Calibrate Brooks MT 3809 Flowmeter and FC-8915 Flow Controller at 242-A Evaporator

Routine Maintenance

<table>
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<tr>
<th>Rev-Mod</th>
<th>Release Date</th>
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<th>Summary of Changes</th>
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<tr>
<td>B-1</td>
<td>02/02/2016</td>
<td>Maintenance Request</td>
<td>Changed 4.1, 5.1.6, 5.1.13, 5.3.6 Added 4.3.4, 5.1.7, 5.1.8, 5.1.9, 5.1.19, 5.1.20 &amp; Figure 4.</td>
</tr>
<tr>
<td>B-0</td>
<td>11/03/2015</td>
<td>Periodic Review</td>
<td>Struck Step 3.1.3. Reword Step 3.1.1 to change DOE lock and tag to Procedure versus Program. Reword Step 5.2.10 to Record FWS resolution.</td>
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<tr>
<td>A-4</td>
<td>09/10/2015</td>
<td>Maintenance Request</td>
<td>Deleted 5.1.2, added air supply connection to 5.1.7, Deleted 5.1.8, Changed 5.1.10 to &quot;INPUT values from Data Sheet and RECORD in the As-Found Column, Changed 5.1.11 to Close air supply, changed 5.1.16 to Slowly Open air supply, changed 5.2.1 to Turn off air supply, Changed note before 5.2.6 to read Air supply will be off instead of Valve 5-3C, changed 5.2.7 to Slowly Open air supply, deleted 5.3.1 and 5.3.8</td>
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<tr>
<td>A-3</td>
<td>10/22/2014</td>
<td>CHAMPS Removal</td>
<td>CHAMPS removal, new records statement.</td>
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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides instructions for ranging and calibrating Brooks Model MT 3809 Variable Area Flowmeter and functionally test and set the integral Brooks Series 8915 Flow Controller.

1.2 Scope

This procedure may only be performed when the 242-A Evaporator is in the “SHUTDOWN” mode.

This procedure applies to Brooks Model MT 3809 Variable Area Flowmeter and Brooks Series 8915 integral Flow Controller.

2.0 INFORMATION

2.1 Terms and Definitions

- FIT Flow Indicating Transmitter
- LRV Lower Range Value (minimum input value)
- URV Upper Range Value (maximum input value)

2.2 General Information

Flow Control Valve FC-CA1-20 will be used (in conjunction with M&TE) to control and measure the air flow through FIT-CA1-20 to obtain as found values and also for calibration purposes.
3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

3.1.1 An Energized Electrical Work Permit is not required when working energized parts that operate at less than 50 volts potential per DOE-0336, Hanford Site Lockout/Tagout Procedure, appendix C.

The maximum voltage encountered when connecting and disconnecting from terminal strips is less than 50 VDC.

3.1.2 IF a lock and tag is required during the performance of this procedure, comply with the DOE-0336, Hanford Site Lockout/Tagout Procedure.

3.2 Radiation and Contamination Control

3.2.1 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.

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

- HPT coverage is required when breaching system
- A damp rag will be used to contain the breach until radiological verifications have been performed.
4.0 PREREQUISITES

4.1 Special Tools, Equipment and Supplies

The following supplies may be needed to perform this procedure:

- Torxbit T20 (torque screwdriver)
- Digital Multimeter (DMM)
- Calibrated Flow Meter (i.e. Sierra 0-15 SCFM or flow range per Data Sheet)
- Hart 275 Hand Held Communicator (or equivalent)
- Damp cloth (to cover system breach)
- Other tools, equipment and supplies as identified by Shift Manager/OE/FWS/User.

4.2 Performance Documents

The following documents may be needed to perform this procedure:

- DOE-0336, Hanford Site Lockout/Tagout Procedure
- H-2-98988 Sheet 1

4.3 Field Preparation

4.3.1 IF Lockout/tagout was applied, ENSURE lockout/tagout and overlocking requirements have been satisfied per DOE-0336, Hanford Site Lockout/Tagout Procedure.

