Limit Controller

The EZ-ZONE® PM Controller User's Manual is copyrighted by Watlow Winona, Inc., © December 2008 with all rights reserved. The EZ-ZONE PM is covered by U.S. Patent No. 6,005,577 and Patents Pending.

Overview

The EZ-ZONE PM Express takes the pain out of solving your thermal loop requirements while reducing the cost of control-loop ownership. You can order this control as over-under Limit controller in either a 16th or 32nd DIN panel-mount package.

Installation and Wiring

Dimensions 1/32 DIN

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 wattechsupport@watlow.com or by dialing 1 (507) 494-5656 between 7 a.m. and 5 p.m., Central Standard Time (CST). Ask 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, +1 (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.

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Warranty

The EZ-ZONE® PM is manufactured by ISO 9001-regis-
tered 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 guar-
antee 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 dam-
age resulting from transportation, alteration, misuse or abuse. The purchaser must use Watlow parts to maintain all listed ratings.

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Installation and Wiring

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The EZ-ZONE® PM Express is a listed device per Underwriters Laboratories®. It has been evaluated to United States and Canadian requirements for Process Control Equipment, UL 61010 and CSA C22.2 No. 61010. For EN50176∙1, QUXX, QUYY: see: www.watlow.com

We use note, caution and warning symbols throughout this book to draw your attention to important opera-
tional 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 you, others and equipment from damage. Pay very close attention to all warnings that apply to your application.

The electrical hazard symbol (a lightning bolt in a triangle) precedes an electric shock hazard CAUTION or WARNING safety statement. Further explanations follow:

Symbol | Explanation
--- | ---
| CAUTION – Warning or Hazard that needs further explanation than label on unit can provide. Consult users manual for further information.
| ESD Sensitive product, use proper grounding and handling techniques when installing or servicing product.
| Unit protected by double insulation or shock hazard prevention.
| Do not throw in trash, use proper recycling techniques or consult many factor for proper disposal.
| Unit can be powered with either alternating current (ac) voltage or direct current (dc) voltage.

Remote User Interface/Gateway (RUI/GTW).

You can order this control as over-under Limit controller in either a 16th or 32nd DIN panel-mount package, reducing the cost of control-loop ownership.

Because the EZ-ZONE family of controls is highly scalable, solving your thermal loop requirements while looking for a single or multi-loop PID controller, an over-under limit controller or an integrated control-ler (PID and Limit), the EZ-ZONE family of controls can meet all of your needs. Point your browser to http://www.watlow.com to find out more about the EZ-ZONE family of controls.

For this particular control, serial communications can be achieved using various protocols such as Modbus RTU/TCP®, EtherCAT®, DeviceNet®, consider using the EZ-ZONE family Remote User Interface/Gateway (RUI/GTW).

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In the pictures below notice that the Slot A connector does not show labeling for the outputs. Labeling for Slot A outputs is based on the controller part number.

### Terminal Definitions

**Slot C**

<table>
<thead>
<tr>
<th>Terminal Function</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>99</td>
<td>PM_(L)_ _ - AAAAB _</td>
</tr>
<tr>
<td>99</td>
<td>PM_(L)_ _ - AAAB _</td>
</tr>
<tr>
<td>CF</td>
<td>Standard Bus EIA-485 communt</td>
</tr>
<tr>
<td>CD</td>
<td>Standard Bus EIA-485 T/RI-</td>
</tr>
<tr>
<td>CE</td>
<td>Standard Bus EIA-485 Tx/R+</td>
</tr>
<tr>
<td>Input 1</td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>S2 (RTD) or current +</td>
</tr>
<tr>
<td>S1</td>
<td>S3 (RTD), thermocouple - current - or volts -</td>
</tr>
<tr>
<td>R1</td>
<td>S1 (RTD), thermocouple + or volts +</td>
</tr>
<tr>
<td>Outputs</td>
<td>Terminal Function</td>
</tr>
<tr>
<td>1</td>
<td>X1</td>
</tr>
<tr>
<td></td>
<td>W1</td>
</tr>
<tr>
<td></td>
<td>Y1</td>
</tr>
<tr>
<td></td>
<td>L1</td>
</tr>
<tr>
<td></td>
<td>K1</td>
</tr>
<tr>
<td></td>
<td>J1</td>
</tr>
<tr>
<td></td>
<td>L2</td>
</tr>
<tr>
<td></td>
<td>K2</td>
</tr>
</tbody>
</table>

**Chemical Compatibility**

- This product is not compatible with strong acids, weak alkalis, alcohols, aromatic hydrocarbons, chlorinated hydrocarbons, esters and ketones.
- This product is compatible with acids, weak alkalis, alcohols, gamma radiation and ultra-violet radiation.
- Use National Electric (NEC) or other country-specific standard wiring and safety practices when wiring and connecting this controller to peripheral devices. Failure to do so may result in damage to equipment and property, and/or injury or loss of life.

