



UDC 3200 Application Note

Wiring Diagrams

Identify Your Wiring Requirements

To determine the appropriate diagrams for wiring your controller, refer to the model number interpretation in this section. The model number of the controller is on the outside of the case.

Universal Output Functionality and Restrictions

Instruments with multiple outputs can be configured to perform a variety of output types and alarms. For example, an instrument with a current output and two relays can be configured to perform any of the following:

- 1) Current Simplex with two alarm relays;
- 2) Current Duplex 100% with two alarm relays;
- 3) Time Simplex with one alarm relay;
- 4) Time Duplex with no alarm relays; or
- 5) Three Position Step Control with no alarm relays.

These selections may all be made via the keyboard and by wiring to the appropriate output terminals; there are no internal jumpers or switches to change. This flexibility allows a customer to stock a single instrument which is able to handle a variety of applications.

Table shows what control types and alarms are available based upon the installed outputs. In this table, when Duplex Control and Reverse Action are configured, “Output 1” is HEAT while “Output 2” is COOL. When Three Position Step Control is configured, “Output 1” is OPEN while “Output 2” is CLOSE. The Output 1/2 option “Single Relay” can be any of the following selections: Electro-Mechanical Relay, Solid-State Relay or Open Collector Output.



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Table 1 Universal Output Functionality and Restrictions

Output Algorithm Type	Output 1/2 Option	Function of Output 1/2	Function of Other Outputs		
			Output #3	Output #4	Auxiliary Output
Time Simplex	Single Relay	Output 1	Alarm 2	Alarm 1	Not Needed
	Current Output	INU	Output 1	Alarm 1	Not Needed
	Dual Relay	Output 1	Alarm 2	Alarm 1	Not Needed
Time Duplex or TPSC or Position Proportional	Single Relay	Output 1	Output 2	Alarm 1	Not Needed
	Current Output	INU	Output 2	Output 1	Not Needed
	Dual Relay	Outputs 1 and 2	Alarm 2	Alarm 1	Not Needed
Current Simplex	Single Relay	INU	Alarm 2	Alarm 1	Output 1
	Current Output	Output 1	Alarm 2	Alarm 1	Not Needed
	Dual Relay	INU	Alarm 2	Alarm 1	Output 1
Current Dup. 100% Current = COOL and HEAT	Single Relay	INU	Alarm 2	Alarm 1	Outputs 1 and 2
	Current Output	Outputs 1 and 2	Alarm 2	Alarm 1	Not Needed
	Dual Relay	INU	Alarm 2	Alarm 1	Outputs 1 and 2
Current Duplex 50% Current = HEAT Aux Out = COOL	Single Relay	N/A	N/A	N/A	N/A
	Current Output	Output 1	Alarm 2	Alarm 1	Output 2
	Dual Relay	N/A	N/A	N/A	N/A
Current/Time Current = COOL Time = HEAT	Single Relay *	Output 1	Output 2	Alarm 1	Output 2
	Current Output	Output 2	Output 2	Alarm 1	Not Needed
	Dual Relay *	Outputs 1 & 2	Alarm 2	Alarm 1	Output 2
Time/Current Time = COOL Current = HEAT	Single Relay *	Output 1	Output 2	Alarm 1	Output 1
	Current Output	Output 1	Output 2	Alarm 1	Not Needed
	Dual Relay *	Outputs 1 & 2	Alarm 2	Alarm 1	Output 1

TPSC = Three Position Step Control

N/A = Not Available – This output algorithm type cannot be performed with this Output 1/2 option.

INU = Installed, Not Used – The installed Output 1/2 option is not used for the configured output algorithm type.

Not Needed = Auxiliary Output is Not Needed to provide the desired output algorithm and can be used for another purpose. With the proper configuration, Auxiliary Output could also be used as a substitute for the Current Output.

* To obtain this output algorithm type with these Output 1/2 Options: 1) Configure the OUTALG selection as “TIME D”; 2) Configure Auxiliary Output for “OUTPUT” and; 3) Scale the Auxiliary Output as necessary for the desired output algorithm type. For these selections, the Output 1 (HEAT) and Output 2 (COOL) signals will be present both on the Auxiliary Output and on the two relays normally used for Time Duplex.



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Wiring the Controller

Using the information contained in the model number, select the appropriate wiring diagrams from the composite wiring diagram below. Refer to the individual diagrams listed to wire the controller according to your requirements.

