EZ-ZONE™ PM

User's Manual

Limit Controller Models

TOTAL CUSTOMER SATISFACTION
3 Year Warranty

ISO 9001
Registered Company
Winona, Minnesota USA

WATLOW

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Phone: +1 (507) 454-5300, Fax: +1 (507) 452-4507 http://www.watlow.com

0600-0057-0000 Rev. B

Made in the U.S.A.

July 2007

$15.00

Safety Information

We use note, caution and warning symbols throughout this book to draw your attention to important operational and safety information.

A "NOTE" marks a short message to alert you to an important detail.

A "CAUTION" safety alert appears with information that is important for protecting your equipment and performance. Be especially careful to read and follow all cautions that apply to your application.

A "WARNING" safety alert appears with information that is important for protecting you, others and equipment from damage. Pay very close attention to all warnings that apply to your application.

The safety alert symbol, ⚠ (an exclamation point in a triangle) precedes a general CAUTION or WARNING statement.

The electrical hazard symbol, ⚠ (a lightning bolt in a triangle) precedes an electric shock hazard CAUTION or WARNING safety statement.

CAUTION or WARNING

Electrical Shock Hazard
CAUTION or WARNING

Warranty

The EZ-ZONE™ PM is manufactured by ISO 9001-registered processes and is backed by a three-year warranty to the first purchaser for use, providing that the units have not been misapplied. Since Watlow has no control over their use, and sometimes misuse, we cannot guarantee against failure. Watlow's obligations hereunder, at Watlow's option, are limited to replacement, repair or refund of purchase price, and parts which upon examination prove to be defective within the warranty period specified. This warranty does not apply to damage resulting from transportation, alteration, misuse or abuse. The purchaser must use Watlow parts to maintain all listed ratings.

Technical Assistance

If you encounter a problem with your Watlow controller, review your configuration information to verify that your selections are consistent with your application: inputs, outputs, alarms, limits, etc. If the problem persists, you can get technical assistance from your local Watlow representative (see back cover), by e-mailing your questions to wintechsupport@watlow.com or by dialing +1 (507) 494-5656 between 7 a.m. and 5 p.m., Central Standard Time (CST). Ask for for an Applications Engineer. Please have the following information available when calling:

- Complete model number
- All configuration information
- User's Manual
- Factory Page

Return Material Authorization (RMA)

1. Call Watlow Customer Service, (507) 454-5300, for a Return Material Authorization (RMA) number before returning any item for repair. If you do not know why the product failed, contact an Application Engineer or Product Manager. All RMA's require:
   - Ship-to address
   - Bill-to address
   - Contact name
   - Phone number
   - Method of return shipment
   - Your P.O. number
   - Detailed description of the problem
   - Any special instructions
   - Name and phone number of person returning the product.
2. Prior approval and an RMA number from the Customer Service Department is required when returning any product for credit, repair or evaluation. Make sure the RMA number is on the outside of the carton and on all paperwork returned. Ship on a Freight Prepaid basis.
3. After we receive your return, we will examine it and try to verify the reason for returning it.
4. In cases of manufacturing defect, we will enter a repair order, replacement order or issue credit for material returned. In cases of customer mis-use, we will provide repair costs and request a purchase order to proceed with the repair work.
5. To return products that are not defective, goods must be be in new condition, in the original boxes and they must be returned within 120 days of receipt. A 20 percent restocking charge is applied for all returned stock controls and accessories.
6. If the unit is unrepairable, you will receive a letter of explanation. and be given the option to have the unit returned to you at your expense or to have us scrap the unit.
7. Watlow reserves the right to charge for no trouble found (NTF) returns.

EZ-ZONE™ PM is covered by U.S. Patent No. 6,005,577 and Patents Pending

TC

Table of Contents

1 Chapter 1: Overview

The EZ-ZONE™ PM takes the pain out of solving your thermal loop requirements.

Watlow's EZ-ZONE™ PM controllers offer options to reduce system complexity and the cost of control-loop ownership. You can also select from a number of serial communications options to help you manage system performance.

It just got a whole lot easier to solve the thermal requirements of your system. Because the EZ-ZONE™ PM controllers are highly scalable, you only pay for what you need. So if you are looking for a Limit controller, the EZ-ZONE™ PM is the answer.

Standard Features and Benefits

Advanced PID Control Algorithm

- TRU-TUNE+ Adaptive tune provides tighter control for demanding applications.
- Auto Tune for fast, efficient start ups

High-amperage Power Control Output

- Reduces component count
- Saves panel space and simplifies wiring
- Reduces the cost of ownership

EZ-Zone configuration communications and software

- Saves time and improves the reliability of controller set up

FM Approved Over-under Limit with Auxiliary Outputs

- Increases user and equipment safety for over-under temperature conditions

Parameter Save & Restore Memory

- Reduces service calls and down time

Agency approvals: UL Listed, CSA, CE, RoHS, W.E.E.E. FM

- Assures prompt product acceptance
- Reduces end product documentation costs
- FM approval on Limit Models
- Semi F47-0200

P3T Armor Sealing System

- NEMA 4X and IP66 offers water and dust resistance, can be cleaned and washed down
- Backed up by UL 50 independent certification to NEMA 4X specification

Three-year warranty

- Demonstrates Watlow's reliability and product support

Touch-safe Package

- IP2X increased safety for installers and operators

Removable cage clamp wiring connectors

- Reliable wiring, reduced service calls
- Simplified installation

EZ-Key

- Programmable EZ-Key enables simple one-touch operation of repetitive user activities

Programmable Menu System

- Reduces set up time and increases operator efficiency

Full-featured Alarms

- Improves operator recognition of system faults
- Control of auxiliary devices

Heat-Cool Operation

- Provides application flexibility with accurate temperature and process control

A Conceptual View of the PM

The flexibility of the PM's software and hardware allows a large range of configurations. Acquiring a better understanding of the controller's overall functionality and capabilities while at the same time planning out how the controller can be used will deliver maximum effectiveness in your application.

It is useful to think of the controller in three parts: inputs; procedures; and outputs. Information flows from an input to a procedure to an output when the controller is properly configured. A single PM controller can carry out several procedures at the same time, for instance closed-loop control, monitoring for several different alarm situations and operating switched devices, such as lights and motors. Each process needs to be thought out carefully and the controller's inputs, procedures and outputs set up properly.

Inputs

The inputs provide the information that any given programmed procedure can act upon. In a simple form, this information may come from an operator pushing a button or as part of a more complex procedure it may represent a remote set point being received from another controller.

Each analog input typically uses a thermocouple or RTD to read the temperature of something. It can also read volts, current or resistance, allowing it to use various devices to read humidity, air pressure, operator inputs and others values. The settings in the Analog Input Menu (Setup Page) for each analog input must be configured to match the device connected to that input.

Each digital input reads whether a device is active or inactive. A PM with digital input-output hardware includes two sets of terminals each of which can be used as either an input or an output. Each pair of terminals must be configured to function as either an input or output with the Direction parameter in the Digital Input/Output Menu (Setup Page).

The Function or EZ Key on the front panel of the PM also operates as a digital input by toggling the function assigned to it in the Digital Input Function parameter in the Function Key Menu (Setup Page).

Functions

Functions use input signals to calculate a value. A function may be as simple as reading a digital input to set a state to true or false, or reading a temperature to set an alarm state to on or off. Or, it could compare the temperature of a process to the set point and calculate the optimal power for a heater.

To set up a function, it's important to tell it what source, or instance, to use. For example, an alarm may be set to respond to either analog input 1 or 2 (instance 1 or 2, respectively).

Keep in mind that a function is a user-programmed internal process that does not execute any action outside of the controller. To have any effect outside of the controller, an output must be configured to respond to a function.

Outputs

Outputs can perform various functions or actions in response to information provided by a function, such as operating a heater; turning a light on or off; unlocking a door; or turning on a buzzer.

Assign an output to a Function in the Output Menu or Digital Input/Output Menu. Then select which instance of that function will drive the selected output. For example, you might assign an output to respond to alarm 4 (instance 4) or to retransmit the value of analog input 2 (instance 2).

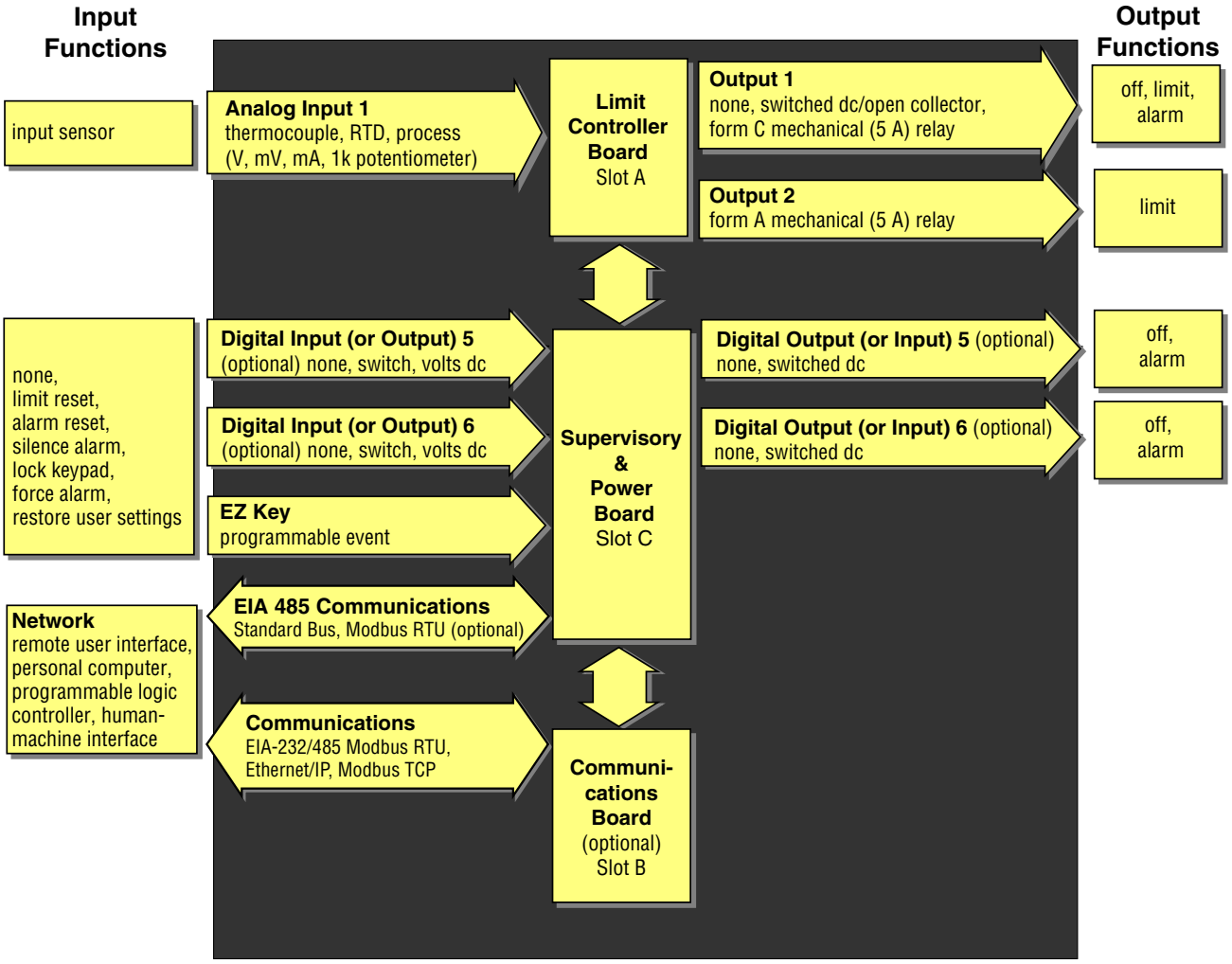
You can assign more than one output to respond to a single instance of a function. For example, alarm 2 could be used to trigger a light connected to output 1 and a siren connected to digital output 5.

Input Events and Output Events

Input events are internal states that are set by the digital inputs. Digital input 5 provides the state of input event 1, and digital input 6 provides the state of input event 2. The setting of Digital Input Function (Setup Page, Digital Input/Output Menu) does not change the relationship between the input and the event. An input will still control the input event state, even if Digital Input Function is set to None.

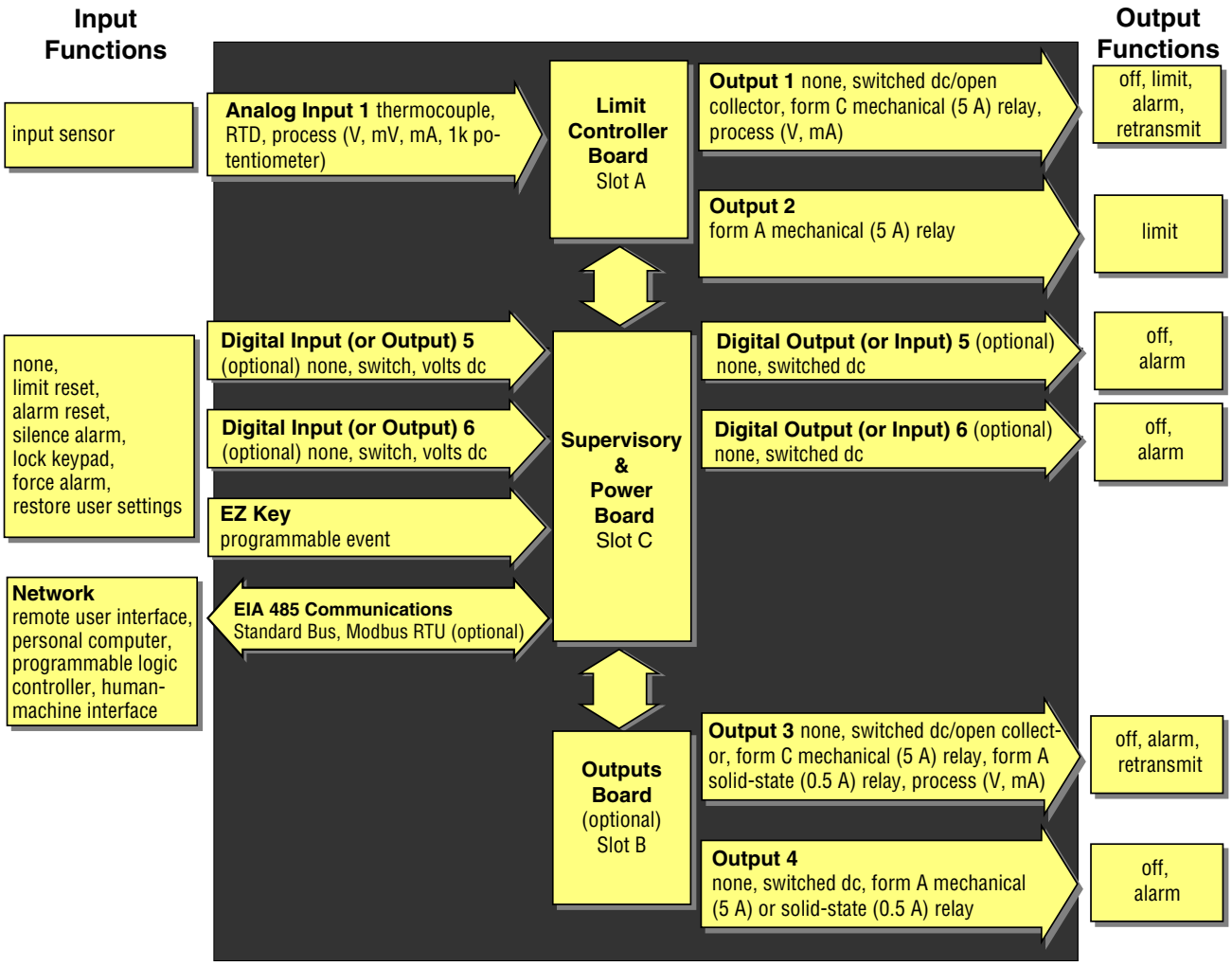
EZ-ZONE™ PM Enhanced Limit Model 1/16 DIN — Input/Output (with communications options 2 to 3)

Universal Sensor Input, Configuration Communications,
Red/Green 7-Segment Display



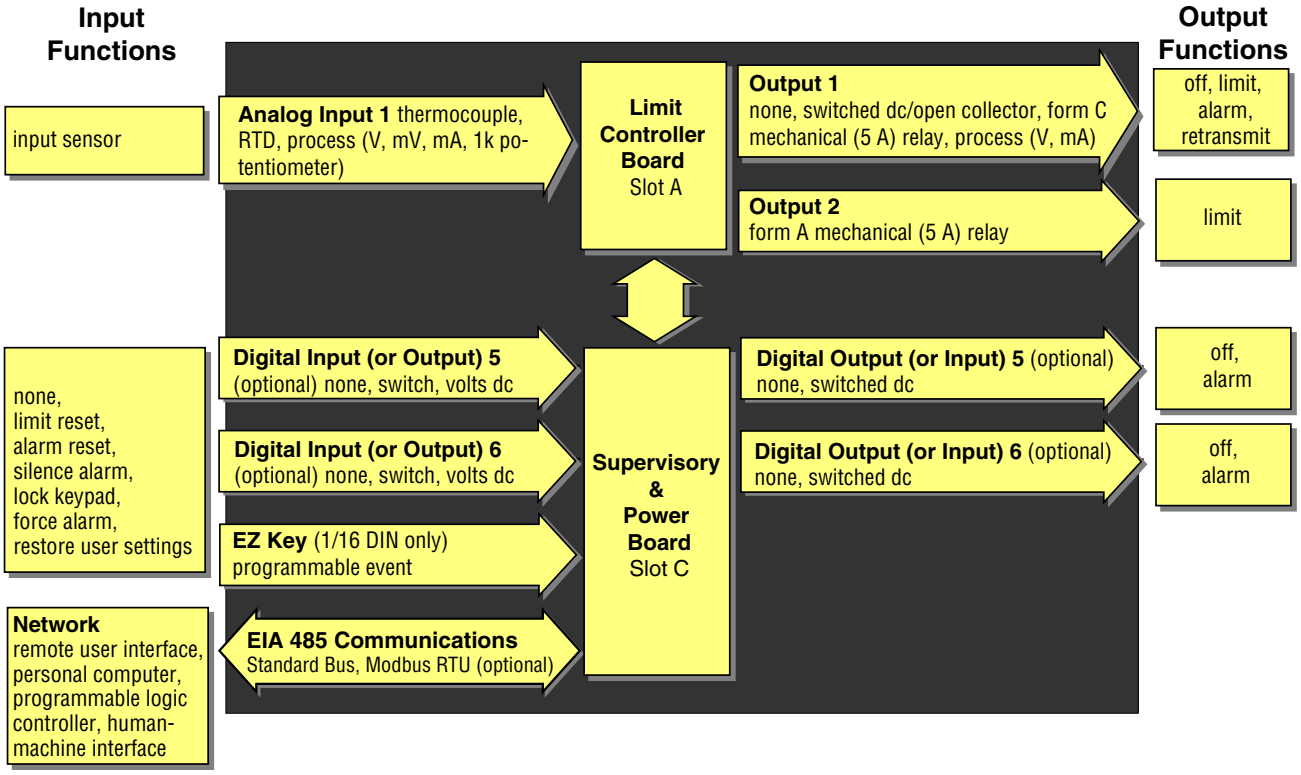
EZ-ZONE™ PM Enhanced Limit Model 1/16 DIN — Input/Output (no communications options 2 to 3)