### Warning:

- To prevent damage to the controller, do not connect wires to unused terminals.
- Adjacent terminals may be labeled differently, depending on the model number.

**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.
- Using your thumbs push on either side of the controller until both latchs click.
- Ensure that the orientation of the controller is correct and slide it back into the housing.

**Input:**

- When using a 2 wire RTD, jumper S1 and T1 together.

**Outputs:**

- Process
  - Volt:
    - 2 or 3 Wire
    - RTD
    - Thermocouple
  - Amperes:
    - S1
  - Power:
    - 47 to 63 Hz
    - 10VA maximum power consumption
  - Note:
    - In the drawings below for each input notice that the Slot A connector labeling is identified.
    - When using a 2 wire RTD, jumper S1 and T1 together.
**Setup Menu 16th & 32nd DIN Limit Controller**

<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter Name Description</th>
<th>Range (Details are shown bold)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L.C.C.</td>
<td>Lockout Menu</td>
<td>1 to 5</td>
</tr>
<tr>
<td>S.F.n</td>
<td>Sensor Type</td>
<td>Thermostate Volt dc</td>
</tr>
<tr>
<td>d.E.C</td>
<td>Linearization</td>
<td>0.001 to 220°F</td>
</tr>
<tr>
<td>L.n.r</td>
<td>Decmal</td>
<td>0.001 to 9,999.999°F</td>
</tr>
<tr>
<td>L.n.</td>
<td>Display Units</td>
<td>Units, 3.0°F or 2°C</td>
</tr>
<tr>
<td>L.n.r</td>
<td>Limit Hysteresis</td>
<td>None</td>
</tr>
<tr>
<td>R.n.y</td>
<td>Alarm Type</td>
<td>On</td>
</tr>
<tr>
<td>R.n.h</td>
<td>Alarm Hysteresis</td>
<td>Off</td>
</tr>
<tr>
<td>R.L.R</td>
<td>Alarm Latching</td>
<td>Off</td>
</tr>
<tr>
<td>R.L.B</td>
<td>Alarm Blocking</td>
<td>Off</td>
</tr>
<tr>
<td>R.n.S</td>
<td>Alarm Silencing</td>
<td>Off</td>
</tr>
<tr>
<td>Rd.l.S</td>
<td>Alarm Display</td>
<td>Off</td>
</tr>
<tr>
<td>P.R.L.</td>
<td>Upper or Left Display</td>
<td>Off</td>
</tr>
<tr>
<td>P.R.R.</td>
<td>Lower or Right Display</td>
<td>Off</td>
</tr>
<tr>
<td>R.s.</td>
<td>Zone Address</td>
<td>None</td>
</tr>
</tbody>
</table>

**Setup Menu 16th & 32nd DIN PID Controller**

<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter Name Description</th>
<th>Range (Details are shown bold)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L.C.Y.</td>
<td>Limit Hysteresis</td>
<td>None</td>
</tr>
<tr>
<td>L.n.y</td>
<td>Alarm Type</td>
<td>Off</td>
</tr>
<tr>
<td>L.n.h</td>
<td>Alarm Hysteresis</td>
<td>Off</td>
</tr>
<tr>
<td>R.L.R</td>
<td>Alarm Latching</td>
<td>Off</td>
</tr>
<tr>
<td>R.L.B</td>
<td>Alarm Blocking</td>
<td>Off</td>
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<tr>
<td>R.n.S</td>
<td>Alarm Silencing</td>
<td>Off</td>
</tr>
<tr>
<td>Rd.l.S</td>
<td>Alarm Display</td>
<td>Off</td>
</tr>
<tr>
<td>P.R.L.</td>
<td>Upper or Left Display</td>
<td>Off</td>
</tr>
<tr>
<td>P.R.R.</td>
<td>Lower or Right Display</td>
<td>Off</td>
</tr>
<tr>
<td>R.s.</td>
<td>Zone Address</td>
<td>Off</td>
</tr>
</tbody>
</table>

To enter the Setup Menu push and hold the up and down arrow keys for approxmately 3 seconds. Once there, push the green advance key to scroll through the prompt of choice and then use the up and down arrow keys to change the range. At any point within the Operations menu to return to the default display push the Reset key.