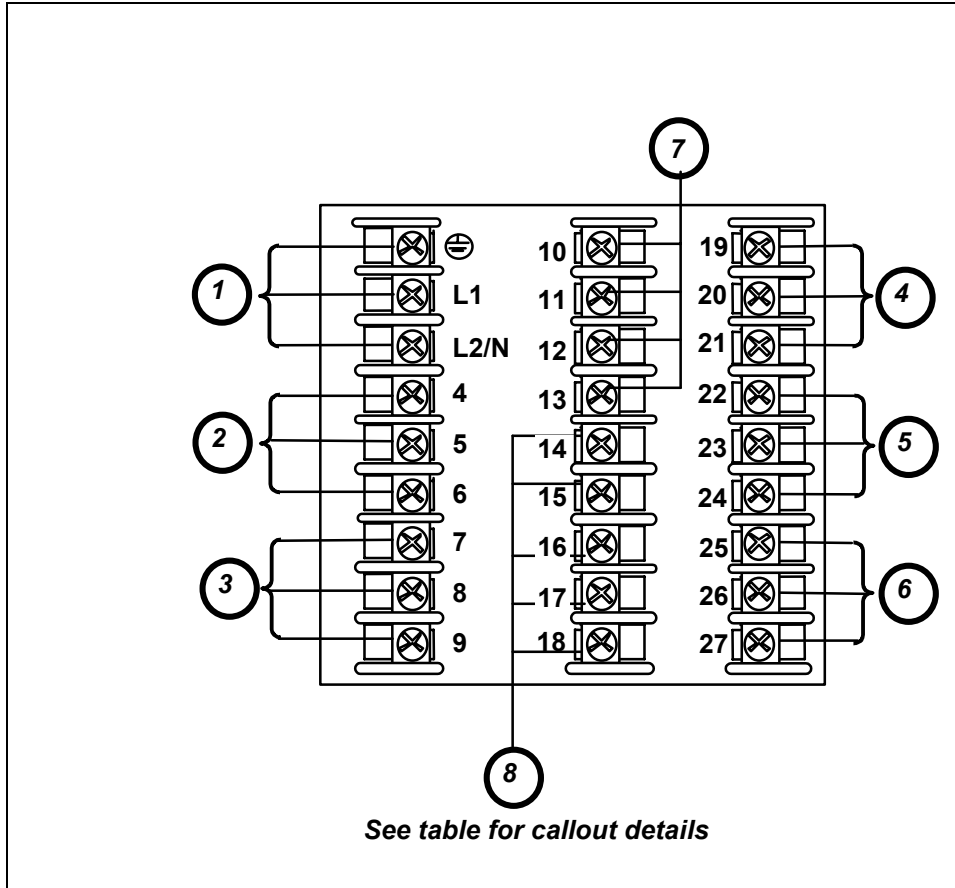


Figure 1 Composite Wiring Diagram

Callout	Details
1	AC/DC Line Voltage Terminals. See Figure 2.
2	Output 3 Terminals. See Figure 8 to 14.
3	Output 4 Terminals. See Figure 8 to 14.
4	Outputs 1 and 2 Terminals. See Figure 8 to 14..
5	Input #2 Terminals. See Figure 7. .
6	Input #1 Terminals. See Figure 6.
7	Aux. Output and Digital Inputs Terminals. See Figure 17.
8	Communications Terminals. See Figure 15 to 16.



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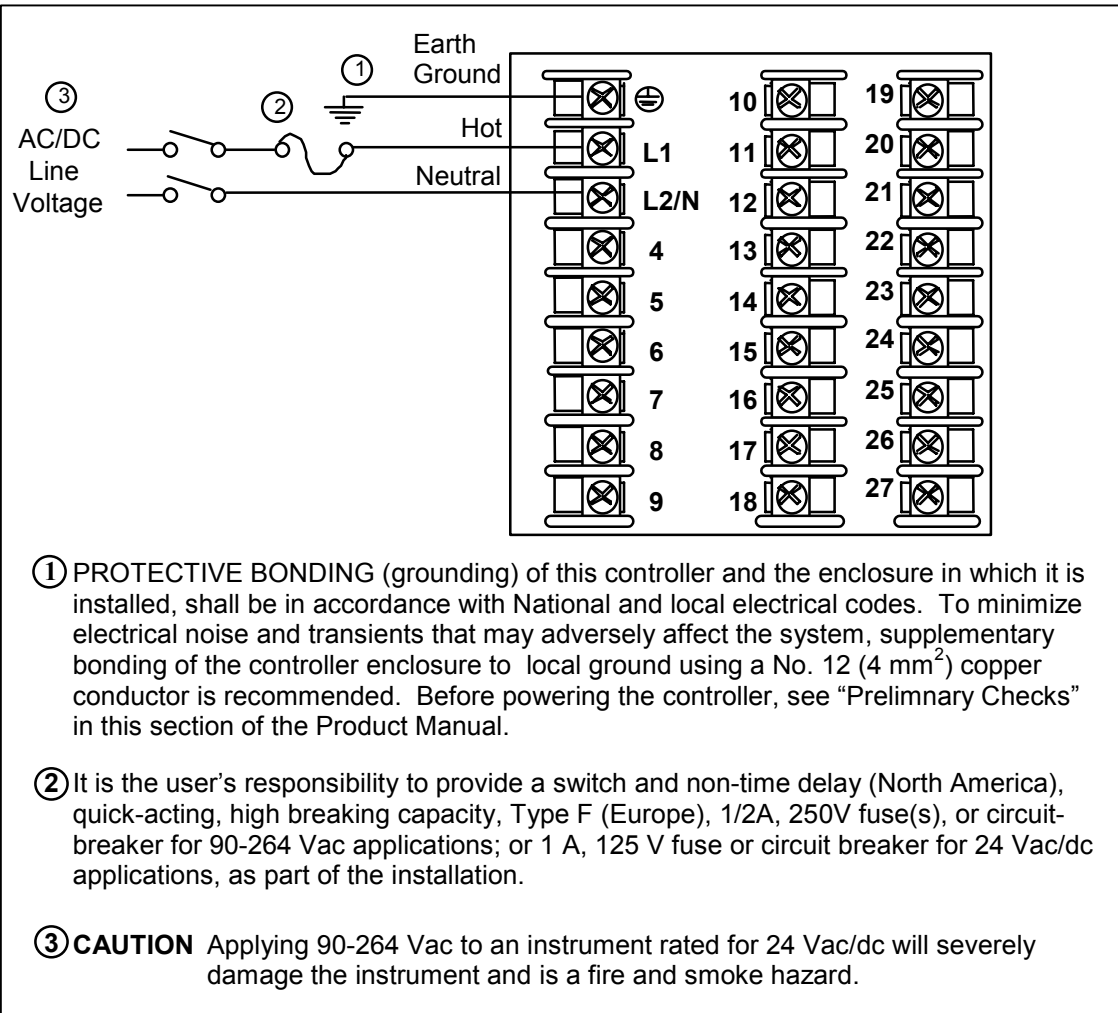


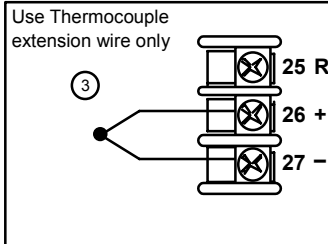
Figure 2 Main Power Supply



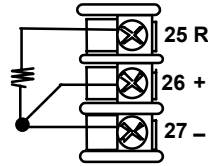
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Input #1

