa
+50						0.5 Pa
-500						5 Pa
-50						0.5 Pa