**Setup Menu**

- **Lockout Menu**
- **Sensor Type**
- **Linearization**
- **Decimal**
- **Display Units**
- **Limit Hysteresis**
- **Alarm Type**
- **Alarm Hysteresis**
- **Alarm Latching**
- **Alarm Blocking**
- **Alarm Silencing**
- **Alarm Display**
- **Upper or Left Display**
- **Lower or Right Display**
- **Zone Address**

**16th & 32nd DIN Limit Controller**

1. 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. Appears: Always.
2. Alarm Type: Select whether the alarm will or will not trigger. Appears: Always.
3. Alarm Hysteresis: Set the hysteresis for the alarm. This determines how far into the safe region the process value needs to move before the alarm can be cleared. Appears: When alarm type is set to process.
4. Alarm Latching: Turn alarm latching on or off. A latched alarm has to be turned off by the user. Appears: When alarm type is set to process.
5. Alarm Blocking: Select when an alarm will be blocked. Appears: When alarm type is set to process.
6. Alarm Silencing: Turn alarm silencing on or off. Appears: Always.
7. Alarm Display: Display an alarm message when an alarm is active. Appears: When alarm type is set to process.
8. Upper or Left Display: Select parameter to display. Appears: Always.

**16th & 32nd DIN PID Controller**

1. Limit High Set Point
2. Limit Low Set Point
3. Alarm Hysteresis
4. Alarm Low Set Point
5. Active Process Value

*You can change the security level at any level.*

*NOTE: Switched DC/collector option should only be used to control an external mechanical relay if Limit function is selected.*
Specifications

**Line Voltage/Power**
- All voltage levels represent minimums and maximums.
- 85 to 240V (ac), 47 to 63Hz
- 20 to 265V (ac) +10/-15 percent: 50/60Hz, 5 percent
- 12 to 40V (dc)
- 100mA maximum power consumption
- Data retention upon power failure via nonvolatile memory.

**Compliance with SEMI F47-0200**: Figure R1-1 voltage sag requirements at 24V (ac) or 30V (dc).

**Designation**
- Winona, MN 55987 USA
- 1241 Bundy Blvd.
- Watlow Winona, Inc.
- Series PM

**Model Numbers**: PM (3 or 6)(Any letter or number) – (1, 2, 3 or 4)(A, C, E, F or K)

**Standards**
- IEC 61000-3-31 2005 Voltage Fluctuations and Flicker
- EN 61000-4-5 2006 Surge Immunity
- EN 61000-4-4 2004 Electrical Fast-Transient / Burst Immunity

**Rated Voltage and Frequency**: 100 to 240 V~ (ac 50/60 Hz)

**Environment**
- -18 to 65°C (0 to 149°F) operating temperature
- -20 to 35°C (0 to 95°F) storage temperature
- 0 to 90 percent RH, non-condensing

**Accuracy**
- Calibration accuracy and sensor conformity: ±0.1 percent of span, ±1°C at the calibrated ambient temperature and rated line voltage
- Type T, S, or R ±0.5 percent
- Type T, B, or J ±0.6 percent
- Calibration ambient temperature at 25°C ±3°C
- Accuracy span: 540°C (1000°F) minimum
- Temperature stability: ±0.1°C (±0.17°F) rise in ambient maximum

**Agency Approvals**
- UL50/EN 61010 Listed File E165611
- UL50, NEMA 4X, EN 60529 IP66
- CSA C22.2 No. 158031
- RoHS, W.E.E.E.
- CSA C22.2 No. 24 File 158031
- CE
- UL® 50, NEMA 4X, EN 60529 IP66
- UL®/EN 61010 Listed File E185611
- Calibration ambient temperature @ 25°C ±3°C

**Operating Range**
- Type T, S, or R: -10°C to 130°C (-14°F to 266°F) (95°F rise in ambient)
- Type K: -50°C to 1370°C (-58°F to 2500°F) (1000°C rise in ambient)
- Type J: -210°C to 1200°C (-346°F to 2192°F) (1150°F rise in ambient)
- Type E: -200°C to 1300°C (-328°F to 2372°F) (1050°C rise in ambient)
- Type N: -200°C to 1300°C (-328°F to 2372°F) (1050°C rise in ambient)
- Type R: -200°C to 1370°C (-328°F to 2700°F) (1000°C rise in ambient)
- RTD: 2- or 3-wire, platinum, 100Ω @ 0°C
- Changeable: ±0.1 percent of span, ±0.5 percent of reading, ±1°C @ the calibrated ambient temperature

