

# EZ-ZONE® PM PANEL MOUNT CONTROLLER

## EZ-ZONE® PM Controllers Take the Pain Out of Meeting Your Thermal Loop Requirements

The EZ-ZONE® PM panel mount controller from Watlow® offers control options to reduce system complexity and the cost of thermal loop ownership. You can order the EZ-ZONE PM as a PID controller, an over/under limit controller or these functions can be combined into an integrated controller. You also have the option to integrate a high amperage power controller output with a high-performance PID controller and an over/under limit controller in one space-saving, panel mount package. A number of communication options are available to support your connectivity needs.

Because the EZ-ZONE PM controller is highly scalable, you only pay for what you need. This controller is available in ½, ⅓, ¼ and ⅛ DIN panel mount packages. If you are looking for a PID controller, an over/under limit controller or an integrated controller, the EZ-ZONE PM will make your life easier.

### Features and Benefits

#### Integrated PID and limit controller

- Reduces wiring time and termination complexity compared with connecting discrete products
- Decreases required panel space
- Lowers installation costs
- Increases user and equipment safety for over/under temperature conditions

#### High amperage power control output

- Drives 15 ampere resistive loads directly
- Reduces component count
- Decreases cost of ownership

#### Current monitoring

- Detects heater current flow and provides alarm indication of a failed output device or heater load

#### Serial communication capabilities

- Provides a wide range of protocol choices including Modbus® RTU, EtherNet/IP™, Modbus® TCP, PROFIBUS DP and DeviceNet™
- Supports network connectivity to a PC or PLC

#### Dual-channel controller

- Provides two PID controllers in one space-saving package

#### Enhanced control options

- Easily handles complex process problems such as cascade, ratio, differential, square-root, motorized valve control without slidewire feedback, wet-bulb/dry-bulb, compressor control and peltier loads

#### Advanced PID control algorithm

- Offers TRU-TUNE®+ adaptive control to provide tighter control for demanding applications
- Provides auto-tune for fast, efficient start-up



#### Configuration communications with software

- Includes Watlow standard bus communications and EZ-ZONE configurator software
- Saves time and improves reliability of controller setup

#### Ten-point linearization curve

- Improves sensor accuracy

#### Built-in sensor compensation curves

- Saves cost of buying compensated sensors
- Includes Vaisala RH and altitude (pressure) curves

#### Remote set point operation

- Supports convenient set point manipulation from a remote device such as a master control or PLC

#### Profile capability

- Offers pre-programmed process control
- Allows ramp/soak programming with 40 total steps, battery backup and real time clock

#### Retransmit Output

- Supports industry needs for recording

#### Factory Mutual (FM) approved over/under limit with auxiliary outputs

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

#### Memory for saving and restoring parameter settings

- Decreases service calls and time down

#### Agency approvals: UL® listed, CSA, CE, RoHS, W.E.E.E., FM, SEMI F47-0200, Class 1, Div. 2 rating on selected models

- Assures prompt product acceptance
- Reduces end product documentation costs

#### Touch-safe package

- Increases safety for installer/operator
- Complies with IP2X requirements

#### Consistent termination labeling connection system

- Simplifies switching between products
- Speeds up user's system documentation

#### EZ-KEY

- Enables simple, one-touch operation of user-defined, repetitive activities

#### Programmable menu system

- Reduces setup time and increases operator efficiency

#### Three-year warranty

- Provides product support and reliability



ISO 9001



Registered Company  
Winona, Minnesota USA

WIN-EZPM-0610

## Specifications

### Controller

- User-selectable heat/cool, on-off, P, PI, PD, PID or alarm action, not valid for limit controllers
- Auto-tune with TRU-TUNE®+ adaptive control algorithm
- Control sampling rates: input = 10Hz, outputs = 10Hz

### Profile Ramp/Soak - Real Time Clock and Battery Backup

- 4 profiles, 40 total steps
- Accuracy (typical):  $\pm 30$  PPM at 77°F (25°C)  
+30/-100 PPM at -4 to 149°F (-20 to 65°C)
- Battery type/typical life: lithium, three cumulative years unpowered at 77°F (25°C)

### Isolated Serial Communications

- EIA 232/485, Modbus® RTU
- EtherNet/IP™/Modbus® TCP
- DeviceNet™
- PROFIBUS DP

### Wiring Termination—Touch-Safe Terminals

- Input, power and controller output terminals are touch safe, removable, 12 to 22 AWG

