Calibrate Watlow Series C and L Temperature Switch and On-Off Controller

Tank Farm Plant 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>C-0</td>
<td>06/07/2016</td>
<td>Periodic Review</td>
<td>Changed Note to Special Instruction and Added Note in Section 5.0.</td>
</tr>
<tr>
<td>B-1</td>
<td>11/19/2014</td>
<td>CHAMPS Removal</td>
<td>Removed reference to CHAMPS, updated records statements and removed next periodic review date.</td>
</tr>
<tr>
<td>B-0</td>
<td>04/09/2013</td>
<td>Periodic Review</td>
<td>Removed vague phrases, added clarification where deeded, and added reference to DOE-0336 per TA.</td>
</tr>
<tr>
<td>A-0</td>
<td>03/26/2009</td>
<td>Maintenance request for Watlow specific procedure.</td>
<td>New Procedure</td>
</tr>
</tbody>
</table>

Table of Contents

1.0 PURPOSE AND SCOPE .............................................................................................................................................................. 3
  1.1 Purpose .............................................................................................................................................................................. 3
  1.2 Scope ............................................................................................................................................................................... 3

2.0 INFORMATION ......................................................................................................................................................................... 3

3.0 PRECAUTIONS AND LIMITATIONS ...................................................................................................................................... 3
  3.1 Personnel Safety .............................................................................................................................................................. 3
  3.2 Radiation and Contamination Control ............................................................................................................................. 3

4.0 PREREQUISITES ....................................................................................................................................................................... 4
  4.1 Special Tools, Equipment and Supplies ............................................................................................................................ 4
  4.2 Performance Documents .................................................................................................................................................... 4
  4.3 Field Preparation ............................................................................................................................................................. 4

5.0 PROCEDURE ............................................................................................................................................................................ 5
  5.1 Obtain As Found Values .................................................................................................................................................... 5
  5.2 Calibrate Watlow C Series On-Off Temperature Controller ............................................................................................. 7
  5.3 Calibrate Watlow L Series Temperature Limit Switch ................................................................................................... 8
  5.4 Restoration ........................................................................................................................................................................ 9
  5.5 Acceptance Criteria ....................................................................................................................................................... 10
  5.6 Review ............................................................................................................................................................................. 10
  5.7 Records ......................................................................................................................................................................... 10
Calibrate Watlow Series C and L Temperature Switch and On-Off Controller

Figure 1 – Watlow Series “C” On-Off Temperature Controller.......................................................... 11

Figure 2 - Watlow Series “L” Temperature Limit Switch................................................................. 12
1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides instructions for calibrating Watlow Series “C” and “L” temperature limit switch and On-Off Controller.

1.2 Scope

This procedure applies to Watlow Series “C” and “L” temperature limit switches and On-Off Controllers and the systems in which they are installed.

2.0 INFORMATION

NONE

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

3.1.1 All safety related hazards and their controls will be reviewed as a part of the pre-job safety meeting.

3.1.2 If a lock and tag is required during the performance of this procedure, comply with the Lockout/Tagout Program.

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 may be needed to perform this procedure:

- Decade Box or T/C Simulator
- RTD Simulator or equivalent
- Digital Multimeter.

4.2 Performance Documents

The following documents may be needed to perform this procedure:

- Lifted/Landed Lead Record (A-6003-876)

4.3 Field Preparation

4.3.1 **ENSURE** Operations has configured system to allow performance of this procedure.

4.3.2 **PERFORM** lockout/tagout and overlocking requirements in accordance with DOE-0336, Hanford Site Lockout/Tagout Procedure.
5.0 PROCEDURE

NOTE - Steps 5.1.1, 5.1.2 and 5.1.3 may be repeated at anytime throughout the performance of this work.

Special Instructions
If performance of any step in this procedure is not required for procedure completion, steps not performed shall be indicated as such by entering "N/A" in appropriate data sheet signoff space.

5.1 Obtain As Found Values

5.1.1 IF potential for radiological contamination exists, SURVEY equipment prior to removal of equipment or component from its installed location.

5.1.2 IF rotating equipment is involved, ENSURE all rotating equipment is shutdown.

5.1.3 ENSURE lockout/tagout and overlocking requirements have been satisfied in accordance with the Lockout/Tagout Program as performed in Step 4.3.2.

5.1.4 DISCONNECT field leads AND RECORD on “Landed/Lifted Lead Sheet”.

NOTE - Equipment may be tested in place or transported to shop for testing.

5.1.5 IF performing bench calibration, REMOVE AND TRANSPORT unit to shop for testing.

5.1.6 CONNECT test equipment in accordance with Figure 1 or Figure 2 as applicable.

5.1.7 APPLY input value per Data Sheet AND

RECORD the value in As-Found column on Data Sheet.

