

Wiring

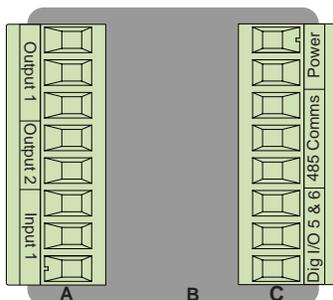
Terminal Definitions for Slots A

Slot A			
Output	Terminal Function		Configuration
1	2		
X1 W1 Y1	common (Any switched dc output can use this common.) dc- (open collector) dc+		Switched dc/open collector output 1: PM ___ [C] _- AAAA _-
	W2 Y2	dc- dc+	Switched dc output 2: PM ___ [C]- AAAA _-
F1 G1 H1	voltage or current - voltage + current +		Universal Process output 1: PM ___ [F] _- AAAA _-
L1 K1 J1	normally open common normally closed		Mechanical Relay 5 A, Form C output 1: PM ___ [E] _- AAAA _-
	L2 K2	normally open common	NO-ARC 15 A, Form A output 2: PM[4, 6, 8, 9] ___ [H]- AAAA _-
	L2 K2	normally open common	Mechanical Relay 5 A, Form A output 2: PM ___ [J]- AAAA _-
L1 K1	L2 K2	normally open common	Solid-state Relay 0.5 A, Form A output 1: PM ___ [K] _- AAAA _- output 2: PM ___ [K]- AAAA _-
Inputs			
1			
T1 S1 R1	S2 (RTD) or current + S3 (RTD), thermocouple -, current -, volts - or potentiometer wiper, thermistor S1 (RTD), thermocouple + or volts +, thermistor		Universal / Thermistor Input input 1: all configurations
Slot A			

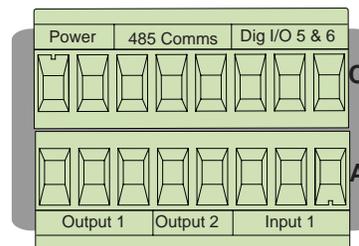
Terminal Definitions for Slot C

Slot C	Terminal Function	Configuration
98 99	power input: ac or dc+ power input: ac or dc-	all
CC CA CB	Standard Bus or Modbus RTU EIA-485 common Standard Bus or Modbus RTU EIA-485 T/R- Standard Bus or Modbus RTU EIA-485 T+/R+	Standard Bus or Modbus PM ___-[1] AAAA _-
CF CD CE	Standard Bus EIA-485 common Standard Bus EIA-485 T/R- Standard Bus EIA-485 T+/R+	PM ___-[A] AAAA _-
B5 D6 D5	digital input-output common digital input or output 6 digital input or output 5	PM ___ [2] _- AAAA _- PM ___ [4] _- AAAA _-

**Back View
Slot Orientation
1/16 DIN PM6**



**Back View
Slot Orientation
1/32 DIN PM3**





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Note:

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 - 0.8 Nm (7.0 lb.-in.) torque

Note:

Adjacent terminals may be labeled differently, depending on the model number.

Note:

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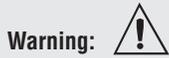
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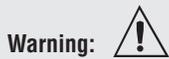
Note:

This Equipment is suitable for use in CLASS I, DIVISION 2, Groups A, B, C and D or Non-Hazardous locations only. Temperature Code T4A



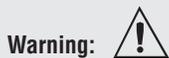
Warning:

Explosion Hazard - Dry contact closure Digital Inputs shall not be used in Class I Division 2 Hazardous Locations unless switch used is approved for this application.



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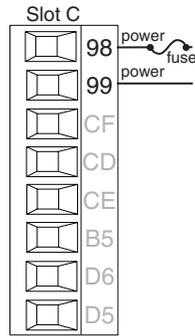
Explosion Hazard – Substitution of component may impair suitability for CLASS I, DIVISION 2.



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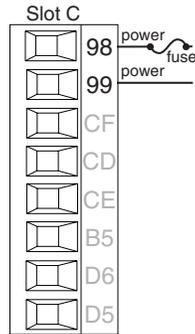
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Low Power



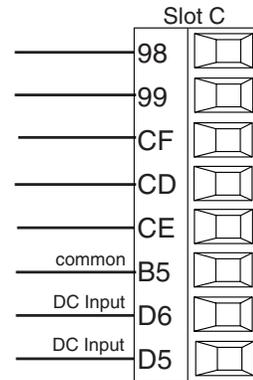
- Minimum/Maximum Ratings
 - 12 to 40V \approx (dc)
 - 20 to 28V \sim (ac) Semi Sig F47
 - 47 to 63 Hz
 - 14VA maximum power consumption (PM4,8 & 9)
 - 10VA maximum power consumption (PM3 & 6)
- PM__ [3,4] _ - - - - -

