SELECTRONIX, INC. WOODINVILLE, WA

SUPERSTEP SERIES 4000

SEQUENCING STEP

CONTROLLERS

INSTALLATION & OPERATING

SLC4000 TechNote01

LOAD LIMIT INPUT CONFIGURATIONS

Rev 01/19/2/

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Introduction

This addendum describes how to configure the Series 4000 controllers for the various Load Limit input configurations and signal sources. It also has a block diagram for connecting to a Building Automation System.

The following configurations provide for 100% load limiting, which means that at the minimum command, all relay stages are enabled, and at the maximum command 0 stages are enabled.

100% load limiting allows for the command to also act as an alternate shutdown command.

1 Various DC Voltage - 100 % Load Limit Input Configuration

1.1 0-5 VDC

1.1.1 Additional Components Required

- R1 1.50K ohm 1%, ¹/₄ watt or greater
- R2 499 ohm 1%, ¹/₄ watt or greater

Available as SLC4040-1.50K Available as SLC4040-499

Note that SLC4040 Resistor Adapter Assemblies contain the resistor, 2 female and 1 male ¹/₄" quick connect terminals and 2 'Y' terminal tab adapters for mounting flexibility.

Install 'Y' adapters on TB5 and TB6. Connect free end of R1 to field wiring using insulated male quick connect and secure to chassis. See Figure 1 for connection schematic.

1.2 0-10 VDC

1.2.1 Additional Components Required

•	R1	3.48K ohm 1%, ¼ watt or greater	Available as SLC4040-3.48K
•	R2	499 ohm 1%, ¼ watt or greater	Available as SLC4040-499

Note that SLC4040 Resistor Adapter Assemblies contain the resistor, 2 female and 1 male ¹/₄" quick connect terminals and 2 'Y' terminal tab adapters for mounting flexibility.

1.3 For an SLC4000-x-02 or SLC4000-x-03 4-20 ma Pre-programmed unit, converting it for other standard Load Limit Inputs

These units are pre-programmed for a 20% offset input, and must be returned to a non-offset input. These units also have an integral 61.9 ohm resistor R9, between TB5 and TB6 which must be removed.

1.3.1 Program the SLC4000 for a non-offset input

Turn the control power off, and disconnect any wires connected to TB1, TB2, and TB3.

- Connect a jumper between TB1 and TB2
- Record the original switch settings for SW1-1 through SW1-5
- Set the Input Configuration switches to the following
- SW1-1 OFF
- SW1-2 OFF
- SW1-3 OFF
- SW1-4 OFF
- SW1-5 OFF
- Apply control power, and verify the status LED is flashing Red, then Grn, at 1 Hz, indicating the programming mode.
- Press and hold the **Test Down** (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
- Remove the jumper between TB1 and TB2
- Set the Input Configuration switches back to the original setting.
- Re-connect the normal sensor inputs, as required.

1.3.2 Remove R9 located between terminal TB5 and TB6

1.3.3 Additional Components Required for 0-10V Load Limit Signal

• R1 3.48K ohm 1%, ¹/₄ watt or greater

Available as SLC4040-3.48K Available as SLC4040-499

• R2 499 ohm1%, ¹/₄ watt or greater

1.3.4 Additional Components Required for 0-5V Load Limit Signal

• R1 1.50K ohm 1%, ¹/₄ watt or greater

Available as SLC4040-1.5K Available as SLC4040-499

• R2 499 ohm1%, ¹/₄ watt or greater

1.3.5 Additional Components Required 1K Potentiometer

• No additional components required







1.4 0-1.2 VDC

1.4.1 Additional Components Required

• None

See Figure 2 for connection schematic

1.4.2 DC Voltage - Direct Connection Wiring Diagram



Figure 2 DC Voltage - Direct Connection Wiring Diagram

2 4-20 ma 100 % Load Limit Input Configuration

2.1 4-20 ma Pre-programmed at the factory (includes resistor as an integral part of the assembly)

- You can order Series 4000 with the 4-20 ma load limit pre-programmed and configured
- Order SLC4000-8-02 (no vernier output) or SLC4000-4-03 (with vernier output).

