Dew Point Alarm System Calibration

7006-G503 Replacement DP Alarm System

I. When calibration is required:

If the replacement dew point monitor was shipped complete with sensor and cable, it was calibrated at the factory. If you purchased a monitor, sensor, or cable separately, you will have to calibrate the system as a whole before releasing it for service.

II. Calibration parameters

A. Measurement.

Measurements will be made by digitizing the capacitive sensor's reading and performing a linear interpolation using the five calibration points established during calibration.

The measurement calibration method will linearly interpolate between the two closest calibration points. This method is shown figuratively in Figure 1, curve A. It is possible that the current reading might fall outside of the calibration points. In this case, linear approximation will be used. This method is shown figuratively in Figure 1, curve B.

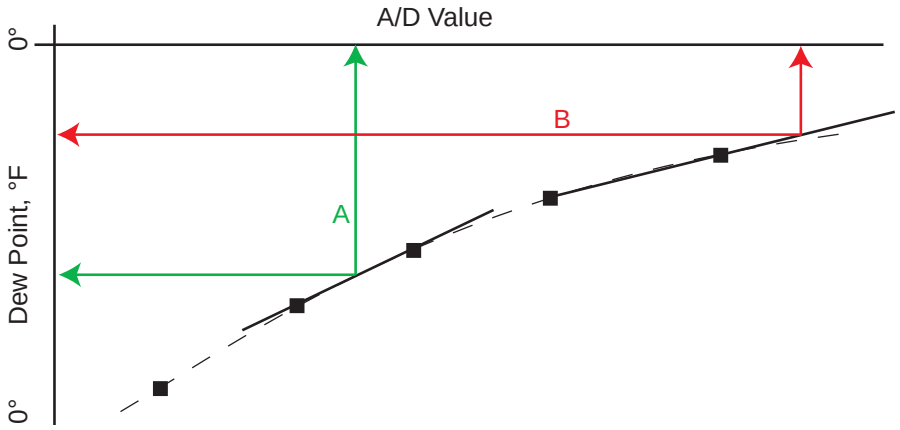

Figure 1. Linear Interpolation (A) and Linear Approximation (B)

B. Analog output.

The 4-20 mA analog output will be scaled from -60° F (4 mA) to 0° F (20 mA).

C. Errors.

If an error occurs (open/shorted sensor or any other error), a fault (FL) error code will be shown on the display and the analog output will go to 0 mA. The following error codes are defined:

Fault Code	Description	Notes
FL1	Bad cal database	You should never see this.
FL2	Bad alarm database	You should never see this.
FL3	Bad +12V supply	
FL4	Bad -12V supply	
FL5	Sensor out of range, low	Open, grounded or shorted sensor or cable or the sensor capacitance is less than 1.0 nF (see section on calibration data values).
FL7	Sensor Out of Range, high	The sensor capacitance is greater than 7.0 nF (see section on calibration data values).

D. Calibration

The system will be calibrated using the calibration push button mounted on the enclosure door, a potentiometer, the digital display, and a calibrated external dew point standard. During calibration, five known results will be measured and stored in non-volatile memory for use in future dew point readings.

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E. The display

During normal operation, the display will show the current dew point reading. An example of this reading is shown in Figure 2.

Figure 2. Typical Operating Displays

NOTE

The first (leftmost) digit is not used during normal operation. Normal operating range is -60 to 00, but the display will support -99 to 99.

The procedure requires 5 data point entries before it completes and the data points may be entered in any order.

The system will continue to monitor the dew point and update the analog output (using the existing/old calibration-data) during the calibration process.