High Power



- Minimum/Maximum Ratings
 - 85 to 264V \sim (ac)
 - 100 to 240V \sim (ac) Semi Sig F47
 - 47 to 63 Hz
 - 14VA maximum power consumption (PM4,8 & 9)
 - 10VA maximum power consumption (PM3 & 6)
- PM__ [1,2] _ - - - - -

Digital Input 5, 6



Digital Input

- Update rate 10 Hz
- Dry contact or dc voltage

DC Voltage

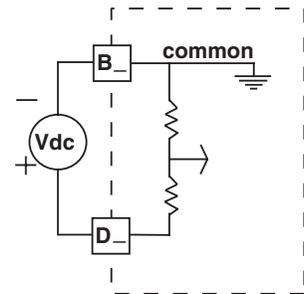
- Input not to exceed 36V at 3 mA
- Input active when > 3V @ 0.25 mA
- Input inactive when < 2V

Dry Contact

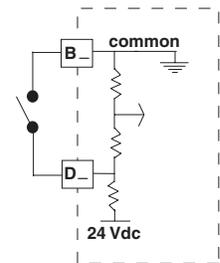
- Input inactive when > 500 Ω
- Input active when < 100 Ω
- maximum short circuit 13 mA

PM__ [2,4] _ - - - - -

Voltage Input



Dry Contact





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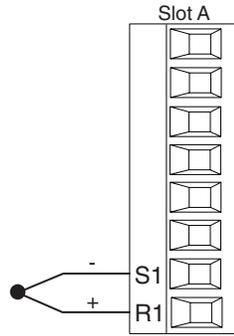
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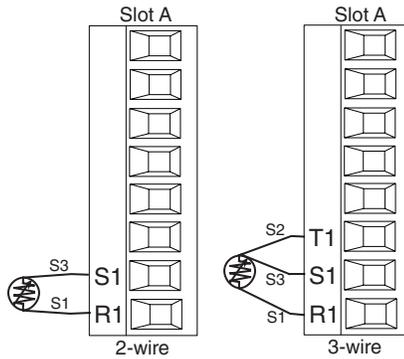
Input 1 Thermocouple



- 2 kΩ maximum source resistance
- >20 MΩ input impedance
- 3 microampere open-sensor detection
- Thermocouples are polarity sensitive. The negative lead (usually red) must be connected to S1.
- To reduce errors, the extension wire for thermocouples must be of the same alloy as the thermocouple.

PM _ _ _ _ _ - _ AAAAA _ _

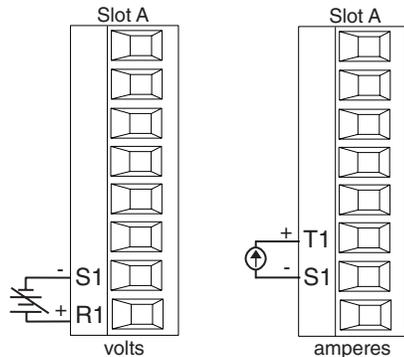
Input 1 RTD



- platinum, 100 and 1,000 Ω @ 0°C
- calibration to DIN curve (0.00385 Ω/Ω°C)
- 20 Ω total lead resistance
- RTD excitation current of 0.09 mA typical. Each ohm of lead resistance may affect the reading by 0.03°C.
- For 3-wire RTDs, the S1 lead (usually white) must be connected to R1.
- For best accuracy use a 3-wire RTD to compensate for lead-length resistance. All three lead wires must have the same resistance.

PM _ _ _ _ _ - _ AAAAA _ _

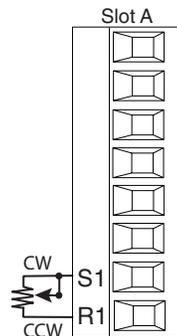
Input 1 Process



- 0 to 20 mA @ 100 Ω input impedance
- 0 to 10V_{DC} @ 20 kΩ input impedance
- 0 to 50 mV_{DC} @ 20 kΩ input impedance
- scalable

PM _ _ _ _ _ - _ AAAAA _ _

Input 1 Potentiometer



- Use a 1 kΩ potentiometer.

