Tank Farm Maintenance Procedure

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>B-3</td>
<td>12/07/2017</td>
<td>Maintenance Request</td>
<td>Added steps for new equipment and removed outdated ones.</td>
</tr>
<tr>
<td>B-2</td>
<td>08/16/2017</td>
<td>PCA generated from Periodic Review</td>
<td>Remove Warnings. Add “first and last” to signature lines. Update Records Section.</td>
</tr>
<tr>
<td>B-1</td>
<td>09/16/2015</td>
<td>Maintenance request to add “B” train “AZ-K1-2-1 B”</td>
<td>Changed Procedure Title to include “B” Train. Add warning at 3.1 for “B” Train. Add second bullet at 4.2. Add Special Inst. And Step 4.3.2. Add “AZ-K1-2-1A on Train A” at 5.1, 5.2 5.3 title. Add Step 5.1.1. Add Sections 5.4 thru 5.6 for “B-Train”. Rework Scope 1.2, and Steps 5.2.20, 5.3.15 and Records Section 5.10.</td>
</tr>
<tr>
<td>B-0</td>
<td>04/13/2015</td>
<td>Periodic Review</td>
<td>Removed PPE Warnings, updated to current standards.</td>
</tr>
<tr>
<td>A-3</td>
<td>02/11/2014</td>
<td>Engineering request</td>
<td>Moved Step 5.1.3 to 5.1.4. Changed Steps 5.5.3 and 5.5.4 and Figure 4.</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
   2.1 Terms and Definitions ............................................................................................................. 3

3.0 PRECAUTIONS AND LIMITATIONS ......................................................................................... 3
   3.1 Personnel Safety ..................................................................................................................... 3
   3.2 Radiation and Contamination Control ..................................................................................... 4
   3.3 Limits ..................................................................................................................................... 4

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 ............................................................................................................................... 6
   5.1 Obtain As-Found Values at AZ-K1-2-1A on Train A ............................................................. 6
   5.2 RTD (3-wire) Input 1 Calibration at AZ-K1-2-1A on Train A .................................................. 8
### Watlow EZ Zone TCD Calibration at AZK102-1A or 1B at A or B - Trains

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.3</td>
<td>Current Input 2 Calibration at AZ-K1-2-1A on Train A</td>
</tr>
<tr>
<td>5.4</td>
<td>Obtain As-Found Values at AZK102-1B on B Train</td>
</tr>
<tr>
<td>5.5</td>
<td>RTD (3-wire) Input 1 Calibration at AZ-K1-2-1 B on Train B</td>
</tr>
<tr>
<td>5.6</td>
<td>RTD (3-wire) Input 2 Calibration at AZ-K1-2-1 B on Train B</td>
</tr>
<tr>
<td>5.7</td>
<td>Restoration</td>
</tr>
<tr>
<td>5.8</td>
<td>Acceptance Criteria</td>
</tr>
<tr>
<td>5.9</td>
<td>Review</td>
</tr>
<tr>
<td>5.10</td>
<td>Records</td>
</tr>
</tbody>
</table>

Figure 1 – EZ Zone PM 8 Controller Display Layout and Release Tabs
Figure 2 – EZ Zone PM 8 Controller Keys and Displays
Figure 3 – Analog Input 1
Figure 4 – Analog Input 2
Figure 5 – Parameters Setup: Control Loop 1
Figure 6 – Parameters Setup: Output 1
Figure 7 – Parameters Operations: Control Loop 1
Figure 8 – Connection to Setpoint (mA Source)
Figure 9 – Connection to Decade Box
Attachment 1 – Calibration Offset
1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides instructions for calibration of the Watlow Model EZ Zone PM 8 Temperature Controller.

1.2 Scope

This procedure applies to field or bench calibration of a Watlow Model EZ Zone PM 8 Temperature Controllers located at the following:

- AZK102-1A on A-Train
- AZK102-1B on B-Train.