Universal Sensor Input, Configuration Communications,
Red/Green 7-Segment Display



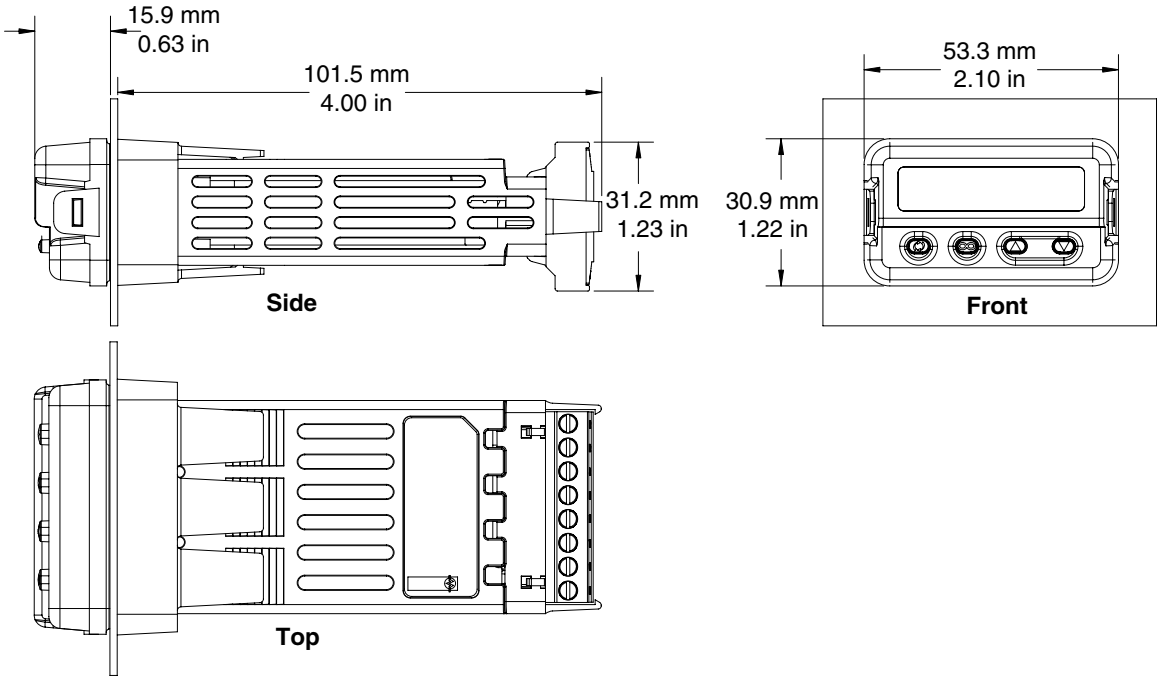
EZ-ZONE™ PM Model 1/32 & 1/16 DIN — Input/Output

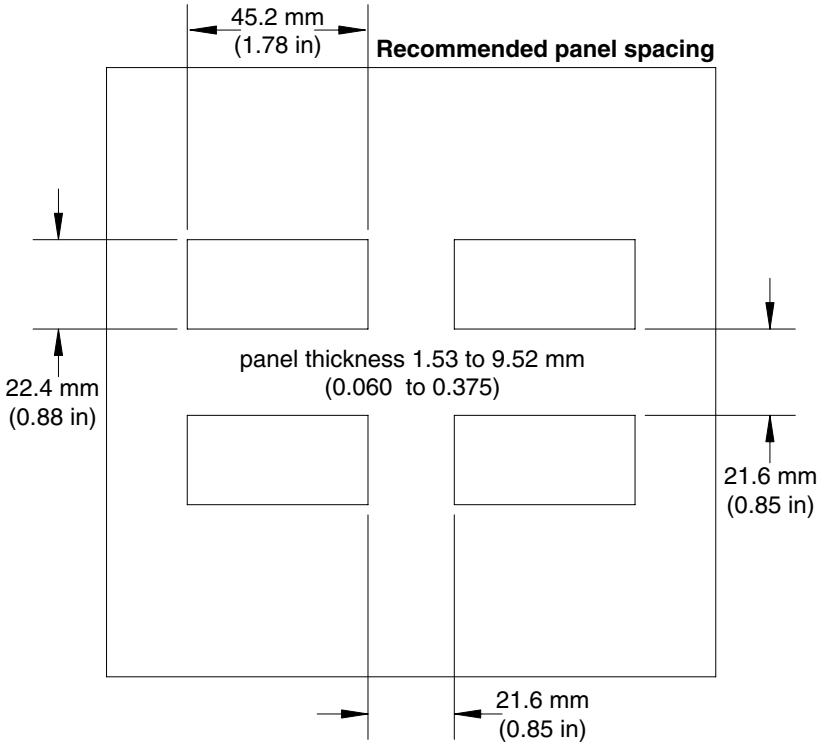
Universal Sensor Input, Configuration Communications,
Red/Green 7-Segment Display



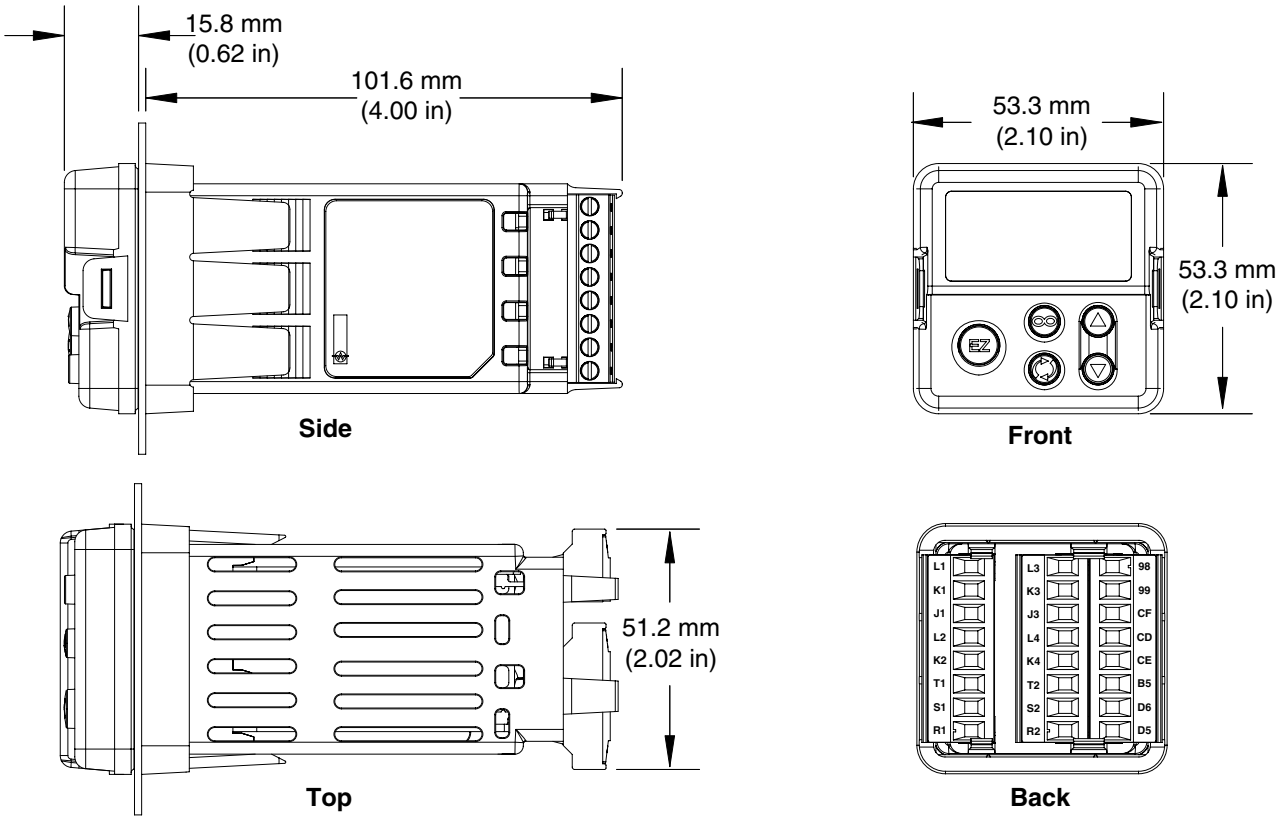
2 Chapter 2: Install and Wire

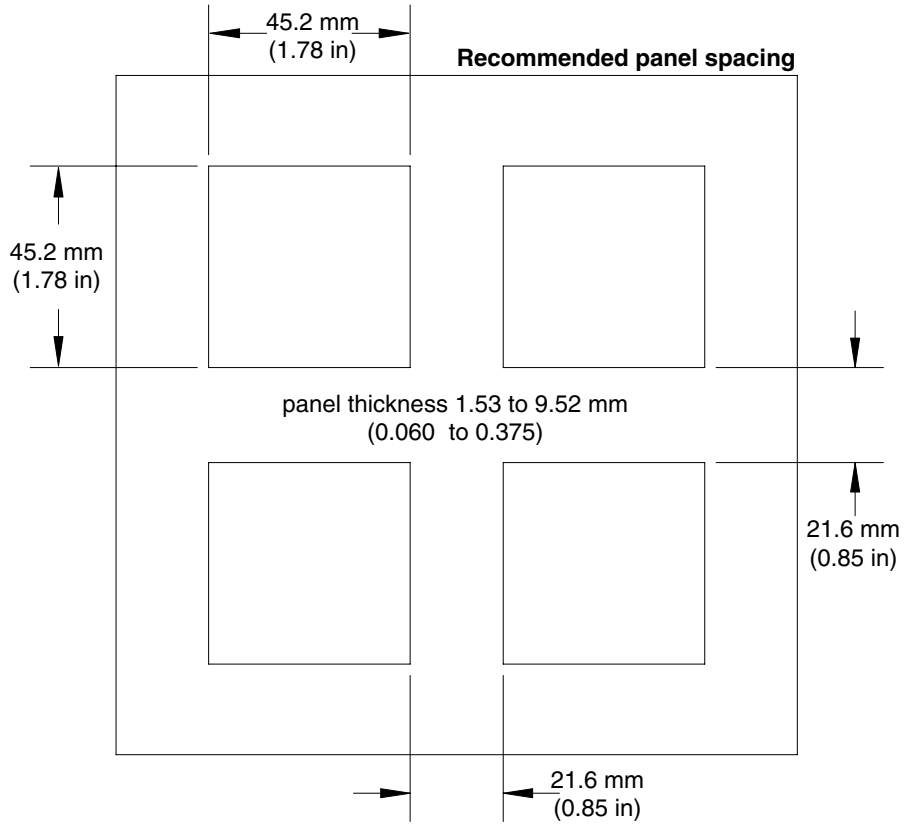
1/32 DIN Dimensions



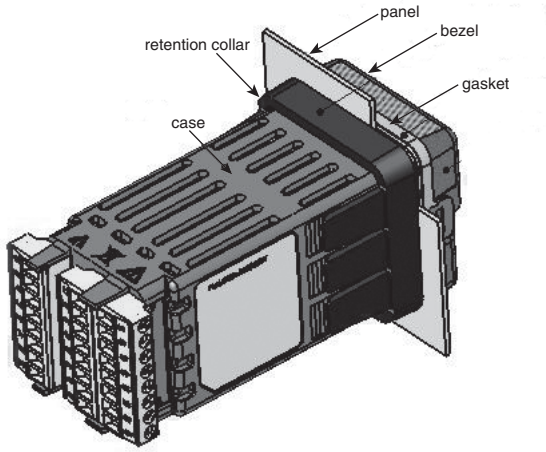


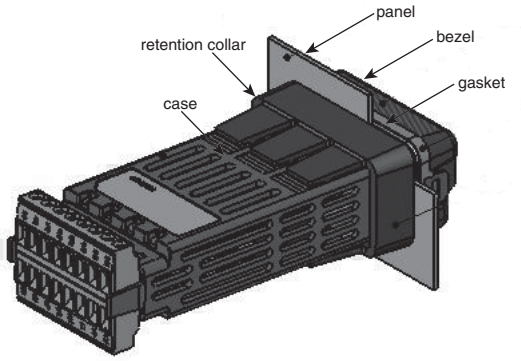
1/16 DIN Dimensions





Installation



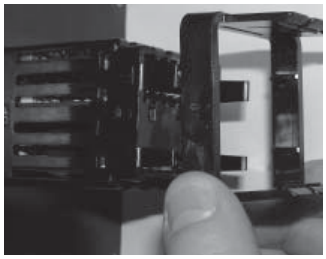


1. Make the panel cutout using the mounting template dimensions in this chapter.

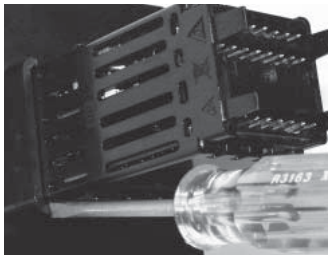
   Insert the case assembly into the panel cutout.

2. While pressing the case assembly firmly against the panel, slide the mounting collar over the back of the controller.

   If the installation does not require a NEMA 4X seal, slide the mounting collar up to the back of the panel tight enough to eliminate the spacing between the gasket and the panel.



Slide the mounting collar over the back of the controller.



Place the blade of a screwdriver in the notch of the mounting collar assembly.

3. For a NEMA 4X seal (UL50, IP66), place the blade of a screwdriver in the notch of the mounting collar assembly and push toward the panel while applying pressure to the face of the controller. Don't be afraid to apply enough pressure to properly install the controller. The seal system is compressed more by mating the mounting collar tighter to the front panel (see pictures). If you can move the case assembly back and forth in the cutout, you do not have a proper seal.

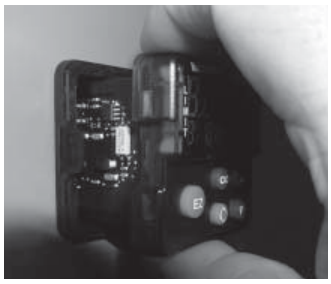
   The tabs on each side of the mounting collar have teeth that latch into the ridges on the sides of the controller. Each tooth is staggered at a different depth from the front so that only one of the tabs, on each side, is locked onto the ridges at a time.

Note: There is a graduated measurement difference between the upper and lower half of the display to the panel. In order to meet the seal requirements mentioned above, ensure that the distance from the front of the top half of the display to the panel is 16 mm (0.630 in.) or less, and the distance from the front of the bottom half and the panel is 13.3 mm (0.525 in.) or less.

Removing the Mounted Controller from Its Case

1. From the controller's face, pull out the tab on each side until you hear it click.

Pull out the tab on each side until you hear it click.



Grab the unit above and below the face and pull forward.

2. Once the sides are released, grab the unit above and below the face with two hands and pull the unit out.

   If it is difficult to pull the unit out, remove the connectors from the back of the controller. This should make it easier to remove.

Warning:

• This equipment is suitable for use in class 1, div. 2, Groups A, B, C and D or Non-Hazardous locations only. Temperature Code T4A.

• WARNING – EXPLOSION HAZARD. Substitution of component may impair suitability for class 1, div. 2.

• WARNING – EXPLOSION HAZARD. Do not disconnect equipment unless power has been switched off or the area is known to be nonhazardous.

Returning the Controller to its Case

1. Ensure that the orientation of the controller is correct and slide it back into the housing.

Note: The controller is keyed so if it feels that it will not slide back in do not force it. Check the orientation again and reinsert after correcting.

2. Using your thumbs push on either side of the controller until both latches click.

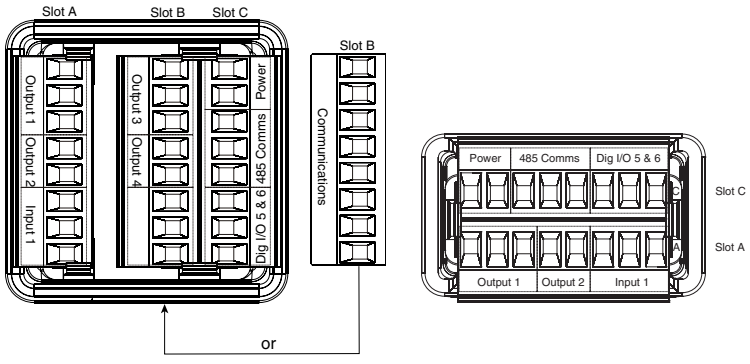
Chemical Compatibility

This product is compatible with acids, weak alkalis, alcohols, gamma radiation and ultraviolet radiation.

This product is not compatible with strong alkalis, organic solvents, fuels, aromatic hydrocarbons, chlorinated hydrocarbons, esters and keytones.