PM _ _ _ _ _ - _ AAAAA _ _



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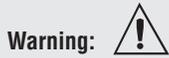
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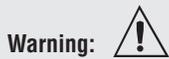
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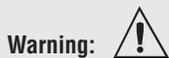
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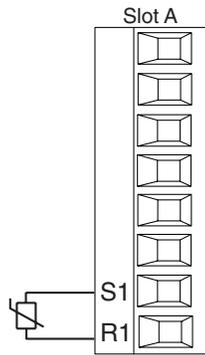
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Input 1 Thermistor



- >20 MΩ input impedance
 - 3 microampere open-sensor detection
- Input 1: PM _ [J,N,E*] _ _ _ _ _ (S1/R1)

*PM4,8 & 9 only



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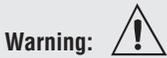
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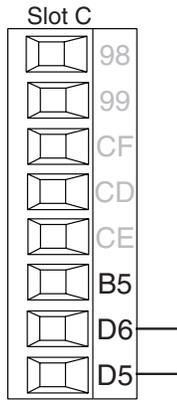
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Quencharc Note:

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Digital Output 5, 6

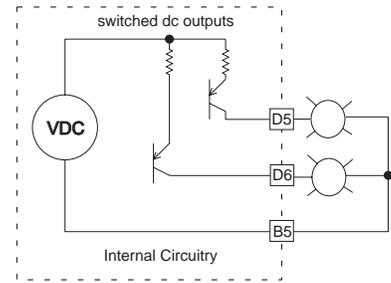


Digital Output

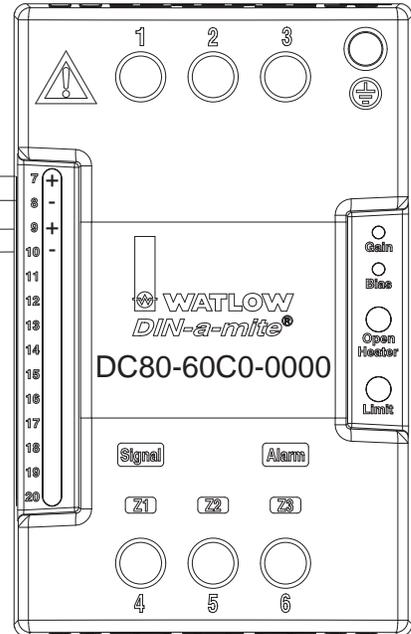
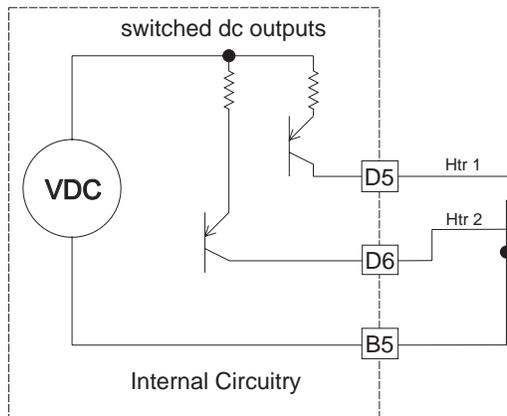
- Update rate 10 Hz
- Output voltage 24V
- Current limit, Output 5, 24 mA maximum
- Current limit, Output 6, 10 mA maximum driving single pole DIN-A-MITE
- *Capable of driving a 3-pole DIN-A-MITE
- Open-circuit voltage 22 to 32V_{DC} (dc)

PM _ _ [2,4] _ _ _ _ _

* Output 5 only



Switched DC Wiring Example Using DO 5 and 6





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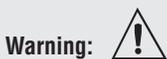
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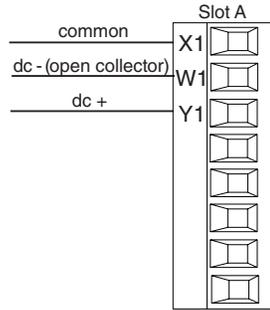
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Output 1 Switched DC/Open Collector



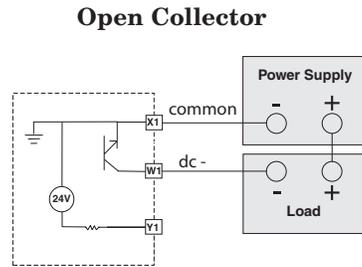
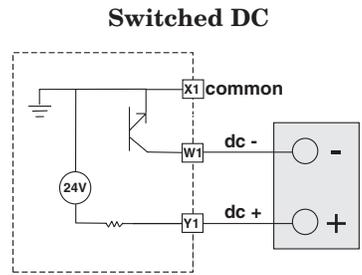
Switched DC