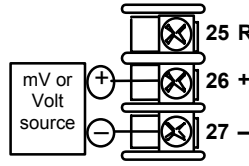
Thermocouple



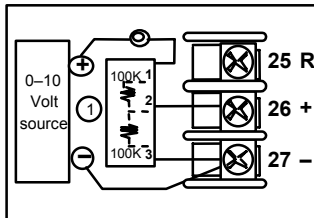
RTD



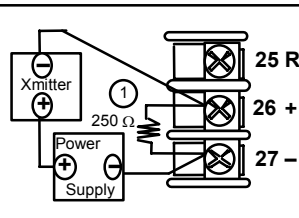
Millivolt or Volts except 0-10 Volts



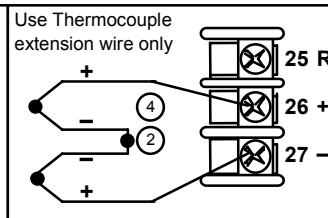
0-10 Volts



Milliamps



Thermocouple Differential



- ① The 250 ohm resistor for milliamp inputs or the voltage divider for 0-10 Volt inputs are supplied with the controller when those inputs are specified. These items must be installed prior to start up when the controller is wired. For 0-20 mA applications, the resistor should be located at the transmitter terminals if Burnout detection is desired.
- ② Splice and tape this junction between the two thermocouples. This junction may be located anywhere between the thermocouples and the instrument terminals, it does not need to be close to the other thermocouple junctions. Both thermocouples must be of the same type. For best accuracy, the two thermocouples should be matched or, preferably, made from the same batch of wire.
- ③ This controller does not produce a steady current for burnout detection. For that reason, when a thermocouple is used in parallel with another instrument, it may be desirable to configure the burnout selection for this controller to "NOFS" and use the burnout current from the other instrument to also drive this controller.
- ④ The millivolt values for the Thermocouple Differential Input are for a pair of J thermocouples at an ambient temperature mean of 450°F / 232°C.

Figure 3 Input 1 Connections

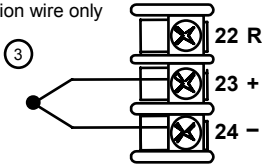


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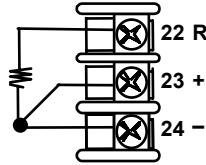
Input #2

Thermocouple

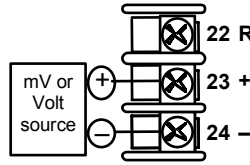
Use Thermocouple extension wire only



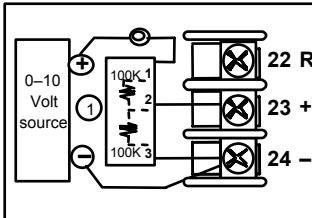
RTD



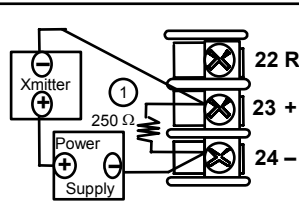
Millivolt or Volts except 0-10 Volts



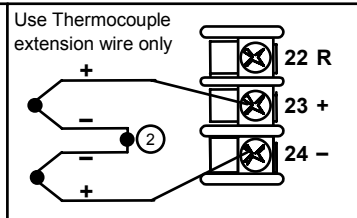
0-10 Volts



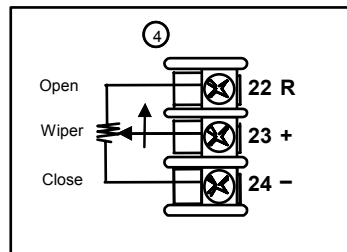
Milliamps



Thermocouple Differential



Slidewire Input (for Position Proportional Control or Three Position Step Control)



- ① The 250 ohm resistor for milliamp inputs or the voltage divider for 0-10 Volt inputs are supplied with the controller when those inputs are specified. These items must be installed prior to start up when the controller is wired. For 0-20 mA applications, the resistor should be located at the transmitter terminals if Burnout detection is desired.
- ② Splice and tape this junction between the two thermocouples. This junction may be located anywhere between the thermocouples and the instrument terminals, it does not need to be close to the other thermocouple junctions. Both thermocouples must be of the same type. For best accuracy, the two thermocouples should be matched or, preferably, made from the same batch of wire.
- ③ This controller does not produce a steady current for burnout detection. For that reason, when a thermocouple is used in parallel with another instrument, it may be desirable to configure the burnout selection for this controller to "NOFS" and use the burnout current from the other instrument to also drive this controller.
- ④ Input 2 is used to measure the Slidewire Input for Position Proportional Control.

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Figure 4 Input 2 Connections