4.3.2 REQUEST Operations to configure system to allow performance of this procedure.

4.3.3 NOTIFY HPT coverage will be required during system breach.

4.3.4 ASSEMBLE Flow Meter test rig including air supply pressure regulator and pressure gauge, calibrated flow meter, calibrated output pressure gauge, and isolation valve per Figure 4.
5.0 PROCEDURE

5.1 Obtain As-Found Values

NOTE - Reference to H-2-98988 sheet 1, and H-2-99053 sheet 6, (for valving, test point connections and Instrument rack layout) may be performed as desired.

5.1.1 CLOSE the following valves:
- 5-3C
- 5-3D
- 5-3E

5.1.2 REMOVE FIT-CA1-20 faceplate and disconnect (-) field wire from terminal two (2) AND

CONNECT DMM in series per Figure 3.

5.1.3 CONNECT Hart communicator, reference Figure 3.

5.1.4 REMOVE Swagelok cap (TP-CA1-20A) between valves 5-3D and 5-3E AND

SIMULTANEOUSLY PLACE a damp cloth over the test point.

5.1.5 OPEN Valve 5-3D.

5.1.6 AFTER HPT survey is complete, CONNECT output of M&TE Flow meter test rig to test port TP-CA1-20A per Figure 4.

5.1.7 CONNECT instrument air supply (100 PSIG min.) to input of M&TE Flow Meter test rig per Figure 4.

5.1.8 OPEN test port TP-CA1-20A to atmosphere.

SIMULTANEOUSLY PLACE a damp cloth over the test point.

5.1.9 ADJUST test flow meter FI-002 output pressure to 20 PSIG using test rig pressure regulator PCV-001, VERIFY pressure using output pressure gauge PI-003 per Figure 4.
5.1 - Obtain As-Found Values (Cont.)

5.1.10 REFER to Figure 1 for FIT-CA1-20 and FC-CA1-20 layout.

5.1.11 CHECK M&TE As-Found reading for the flow setting on FC-CA1-20 AND INPUT the values from the Data Sheet in the As-Found Column.

NOTE - Close air supply to ensure “No Flow” when measuring zero % flow value since the minimum flow setting for Flow Controller FC-CA1-20 is 0.47 SCFM (which is greater than the tolerance for FIT-CA1-20).

5.1.12 CLOSE air supply.

NOTE - The flow control adjustment knob on FC-CA1-20 will be used to adjust flow for taking As-Found values on FIT-CA1-20 and also Calibration if required.

5.1.13 CLOSE FC-CA1-20 flow control adjustment knob (Figure 1).

NOTE - Step 5.1.14 will zero flow meter by nullifying any built up electromagnetic charge. If the zero is mechanically off, it will be set during calibration.

5.1.14 IF FIT-CA1-20 mA output is not zeroed MOMENTARILY SHORT terminals 4 to 5 to zero the transmitter (see Figure 3).

5.1.15 RECORD the LRV (lower range value) for FIT-CA1-20 local display (SCFM) in As-Found columns of the Data Sheet.

5.1.16 RECORD the LRV (lower range value) for FIT-CA1-20 mA output value in the As-Found columns of Data Sheet.

5.1.17 SLOWLY OPEN air supply.

5.1.18 USING flow control knob on FC-CA1-20 APPLY each remaining input for FIT-CA1-20 per Data Sheet while performing the following (see Figure 1):

5.1.19 VERIFY that flow meter FI-002 test rig output pressure is 20 PSIG at each of the calibration flow test points,

5.1.20 ADJUST flow meter test rig pressure regulator PCV-001 as required to obtain 20 PSIG output pressure using PI-003 per Figure 4.

5.1.20.1 ALLOW each remaining reading to stabilize.

5.1.20.2 RECORD each remaining As-Found local Display value on the Data Sheet.

5.1.20.3 RECORD each remaining As-Found mA output on Data Sheet.
5.1 - Obtain As-Found Values (Cont.)

5.1.21 IF As-Found values are within tolerance, **PERFORM** the following:

5.1.21.1 **RECORD** FIT-CA1-20 As-Found local Display values in the As-Left column of the Data Sheet.

5.1.21.2 **RECORD** FIT-CA1-20 As-Found mA output values in the As-Left columns of the Data Sheet.

5.1.21.3 **SET** FC-CA1-20 controlled air flow per Data Sheet **AND** **RECORD** the value in As-Left column of Data Sheet.

5.1.21.4 **GO TO** Restoration, Section 5.3.