2.0 INFORMATION

2.1 Terms and Definitions

- RTD  Resistance Temperature Device

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

3.1.1 Compliance with DOE–0359, Hanford Site Electrical Safety Program is required when working with this procedure.

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.

3.3 Limits

HNF-SD-WM-TSR-006, Tank Farms Technical Safety Requirements
- LCO 3.1, DST Primary Tank Ventilation System
- LCO 3.4, DST Induced Gas Release Event Flammable Gas Control

4.0 PREREQUISITES

4.1 Special Tools, Equipment and Supplies

The following supplies may be needed to perform this procedure:
- Decade box, 1 K ohm precision, with 0.01 ohm resolution (or equivalent)
- Current source, 4 - 20 mAmp, with 0.1 mAmp resolution
- 4½ digit, Digital Multimeter
- RTD Simulator (3-wire RTD)
- Lifted/Landed Lead Record (A-6001-159).

4.2 Performance Documents

The following documents may be needed to perform this procedure:
- Watlow Model EZ-Zone PM, PM8C2CA-ARAAAAA, User’s Manual (0600-0059-0000 Rev. L)
- H-2-131367, Sh. 9, Electrical Drawing for AZ-K1-2-1B Electric Heater.

4.3 Field Preparation

4.3.1 Shift Manager/OE VERIFY that there are no ongoing transfers and no waste disturbing activities in AY/AZ Farm that requires this system to be OPERABLE and in operation. (LCO 3.4)

________________________________________/________________________________________/__________
Signature Print (first & last) Date
Shift Manager
4.3 Field Preparation (Cont.)

Special Instructions

Sections 5.1 through 5.3 will be performed if Train A is selected and Sections 5.4 through 5.6 will be performed if Train B is selected.

4.3.2 FWS NOTIFY Shift Manager to initiate time monitoring per LCO 3.1. B. (LCO 3.1)

4.3.3 NOTIFY Operations to configure system to allow performance of this procedure.

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

5.1 Obtain As-Found Values at AZ-K1-2-1A on Train A

5.1.1 CONFIRM proper Electrical Safety measures have been taken, (i.e. shielding, PPE etc. per DOE–0359, Hanford Site Electrical Safety Program) before proceeding.

5.1.2 OPEN main disconnect switch to AZ-K1-2-1A.

NOTE - RTD simulator may be used in place of Decade Box if accuracy is sufficient.

5.1.3 IF bench testing equipment in the shop, PERFORM the following:

5.1.3.1 REMOVE EZ Zone module per Figure 1 AND

TRANSPORT from field location to shop.

5.1.3.2 INSTALL controller module into shop case for testing.

5.1.3.3 CONNECT power supply to appropriate terminals in Figure 9.
5.1 Obtain As-Found Values at AZ-K1-2-1A on Train A (Cont.)

5.1.4 CONNECT decade box to RTD Input 1, terminals T1/S1/R1.

5.1.5 CONNECT current source (i.e., Transmation) to Input 2, terminals T2/S2 AND APPLY input resistance and mA values per Data Sheet.

5.1.6 RECORD As-Found temperature values from display on Data Sheet.

5.1.7 IF As-Found values are not within specified tolerance per Data Sheet, GO TO Section 5.2 RTD calibration and/or Section 5.3 Current input 2 calibration as applicable,

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 5.7.
5.2 RTD (3-wire) Input 1 Calibration at AZ-K1-2-1A on Train A

**Analog Input 1**

NOTE - Refer to Figure 3 for Analog Input 1.

- Input is RTD.

5.2.1 OPEN Z-Zone Configurator Application.

5.2.2 SELECT “Configure a device while communicating with it” AND CLICK “Next”.

5.2.3 SELECT appropriate comport AND CLICK “Next”.

5.2.4 SELECT “Device” AND CLICK “Next”.

5.2.5 SELECT the following:

5.2.5.1 Operation

5.2.5.2 Analog Input

5.2.5.3 Analog Input 1

5.2.6 ADJUST “calibration offset” until values are within Data Sheet specifications.
5.3 Current Input 2 Calibration at AZ-K1-2-1A on Train A

Analog Input 2

NOTE - Refer to Figure 4 for Analog Input 2.
- Input is mA.