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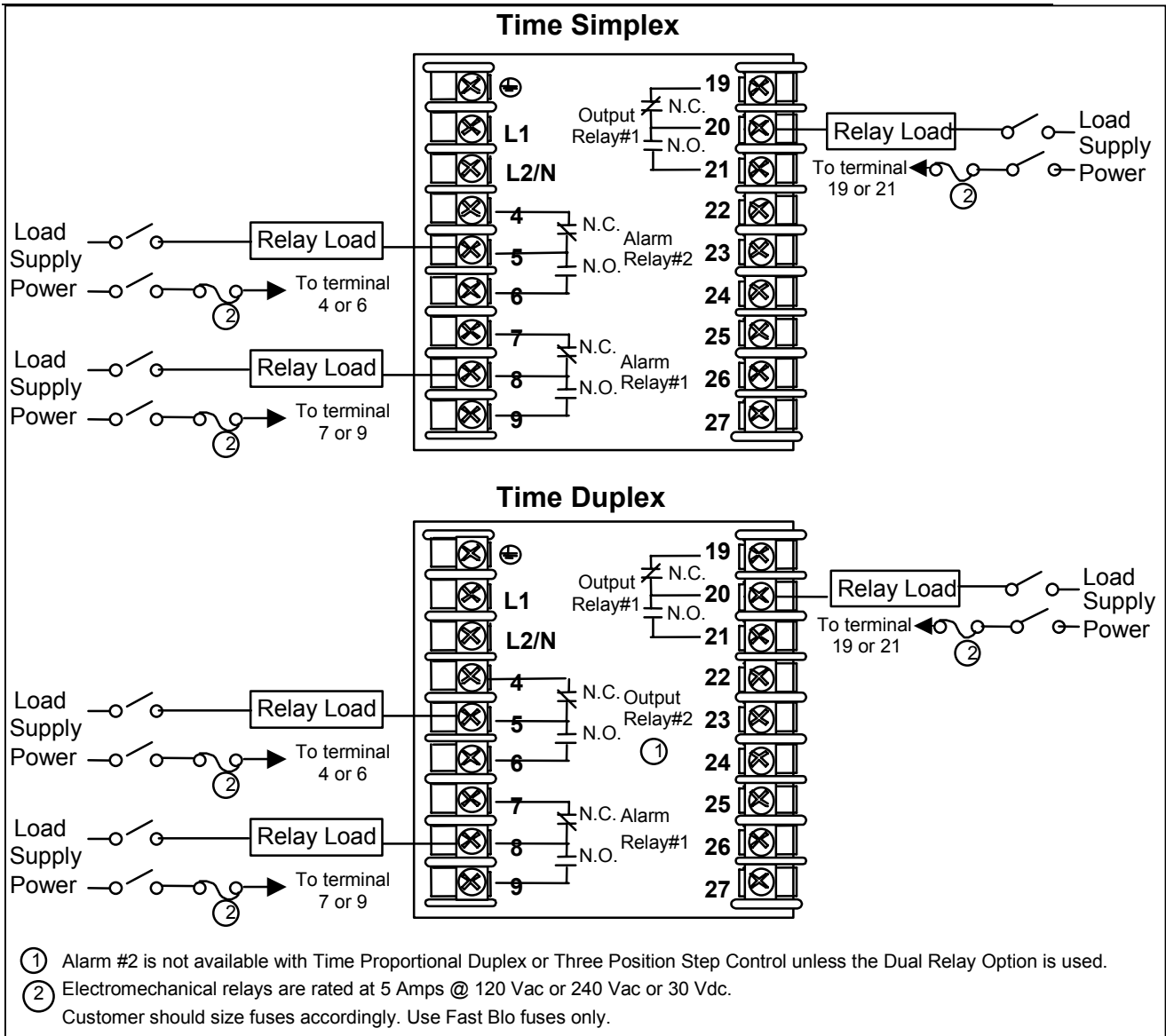


Figure 5 Electromechanical Relay Output

See Table 1 for relay terminal connections for other Output Algorithm Types.



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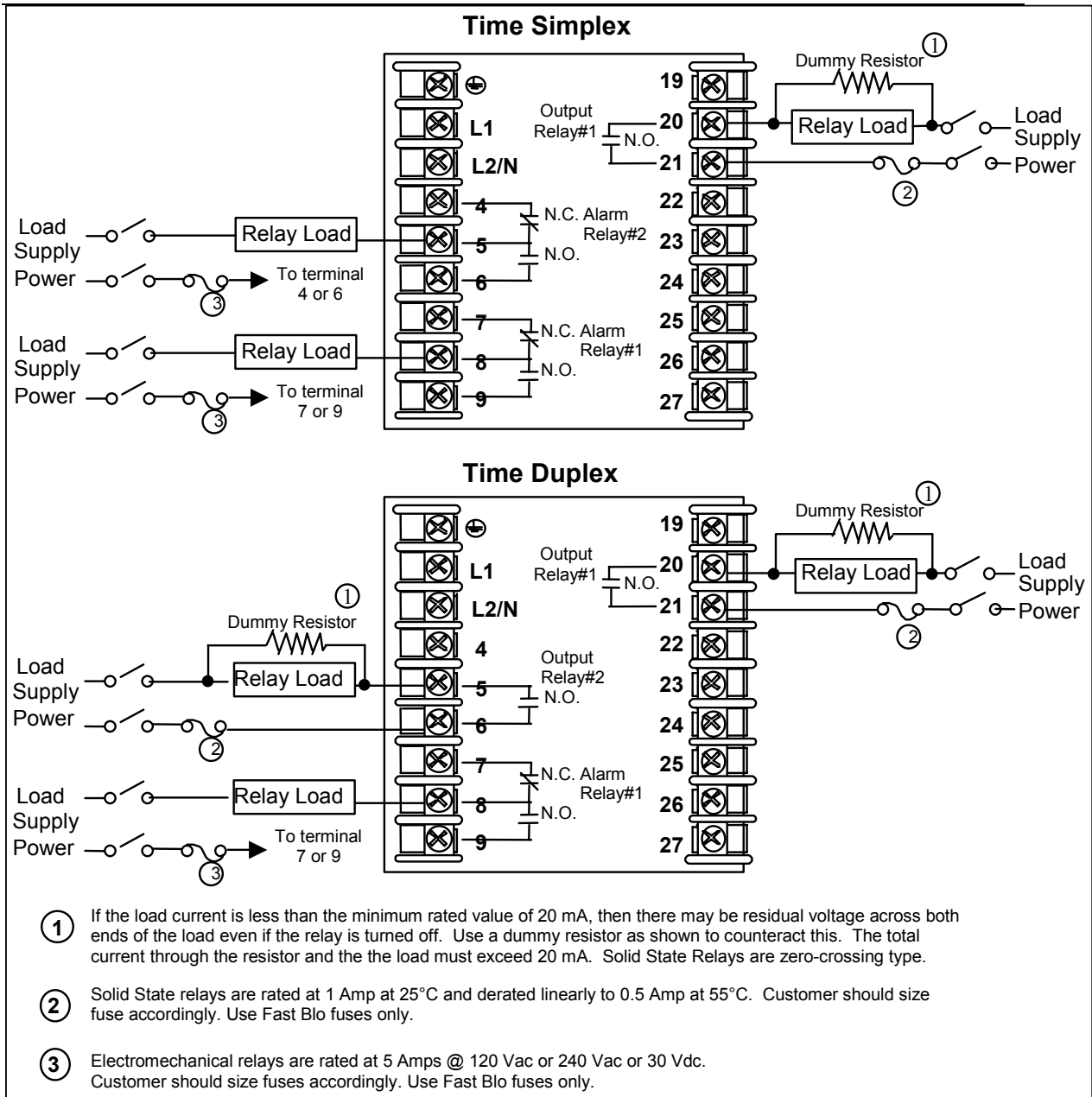


Figure 6 Solid State Relay Output

See Table 1 for relay terminal connections for other Output Algorithm Types.