- 30 mA dc maximum supply current
- Short circuit limited to <math><50\text{ mA}</math>
- 22 to 32V \approx (dc) open circuit voltage
- Use dc- and dc+ to drive external solid-state relay.
- DIN-A-MITE compatible
- Single-pole: up to 4 in parallel or 4 in series
- 2-pole: up to 2 in parallel or 2 in series
- 3-pole: up to 2 in series

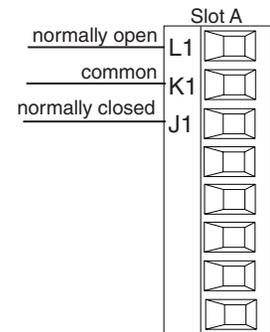
Open Collector

- 100 mA maximum output current sink
- 30V \approx (dc) maximum supply voltage
- Any switched dc output can use the common terminal.
- Use an external power supply to control a dc load, with the load positive to the positive of the power supply, the load negative to the open collector and common to the power supply negative.

See Quencharc note.
PM _ _ _ [C] _ _ AAAA _ _

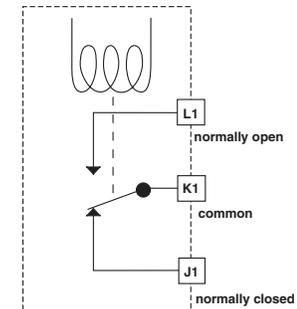


Output 1 Mechanical Relay, Form C

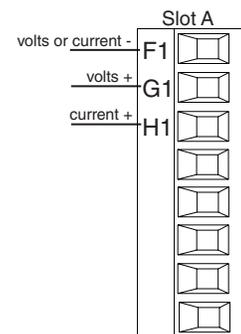


- 5 A at 240V \sim (ac) or 30V \approx (dc) maximum resistive load
- 20 mA at 24V minimum load
- 125 VA pilot duty at 120/240V \sim (ac), 25 VA at 24V \sim (ac)
- 100,000 cycles at rated load
- Output does not supply power.
- for use with ac or dc

See Quencharc note.
PM _ _ _ [E] _ _ AAAA _ _

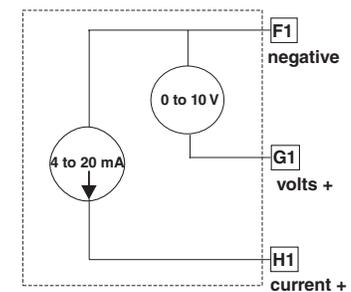


Output 1 Universal Process



- 0 to 20 mA into 800 Ω maximum load
- 0 to 10V \approx (dc) into 1 k Ω minimum load
- scalable
- output supplies power
- cannot use voltage and current outputs at same time
- Output may be used as re-transmit or control.

PM _ _ _ [F] _ _ AAAA _ _





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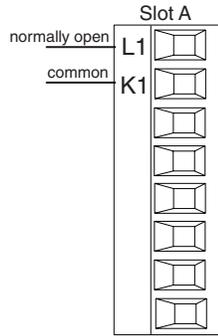
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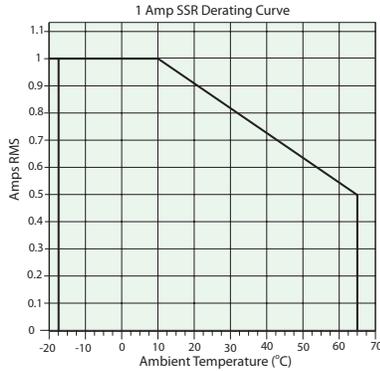
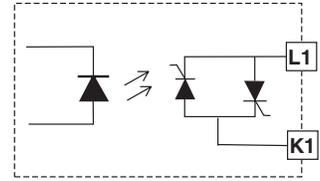
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Output 1 Solid-State Relay, Form A

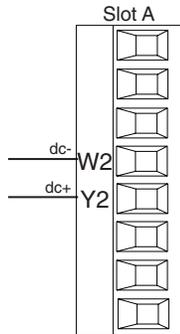


- 0.5 A at 20 to 264V~ (ac) maximum resistive load
- 20 VA 120/240V~ (ac) pilot duty
- opto-isolated, without contact suppression
- maximum off state leakage of 105 microamperes
- output does not supply power
- Do not use on dc loads.
- See Quencharc note.