5.3.1 OPEN Z-Zone Configurator Application.

5.3.2 SELECT “Configure a device while communicating with it” AND CLICK “Next”.

5.3.3 SELECT appropriate comport AND CLICK “Next”.

5.3.4 SELECT “Device” AND CLICK “Next”.

5.3.5 SELECT the following:

5.3.5.1 Operation

5.3.5.2 Analog Input

5.3.6 ADJUST “calibration offset” until values are within Data Sheet specifications.

5.3.7 PERFORM the following to save calibration:

5.3.8 SELECT “Finish” on lower right corner of screen.

5.3.9 SELECT “Save the Configurator in a file and exit.”

5.3.10 LABEL “file name” to current and save.
5.3  Current Input 2 Calibration at AZ-K1-2-1A on Train A

5.3.11  **IF** output values are not within tolerance per Data Sheet, **REPEAT** Steps in 5.2 until values are within tolerance,

**OR**

**IF** output values cannot be brought into tolerance, **NOTIFY** FWS for resolution.

5.3.12  **IF** output values are within tolerance per Data Sheet, and the Current (mA) Input must be calibrated, **GO TO** Section 5.2,

**OR**

**IF** Step 5.3.1 Current (mA) Input does not require calibration, **PERFORM** Watlow Instrument calibration by applying the input values per Data Sheet.

5.3.13 **IF** the output values are within specified tolerance per Data Sheet, **RECORD** values in As-Left column of Data Sheet **AND**

**GO TO** Restoration Section 5.7.
5.4 Obtain As-Found Values at AZK102-1B on B Train

5.4.1 CONFIRM proper Electrical Safety measures have been taken, (i.e. shielding, PPE etc. per DOE–0359, Hanford Site Electrical Safety Program) before proceeding.

5.4.2 OPEN main disconnect switch to AZ-K1-2-1B.

NOTE - RTD simulator may be used in place of Decade Box if accuracy is sufficient.

5.4.3 IF bench testing equipment in the shop, PERFORM the following:

5.4.3.1 REMOVE EZ Zone module per Figure 1 AND TRANSPORT from field location to shop.

5.4.3.2 INSTALL controller module into shop case for testing.

5.4.3.3 CONNECT power supply to appropriate terminals AND GO TO Step 5.4.4.
5.4 Obtain As-Found Values at AZK102-1B on B Train (Cont.)

5.4.4 CONNECT decade box to RTD Input 1, terminals T1/S1/R1.

5.4.5 CONNECT current source (i.e., Transmation) to Input 2, terminals T2/S2.

5.4.6 IF As-Found values are not within specified tolerance per Data Sheet, GO TO Section 5.5 RTD calibration and/or Section 5.6 Current input calibration as applicable,

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 5.7.
5.5 RTD (3-wire) Input 1 Calibration at AZ-K1-2-1 B on Train B

Analog Input 1

5.5.1 OPEN Z-Zone Configurator Application.

5.5.2 SELECT “Configure a device while communicating with it” AND CLICK “Next”.

5.5.3 SELECT appropriate comport AND CLICK “Next”.

5.5.4 SELECT “Device” AND CLICK “Next”.

5.5.5 SELECT the following:

5.5.5.1 Operation
5.5.5.2 Analog Input
5.5.5.3 Analog Input 1
5.6 RTD (3-wire) Input 2 Calibration at AZ-K1-2-1 B on Train B

Analog Input 2

5.6.1 ADJUST “Calibration Offset” per Data Sheet.

5.6.2 SELECT “Analog Input 2” or mA Setpoint Adjust “calibration offset” per datasheet.

5.6.3 PERFORM the following to save calibration:

5.6.4 SELECT “Finish” on lower right corner of screen.

5.6.5 SELECT “Save the Configurator in a file and exit.”

5.6.6 LABEL “file name” to current and save.

5.6.7 IF output values are not within tolerance per Data Sheet, REPEAT Steps 5.6.1 through 5.6.8 until values are within tolerance,

OR

IF output values cannot be brought into tolerance, NOTIFY FWS for resolution.