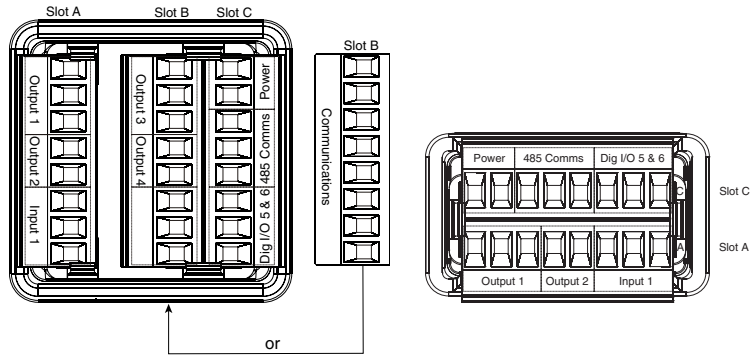
Slot A		Slot B			
Output				Terminal Function	Configuration
1	2	3	4		
X1 W1 Y1		X3 W3 Y3		common (Any switched dc output can use this common.) dc- (open collector) dc+	Switched dc/open collector output 1: PM _ _ _ **C** _-_ _ _ _ AAA output 3: PM6 _ _ _ _-_ _ **C** _ AAA
			W4 Y4	dc- dc+	Switched dc output 4: PM6 _ _ _ _-_ _ _ **C** AAA
		F3 G3 H3		voltage or current - voltage + current +	Universal Process output 3: PM6 _ _ _ _-_ _ **F** _ AAA
L1 K1 J1		L3 K3 J3		normally open common normally closed	Mechanical Relay 5 A, Form C output 1: PM _ _ _ **E** _-_ _ _ _ AAA output 3: PM6 _ _ _ _-_ _ **E** _ AAA
	L2 K2		L4 K4	normally open common	Mechanical Relay 5 A, Form A output 2: PM _ _ _ _ **J**-_ _ _ _ AAA output 4: PM6 _ _ _ _-_ _ _ **J** AAA
		L3 K3	L4 K4	normally open common	Solid-state Relay 0.5 A, Form A output 3: PM6 _ _ _ _-_ _ **K** _ AAA output 4: PM6 _ _ _ _-_ _ _ **K** AAA
Communications					
		CA CB CC CA CB C5 C3 C2		Modbus RTU EIA-485 T-/R- Modbus RTU EIA-485 T+/R+ Modbus RTU EIA-485 common Modbus RTU EIA-485 T-/R- Modbus RTU EIA-485 T+/R+ Modbus RTU EIA-232 common Modbus RTU EIA-232 to DB9 pin 2 Modbus RTU EIA-232 to DB9 pin 3	Modbus RTU 232/485 Communications PM6 _ _ _ _-**2 A A A** AAA
		E8 E7 E6 E5 E4 E3 E2 E1		EtherNet/IP™ and Modbus TCP unused EtherNet/IP™ and Modbus TCP unused EtherNet/IP™ and Modbus TCP receive - EtherNet/IP™ and Modbus TCP unused EtherNet/IP™ and Modbus TCP unused EtherNet/IP™ and Modbus TCP receive + EtherNet/IP™ and Modbus TCP transmit - EtherNet/IP™ and Modbus TCP transmit +	Ethernet 10/100 supporting EtherNet/IP™ and Modbus TCP PM6 _ _ _ _-**3 A A A** AAA
Inputs					
1					
T1 S1 R1				S2 (RTD) or current +, potentiometer wiper S3 (RTD), thermocouple -, current - or volts - S1 (RTD), thermocouple + or volts +	Universal Sensor input 1: all configurations
Slot A		Slot B			

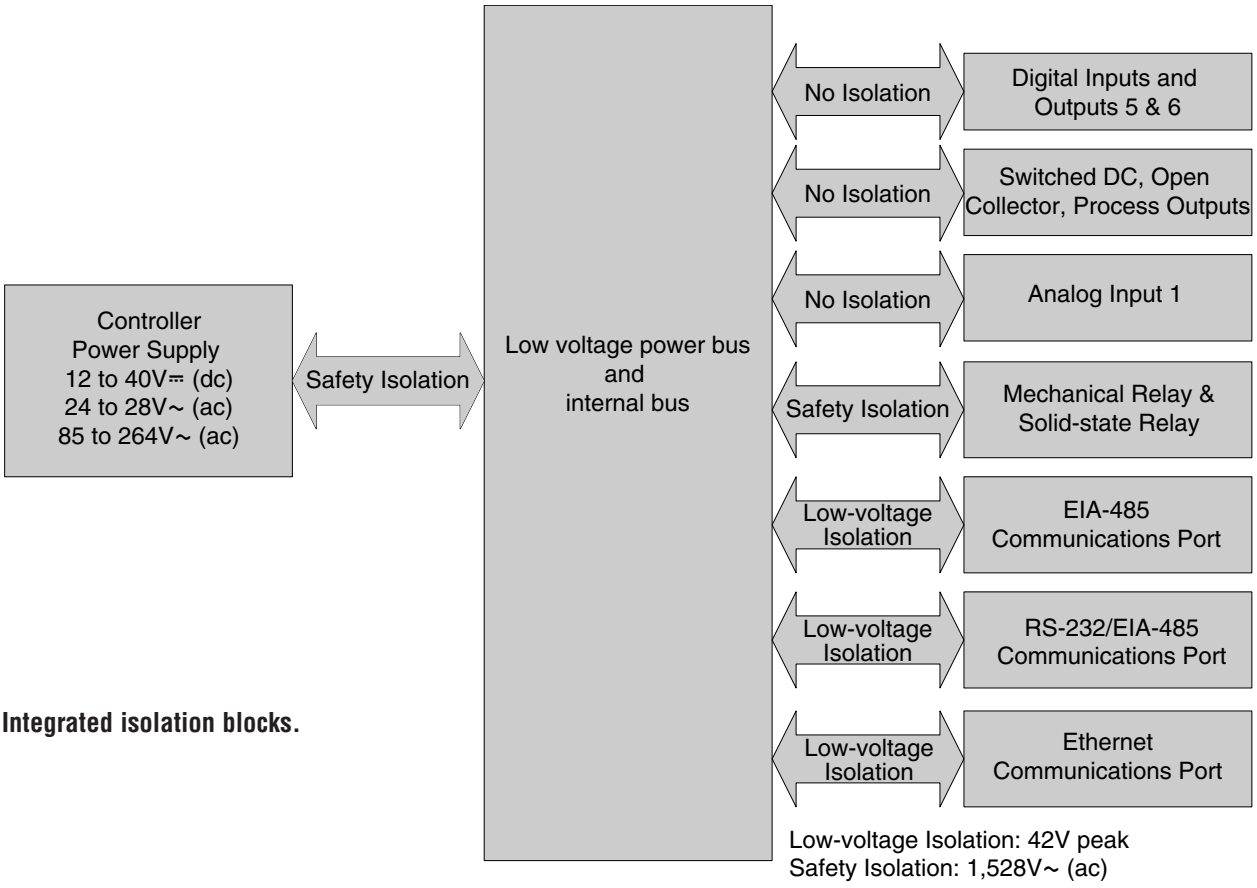
Terminal Definitions for Slots A and B.



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 PM6 _ _ _ _-**1** _ _ _ AAA
CF CD CE	Standard Bus EIA-485 common Standard Bus EIA-485 T-/R- Standard Bus EIA-485 T+/R+	PM6 _ _ _ _-**(A, 2 or 3)** _ _ _ AAA
B5 D6 D5	digital input-output common digital input or output 6 digital input or output 5	PM _ _ **2** _ _-_ _ _ _ AAA PM _ _ **4** _ _-_ _ _ _ AAA

Terminal Definitions for Slot C.





PM Integrated isolation blocks.

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 mm^2 (30 to 12 AWG) single-wire termination or two 1.31 mm^2 (16 AWG)**
- **0.8 Nm (7.0 lb.-in.) torque**

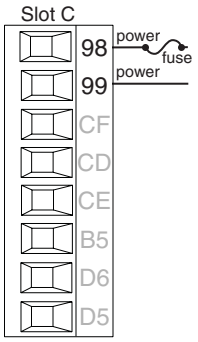
Note:
Adjacent terminals may be labeled differently, depending on the model number.

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.

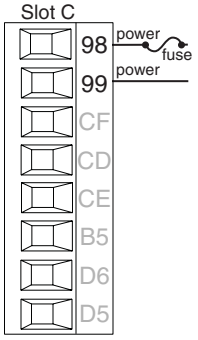
Low Power



- 12 to 40V⎓ (dc)
- 20 to 28V~ (ac)
- 20 to 28V~ (ac) Semi Sig F47
- 47 to 63 Hz
- 10VA maximum power consumption

PM6 _ **(3 or 4)** _ _-_ _ _ _ A _ _

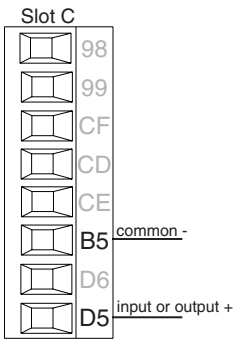
High Power



- 85 to 264V~ (ac)
- 100 to 240V~ (ac) Semi Sig F47
- 47 to 63 Hz
- 10VA maximum power consumption

PM _ _ **(1 or 2)** _ _-_ _ _ _ AAA

Digital Input or Output 5



Digital Input
- update rate 10 Hz
- dry contact or dc voltage

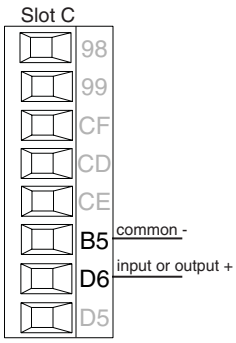
DC voltage
- maximum input 36V at 3 mA
- minimum high state 3V@0.25 mA
- maximum low state 2V

Dry contact
- minimum open resistance 500 Ω
- maximum closed resistance 100 Ω
- maximum short circuit 13 mA

Digital Output
- update rate 10 Hz
- output voltage 24V
- current limit, Output 5, 24 mA maximum
- capable of driving a 3-pole DIN-A-MITE
- open-circuit voltage 22 to 32V⎓ (dc)

PM _ _ **(2 or 4)** _ _-_ _ _ _ AAA

Digital Input or Output 6



Digital Input
- update rate 10 Hz
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DC voltage
- maximum input 36V at 3 mA
- minimum high state 3V@0.25 mA
- maximum low state 2V

Dry contact
- minimum open resistance 500 Ω
- maximum closed resistance 100 Ω
- maximum short circuit 13 mA

Digital Output
- update rate 10 Hz
- output voltage 24V
- current limit, Output 6, 10 mA maximum
- capable of driving a single-pole DIN-A-MITE
- open-circuit voltage 22 to 32V⎓ (dc)

PM _ _ **(2 or 4)** _ _-_ _ _ _ AAA

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 mm^2 (30 to 12 AWG) single-wire termination or two 1.31 mm^2 (16 AWG)**
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Note:
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Note:
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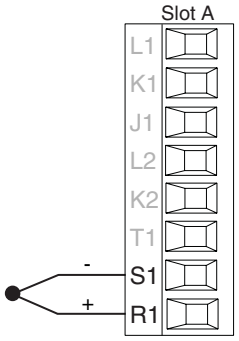
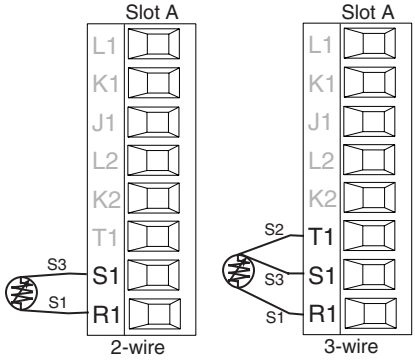
Input 1 Thermocouple



- 20 Ω 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 _ _ _ _ _-_ _ _ _ AAA (all)

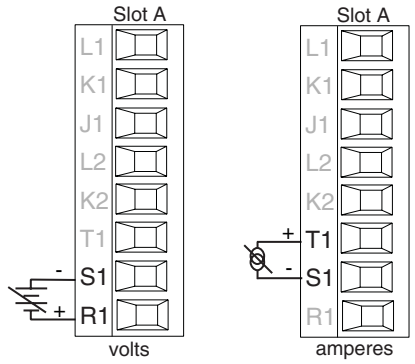
Input 1 RTD



- 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 _ _ _ _ _-_ _ _ _ AAA (all)

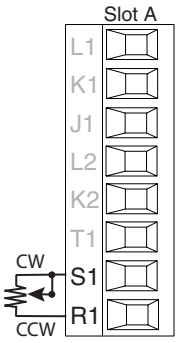
Input 1 Process



- 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 _ _ _ _ _-_ _ _ _ AAA (all)

Input 1 Potentiometer



- Use a 1 kΩ potentiometer.

PM _ _ _ _ _-_ _ _ _ AAA (all)

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 mm^2 (30 to 12 AWG) single-wire termination or two 1.31 mm^2 (16 AWG)**
- **0.8 Nm (7.0 lb.-in.) torque**

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

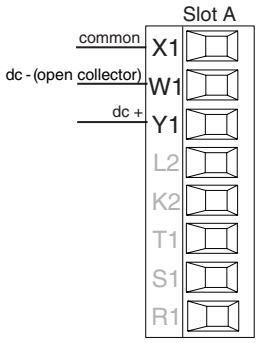
Note:
To prevent damage to the controller, do not connect wires to unused terminals.

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

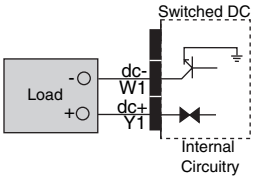
Note:
The control output common terminal and the digital common terminal are referenced to different voltages and must remain isolated.

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.

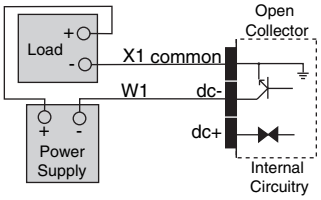
Output 1 Switched DC/Open Collector



Switched DC
- 30 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 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

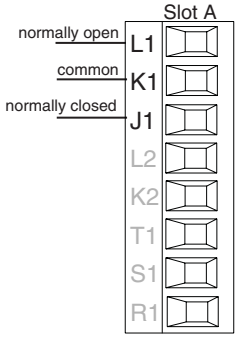


Open Collector
- 100 mA maximum output current sink
- 30V⎓ (dc) maximum supply voltage
- Any switched dc output can use the common terminal.
- Use an external power supply to control a dc load, with the load positive to the positive of the power supply, the load negative to the open collector and common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

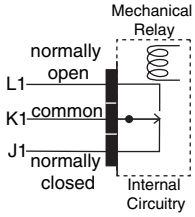


See Quencharc note.
PM _ _ _ **C** _-_ _ _ _ AAA

Output 1 Mechanical Relay, Form C

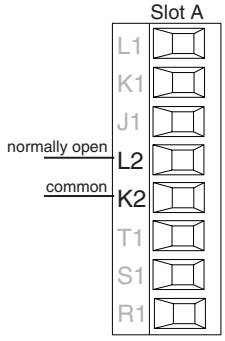


- 5 A at 240V~ (ac) or 30V⎓ (dc) maximum resistive load
- 20 mA at 24V minimum load
- 125 VA pilot duty at 120/240V~ (ac), 25 VA at 24V~ (ac)
- 100,000 cycles at rated load
- Output does not supply power.
- for use with ac or dc

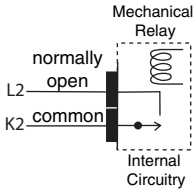


See Quencharc note.
PM _ _ _ **E** _-_ _ _ _ AAA

Output 2 Mechanical Relay, Form A



- 5 A at 240V~ (ac) or 30V⎓ (dc) maximum resistive load
- 20 mV 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**-_ _ _ _ AAA

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 mm^2 (30 to 12 AWG) single-wire termination or two 1.31 mm^2 (16 AWG)**
- **0.8 Nm (7.0 lb.-in.) torque**

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

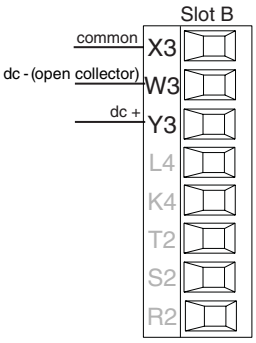
Note:
To prevent damage to the controller, do not connect wires to unused terminals.

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

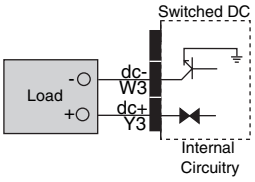
Note:
The control output common terminal and the digital common terminal are referenced to different voltages and must remain isolated.

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.

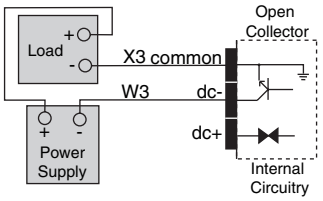
Output 3 Switched DC/Open Collector



Switched DC
- 30 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 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



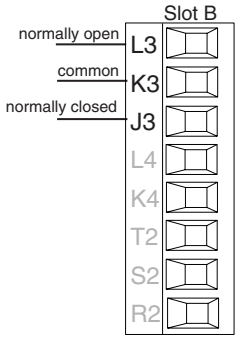
Open Collector
- 100 mA maximum output current sink
- 30V⎓ (dc) maximum supply voltage
- Any switched dc output can use the common terminal.
- Use an external power supply to control a dc load, with the load positive to the positive of the power supply, the load negative to the open collector and common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



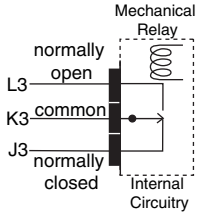
See Quencharc note.

PM _ _ _ _ _-_ _ **C** _ AAA

Output 3 Mechanical Relay, Form C



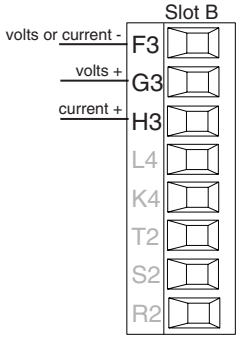
- 5 A at 240V~ (ac) or 30V⎓ (dc) maximum resistive load
- 20 mA at 24V minimum load
- 125 VA pilot duty at 120/240V~ (ac), 25 VA at 24V~ (ac)
- 100,000 cycles at rated load
- Output does not supply power.
- for use with ac or dc



See Quencharc note.

PM _ _ _ _ _-_ _ **E** _ AAA

Output 3 Universal Process



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

PM _ _ _ _ _-_ _ **F** _ AAA

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 mm^2 (30 to 12 AWG) single-wire termination or two 1.31 mm^2 (16 AWG)**
- **0.8 Nm (7.0 lb.-in.) torque**

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

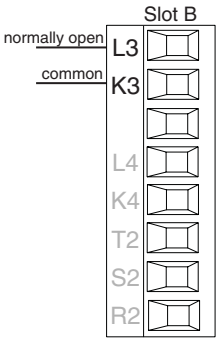
Note:
To prevent damage to the controller, do not connect wires to unused terminals.

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.

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.

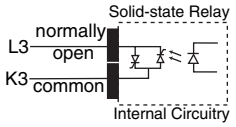
Output 3 Solid-state Relay, Form A



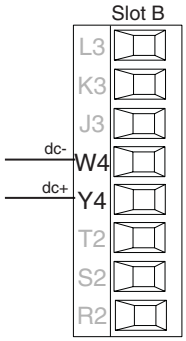
- 0.5 A at 20 to 264V~ (ac) maximum resistive load
- 20 VA 120/240V~ (ac) pilot duty
- opto-isolated, without contact suppression
- maximum off state leakage of 105 microamperes
- Output does not supply power.
- Do not use on dc loads.

See Quencharc note.

