

Field Calibration of the DP-CALC™ Micromanometer Models 8702 and 8705

Application Note TI-112E

The Model 8702¹ and 8705 DP-CALC™ Micromanometers can be calibrated in the field. This enables you to perform a multiple-point pressure calibration similar to the factory calibration. Because velocity and flow rate readings are calculated from the pressure measurement, pressure is the only function that needs to be calibrated. For the most accurate, complete, multiple-point calibration and certification, the instrument should be returned to the factory.

The field calibration will be stored in the instrument's calibration EEPROM in a different location than the factory calibration. The field calibration is stored permanently until changed again. You can return to the factory calibration at any time.

To perform the field calibration, you will need a device to set the pressure on the DP-CALC™ micromanometer, such as a squeeze bulb attached to the DP-CALC with tubing. You also need a device to measure the exact pressure (besides the DP-CALC™ micromanometer), such as a second manometer that has been recently calibrated. To abort the field calibration process at any time, turn off the DP-CALC™ micromanometer. The field calibration data will not be saved unless the whole calibration procedure is completed.

Field Calibration Procedure

1. Prepare the equipment to calibrate the DP-CALC™ micromanometer. Connect a squeeze bulb to a piece of tubing, put a T-shaped fitting at the end of the tubing, and connect two more pieces of tubing to the fitting. These pieces of tubing will be connected to the DP-CALC™ micromanometer and the other measurement device.
2. With the power OFF, remove the batteries and push DIP switch #6 to ON. To return to factory calibration at any time, turn DIP switch #6 off while the DP-CALC™ micromanometer is off. Reinstall the batteries and the battery cover. Turn the DP-CALC™ micromanometer ON.

¹ Field calibration is available on Model 8702 Rev. E and later. To do field calibration on an earlier version, please return the instrument to TSI for a Revision upgrade.

3. Press the VELOCITY and TIME CONSTANT (on the Model 8702) or ENTER (on the Model 8705) keys simultaneously, releasing them when the DP-CALC™ micromanometer beeps. “CAL” should light up on the display for 2 seconds, followed by a zero flashing on the display.
4. Leave both pressure ports open to ambient air. Make sure that there is no significant air flow past the pressure ports.
5. When ready to take the zero reading, press and hold the SAMPLE / ENTER key to start a countdown on the display. Release the SAMPLE / ENTER key when “0” shows on the display. If the key is released at any other time, the calibration point is not saved and this step must be repeated. If the calibration point was saved successfully, “-3” will show on the display.
6. Connect one end of the tubing to the “-” port of the DP-CALC™ micromanometer and the other end to the “-” port of the second measurement device. Squeeze the bulb to apply a pressure of 3 inches H₂O (750 Pa) to the “-” port of the DP-CALC™ micromanometer and the other pressure measurement device. Testing at the factory indicates that a pressure between 2 and 4 inches H₂O (500 and 1000 Pa) is acceptable, but 3 inches H₂O (750 Pa) will give the best accuracy.
7. When ready to take the -3 reading, press and hold the SAMPLE / ENTER key to start a countdown on the display. Release the SAMPLE / ENTER key when “0” shows on the display. If the key is released at any other time, the calibration point is not saved and the step must be repeated. If the calibration point was saved successfully, “-3.00” will show on the display.
8. Press the up and down arrows to change the display to read the same as the other pressure measurement device. Press the SAMPLE / ENTER key to accept the value on the display. If the calibration point was successful, “7” will show on the display.
9. Connect one end of the tubing to the “+” port of the DP-CALC™ micromanometer and the other end to the “+” port of the second measurement device. Squeeze the bulb to apply a pressure of 7 inches H₂O (1750 Pa) to the “+” port of the DP-CALC™ micromanometer and the other pressure measurement device. Testing at the factory indicates that a pressure between 6 and 8 inches H₂O (1500 and 2000 Pa) is acceptable, but 7 inches H₂O (1750 Pa) will give the best accuracy.
10. When ready to take the +7 reading, press and hold the SAMPLE / ENTER key to start a countdown on the display. Release the SAMPLE / ENTER key when “0” shows on the display. If the key is released at any other time, the calibration point is not saved and the step must be repeated. If the calibration point was saved successfully, “7.00” will show on the display.
11. Press the up and down arrows to change the display to read the same as the other pressure measurement device. Press the SAMPLE / ENTER key to accept the value on the display. If the calibration point was successful, “14” will show on the display.
12. Squeeze the bulb to apply a pressure of 14 inches H₂O (3500 Pa) to the “+” port of the DP-CALC™ micromanometer and the other pressure measurement device. Testing at the factory indicates that a pressure between 13 and 15 inches H₂O (3250 and 3750 Pa) is acceptable, but 14 inches H₂O (3500 Pa) will give the best accuracy.
13. When ready to take the +14 reading, press and hold the SAMPLE / ENTER key to start a countdown on the display. Release the SAMPLE / ENTER key when “0” shows on the display. If the key is released at any other time, the calibration point is not saved and the step must be repeated. If the calibration point was saved successfully, “14.00” will show on the display.
14. Press the up and down arrows to change the display to read the same as the other pressure measurement device. Press the SAMPLE / ENTER key to accept the value on the display. “CAL” will light up on the display to indicate that the field calibration was finished successfully.
15. Turn off the DP-CALC™ micromanometer and then turn it back on to initialize the new calibration data.

Troubleshooting

The table below lists the symptoms, possible causes, and recommended solutions for possible field calibration problems encountered with the DP-CALC™ micromanometer. If your symptom is not listed, or if none of the solutions solve your problem, please contact TSI.

Note: *All problems encountered during field calibration can be corrected by turning off the DP-CALC™ micromanometer, setting DIP switch #6 to OFF, and turning on the DP-CALC™ micromanometer. This enables the factory calibration, which was not affected by the field calibration procedure.*

Symptom	Possible Causes	Corrective Action
Display reads "CAL"	New data has not been initialized.	Turn unit off and then on.
	The DP-CALC™ micromanometer has detected an internal fault.	Return to factory for service.
Display says "OVER"	Field calibration data changed zero point by an excessive amount.	Press and hold PRESSURE key to zero pressure.
	Field calibration points were not accurate.	Recalibrate DP-CALC™ micromanometer with a more accurate pressure measurement.
Pressure values displayed appear incorrect	Field calibration points were not accurate.	Recalibrate DP-CALC™ micromanometer with a more accurate pressure measurement device.
"Port Swap Error"	Field calibration with Rev. D or earlier.	Return to TSI for upgrade to latest Revision.

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