5.6.8 IF output values are within tolerance per Data Sheet, and the Current (mA) Input must be calibrated, GO TO Section 5.5,

OR

IF Section 5.6 Current (mA) Input does not require calibration, PERFORM Watlow Instrument calibration by applying the input values per Data Sheet.

5.6.9 IF the output values are within specified tolerance per Data Sheet, RECORD values in As-Left column of Data Sheet AND

GO TO Restoration Section 5.7.
5.7 Restoration

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

5.7.2 IF not already disconnected, DISCONNECT AND REMOVE the Test Equipment.

5.7.3 IF controller was removed for bench calibration, PERFORM the following:

5.7.3.1 REINSTALL controller to its field location.

5.7.3.2 CLOSE main disconnect switch to AZ-K1-2-1A or AZ-K1-2-1B.

5.7.3.3 GO TO Step 5.7.5.

5.7.4 IF controller was calibrated in the field location, PERFORM the following:

5.7.4.1 RECONNECT field wires to the As-Found condition.

5.7.4.2 OPEN main disconnect switch to AZ-K1-2-1A or AZ-K1-2-1B.

5.7.4.3 CLOSE door to Heater Control Box JBV-2C12 or JBV-2C11.

5.7.4.4 CLOSE main disconnect switch to AZ-K1-2-1A or AZ-K1-2-1B.

5.7.5 RECORD the Test Equipment information and calibration status on Data Sheet.

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

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

5.8 Acceptance Criteria

5.8.1 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.

5.8.2 IF PM passed calibration NOTIFY Shift Manager to stop time monitoring per LCO 3.1.B. (LCO 3.1)
5.9 Review

5.9.1 INFORM FWS test is complete.

5.9.2 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.

5.10 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– EZ Zone PM 8 Controller Display Layout and Release Tabs

On the PM 8 Controls, slide a screwdriver under the pry tabs and twist slightly to release tab from latch.
**Figure 2 – EZ Zone PM 8 Controller Keys and Displays**

- **Upper Display**
  In the Home Page displays the process value, otherwise displays the value of the parameter in the lower display.

- **Communications Activity**
  Flashes when another device is communicating with this controller.

- **Up and Down Keys**
  In the home page, adjusts the set point in the lower display. In other pages, changes the upper display to a higher or lower value, or changes a parameter selection.

- **Channel Display**
  Indicates the channel for any given EZ-ZONE module.

- **Lower Display**
  Indicates Set Point or output power value during operation, or the parameter whose value appears in the upper display.

- **Infinity key**
  Press to back up one level, or press and hold for two seconds to return to the Home Page. From the Home Page clears alarms and errors if clearable.

- **Advance Key**
  Advances through parameter prompts.
Figure 3 – Analog Input 1
Figure 4 – Analog Input 2
Figure 5 – Parameters Setup: Control Loop 1

- Host Algorithms: PID
- Cool Algorithms: Off
- Cool Output Curve: Off
- TRU-TUNE® Enable: No
- TRU-TUNE® Band: 0°
- TRU-TUNE® Gain: 1
- Autotune Aggressiveness: Critical
- Filter Delay: 0.0
- User Failure Action: User
- Input Error Failure: Simplex Transistor
- Fixed Power: 0.0%
- Open Loop Detect Enable: No
- Open Loop Detect Time: 340
- Open Loop Detect Deviation: 1.0
- Ramp Action: Off
- Ramp Scale: Minutes
- Ramp Rate: 0.0
- Low Set Point: 0.0°
- High Set Point: 200.0°
- Set Point Open Limit Low: 110.0%
- Set Point Open Limit High: 100.0%
Figure 6 – Parameters Setup: Output 1
Figure 7 – Parameters Operations: Control Loop 1
Figure 8 – Connection to Setpoint (mA Source)
Figure 9 – Connection to Decade Box

Decade box

Slot A

Jumper

Red
White
Black

H
L
GND

T1
S1
R1
Watlow EZ Zone TCD Calibration at AZK102-1A or 1B at A or B - Trains

Attachment 1 – Calibration Offset

Inputs

Calibration Offset

Calibration offset allows a device to compensate for an inaccurate sensor, lead resistance or other factors that affect the input value. A positive offset increases the input value, and a negative offset decreases the input value.

