Tank Farm Maintenance Procedure

Effluent Treatment Facility

USQ Not Required – ETF is a <Hazard Category 3 Radiological Facility

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides a safe, uniform method for calibration of Drexelbrook® model 408/508 level transmitter.

1.2 Scope

This procedure provides instructions for new installations or where original calibration data have been lost and calibration with standard where calibration data are available.

2.0 INFORMATION

None.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Radiation and Contamination Control

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

3.2 Environmental Compliance

3.2.1 In the event of a spill/leak/release, notify the SOM/FWS and respond per ETF-ERP-85B-003, Emergency Spill or Release at ETF.
4.0 PREREQUISITES

4.1 Special Tools, Equipment, and Supplies

NOTE - Measuring and Test Equipment used to collect acceptance criteria data during performance of this procedure shall meet the following requirements:

- Be within its current calibration cycle as evidenced by an affixed calibration label
- Be capable of desired range
- Accuracy is equal to or greater than M&TE tolerance specified on PM/S Data Sheet or is at least four times greater than specified device tolerance.

The following supplies may be needed to perform this procedure:

- CMD capable of measuring 4-20 mA
- Capacitance calibration simulator, i.e., Drexelbrook model 401-6-8.

4.2 Performance Documents

- Manufacturer’s manual: V-1373-010-002, Rev. 0, Adtechs CVI file information for the Drexelbrook Series 508 Universal IITM Transmitters.
5.0 PROCEDURE

Special Instructions

Sections 5.1, 5.2, and 5.3 may be performed in any logical order.

Sections 5.1 and 5.2 are for new installations or where original calibration data have been lost.

As-found data cannot be obtained in Sections 5.1 and 5.2. Section 5.3 should be used whenever possible.

5.1 Calibration for Data Collections (Immersion – Low-Level Fail-Safe)

NOTE - Section 5.1 addresses calibration when output current increases as level increases.

5.1.1 SET Fail Safe jumper in low-level fail-safe position (Figure 1 - Fail-Safe Link).

5.1.2 CONNECT CMD (measuring for mA) to output current loop using “cal” test points on transmitter.

5.1.3 SET “Fine Span” and “Fine Zero” controls to extreme counterclockwise position.

5.1.4 SET “Step Span” to position 1.

5.1.5 DRAIN vessel of liquid to uncover probe.

NOTE - The following calibration may require the addition of a compensation capacitor (in 100 pF steps) across terminals PAD and CW if minimum output current cannot be obtained.

5.1.6 ADJUST “Step Zero” and “Fine Zero” controls until output indicates 4 mA on CMD.

NOTE - Output current level will exceed full scale (20+ mA).

5.1.7 FILL vessel with liquid AND

OBSERVE output current reading on CMD.
5.1 Calibration for Data Collections (Immersion – Low-Level Fail-Safe)  
(Cont.)

5.1.8  TURN “Step Span” control clockwise until output indicates less than 20 mA on CMD.

5.1.8.1  IF current did not exceed 20 mA in Step 5.1.7, LEAVE “Step Span” in position 1.

5.1.9  TURN “Fine Span” control clockwise until output indicates 20 mA on CMD.

5.1.10  REPEAT Steps 5.1.5 through 5.1.9 until no further adjustments are necessary.

NOTE - In some applications, it is difficult or even impossible to completely empty or fill a vessel. In such a case, it is desirable to have a secondary calibration standard such as Drexelbrook model 401-6-8, which can be used to simulate capacitance of an empty or full vessel. The following permits recalibration of an instrument without the necessity of emptying or filling vessel.

5.1.11  DISCONNECT coax center wire from probe.

5.1.12  CONNECT calibration standard to instrument in parallel with existing cable:
- Ground wire to GND
- Center wire CW
- Shield to SHD or SW.

5.1.13  ADJUST calibration standard until instrument indicates minimum current, 4 mA on CMD.

NOTE – Recording value on inside of instrument door is also suggested.

5.1.14  RECORD capacitance value read on calibration standard and its serial number on data sheet for later use.

5.1.15  ADJUST calibration standard until instrument indicates maximum current, 20 mA on CMD.

5.1.16  RECORD capacitance value as in Step 5.1.14.

5.1.17  IF no other calibrations are needed, PROCEED TO Section 5.4, Restoration.
5.2 Calibration for Data Collections (Immersion - High-Level Fail-Safe)

NOTE - Section 5.2 addresses calibration when output current decreases as level increases.

