Calibrate Fischer Porter Series 50DP4100 Pressure Transmitter

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides instructions for calibration of the Fischer Porter Pressure Transmitter with 4 to 20 mA output.

1.2 Scope

This procedure involves Fischer Porter Series 50DP4100 Pressure Transmitter with 4 to 20 mA output.

2.0 INFORMATION

NONE

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

WARNING - Failure to comply with electrical safety practices as outlined in DOE–0359, Hanford Site Electrical Safety Program could result in electrical shock or electrocution.

3.2 Radiation and Contamination Control

3.2.1 Work in radiological areas will be performed using a radiation work permit following review by Radiological Control per the ALARA Work Planning procedure TFC-ESHQ-RP_RWP-C-03.

4.0 PREREQUISITES

4.1 Special Tools, Equipment, and Supplies

The following supplies may be needed to perform this procedure:

- Calibrated Digital Multimeter (DM) with range 4-20 mADC
- Calibrated Digital Manometer with range as required on the Data Sheets
- Power Supply; 18 - 45 V dc (use loop power supply for field calibrations).
4.2 Performance Documents

The following documents may be needed during the performance of this procedure.

- VI File, Vendor Information, Fischer Porter, Inc., "Series 50DP4100 Pressure Transmitters."
5.0  PROCEDURE

WARNING

Failure to comply with electrical safety practices as outlined in DOE–0359, Hanford Site Electrical Safety Program could result in electrical shock or electrocution.

5.1  As-Found Values

5.1.1  ISOLATE transmitter from service.

5.1.2  CONNECT test equipment to transmitter.

5.1.3  APPLY test input signals specified on Data Sheet AND RECORD corresponding output values in As-Found section of Data Sheet.

5.1.4  IF transmitter As-Found values are within tolerance range specified by Data Sheet, RECORD values in As-Left section of Data Sheet AND GO TO Section 5.3, Restoration.

5.1.5  IF instrument As-Found outputs are out of tolerance specified by Data Sheet and adjustments are required, PROCEED to Section 5.2, Calibration.
5.2 Calibration

NOTE - Zero and span adjustment screws are accessible externally behind the nameplate on the terminal side of the electronics housing.

- Figure 1 and Figure 2 can be referred to for Connection Locations.

- The following set of steps for Zero Suppression, Zero Elevation, and Zero equal to 4 mA calibration may be performed independently or not at all, but "MUST" be performed in sequence.

- Steps 5.2.1 through 5.2.13 are for Zero Elevation, Steps 5.2.14 through 5.2.27 are for Zero Suppression, Steps 5.2.28 through 5.2.37 are for a Zero equal to 4 mA calibration.

- For Section 5.2, Calibration, tolerances for 4 to 20 mA are specified on the individual Data Sheets.

Zero Elevation

5.2.1 OPEN high/low sides of transmitter to atmosphere.

5.2.2 ADJUST ZERO adjustment screw until transmitter output is 4 mA.

5.2.3 APPLY full scale span.

5.2.4 ADJUST SPAN adjustment screw until transmitter output is 20 mA.

5.2.5 RETURN inputs to atmospheric pressure.

5.2.6 ADJUST ZERO output to 4 mA.

5.2.7 APPLY full scale span.

NOTE - Under operating conditions that subject the transmitter to temperature extremes or significant vibration, mechanical backlash may occur in the zero and span adjustment screws.

5.2.8 IF backlash occurs, (to improve stability) slightly, ADJUST zero or span adjustment screw(s) back after final adjustment to break contact between potentiometer blades and adjustment screw slot surfaces as applicable.

5.2.9 REPEAT steps 5.2.5 through 5.2.8 until readings are within tolerance.
5.2 Calibration (Cont.)

5.2.10 ADJUST input pressure to minimum input value as listed on the Data Sheet.

5.2.11 ADJUST ZERO screw until transmitter output is 4 mA.

5.2.12 IF elevation cannot be achieved, MOVE large elevation jumper (see Figure 3) AND

REPEAT step 5.2.11.