The input offset value can be viewed or changed with Calibration Offset (Operations Page, Analog Input Menu).

Calibration

Before performing any calibration procedure, verify that the displayed readings are not within published specifications by inputting a known value from a precision source to the analog input. Next, subtract the displayed value with the known input and compare this difference to the published accuracy range specification for that type of input.

Use of the Calibration Offset parameter found in the Operations Page, Analog Input Menu, shifts the readings across the entire displayed range by the offset value. Use this parameter to compensate for sensor error or sensor placement error. Typically this value is set to zero.

Equipment required while performing calibration:

Obtain a precision source for millivolts, volts, milliampere or resistance depending on the sensor type to be calibrated. Use copper wire only to connect the precision source to the controller’s input. Keep leads between the precision source and controller as short as possible to minimize error. In addition, a precision volt/ohm meter capable of reading values to 4 decimal places or better is recommended. Prior to calibration, connect this volt/ohm meter to the precision source to verify accuracy.

Actual input values do NOT have to be exactly the recommended values, but it IS critical that the actual value of the signal connected to the controller be accurately known to at least four digits.

Calibration of Analog Inputs:

To calibrate an analog input, you will need to provide a source of two electrical signals or resistance values near the extremes of the range that the application is likely to utilize. See recommended values below:

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Precision Source Low</th>
<th>Precision Source High</th>
</tr>
</thead>
<tbody>
<tr>
<td>thermocouple</td>
<td>0.000 mV</td>
<td>50.000 mV</td>
</tr>
<tr>
<td>millivolts</td>
<td>0.000 mV</td>
<td>50.000 mV</td>
</tr>
<tr>
<td>volts</td>
<td>0.000V</td>
<td>10.000V</td>
</tr>
<tr>
<td>milliamps</td>
<td>0.000 mA</td>
<td>20.000 mA</td>
</tr>
<tr>
<td>100 Ω RTD</td>
<td>50.00 Ω</td>
<td>350.0 Ω</td>
</tr>
<tr>
<td>1,000 Ω RTD</td>
<td>500.0 Ω</td>
<td>3,500 Ω</td>
</tr>
<tr>
<td>thermistor 5 kΩ</td>
<td>50.00</td>
<td>5,000</td>
</tr>
<tr>
<td>thermistor 10 kΩ</td>
<td>150.0</td>
<td>10,000</td>
</tr>
<tr>
<td>thermistor 20 kΩ</td>
<td>1,800</td>
<td>20,000</td>
</tr>
<tr>
<td>thermistor 40 kΩ</td>
<td>1,700</td>
<td>40,000</td>
</tr>
<tr>
<td>potentiometer</td>
<td>0.000</td>
<td>1,200</td>
</tr>
</tbody>
</table>

Note:
The user may only calibrate one sensor type. If the calibrator interferes with open thermocouple detection, set Sensor Type in Setup Page, Analog Input Menu to millivolt instead of Thermocouple to avoid interference between the calibrator and open thermocouple detect circuit for the duration of the calibration process. Be sure to set sensor type back to the thermocouple type utilized.

