Calibration Testing and Re-Calibration Sequence for Moore Industries CPT Temperature Transmitters

Tank Farm Maintenance Procedure

USQ # Routine Maintenance

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides instructions for equipment set-up, checking calibration via testing sequence, and re-calibration of Moore Industries CPT Temperature Transmitters as needed.

1.2 Scope

This procedure involves any Tank Farm system utilizing a Moore Industries CPT Temperature Transmitter.

2.0 INFORMATION

2.1 General Information

A general overview of setups, hookups and software screens can be seen on the following:

- Figure 1 - CPT Temperature Transmitter Setup Configuration
- Figure 2 - Input Hook-up Connections
- Figure 3 - CPT Configuration Software Summary
- Figure 4 - PC Configuration Software Trimming/Damping Tab
- Figure 5 - Trimming the CPT (TPRG) on TT-3 Only
- Figure 6 - PC Configuration Software Custom Table Tab.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

All hazards will be identified in accordance with TFC-ESHQ-S_SAF-C-02.

3.2 Radiation and Contamination Control

Work in radiological areas will be performed using a radiation work permit following review by Radiological Control per ALARA 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:

- DC Power Source
- IBM Compatible Laptop Computer with the following capabilities:
  - 4 MB free RAM: (8MB recommended)
  - 20 MB free disk space on hard drive
  - Any of the following Microsoft Windows NT, 2000, XP, Vista, or 7
  - Internet Explorer 3.0+
  - One (1) serial port (COM 1,2,3 or 4) set to 9600 baud, no parity, 8 data bits and one (1) stop bit or one (1) available USB port (with Optional USB cable)
- Non-Isolated Communications Cable #803-053-26

OR

Optional USB cable Part # 208-236-00A
- Computer Program (“CPA CPT PC Configuration Software” Folder)
- Current Meter (Calibrated With Expiration Dates)
- Decade Box (Calibrated With Expiration Dates)
- Other tools, equipment and supplies as identified by Shift Manager/OE/FWS/User.

4.2 Field Preparation

4.2.1 If during performance of this procedure, any of the following conditions are found, immediately stop work, place equipment in a safe condition, notify Supervision, and proceed as directed:

- Any equipment malfunction which could prevent fulfillment of its functional requirements
- Personnel error or procedural inadequacy which could prevent fulfillment of procedural requirements.
5.0 PROCEDURE

Special Instructions

If generated, the Computer Calibration printouts are to be enclosed with the work package.

If any step is not required for procedure completion, record N/A in the applicable space(s) on the data sheet and document explanation in the data sheet’s comments/remarks section.

5.1 Obtain As-Found Data

5.1.1 ATTACH Current Meter as shown on Figure 1 and Figure 2 on terminals 2, 3 and 4.

5.1.2 ATTACH Decade Box or equivalent to CPT Temperature Transmitter as shown on Figure 1.

5.1.3 PERFORM Calibration Test on CPT Temperature Transmitter based on input values listed on Data Sheet.

5.1.4 RECORD As-Found Calibration Test results on Data Sheet.

5.1.5 IF As-Found values are not within specified tolerance per Data Sheet, GO TO Section 5.3, OR

IF As-Found values are within specified tolerance, but deemed marginal, and optimization is desired, GO TO Section 5.3, OR

IF As-Found values are within specified tolerance, RECORD As-Found values in As-Left column of Data Sheet AND

GO TO Restoration, Section 5.6.
### Calibration Testing and Re-Calibration Sequence for Moore Industries CPT Temperature Transmitters

**5.2 Transmitter Setup**

5.2.1 CONNECT power supply and desired input/output to transmitter in accordance with Data Sheet.

5.2.2 CONNECT R5232 cable, using the transmitter, to computer or proper adapter cable to connect to com port.

5.2.3 TURN ON power supply AND ENSURE transmitter is powered (Input, Ready, and Alarm indicators are lit).

**5.3 Computer Setup**

5.3.1 GO TO “Start”.

5.3.2 SELECT “All Programs”.

5.3.3 SELECT “Moore Industries”.

5.3.4 OPEN “CPT CPA Configuration”.

5.3.5 SELECT “Configuration” in main tool bar AND SELECT “Upload Configuration”.

**5.4 Transmitter Calibration Input**

NOTE - The transmitter is communication with the computer when indicator is flashing yellow and “Measurements ON/OFF” is displayed in top left, under status.

5.4.1 ENSURE Transmitter is communicating with computer.

5.4.2 ENSURE input configuration for Transmitter is correct once upload is finished from Step 5.3.5.

5.4.3 ENSURE the "Input Zero" and "Input Full" Range and Units are consistent with the Data Sheet.

5.4.4 ENSURE “Input Trim” and “Output Trim” boxes are selected.

5.4.5 ENSURE Output Configuration is consistent with Data Sheet.

5.4.6 IF alarm points changes are needed, **PERFORM** changes under “Alarm Tab”. 
5.4 Transmitter Calibration Input (Cont.)