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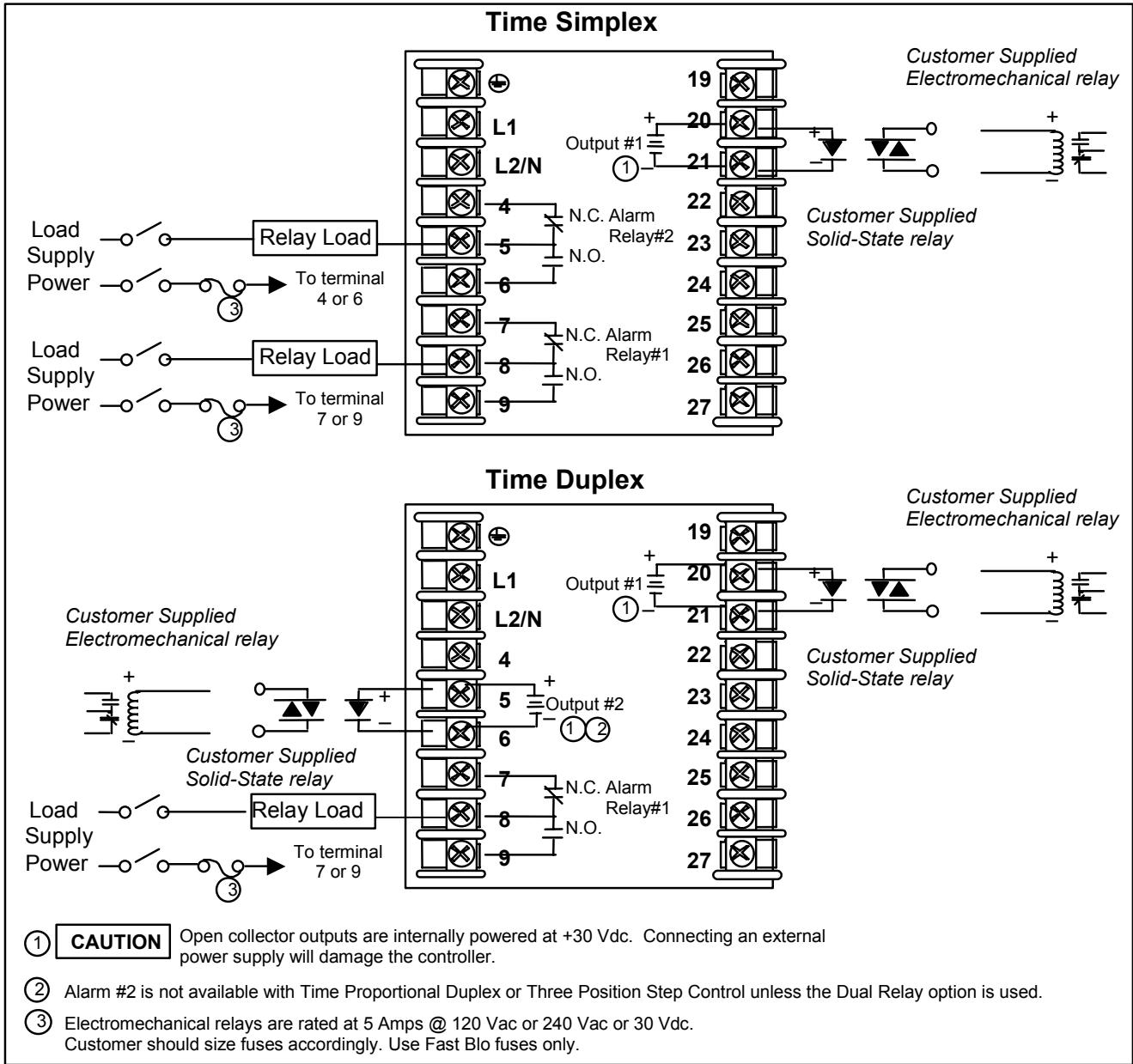


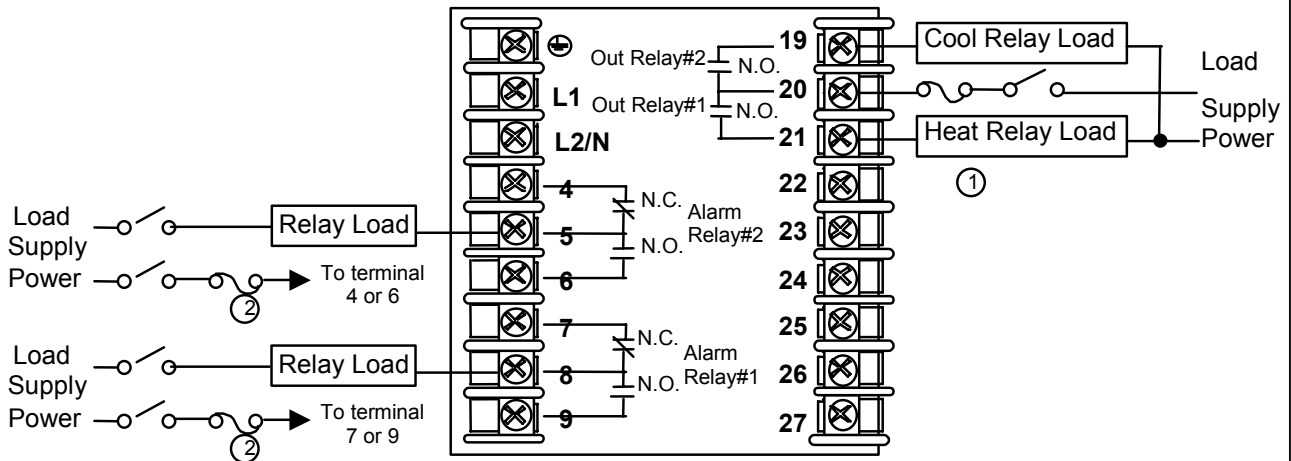
Figure 7 Open Collector Output

See Table 1 for relay terminal connections for other Output Algorithm Types.