5.2.1 SET Fail-Safe jumper in high-level fail-safe position (Figure 1).

5.2.2 CONNECT CMD (measuring for mA) to output current loop using “cal” test points on transmitter.

5.2.3 SET “Fine Span” and “Fine Zero” controls to extreme counterclockwise position.

5.2.4 SET “Step Span” to position 1.

5.2.5 FILL vessel to upper operating level.

NOTE - The following calibration may require the addition of a compensation capacitor (in 100 pF steps) across terminals PAD and CW if minimum output current cannot be obtained.

5.2.6 ADJUST “Step Zero” and “Fine Zero” controls until output indicates 4 mA on CMD.

NOTE - Output current level will exceed full scale (20+ mA).

5.2.7 DRAIN vessel to minimum operating level AND

OBSERVE output current level reading on CMD.

5.2.8 TURN “Step Span” control clockwise until output indicates less than 20 mA on CMD.

5.2.9 IF current did not exceed 20 mA in Step 5.2.8, LEAVE “Step Span” in position #1.

5.2.10 TURN “Fine Span” control clockwise until output indicates 20 mA on CMD.
5.2 Calibration for Data Collections (Immersion - High-Level Fail-Safe) (Cont.)

NOTE - In some applications, it is difficult or even impossible to completely empty or fill a vessel. In such a case, it is desirable to have a secondary calibration standard such as Drexelbrook model 401-6-8, which can be used to simulate capacitance of an empty or full vessel. The following permits recalibration of an instrument without the necessity of emptying or filling vessel.

5.2.11 REPEAT Steps 5.2.5 through 5.2.10 until no further adjustments are necessary.

5.2.12 DISCONNECT coax center wire from probe.

5.2.13 CONNECT calibration standard to instrument in parallel with existing cable:
   - Ground wire to GND
   - Center wire CW
   - Shield to SHD or SW.

5.2.14 ADJUST calibration standard until instrument indicates minimum current, 4 mA on CMD.

NOTE – Recording value on inside of instrument door is also suggested.

5.2.15 RECORD capacitance value read on calibration standard and its serial number on data sheet for later use.

5.2.16 ADJUST calibration standard until instrument indicates maximum current, 20 mA on CMD.

5.2.17 RECORD capacitance value as in Step 5.2.15.

5.2.18 IF no other calibrations are needed, PROCEED TO Section 5.4.
5.3 Calibration with Standard

5.3.1 CONNECT CMD (measuring for mA) to output current loop using “cal” test points on transmitter.

5.3.2 DISCONNECT coax center wire from probe.

5.3.3 CONNECT calibration standard to instrument in parallel with existing cable:
   * Ground wire to GND
   * Center wire CW
   * Shield to SHD or SW.

5.3.4 SET calibration standard to the Zero value on data sheet.

5.3.5 RECORD mA reading in as-found section of data sheet.

5.3.6 SET calibration standard to the maximum value on data sheet.

5.3.7 RECORD mA reading in as-found section of data sheet.

5.3.8 IF as-found output values are within tolerance per data sheet and no adjustments are required or desired, RECORD as-found values in as-left section of data sheet AND

   GO TO Section 5.4.

5.3.9 SET standard to Zero value found on data sheet.

5.3.10 ADJUST “Zero” controls for 4 mA output.

5.3.11 SET standard to maximum value found on data sheet.

5.3.12 ADJUST “Span” controls for 20 mA output.

5.3.13 REPEAT Steps 5.3.9 through 5.3.12 until no further adjustments are necessary AND

   RECORD mADC readings from CMD in as-left section of data sheet.
5.4 Restoration

5.4.1 **ENSURE** transmitter is in same configuration as found preceding Section 5.1, 5.2, or 5.3.

5.4.2 **RESTORE** to as-found conditions.

5.4.3 **INFORM** SOM test is complete and instrument/equipment/system may be returned to service.

5.5 Acceptance Criteria

Acceptance criteria has been met when steps in this procedure have been satisfactorily performed and results are recorded on the data sheet(s).

5.6 Review

5.6.1 **INFORM** FWS test is complete.

5.6.2 (FWS) **REVIEW AND ENSURE** the following:
- Completed data sheets meet the acceptance criteria
- Comments sections are filled out appropriately
- Work requests needed as a result of this procedure are identified and generated
- 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.

5.7 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 record custodian identified in the Company Level Records Inventory and Disposition Schedule (RIDS) is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.
Figure 1 - Fail-Safe Link