5.1.22 IF As-Found values are not within specified tolerance per Data Sheet, **GO TO** Calibration Section 5.2,

**OR**

IF As-Found values are within specified tolerance, but deemed marginal, and optimization is desired, **GO TO** Calibration Section 5.2.
Calibrate Brooks MT 3809 Flowmeter and FC-8915 Flow Controller at 242-A Evaporator

5.2 Calibration

Calibration Setup

5.2.1 IF not already OFF, TURN OFF air supply.

5.2.2 IF not already closed TURN flow control adjustment knob on FC-CA1-20 to close.

5.2.3 IF FIT-CA1-20 is not zeroed MOMENTARILY SHORT terminals 4 to 5 to zero the transmitter (see Figure 3).

5.2.3.1 IF flow meter is still not at zero, ADJUST needle pointer alignment screw to zero the flow meter.

NOTE - The Hart hand held controller is used to calibrate the LRV (lower range value) and the URV (upper range value).

5.2.4 REFER to Figure 2, Hart menu tree for Brooks Model 3809.

Calibration

5.2.5 USING the Hart hand held controller, PERFORM the following:

5.2.5.1 APPLY AND SET the LRV per Data Sheet.

5.2.5.2 APPLY AND SET the URV per Data Sheet.

NOTE - Air supply will be off to ensure “No Flow” when measuring zero % flow value since the minimum flow setting for Flow Controller FC-CA1-20 is 0.47 SCFM (which is greater than the tolerance for FIT-CA1-20).

5.2.6 WITH zero SCFM applied, CHECK FIT-CA1-20 local Display and mA output for tolerance at minimum value.

5.2.7 SLOWLY OPEN air supply.

5.2.8 USING the flow control knob on FC-CA1-20 APPLY each remaining test input value per Data Sheet AND CHECK local Display and mA output values for tolerance.
Calibrate Brooks MT 3809 Flowmeter and FC-8915 Flow Controller at 242-A Evaporator

5.2 Calibration (Cont.)

5.2.9 IF all values are within tolerance per Data Sheet, **PERFORM** the following:

5.2.9.1 **RECORD** FIT-CA1-20 local Display values in the As-Left column of the Data Sheet.

5.2.9.2 **RECORD** FIT-CA1-20 mA output values in the As-Left column of the Data Sheet.

5.2.9.3 **USING** flow control knob **SET** FC-CA1-20 per Data Sheet **AND** **RECORD** the value in As-Left column of Data sheet.

5.2.9.4 **GO TO** Restoration, Section 5.3.

5.2.10 IF values are not within tolerance per Data Sheet, **REPEAT** Steps 5.2.1 through 5.2.9 until values are within tolerance

**OR**

IF unable to bring values into tolerance **NOTIFY** FWS for resolution **AND** **RECORD** the resolution in the Data Sheet Comments Section or on the Work Record.
5.3 Restoration

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

5.3.2 DISCONNECT AND REMOVE Test Equipment and associated components.

5.3.3 RE-CONNECT (-) field wire to terminal 2 AND INSTALL FIT-CA1-20 faceplate.

5.3.4 RETURN test port TP-CA1-20 to as found configuration (closed).

5.3.5 RETURN test port TP-CA1-20A to as found configuration (closed).

5.3.6 SLOWLY OPEN blocking valve 5-3C, 5-3E.

5.3.7 RECORD Test Equipment information and calibration status on Data Sheet.

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

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

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.
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Figure 1 – Brooks FIT Model 3809 with Integral Flow Controller Model 8915
Calibrate Brooks MT 3809 Flowmeter and FC-8915 Flow Controller at 242-A Evaporator

Figure 2 – Hart Menu Tree for Brooks 3809 FIT
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Figure 2 – Hart Menu Tree for Brooks 3809 FIT (Cont.)
Calibrate Brooks MT 3809 Flowmeter and FC-8915 Flow Controller at 242-A Evaporator

Figure 3 – Transmitter Analog Output with Hart 275 Hook-Up
Calibrate Brooks MT 3809 Flowmeter and FC-8915 Flow Controller at 242-A Evaporator

Figure 4 – Flow Meter Test Rig Hook-up

NOTICE: USE FC–CA1–20 flow controller valve to adjust for flow test points.