EZ-ZONE® PM

User’s Manual

Limit Controller Models

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

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>!</td>
<td>CAUTION – Warning or Hazard that needs further explanation than label on unit can provide. Consult users manual for further information.</td>
</tr>
<tr>
<td>⚡</td>
<td>ESD Sensitive product, use proper grounding and handling techniques when installing or servicing product.</td>
</tr>
<tr>
<td>⌫</td>
<td>Unit protected by double/reinforced insulation for shock hazard prevention.</td>
</tr>
<tr>
<td>🔄</td>
<td>Do not throw in trash, use proper recycling techniques or consult manufacturer for proper disposal.</td>
</tr>
<tr>
<td>7PC</td>
<td>Enclosure made of Polycarbonate material. Use proper recycling techniques or consult manufacturer for proper disposal.</td>
</tr>
<tr>
<td></td>
<td>Unit can be powered with either alternating current (ac) voltage or direct current (dc) voltage.</td>
</tr>
<tr>
<td></td>
<td>Unit 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. File E165611 QUXX, QUXX7. See: <a href="http://www.ul.com">www.ul.com</a></td>
</tr>
</tbody>
</table>

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 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.

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EZ-ZONE PM is covered by U.S. Patent No. 6,005,577 and Patents Pending
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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 also select from a number of serial communications options to help you manage system performance over a network.

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

**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 (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 (PM4/6/8/9 only)

**Programmable Menu System**
- Reduces set up time and increases operator efficiency

**Full-featured Alarms**
- Improves operator recognition of system faults
- Control of auxiliary devices
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 EZ-ZONE® family controller’s and their 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 PM limit controller can carry out several procedures at the same time, for instance, monitoring for several different alarm situations, monitoring and acting upon digital inputs and driving output devices such as lights and contactors. 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. Simply stated, this information may come from an operator pushing a button or from a sensor monitoring the temperature of a part being heated or cooled.

Each analog input typically uses a thermocouple or RTD to read the process temperature. 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 where 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/s (PM4/6/8/9 only) 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, if a failure with the primary sensing device should occur the limit could trip a contactor removing power from the heating element to avoid damaging the load.

To set up a function, it’s important to tell it what source, or instance, to use. For example, if the control is equipped with digital inputs they can be configured as an alarm. If configured as such the next step would be to define which of the four available alarm instances this digital input would be tied to. So, in this example the source would be Digital Input 5 or 6 where the instance would be selected as 1, 2, 3, or 4 corresponding to the alarm instances.

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 removal of the control voltage to a contactor; 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, in using a Limit Control an output can be configured to respond to an alarm, i.e., (instance 4) or to a limit condition.

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 PM4/6/8/9 Models - System Diagram
(with communications options 2, 3, 5 or 6)

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

Note:
Number of inputs and outputs and various combinations of the same will vary
depending upon part number; see ordering matrix for more detail.
EZ-ZONE® PM Enhanced Limit PM4/6/8/9 Models - Input/Output
(no communications options 2, 3, 5 or 6)

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

Note:
Number of inputs and outputs and various combinations of the same will vary depending upon part number; see ordering matrix for more detail.
EZ-ZONE® PM Limit All Models System Diagram
Universal Sensor Input, Configuration Communications, Red/Green 7-Segment Display

Note:
Number of inputs and outputs and various combinations of the same will vary depending upon part number; see ordering matrix for more detail.
Chapter 2: Install and Wire

Dimensions

1/32 DIN

Side

Top

Front

Recommended panel spacing

- 45.2 mm (1.78 in)
- 22.4 mm (0.88 in)
- 21.6 mm (0.85 in)

panel thickness 1.53 to 9.52 mm (0.060 to 0.375)
1/8 DIN (PM8) Vertical

1/8 DIN (PM8) Vertical Recommended Panel Spacing
1/8 DIN (PM9) Horizontal

1/8 DIN (PM9) Horizontal Recommended Panel Spacing

<table>
<thead>
<tr>
<th>Panel thickness (0.060 in)</th>
<th>1.53 mm to (0.375 in)</th>
<th>9.52 mm</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Panel thickness (0.85 in)</th>
<th>21.6 mm</th>
</tr>
</thead>
</table>
1/4 DIN (PM4) Recommended Panel Spacing

Panel thickness .060 (1.53) to .375 (9.52)
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.

3. For a NEMA 4X (UL50, IP66) seal, alternately place and push the blade of a screwdriver against each of the four corners of the mounting collar assembly. Apply pressure to the face of the controller while pushing with the screwdriver. 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 above). 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.

   ![Diagram](image)

   Slide the mounting collar over the back of the controller.

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

   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.

   ![Images](image)

   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. On the PM4/8/9 controls slide a screwdriver under the pry tabs and turn.

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.
<table>
<thead>
<tr>
<th>Slot C</th>
<th>Terminal Function</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>98</td>
<td>power input: ac or dc+</td>
<td>all</td>
</tr>
<tr>
<td>99</td>
<td>power input: ac or dc-</td>
<td>all</td>
</tr>
<tr>
<td>CC</td>
<td>Standard Bus or Modbus RTU EIA-485 common</td>
<td>Standard Bus or Modbus PM [4, 6, 8, 9] _ _ _ _ [1] _ _ AAA</td>
</tr>
<tr>
<td>CA</td>
<td>Standard Bus or Modbus RTU EIA-485 T/-R-</td>
<td>Standard Bus or Modbus PM [4, 6, 8, 9] _ _ _ _ [A, 2 or 3] _ _ AAA</td>
</tr>
<tr>
<td>CB</td>
<td>Standard Bus or Modbus RTU EIA-485 T+/R+</td>
<td>Standard Bus or Modbus PM [4, 6, 8, 9] _ _ _ _ AAA</td>
</tr>
<tr>
<td>CF</td>
<td>Standard Bus EIA-485 common</td>
<td>Standard Bus EIA-485 common</td>
</tr>
<tr>
<td>CD</td>
<td>Standard Bus EIA-485 T/-R-</td>
<td>Standard Bus EIA-485 PM [4, 6, 8, 9] _ _ _ _ AAA</td>
</tr>
<tr>
<td>CE</td>
<td>Standard Bus EIA-485 T+/R+</td>
<td>Standard Bus EIA-485 PM [4, 6, 8, 9] _ _ _ _ AAA</td>
</tr>
<tr>
<td>B5</td>
<td>digital input-output common</td>
<td>PM _ _ [2] _ _ _ _ AAA</td>
</tr>
<tr>
<td>D6</td>
<td>digital input or output 6</td>
<td>PM _ _ [4] _ _ _ _ AAA</td>
</tr>
<tr>
<td>D5</td>
<td>digital input or output 5</td>
<td>PM _ _ [4] _ _ _ _ AAA</td>
</tr>
</tbody>
</table>