### Universal Input

- Thermocouple, grounded or ungrounded sensors greater than 20M $\Omega$  input impedance, 3 $\mu$ A open sensor detection, 2k $\Omega$  source resistance max.
- RTD 2- or 3-wire, platinum, 100 $\Omega$  and 1000 $\Omega$  @ 32F (0°C) calibration to DIN curve (0.00385  $\Omega/\Omega/^\circ\text{C}$ )
- Process, 0-20mA @ 100 $\Omega$ , or 0-10VDC @ 20k $\Omega$ , 0-50mV at 20M $\Omega$ , 0-1000 $\Omega$  potentiometer; scalable; inverse scaling

### Functional Operating Range

Type J: -346 to 2192°F (-210 to 1200°C)  
Type K: -454 to 2500°F (-270 to 1371°C)  
Type T: -454 to 750°F (-270 to 400°C)  
Type E: -454 to 1832°F (-270 to 1000°C)  
Type N: -454 to 2372°F (-270 to 1300°C)  
Type C: 32 to 4200°F (0 to 2315°C)  
Type D: 32 to 4200°F (0 to 2315°C)  
Type F: 32 to 2449°F (0 to 1343°C)  
Type R: -58 to 3214°F (-50 to 1767°C)  
Type S: -58 to 3214°F (-50 to 1767°C)  
Type B: 32 to 3300°F (0 to 1816°C)  
RTD (DIN): -328 to 1472°F (-200 to 800°C)  
Process: -1999 to 9999 units

### Accuracy

- Calibration accuracy and sensor conformity:  $\pm 0.1\%$  of span,  $\pm 1^\circ\text{C}$  @ the calibrated ambient temperature and rated line voltage
  - Types R, S, B; 0.2%
  - Type T below -50°C; 0.2%
- Calibration ambient temperature @ 77°F  $\pm 5^\circ\text{F}$  (25°C  $\pm 3^\circ\text{C}$ )
- Accuracy span: 1000°F (540°C) min.
- Temperature stability:  $\pm 0.1^\circ\text{F}/^\circ\text{F}$  ( $\pm 0.1^\circ\text{C}/^\circ\text{C}$ ) rise in ambient max.

### Thermistor Input

- 0 to 40k $\Omega$ , 0 to 20k $\Omega$ , 0 to 10k $\Omega$ , 0 to 5k $\Omega$
- 2.252k $\Omega$  and 10k $\Omega$  base at 77°F (25°C)
- Linearization curves built-in

### Current Transformer Input

- Accepts 0-50mA signal (user-programmable range)
- Displayed operating range and resolution can be scaled and are user-programmable

### Digital Inputs (DC Voltage)

- Max. input: 36V at 3mA
- Logic: min. high state 3V at 0.25mA, max. low state 2V

### Digital Inputs (Dry Contact)

- Logic: min. open resistance 10k $\Omega$ , max. closed resistance 50 $\Omega$
- Max. short circuit: 20mA

### 2 Digital I/O (ordered with power supply option)

- Update rate: 10Hz
- Input type: user-selectable, dc voltage or dry contact
- Output type: switched dc
- Output voltage: 24V
- Output 5: 24mA max. or drive one 3-pole DIN-A-MITE®
- Output 6: 10mA max.

### 6 Digital I/O (ordered with communications option)

- Update rate: 10Hz
- Input type: user-selectable, dc voltage or dry contact
- Output type: user-selectable, switched dc or open collector
- Switched dc output voltage: 12 to 24VDC, depending on current draw
- Switched dc max. supplied current: 40mA at 20VDC and 80mA at 12VDC
- Switched dc max. low state: 2V
- Open collector max. switched voltage: 32VDC
- Open collector max. switched current: 1.5A per output; 8A total for all 6 outputs

### Output Hardware

- Switched dc: 22 to 32VDC @ 30mA max. per single output and 40mA max. total per paired outputs (1 & 2, 3 & 4)
- Open collector: 30VDC max. @ 100mA max.
- SSR, Form A, 24 to 240VAC, 1A at 50°F (10°C) to 0.5A at 149°F (65°C) resistive load, 264VAC max., opto-isolated, without contact suppression, 120/240VAC @ 20VA pilot duty
- Electromechanical relay, Form C, 24 to 240VAC or 30VDC max., 5A resistive load, 100,000 cycles at rated load, 120/240 @ 125VA or 24VAC @ 25VA pilot duty
- Electromechanical relay, Form C, 24 to 240VAC or 30VDC max., 5A resistive load, 100,000 cycles at rated load, 120/240 @ 125VA or 24VAC @ 25VA pilot duty
- NO-ARC relay, Form A, 85 to 264VAC, 15A @ 122°F (50°C), resistive load, no VDC, 2,000,000 cycles at rated load
- Universal process/retransmit: output range selectable; 0 to 10VDC  $\pm 15\text{mV}$  into a min. 1,000 $\Omega$  load with 2.5mV nominal resolution; 0 to 20mA  $\pm 30\mu\text{A}$  into max. 800 $\Omega$  load with 5 $\mu\text{A}$  nominal resolution; temperature stability 100ppm/°C