PM ___ [K] _ AAAA _

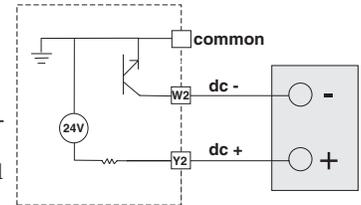


Output 2 Switched DC



- 10 mA dc maximum supply current
- short circuit limited to <50 mA
- 22 to 32V= (dc) open circuit voltage
- use dc- and dc+ to drive external solid-state relay
- DIN-A-MITE compatible
- single-pole: up to 2 in series, none in parallel

PM ___ [C] _ AAAA _





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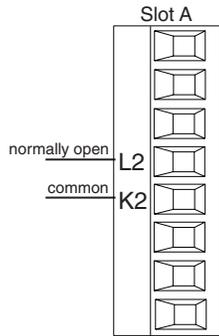
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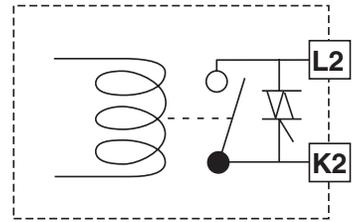
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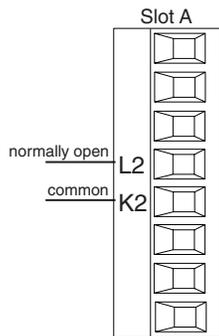
Output 2 NO-ARC Relay, Form A



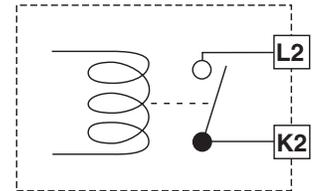
- 15 A at 85 to 264V~ (ac) resistive load only
 - 2,000,000 cycle rating for NO-ARC circuit
 - 100 mA minimum load
 - 2 mA maximum off state leakage
 - Do not use on dc loads.
 - Output does not supply power.
- PM [4, 6, 8, 9] _ _ _ [H]_ AAAA
--



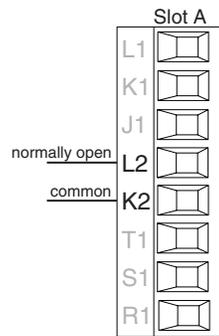
Output 2 Mechanical Relay, Form A



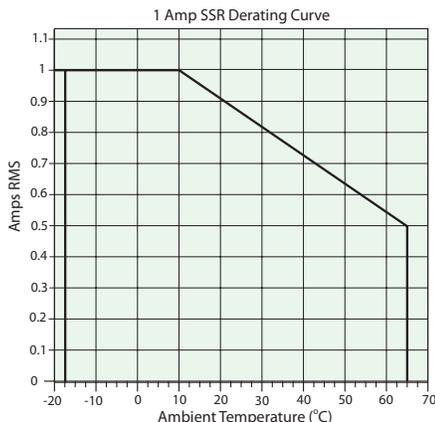
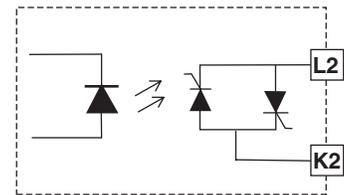
- 5 A at 240V~ (ac) or 30V= (dc) maximum resistive load
 - 20 mA at 24V minimum load
 - 125 VA pilot duty @ 120/240V~ (ac), 25 VA at 24V~ (ac)
 - 100,000 cycles at rated load
 - Output does not supply power.
 - for use with ac or dc
- See Quencharc note.
PM _ _ _ _ [J]_ AAAA _ _



Output 2 Solid-state Relay, Form A



- 0.5 A at 20 to 264V~ (ac) maximum resistive load
 - 20 VA 120/240V~ (ac) pilot duty
 - opto-isolated, without contact suppression
 - maximum off state leakage of 105 microamperes
 - Output does not supply power.
 - Do not use on dc loads.
- See Quencharc note.
PM _ _ _ _ [K]_ AAAA _ _





Warning:

Use National Electric (NEC) or other country-specific standard wiring and safety practices when wiring and connecting this controller to a power source and to electrical sensors or peripheral devices. Failure to do so may result in damage to equipment and property, and/or injury or loss of life.

Note:

- Maximum wire size termination and torque rating:
 - 0.0507 to 3.30 mm² (30 to 12 AWG) single-wire termination or two 1.31 mm² (16 AWG)
 - 0.8 Nm (7.0 lb.-in.) torque

Note:

Adjacent terminals may be labeled differently, depending on the model number.

Note:

To prevent damage to the controller, do not connect wires to unused terminals.

Note:

Maintain electrical isolation between analog input 1, digital input-outputs, switched dc/open collector outputs and process outputs to prevent ground loops.

Note:

The control output common terminal and the digital common terminal are referenced to different voltages and must remain isolated.