PM _ _ _ _ _ -_ _ **K** _ AAA

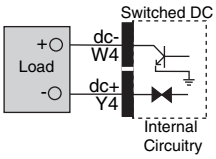


Output 4 Switched DC

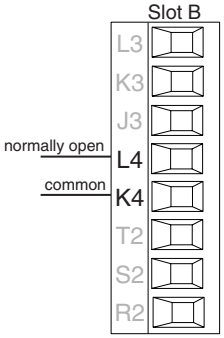


- 10 mA DC maximum supply current
- short circuit limited to <50 mA
- 22 to 32V⎓ (dc) open circuit voltage
- Use dc- and dc+ to drive external solid-state relay.
- DIN-A-MITE compatible
- single-pole: up to 2 in series, none in parallel

PM _ _ _ _ _-_ _ _ **C** AAA



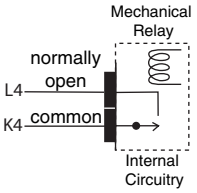
Output 4 Mechanical Relay, Form A



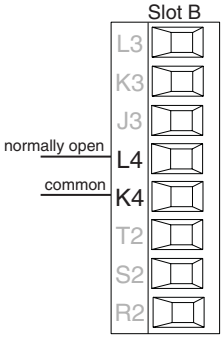
- 5 A at 240V~ (ac) or 30V⎓ (dc) maximum resistive load
- 20 mV at 24V minimum load
- 125 VA pilot duty at 120/240V~ (ac), 25 VA at 24V~ (ac)
- 100,000 cycles at rated load
- Output does not supply power.
- for use with ac or dc

See Quencharc note.

PM _ _ _ _ _-_ _ _ **J** AAA



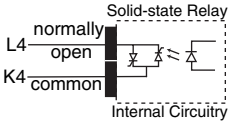
Output 4 Solid-state Relay, Form A



- 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** AAA



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 mm^2 (30 to 12 AWG) single-wire termination or two 1.31 mm^2 (16 AWG)**
- **0.8 Nm (7.0 lb.-in.) torque**

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

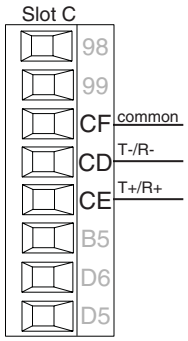
Note:
To prevent damage to the controller, do not connect wires to unused terminals.

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:
Avoid continuous writes within loops. Excessive writes to EEPROM will cause premature EEPROM failure. The EEPROM is rated for 1,000,000 writes.

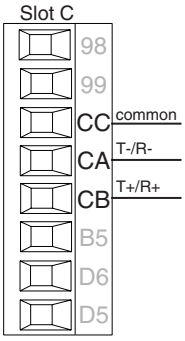
Standard Bus EIA-485 Communications



- 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, 2 or 3)** _ _ _ AAA

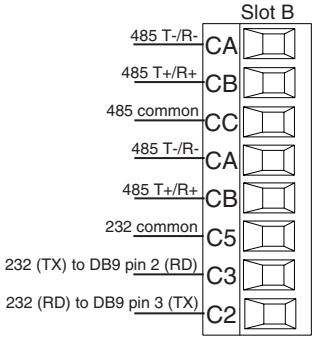
Modbus RTU or Standard Bus EIA-485 Communications



- 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 _ _ _ _ _-**1** _ _ _ AAA

EIA-232/485 Modbus RTU 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.
- Do not wire to both the EIA-485 and the EIA-232 pins at the same time.
- Two EIA-485 terminals of T/R are provided to assist in daisy-chain wiring.
- Do not connect more than one EZ-ZONE PM controller on an EIA-232 network.
- Do not connect more than 16 EZ-ZONE PM controllers on a Standard Bus EIA-485 network.
- Do not connect more than 247 EZ-ZONE PM controllers on a Modbus RTU EIA-485 network.
- maximum EIA-232 network length: 15 meters (50 feet)
- maximum EIA-485 network length: 1,200 meters (4,000 feet)
- 1/8th unit load on EIA-485 bus.

PM6 _ _ _ _-**2** AAA AAA

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

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 mm^2 (30 to 12 AWG) single-wire termination or two 1.31 mm^2 (16 AWG)**
- **0.8 Nm (7.0 lb.-in.) torque**

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

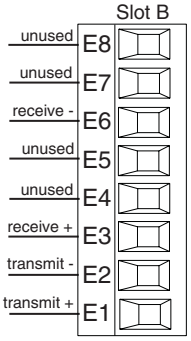
Note:
To prevent damage to the controller, do not connect wires to unused terminals.

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:
Avoid continuous writes within loops. Excessive writes to EEPROM will cause premature EEPROM failure. The EEPROM is rated for 1,000,000 writes.

EtherNet/IP™ and Modbus TCP Communications



RJ-45 pin	T568B wire color	Signal	Slot B
8	brown	unused	E8
7	brown & white	unused	E7
6	green	receive -	E6
5	white & blue	unused	E5
4	blue	unused	E4
3	white & green	receive +	E3
2	orange	transmit -	E2
1	white & orange	transmit +	E1

EtherNet/IP™ and Modbus TCP communications to connect with a 10/100 switch.

- Do not route network wires with power wires.
- Connect one Ethernet cable per controller to a 10/100 mbps ethernet switch. Both Modbus TCP and EtherNet/IP™ are available on the network.
- A RUI may be connected at the same time using Slot C.

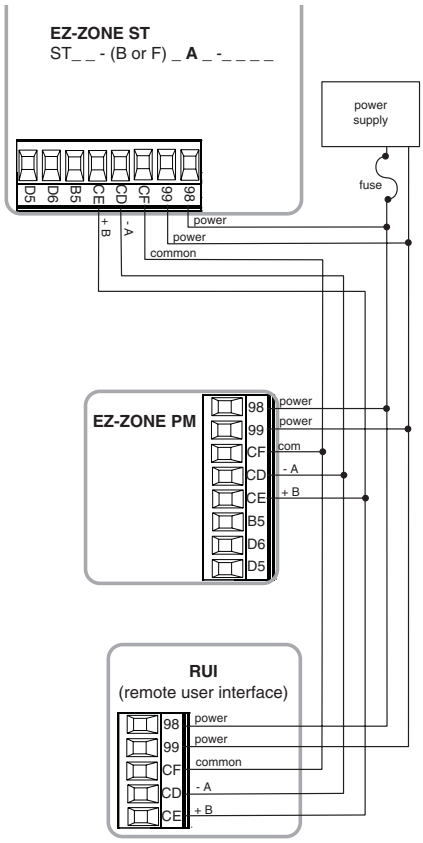
Wiring a Serial EIA-485 Network

Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network.

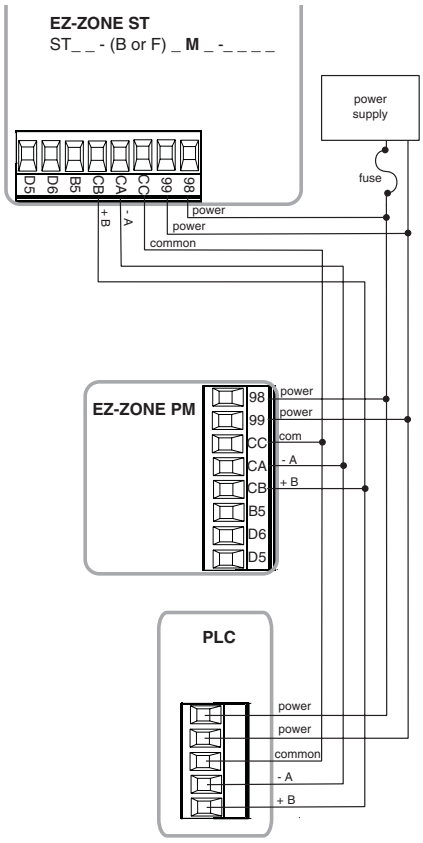
A termination resistor may be required. Place a 120 Ω resistor across T+/R+ and T-/R- of the last controller on a network.

Only one protocol per port is available at a time: either Modbus RTU or Standard Bus.

Note:
The RUI (remote user interface) can communicate using Watlow's Standard Bus only.



A network using Watlow's Standard Bus and an RUI (remote user interface).



A network using Modbus RTU.

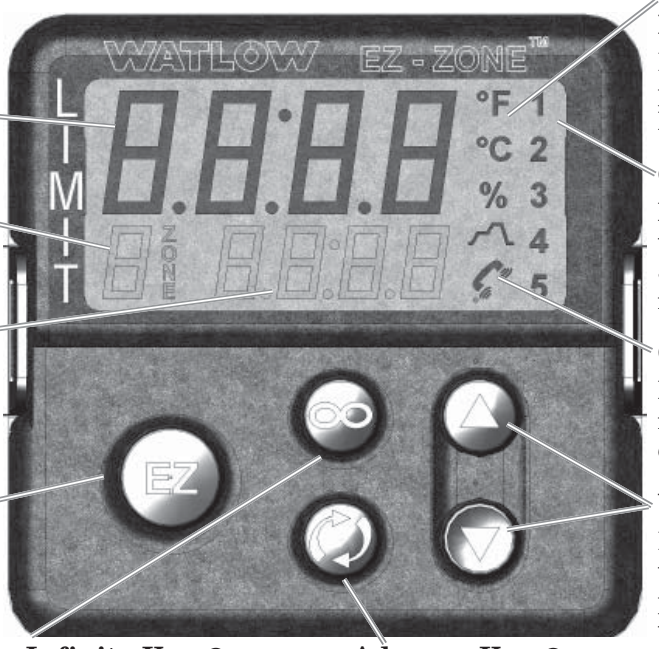
3 Chapter 3: Keys and Displays

Upper Display:
In the Home Page, displays the process value, otherwise displays the value of the parameter in the lower display.

Zone Display:
Indicates this controller's Standard Bus address in hexadecimal (1, 2, 3, 4, 5, 6, 7, 8, 9, A, b, c, d, E, F, H).

Lower Display:
Indicates the set point or output power value during operation, or the parameter whose value appears in the upper display.

EZ Key:
This key can be programmed to do various tasks, such as starting a profile.



Infinity Key
Press to back up one level, or press and hold for two seconds to return to the Home Page.

Advance Key
Advances through parameter prompts.

Temperature Units Indicator Lights:
Indicates whether the temperature is displayed in Fahrenheit or Celsius.

Output Activity:
Number lights indicate activity of outputs 1 through 5. A flashing light indicates retransmit activity.

Communications Activity
Flashes when another device is communicating with this controller.

Up and Down Keys
In the Home Page, adjusts the set point in the lower display. In other pages, changes the upper display to a higher or lower value, or changes a parameter selection.

Responding to a Displayed Message

An active message will cause the display to toggle between the normal settings and the active message in the upper display and [Atn] in the lower display.

Your response will depend on the message and the controller settings. If the message was generated by a latched alarm or limit condition, the message can be cleared when the condition no longer exists. If an alarm has silencing enabled, it can be silenced.

Push the Advance Key to display [,gnr] in the upper display and the message source (such as [L.h1]) in the lower display.

Use the Up and Down keys to scroll through possible responses, such as Clear [CLr] or Silence [S.iL]. Then push the Advance or Infinity key to execute the action.

[AL.L1] [AL.L2] [AL.L3] [AL.L4] Alarm Low 1 to 4
[AL.h1] [AL.h2] [AL.h3] [AL.h4] Alarm High 1 to 4
[AL.E1] [AL.E2] [AL.E3] [AL.E4] Alarm Error 1 to 4
[Er.i1] Error Input 1
[L.iL1] [L.iL2] Limit Low 1 or 2
[L.ih1] [L.ih2] Limit High 1 or 2
[L.iE1] [L.iE2] Limit Error 1 or 2
[LP.o1] Loop Open Error
[LP.r1] Loop Reversed Error

Left (Upper) Display:
In the Home Page, displays the process value, otherwise displays the value of the parameter in the lower display.

Output Activity:
Number lights indicate activity of outputs 1, 2, 5 and 6.

Right (Lower) Display:
Indicates the set point or output power value during operation, or the parameter whose value appears in the upper display.

Advance Key
Advances through parameter prompts.

Infinity Key
Press to back up one level, or press and hold for two seconds to return to the Home Page.

Up and Down Keys
In the Home Page, adjusts the set point in the lower display. In other pages, changes the upper display to a higher or lower value, or changes a parameter selection.

Responding to a Displayed Message

An active message will cause the display to toggle between the normal settings and the active message in the upper display and [AtEn] in the lower display.

Your response will depend on the message and the controller settings. If the message was generated by a latched alarm or limit condition, the message can be cleared when the condition no longer exists. If an alarm has silencing enabled, it can be silenced.

Push the Advance Key to display [iGnr] in the upper display and the message source (such as [L.h1]) in the lower display.

Use the Up and Down keys to scroll through possible responses, such as Clear [CLr] or Silence [SiL]. Then push the Advance or Infinity key to execute the action.

[AL.L1] [AL.L2] [AL.L3] [AL.L4] Alarm Low 1 to 4
[AL.h1] [AL.h2] [AL.h3] [AL.h4] Alarm High 1 to 4
[AL.E1] [AL.E2] [AL.E3] [AL.E4] Alarm Error 1 to 4
[Er.i1] Error Input 1
[L.L1] [L.L2] Limit Low 1 or 2
[L.h1] [L.h2] Limit High 1 or 2
[L.E1] [L.E2] Limit Error 1 or 2
[LP.o1] Loop Open Error
[LP.r1] Loop Reversed Error

Navigating the EZ-ZONE™ PM Limit Controller

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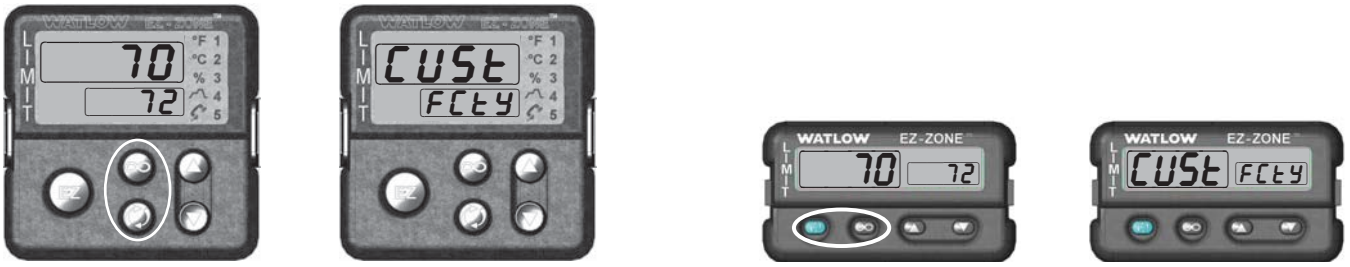
Home Page from anywhere: Press the Infinity Key for two seconds to return to the Home Page.

Operations Page from Home Page: Press both the Up and Down keys for three seconds.

Setup Page from Home Page: Press both the Up and Down keys for six seconds.



Factory Page from Home Page: Press both the Advance and Infinity keys for six seconds.

4 Chapter 4: Home Page

Default Home Page Parameters

The Home Page is a customized list of as many as 20 parameters that can be configured and changed in the Custom Menu [CUSt] (Factory Page). The default list of parameters below includes the Active Process Value (value in upper display) and Active Set Point (value in lower display). The Attention [Attn] parameter only appears if there is an active message. An active message could be a reported error, for example, [CEr 1] (Current Error), or it could be for information only, for example, [tUn 1] (Autotuning).

Use the Advance Key ◉ to step through the other parameters. The parameter prompt will appear in the lower display, and the parameter value will appear in the upper display. You can use the Up ▲ and Down ▼ keys to change the value of read-write parameters, just as you would in any other menu.

If a sensor failure has occurred, [- - - -] is in the upper display and the output power level (read-write) is in the lower display.

Changing the Set Point

You can change the set point by using the Up ▲ and Down ▼ keys, when a profile is not running.

If the set point is displayed and the % indicator is lit, the controller is in open-loop (manual) mode.

Note: Avoid continuous writes within loops. Excessive writes to EEPROM will cause premature EEPROM failure. The EEPROM is rated for 1,000,000 writes.

Custom Menu Number	Home Page Display (defaults)	Parameter Name	Settings	Custom Menu Display (defaults)	Parameter Page and Menu
1 Upper Display	(value only)	Active Process Value		[Ac.Pu]	Operations Page, Analog Input Menu
2 Lower Display	flashes from off to [Attn] due to the defaulted trip condition.				
3 to 20	(skipped)	None		[nonE]	(Add parameters to the Home Page in the Custom Menu, Factory Page.)

Default Home Page
On default the lower displayOn default the lower display flashes from off to Attn due to the defaulted trip condition.

Attention Codes

Display	Parameter Name Description	Setting	Range	Default	Appears If
[Attn]	**Attention** An active message will cause the display to toggle between the normal settings and the active message in the upper display and [Attn] in the lower display. Your response will depend on the message and the controller settings. If the message was generated by a latched alarm or limit condition, the message can be cleared when the condition no longer exists. If an alarm has silencing enabled, it can be silenced. Push the Advance Key to display [,9nr] in the upper display and the message source (such as [L ,h 1]) in the lower display. Use the Up ▲ and Down ▼ keys to scroll through possible responses, such as Clear [CLr] or Silence [S ,L]. Then push the Advance ◉ or Infinity ∞ key to execute the action.		[AL.L 1] [AL.L2] [AL.L3] [AL.L4] Alarm Low 1 to 4 [AL.h 1] [AL.h2] [AL.h3] [AL.h4] Alarm High 1 to 4 [AL.E 1] [AL.E2] [AL.E3] [AL.E4] Alarm Error 1 to 4 [Er. 1] Error Input 1 [L .L 1] [L .L2] Limit Low 1 or 2 [L .h 1] [L .h2] Limit High 1 or 2 [L .E 1] [L .E2] Limit Error 1 or 2 [LP.o 1] Loop Open Error [LP.r 1] Loop Reversed Error		an alarm or error message is active.