### Operator Interface

- Dual 4-digit, 7-segment LED displays
- Advance, infinity, up and down keys, plus 1 or 2 programmable EZ-KEY(s) depending on model size
- Typical display update rate: 1Hz
- RESET key substituted for infinity on all models with limit controller

### Line Voltage/Power

- High voltage option: 85 to 264VAC, 47 to 63Hz
- Low voltage option: 20 to 28VAC, +10/-15%; 50/60Hz,  $\pm 5\%$  or 12 to 40VDC
- Max. power consumption: 10VA ( $\frac{1}{32}$  and  $\frac{1}{16}$  DIN); 14VA ( $\frac{1}{8}$  and  $\frac{1}{4}$  DIN)
- Data retention upon power failure via nonvolatile memory
- Compliant with SEMI F47-0200, Figure R1-1 voltage sag requirements @ 24VAC or higher

### Environment

- Operating temperature: 0 to 149°F (-18 to 65°C)
- Storage temperature: -40 to 185°F (-40 to 85°C)
- Relative humidity: 0 to 90% RH, non-condensing

### Agency Approvals

- cULus® UL/EN/CSA C22.2 No 61010-1 Listed, File E185611
- CSA C22.2 No. 24, File 158031 ( $\frac{1}{32}$  and  $\frac{1}{16}$  DIN sizes)
- UL® 50 4X indoor locations, NEMA 4X, IP66 front seal
- cULus® ANSI/ISA 12.1201-2001, CSA-C22.2 No. 213-1987, Class 1, Div. 2, Groups A, B, C and D, Temperature Code T4A, File E184390 (optional)
- FM Class 3545 (limit controls)
- CE, RoHS by design, W.E.E.E.
- EtherNet/IP™ and DeviceNet™ ODVA Conformance Tested

## Comparison of Available Features

	1/32 DIN	1/16 DIN	1/8 DIN	1/4 DIN
<b>PID Loops</b>	1	1	1 to 2	1 to 2
<b>Profile Ramp/Soak</b>	40 total steps	40 total steps	40 total steps	40 total steps
<b>Profile Battery Backup and Real Time Clock</b>	None	None	Yes	Yes
<b>Number of Digital Inputs/Outputs</b>	0 to 2	0 to 2	0 to 8	0 to 8
<b>Number of Outputs</b>	1 to 4	1 to 6	1 to 12	1 to 12
<b>Integrated Safety Limits</b>	Limit must be ordered as separate device	1	1	1
<b>Maximum Power Output</b>	5A mechanical relay	15A NO-ARC	15A NO-ARC	15A NO-ARC
<b>Current Measurement</b>	None	Accepts 0-50mA signal from external current transformer		
<b>Standard Bus Communications</b>	Yes	Yes	Yes	Yes
<b>Field Bus Communications</b>	Modbus® RTU 485	Modbus® RTU 232/485, EtherNet/IP™, Modbus® TCP, DeviceNet™, PROFIBUS DP		
<b>10-Point Calibration Offset</b>	None	None	Yes	Yes
<b>Cascade, Ratio, Differential and Square-Root</b>	None	None	Yes	Yes
<b>Sensor Compensation Curves - Altitude (Pressure) and Vaisalla RH</b>	None	None	Yes	Yes
<b>Motorized Valve Control (without Feedback)</b>	None	None	Yes	Yes
<b>Wet Bulb/Dry Bulb</b>	None	None	Yes	Yes

## Compatible Accessories

More information is available on these products at [www.watlow.com](http://www.watlow.com)

EZ-ZONE® configurator software is used to set up Watlow EZ-ZONE products in one simple process. It works without requiring the purchase of any communications options because it uses the standard bus communications protocol that is included with all EZ-ZONE products. EZ-ZONE configurator can be used for on-line and off-line configuration and downloading previously saved setups. It is available free as a download at [www.watlow.com](http://www.watlow.com)



Silver Series Touchscreen Operator Interface Terminals provide a customizable user interface and log and graph data for Watlow controllers and other devices. A Silver Series operator interface terminal paired with Watlow controllers is the perfect solution for your industrial process or machine control application.