**Note:** Slot B above can also be configured with a communications card.
EZ-ZONE PM Isolation Blocks.

- **Controller Power Supply**
  - 12 to 40V (dc)
  - 20 to 28V (ac)
  - 100 to 240V (ac)

- **Mechanical Relay, Solid-State Relay Outputs**

- **Controller Low Voltage Power Bus**

  - **Digital Inputs & Outputs 5-6**
  - **Switched DC, Open Collector, Process outputs**
  - **Analog Input 1**
  - **Communications Ports**

- **Safety Isolation**

- **Low-voltage Isolation: 42V peak**
- **Safety Isolation: 2300V (ac)**
Warning:
Use National Electric (NEC) or other country-specific standard wiring and safety practices when wiring and connecting this controller to a power source and to electrical sensors or peripheral devices. Failure to do so may result in damage to equipment and property, and/or injury or loss of life.

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

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

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

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

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

Low Power

- Minimum/Maximum Ratings
  - 12 to 40V= (dc)
  - 20 to 28V~ (ac) Semi Sig F47
  - 47 to 63 Hz
- 14VA maximum power consumption (PM4, 8 & 9)
- 10VA maximum power consumption (PM3 & 6)

High Power

- Minimum/Maximum Ratings
  - 85 to 264V~ (ac)
  - 100 to 240V~ (ac) Semi Sig F47
  - 47 to 63 Hz
- 14VA maximum power consumption (PM4, 8 & 9)
- 10VA maximum power consumption (PM3 & 6)

Digital Input 5, 6

- Digital Input
  - Update rate 10 Hz
  - Dry contact or dc voltage

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

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

Voltage Input

Dry Contact

24 Vdc
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.

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

Input 1 Thermocouple

- 2KΩ 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.

Input 1 RTD

- platinum, 100 and 1,000 Ω @ 0°C
- calibration to DIN curve (0.00385 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.

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

Input 1 Potentiometer

- Use a 1 kΩ potentiometer.

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Warning:
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Note:
Maximum wire size termination and torque rating:
• 0.0507 to 3.30 mm² (30 to 12 AWG) single-wire termination or two 1.31 mm² (16 AWG)
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Note:
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Note:
The control output common terminal and the digital common terminal are referenced to different voltages and must remain isolated.

---

### Input 1 Thermistor

- 20 Ω maximum source resistance
- >20 MΩ input impedance
- 3 microampere open-sensor detection

Input 1: PM _ [M] _ _ _ _-_ _ _ _ (S1/R1)
**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.

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### Digital Output 5, 6

![Digital Output Diagram]

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

**Output 1 Switched DC/Open Collector**

![Switched DC/Open Collector Diagram]

**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.

**Output 1 Mechanical Relay, Form C**

![Mechanical Relay Diagram]

- 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.

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Watlow EZ-ZONE® PM Limit Controller • 20 • Chapter 2 Install and Wire
Warning: Use National Electric (NEC) or other country-specific standard wiring and safety practices when wiring and connecting this controller to a power source and to electrical sensors or peripheral devices. Failure to do so may result in damage to equipment and property, and/or injury or loss of life.

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

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

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

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

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

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 2 Mechanical Relay, Form A

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

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.

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

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

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

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

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

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

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 Universal Process
- 0 to 20 mA into 800 Ω maximum load
- 0 to 10V= (dc) into 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

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.

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

1 Amp SSR Derating Curve

Ambient Temperature (°C) vs. Safe Operating Area

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

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

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

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

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

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

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 4 Mechanical Relay, Form A

Output 4 Solid-State Relay, Form A

Quencharc Wiring Example

In this example the Quencharc circuit (Watlow part# 0804-0147-0000) is used to protect PM internal circuitry from the counter electromagnetic force from the inductive user load when de-energized. It is recommended that this or an equivalent Quencharc be used when connecting inductive loads to PM outputs.
Warning:
Use National Electric (NEC) or other country-specific standard wiring and safety practices when wiring and connecting this controller to a power source and to electrical sensors or peripheral devices. Failure to do so may result in damage to equipment and property, and/or injury or loss of life.

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

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

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

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

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

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

### 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.
- Maximum number of EZ-ZONE controllers on a Modbus RTU network is 247.
- Maximum network length: 1,200 meters (4,000 feet)
- 1/8th unit load on EIA-485 bus.

### 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 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

---

<table>
<thead>
<tr>
<th>Modbus-IDA Terminal</th>
<th>EIA/TIA-485 Name</th>
<th>Watlow Terminal Label</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>DO</td>
<td>A</td>
<td>CA or CD</td>
<td>T/R-</td>
</tr>
<tr>
<td>D1</td>
<td>B</td>
<td>CB or CE</td>
<td>T+/R+</td>
</tr>
<tr>
<td>common</td>
<td>common</td>
<td>CC or CP</td>
<td>common</td>
</tr>
</tbody>
</table>
Warning:
Use National Electric (NEC) or other country-specific standard wiring and safety practices when wiring and connecting this controller to a power source and to electrical sensors or peripheral devices. Failure to do so may result in damage to equipment and property, and/or injury or loss of life.

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

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

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

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

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

EtherNet/IP™ and Modbus TCP Communications

Note:
When changing the fixed IP address cycle module power for new address to take effect

Ethernet LED Indicators

Viewing the control from the front and then looking on top four LEDs can be seen aligned vertically front to back. The LEDs are identified accordingly: closest to the front reflects the Network (Net) Status, Module (Mod) Status is next, Activity status follows and lastly, the LED closest to the rear of the control reflects the Link status.

Note:
When using Modbus TCP, the Network Status and Module Status LEDs are not used.