Note:

This Equipment is suitable for use in CLASS I, DIVISION 2, Groups A, B, C and D or Non-Hazardous locations only. Temperature Code T4A



Warning:

Explosion Hazard - Dry contact closure Digital Inputs shall not be used in Class I Division 2 Hazardous Locations unless switch used is approved for this application.



Warning:

Explosion Hazard – Substitution of component may impair suitability for CLASS I, DIVISION 2.



Warning:

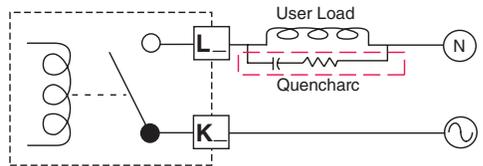
Explosion Hazard - Do not disconnect while the circuit is live or unless the area is known to be free of ignitable concentrations of flammable substances.

Quencharc Note:

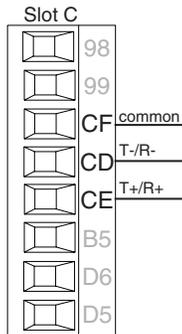
Switching pilot duty inductive loads (relay coils, solenoids, etc.) with the mechanical relay, solid state relay or open collector output options requires use of an R.C. suppressor.

Quencharc Wiring Example

In this example the Quencharc circuit (Watlow part# 0804-0147-0000) is used to protect PM internal circuitry from the counter electromagnetic force from the inductive user load when de-energized. It is recommended that this or an equivalent Quencharc be used when connecting inductive loads to PM outputs.



Standard Bus EIA-485 Communications



- Wire T-/R- to the A terminal of the EIA-485 port.
- Wire T+/R+ to the B terminal of the EIA-485 port.
- Wire common to the common terminal of the EIA-485 port.
- Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network.

- Do not connect more than 16 EZ-ZONE PM controllers on a network.
- maximum network length: 1,200 meters (4,000 feet)
- 1/8th unit load on EIA-485 bus PM _ _ _ _-[A] AAAA _ _

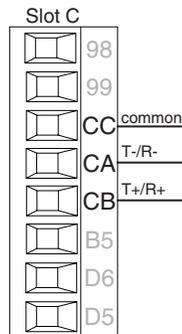
Note:

A 120 Ω termination resistor may be required across T+/R+ and T-/R-, placed on the last controller on the network.

Note:

Do not leave a USB to EIA-485 converter connected to Standard Bus without power (i.e., disconnecting the USB end from the computer while leaving the converter connected on Standard Bus). Disturbance on the Standard Bus may occur.

Modbus RTU or Standard Bus EIA-485 Communications



- Wire T-/R- to the A terminal of the EIA-485 port.
- Wire T+/R+ to the B terminal of the EIA-485 port.
- Wire common to the common terminal of the EIA-485 port.
- Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network.
- A termination resistor may be required. Place a 120 Ω resistor across T+/R+ and T-/R- of last controller on network.

- Only one protocol per port is available at a time: either Modbus RTU or Standard Bus.
- Do not connect more than 16 EZ-ZONE PM controllers on a Standard Bus network.
- Do not connect more than 247 EZ-ZONE PM controllers on a Modbus RTU network.
- maximum network length: 1,200 meters (4,000 feet)
- 1/8th unit load on EIA-485 bus. PM _ _ _ _-[I] AAAA _ _

Note:

Do not leave a USB to EIA-485 converter connected to Standard Bus without power (i.e., disconnecting the USB end from the computer while leaving the converter connected on Standard Bus). Disturbance on the Standard Bus may occur.

Modbus-IDA Terminal	EIA/TIA-485 Name	Watlow Terminal Label	Function
DO	A	CA or CD	T-/R-
D1	B	CB or CE	T+/R+
common	common	CC or CF	common

Wiring a Serial EIA-485 Network

Two example networks are shown below where the first one is using Watlow's Standard Bus and the other showing connections over Modbus. Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network. A termination resistor may be required. Place a 120 Ω resistor across T+/R+ and T-/R- of the last controller on a network. Only one protocol per port is available at a time: either Modbus RTU or Standard Bus.



Warning: Use National Electric (NEC) or other country-specific standard wiring and safety practices when wiring and connecting this controller to a power source and to electrical sensors or peripheral devices. Failure to do so may result in damage to equipment and property, and/or injury or loss of life.

Note: Maximum wire size termination and torque rating:

- 0.0507 to 3.30 mm² (30 to 12 AWG) single-wire termination or two 1.31 mm² (16 AWG)
- 0.8 Nm (7.0 lb.-in.) torque

Note: Adjacent terminals may be labeled differently, depending on the model number.