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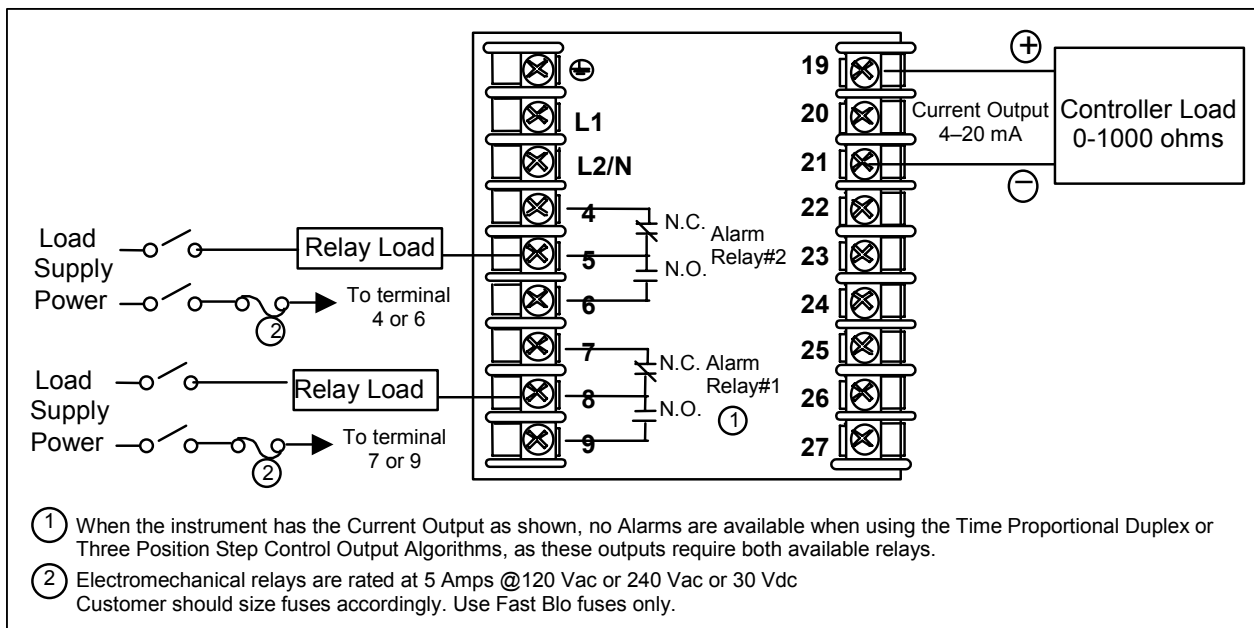
Time Duplex with a Dual Relay Board



- ① Dual Electromechanical relays are rated at 2 Amps @120 Vac or 240 Vac or 30 Vdc. Customer should size fuses accordingly. Use Fast Blo fuses only.
- ② Electromechanical relays are rated at 5 Amps @120 Vac or 240 Vac or 30 Vdc. Customer should size fuses accordingly. Use Fast Blo fuses only.

Figure 8 Dual Electromechanical Relay Option Output

See Table for relay terminal connections for other Output Algorithm Types.



- ① When the instrument has the Current Output as shown, no Alarms are available when using the Time Proportional Duplex or Three Position Step Control Output Algorithms, as these outputs require both available relays.
- ② Electromechanical relays are rated at 5 Amps @120 Vac or 240 Vac or 30 Vdc. Customer should size fuses accordingly. Use Fast Blo fuses only.

Figure 9 Current Output

See Table 1 for relay terminal connections for other Output Algorithm Types.



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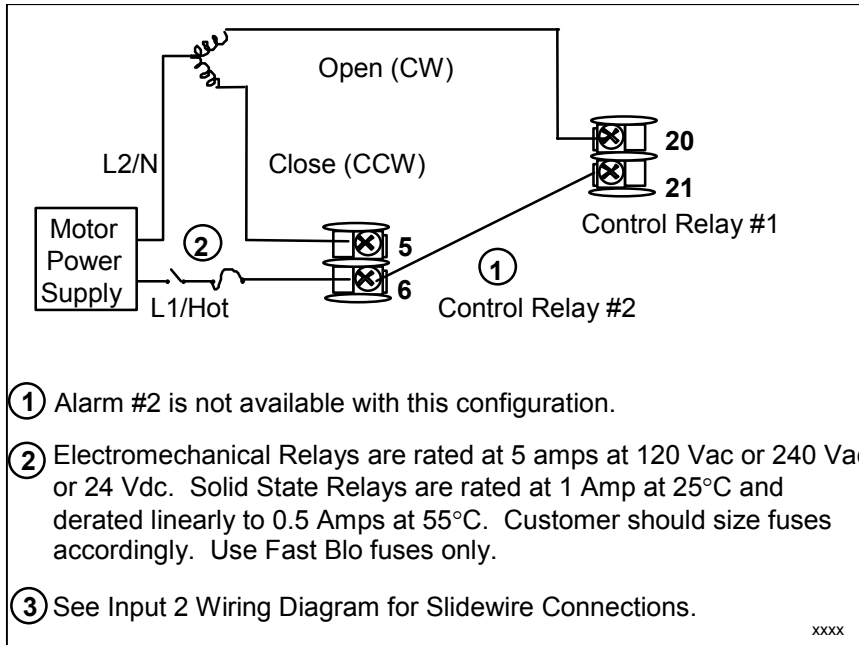