**Reliability**
- Electromechanical relay, Form A, 5A, 24 to 30V (ac) or 30V (dc)
- Electronic relay, Form A, 24 to 30V (ac) or 30V (dc)
- Mechanical relay, Form A, 24 to 30V (ac) or 30V (dc)

**Environmental Conditions**
- ISO: 7779:2006
- IP: 66
- Environmental conditions: 100°F to 140°F (38°C to 60°C)

**Data Retention**
- Upon power failure via nonvolatile memory
- 10VA maximum power consumption
- 120VA max current

**Serial Communications**
- RTD: 2- or 3-wire, platinum, 100Ω @ 0°C
- >20MΩ input impedance
- Isolated communications

**Serial Specifications**
- UART: 9600 bps, 8 data bits, 1 stop bit, no parity
- Standard ASCII protocol

**Output Hardware**
- Switched dc: 22 to 325V (dc) @ 40mA
- Open collector, maximum sink current 100 mA, 100V (dc)

**Functional Operating Range**
- Type J: -210°C to 1200°C (-346°F to 2192°F)
- Type K: -200°C to 1370°C (-328°F to 2700°F)
- Type T: -200°C to 1300°C (-328°F to 2372°F)

**Output Specifications**
- Voltage sag requirements at 24V (ac), +10/-15 percent; 50/60Hz, ±5%
- Voltage sag requirements at 24V (ac), ±10 percent; 50/60Hz, ±5%
- Voltage sag requirements at 24V (ac), ±10 percent; 60/50Hz, ±5%
- Voltage sag requirements at 24V (ac), ±10 percent; 400/60Hz, ±5%

**Additional Options**
- 20kΩ input impedance; scalable from 500Ω to 20MΩ

**Menu Type**
- 32 digit, 7 segment LED displays
- Typical display update rate 1Hz
- Advance, RESET, up and down keys

**Ordering Part Number**
- Part number digits 1 through 14 PMXXXXXXAAAABXX

**Additional Information**
- All Models include: *Universal Sensor Input, Standard Bus Configuration Communications* *Dual line red over green 7 Segment displays*

**Power Supply**
- 1 = 100-240 VAC
- 2 = 12-28 VDC

**Output Hardware Options**
- Output 1
  - Output 2
  - Output 3

**Environmental Conditions**
- Temperature: 10°C to 30°C (50°F to 86°F)
- Humidity: 0% to 95% RH
- Altitude: 10,000 feet (3048 meters)

**Additional Options**
- AA = Standard E2-ZONE face plate

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**Declaration of Conformity**

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

Declares the following product:

**Series PM**
- Watlow Winona, Inc.
- 1241 Bundy Blvd.
- Winona, MN 55987 USA

- Designed and manufactured to comply with the essential requirements of the following European Union Directives by using the relevant standards shown below to indicate compliance.


EN 61326-1
- 2001

**2005/55/EC Low-Voltage Directive**

EN 61010-1
- 2001

**Safety Requirements**
- Electrical equipment for measurement, control and laboratory use - EMC requirements (industrial immunity, Class B Emissions).
- Electromagnetic Compatibility, Radiated Field Immunity
- Electrical Fast-Transient / Burst Immunity
- Conducted Immunity
- Voltage Dips, Short Interruptions and Voltage-Induced Transients
- Harmonic Current Emissions
- Voltage Fluctuations and Flicker

**Ordering Information**

**How to Reach Us**

Corporate Headquarters
Watlow Electric Manufacturing Company
1241 Bundy Blvd.
Winona, MN 55987 USA

- Tel: +1 (800) 449-3535
- Fax: +1 (507) 454-4820

- www.watlow.com

**North America**

- 1-507-454-5300
- 1-507-452-4507

**Latin America**

- 52 442 217-6235
- 52 442 217-6443

**Asia and Pacific**

- 65 6773 9488
- 65 6778 0323

**Europe**

- 39 0245869954
- 39 0245869954

**How to Contact Us**

- info@watlow.com
- www.watlow.com

**Additional Information**

- Your Authorized Watlow Distributor
- www.watlow.com