Network Status

<table>
<thead>
<tr>
<th>Indicator State</th>
<th>Summary</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steady Off</td>
<td>Not powered, no IP address</td>
<td>If the device does not have an IP address (or is powered off), the network status indicator shall be steady off.</td>
</tr>
<tr>
<td>Flashing Green</td>
<td>No connections</td>
<td>If the device has no established connections, but has obtained an IP address, the network status indicator shall be flashing green.</td>
</tr>
<tr>
<td>Steady Green</td>
<td>Connected</td>
<td>If the device has at least one established connection (even to the Message Router), the network status indicator shall be steady green.</td>
</tr>
<tr>
<td>Flashing Red</td>
<td>Connection timeout</td>
<td>If one or more of the connections in which this device is the target has timed out, the network status indicator shall be flashing red. This shall be left only if all timed out connections are reestablished or if the device is reset.</td>
</tr>
<tr>
<td>Steady Red</td>
<td>Duplicate IP</td>
<td>If the device has detected that its IP address is already in use, the network status indicator shall be steady red.</td>
</tr>
<tr>
<td>Flashing Green / Red</td>
<td>Self-test</td>
<td>While the device is performing its power up testing, the network status indicator shall be flashing green / red.</td>
</tr>
</tbody>
</table>
Module Status

<table>
<thead>
<tr>
<th>Indicator State</th>
<th>Summary</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steady Off</td>
<td>No power</td>
<td>If no power is supplied to the device, the module status indicator shall be steady off.</td>
</tr>
<tr>
<td>Steady Green</td>
<td>Device operational</td>
<td>If the device is operating correctly, the module status indicator shall be steady green.</td>
</tr>
<tr>
<td>Flashing Green</td>
<td>Standby</td>
<td>If the device has not been configured, the module status indicator shall be flashing green.</td>
</tr>
</tbody>
</table>
| Flashing Red      | Minor fault            | If the device has detected a recoverable minor fault, the module status indicator shall be flashing red.  
                     |                        | NOTE: An incorrect or inconsistent configuration would be considered a minor fault. |
| Steady Red        | Major fault            | If the device has detected a non-recoverable major fault, the module status indicator shall be steady red. |
| Flashing Green / Red | Self-test           | While the device is performing its power up testing, the module status indicator shall be flashing green / red. |

Link Status

<table>
<thead>
<tr>
<th>Indicator State</th>
<th>Summary</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steady Off</td>
<td>Not powered, unknown link speed</td>
<td>If the device cannot determine link speed or power is off, the network status indicator shall be steady off.</td>
</tr>
<tr>
<td>Red</td>
<td>Link speed = 10 Mbit</td>
<td>If the device is communicating at 10 Mbit, the link LED will be red.</td>
</tr>
<tr>
<td>Green</td>
<td>Link speed = 100 Mbit</td>
<td>If the device is communicating at 100 Mbit, the link LED will be green.</td>
</tr>
</tbody>
</table>

Activity Status

<table>
<thead>
<tr>
<th>Indicator State</th>
<th>Summary</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flashing Green</td>
<td>Detects activity</td>
<td>If the MAC detects activity, the LED will be flashing green.</td>
</tr>
<tr>
<td>Red</td>
<td>Link speed = 10Mbit</td>
<td>If the MAC detects a collision, the LED will be red.</td>
</tr>
</tbody>
</table>

DeviceNet™ Communications

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>V+</td>
<td>V+</td>
<td>DeviceNet™ power</td>
</tr>
<tr>
<td>CH</td>
<td>CAN_H</td>
<td>positive side of DeviceNet™ bus</td>
</tr>
<tr>
<td>SH</td>
<td>shield</td>
<td>shield interconnect</td>
</tr>
<tr>
<td>CL</td>
<td>CAN_L</td>
<td>negative side of DeviceNet™ bus</td>
</tr>
<tr>
<td>V-</td>
<td>V-</td>
<td>DeviceNet™ power return</td>
</tr>
</tbody>
</table>

PM [4, 6, 8, 9] __ __ __ [5] __ __ __

DeviceNet LED Indicators

Viewing the control from the front and then looking on top two LEDs can be seen aligned vertically front to back. The LED closest to the front is identified as the network (Net) LED where the one next to it would be identified as the module (Mod) LED.
**Warning:**

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

**Note:**

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

**Note:**

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

**Note:**

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

**Note:**

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

**Note:**

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

### Network Status

<table>
<thead>
<tr>
<th>Indicator LED</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>The device is not online and has not completed the duplicate MAC ID test yet. The device may not be powered.</td>
</tr>
<tr>
<td>Green</td>
<td>The device is online and has connections in the established state (allcated to a Master).</td>
</tr>
<tr>
<td>Red</td>
<td>Failed communication device. The device has detected an error that has rendered it incapable of communicating on the network (duplicate MAC ID or Bus-off).</td>
</tr>
<tr>
<td>Flashing Green</td>
<td>The device is online, but no connection has been allocated or an explicit connection has timed out.</td>
</tr>
<tr>
<td>Flashing Red</td>
<td>A poll connection has timed out.</td>
</tr>
</tbody>
</table>

### Module Status

<table>
<thead>
<tr>
<th>Indicator LED</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>No power is applied to the device.</td>
</tr>
<tr>
<td>Flashing Green-Red</td>
<td>The device is performing a self-test.</td>
</tr>
<tr>
<td>Flashing Red</td>
<td>Major Recoverable Fault.</td>
</tr>
<tr>
<td>Red</td>
<td>Major Unrecoverable Fault.</td>
</tr>
<tr>
<td>Green</td>
<td>The device is operating normally.</td>
</tr>
</tbody>
</table>

### Profibus DP 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 Digital Ground 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 should be used if this control is the last one on the network.
- If using a 150 Ω cable Watlow provides internal termination. Place a jumper across pins trB and B and trA and A.
- If external termination is to be used with a 150 Ω cable place a 390 Ω resistor across pins VP and B, a 220 Ω resistor across pins B and A, and lastly, place a 390 Ω resistor across pins DG and A.
- Do not connect more than 32 EZ-ZONE PM controllers on any given segment.
- Maximum EIA-485 network length: 1,200 meters (4,000 feet)
- 1/8th unit load on EIA-485 bus.