Parameters that appear only in the Home Page

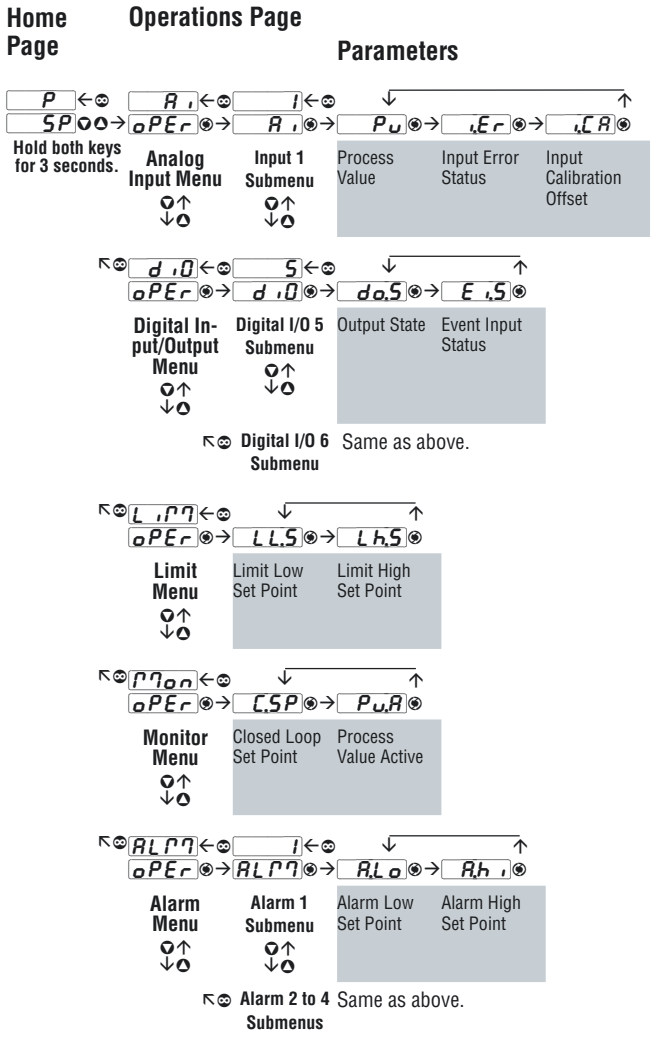
5 Chapter 5: Operations Page

To go to the Operations Page from the Home Page, press both the Up ▲ and Down ▼ keys for three seconds. A1 will appear in the upper display and oPEr will appear in the lower display.

- Press the Up ▲ or Down ▼ key to move through the menus.
- Press the Advance Key ◉ to move to a submenu.
- Press the Up ▲ or Down ▼ key to move through the submenus.
- Press the Advance Key ◉ to move through the parameters of the menu or submenu.
- Press the Infinity Key ∞ to move backwards through the levels: parameter to submenu; submenu to menu; menu to Home Page.
- Press and hold the Infinity Key ∞ for two seconds to return to the Home Page.

Note: Avoid continuous writes within loops. Excessive writes to EEPROM will cause premature EEPROM failure. The EEPROM is rated for 1,000,000 writes.

Navigating the Operations Page



Note:

Some of these menus and parameters may not appear, depending on the controller's options. See model number information in the Appendix for more information.

If there is only one instance of a menu, no submenus will appear.

Display	Parameter name Description	Set-tings	Range	Default	Appears If
A1 oPEr **Analog Input Menu**					
Pu [Pv]	*Analog Input 1* **Process Value** View the process value.		-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C		always
i.Er [i.Er]	*Analog Input 1* **Error Status** View the cause of the most recent error. If the AtAn message is Er.11 or Er.12, this parameter will display the cause of the input error.		nonE None OPEn Open Shrt Shorted E.rM Measurement Error E.CAL Bad Calibration Data Er.Ab Ambient Error E.rtd RTD Lead Resistance Error	None	always
i.CA [i.CA]	*Analog Input 1* **Calibration Offset** Offset the input reading to compensate for lead wire resistance or other factors that cause the input reading to vary from the actual process value.		-1,999.000 to 9,999.000°F or units -1,110.555 to 5,555.000°C	0.0	always
d.io oPEr **Digital Input/ Output Menu**	5 d.io **Digital Input or Output 5**	6 d.io **Digital Input or Output 6**	(menu appears if PM _ _ **[2 or 4]** _ _-_ _ _ _ AAA)		
do.S [do.S]	*Digital Output (5 or 6)* **Output State** View the state of this output.		on On oFF Off		always
E.iS [Ei.S]	*Digital Input (5 or 6)* **Event Input Status** View this event input state.		inAct Inactive Act Active		always
L.PM oPEr **Limit Menu**					
LL.S [LL.S]	*Limit* **Low Set Point** Set the low process value that will trigger the limit.		-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	0.0°F or units -18.0°C	Limit Sides (Setup Page) is not set to High.
Lh.S [Lh.S]	*Limit* **High Set Point** Set the high process value that will trigger the limit.		-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	0.0°F or units -18.0°C	Limit Sides (Setup Page) is not set to Low.
MMon oPEr **Monitor Menu**					
C.SP [C.SP]	*Monitor* **Closed Loop Set Point** View the set point currently in effect.		-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	75°F or units 24°C	always
Pu.A [Pv.A]	*Monitor* **Process Value Active** View the current filtered process value using the control input.		-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C		always
ALM oPEr **Alarm Menu**	1 ALM **Alarm 1**	2 ALM **Alarm 2**	3 ALM **Alarm 3**	4 ALM **Alarm 4**	
A.Lo [A.Lo]	*Alarm (1 to 4)* **Low Set Point** Set the process value that will trigger a low alarm.		-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	32.0°F or units 0.0°C	Alarm Sides (Set-up Page) is not set to High.

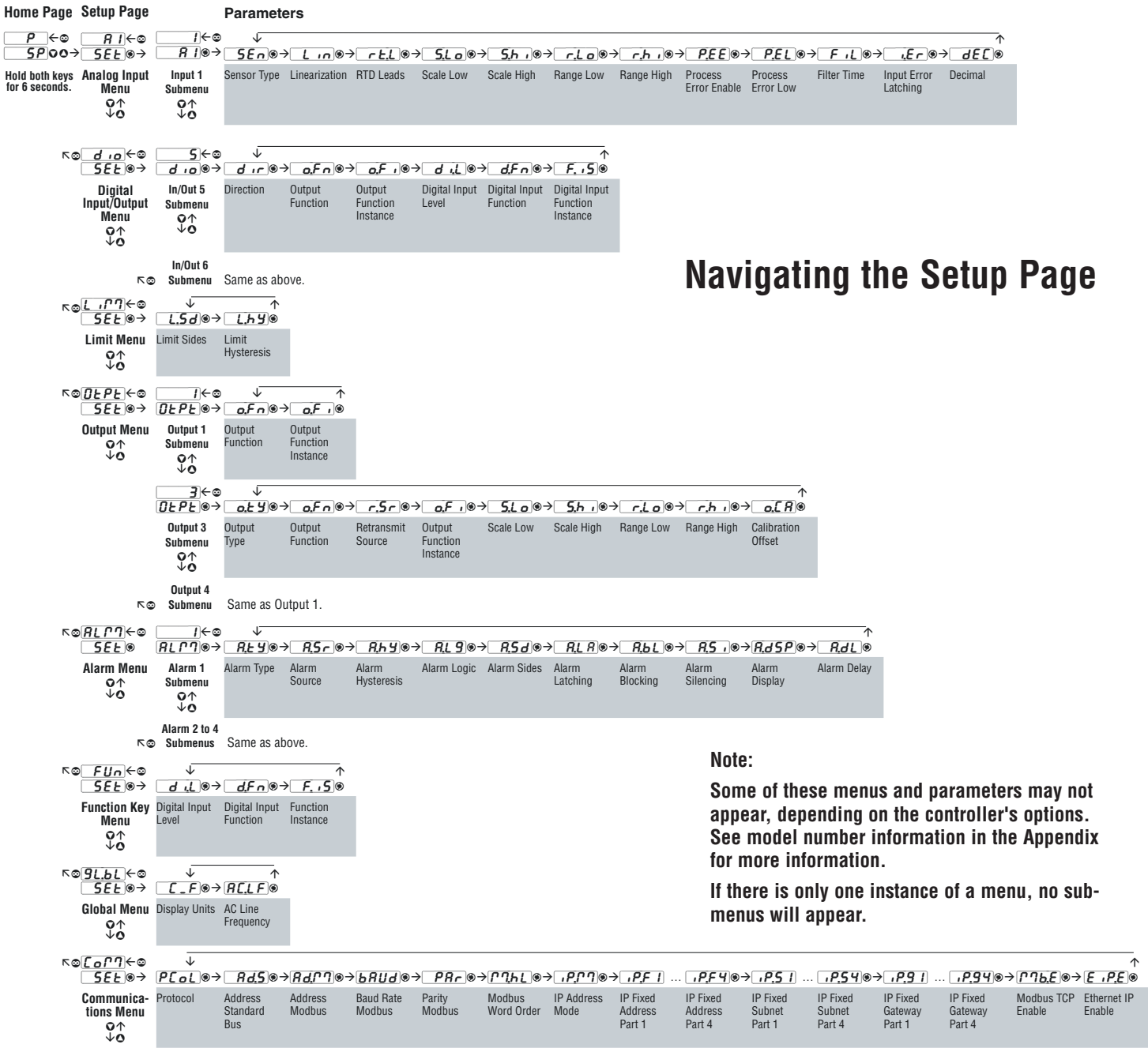
Note: Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces.

If there is only one instance of a menu, no submenus will appear.

Display	Parameter name Description	Set-tings	Range	Default	Appears If
A.hi [A.hi]	*Alarm (1 to 4)* **High Set Point** Set the process value that will trigger a high alarm.		-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	300.0°F or units 150.0°C	Alarm Sides (Set-up Page) is not set to Low.
Note: Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces. **If there is only one instance of a menu, no submenus will appear.**					

6 Chapter 6: Setup Page

Navigating the Setup Page



Note:

Some of these menus and parameters may not appear, depending on the controller's options. See model number information in the Appendix for more information.

If there is only one instance of a menu, no sub-menus will appear.

To go to the Setup Page from the Home Page, press both the Up ▲ and Down ▼ keys for six seconds. A1 will appear in the upper display and SEt will appear in the lower display.

- Press the Up ▲ or Down ▼ key to move through the menus.
- Press the Advance Key ◉ to move to a submenu.
- Press the Up ▲ or Down ▼ key to move through the submenus.
- Press the Advance Key ◉ to move through the parameters of the menu or submenu.
- Press the Infinity Key ∞ to move backwards through the levels: parameter to submenu; submenu to menu; menu to Home Page.
- Press and hold the Infinity Key ∞ for two seconds to return to the Home Page.

Note:
Avoid continuous writes within loops. Excessive writes to EEPROM will cause premature EEPROM failure. The EEPROM is rated for 1,000,000 writes.

Display	Parameter Name Description	Settings	Range	Default	Appears If
A1 SEt **Analog Input Menu**					
SEn [SEn]	*Input 1* **Sensor Type** Set the analog sensor type to match the device wired to this input. **Note: There is no open-sensor detection for process inputs.**		oFF Off tC Thermocouple mV Millivolts volt Volts dc mA Milliamps dc rtd.H RTD 100 Ω r1.0H RTD 1,000 Ω Pot Potentiometer 1 kΩ	Thermocouple	always
Lin [Lin]	*Input 1* **Linearization** Set the linearization to match the thermocouple wired to this input.		b B C C d D E E F F J J H K n N r R S S t T	J	Sensor Type is set to Thermocouple.
rtL [rt.L]	*Input 1* **RTD Leads** Set to match the number of leads on the RTD wired to this input.		2 2 3 3	2	Sensor Type is set to RTD 100 Ω or RTD 1,000 Ω.
S.Lo [S.Lo]	*Input 1* **Scale Low** Set the low scale for process inputs. This value, in millivolts, volts or milliamps, will correspond to the Range Low displayed by the controller.		-100.0 to 1,000.0	0.0	Sensor Type is set to Millivolts, Volts, Milliamps or Potentiometer 1 kΩ.
S.hi [S.hi]	*Input 1* **Scale High** Set the high scale for process inputs. This value, in millivolts, volts or milliamps, will correspond to the Range High displayed by the controller.		-100.0 to 1,000.0	20.0	Sensor Type is set to Millivolts, Volts, Milliamps or Potentiometer 1 kΩ.
r.Lo [r.Lo]	*Input 1* **Range Low** Set the low range for the displayed process input units.		-1,999.000 to 9,999.000	0.0	Sensor Type is set to Millivolts, Volts, Milliamps or Potentiometer 1 kΩ.
r.hi [r.hi]	*Input 1* **Range High** Set the high range for the displayed process input units.		-1,999.000 to 9,999.000	9,999	Sensor Type is set to Millivolts, Volts, Milliamps or Potentiometer 1 kΩ.
P.EE [P.EE]	*Input 1* **Process Error Enable** Turn the Process Error Low feature on or off.		oFF Off Lobd Low	Off	Sensor Type is set to Millivolts, Volts, Milliamps or Potentiometer 1 kΩ.
Note: Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces. **If there is only one instance of a menu, no submenus will appear.**					

Display	Parameter Name Description	Settings	Range	Default	Appears If
P.EL [P.EL]	*Input 1* **Process Error Low** If the process value drops below this value, it will trigger an input error.		-100.0 to 1,000.0	0.0	Sensor Type is set to Millivolts, Volts, Milliamps or Potentiometer 1 kΩ, and Error Enable is set to Low.
F iL [FiL]	*Input 1* **Filter Time** Filtering smooths out the process signal to both the display and the input. Increase the time to increase filtering.		0.0 to 60.0 seconds	0.5	always
i.Er [i.Er]	*Input 1* **Error Latching** Turn input error latching on or off. If latching is on errors must be manually cleared.		oFF Off on On	Off	always
dEC [dEC]	*Input 1* **Decimal** Set the precision of the displayed value.		0 Whole 0.0 Tenths 0.00 Hundredths 0.000 Thousandths	Whole	always
d io SEt **Digital Input/ Output Menu**		5 d io **Digital Input or Output 5**	6 d io **Digital Input or Output 6**	(menu appears if PM _ _ **[2 or 4]** _ _-_ _ _ _ AAA)	
dir [dir]	*Digital Input / Output (5 or 6)* **Direction** Set the function to an input or output.		OtPt Output in Input Voltage iCon Input Dry Contact	Output	always
o.Fn [o.Fn]	*Digital Output (5 or 6)* **Function** Select what function will drive this output.		oFF Off ALM Alarm	Off	Direction is set to Output.
o.Fi [o.Fi]	*Digital Output (5 or 6)* **Function Instance** Select which source instance will drive the output.		1 to 4	1 (output 5) 2 (output 6)	Direction is set to Output, and there is more than one instance of the Function selection.
di.L [di.L]	*Digital Input (5 or 6)* **Level** Select what action will be interpreted as a true state.		high High LoLo Low	High	Direction is set to Input Voltage or Input Dry Contact.
d.Fn [d.Fn]	*Digital Input (5 or 6)* **Function** Select the function that will be triggered by a true state. Functions respond to a level state change or an edge level change.		nonE None ALM Alarm Reset (edge) Si.L Silence Alarms (edge) P.LoC Lock Keypad (level) F.AL Force Alarm (level) AoF Alarm Outputs Off (level) USr.r Restore User Settings (edge) LM r Limit Reset (edge)	None	Direction is set to Input Voltage or Input Dry Contact.

Note: Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces.

If there is only one instance of a menu, no submenus will appear.

Display	Parameter Name Description	Settings	Range	Default	Appears If
F.iS [F.iS]	*Digital Input (5 or 6)* **Function Instance** Select which instance of the Event Function will be triggered by a true state.		0 All Instances (except profiles) (For example, if Digital Function is set to Silence Alarms and Function Instance is set to 0, then this digital input will silence both alarms.) 1 to 4	1	Direction is set to Input Voltage or Input Dry Contact, and there is more than one instance of the Function selection.
LIM SEt **Limit Menu**					
L.Sd [L.Sd]	*Limit* **Sides** Select which side or sides of the process value will be monitored.		both Both high High Lolo Low	Both	always
L.hy [L.hy]	*Limit* **Hysteresis** Set the hysteresis for the limit function. This determines how far into the safe range the process value must move before the limit turns the output back on.		0.001 to 9,999.0°F or units 0.001 to 5,555.0°C	3.0°F or units -16.111°C	always
oPt SEt **Output Menu**	1 oPt **Output 1**	3 oPt **Output 3**	4 oPt **Output 4**	(Output 2 is a dedicated limit output. Check model number for other output information.)	
o.ty [o.ty]	*Output 3* **Type** Select whether the process output will operate in volts or milliamps.		volt Volts mA Milliamps	Volts	a process output (PM6 _ _ _-_ _ **F** _ AAA)
o.Fn [o.Fn]	*Output 1, 3 or 4* **Function** Select what function will drive this output.		oFF Off ALM Alarm L.M Limit (output 1) rMt Retransmit (output 3)	Heat (output 1) Off (output 2)	always
r.Sr [r.Sr]	*Output 3* **Retransmit Source** Select the value that will be retransmitted.		A.I Analog Input SPt Set Point	Analog Input	a process output (PM6 _ _ _-_ _ **F** _ AAA) and Function is set to Retransmit.
o.Fi [o.Fi]	*Output 1, 3 or 4* **Function Instance** Select which source instance will drive the output.		1 to 4	1	there is more than one instance of the Function selection.
S.Lo [S.Lo]	*Output 3* **Scale Low** Set the minimum value of the process output range in electrical units.		0.00 to 20.00	0.00	a process output (PM6 _ _ _-_ _ **F** _ AAA)
S.hi [S.hi]	*Output 3* **Scale High** Set the maximum value of the process output range in electrical units.		0.00 to 20.00	10.00	a process output (PM6 _ _ _-_ _ **F** _ AAA)
r.Lo [r.Lo]	*Output 3* **Range Low** Set the minimum value of the retransmit value range in process units. When the retransmit source is at this value, the retransmit output will be at its Scale Low value.		-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	0.0°F or units -18.0°C	a process output (PM6 _ _ _-_ _ **F** _ AAA) and Function is set to Retransmit.

Note: Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces.

If there is only one instance of a menu, no submenus will appear.

Display	Parameter Name Description	Settings	Range	Default	Appears If
r.hi [r.hi]	*Output 3* **Range High** Set the maximum value of the retransmit value range in process units. When the retransmit source is at this value, the retransmit output will be at its Scale Low value.		-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	9,999.000°F or units 5,537.000°C	a process output (PM6 _ _ _-_ _ **F** _ AAA) and Function is set to Heat or Cool.
o.CA [o.CA]	*Output 3* **Calibration Offset** Set an offset value for a process output.		-1,999.000 to 9,999.000°F or units -1,110.555 to 5,555.000°C	0.0	a process output (PM6 _ _ _-_ _ **F** _ AAA)
ALM1 SEt **Alarm Menu**		ALM1 1 **Alarm 1**	ALM2 2 **Alarm 2**	ALM3 3 **Alarm 3**	ALM4 4 **Alarm 4**
A.ty [A.ty]	*Alarm (1 to 4)* **Type** Select how the alarm will or will not track the set point.		oFF Off Pr.AL Process Alarm	Off	always
A.Sr [A.Sr]	*Alarm (1 to 4)* **Source** Select what will trigger this alarm.		A 1 Analog Input	Analog Input	always
A.hy [A.hy]	*Alarm (1 to 4)* **Hysteresis** Set the hysteresis for an alarm. This determines how far into the safe region the process value needs to move before the alarm can be cleared.		0.001 to 9,999.000°F or units 0.001 to 5,555.000°C	1.0°F or units 1.0°C	always
A.Lg [A.Lg]	*Alarm (1 to 4)* **Logic** Select what the output condition will be during the alarm state.		AL.C Close On Alarm AL.o Open On Alarm	Close On Alarm	always
A.Sd [A.Sd]	*Alarm (1 to 4)* **Sides** Select which side or sides will trigger this alarm.		both Both h 1gh High LoLo Low	Both	always
A.LA [A.LA]	*Alarm (1 to 4)* **Latching** Turn alarm latching on or off. A latched alarm has to be turned off by the user.		nLAt Non-Latching LAt Latching	Non-Latching	always
A.bL [A.bL]	*Alarm (1 to 4)* **Blocking** Select when an alarm will be blocked. After startup and/or after the set point changes, the alarm will be blocked until the process value enters the normal range.		oFF Off Str Startup StPt Set Point both Both	Off	always
A.Si [A.Si]	*Alarm (1 to 4)* **Silencing** Turn alarm silencing on to allow the user to disable this alarm.		oFF Off on On	Off	always
A.dSP [A.dSP]	*Alarm (1 to 4)* **Display** Display an alarm message when an alarm is active.		oFF Off on On	On	always
A.dL [A.dL]	*Alarm (1 to 4)* **Delay** Set the time the alarm will be delayed after the process value exceeds the alarm set point.		0 to 9,999 seconds	0	always
FUn SEt **Function Key Menu (1/32 DIN models do not have a Function Key.)**					

Note: Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces.