Note: To prevent damage to the controller, do not connect wires to unused terminals.

Note: Maintain electrical isolation between analog input 1, digital input-outputs, switched dc/open collector outputs and process outputs to prevent ground loops.

Note: The control output common terminal and the digital common terminal are referenced to different voltages and must remain isolated.

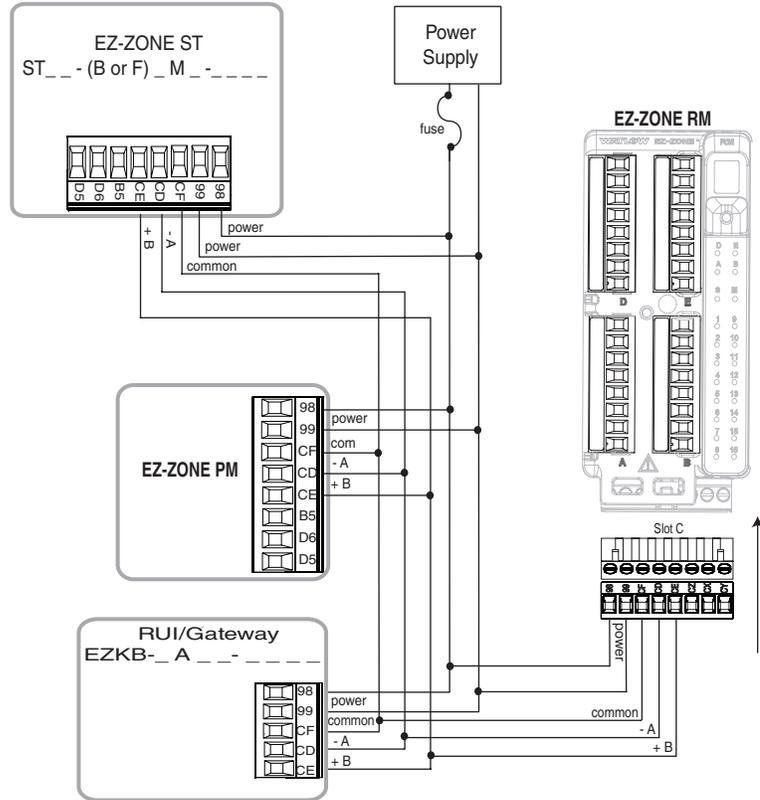
Note: This Equipment is suitable for use in CLASS I, DIVISION 2, Groups A, B, C and D or Non-Hazardous locations only. Temperature Code T4A

Warning: Explosion Hazard - Dry contact closure Digital Inputs shall not be used in Class I Division 2 Hazardous Locations unless switch used is approved for this application.

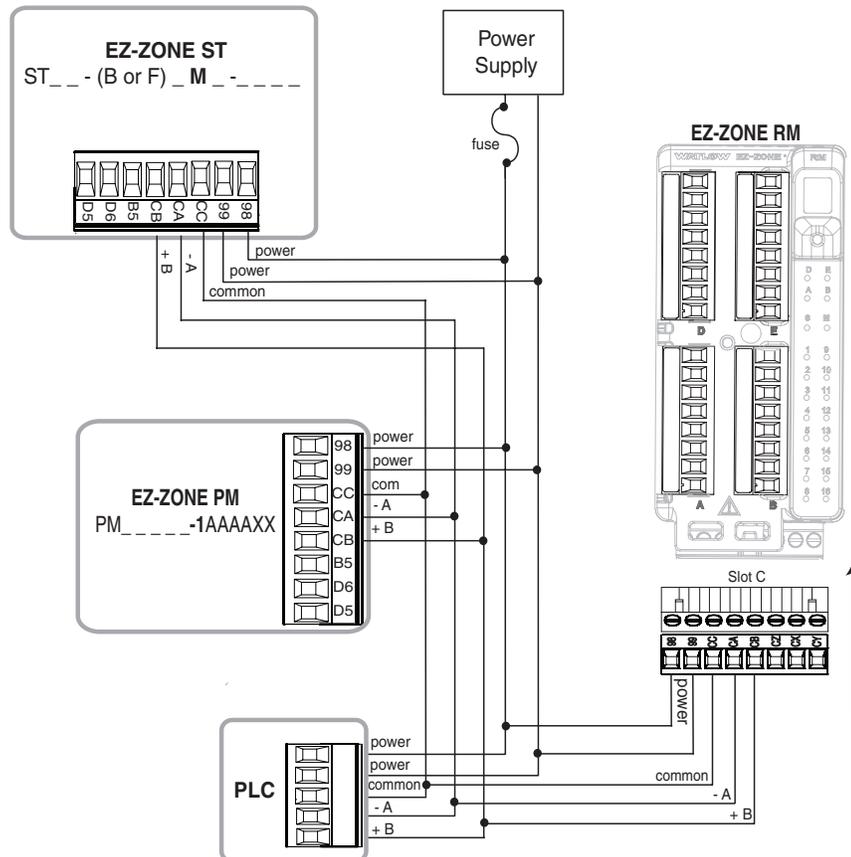
Warning: Explosion Hazard - Substitution of component may impair suitability for CLASS I, DIVISION 2.