### Profibus Terminal EIA/TIA-485 Name

<table>
<thead>
<tr>
<th>Profibus Terminal</th>
<th>EIA/TIA-485 Name</th>
<th>Watlow Terminal Label</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>VP (Voltage Potential)</td>
<td>- - - -</td>
<td>VP</td>
<td>+5Vdc</td>
</tr>
<tr>
<td>B-Line</td>
<td>B</td>
<td>B</td>
<td>T+/R+</td>
</tr>
<tr>
<td>A-Line</td>
<td>A</td>
<td>A</td>
<td>T-/R-</td>
</tr>
<tr>
<td>DP-GND</td>
<td>common</td>
<td>DG</td>
<td>common</td>
</tr>
</tbody>
</table>

### Profibus DP LED Indicators

Viewing the unit from the front and then looking on top of the RUI/GTW two bi-color LEDs can be seen where only the front one is used. Definition follows:

### Closest to the Front

<table>
<thead>
<tr>
<th>Indicator LED</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Profibus network not detected</td>
</tr>
<tr>
<td>Red Flashing</td>
<td>Indicates that the Profibus card is waiting for data exchange.</td>
</tr>
<tr>
<td>Green</td>
<td>Data exchange mode</td>
</tr>
</tbody>
</table>
Warning:
Use National Electric (NEC) or other country-specific standard wiring and safety practices when wiring and connecting this controller to a power source and to electrical sensors or peripheral devices. Failure to do so may result in damage to equipment and property, and/or injury or loss of life.

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

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

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

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

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

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.

A network using Watlow's Standard Bus and an RUI/Gateway.

A network with all devices configured using Modbus RTU.
Chapter 3: Keys and Displays

Upper (Left, 32nd DIN) Display:
In the Home Page, displays the process value, otherwise displays the value of the parameter in the lower display.

Zone Display:
Indicates the controller zone.
1 to 9 = zones 1 to 9
A = zone 10  E = zone 14
b = zone 11  F = zone 15
C = zone 12  h = zone 16
d = zone 13

Percent Units:
Lights when the controller is displaying values as a percentage

Channel Display:
Indicates the channel for any given EZ-ZONE module.
- Available with the PM4, 8 and PM9 only.

Reset Key
Press to back up one level, or press and hold for two seconds to return to the Home Page. From the Home Page will reset the limit and clear alarms and errors if clearable.

Advance Key
Advances through parameter prompts.

Lower (Right, 32nd DIN) Display:
Indicates the set point or output power value during operation, or the parameter whose value appears in the upper display.

EZ Key/s:
This key can be programmed to do various tasks, such as locking the keyboard, restoring user settings, etc...

Output Activity:
Number LEDs indicate activity of outputs. A flashing light indicates output activity.

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

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

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.

Temperature Units:
Indicates whether the temperature is displayed in Fahrenheit or Celsius.
Responding to a Displayed Messages

An active message will cause the display to toggle between the normal settings and the active message in the upper display and \texttt{[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 by simply pushing the Reset \texttt{RESET} key or alternatively by following the steps below.

Push the Advance Key to display \texttt{[ignr]} in the upper display and the message source (such as \texttt{[Li;h1]}) in the lower display.

Use the Up \texttt{Up} or Down \texttt{Down} keys to scroll through possible responses, such as Clear \texttt{[CLr]} or Silence \texttt{[Sil]}. Then push the Advance \texttt{Advance} or Reset \texttt{Reset} key to execute the action.

Attention Codes

<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter Name Description</th>
<th>Setting</th>
<th>Range</th>
<th>Default</th>
<th>Appears If</th>
</tr>
</thead>
<tbody>
<tr>
<td>\texttt{[Attn]}</td>
<td>Attention</td>
<td></td>
<td>\texttt{[AL;L1] [AL;L2] [AL;L3] [AL;L4] [AL;h1] [AL;h2] [AL;h3] [AL;h4] [AL;E1] [AL;E2] [AL;E3] [AL;E4] [Er;i1] [Li;L1] [Li;h1] [Li;E1]}</td>
<td>an alarm or error message is active.</td>
<td></td>
</tr>
</tbody>
</table>

Parameters that appear only in the Home Page
Chapter 4: Home Page

Default Home Page Parameters

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. The default Home Page is shown on the following page. 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 Attention \( \text{Attn} \) parameter appears only if there is an active message. An example of an active message could be that Alarm 1 High occurred where the display would flash \( \text{Attn} \) on the bottom display and \( \text{Attn} \) on top.

Use the Advance key \( \uparrow \) to step through the other parameters. When not in pairs the parameter prompt will appear in the lower display, and the parameter value will appear in the upper display. You can use the Up \( \uparrow \) or Down \( \downarrow \) keys to change the value of writable parameters, just as you would in any other menu.

If a sensor failure has occurred, dashed lines \( \text{---} \) will appear in the upper display and \( \text{fail} \) in the lower display. This would also cause the limit to trip as well.

Changing the Set Point

From the default Home Page the Limit set points (high and or low) can be changed. If the Limit is set up for high and low limits push the Advance \( \uparrow \) key one time and the Limit Low Set Point \( \text{ll} \) prompt will appear in the lower display while the current set point will be displayed above. Pushing the Up \( \uparrow \) or Down \( \downarrow \) keys will change the set point. Once done, simply push the Advance \( \uparrow \) key to display the Limit High Set Point \( \text{lh} \) will appear below and the current high set point will be displayed above. Again, to change simply push the Up and Down arrow keys.

Modifying the Home Page

To modify the Home Page proceed to the Factory Menu by pushing and holding the Advance \( \uparrow \) key and the Reset \( \downarrow \) key for approximately six seconds. Upon entering the Factory Page the first menu will be the Custom Menu \( \text{Cust} \). Once there push the Advance \( \uparrow \) key where the lower display will show \( \text{Cust} \) and the upper display will show \( \text{f} \). Again, push the Advance \( \uparrow \) button where the prompt for the Process Value \( \text{Pr} \) will be displayed on top and Parameter \( \text{Pr} \) in the bottom. Using the Up \( \uparrow \) or Down \( \downarrow \) arrow keys will allow for a customized selection of choice. There are twenty positions available that can be customized.

Modifying the Display Pairs

The Home Page, being a customized list of as many as 20 parameters can be configured in pairs of up to 10 via the Display Pairs \( \text{dP} \) prompt found in the Diagnostic Menu \( \text{d} \) (Factory Page). The listing in the table that follows represents the Limit default Home Page. It is important to note that some of the prompts shown may not appear simply because the feature is not being used or is turned off. As an example, the prompt shown in position 3 (Limit Low Set Point) will not appear unless the Limit is set up for limit low found on the Set Page under the Limit Menu.

As stated above, the user can define ten pairs of prompts to appear on the display every time the Advance \( \uparrow \) key is pushed. In a default state the Display Pairs \( \text{dP} \) prompt is equal to one with the first pair displayed as is defined in the Home Page table that follows. If the Display Pairs prompt were to be changed to two pushing the Advance key one time would cause the display to show the Limit low Set Point on the top and the Limit High Set point on the bottom reflecting position 3 and 4 respectively. Note that both of these parameters are writable however being paired in this manner only Limit High Set Point can be changed. Pairing two writable prompts will only allow for the bottom one to be changed.