If there is only one instance of a menu, no submenus will appear.

Display	Parameter Name Description	Settings	Range	Default	Appears If
d.iL [di.L]	*Function Key* **Level** Select what state the Function Key will be in at startup. Pressing the Function Key will toggle the selected action.		High Low	High	always
d.Fn [d.Fn]	*Function Key* **Digital Input Function** Program the EZ Key to trigger an action. Functions respond to a level state change or an edge level change.		None Alarm Reset (edge) Silence Alarms (edge) Lock Keypad (level) Force Alarm (level) Alarm Outputs Off (level) Restore User Settings (edge) Limit Reset (edge)	None	always
F.iS [F.iS]	*Function Key* **Instance** Select which instance the EZ Key will affect. If only one instance is available, any selection will affect it.		0 All Instances (except Profile) (For example, if Digital Function is set to Silence Alarms and Function Instance is set to 0, then the digital input would silence both alarms.) 1 to 4	0	there is more than one instance of the Digital Input Function selection.
GLbL SEt **Global Menu**					
C_F [C_F]	*Global* **Display Units** Select which units will be displayed.		°F °C	°F	always
AC.LF [AC.LF]	*Global* **AC Line Frequency** Set the frequency to the applied ac line power source.		50 Hz 60 Hz	60 Hz	always
CoMM SEt **Communications Menu**					
PCoL [PCoL]	*Communications* **Protocol** Set the protocol of this controller to the protocol that this network is using.		Standard Bus Modbus RTU	Modbus	the controller includes Modbus RTU (PM6 _ _ _ _-**1** A _ _ AAA).
Ad.S [Ad.S]	*Communications* **Address Standard Bus** Set the network address of this controller. Each device on the network must have a unique address. The Zone Display on the front panel will display this number.		1 to 16	1	Protocol is set to Standard bus Range depends on the model.
Ad.M [Ad.M]	*Communications* **Address Modbus** Set the network address of this controller. Each device on the network must have a unique address.		1 to 247	1	Protocol is set to Modbus Range depends on the model.
bAUd [bAUd]	*Communications* **Baud Rate Modbus** Set the speed of this controller's communications to match the speed of the network.		9,600 19,200 38,400	38,400	Protocol is set to Modbus Range depends on the model.

Note: Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces.

If there is only one instance of a menu, no submenus will appear.

Display	Parameter Name Description	Settings	Range	Default	Appears If
PAr [PAr]	*Communications* **Parity Modbus** Set the parity of this controller to match the parity of the serial network.		nonE None EuEn Even odd Odd	None	Protocol is set to Modbus Range depends on the model.
M.hL [M.hL]	*Communications* **Modbus Word Order** Select the word order of the two 16-bit words in the floating-point values.		Loh ı Low-High h ıLo High-Low	Low-High	Protocol is set to Modbus.
ıP.M [iP.M]	*Communications* **IP Address Mode** Select DHCP to let a DHCP server assign an address to this controller.		dhCP DHCP FAdd Fixed Address		the controller includes EtherNet/IP (PM6 _ _ _ _-**3AA** _ AAA).
ıP.F1 [ip.F1]	*Communications* **IP Fixed Address Part 1** Set the IP address of this controller. Each device on the network must have a unique address.		0 to 255	169	IP Address Mode is set to Fixed
ıP.F2 [ip.F2]	*Communications* **IP Fixed Address Part 2** Set the IP address of this controller. Each device on the network must have a unique address.		0 to 255	254	IP Address Mode is set to Fixed
ıP.F3 [ip.F3]	*Communications* **IP Fixed Address Part 3** Set the IP address of this controller. Each device on the network must have a unique address.		0 to 255	1	IP Address Mode is set to Fixed
ıP.F4 [ip.F4]	*Communications* **IP Fixed Address Part 4** Set the IP address of this controller. Each device on the network must have a unique address.		0 to 255	1	IP Address Mode is set to Fixed
ıP.S1 [ip.S1]	*Communications* **IP Fixed Subnet Part 1** Set the IP subnet mask for this controller.		0 to 255	255	IP Address Mode is set to Fixed
ıP.S2 [ip.S2]	*Communications* **IP Fixed Subnet Part 2** Set the IP subnet mask for this controller.		0 to 255	255	IP Address Mode is set to Fixed
ıP.S3 [ip.S1]	*Communications* **IP Fixed Subnet Part 3** Set the IP subnet mask for this controller.		0 to 255	0	IP Address Mode is set to Fixed
ıP.S4 [ip.S4]	*Communications* **IP Fixed Subnet Part 4** Set the IP subnet mask for this controller.		0 to 255	0	IP Address Mode is set to Fixed
ıP.g1 [ip.g1]	*Communications* **IP Fixed Gateway Part 1** Set the IP gateway address for this controller.		0 to 255	0	IP Address Mode is set to Fixed
ıP.g2 [ip.g2]	*Communications* **IP Fixed Gateway Part 2** Set the IP gateway address for this controller.		0 to 255	0	IP Address Mode is set to Fixed
ıP.g3 [ip.g3]	*Communications* **IP Fixed Gateway Part 3** Set the IP gateway address for this controller.		0 to 255	0	IP Address Mode is set to Fixed
ıP.g4 [ip.g4]	*Communications* **IP Fixed Gateway Part 4** Set the IP gateway address for this controller.		0 to 255	0	IP Address Mode is set to Fixed

Note: Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces.

If there is only one instance of a menu, no submenus will appear.

Display	Parameter Name Description	Settings	Range	Default	Appears If
PMb.E [Mb.E]	*Communications* **Modbus TCP Enable** Activate Modbus TCP.		no No YES Yes	Yes	the controller includes Modbus TCP (PM6 _ _ _ _-**3AA** _ AAA).
E IP.E [EiP.E]	*Communications* **EtherNet/IP™ Enable** Activate EtherNet/IP™.		no No YES Yes	Yes	the controller includes EtherNet/IP (PM6 _ _ _ _-**3AA** _ AAA).

Note: Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces.

If there is only one instance of a menu, no submenus will appear.

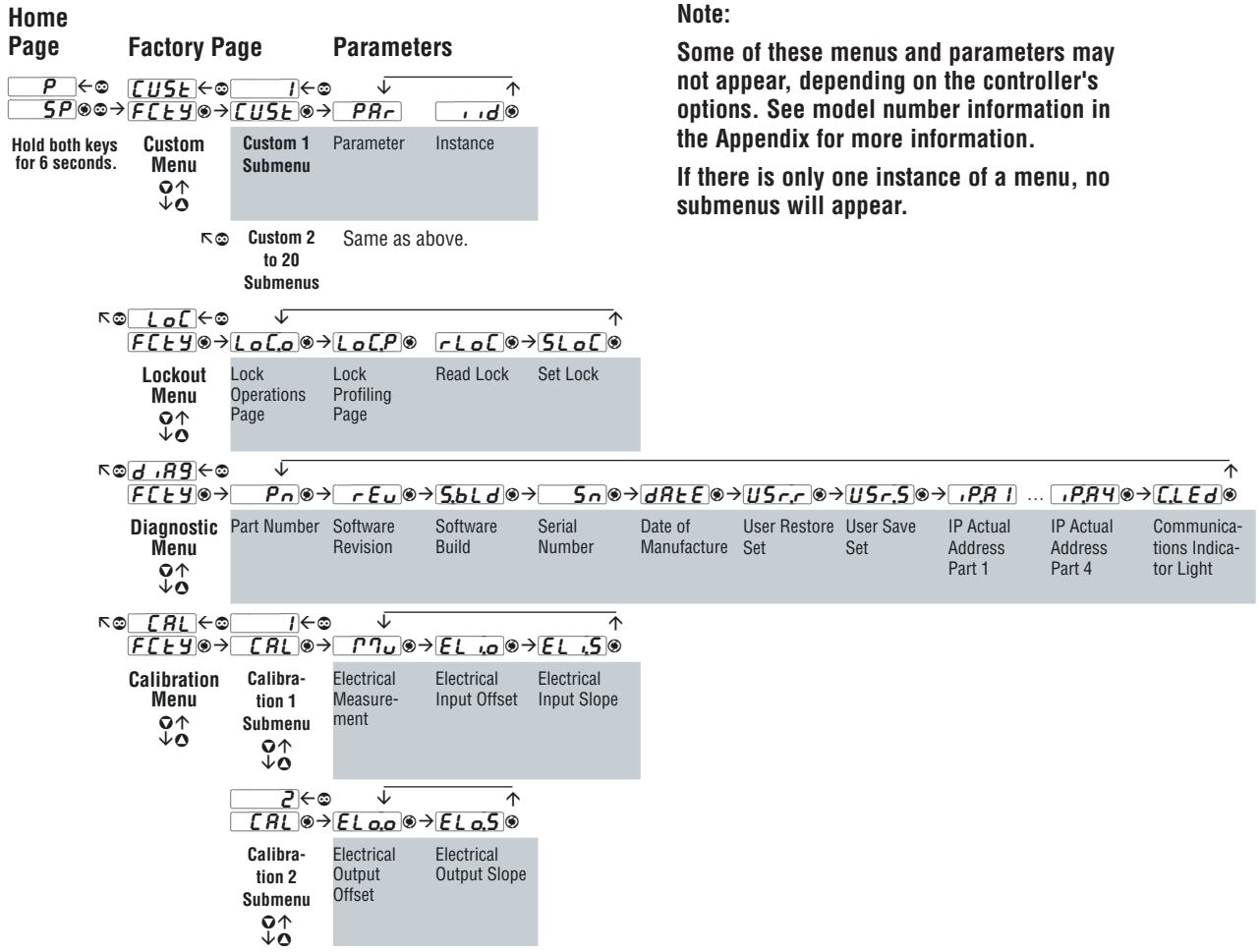
7 Chapter 7: Factory Page

To go to the Factory Page from the Home Page, press and hold both the Advance ◉ and Infinity ∞ keys for six seconds.

- Press the Advance Key ◉ to move through the parameter prompts.
- Press the Up ▲ or Down ▼ keys to change the parameter value.
- Press the Infinity Key ∞ to return to the Home Page.

Note: Avoid continuous writes within loops. Excessive writes to EEPROM will cause premature EEPROM failure. The EEPROM is rated for 1,000,000 writes.

Navigating the Factory Page



Note:

Some of these menus and parameters may not appear, depending on the controller's options. See model number information in the Appendix for more information.

If there is only one instance of a menu, no submenus will appear.

Display	Parameter Name Description	Settings	Range	Default	Appears If
CUSt FCty **Custom Menu**		1 CUSt **Custom 1**	20 CUSt **Custom 20**		
PAr [PAr]	*Custom Menu* **Parameter 1 to 20** Select the parameters that will appear in the Home Page. The Parameter 1 value will appear in the upper display of the Home Page. It cannot be changed with the Up and Down Keys in the Home Page. The Parameter 2 value will appear in the lower display in the Home Page. It can be changed with the Up and Down Keys, if the parameter is a writable one Scroll through the other Home Page parameters with the Advance Key ⏻.		nonE None Pro Process StPt Set Point ACPu Active Process Value iCA Input Calibration Offset C_F Display Units USrr User Restore Set A1Lo Alarm Low Set Point A1hi Alarm High Set Point A1hy Alarm Hysteresis CUSt Custom Menu LLS Limit Low Set Point LhS Limit High Set Point Lhy Limit Hysteresis	Active Process Value (1, Top Display) Active Set Point (2, Bottom Display) None (3 to 20)	always
iid [iid]	*Custom Menu* **Instance** Select which instance of the parameter will be selected.		1 to 4		the parameter may apply to more than one instance.
LoC FCty **Lockout Menu**					
LoC.o [LoC.o]	*Lockout Menu* **Lock Operations Page** Change the security level of the Operations Page.		1 to 3	2	always
rLoC [rLoC]	*Lockout Menu* **Read Lockout Security** Set the read security clearance level. The user can access the selected level and all lower levels. If the Set Lockout Security level is higher than the Read Lockout Security, the Read Lockout Security level takes priority.		1 to 5 1 Home Page 2 Operations Page* 4 Setup Page and Diagnostics Menu 5 Lock, Calibration and Custom menus *You can change the security level of the Operations Page with Lock Operations Page.	5	always
SLoC [SLoC]	*Lockout Menu* **Set Lockout Security** Set the write security clearance level. The user can access the selected level and all lower levels. If the Set Lockout Security level is higher than the Read Lockout Security, the Read Lockout Security level takes priority.		0 to 5 0 No changes allowed, except to SLoC 1 Home Page 2 Operations Page* 4 Setup Page and Diagnostics Menu 5 Lock, Calibration and Custom menus *You can change the security level of the Operations Page with Lock Operations Page.	5	always
diAG FCty **Diagnostics Menu**					
Pn [Pn]	*Diagnostics Menu* **Part Number** Display this controller's part number.		0 to 2,147,483,647		always

Note: Some values will be rounded off to fit in the four-character display. Full values can be read with another interface.

If there is only one instance of a menu, no submenus will appear.

Display	Parameter Name Description	Settings	Range	Default	Appears If
rEv [rEv]	*Diagnostics Menu* **Software Revision** Display this controller's firmware revision number.				always
S.bLd [S.bLd]	*Diagnostics Menu* **Software Build** Display the firmware build number.		0 to 2,147,483,647		always
Sn [Sn]	*Diagnostics Menu* **Serial Number** Display the serial number.		0 to 2,147,483,647		always
dAtE [dAtE]	*Diagnostics Menu* **Date of Manufacture** Display the date code.		0 to 2,147,483,647		always
USr.r [USr.r]	*Diagnostics Menu* **User Restore Set** Replace all of the controller's settings with another set.		nonE None SEt 1 User Set 1 SEt2 User Set 2 FCtY Factory Default	None	always
USr.S [USr.S]	*Diagnostics Menu* **User Save Set** Save all of the controller's settings to the selected set.		nonE None SEt 1 User Set 1 SEt2 User Set 2	None	always
iP.A1 [iP.A1]	*Diagnostics Menu* **IP Actual Address Part 1** Display the first part of this controller's IP address.		0 to 255	None	always
iP.A2 [iP.A2]	*Diagnostics Menu* **IP Actual Address Part 2** Display the second part of this controller's IP address.		0 to 255	None	always
iP.A3 [iP.A3]	*Diagnostics Menu* **IP Actual Address Part 3** Display the third part of this controller's IP address.		0 to 255	None	always
iP.A4 [iP.A4]	*Diagnostics Menu* **IP Actual Address Part 4** Display the fourth part of this controller's IP address.		0 to 255	None	always
C.LEd [C.LEd]	*Diagnostics Menu* **Communications Indicator Light** Select which channel the Communications Activity indicator light will monitor.		oFF Off Con 1 Channel 1 Con2 Channel 2 both Both		
CAL FCtY **Calibration Menu**	1 CAL **Calibration 1**	2 CAL **Calibration 2**			
Mv [Mv]	*Calibration Menu 1* **Electrical Measurement** Read the raw electrical value for this input in the units corresponding to the Sensor Type (Setup Page, Analog Input Menu) setting.		-1,999.000 to 9,999.000		always
ELio [ELi.o]	*Calibration Menu 1* **Electrical Input Offset** Change this value to calibrate the low end of the input range.		-2,147,483,647 [-3.4E+38] to 2,147,483,647 [3.4E+38]	0.0	always

Note: Some values will be rounded off to fit in the four-character display. Full values can be read with another interface.

If there is only one instance of a menu, no submenus will appear.

Display	Parameter Name Description	Settings	Range	Default	Appears If
EL .S [ELi.S]	*Calibration Menu 1* **Electrical Input Slope** Adjust this value to calibrate the slope of the input value.		-2,147,483,647 [-3.4E+38] to 2,147,483,647 [3.4E+38]	1.0	always
ELo.o [ELo.o]	*Calibration Menu 3* **Electrical Output Offset** Change this value to calibrate the low end of the output 3 range.		-2,147,483,647 [-3.4E+38] to 2,147,483,647 [3.4E+38]	0.0	the controller has a process output (PM6_ _ _ _ - _ AF _ AAA)
ELo.S [ELo.S]	*Calibration Menu 3* **Electrical Output Slope** Adjust this value to calibrate the slope of the output 3 value.		-2,147,483,647 [-3.4E+38] to 2,147,483,647 [3.4E+38]	1.0	the controller has a process output (PM6_ _ _ _ - _ AF _ AAA)

Note: Some values will be rounded off to fit in the four-character display. Full values can be read with another interface.

If there is only one instance of a menu, no submenus will appear.

8 Chapter 8: Features

Saving and Restoring User Settings

Recording setup and operations parameter settings for future reference is very important. If you unintentionally change these, you will need to program the correct settings back into the controller to return the equipment to operational condition.

After you program the controller and verify proper operation, use User Save Set [USr.S] (Factory Page, Diagnostics Menu) to save the settings into either of two files in a special section of memory. If the settings in the controller are altered and you want to return the controller to the saved values, use User Restore Set [USr.r] (Factory Page, Diagnostics Menu) to recall one of the saved settings.

A digital input or the Function Key can also be configured to restore user settings.

Note: Only perform the above procedure when you are sure that all the correct settings are programmed into the controller. Saving the settings overwrites any previously saved collection of settings. Be sure to document all the controller settings.

Programming the Home Page

Watlow's patented user-defined menu system improves operational efficiency. The user-defined Home Page provides you with a shortcut to monitor or change the parameter values that you use most often.