Warning: Explosion Hazard - Do not disconnect while the circuit is live or unless the area is known to be free of ignitable concentrations of flammable substances.

A Network Using Watlow's Standard Bus and an RUI/Gateway



A Network Using Modbus RTU.





Warning:

Use National Electric (NEC) or other country-specific standard wiring and safety practices when wiring and connecting this controller to a power source and to electrical sensors or peripheral devices. Failure to do so may result in damage to equipment and property, and/or injury or loss of life.

Note:

- Maximum wire size termination and torque rating:
 - 0.0507 to 3.30 mm² (30 to 12 AWG) single-wire termination or two 1.31 mm² (16 AWG)
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Note:

Adjacent terminals may be labeled differently, depending on the model number.

Note:

To prevent damage to the controller, do not connect wires to unused terminals.

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Note:

The control output common terminal and the digital common terminal are referenced to different voltages and must remain isolated.

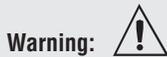
Note:

This Equipment is suitable for use in CLASS I, DIVISION 2, Groups A, B, C and D or Non-Hazardous locations only. Temperature Code T4A



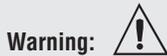
Warning:

Explosion Hazard - Dry contact closure Digital Inputs shall not be used in Class I Division 2 Hazardous Locations unless switch used is approved for this application.



Warning:

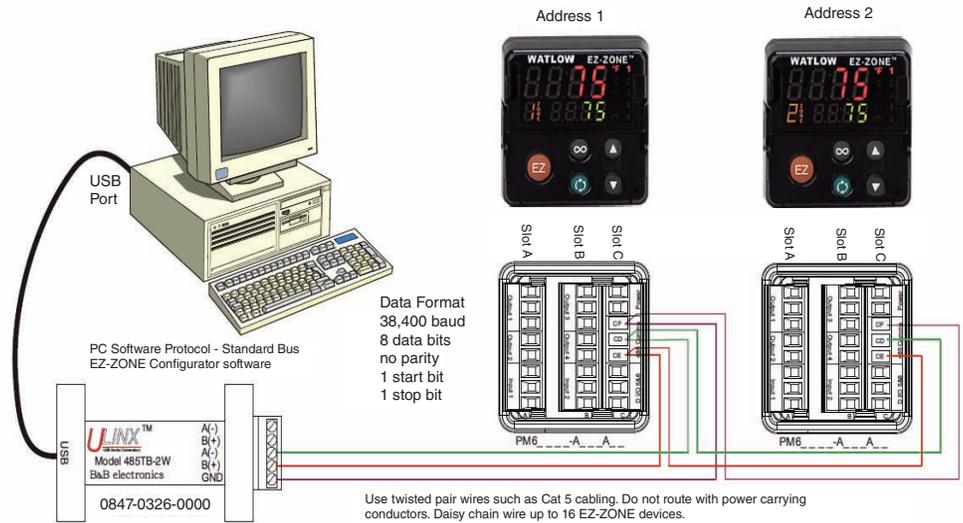
Explosion Hazard - Substitution of component may impair suitability for CLASS I, DIVISION 2.



Warning:

Explosion Hazard - Do not disconnect while the circuit is live or unless the area is known to be free of ignitable concentrations of flammable substances.

Connecting a Computer to PM Controls Using B&B 485 to USB Converter



Note:

Do not leave a USB to EIA-485 converter connected to Standard Bus without power (i.e., disconnecting the USB end from the computer while leaving the converter connected on Standard Bus). Disturbance on the Standard Bus may occur.

Note:

When connecting the USB converter to the PC it is suggested that the Latency Timer be changed from the default of 16 msec to 1 msec. Failure to make this change may cause communication loss between the PC running ZE-ZONE Configurator software and the control.

To modify Latency Timer settings follow the steps below:

1. Navigate to Device Manager.
2. Double click on Ports.
3. Right click on the USB serial port in use and select Properties.
4. Click the tab labeled Port settings and then click the Advance button.