2.2 4-20 ma Field Programming

2.2.1 Additional Components Required

• R1 61.9 ohm 1%, ¼ watt or greater Available as SLC4040-61.9

Note that SLC4040 Resistor Adapter Assemblies contain the resistor, 2 female and 1 male ¹/₄" quick connect terminals and 2 'Y' terminal tab adapters for mounting flexibility. Install 'Y' adapters on TB5 and TB6. Connect positive (+) to TB5, and minus(-) to TB6.

2.3 Programming for 4-20 ma Load Limit Input

The Load Limit input must be programmed for a 20% offset to accommodate the 4 ma offset.

2.3.1 Steps To Program the Load Limit Input for 4-20 ma

Turn the control power off, and disconnect any wires connected to TB1, TB2, and TB3.

- Connect a jumper between TB2 and TB3
- Record the original switch settings for SW1-1 through SW1-5
- Set the Input Configuration switches to the following
- SW1-1 OFF
- SW1-2 OFF
- SW1-3 OFF
- SW1-4 OFF
- SW1-5 OFF
- Apply control power, and verify the status LED is flashing Red, then Grn, at 1 Hz, indicating the programming mode.
- 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
- Remove the jumper between TB2 and TB3
- Set the Input Configuration switches back to the original setting.
- Re-connect the normal sensor inputs, as required.





Figure 3 4-20ma DC Current Wiring Diagram

3 Potentiometer 100 % Load Limit Input Configuration

- 1. Connect a 1K to 5K, 2 watt potentiometer as shown below for 100% load limiting.
 - Full Clockwise (CW) will allow all the stages to come on.
 - For full Counter-Clockwise to allow all stages to come on, reverse TB4 and TB6 connections.

3.1.1 **Potentiometer Wiring Diagram**



Figure 4 Potentiometer Wiring Diagram

4 Standby Generator or Low Fire Hold Load Limiting Configuration

- A variation of the potentiometer load limiting may be used to limit the maximum load when a standby generator is activated or a low fire hold is desired.
- Install a relay, C1, whose contacts close when the generator is activated, using the Normally Open contacts. Alternately, wire the relay to be energized with line power using the Normally Closed contacts, so that when the relay is de-energized, the load limit takes effect.
- For a Low Fire Hold, use a temperature or pressure switch for C1 for a slow startup.
- If a non-adjustable load limit is desired, replace the potentiometer with 2 resistors, R1 and R2, in a voltage divider configuration to provide the desired percentage of the 1.24V reference.
 - Assuming R1 is 1K ohm, 1/4 Watt, then R2 is determined by:
 - X = Desired load, in percent
 - R2 = (100,000/X) 1000 in ohms
 - Example:
 - Desired load percent = 30%
 - R2 = (100,000/30) 1000
 - = 2333 ohms

Obtain the closest standard 5%, 1/4 watt value of 2.4K ohms

4.1.1 Standby Generator or Low Fire Hold Wiring Diagram



• Figure 5 Standby Generator or Low Fire Hold Wiring Diagram

5 Relay Closure Shutdown & Hardware Lockout Configuration

• A normally open or normally closed set of contacts may be used to command all in-service relay outputs to sequence off. This might be used as a **low water, fault or general purpose output shutdown**.

5.1.1 Relay Closure Shutdown Wiring Diagram



• Figure 6 Relay Closure Wiring Diagram

Action	Contact set connects	Additional Component	Remarks
		and connections	
		and connections	
Closing contact causes	TB4 and TB5	N/A	*1
graceful shutdown			
Opening contact causes	TB5 and TB6	Reverse NO and NC	*1
graceful shutdown		contacts in Figure 6	

*1 To provide for a total 'E-stop' failsafe type of hardware lockout of the line power supplying the contactors, add a relay contact in series with the line power sourcing the RLYCOM terminal, TB109, on the master SLC4000, as well as on all expansion units. On lockout, the contactors will release immediately. On restoral of power, the load limit contacts provide for the graceful sequencing restoral of the active relays.