The display can be configured to scroll by going to the Factory Page under the Diagnostic Menu and changing the Display Time \( \text{dt} \) prompt to something greater than 0. If set to 2, the display will scroll every 2 seconds from Custom Menu Pair 1 to 2, etc...
Navigating the EZ-ZONE PM Limit Controller
PM6 Shown, Applies to All Models

**Home Page from anywhere:** Press the Reset key for two seconds to return to the Home Page.

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

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

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

<table>
<thead>
<tr>
<th>Custom Menu Number</th>
<th>Home Page Display (defaults)</th>
<th>Parameter Name</th>
<th>Settings</th>
<th>Custom Menu Display (defaults)</th>
<th>Parameter Page and Menu</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 (Lower or right display)</td>
<td>![SAFE] or ![FAIL]</td>
<td>Limit Status</td>
<td>![l;st]</td>
<td>![l;st]</td>
<td>Operations Page, Limit Menu</td>
</tr>
<tr>
<td>3</td>
<td>Numerical value</td>
<td>Limit Low Set Point</td>
<td>![ll;51]</td>
<td>![ll;51]</td>
<td>Operations Page, Limit Menu</td>
</tr>
<tr>
<td>5 to 20</td>
<td>(skipped)</td>
<td></td>
<td>![nonE]</td>
<td>![nonE]</td>
<td>(Add parameters to the Home Page in the Custom Menu, Factory Page.)</td>
</tr>
</tbody>
</table>

**Default Home Page**

When the Limit is in a default state (as shipped from factory), the display will flash where the top display will show the Process Value and ![L_1] and the bottom will display ![REn] and ![FIL].
Conventions Used in the Menu Pages

To better understand the menu pages that follow review the naming conventions used. When encountered throughout this document, the word “default” implies as shipped from the factory. Each page (Operations, Setup, Profile and Factory) and their associated menus have identical headers defined below:

<table>
<thead>
<tr>
<th>Header Name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display</td>
<td>Visually displayed information from the control.</td>
</tr>
<tr>
<td>Parameter Name</td>
<td>Describes the function of the given parameter.</td>
</tr>
<tr>
<td>Range</td>
<td>Defines options available for this prompt, i.e., min/max values (numerical), yes/no, etc... (further explanation below).</td>
</tr>
<tr>
<td>Default</td>
<td>Values as delivered from the factory.</td>
</tr>
<tr>
<td>Parameter Appears in Menu When</td>
<td>Conditions required for parameter to appear in menu.</td>
</tr>
<tr>
<td>Modbus Relative Address</td>
<td>Identifies unique parameters using either the Modbus RTU or Modbus TCP protocols (further explanation below).</td>
</tr>
<tr>
<td>CIP (Common Industrial Protocol)</td>
<td>Identifies unique parameters using either the DeviceNet or EtherNet/IP protocol (further explanation below).</td>
</tr>
<tr>
<td>Profibus Index</td>
<td>Identifies unique parameters using Profibus DP protocol (further explanation below).</td>
</tr>
<tr>
<td>Parameter ID</td>
<td>Identifies unique parameters used with other software such as, LabVIEW.</td>
</tr>
<tr>
<td>Data Type R/W</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>**</td>
</tr>
</tbody>
</table>

Display

Visual information from the control is displayed to the observer using a fairly standard 7 segment display. Due to the use of this technology, several characters displayed need some interpretation, see the list below:

- \( i = 1 \)
- \( d = 0 \)
- \( r = i \)
- \( r = r \)
- \( 2 = 2 \)
- \( A = A \)
- \( J = J \)
- \( S = S \)
- \( 3 = 3 \)
- \( b = b \)
- \( H = K \)
- \( t = t \)
- \( 4 = 4 \)
- \( e = c \)
- \( c = L \)
- \( u = u \)
- \( 5 = 5 \)
- \( d = d \)
- \( M = M \)
- \( v = v \)
- \( 6 = 6 \)
- \( E = E \)
- \( n = n \)
- \( W = W \)
- \( 7 = 7 \)
- \( F = F \)
- \( o = o \)
- \( y = y \)
- \( 8 = 8 \)
- \( g = g \)
- \( P = P \)
- \( Z = Z \)
- \( 9 = 9 \)
- \( h = h \)
- \( q = q \)

Range

Within this column notice that on occasion there will be numbers found within parenthesis. This number represents the enumerated value for that particular selection. Range selections can be made simply by writing the enumerated value of choice using any of the available communications protocols. As an example, turn to the Setup Page and look at the Analog Input \([\text{Ai}]\) menu and then the Sensor Type \([\text{Sen}]\) prompt. To turn the sensor off simply write the value of 62 (off) to Modbus register 400369 and send that value to the control.

Communication Protocols

When using a communications protocol in conjunction with the EZ-ZONE PML there may be two possible ports (instances) used. Port 1 or instance 1 is always dedicated to Standard Bus communications. This same instance can also be used for Modbus RTU if ordered. Depending on the controller part number port 2 (instance 2) can be used with Modbus, CIP and Profibus. For further information read through the remainder of this section.

Modbus RTU & TCP Protocols

All Modbus registers are 16-bits and as displayed in this manual are relative addresses (actual). Some legacy software packages limit available Modbus registers to 40001 to 49999 (5 digits). Many applications today require access to all available Modbus registers which range from 400001 to 465535 (6 digits). Watlow controls support 6 digit Modbus registers. For parameters listed as float notice that only one (low order) of the two registers is listed, this is true throughout this document. By default the low order word contains the two low bytes of the 32-bit parameter. As an example, look in the Operations Page for the Process Value. Find the column identified in the header as Modbus Relative Address and notice that it lists register 360. Because this parameter is a float it is actually represented by registers 360 (low order bytes) and 361 (high order bytes). Because the
Modbus specification does not dictate which register should be high or low order Watlow provides the user the ability to swap this order (Setup Page, Menu) from the default low/high to high/low.

**Note:**
With the release of firmware revision 7.00 and above new functions where introduced into the EZ-ZONE product line. With the introduction of these new functions there was a reorganization of Modbus registers. Notice in the column identified as Modbus Relative Address the reference to Map 1 and Map 2 registers for each of the various parameters. To be backwards compatible in your programming use Map 1 registers. To be able to implement new functions in the Limit when and if they become available use Map 2 registers. The Data Map for Modbus registers can be changed in the Setup Page under the Menu. This setting will apply across the control.