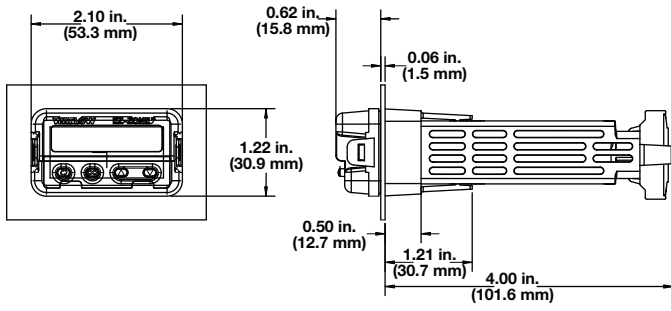
SpecView from Watlow is designed for industrial users with features such as data logging, trending and support for bar code readers and touch screens. Errors are reduced, for any process, by creating application-specific screens. The software provides a historical replay option, easy-to-use recipe features and remote access options, including LAN, internet and modem.

### SPECVIEW

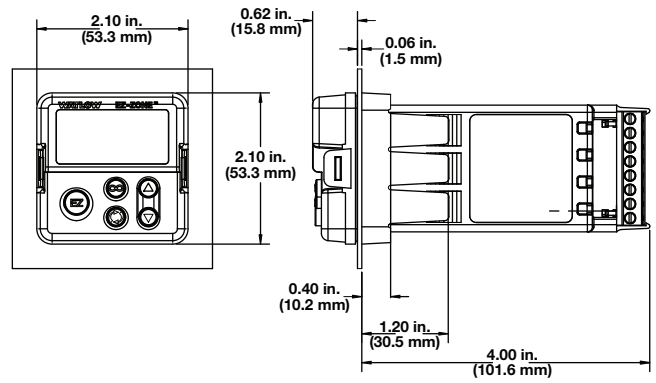


# Dimensional Drawings

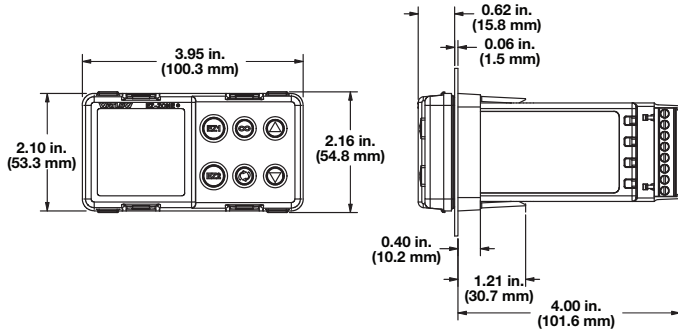
## EZ-ZONE PM 1/32 DIN



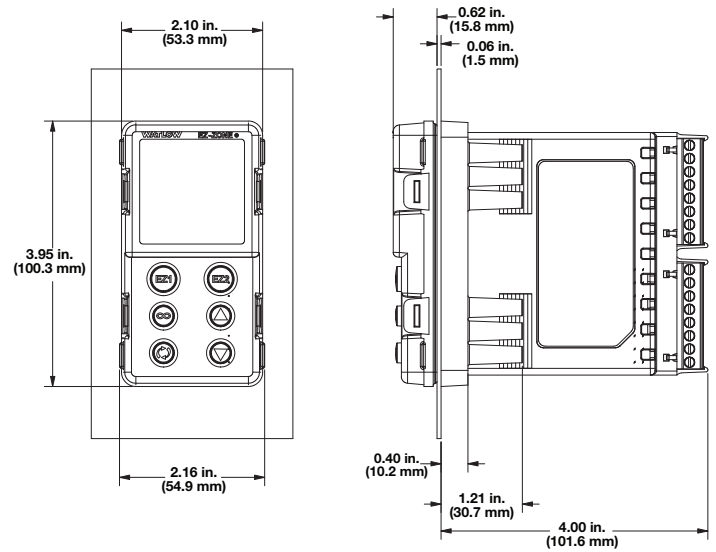
## EZ-ZONE PM 1/6 DIN



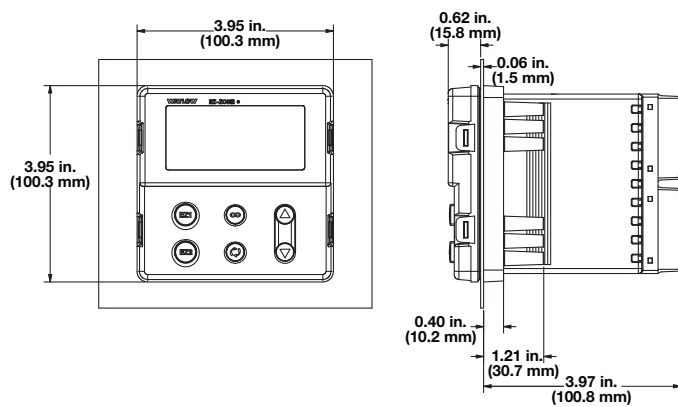
## EZ-ZONE PM 1/8 DIN - Horizontal



## EZ-ZONE PM 1/8 DIN - Vertical



## EZ-ZONE PM 1/4 DIN



## PID Model Ordering Information

Universal Sensor Input, Standard Bus Communications, TRU-TUNE+ Adaptive Tune  
Red and Green Seven-Segment Displays

### Code Number

PM - - - - - A A A A

**PM** = EZ-ZONE PM controller

### Package Size

- 3 = 1/2 DIN
- 6 = 1/6 DIN
- 8 = 1/8 DIN vertical
- 9 = 1/8 DIN horizontal
- 4 = 1/4 DIN

### Primary Function

**Options B and E are not available with 1/2 DIN (PM3) or 1/6 DIN (PM6) models**

- C = PID controller with universal input
- R = PID controller with universal input and profiling ramp/soak
- B = PID controller with universal input and profiling ramp/soak and battery backup with real time clock
- J = PID controller with thermistor input
- N = PID controller with thermistor input and profiling ramp/soak
- E = PID controller with thermistor input and profiling ramp/soak and battery backup with real time clock
- S = Custom firmware

### Power Supply, Digital Inputs/Outputs (I/O)

- 1 = 100 to 240VAC
- 2 = 100 to 240VAC plus 2 digital I/O points
- 3 = 20 to 28VAC or 12 to 40VDC
- 4 = 20 to 28VAC or 12 to 40VDC, plus 2 digital I/O points

### Output 1 and 2 Hardware Options

**PM3: CH, EH and KH are not valid options for 1/2 DIN package type**

#### Output 1

- CA = Switched dc/open collector
- CH = Switched dc/open collector
