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SLC4000TechNote22_WatlowSettingForCurrentOrVoltageOutput
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SLC4000 Tech Note 22 Watlow Setting For Nominal 4-20 ma Output

Issue: This tech note addresses a very uncommon anomaly where one relay on the SLC4000 is left on when a desired zero command (4.0 ma) has been issued from the Watlow controller. The suspected cause is conducted or induced EMI noise affecting the command wiring to the SLC4000.

This situation can occur when the command line is:

1. Routed with AC wiring
2. Command line wires are not shielded twisted pair.
 - a. The shields are connected to earth ground.
 - b. The shields are terminated at both ends.
 - c. *The recommended shield termination is to the SLC4000 signal common, either TB3 or TB6.*
3. *Quick verification test of 4-20ma signal to determine if the issue is caused by EMI corrupting the command line.*
 - a. *Disconnect the command wires from the Watlow unit.*
 - b. *Disconnect the command line from SLC4000 TB2(+) and TB3(-).*
 - c. *Connect a temporary twisted shielded pair directly between the Watlow*
 - i. *H1 (+)*
 - ii. *F1 (-)*
 - iii. *Shield clipped and left unterminated*
 - d. *Connect the Watlow H1(+) to SLC4000 TB2(+).*
 - e. *Connect the Watlow F1 (-) to SLC4000 TB3(-)*
 - f. *Connect the shield to SLC4000 TB6(-)*
 - g. *Re-test to determine if a step remains ON or any other observed anomalies*
 - i. *If the anomalies do not recur, the issue is most likely EMI coupling into the command wiring. Separate the command line from adjacent AC wiring and re-test.*
 - ii. *If the SLC4000 continues to show anomalies, the unit may be defective. Replace the unit and re-test with the original wiring.*

Possible Work-around Resolution to Improve Command Line Noise Immunity

Change the Watlow EZ-Zone Output Setting

Applicable Models:

1. EZ-Zone PM, Integrated Controller Model
 - a. PM*C*FA****A**
 - ^ Panel Mount 1/8 DIN Vertical
 - ^ PID Controller with Universal Input
 - ^^ Universal Process
 - ^ (A) Standard
2. Example: PM8C1FA-1RAAAAB

Parameters for nominal 4-20 ma Output changed to 3.5ma-20ma

1. Apply power to EZ-Zone
2. Press and hold <Up><Dn> for about 8 sec or until “Set” is displayed in the lower display and “Ai” is displayed in the upper display
3. Press the <Dn> key 4 times or until “otPt” is displayed in the upper display (Step 1)
4. Press<Green o> to enter the menu item (Step 2)

- a. See o.ty in the lower display
 - i. Press <Dn> until “MA” is displayed in the upper display
5. Press<Green o> to enter the next menu item (Step 3)
 - a. See “hEAt” in the upper display
6. Press<Green o> to enter the next menu item (Step 4)
 - a. See “Fi” in the lower display
7. Press<Green o> to enter the next menu item (Step 5)
 - a. See “S.Lo” in the lower display
 - i. Press <Up> until the upper display reads **3.25** (increases the noise margin for nominal 4.00 ma)
 - ii. **Note that under severe EMI conditions, this value may need to be set lower.** For settings less than 3.2ma, the status LED DS9 flashes red. This is only a warning that the signal is out-of-range. When the signal returns to a normal value, the SLC4000 operates normally.
8. Press<Green o> to enter the next menu item (Step 6)
 - a. See “S.hi” in the lower display
 - i. Press <Up> until the upper display reads 20.00
9. Press<Green o> to enter the next menu item (Step 7)
 - a. See “r.Lo” in the lower display
 - i. See “0.0” in the upper display
10. Press<Green o> to enter the next menu item (Step 8)
 - a. See “r.hi” in the lower display
 - i. See “100.0” in the upper display
11. Press<Green o> to enter the next menu item (Step 9)
 - a. See o.CA in the lower display
 - i. See “0.0” in the upper display
12. Press <infinity> <infinity> to exit to the home page
13. On the SLC4000 master, verify the input configuration DIP Switches 1 through 5 are set for 4-20 ma
 - a. SW1-1 ON
 - b. SW1-2 OFF
 - c. SW1-3 ON
 - d. SW1-4 OFF
 - e. SW1-5 ON

Output Settings for Nominal 4-20ma

Step	Parameter	Lower Display	Upper Display	Remarks
1	Output		otPt	
2	Output Type	o.ty	MA	
3	Mode	Fn	hEAt	
4	Function	F1	1	
5	Scale Low	S.L0	3.50	Changed to provide added noise immunity
6	Scale High	S.hi	20.00	
7	Range.Lo	R.Lo	0.0	
8	Range.High	R.HI	100.0	
9	Lo Calibration	Lo.CA	0.0 %	