You can create your own Home Page with as many as 20 of the active parameters. When a parameter normally located in the Setup Page or Operations Page is placed in the Home Page, it is accessible through both. If you change a parameter in the Home Page, it is automatically changed in its original page. If you change a parameter in its original page it is automatically changed in the Home Page.

The default parameters will automatically appear in the Home Page.

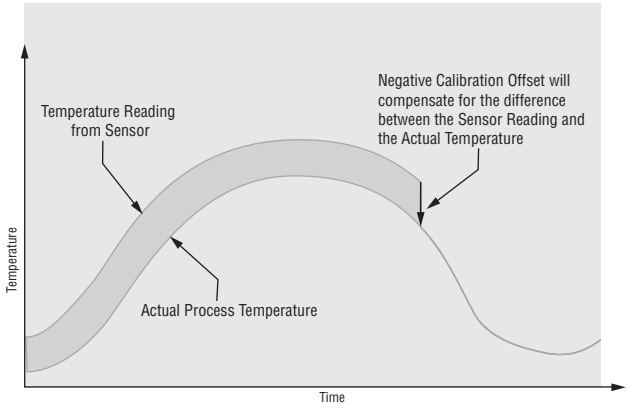
Change the list of parameters in the Home Page from the Custom Menu [CUSt] (Factory Page).

Inputs

Calibration Offset

Calibration offset allows a device to compensate for an inaccurate sensor, lead resistance or other factors that affect the input value. A positive offset increases the input value, and a negative offset decreases the input value.

The input offset value can be viewed or changed with Calibration Offset [InCA] (Operations Page, Analog Input Menu).



Calibration

To calibrate an analog input, you will need to provide two electrical signals or resistance loads near the extremes of the range that the application is likely to utilize. See recommended values below:

Sensor Type	Low Source	High Source
thermocouple	0.000 mV	50.000 mV
millivolts	0.000 mV	50.000 mV
volts	0.000V	10.000V
milliamps	0.000 mA	20.000 mA
100 Ω RTD	50.00 Ω	350.00 Ω
1,000 Ω RTD	500.00 Ω	3,500.00 Ω

Follow these steps for a thermocouple or process input:

1. Apply the low source signal to the input you are calibrating. Measure the signal to ensure it is accurate.
2. Read the value of Electrical Measurement [InU] (Factory Page, Calibration Menu) for that input.
3. Calculate the offset value by subtracting this value from the low source signal.
4. Set Electrical Offset [InO] (Factory Page, Calibration Menu) for this input to the offset value.
5. Check the Electrical Measurement to see whether it now matches the signal. If it doesn't match, adjust Electrical Offset again.
6. Apply the high source signal to the input. Measure the signal to ensure it is accurate.
7. Read the value of Electrical Measurement for that input.
8. Calculate the gain value by dividing the low source signal by this value.
9. Set Electrical Slope [InS] (Factory Page, Calibration Menu) for this input to the calculated gain value.
10. Check the Electrical Measurement to see whether it now matches the signal. If it doesn't match, adjust Electrical Slope again.

Set Electrical Offset to 0 and Electrical Slope to 1 to restore factory calibration.

Follow these steps for an RTD input:

1. Measure the low source resistance to ensure it is accurate. Connect the low source resistance to the input you are calibrating.
2. Read the value of Electrical Measurement [rnu] (Factory Page, Calibration Menu) for that input.
3. Calculate the offset value by subtracting this value from the low source resistance.
4. Set Electrical Offset [E.o] (Factory Page, Calibration Menu) for this input to the offset value.
5. Check the Electrical Measurement to see whether it now matches the resistance. If it doesn't match, adjust Electrical Offset again.
6. Measure the high source resistance to ensure it is accurate. Connect the high source resistance to the input.
7. Read the value of Electrical Measurement for that input.
8. Calculate the gain value by dividing the low source signal by this value.
9. Set Electrical Slope [EL.S] (Factory Page, Calibration Menu) for this input to the calculated gain value.
10. Check the Electrical Measurement to see whether it now matches the signal. If it doesn't match, adjust Electrical Slope again.

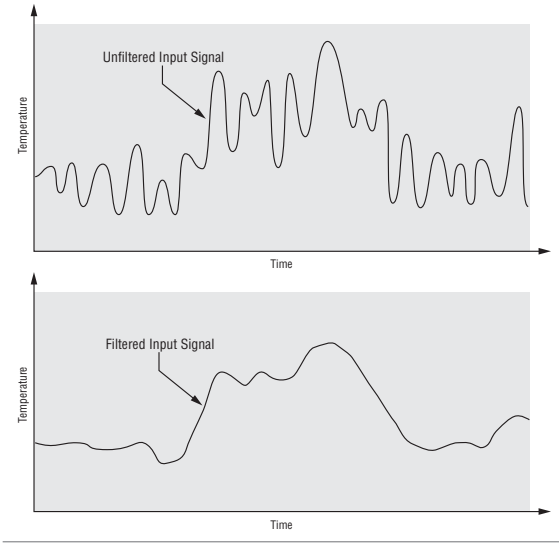
Set Electrical Offset to 0 and Electrical Slope to 1 to restore factory calibration.

Filter Time Constant

Filtering smoothes an input signal by applying a first-order filter time constant to the signal. Filtering the displayed value makes it easier to monitor. Filtering the signal may improve the performance of PID control in a noisy or very dynamic system.

Adjust the filter time interval with Filter Time [F.iL] (Setup Page, Analog Input Menu).

Example: With a filter value of 0.5 seconds, if the process input value instantly changes from 0 to 100 and remained at 100, the display will indicate 100 after five time constants of the filter value or 2.5 seconds.



Sensor Selection

You need to configure the controller to match the input device, which is normally a thermocouple, RTD or process transmitter. When you select an input device, the controller automatically sets the input linearization to match the sensor. It also sets high and low limits, which in turn limit the set point range-high and range-low values.

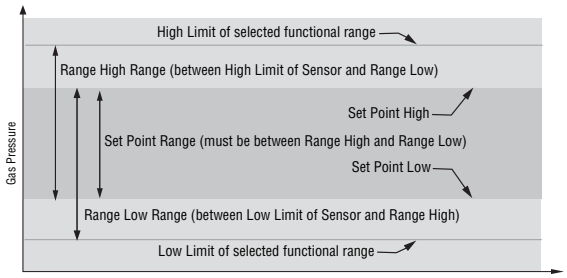
Select the sensor type with Sensor Type [SEn] (Setup Page, Analog Input Menu).

Note:
The E-Z ZONE™ PM does not have an open-sensor detection feature for process inputs.

Set Point Low Limit and High Limit

The controller constrains the set point to a value between a set point low limit and a set point high limit.

Set the set point range with Low Set Point [LSP] and High Set Point [hSP] (Setup Page, Loop Menu).



Scale High and Scale Low

When an analog input is selected as process voltage or process current input, you must choose the value of voltage or current to be the low and high ends. For example, when using a 4 to 20 mA input, the scale low value would be 4.00 mA and the scale high value would be 20.00 mA. Commonly used scale ranges are: 0 to 20 mA, 4 to 20 mA, 0 to 5V, 1 to 5V and 0 to 10V.

You can create a scale range representing other units for special applications. You can reverse scales from high values to low values for analog input signals that have a reversed action. For example, if 50 psi causes a 4 mA signal and 10 psi causes a 20 mA signal.

Scale low and high low values do not have to match the bounds of the measurement range. These along with range low and high provide for process scaling and can include values not measureable by the controller. Regardless of scaling values, the measured value will be constrained by the electrical measurements of the hardware.

Select the low and high values with Scale Low [SLo] and Scale High [Sh.i]. Select the displayed range with Range Low [rLo] and Range High [rh.i] (Setup Page, Analog Input Menu).

Range High and Range Low

With a process input, you must choose a value to represent the low and high ends of the current or voltage range. Choosing these values allows the controller's display to be scaled into the actual working units of measurement. For example, the analog input from a humidity transmitter could represent 0 to 100 percent relative humidity as a process signal of 4 to 20 mA. Low scale would be set to 0 to represent 4 mA and high scale set to 100 to represent 20 mA. The indication on the display would then represent percent humidity and range from 0 to 100 percent with an input of 4 to 20 mA.

Select the low and high values with Range Low [r.Lo] and Range High [r.hi] (Setup Page, Analog Input Menu).

Outputs

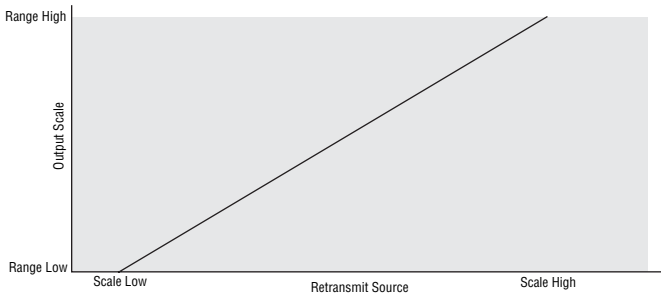
Retransmitting a Process Value or Set Point

The retransmit feature allows a process output to provide an analog signal that represents the set point or process value. The signal may serve as a remote set point for another controller or as an input for a chart recorder documenting system performance over time.

In choosing the type of retransmit signal the operator must take into account the input impedance of the device to be retransmitted to and the required signal type, either voltage or milliamps.

Typically applications might use the retransmit option to record one of the variables with a chart recorder or to generate a set point for other controls in a multi-zone application.

Outputs 1 and 3 can be ordered as process outputs and used to retransmit. Select retransmit [rMt] as the Output Function [o.Fn] (Setup Page, Output Menu). Set the output to volts [volt] or milliamps [mA] with Output Type [o.ty]. Select the signal to retransmit with Retransmit Source [r.Sr].



Set the range of the process output with Scale Low [S.Lo] and Scale High [S.hi]. Scale the retransmit source to the process output with Range Low [r.Lo] and Range High [r.hi].

When the retransmit source is at the Range Low value, the retransmit output will be at its Scale Low value. When the retransmit source is at the Range High value, the retransmit output will be at its Scale High value.

Alarms

Alarms are activated when the output level, process value or temperature leaves a defined range. A user can configure how and when an alarm is triggered, what action it takes and whether it turns off automatically when the alarm condition is over.

Configure alarm outputs in the Setup Page before setting alarm set points.

Alarms do not have to be assigned to an output. Alarms can be monitored and controlled through the front panel or by using software.

Process and Deviation Alarms

A process alarm uses one or two absolute set points to define an alarm condition.

A deviation alarm uses one or two set points that are defined relative to the control set point. High and low alarm set points are calculated by adding or subtracting offset values from the control set point. If the set point changes, the window defined by the alarm set points automatically moves with it.

Select the alarm type with Type [A.tY] (Setup Page, Alarm Menu).

Alarm Set Points

The alarm high set point defines the process value or temperature that will trigger a high side alarm. It must be higher than the alarm low set point and lower than the high limit of the sensor range.

The alarm low set point defines the temperature that will trigger a low side alarm. It must be lower than the alarm high set point and higher than the low limit of the sensor range.

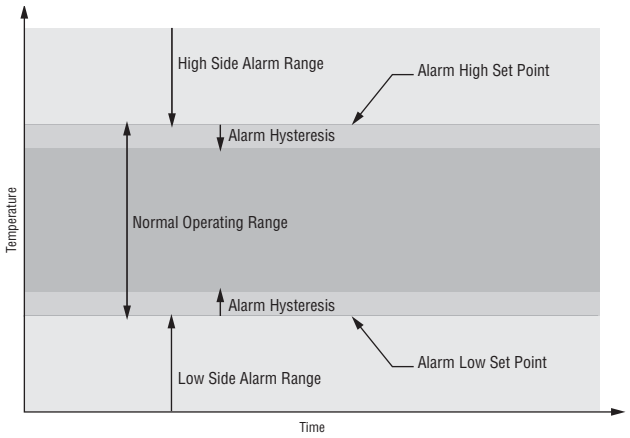
View or change alarm set points with Low Set Point [A.Lo] and High Set Point [A.hi] (Operations Page, Alarm Menu).

Alarm Hysteresis

An alarm state is triggered when the process value reaches the alarm high or alarm low set point. Alarm hysteresis defines how far the process must return into the normal operating range before the alarm can be cleared.

Alarm hysteresis is a zone inside each alarm set point. This zone is defined by adding the hysteresis value to the alarm low set point or subtracting the hysteresis value from the alarm high set point.

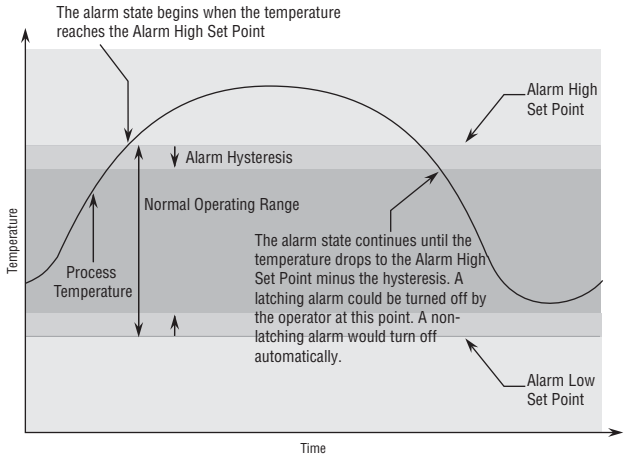
View or change alarm hysteresis with Hysteresis [A.hY] (Setup Page, Alarm Menu).



Alarm Latching

A latched alarm will remain active after the alarm condition has passed. To clear a latched alarm, press the Infinity Key ∞. It can only be deactivated by the user. An alarm that is not latched (self-clearing) will deactivate automatically when the alarm condition has passed.

Turn alarm latching on or off with Latching [A.LA] (Setup Page, Alarm Menu).



Alarm Silencing

Alarm silencing allows the operator to disable the alarm output while the controller is in an alarm state. The process value or temperature has to enter the normal operating range beyond the hysteresis zone to activate the alarm output function again.

Turn alarm silencing on or off with Silencing [A.SI] (Setup Page, Alarm Menu).

Alarm Blocking

Alarm blocking allows a system to warm up after it has been started up. With alarm blocking on, an alarm is not triggered when the process temperature is initially lower than the alarm low set point. The process temperature has to enter the normal operating range beyond the hysteresis zone to activate the alarm function.

If the EZ-ZONE™ PM has an output that is functioning as a deviation alarm, the alarm is blocked when the set point is changed, until the process value re-enters the normal operating range.

Turn alarm blocking on or off with Blocking [A.bL] (Setup Page, Alarm Menu).

Using Lockout to Secure Settings

If unintentional changes to parameter settings might raise safety concerns or lead to downtime, your can use the lockout feature to make them more secure.

Each of the menus in the Factory Page and each of the pages, except the Factory Page, has a security level assigned to it. You can change the read and write access to these menus and pages by using the parameters in the Lockout Menu (Factory Page).

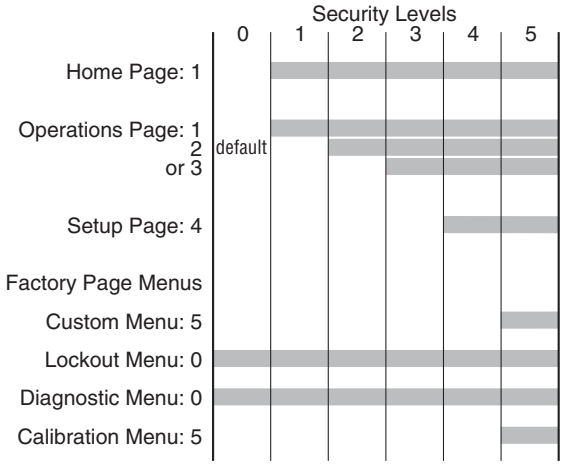
Lockout Menu

There are three parameters in the Lockout Menu (Factory Page):

Lock Operations Page [LoC.o] sets the security level for the Operations Page. (default: 2)

Read Lockout Security [rLoC] determines which pages can be accessed. The user can access the selected level and all lower levels. (default: 5)

Set Lockout Security [SLoC] determines which parameters within accessible pages can be written to. The user can write to the selected level and all lower levels. (default: 5)



Bars indicate page and menu access by security level.

The following examples show how the Lockout Menu parameters may be used in applications:

1. The operator wants to read all the menus and not allow any parameters to be changed.

   In the Factory Page, Lockout Menu, set Read Lockout Security [rLoC] to 5 and Set Lockout Security [SLoC] to 0.
2. The operator wants to read and write to the Home Page and Operations Page, and lock all other pages and menus.

In the Factory Page, Lockout Menu, set Read Lockout Security [rLoC] to 2 and Set Lockout Security [SLoC] to 2.

In the Factory Page, Lockout Menu, set Lock Operations Page [LoC.O] to 2.

3. The operator wants to read the Operations Page, Setup Page, Diagnostics Menu, Lock Menu, Calibration Menu and Custom Menus. The operator also wants to read and write to the Home Page.

   In the Factory Page, Lockout Menu, set Read Lockout Security [rLoC] to 1 and Set Lockout Security [SLoC] to 5.

   In the Factory Page, Lockout Menu, set Lock Operations Page [LoC.O] to 2.