- CC = Switched dc/open collector
- CJ = Switched dc/open collector
- CK = Switched dc/open collector
- EA = Mechanical relay 5A, Form C
- EH = Mechanical relay 5A, Form C
- EC = Mechanical relay 5A, Form C
- EJ = Mechanical relay 5A, Form C
- EK = Mechanical relay 5A, Form C
- FA = Universal process
- FC = Universal process
- FJ = Universal process
- FK = Universal process
- AK = None
- KH = SSR Form A, 0.5A
- KK = SSR Form A, 0.5A

#### Output 2

- None
- NO-ARC 15A power control
- Switched dc
- Mechanical relay 5A, Form A
- SSR Form A, 0.5A
- None
- NO-ARC 15A power control
- Switched dc
- Mechanical relay 5A, Form A
- SSR Form A, 0.5A
- None
- Switched dc
- Mechanical relay 5A, Form A
- SSR Form A, 0.5A
- SSR Form A, 0.5A
- NO-ARC 15A power control
- SSR Form A, 0.5A

### Additional Communication Options, Standard Bus Always Included

- A = None
- 1 = EIA 485 Modbus® RTU

### Future Option

- AAAA = None

### Custom Options

- Firmware, overlays, parameter settings
- AA = Standard EZ-ZONE PM face plate
- 12 = Class 1, Div. 2 (not available with mechanical relay Output types E, H or J)

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UL® and cUL® are registered trademarks of Underwriter's Laboratories, Inc.

Modbus® is a registered trademark of Schneider Automation Inc.

DeviceNet™ and EtherNet/IP™ are trademarks of Open DeviceNet Vendors Association.

PROFIBUS is a registered trademark of PROFIBUS Nutzerorganisation e.V. (PNO).

## Limit Model Ordering Information

Universal Sensor Input, Standard Bus Communications, Red and Green Seven-Segment Displays  
Code Number

PM = EZ-ZONE PM controller

### Package Size

- 3 = 1/2 DIN
- 6 = 1/6 DIN
- 8 = 1/8 DIN vertical
- 9 = 1/8 DIN horizontal
- 4 = 1/4 DIN

### Primary Function

- L = Limit controller with universal input
- M = Limit controller with thermistor input
- D = Custom firmware

### Power Supply, Digital Inputs/Outputs (I/O)

- 1 = 100 to 240VAC
- 2 = 100 to 240VAC plus 2 digital I/O points
- 3 = 20 to 28VAC or 12 to 40VDC
- 4 = 20 to 28VAC or 12 to 40VDC, plus 2 digital I/O points