Optional – Output Parameters for nominal 0-10V/2-10V Output

1. *If the Watlow unit is configured for 4-20 ma, on the Watlow terminal board, change the (+) lead from H1 to G1.*
2. Apply power to EZ-Zone
3. Press and hold <Up><Dn> for about 8 sec or until “Set” is displayed in the lower display and “Ai” is displayed in the upper display
4. Press the <Dn> key 4 times or until “otPt” is displayed in the upper display (Step 1)
5. Press<Green o> to enter the menu item (Step 2)

- a. See o.ty in the lower display
 - i. Press <Dn> until “volt” is displayed in the upper display
6. Press<Green o> to enter the next menu item (Step 3)
 - a. See “hEAt” in the upper display
7. Press<Green o> to enter the next menu item (Step 4)
 - a. See “Fi” in the lower display
8. Press<Green o> to enter the next menu item (Step 5)
 - a. See “S.Lo” in the lower display
 - i. Press <Up> or <Dn> until the upper display reads 0.00 for 0-10V or 2.00 for 2-10V
9. Press<Green o> to enter the next menu item (Step 6)
 - a. See “S.hi” in the lower display
 - i. Press <Up> or <Dn> until the upper display reads 10.00
10. Press<Green o> to enter the next menu item (Step 7)
 - a. See “r.Lo” in the lower display
 - i. See “0.0” in the upper display
11. Press<Green o> to enter the next menu item (Step 8)
 - a. See “r.hi” in the lower display
 - i. See “100.0” in the upper display
12. Press<Green o> to enter the next menu item (Step 9)
 - a. See o.CA in the lower display
 - i. See “0.0” in the upper display
- 13. Press <infinity> <infinity> to exit to the home page**
- 14. On the SLC4000 master, verify the input configuration DIP Switches 1 through 5 are**
 - a. **For 0-10V input**
 - i. SW1-1 OFF
 - ii. SW1-2 ON
 - iii. SW1-3 ON
 - iv. SW1-4 ON
 - v. SW1-5 OFF
 - b. **For 2-10V input**
 - i. SW1-1 OFF
 - ii. SW1-2 ON
 - iii. SW1-3 ON
 - iv. SW1-4 ON
 - v. SW1-5 ON

Output Setting for 0-10V or 2-10V

Step	Parameter	Lower Display	Upper Display	Remarks
1	Output		otPt	
2	Output Type	o.ty	volt	
3	Mode	Fn	hEAt	
4	Function	F1	1	
5	Scale Low	S.L0	0.00 or 2.00	0-10V or 2-10V
6	Scale High	S.hi	10.00	
7	Range.Lo	R.Lo	0.0	
8	Range.High	R.HI	100.0	
9	Lo Calibration	Lo.CA	0.0 %	

Use Our User-Defined Inputs

- Following instructions are for a 4-20 ma input,

Programming The User-Defined Levels or Options

There are 2 values that the user may store in non-volatile EEPROM. These values are interpreted differently, based on the Input Configuration switch settings.

General Steps To Program the User-Defined Levels

- Use your controller to set the upper and lower, 4 and 20ma signals.
- o You must be able to set you controller to output the 4ma and 20ma signal, when required.
- Set the Input Configuration switches to **Program the User-Defined values**

Table 10 Switch Position for Programming the User-Defined Values

Signal Source	SW1-1 *1	SW1-2 *2	SW1-3	SW1-4	SW1-5
Current less than 80 ma DC	On	Off	Off	Off	Off

*1 SW1-1 connects a 61.9 ohm (F/W<=V5.25) OR 249 ohm (F/W V5.26+) ohm resistor from TB2 to signal common, and is typically used for current loop inputs.

Step-By-Step Programming Instructions For User-Defined Inputs

- Apply control power, and verify the status LED is flashing Red, then Green, at 5 flashes in 10 secs, indicating the **programming mode.**
- Apply the **20ma** signal. To ensure all steps turn ON, apply, say, a 19.5ma signal to turn all steps ON.
- Program the **Upper Limit Value:**
 - o Press and hold the **Test Up** pushbutton for greater than 1 second, until the status LED turns off, then cycles Grn, Org, and Red. It returns to flashing Red and Grn.
- Apply the 4ma signal. To ensure all step turn OFF, apply, say, a 3.9ma signal.
- Program the **Lower Limit Value:**
 - o Press and hold the **Test Dn** pushbutton for greater than 1 second, until the status LED turns off, then cycles Grn, Org, and Red. It returns to flashing Red and Grn.
- Turn off control power
- For 4-20ma signal
 - Set SW1-1 to ON
 - Set SW1-2 to OFF
 - Set SW1-3 to OFF
 - Set SW1-4 to ON
 - Set SW1-5 to ON
- **Test and verify the User-Defined levels.**

Questions? Call or email Selectronix at techsupport@selectronix.us