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SLC4000TechNote20_ErraticBehaviorCausesAndResolution

Rev 04/23/24

Optional Test Equipment

1. Digital Voltmeter
2. Fluke 789 Process Calibrator

Some Reported Erratic Behavior of SLC4000

1. **A step is left ON when the command is presumably at zero command.**
2. **Does not consistently step to full on, without unexpected delays between steps.**
3. **Latch up of controller at zero demand, requiring power cycle to resume normal behavior.**

- **The typical cause of erratic behavior is induced noise due to wiring issues to the SLC4000 power and/or command terminals.**

Guidelines for Successful Implementation of SLC4000

Command Wiring

a. ***Follow all local and national wiring codes.***
b. ***VERIFY that the external signal (-) is isolated from earth or chassis ground***
   i. ***The SLC4000 (-) terminal is isolated from earth ground. The isolation from earth ground is to eliminate ground currents and other conducted or induced EMI effects.***
c. ***Twisted-pair shielded wiring should be used for the command signal.***
   i. Care must be taken when terminating the shield. The shield should be terminated using one of the following methods, in order of preference:
      1. ***the signal source's signal common OR***
      2. ***the SLC4000's signal common at terminal TB3 or TB6 OR***
      3. ***left totally unterminated.***
      4. **DO NOT terminate the shield to earth or chassis ground.**
      5. The best choice is dependent on the characteristics of the individual installation and any national or local wiring codes.
   ii. **Do not route in the same wire trough, cable tie, or bundle with any AC power lines**
      1. Consider "air-lining" command wiring to the SLC4000 control terminals to minimize induced EMI noise.

Noisy Contactors

d. Noisy contactors can produce a large amount of AC EMI noise on the power lines, resulting in induced and conducted EMI to the command and power lines to the SLC4000.

Power Wiring

e. **Do not bundle the power wiring with the contactor output wiring.**

EMI Suppression Devices

f. **Consider adding our SLC4032, Line Filter to suppress conducted EMI on the power lines.**
g. **Consider adding our SLC4033, Ferrite Core to the command wiring.**

Step staying ON at Zero Command Input

1. Check command input wiring for proper shielding and shield termination.
2. 4-20 ma Input
   - The noise margin with a 4-20ma is small. The switching threshold is at ½ step current.
   - Example: for the worst case 32 step system, the current/step is
     - Span current = 16 ma (20ma-4ma)
     - Current/step = Span current/Qty steps = 16/32 = 0.5 ma
     - The switch point for the 1st step is ½ step or 0.25 ma
   - Switching hysteresis on increasing command is higher than the calculated switch point, and on decreasing demand is lower than the calculated switch point.
   - With a Fluke 789 Process Calibrator, send a 3.5 to 4.0 ma signal directly to the SLC4000 configured for 4-20ma using shielded wire, with the shield terminated to our signal common, either TB3 or TB6.
     - Verify that all steps are OFF and remain OFF.
   - With a digital volt meter, measure the DC voltage between TB2(+) and TB3 (-)
     - **The current sensing resistor for F/W V5.25 and below is 61.9 ohms, so the voltage at minimum demand is 0.25 VDC**
     - **The current sensing resistor for F/W V5.26+ is 249 ohms, so the voltage at minimum demand is 1.00 VDC**
     - If the current cannot be adjusted to this level, change the SLC4000 input configuration to 0-10V or 2-10V input and change the input command configuration to match.

Work-around to lower input threshold

- **Adjust the Watlow output command minimum to >= *3.5ma, but <=4.0 ma.***
- OR for F/W 5.25 and below, Add a 1K ohm >1/4 watt resistor between TB2 and TB3.
  - This places the resistor in parallel with the current sensing resistor of 61.9 ohms.
- See SLC4000TechNote22_WatlowSettingForCurrentOrVoltageOutput.pdf for Watlow EZ-Zone controllers.

For additional questions email techsupport@selectronix.us.