### Output 1 and 2 Hardware Options

- |                                  |                             |
|----------------------------------|-----------------------------|
| <b>Output 1</b>                  | <b>Output 2</b>             |
| AJ = None                        | Mechanical relay 5A, Form A |
| CJ = Switched dc/open collector  | Mechanical relay 5A, Form A |
| EJ = Mechanical relay 5A, Form C | Mechanical relay 5A, Form A |

### Additional Communication Options, Standard Bus Always Included

- A = None
- 1 = EIA 485 Modbus® RTU

### Future Option

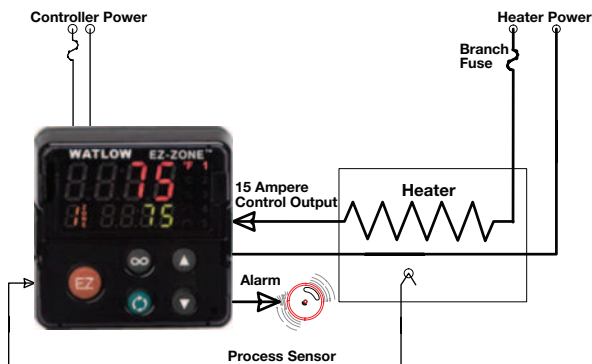
- AAAA = None

### Custom Options

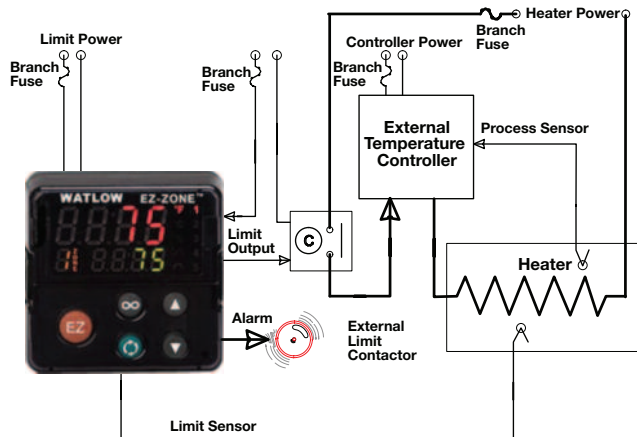
- Firmware, overlays, parameter settings
- AA = Standard EZ-ZONE PM face plate

## Typical Block Diagrams

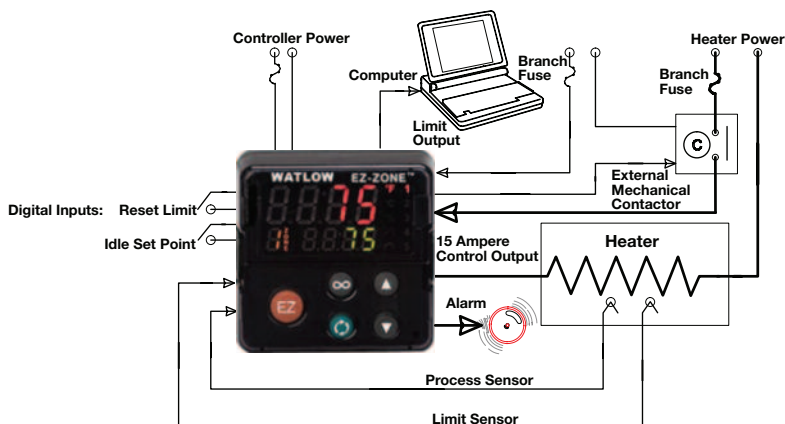
### EZ-ZONE PM PID Model



### EZ-ZONE PM Limit Model



### EZ-ZONE PM Integrated PID Model



# Integrated PID Controller Model Ordering Information

Universal Sensor Input, Standard Bus Communications, TRU-TUNE+ Adaptive Tune, Red and Green Seven-Segment Displays

Code Number

PM

PM = EZ-ZONE PM controller

Package Size

- 6 = 1/6 DIN
- 8 = 1/8 DIN Vertical
- 9 = 1/8 DIN Horizontal
- 4 = 1/4 DIN

Primary Function

Options B and E are not available with 1/6 DIN (PM6) models

- C = PID controller with universal input
- R = PID controller with universal input and profiling ramp/soak
- B = PID controller with universal input and profiling ramp/soak and battery backup with real time clock
- J = PID controller with thermistor input
- N = PID controller with thermistor input and profiling ramp/soak
- E = PID controller with thermistor input and profiling ramp/soak and battery backup with real time clock
- S = Custom firmware