5.4.7 ENSURE “Measurements OFF” is displayed under Status in upper left corner.

5.4.7.1 IF “Measurements OFF” is displayed, GO TO 5.4.8.

5.4.7.2 SELECT “Mode” from menu bar.

5.4.7.3 SELECT “Measurements OFF”

5.4.7.4 CONFIRM “Measurements OFF” is displayed under status.

5.4.8 SELECT “Configuration” from menu.

5.4.9 SELECT “Download Configuration”.

5.4.10 ENSURE “Input Trim” and “Output Trim” boxes are selected once download is complete.

5.4.11 OPEN “Trimming/Damping” tab.

5.4.12 ENSURE “Input Trim” On box is selected.

5.4.13 SELECT one or two points to be trimmed.

5.4.14 ENSURE “Measurements On” is displayed under status.

5.4.15 INPUT desired “Input Trim” value in trim point box.

NOTE - This value is the process variable value and may not match the test point value applied with M&TE.

5.4.16 APPLY desired test point input value using M&TE.

5.4.17 SELECT point trim for corresponding trim point once input has stabilized.

NOTE - Trim is complete when value is displayed in “Captured” box.

5.4.18 IF value in box in box is not the desired value, COTINUE to next step.

5.4.19 IF only single point trim is being done, GO TO section 5.5.

5.4.19.1 For a second point trim, APPLY desired test point value using M&TA.
5.4 Transmitter Calibration Input (Cont.)

5.4.20 SELECT point trim for corresponding trim point once input has stabilized.

5.5 Transmitter Calibration Output

5.5.1 ENSURE “Output Trim” on box is selected in the output trim section under Trimming/Damping tab.

5.5.1.1 ENSURE correct output variable is displayed in box.

5.5.2 IF measurements are on under status, GO TO “Mode” in main tool bar AND TURN OFF measurements.

5.5.3 SELECT low range output value.

5.5.4 ADJUST output to desired setting using scroll bar.

5.5.5 SELECT upper range output.

5.5.6 ADJUST output to desired setting using scroll bar.

5.5.7 ENSURE “Measurement Off” is displayed.

5.5.8 SELECT “Configuration” from main tool bar.

5.5.9 SELECT “Download Configuration”.

5.5.10 ONCE download is complete, DISCONNECT transmitter AND CLOSE configuration program computer.

5.5.11 FOLLOW Steps 5.1.3 through 5.1.5 to obtain As-Left values.
5.6 Restoration

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

5.6.2 DISCONNECT AND REMOVE Test Equipment as necessary.

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

5.6.4 CHECK equipment restoration by observing indications are consistent with expected conditions.

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

5.7 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.

5.8 Review

5.8.1 INFORM FWS test is complete.

5.8.2 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, as applicable.
5.9 Records

The performance of this procedure generates no records. However, PM Data Sheets associated with the procedure, are records and are maintained in the work package as record material.

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 - CPT Temperature Transmitter Setup Configuration
Calibration Testing and Re-Calibration Sequence for Moore Industries CPT Temperature Transmitters

Figure 2 - Input Hook-up Connections
Figure 3 - CPT Configuration Software Summary

Once the default configuration has been saved to disk, it is safe to program other parameters. The PC Software is made up of these sections:

1. **Status** - This portion of the program displays the activity of the connected unit. It will show the COM Port being used and the current Measurement Mode.

2. **Measurements** - Displays current software processes and indications. Allows you to select the decimal place of your process variable (Decimal Places (PV)) indication and monitor up to two configuration variables (Monitored Vars).

3. **Device Information** - This "read only" display indicates firmware version, hardware revision, serial number, calibration date, software version and configuration date and the last configuration source.

4. **Communication** - From here you may enable Start Measurements and Stop Measurements, upload your configuration to PC or download your configuration to the unit, save your configuration to a file, and print out your configuration settings.

5. **Input Configuration** - Select 50/60Hz Rejection Selection and selection of “C” or “F”. Allows you to choose sensor type and wiring connections. You may also enable Input Trim, Output Trim, Custom Table and Broken Wire Test functions.

6. **Device Configuration** - Use this parameter to place an identifying “Message” (32 alphanumeric characters maximum), select an “ID Tag” (6 alphanumeric characters maximum) and “Descriptor” (16 alphanumeric characters maximum).

7. **Output Configuration** - Use this section to select your output configuration and output limits.

8. **Output Level at Failure** - Used to select configuration of Upscale/Downscale Drive failure detection of sensor or sensor wiring. Refer to Output Level at Failure section for a complete description.

9. **Broken Wire Test Override** - Allows you to enable or disable the Broken Wire Test Override feature by clicking the “BW ON” or “BW OFF” buttons. Refer to the Broken Wire Test Override section for a complete description.
Calibration Testing and Re-Calibration Sequence for Moore Industries CPT Temperature Transmitters

Figure 4 - PC Configuration Software Trimming/Damping Tab
Figure 5 - Trimming the CPT (TPRG) on TT-3 Only
Figure 6 - PC Configuration Software Custom Table Tab