It should also be noted that some of the cells in the Modbus column contain wording pertaining to an offset. Several parameters in the control contain more than one instance; such as, profiles (4), alarms (4), etc... The Modbus register shown always represents instance one. Take for an example the Alarm Silence parameter found in the Setup Page under the Alarm menu. Instance one of Map 1 is shown as address 1490 and +50 is identified as the offset to the next instance. If there was a desire to read or write to instance 3 simply add 100 to 1490 to find its address, in this case, the instance 3 address for Alarm Silence is 1590.

To learn more about the Modbus protocol point your browser to http://www.modbus.org.

**Common Industrial Protocol (CIP)**

**DeviceNet & Ethernet/IP**
Both DeviceNet and EtherNet/IP use open object based programming tools and use the same addressing scheme. In the following menu pages notice the column header identified as CIP. There you will find the Class, Instance and Attribute in hexadecimal, (decimal in parenthesis) which makes up the addressing for both protocols.

**Data Types Used with CIP**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>uint</td>
<td>Unsigned 16 bit integer</td>
</tr>
<tr>
<td>int</td>
<td>Signed 16-bit</td>
</tr>
<tr>
<td>dint</td>
<td>Signed 32-bits, long</td>
</tr>
<tr>
<td>real</td>
<td>Float, IEEE 754 32-bit</td>
</tr>
<tr>
<td>string</td>
<td>ASCII, 8 bits per character</td>
</tr>
<tr>
<td>sint</td>
<td>Signed 8 bits, byte</td>
</tr>
</tbody>
</table>

To learn more about the DeviceNet and EtherNet/IP protocol point your browser to http://www.odva.org.

**Profibus DP**
To accomodate for Profibus DP addressing the following menus contain a column identified as Profibus Index. Data types used in conjunction with Profibus DP can be found in the table below.

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word</td>
<td>Unsigned 16 bit</td>
</tr>
<tr>
<td>INT</td>
<td>Signed 16-bit Integer</td>
</tr>
<tr>
<td>dint</td>
<td>Signed 32-bit Integer</td>
</tr>
<tr>
<td>REAL</td>
<td>Float, IEEE 754 32-bit</td>
</tr>
<tr>
<td>CHAR</td>
<td>ASCII, 8 bits per character</td>
</tr>
<tr>
<td>BYTE</td>
<td>8 bits</td>
</tr>
</tbody>
</table>

To learn more about the Profibus DP protocol point your browser to http://www.profibus.org.
Chapter 5: Operations Page

Navigating the Operations Page

To go to the Operations Page from the Home Page, press both the Up \( \uparrow \) and Down \( \downarrow \) keys for three seconds. \( \text{Ai} \) will appear in the upper display and \( \text{oPER} \) will appear in the lower display.

- Press the Up \( \uparrow \) or Down \( \downarrow \) key to view available menus. On the following pages top level menus are identified with a yellow background color.
- Press the Advance key \( \Rightarrow \) to enter and view available prompts within a menu.
- Press the Infinity Key \( \hat{\text{R}} \) to move backwards through the levels: parameter to submenu; submenu to menu; menu to Home Page.
- Press and hold the Infinity Key \( \hat{\text{R}} \) for two seconds to return to the Home 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.

**Note:**
Some of the listed parameters may not be visible. Parameter visibility is dependent upon controller part number.

\( \text{Ai} \)
\( \text{oPER} \) Analog Input Menu
- \( \text{AiR} \) Process Value
- \( \text{AiE} \) Error Status
- \( \text{AiC} \) Calibration Offset

\( \text{dio} \)
\( \text{oPER} \) Digital Input/Output Menu
- \( \text{dioS} \) Digital Input/Output
  - \( \text{dioS} \) Output State
  - \( \text{eS} \) Event State
  - \( \text{iS} \) Input State

\( \text{lim} \)
\( \text{oPER} \) Limit Menu
- \( \text{limS} \) Low Set Point
- \( \text{lS} \) High Set Point

\( \text{alm} \)
\( \text{oPER} \) Alarm Menu
- \( \text{almS} \) Alarm
  - \( \text{lS} \) Low Set Point
  - \( \text{hS} \) High Set Point
## Operations Page

<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter Name Description</th>
<th>Range</th>
<th>Default</th>
<th>Modbus Relative Address</th>
<th>CIP Class Instance Attribute hex (dec)</th>
<th>Pro-</th>
<th>Param-</th>
<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Analog Input Menu</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Input (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Process Value</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>View the process value.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>error status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Error Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>View the cause of the most</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>recent error. If the <code>Err</code></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>message is <code>Err</code>, this</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>parameter will display the</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>cause of the input error.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>calibration Offset</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Offset the input reading</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>to compensate for lead wire</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>resistance or other factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>that cause the input reading</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>to vary from the actual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>process value.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Output State</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>View the state of this</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>output.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Event Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>View this event input state.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EZ-Key/s (1 to 2) Event</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>View this event input state.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

### Limit Menu

<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter Name</th>
<th>Description</th>
<th>Range</th>
<th>Default</th>
<th>Modbus Relative Address</th>
<th>CIP Class</th>
<th>Pro-fi Bus Index</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>L S</td>
<td>Limit (1)</td>
<td>Low Set Point</td>
<td>Set the low process value that will trigger the limit.</td>
<td>-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C</td>
<td>0.0°F or units -18.0°C</td>
<td>Instance 1</td>
<td>0x70 (112)</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>L S</td>
<td>Limit (1)</td>
<td>High Set Point</td>
<td>Set the high process value that will trigger the limit.</td>
<td>-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C</td>
<td>0.0°F or units -18.0°C</td>
<td>Instance 1</td>
<td>0x70 (112)</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>L S</td>
<td>Limit (1)</td>
<td>Limit State</td>
<td>Clear limit once limit condition is cleared.</td>
<td>Off (62) None (61) Limit High (51) Limit Low (52) Error (225)</td>
<td>- - - -</td>
<td>Instance 1</td>
<td>0x70 (112)</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>L S</td>
<td>Limit (1)</td>
<td>Limit Clear Request</td>
<td>Clear limit once limit condition is cleared.</td>
<td>Clear (1131)</td>
<td>0</td>
<td>Instance 1</td>
<td>0x70 (112)</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

