# Barton FCX Series Pressure Transmitter Calibration Procedure

## Tank Farm Maintenance Procedure

### MAINTENANCE

#### USQ # Routine Maintenance

<table>
<thead>
<tr>
<th>Rev-Mod</th>
<th>Release Date</th>
<th>Justification</th>
<th>Summary of Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-2</td>
<td>07/17/2017</td>
<td>Periodic Review</td>
<td>Added Steps 3.2.2 and 3.2.3 and Record Section Update.</td>
</tr>
<tr>
<td>F-1</td>
<td>11/18/2014</td>
<td>CHAMPS Removal</td>
<td>Removed reference to CHAMPS, updated records statements and removed next periodic review date.</td>
</tr>
<tr>
<td>F-0</td>
<td>03/12/2014</td>
<td>Periodic Review</td>
<td>Reworked Steps 3.2, 5.1.4, 5.1.5, 5.2.8, 5.2.11, 5.2.14, 5.3.1. Add Step 5.3.10. Reworked Acceptance Criteria and Review Sections to Writers Standard. Reworked the Records section to Writers Standard verbiage.</td>
</tr>
<tr>
<td>E-1</td>
<td>02/04/2013</td>
<td>DOE Standard</td>
<td>Replaced references to document TPC-ESHQ-S-STD-03. Electrical Safety with DOE–0359, Hanford Site Electrical Safety Program.</td>
</tr>
<tr>
<td>E-0</td>
<td>03/16/2009</td>
<td>Periodic Review</td>
<td>Delete step 3.1.2, add section 3.3 and step 3.3.1, add “Other tools, equipment and supplies as identified by Shift Manager/OE/FWS/User” to section 4.1 and modify the wording in step 5.2.2.</td>
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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides instructions for the calibration of the ITT Barton FCX Series Transmitter with 4 to 20 mA output.

1.2 Scope

This procedure involves performing calibration checks and adjustments of the Barton FCX Series Pressure Transmitter.

2.0 INFORMATION

NONE

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

3.1.1 Use safe electrical practice per DOE–0359, Hanford Site Electrical Safety Program when disconnecting/connecting an item from terminal strips or working in the vicinity of live electrical circuits.

3.1.2 The Work package hazards for performance of this procedure have been determined to fall under the scope of the General Hazard analysis (GHA) in accordance with TFC-ESHQ-SAF_S-C-02.

3.1.3 Contact IH for Appropriate Sample Plan.

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.

3.2.2 The opening of any system or component within a Radiological Area requires presence of a Health Physics Technician to verify contamination control.

3.2.3 When disconnecting, breaching, or opening system components that are currently or previously connected to waste tanks or waste transfer systems:

- Follow the RWP for radiological control requirements
- Pre-job and post-job surveys are required.
3.3 Environmental Compliance

3.3.1 In accordance with TFC-ESHQ-ENV-STD-06, the following action will be taken when working on a potentially contaminated ventilation system:

- HPT coverage will be performed as specified in the Radiological Work Permit
- Equipment with removable contamination and/or work with removable contamination will be contained per the latest revision of the Containment Selection guide, Attachment A, in TFC ESHQ-RP_RWP-C-02.
- Pre- and post-job surveys (smears) shall be taken.
4.0 PREREQUISITES

4.1 Special Tools, Equipment, and Supplies

The following supplies may be needed to perform this procedure:

- A calibrated Digital Multimeter (DMM) with range of 4-20 mA DC and accuracy to within 0.1%.
- A calibrated Digital Manometer with range as required on Data Sheets
- Other tools, equipment and supplies as identified by Shift Manager/OE/FWS/User.
5.0 PROCEDURE

5.1 As-Found Values

NOTE - Refer to Figure 1 for connection locations and Table 1 for "Mode Switch Settings".

5.1.1 ISOLATE transmitter from service.

5.1.2 CONNECT test equipment to transmitter (Figure 1).

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 the instrument As-Found outputs are out of tolerance specified by Data Sheet and adjustments are required, GO TO Section 5.2, Calibration.
5.2 Calibration

5.2.1 IF Field Indicator Option is not installed, GO TO step 5.2.7.

5.2.2 IF installed, REMOVE amplifier module cover and indicator.

5.2.3 SET the MODE switch (top switch) on the transmitter's amplifier unit to 3 (Table 1).

NOTE - The UP-DOWN switch has two speeds. Changes are slow when the switch is first pressed. If the switch is continuously pressed, the rate of change increases to allow for larger changes. The zero point value will change 100% of the span in approximately 30 seconds. Large zero suppression/elevation changes, with a small span, will take several minutes.

5.2.4 ADJUST output to 4 mA using the UP-DOWN switch.

5.2.5 SET the MODE switch on the transmitter's amplifier unit to 5.

5.2.6 ADJUST output to 20 mA using the UP-DOWN switch.

5.2.7 SET the amplifier module's MODE switch to the "0" or “ZERO” position (see Table 1).

5.2.8 ADJUST the input pressure to the low input value as specified on the Data Sheet.

5.2.9 ADJUST the output to 4 mA using the Zero Adjust on the outside of the transmitter case (Figure 1).

5.2.10 SET the amplifier module MODE switch to "1" or “SPAN”.

5.2.11 APPLY full scale input value as specified on the Data Sheet.

5.2.12 ADJUST the output to 20 mA using the Span Adjust on the outside of the transmitter case (Figure 1).

5.2.13 REPEAT steps 5.2.7 through 5.2.12 until no further adjustments are required.

5.2.14 APPLY test inputs AND

RECORD As-Left values on Data Sheet.
5.3 Restoration

5.3.1 RECORD measuring and test equipment (M&TE) and calibration status on Data Sheet.

5.3.2 DISCONNECT all M&TE.

5.3.3 PLACE MODE switch to "O" or “ZERO” for normal operation or "2" to lock the UP-DOWN switch.

5.3.4 REPLACE the indicator, if installed.

5.3.5 REPLACE the amplifier module cover.

5.3.6 REPLACE the terminal block cover.

5.3.7 RESTORE transmitter to service.

5.3.8 ENSURE alarms are reset or cleared.

5.3.9 ENSURE displays are lit and reading within normal parameters.

5.3.10 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 test 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 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 (if 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 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 - Typical Pressure Calibration Setup

Table 1 - Mode Switch Settings

<table>
<thead>
<tr>
<th>Switch Setting</th>
<th>Function</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 or ZERO</td>
<td>Zero Adjust</td>
<td>Zero Adjust</td>
</tr>
<tr>
<td>1 or SPAN</td>
<td>Span Adjust</td>
<td>Span Adjust</td>
</tr>
<tr>
<td>2</td>
<td>Zero/Span Lock</td>
<td>Locks UP-DOWN Switches</td>
</tr>
<tr>
<td>3</td>
<td>4 mA Output</td>
<td>Output Adjust Option</td>
</tr>
<tr>
<td>4</td>
<td>12 mA Output</td>
<td>Output Adjust Option</td>
</tr>
<tr>
<td>5</td>
<td>20 mA Output</td>
<td>Output Adjust Option</td>
</tr>
<tr>
<td>6</td>
<td>Zero Adjust</td>
<td>Same as &quot;0&quot;</td>
</tr>
<tr>
<td>7</td>
<td>Span Adjust</td>
<td>Same as &quot;1&quot;</td>
</tr>
</tbody>
</table>