Figure 10 Position Proportional Three Position Step Control Connections w/o Dual Relay Option

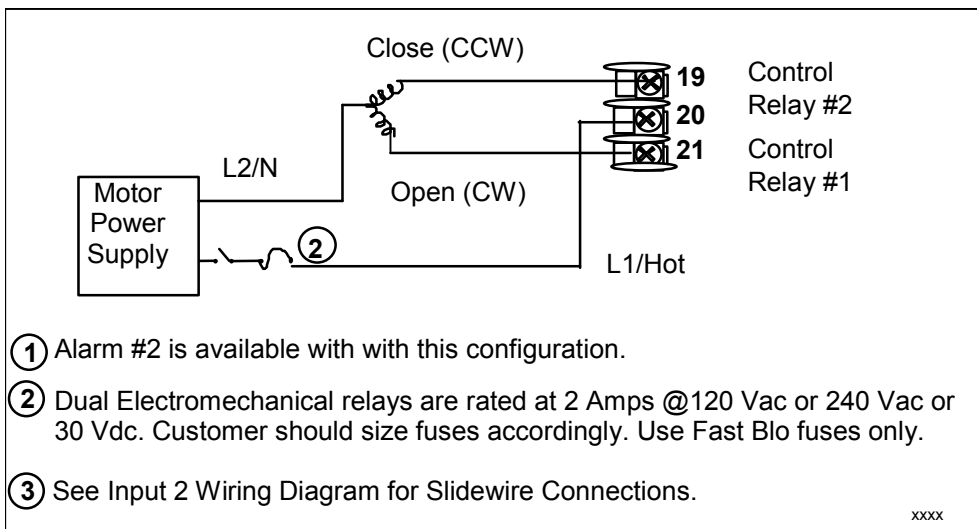


Figure 11 Position Proportional or Three Position Step Control Connections with Dual Relay Option



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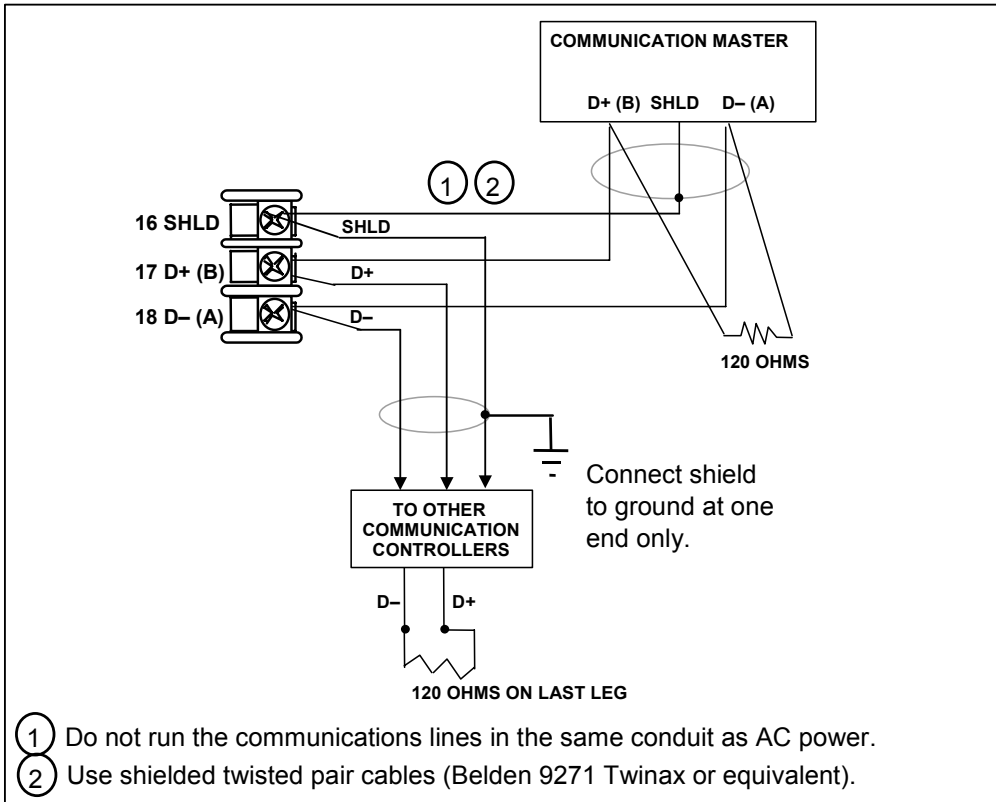