5.2.13 IF elevation is achieved, GO TO step 5.2.37.

Zero Suppression

5.2.14 OPEN high/low sides of transmitter to atmosphere.

5.2.15 ADJUST ZERO adjustment screw until transmitter output is 4 mA.

5.2.16 APPLY full scale span.

5.2.17 ADJUST SPAN adjustment screw until transmitter output is 20 mA.

5.2.18 RETURN input to atmospheric pressure.

5.2.19 ADJUST ZERO output to 4 mA.

5.2.20 APPLY full scale span.

NOTE - Under operating conditions that subject the transmitter to temperature extremes or significant vibration, mechanical backlash may occur in the zero and span adjustment screws.

5.2.21 IF backlash occurs, (to improve stability) slightly, ADJUST zero or span adjustment screw(s) back after final adjustment to break contact between the potentiometer blades and the adjustment screw slot surfaces as applicable.

5.2.22 REPEAT steps 5.2.18 through 5.2.21 until readings are within tolerance.

5.2.23 CONNECT manometer to low input side of transmitter.
5.2 Calibration (Cont.)

5.2.24 ADJUST input pressure to minimum input value (use positive pressure) as listed on Data Sheet.

Example: if minimum is -10 in H₂O input 10 in H₂O.

5.2.25 ADJUST ZERO screw until transmitter output is 4 mA.

5.2.26 IF Elevation cannot be achieved, MOVE large suppression jumper (see Figure 3) AND

REPEAT step 5.2.25.

5.2.27 IF suppression is achieved, GO TO step 5.2.37.

For Zero Equal to 4 mA

5.2.28 CALCULATE span from minimum value to maximum value.

5.2.29 OPEN high/low sides of transmitter to atmosphere.

5.2.30 ADJUST ZERO adjustment screw until transmitter output is 4 mA.

5.2.31 APPLY full scale span. (as calculated in step 5.2.28)

5.2.32 ADJUST SPAN adjustment screw until transmitter output is 20 mA.

5.2.33 RETURN input to atmospheric pressure.

5.2.34 ADJUST ZERO output to 4 mA.

NOTE - Under operating conditions that subject the transmitter to temperature extremes or significant vibration, mechanical backlash may occur in the zero and span adjustment screws.

5.2.35 IF backlash occurs, (to improve stability) slightly, ADJUST zero or span adjustment screw(s) back after final adjustment to break contact between potentiometer blades and adjustment screw slot surfaces as applicable.

5.2.36 REPEAT steps 5.2.33 through 5.2.35 until readings are within tolerance.

5.2.37 APPLY test inputs and record As-Left data on Data Sheet.
5.3 Restoration

5.3.1 IF any problems were encountered with calibration, INFORM FWS.

5.3.2 DISCONNECT AND REMOVE Test Equipment.

5.3.3 CLEAR or reset alarms.

5.3.4 CHECK system restoration by observing that readings are consistent with expected conditions.

5.3.5 RECORD the Test Equipment information and calibration status on Data Sheet as applicable.

5.3.6 NOTIFY Operations that testing is complete and system may be returned to desired configuration.

5.4 Acceptance Criteria

Acceptance Criteria has been met when Steps in this procedure have been satisfactorily performed and As-Left values meet the specifications and tolerance(s) per the Data Sheet.

5.5 Review

5.5.1 INFORM FWS calibration is complete.

5.5.2 FWS REVIEW AND ENSURE the following:

- Completed Data Sheets meet the acceptance criteria.
- Comments sections are filled out appropriately.
- Work request number(s) of any work documents generated as a result of this procedure, are recorded in the Comments/Remarks section of the Data Sheet, as applicable.
5.6 Records

This procedure is performed within a work package, as such, the procedure in its entirety will be maintained as a record per the Work Control process.

The identified record custodian is responsible for record management in accordance with TFC-BSM-IRM_DC-C-02 or other applicable requirements.
Figure 1 - Calibration Connections (Process Connected)

NOTE: 
Power supply/receiver loop (not shown) remains connected to transmitter during field calibration.

BYPASS VALVE 
LOW PRESSURE VALVE 

OPTIONAL 3- VALVE BYPASS MANIFOLD 

HIGH PRESSURE VALVE 
BLEEDER VALVE (NEEDLE TYPE) 

CALIBRATION PRESSURE SOURCE 
ON-OFF VALVE
Figure 2 - 4 to 20 mA Output Calibration Setup
Figure 3 - Large Suppression or Elevation Adjustment

E OUTPUT OPTION
(4 - 20 mA)

ELEVATE ZERO

SUFPRESS ZERO