### Alarm Menu

<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter Name</th>
<th>Description</th>
<th>Range</th>
<th>Default</th>
<th>Modbus Relative Address</th>
<th>CIP Class</th>
<th>Pro-fi Bus Index</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>L a</td>
<td>Alarm (1 to 4)</td>
<td>Low Set Point</td>
<td>If Alarm Type (Setup Page, Alarm Menu) is set to: process - set the process value that will trigger a low alarm.</td>
<td>-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C</td>
<td>32.0°F or units 0.0°C</td>
<td>Instance 1</td>
<td>0x6D (109)</td>
<td>1 to 4</td>
<td>2</td>
</tr>
<tr>
<td>L a</td>
<td>Alarm (1 to 4)</td>
<td>High Set Point</td>
<td>If Alarm Type (Setup Page, Alarm Menu) is set to: process - set the process value that will trigger a high alarm.</td>
<td>-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C</td>
<td>300.0°F or units 150.0°C</td>
<td>Instance 1</td>
<td>0x6D (109)</td>
<td>1 to 4</td>
<td>1</td>
</tr>
</tbody>
</table>

**Note:**
Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces.
<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter Name</th>
<th>Description</th>
<th>Range</th>
<th>Default</th>
<th>Modbus Relative Address</th>
<th>CIP Class</th>
<th>Instance</th>
<th>Instance Attribute</th>
<th>hex (dec)</th>
<th>Proﬁbus Index</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Displayed</td>
<td><strong>Alarm (1 to 4)</strong></td>
<td><strong>Alarm State</strong></td>
<td>Startup (88)</td>
<td>None</td>
<td>Instance 1</td>
<td></td>
<td>1 to 4</td>
<td>[Map 1] [Map 2]</td>
<td>1496</td>
<td>1986</td>
<td>0x6D (109)</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>None</td>
<td>- - -</td>
<td></td>
<td></td>
<td>[Map 1] 50</td>
<td>[Map 2] 60</td>
<td></td>
<td></td>
<td></td>
<td>R: Read W: Write E: EEPROM S: User Set</td>
</tr>
<tr>
<td></td>
<td><strong>Alarm Clearable</strong></td>
<td><strong>Alarm Clearable</strong></td>
<td>No (59)</td>
<td>- - -</td>
<td>Instance 1</td>
<td></td>
<td>1 to 4</td>
<td>[Map 1] [Map 2]</td>
<td>1502</td>
<td>1902</td>
<td>0x6D (109)</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yes (106)</td>
<td>- - -</td>
<td></td>
<td></td>
<td>[Map 1] 15</td>
<td>[Map 2] 20</td>
<td></td>
<td></td>
<td></td>
<td>R</td>
</tr>
<tr>
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<td><strong>Alarm Clear Request</strong></td>
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<td></td>
<td>1 to 4</td>
<td>[Map 1] [Map 2]</td>
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<td>1904</td>
<td>0x6D (109)</td>
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<td>[Map 1] 15</td>
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<td><strong>Alarm Silence Request</strong></td>
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<td>1 to 4</td>
<td>[Map 1] [Map 2]</td>
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<td><strong>Alarm Silenced</strong></td>
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<td>Instance 1</td>
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<td>1 to 4</td>
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<td><strong>Alarm Latched</strong></td>
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<td>Instance 1</td>
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<td>1 to 4</td>
<td>[Map 1] [Map 2]</td>
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<td>[Map 2] 60</td>
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</table>

**Note:** Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces.
# Chapter 6: Setup Page

## Navigating the Setup Page

To go to the Setup Page from the Home Page, press both the Up \( \uparrow \) and Down \( \downarrow \) keys for six seconds. \( \mathbf{Fn} \) will appear in the upper display and \( \mathbf{SEE} \) will appear in the lower display.

- Press the Up \( \uparrow \) or Down \( \downarrow \) key to view available menus. On the following pages top level menus are identified with a yellow background color.
- Press the Advance Key \( \mathbf{A} \) to enter and view available prompts within a menu.
- Press the Up \( \uparrow \) or Down \( \downarrow \) key to move through available menu prompts.
- Press the Infinity Key \( \mathbf{AO} \) to move backwards through the levels: parameter to submenu; submenu to menu; menu to Home Page.
- Press and hold the Infinity Key \( \mathbf{AO} \) for two seconds to return to the Home 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.

### Note:
Some of the listed parameters may not be visible. Parameter visibility is dependent upon controller part number.

## Analog Input Menu

<table>
<thead>
<tr>
<th>( \mathbf{A} )</th>
<th>Function Instance</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \mathbf{Fn} )</td>
<td>Scale Low</td>
</tr>
<tr>
<td>( \mathbf{r} )</td>
<td>Scale High</td>
</tr>
<tr>
<td>( \mathbf{r} )</td>
<td>Range Low</td>
</tr>
<tr>
<td>( \mathbf{h} )</td>
<td>Range High</td>
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</tbody>
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## Process Error Enable

<table>
<thead>
<tr>
<th>( \mathbf{F} )</th>
<th>Process Error Enable</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \mathbf{Fn} )</td>
<td>Process Error Low</td>
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</tbody>
</table>

## Thermistor Curve

<table>
<thead>
<tr>
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<th>Thermistor Curve</th>
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</thead>
<tbody>
<tr>
<td>( \mathbf{Fn} )</td>
<td>Resistance Range</td>
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## Filter

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<tr>
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<tr>
<td>( \mathbf{Fn} )</td>
<td>Error Latching</td>
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<td>( \mathbf{d} )</td>
<td>Display</td>
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## Digital Input/Output Menu

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<tr>
<td>( \mathbf{Fn} )</td>
<td>Direction</td>
</tr>
<tr>
<td>( \mathbf{L} )</td>
<td>Function</td>
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<tr>
<td>( \mathbf{L} )</td>
<td>Function Instance</td>
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<tr>
<td>( \mathbf{S} )</td>
<td>Sides</td>
</tr>
<tr>
<td>( \mathbf{h} )</td>
<td>Hysteresis</td>
</tr>
<tr>
<td>( \mathbf{S} )</td>
<td>Set Point Limit High</td>
</tr>
<tr>
<td>( \mathbf{L} )</td>
<td>Set Point Limit Low</td>
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## Output Menu

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<td>Output</td>
</tr>
<tr>
<td>( \mathbf{F} )</td>
<td>Function</td>
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<td>( \mathbf{F} )</td>
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## Output 3 process