Power Supply, Digital Inputs/Outputs (I/O)

- 1 = 100 to 240VAC
- 2 = 100 to 240VAC plus 2 digital I/O points
- 3 = 20 to 28VAC or 12 to 40VDC
- 4 = 20 to 28VAC or 12 to 40VDC, plus 2 digital I/O points

Output 1 and 2 Hardware Options

Output 1

- CA = Switched dc/open collector
- CH = Switched dc/open collector
- CC = Switched dc/open collector
- CJ = Switched dc/open collector
- CK = Switched dc/open collector
- EA = Mechanical relay 5A, Form C
- EH = Mechanical relay 5A, Form C
- EC = Mechanical relay 5A, Form C
- EJ = Mechanical relay 5A, Form C
- EK = Mechanical relay 5A, Form C
- FA = Universal process
- FC = Universal process
- FJ = Universal process
- FK = Universal process
- AK = None
- KH = SSR Form A, 0.5A
- KK = SSR Form A, 0.5A

Output 2

- None
- NO-ARC 15A power control
- Switched dc
- Mechanical relay 5A, Form A
- SSR Form A, 0.5A
- None
- NO-ARC 15A power control
- Switched dc
- Mechanical relay 5A, Form A
- SSR Form A, 0.5A
- None
- Switched dc
- Mechanical relay 5A, Form A
- SSR Form A, 0.5A
- SSR Form A, 0.5A
- NO-ARC 15A power control
- SSR Form A, 0.5A

Communication Options or Additional Digital I/O (Standard Bus Always Included)

- A = None
- 1 = EIA 485 Modbus® RTU
- 2 = EIA 232/485 Modbus® RTU
- 3 = EtherNet/IP™/Modbus® TCP
- 5 = DeviceNet™
- 6 = PROFIBUS DP
- C = 6 digital I/O (not available on 1/6 DIN models)
- D = 6 digital I/O and EIA 485 Modbus® RTU (not available on 1/6 DIN models)

Auxiliary Control Functions

- A = None
  - C = 2nd PID channel with universal input (not available on 1/6 DIN models)
  - J = 2nd PID channel with thermistor input (not available on 1/6 DIN models)
  - R = Auxillary 2nd input (universal input)
  - P = Auxillary 2nd input (thermistor input)
  - T = Current transformer input (not valid Output 3 and 4 selections is FA, FC, FJ and FK)
  - L = Integrated limit controller with universal input (only valid Output 3 and 4 selections = CJ, EJ and AJ)
  - M = Integrated limit controller with thermistor input (only valid Output 3 and 4 selections = CJ, EJ and AJ)
- 1/6 DIN Models: If communications option 2 thru 6 is ordered in previous digit, then Option A must be ordered here
- 1/6 DIN Models: Auxiliary input supports remote set point and backup sensor
- 1/6 DIN and 1/4 DIN Models: Auxiliary input supports remote set point, backup sensor, ratio, differential and wet-bulb/dry-bulb input

Output 3 and 4 Hardware Options

Output 3

- AA = None
- AJ = None
- AK = None
- CA = Switched dc/open collector
- CH = Switched dc/open collector
- CC = Switched dc/open collector
- CJ = Switched dc/open collector
- CK = Switched dc/open collector
- EA = Mechanical relay 5A, Form C
- EH = Mechanical relay 5A, Form C
- EC = Mechanical relay 5A, Form C
- EJ = Mechanical relay 5A, Form C
- EK = Mechanical relay 5A, Form C
- FA = Universal process
- FC = Universal process
- FJ = Universal process
- FK = Universal process
- KK = SSR Form A, 0.5A
- KH = SSR Form A, 0.5A
- KK = SSR Form A, 0.5A

Output 4

- None
- Mechanical relay 5A, Form A
- SSR Form A, 0.5A
- None
- NO-ARC 15A power control
- Switched dc
- Mechanical relay 5A, Form A
- SSR Form A, 0.5A
- None
- NO-ARC 15A power control
- Switched dc
- Mechanical relay 5A, Form A
- SSR Form A, 0.5A
- None
- Switched dc
- Mechanical relay 5A, Form A
- SSR Form A, 0.5A
- SSR Form A, 0.5A
- NO-ARC 15A power control
- SSR Form A, 0.5A

1/6 DIN Models: If communication options 2 thru 6 is ordered in previous digit, then Option AA must be ordered here

1/6 DIN Models: Output options CH, EH and KH are not valid

Additional Options

- A = Standard
- C = Enhanced firmware which includes compressor control, cascade, ratio, differential, square-root and motorized valve control without feedback. Option not available on 1/6 DIN models.