Chapter 9: Appendix

Troubleshooting Alarms, Errors and Control Issues

Indication	Description	Possible Cause(s)	Corrective Action
Alarm won't clear or reset	Alarm will not clear or reset with keypad or digital input	• Alarm latching is active • Alarm set to incorrect output • Alarm is set to incorrect source • Sensor input is out of alarm set point range • Alarm set point is incorrect • Alarm is set to incorrect type • Digital input function is incorrect	• Reset alarm when process is within range or disable latching • Set output to correct alarm source instance • Set alarm source to correct input instance • Correct cause of sensor input out of alarm range • Set alarm set point to correct trip point • Set alarm to correct type: process, deviation or power • Set digital input function and source instance
Alarm won't occur	Alarm will not activate output	• Alarm silencing is active • Alarm blocking is active • Alarm is set to incorrect output • Alarm is set to incorrect source • Alarm set point is incorrect • Alarm is set to incorrect type	• Disable alarm silencing, if required • Disable alarm blocking, if required • Set output to correct alarm source instance • Set alarm source to correct input instance • Set alarm set point to correct trip point • Set alarm to correct type: process, deviation or power
AL.E1 Alarm Error AL.E2 AL.E3 AL.E4	Alarm state cannot be determined due to lack of sensor input	• Sensor improperly wired or open • Incorrect setting of sensor type • Calibration corrupt	• Correct wiring or replace sensor • Match setting to sensor used • Check calibration of controller
AL.L1 Alarm Low AL.L2 AL.L3 AL.L4	Sensor input below low alarm set point	• Temperature is less than alarm set point • Alarm is set to latching and an alarm occurred in the past • Incorrect alarm set point • Incorrect alarm source	• Check cause of under temperature • Clear latched alarm • Establish correct alarm set point • Set alarm source to proper setting
AL.h1 Alarm High AL.h2 AL.h3 AL.h4	Sensor input above high alarm set point	• Temperature is greater than alarm set point • Alarm is set to latching and an alarm occurred in the past • Incorrect alarm set point • Incorrect alarm source	• Check cause of over temperature • Clear latched alarm • Establish correct alarm set point • Set alarm source to proper setting
Er.i1 Error Input	Sensor does not provide a valid signal to controller	• Sensor improperly wired or open • Incorrect setting of sensor type • Calibration corrupt	• Correct wiring or replace sensor • Match setting to sensor used • Check calibration of controller
Limit won't clear or reset	Limit will not clear or reset with keypad or digital input	• Sensor input is out of limit set point range • Limit set point is incorrect • Digital input function is incorrect	• Correct cause of sensor input out of limit range • Set limit set point to correct trip point • Set digital input function and source instance
L.E1 Limit Error L.E2	Limit state cannot be determined due to lack of sensor input, limit will trip	• Sensor improperly wired or open • Incorrect setting of sensor type • Calibration corrupt	• Correct wiring or replace sensor • Match setting to sensor used • Check calibration of controller
L.L1 Limit Low L.L2	Sensor input below low limit set point	• Temperature is less than limit set point • Limit outputs latch and require reset • Incorrect alarm set point	• Check cause of under temperature • Clear limit • Establish correct limit set point

Indication	Description	Possible Cause(s)	Corrective Action
LiH1 Limit High LiH2	Sensor input above high limit set point	• Temperature is greater than limit set point • Limit outputs latch and require reset • Incorrect alarm set point	• Check cause of over temperature • Clear limit • Establish correct limit set point
LPo1 Loop Open Error	Open Loop Detect is active and the process value did not deviate by a user-selected value in a user specified period.	• Setting of Open Loop Detect Time incorrect • Setting of Open Loop Detect Deviation incorrect • Thermal loop is open • Open Loop Detect function not required but activated	• Set correct Open Loop Detect Time for application • Set correct Open Loop Deviation value for application • Determine cause of open thermal loop: misplaced sensors, load failure, loss of power to load, etc. • Deactivate Open Loop Detect feature
LPr1 Loop Reversed Error	Open Loop Detect is active and the process value is headed in the wrong direction when the output is activated based on deviation value and user-selected value.	• Setting of Open Loop Detect Time incorrect • Setting of Open Loop Detect Deviation incorrect • Output programmed for incorrect function • Thermocouple sensor wired in reverse polarity	• Set correct Open Loop Detect Time for application • Set correct Open Loop Deviation value for application • Set output function correctly • Wire thermocouple correctly, (red wire is negative)
No Display	No display indication or LED illumination	• Power to controller is off • Fuse open • Breaker tripped • Safety interlock switch open • Separate system limit control activated • Wiring error • Incorrect voltage to controller	• Turn on power • Replace fuse • Reset breaker • Close interlock switch • Reset limit • Correct wiring issue • Apply correct voltage, check part number
No Serial Communication	Cannot establish serial communications with the controller	• Address parameter incorrect • Incorrect protocol selected • Baud rate incorrect • Parity incorrect • Wiring error • EIA-485 converter issue • Incorrect computer or PLC communications port • Incorrect software setup • Termination resistor may be required	• Set unique addresses on network • Match protocol between devices • Match baud rate between devices • Match parity between devices • Correct wiring issue • Check settings or replace converter • Set correct communication port • Correct software setup to match controller • Place 120 Ω resistor across EIA-485 on last controller
Temperature runway	Process value continues to increase or decrease past set point.	• Controller output incorrectly programmed • Thermocouple reverse wired • Controller output wired incorrectly • Short in heater • Power controller connection to controller defective • Controller output defective	• Verify output function is correct (heat or cool) • Correct sensor wiring (red wire negative) • Verify and correct wiring • Replace heater • Replace or repair power controller • Replace or repair controller
100 Device Error rEtn	Controller displays internal malfunction message at power up.	• Controller defective	• Replace or repair controller

Indication	Description	Possible Cause(s)	Corrective Action
CEr Current Error	Load current incorrect.	• Shorted solid-state or mechanical relay • Open solid-state or mechanical relay • Current transformer connected to wrong output • Defective current transformer or controller • Noisy electrical lines	• Replace relay • Replace relay • Route load wire through current transformer from correct output • Replace or repair sensor or controller • Route wires appropriately, check for loose connections, add line filters
Menus inaccessible	Unable to access SEt, OPEr, FCty or ProF menus or particular prompts in Home Page	• Security set to incorrect level • Digital input set to lockout keypad • Custom parameters incorrect	• Check lockout setting in Factory Page • Change state of digital input • Change custom parameters in Factory Page
EZ-Key doesn't work	EZ-Key does not activate required function	• EZ-Key function incorrect • EZ-Key function instance not incorrect • Keypad malfunction	• Verify EZ-Key function in Setup Menu • Check that the function instance is correct • Replace or repair controller

Specifications

Line Voltage/Power

- 85 to 264V~ (ac), 47 to 63 Hz
- 12 to 40V⎓ (dc); 20 to 28V~ (ac), 47 to 63 Hz
- 10VA maximum power consumption
- Data retention upon power failure via nonvolatile memory
- Compliant with Semi F47-0200, Figure R1-1 voltage sag requirements @ 24~ (ac) or higher

Environment

- -18 to 65°C (0 to 149°F) operating temperature
- -40 to 85°C (-40 to 185°F) storage temperature
- 0 to 90 percent RH, non-condensing

Accuracy

- Calibration accuracy and sensor conformity: ±0.1 percent of accuracy span, ±1°C at the calibrated ambient temperature and rated line voltage
- Types R, S, B; 0.2 percent
- Type T below -50°C (58°F); 0.2 percent
- Calibration ambient temperature @ 25°C, ±3°C (77°F, ±5°F)
- Accuracy span: 540°C (1,000°F) minimum
- Temperature stability: ±0.1°C/°C (±0.1°F/°F) rise in ambient maximum

Agency Approvals

- UL® Listed to UL 61010-1 File E185611.
  - UL Reviewed to CSA C22.2 No. 61010-1-04.
- UL 50 Type 4X, NEMA 4X indoor locations, IP66 front panel seal.
- FM Class 3545 File 3029084 temperature limit switches.
- CE – See Declaration of Conformity. RoHS and W.E.E.E. compliant.
- ODVA – EtherNet/IP™ Compliance.
- Limit version features FM Class 3545

Controller

- Microprocessor-based, user-selectable control modes
- PID module: Single universal input, 2 outputs
- Limit module: Single universal input, 2 outputs
- 2 total additional digital input/outputs shared between PID and limit functions
- Control sampling rates: input 10 Hz, outputs 10 Hz

Serial Communications

- Isolated communications EIA-485, Standard Bus: all models; EIA-232/485, Modbus™ RTU and Ethernet IP/Modbus™ TCP serial communications. Future options include DeviceNet™ and Profibus™ DP

Wiring Termination, Touch-Safe Terminals

- Input, power and controller output terminals touch-safe removable 3.30 to 0.0507mm² (12 to 30 AWG)
- Wire strip length 7.6 mm (0.30 in)
- Torque 0.8 Nm (7.0 lb.- in.)

Universal Input

- Thermocouple, grounded or ungrounded sensors
  - >20 MΩ input impedance
  - 3 microampere open sensor detection
- Maximum of 20 Ω source resistance
- RTD 2- or 3-wire, platinum, 100 and 1,000 Ω @ 0°C calibration to DIN curve (0.00385 Ω/Ω/°C); lead resistance effect: 0.3°C/Ω maximum
- Process, 0 to 20 mA @ 100 Ω, or 0 to 10V⎓ (dc) and 0 to 50 mV @ 20 kΩ input impedance; scalable
- Inverse scaling

Accuracy Range

Type J: 0 to 750°C or 32 to 1,383°F (±1.75°C)
Type K: -200 to 1,250°C or -328 to 2,282°F (±2.45°C)
Type T: -200 to 350°C or -328 to 662°F (±1.55°C)
Type E: -328 to 1,652°C or -200 to 900°F (±2.10°C)
Type N: 0 to 1,250°C or 32 to 2,282°F (±2.25°C)
Type C: 0 to 2,315°C or 32 to 4,199°F (±3.32°C)
Type D: 0 to 2,315°C or 32 to 4,199°F (±3.32°C)
Type F: 0 to 1,343°C or 32 to 2,450°F (±2.39°C)
Type R: 0 to 1,450°C or 32 to 2,642°F (±3.90°C)
Type S: 0 to 1,450°C or 32 to 2,642°F (±3.90°C)
Type B: 870 to 1,700°C or 1,598 to 3,092°F (±2.66°C)
RTD (DIN): -200 to 800°C or -328 to 1,472°F (±2.00°C)
Volts: 0 to 10 (±0.01V)
mA DC: 0 to 20 (±0.02 mA)
mV: 0 to 50 (±0.05 mV)
Potentiometer: 0 to 1,200 Ω (±1.0 Ω)

Functional Operating Range

Type J: -210 to 1,200°C or -346 to 2,192°F
Type K: -200 to 1,370°C or -328 to 2,500°F
Type T: -200 to 400°C or -328 to 750°F
Type E: -200 to 1,000°C or -328 to 1,832°F
Type N: -200 to 1,300°C or -328 to 2,372°F
Type C: 0 to 2,315°C or 32 to 4,200°F
Type D: 0 to 2,315°C or 32 to 4,200°F
Type F: 0 to 1,395°C or 32 to 2,543°F
Type R: -50 to 1,767°C or -58 to 3,214°F
Type S: -50 to 1,767°C or -58 to 3,214°F
Type B: 0 to 1,816°C or 32 to 3,300°F
RTD (DIN): -200 to 800°C or -328 to 1,472°F
Process: -1,999 to 9,999 units

Digital Input

- Update rate 10 Hz
- Dry contact or dc voltage

DC voltage

- Maximum input 36V at 3 mA
- Minimum high state 3V @ 0.25 mA
- Maximum low state 2V

Dry contact

- Minimum open resistance 10 kΩ
- Maximum closed resistance 50 Ω
- Maximum short circuit 13 mA

Digital Output

- Update rate 10 Hz
- Output voltage 24V
- Current limit, Output 5, 24 mA maximum; Output 6, 10 mA maximum.

Output Hardware

- User selectable for heat-cool as on-off, P, PI, PD, PID, alarm action or limit.

Switched DC

- Unregulated 22 to 32V⎓ (dc) low side @ 30 mA outputs 1 and 3, 10 mA outputs 2 and 4

Open Collector

- Output sink 100 mA @ 30V⎓ (dc) maximum

Solid-State Relay

- 0.5 A @ 24 to 264V~ (ac) maximum, opto-isolated, without contact suppression; maximum off-state leakage current: 105 microamperes

Electromechanical Relay, Form A

- 5 A, 24 to 240V~ (ac) or 30V⎓ (dc) maximum, resistive load, 100,000 cycles at rated load, 125 VA pilot duty
- Requires a minimum load of 20 mA @ 24V

Electromechanical Relay, Form C

- 5 A, 24 to 240V~ (ac) or 30V⎓ (dc) maximum, resistive load, 100,000 cycles at rated load, 125 VA pilot duty
- Requires a minimum load of 20 mA @ 24V

Process

- Universal process/Retransmit, outputs range selectable, 0 to 10 V⎓ (dc) into minimum 1,000 Ω load, 0 to 20 mA into maximum 800 Ω load

Operator Interface

- Dual 4-digit, 7-segment LED displays
- Advance, infinity, up and down keys plus an EZ Key programmable function key
- Typical display update rate 1 Hz
- Agency approved to IP66/NEMA 4X

Dimensions

Size	Behind Panel (max.)	Width	Height	Display Height
1/16	101.6 mm (4.00 in)	53.3 mm (2.10 in)	53.3 mm (2.10 in)	up: 10.80 mm (0.425 in) low: 6.98 mm (0.275 in)
1/32	101.6 mm (4.00 in)	53.3 mm (2.10 in)	30.9 mm (1.22 in)	left: 7.59 mm (0.299 in) right: 5.90 mm (0.220 in)

Weight

- Controller: 200 g (7.1 oz.)
- User manual: 167.26 g (5.9 oz)

Note: These specifications are subject to change without prior notice.

Ordering Information for Enhanced Limit Controller Models

Controller **P M 6 __ __ __ __ - __ A __ __ A A A**

EZ-Zone™ Enhanced Limit Controller Models
Universal Sensor Input, configuration communications
red-green 7-segment displays

Package Size

6	1/16 DIN

Primary Function

L	Limit Controller
D	Custom Firmware

Power Supply, Digital Input/Output

1	100 to 240V~ (ac)
2	100 to 240V~ (ac) plus 2 digital i/o points
3	12 to 40V⎓ (dc) and 20 to 28V ~ (ac)
4	12 to 40V⎓ (dc) and 20 to 28V ~ (ac), plus 2 digital i/o points

Output 1 and 2 Hardware Options

	Output 1	Output 2
AJ	None	Mechanical relay 5 A, form A
CJ	Switched dc/open collector	Mechanical relay 5 A, form A
EJ	Mechanical relay 5 A, form C	Mechanical relay 5 A, form A

Communications Options All options below include EIA-485 Standard Bus.

A	None
1	EIA 485 Modbus RTU®
	With options 2 or 3, order option AA for Outputs 3 & 4.
2	Modbus RTU 232/485
3	EtherNet/IP™, Modbus TCP

Output 3 and 4 Hardware Options With Communications Options 2 or 3, option AA must be ordered below.

	Output 3	Output 4
AA	None	None
CA	Switched dc/open collector	None
CC	Switched dc/open collector	Switched dc
CJ	Switched dc/open collector	Mechanical relay 5 A, form A
CK	Switched dc/open collector	Solid-state relay 0.5 A, form A
EA	Mechanical relay 5 A, form C	None
EC	Mechanical relay 5 A, form C	Switched dc
EJ	Mechanical relay 5 A, form C	Mechanical relay 5 A, form A
EK	Mechanical relay 5 A, form C	Solid-state relay 0.5 A, form A
FA	Universal Process	None
FC	Universal Process	Switched dc
FJ	Universal Process	Mechanical relay 5 A, form A
FK	Universal Process	Solid-state relay 0.5 A, form A
AK	None	Solid-state relay 0.5 A, form A
KK	Solid-state relay 0.5 A, form A	Solid-state relay 0.5 A, form A

Future Options

Custom Options firmware, overlays,parameter settings

Note: The model of controller that you have is one of many possible models in the EZ-ZONE PM™ family of controllers. To view the others, visit our website (http://www.watlow.com/literature/pti search.cfm) and type EZ-ZONE into the Keyword field.

Ordering Information for Limit Controller Models

Controller	**P**	**M**	__	__	__	__	__	-	__	A	A	A	A	A	A
EZ-Zone™ Limit Controller Models															
Universal Sensor Input, configuration communications															
red-green 7-segment displays															
Package Size															
3 1/32 DIN															
6 1/16 DIN															
Primary Function															
L Limit Controller															
D Custom Firmware															
Power Supply, Digital Input/Output															
1 100 to 240V~ (ac)															
2 100 to 240V~ (ac) plus 2 digital i/o points															
3 12 to 40V⎓ (dc) and 20 to 28V ~ (ac)															
4 12 to 40V⎓ (dc) and 20 to 28V ~ (ac), plus 2 digital i/o points															
Output 1 and 2 Hardware Options															
Output 1 / **Output 2**															
AJ None / Mechanical relay 5 A, form A															
CJ Switched dc/open collector / Mechanical relay 5 A, form A															
EJ Mechanical relay 5 A, form C / Mechanical relay 5 A, form A															
Communications Options All options below include EIA-485 Standard Bus.															
A None															
1 EIA 485 Modbus RTU®															
Custom Options firmware, overlays,parameter settings															

Note: The model of controller that you have is one of many possible models in the EZ-ZONE PM™ family of controllers. To view the others, visit our website (http://www.watlow.com/literature/pti search.cfm) and type EZ-ZONE into the Keyword field.

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Declaration of Conformity

Series PM

CE

Watlow Winona, Inc.
1241 Bundy Blvd.
Winona, MN 55987 USA

Declares that the following product:

Designation:	**Series PM (Panel Mount)**
Model Numbers:	PM (3 or 6)(Any Letter or number) – (1, 2, 3 or 4)(A, C, E, F or K) (A, C, H, J or K)(Any letter or number) – (Any letter or number)(A, C, E, F or K)(A, D, J or K) A (Any two letters or numbers)
Classification:	Temperature control, Installation Category II, Pollution degree 2
Rated Voltage and Frequency:	100 to 240 V~ (ac 50/60 Hz) **or** 15 to 36 Vdc/ 24 Vac 50/60 Hz
Rated Power Consumption:	10 VA maximum

Meets the essential requirements of the following European Union Directives by using the relevant standards show below to indicate compliance.

89/336/EEC Electromagnetic Compatibility Directive

EN 61326	**1997**	**With A1:1998 A2:2002**	**Electrical equipment for measurement, control and laboratory use – EMC requirements (Industrial Immunity, Class B Emissions).**
EN 61000-4-2	1996	A1, A2, 2001	Electrostatic Discharge Immunity
EN 61000-4-3	2002	A1, A2, 2005	Radiated Field Immunity
EN 61000-4-4	2004		Electrical Fast-Transient / Burst Immunity
EN 61000-4-5	1995	A1, A2, 2001	Surge Immunity
EN 61000-4-6	1996	A1, 2, 3, 2005	Conducted Immunity
EN 61000-4-11	2004		Voltage Dips, Short Interruptions and Voltage Variations Immunity
EN 61000-3-2	2000	Edition 2	Harmonic Current Emissions
EN 61000-3-3[1]	1995	A2, 2002	Voltage Fluctuations and Flicker

[1]For mechanical relay loads, cycle time may need to be extended up to 30 seconds to meet flicker requirements depending on load switched and source impedance.

73/23/EEC Low-Voltage Directive

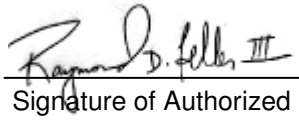
EN 61010-1	**2001**	**Safety Requirements of electrical equipment for measurement, control and laboratory use. Part 1: General requirements**

Raymond D. Feller III
Name of Authorized Representative

Winona, Minnesota, USA
Place of Issue

General Manager
Title of Authorized Representative

February 2007
Date of Issue



Signature of Authorized Representative

How to Reach Us

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3 Year Warranty

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