Figure 12 RS-422/485 Communications Option Connections

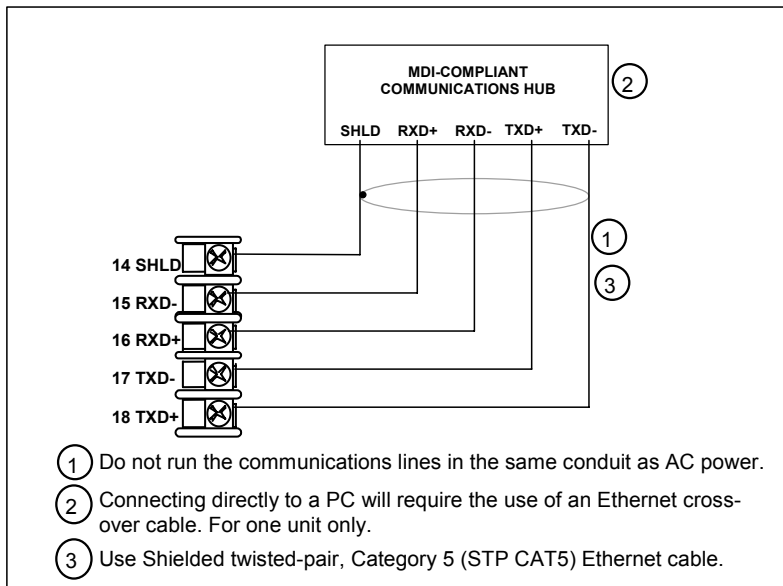


Figure 13 Ethernet Communications Option Connections



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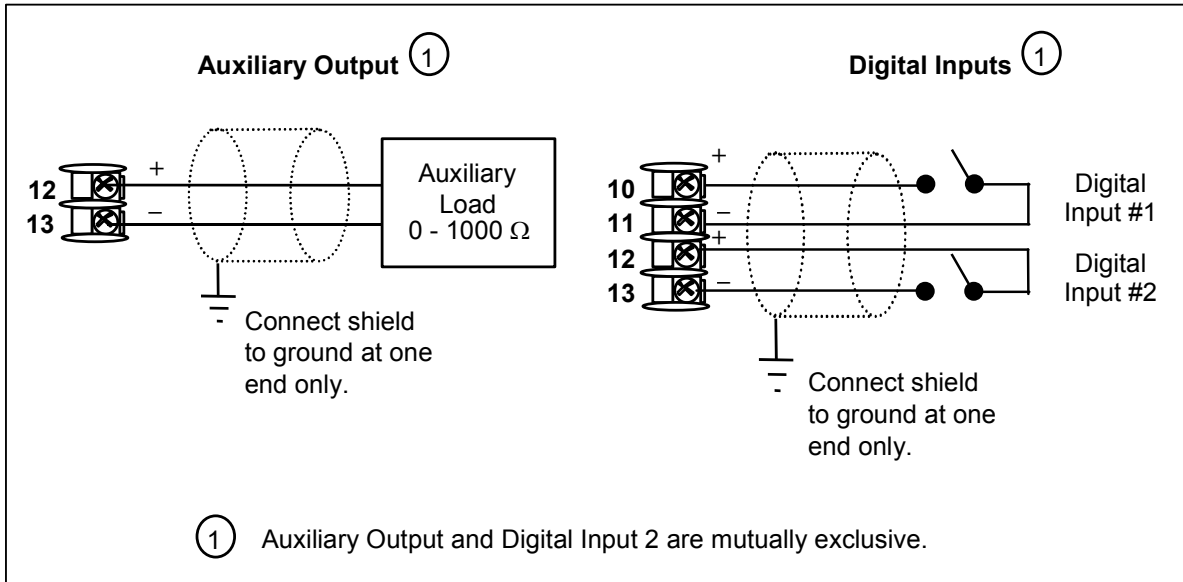


Figure 14 Auxiliary Output and Digital Inputs Option Connections

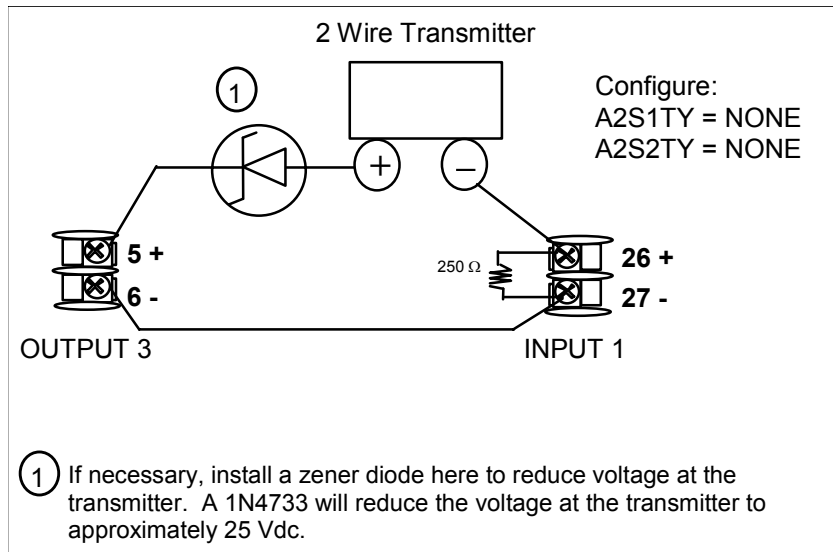
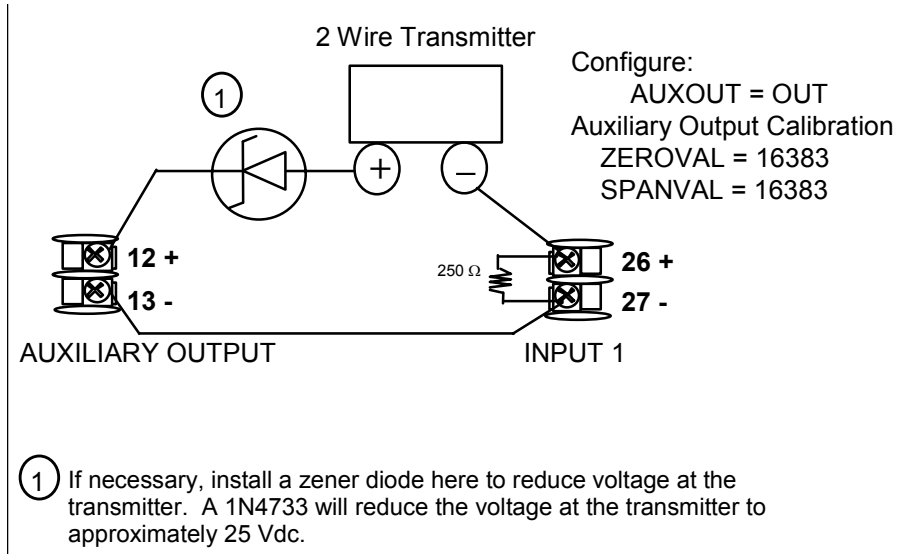


Figure 15 Transmitter Power for 4-20 mA — 2 wire Transmitter Using Open Collector Alarm 2 Output



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**Figure 16 Transmitter Power for 4-20 mA
2 Wire Transmitter Using Auxiliary Output**