F. Calibration data values

The following scaling is used for the analog-to-digital (A/D) readings that are shown on the display:

- Calibration Setting A/D Range: 0 to 8192
- Capacitance Range: 1 to 7.1 nF

Consequently, an A/D calibration value of 2500 would correspond to a nominal sensor capacitance value of 2.17 nF:

Sensor Capacitance = (Reported A/D Value)(7.1 nF / 8192)

For the 2500 reported value in the above example, the calculation is:

2.17 nF = (2500) (7.1 nF / 8192)

These capacitance values are nominal and the calibration procedure will remove any errors due to component tolerances.

Calculated values outside of 1 nF to 7 nF will be considered an error (sensor out of range).

III. Calibration procedure

a. Start the dehydrator in accordance with Paragraph 2.3.2 of the technical manual. Observe all precautions.

b. Connect an external dew point monitor with approximately ± 1° F precision to the dew point sample port (Figure 3, 1).

c. Turn the purge selector valve (Figure 3, 2) from Normal to Isolate.

d. Turn the calibration dump valve (Figure 3, 3) from Normal to Calibrate. You will hear a rush of air to atmosphere behind the panel.

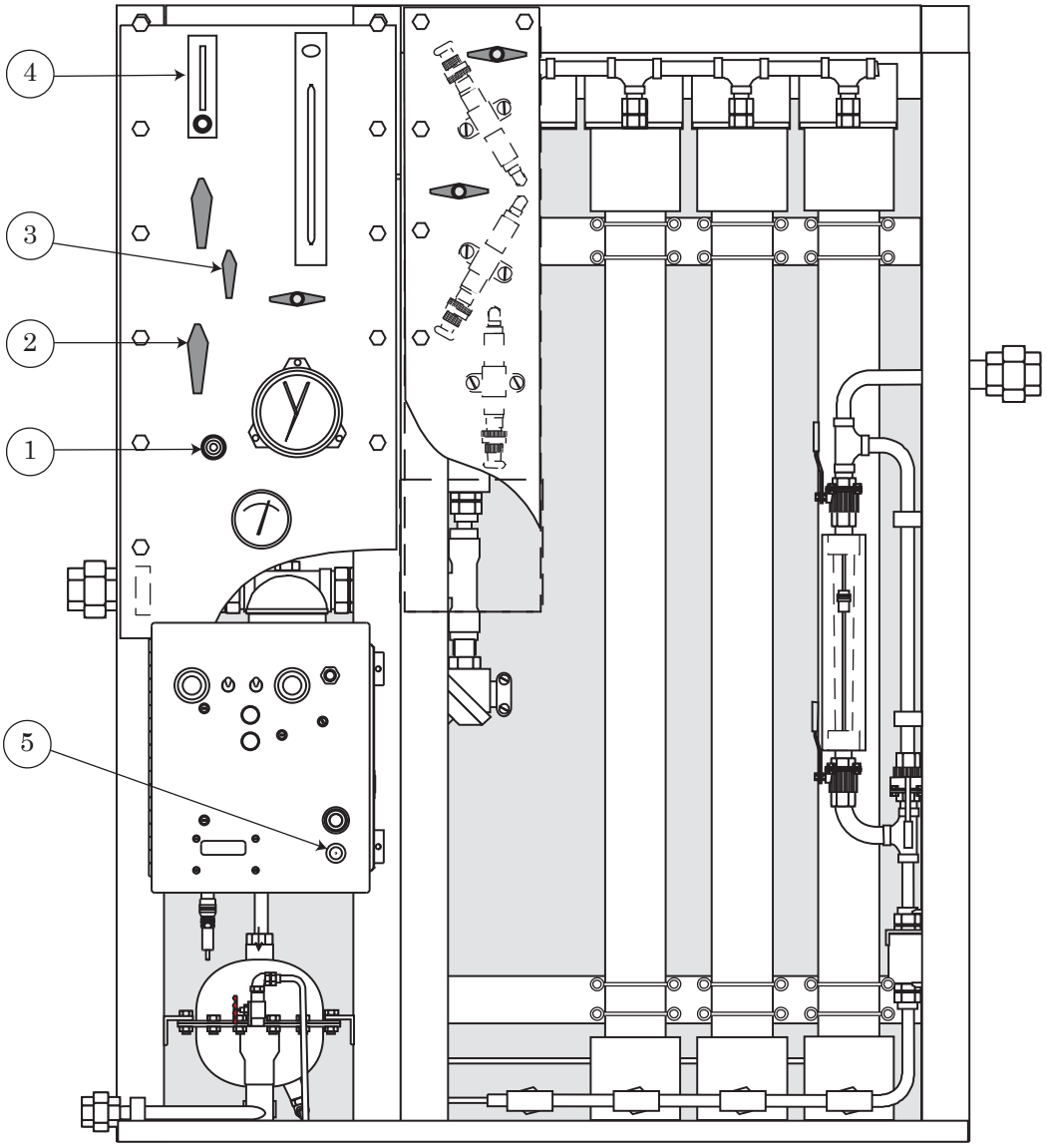

Figure 3. Front View

e. Close the metering valve at the bottom of the calibration flowmeter (Figure 3, 4). This allows starting with dry air from the dehydrator outlet.

f. Press the calibration push button (Figure 3, 5) and hold for 5 seconds (but not more than 10 seconds), then release it. The system enters calibration mode and the display will show (Figure 4) the calibration input number (blinking) and the setpoint value (not blinking - steady).

NOTE

In the preceding step, if the system immediately enters an "FL5" error state, the output air is too dry (the system thinks the sensor has failed). Open the metering valve closed in step e just a little to raise the dew point into the -60° - 0° F range. Periodically, press the calibration push button briefly (do not hold it) until the FL5 error clears, then proceed with step f.

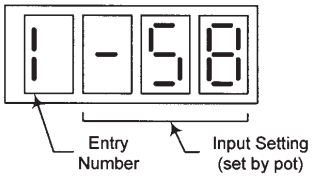

Figure 4. Typical First Calibration Display