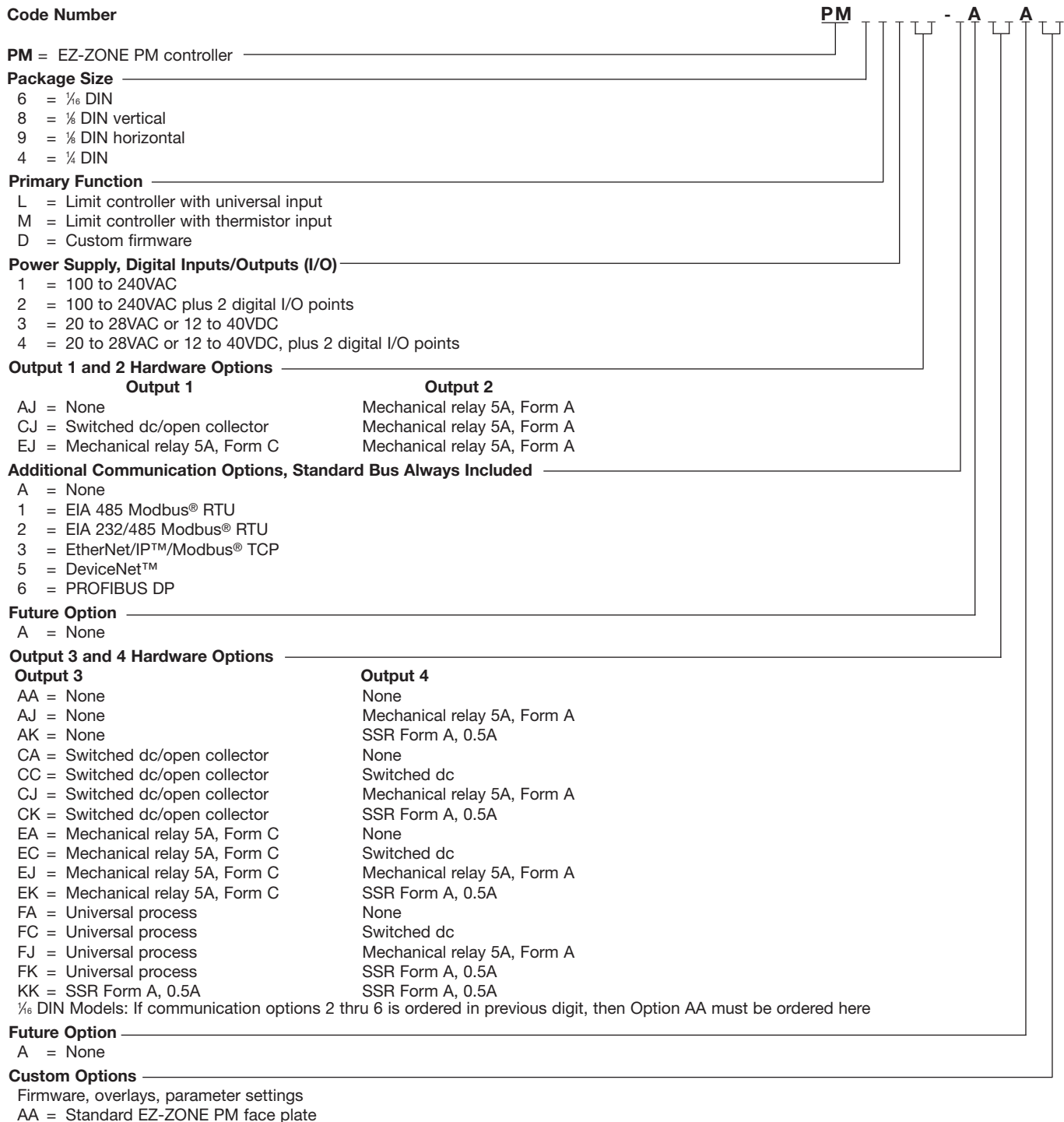
Custom Options

- AA = Standard EZ-ZONE PM face plate
- 12 = Class 1, Div. 2 (not available with integrated limit Option "L" or "M", or with Output types E, H, or J)

## Enhanced Limit Model Ordering Information

Universal Sensor Input, Standard Bus Communications, Red and Green Seven-Segment Displays

Code Number



To be automatically connected to the nearest North American Technical Sales Office:

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**International Technical Sales Offices:** Australia, +61 3 9335 6449 • China, +86 21 3381 0188 • France, +33 1 41 32 79 70

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