5.1.8 IF As-Found value is not within specified tolerance per Data Sheet, GO TO Calibration Section 5.2 for C series or 5.3 for L series,

OR

5.1.9 IF As-Found value is within specified tolerance, but deemed marginal, and optimization is desired, GO TO Calibration Section 5.2 for C series or 5.3 for L series,

OR

IF As-Found value is within specified tolerance, RECORD As-Found values in As-Left column of Data Sheet AND
GO TO Restoration, Section 5.4.
5.2 Calibrate Watlow C Series On-Off Temperature Controller

5.2.1 REFER to Figure 1 for “C” Series.

5.2.2 PRESS AND HOLD both increment and decrement keys for five (5) seconds.

5.2.3 OBSERVE the display shows “CAL” for approximately five (5) seconds.

5.2.4 AFTER approximately five (5) seconds, CHECK the display shifts to “Calibration offset Value”.

5.2.5 ADJUST the “Calibration offset Value” per the Data Sheet using the increment and decrement keys to obtain the desired value.

5.2.6 CHECK the new value takes effect approximately three (3) seconds after last key stroke.

5.2.7 OBSERVE the display blink AND

RETURN to the primary display within approximately five (5) seconds.

5.2.8 IF value is within tolerance per Data Sheet, RECORD As-Left value on Data Sheet AND

GO TO Section 5.4 Restoration.

5.2.9 IF value is not within tolerance per Data Sheet, REPEAT Steps 5.2.2 through 5.2.8 until value is within tolerance

OR

IF value cannot be brought into tolerance, NOTIFY FWS for resolution AND

STOP WORK until further directed.
5.3 Calibrate Watlow L Series Temperature Limit Switch

5.3.1 REFER to Figure 2 for “L” Series.

5.3.2 PRESS AND HOLD both increment and decrement keys for five (5) seconds.

5.3.3 OBSERVE the display shows “CAL” for approximately five (5) seconds.

5.3.4 AFTER approximately five (5) seconds, CHECK the display shifts to “Calibration offset Value”.

5.3.5 ADJUST the “Calibration offset Value” per the Data Sheet using the increment and decrement keys to obtain the desired value.

5.3.6 CHECK the new value takes effect approximately three (3) seconds after last key stroke.

5.3.7 OBSERVE the display blink AND

RETURN to the primary display within five (5) seconds.

5.3.8 IF value is within tolerance per Data Sheet, RECORD As-Left value on Data Sheet AND

GO TO Section 5.4 Restoration.

5.3.9 IF value is not within tolerance per Data Sheet, REPEAT Steps 5.3.2 through 5.3.8 until value is within tolerance OR

IF value cannot be brought into tolerance, NOTIFY FWS for resolution AND

STOP WORK until further directed.
5.4 Restoration

5.4.1 DISCONNECT AND REMOVE Test Equipment as necessary.

5.4.2 IF instrument was moved to shop, TRANSPORT unit back to field location.

5.4.3 RECONNECT field wiring per “Landed/Lifted Lead Sheet”.

5.4.4 IF Lockout/Tagout was installed, REMOVE in accordance with the Lockout/Tagout Program.

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

5.4.6 RETURN the equipment to the original configuration.

5.4.7 CLEAR OR RESET alarms as necessary.

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

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

5.4.10 INFORM Operations that calibration is complete and system may be returned to desired configuration.
5.5 **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.

5.6 **Review**

5.6.1 **INFORM** FWS test is complete.

5.6.2 **FWS REVIEW AND CONFIRM** 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.

5.7 **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.
Calibrate Watlow Series C and L Temperature Switch and On-Off Controller

Figure 1 – Watlow Series “C” On-Off Temperature Controller

*(100 Ω Platinum DET curve 0.00385 Ω/C/C)*
Terminals S2 and S3 must be shorted for a two-wire RTD

*No load resistance compensation*

Variable Set Point, Push to Set
CV _ (A, B, C or D) __ __ __ __ __ __ D

LED Display: Indicates the process value until the Push to Set Key is operated.

PUSH TO SET Key:
The process value (Actual Temperature) is displayed when this key is not operated. When this key is depressed, the set point is displayed and can be adjusted.

*For °F or °C Indicator Light: Lit to indicate if unit is configured for degrees Farenheit or degrees Celcius.*

LOAD Indicator Light: Lit when output is energized.

Increment and Decrement Keys:
Press the Up-Arrow key to increase the set point.
Press the Down-Arrow key to decrease the set point.
The new set point is entered 2 seconds after the last key stroke.
Calibrate Watlow Series C and L Temperature Switch and On-Off Controller

Figure 2 - Watlow Series “L” Temperature Limit Switch

Reset Switch (Customer Supplied)

LV _ (A, B, C or D) _ _ _ _ _ _ _ _ _ _ _ A

LED Display: Indicates the limit set point.

SET/RESET Key: Press and hold key to adjust the limit set point temperature. New limit set point is entered 3 seconds after the last key press. Press key to reset latched limit output once temperature is back in safe region. Can also be reset through customer supplied external reset switch.

°F or °C Indicator Light: Lit to indicate if unit is configured for degrees Fahrenheit or degrees Celsius.

ALARM Indicator Light: Lit when limit is tripped.

Increment and Decrement Keys: Press the Up-Arrow key to increase the limit set point. Press the Down-Arrow key to decrease the limit set point. The new set point is entered 3 seconds after the last key press. The limit set point will not change unless the SET/RESET key is pressed.