g. In accordance with the technical manual, establish and measure a dew point of -60° F ± 5°. Wait 30 minutes for the dew point to stabilize before proceeding.

h. Note the dew point reading on the external dew point monitor. Use the potentiometer to set the display to that value (the -58 in Figure 4).

i. Once the setting is made, press the calibration push button to record that calibration point. The system moves to the second calibration point and the leftmost digit (entry number) changes to "2."

j. Repeat steps g through i for calibration points 2, 3, 4, and 5 at dew points of -45° F ± 5°, -30° F ± 5°, -15° F ± 5°, and 0° F ± 5° respectively.

k. When you press the calibration button to accept the fifth and final reading (Figure 5), the system will indicate a successful calibration run by flashing "ACC." (accepted), as shown in Figure 6. Press the button one more time to clear the accepted indication and return to normal operation.

l. If the calibration fails for any reason, a "FAIL" indication will flash. Press the button one more time to clear the failure indication and return to normal operation. In this case, the new calibration data will be discarded and the old data used.

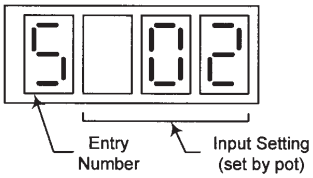

Figure 5. Typical Fifth Calibration Display

Exiting the calibration procedure

To exit the calibration procedure at any time, press and hold the push button for five seconds. The failure indication will be shown. Press the button one more time to clear the failure indication and the system will return to normal operation. The new calibration data will be discarded and the old data used.

Figure 6. "Accept" and "Fail" Displays

Recalling the calibration data

To display the calibration data, press (quickly) the calibration push button while the system is in normal operation. The display will show "C1" for the first calibration setpoint. Press the push button to display the A/D (Analog-to-Digital) value, a four-digit number. Press again to display the corresponding dew point. Record the A/D value and the dew point manually.

Press the push button repeatedly to display the remaining four setpoints. Record the A/D values and the dew points manually.