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## 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 order the EZ-ZONE PM as a PID controller or an over-under limit controller, or you can combine both functions in the PM Integrated Limit Controller. You now have the option to integrate a high-amperage power controller output, an over-under limit controller and a high-performance PID controller all in space-saving, panel-mount packages. 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 PID controller, an over-under limit controller or an integrated 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

- Drives 15 amp resistive loads directly
- 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

#### 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
- Semi F47-0200

#### P3T Armor Sealing System

- NEMA 4X and IP66 offers water and dust resistance, can be cleaned and washed down (indoor use only)
- 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/s

- 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

#### Profile Capability

- Preprogrammed process control
- Ramp and soak programming with four files and 40 total steps

## 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 out-

side 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 and output events are internal states that are used exclusively by profiles. The source of an event input can come from a real-world digital input or an output from another function. Likewise, event outputs may control a physical output such as an output function block or be used as an input to another function.

## Getting Started Quickly

The PM control has a page and menu structure that is listed below along with a brief description of its purpose.

<p><b>Setup Page</b> Push and hold the up and down keys (▲ ▼) for 6 seconds to enter. (See the <a href="#">Setup Page</a> for further information)</p>	<p>Once received, a user would want to setup their control prior to operation. As an example, define the input type and set the output cycle time.</p>
<p><b>Operations Page</b> Push and hold the up and down keys (▲ ▼) for 3 seconds to enter. (See the <a href="#">Operations Page</a> for further information)</p>	<p>After setting up the control to reflect your equipment, the Operations Page would be used to monitor or change runtime settings. As an example, the user may want to see how much time is left in a profile step or perhaps change the autotune set point.</p>
<p><b>Factory Page</b> Push and hold the Infinity and the green Advance keys (∞ ⚙) for 6 seconds to enter. (See the <a href="#">Factory Page</a> for further information)</p>	<p>For the most part the Factory Page has no bearing on the control when running. A user may want to enable password protection, view the control part number or perhaps create a custom Home Page.</p>
<p><b>Home Page</b> The control is at the <a href="#">Home Page</a> when initially powered up.</p>	<p>Pushing the green Advance key ⚙ will allow the user to see and change such parameters as the control mode, enable autotune and idle set point to name a few.</p>
<p><b>Profile Page</b> Push and hold the the green Advance key ⚙ for 6 seconds to enter. (See the <a href="#">Profile Page</a> for further information)</p>	<p>If equipped with this feature a user would want to go here to configure a profile.</p>

The default PM loop configuration out of the box is shown below:

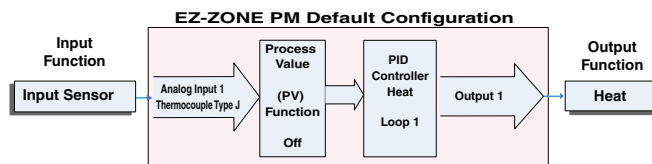
- Analog Input functions set to thermocouple, type J
- Heat algorithm set for PID, Cool set to off
- Output 1 set to Heat
- Control mode set to Auto
- Set point set to 75 °F

If you are using the input type shown above, simply connect your input and output devices to the control. Power up the control and push the up arrow ▲ on the face of the control to change the set point from

the default value of 75 °F to the desired value. As the Set Point increases above the Process Value, output 1 will come on and it will now begin driving your output device. The PV function as shown in the graphic below is only available with PM4/8/9 models.

### Note:

The output cycle time will have a bearing on the life of mechanical relay outputs and can be different based on the type of output ordered. The output cycle time can be changed in the Setup Page under the Output Menu.



# EZ-ZONE® PM PID Model System Diagram

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