1. Disconnect the sensor from the controller.
2. Record the Calibration Offset parameter value in the Operations Page, Analog Input Menu, then set value to zero.
3. Wire the precision source to the appropriate controller input terminals to be calibrated. Do not have any other wires connected to the input terminals. Please refer to the Install and Wiring section of this manual for the appropriate connections.
4. Ensure the controller sensor type is programmed to the appropriate Sensor Type in the Setup Page, Analog Input Menu.
5. Enter Factory Page, Calibration Menu, Calibration input instance to be calibrated. This corresponds to the analog input to be calibrated.
6. Set Electrical Input Slope and Electrical Input Offset to 1.000 and 0.000 (this will cancel any prior user calibration values)
7. Input a Precision Source Low value, Read Electrical Measurement value of controller via EZ-Configurator or RUI. This will be referred to as Electrical Measured Low.
8. Record low value
9. Input a Precision Source High value.
Attachment 1 – Calibration Offset (Cont.)

10. Read Electrical Measurement value $P_{SU}$ of controller via EZ-Configurator or RUL. This will be referred to as Electrical Measured High. Record high value

11. Calculated Electrical Input Slope = (Precision High – Precision Low) / (Electrical Measured High – Electrical Measured Low)

12. Calculated Electrical Input Offset = Precision Low – (Electrical Input Slope * Measured Low)

13. Enter the calculated Electrical Input Slope $EL_{15}$ and Electrical Input Offset $EL_{10}$ into the controller.

14. Exit calibration menu.

15. Validate calibration process by utilizing a calibrator to the analog input.

16. Enter calibration offset as recorded in step 2 if required to compensate for sensor error.

Setting Electrical Input Slope $EL_{15}$ to 1.000 and Electrical Input Offset $EL_{10}$ to 0.000, restores factory calibration as shipped from factory.

Filter Time Constant

Filtering smoothes an input signal by applying a first-order filter time constant to the signal. Filtering the displayed value makes it easier to monitor. Filtering the signal may improve the performance of PID control in a noisy or very dynamic system.

Adjust the filter time interval with Filter Time $F_{IL}$ (Setup Page, Analog Input Menu). Example: With a filter value of 0.5 seconds, if the process input value instantly changes from 0 to 100 and remained at 100, the display will indicate 100 after five time constants of the filter value or 2.5 seconds.

Sensor Selection

You need to configure the controller to match the input device, which is normally a thermocouple, RTD or process transmitter.

Select the sensor type with Sensor Type $SE_n$ (Setup Page, Analog Input Menu).

Sensor Backup

Sensor backup maintains closed-loop control after an input failure by switching control to input 2. The sensor backup feature is only available in an EZ-ZONE PM Integrated Limit or Remote Set Point controller. Turn sensor backup on or off with Sensor Backup Enable $SB_{ERR}$ (Setup Page, Analog Input 1).

Note:

When Sensor Backup is enabled the Process Value function will automatically set itself to Sensor Backup.

Set Point Low Limit and High Limit

The controller constrains the set point to a value between a set point low limit and a set point high limit.

Set the set point limits with Low Set Point $LS_P$ and High Set Point $HS_P$ (Setup Page, Loop Menu).

There are two sets of set point low and high limits: one for a closed-loop set point, another for an open-loop set point.

Scale High and Scale Low

When an analog input is selected as process voltage or process current input, you must choose the value of voltage or current to be the low and high ends. For example, when using a 4 to 20 mA input, the scale low value would be 4.00 mA and the scale high value would be 20.00 mA. Commonly used scale ranges are: 0 to 20 mA, 4 to 20 mA, 0 to 5V, 1 to 5V and 0 to 10V.

You can create a scale range representing other units for special applications. You can reverse scales from high values to low values for analog input signals that have a reversed action. For example, if 50 psi causes a 4 mA signal and 10 psi causes a 20 mA signal.

Scale low and high low values do not have to match the bounds of the measurement range. These along with range low and high provide for process scaling and can include values not measurable by the controller. Regardless of scaling values, the measured value will be constrained by the electrical measurements of the hardware.

Select the low and high values with Scale Low $SL_o$ and Scale High $SH_i$. Select the displayed range with Range Low $RL_o$ and Range High $RH_i$ (Setup Page, Analog Input Menu).