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<td>Type</td>
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<tr>
<td>( \mathbf{F} )</td>
<td>Function</td>
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## Function Key Menu

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<td>( \mathbf{Fn} )</td>
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<tr>
<td>( \mathbf{F} )</td>
<td>Digital Input Function</td>
</tr>
<tr>
<td>( \mathbf{F} )</td>
<td>Instance</td>
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## Global Menu

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<td>( \mathbf{F} )</td>
<td>Display Units</td>
</tr>
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<td>( \mathbf{F} )</td>
<td>Communications LED Action</td>
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## Communications Menu

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<td>( \mathbf{F} )</td>
<td>Standard Bus Address</td>
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<tr>
<td>( \mathbf{F} )</td>
<td>Baud Rate</td>
</tr>
<tr>
<td>( \mathbf{C} )</td>
<td>Parity</td>
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<td>( \mathbf{F} )</td>
<td>Modbus Word Order</td>
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## Modbus Address

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<td>IP Fixed Address (Part 1)</td>
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<tr>
<td>( \mathbf{F} )</td>
<td>IP Fixed Address (Part 2)</td>
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<tr>
<td>( \mathbf{F} )</td>
<td>IP Fixed Address (Part 3)</td>
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<td>( \mathbf{F} )</td>
<td>IP Fixed Address (Part 4)</td>
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<td>( \mathbf{F} )</td>
<td>IP Fixed Subnet (Part 1)</td>
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<tr>
<td>( \mathbf{F} )</td>
<td>IP Fixed Subnet (Part 2)</td>
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<tr>
<td>( \mathbf{F} )</td>
<td>IP Fixed Subnet (Part 3)</td>
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<td>( \mathbf{F} )</td>
<td>IP Fixed Subnet (Part 4)</td>
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<td>( \mathbf{F} )</td>
<td>IP Fixed Gateway (Part 1)</td>
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<td>( \mathbf{F} )</td>
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<td>IP Fixed Gateway (Part 4)</td>
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<td>( \mathbf{F} )</td>
<td>Display Units</td>
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<td>Data Map</td>
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## Setup Page

### Analog Input Menu

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<th>Parameter Name Description</th>
<th>Range</th>
<th>Default</th>
<th>Modbus Relative Address</th>
<th>CIP Class</th>
<th>Modbus Attribute (hex) (dec)</th>
<th>Profibus Index</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
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<tr>
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<td>Lo</td>
<td>Scale Low</td>
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<td>0.0</td>
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<tr>
<td>Lo</td>
<td>Scale High</td>
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<td>20.0</td>
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</tbody>
</table>

**Note:**

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### Setup Page

<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter Name Description</th>
<th>Range</th>
<th>Default</th>
<th>Modbus Relative Address</th>
<th>CIP Class/Instance Attribute hex (dec)</th>
<th>ProfiBus Index</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
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</thead>
<tbody>
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<td>Analog Input (1) Range Low</td>
<td>-1,999.000 to 9,999.000</td>
<td>0.0</td>
<td>Instance 1 Map 1 Map 2 392 392</td>
<td>0x68 (104) 1</td>
<td>8</td>
<td>4017</td>
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</tr>
<tr>
<td><img src="r.h" alt="Image" /> <img src="r.hi" alt="Image" /></td>
<td>Analog Input (1) Range High</td>
<td>-1,999.000 to 9,999.000</td>
<td>9,999</td>
<td>Instance 1 Map 1 Map 2 394 394</td>
<td>0x68 (104) 1</td>
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<td>Analog Input (1) Process Error Enable</td>
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<td>Instance 1 Map 1 Map 2 418 388</td>
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<td>-100.0 to 1,000.0</td>
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<td><img src="t.L" alt="Image" /> <img src="t.C" alt="Image" /></td>
<td>Analog Input (1) Thermistor Curve</td>
<td>Curve A (1451)</td>
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<td>Analog Input (1) Error Latching</td>
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<td>Instance 1 Map 1 Map 2 414 414</td>
<td>0x68 (104) 1 to 2 0x1C (26)</td>
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<td>4028</td>
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<td>Analog Input (1) Display Precision</td>
<td>Whole (105)</td>
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<td>4020</td>
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</table>

**Note:**
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### Setup Page

<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter Name Description</th>
<th>Range</th>
<th>Default</th>
<th>Modbus Relative Address</th>
<th>CIP Class</th>
<th>Profinet</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
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</thead>
<tbody>
<tr>
<td></td>
<td><strong>Digital Input/Output Menu</strong></td>
<td></td>
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<td><strong>Digital Input/Output Menu</strong></td>
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<td>d, r</td>
<td><strong>Direction</strong></td>
<td>Digital Input/Output (5 to 6)</td>
<td>Output (68)</td>
<td>Off (62)</td>
<td>Output</td>
<td>Instance 1</td>
<td>Map 1</td>
<td>Map 2 0x6A (106)</td>
</tr>
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<td><strong>Input Dry Contact</strong></td>
<td>Input Dry Contact (44)</td>
<td>High (37)</td>
<td>Low (53)</td>
<td>High</td>
<td>Instance 1</td>
<td>Map 1</td>
<td>Map 2 0x6E (110)</td>
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<td></td>
<td><strong>Input Voltage</strong></td>
<td>Input Voltage (193)</td>
<td>None (61)</td>
<td>Limit Reset (82)</td>
<td>None</td>
<td>Instance 1</td>
<td>Map 1</td>
<td>Map 2 0x6E (110)</td>
</tr>
<tr>
<td>F, n</td>
<td><strong>Function</strong></td>
<td>Digital Output (5 to 6)</td>
<td>Off</td>
<td>Off (62)</td>
<td>Off</td>
<td>Instance 1</td>
<td>Map 1</td>
<td>Map 2 0x6A (106)</td>
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<td>l, Fn</td>
<td><strong>Alarm (6)</strong></td>
<td>Alarm (6)</td>
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<td>Map 1</td>
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<td><strong>Function Instance</strong></td>
<td>Digital Output (5 to 6)</td>
<td>Instance 1</td>
<td>Map 1</td>
<td>Instance 1</td>
<td>Map 1</td>
<td>Map 2 0x6A (106)</td>
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<td>Digital Output (5 to 6)</td>
<td>Instance 1</td>
<td>Map 1</td>
<td>Instance 1</td>
<td>Map 1</td>
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<td><strong>Action Function</strong></td>
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<td>Map 1</td>
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<tr>
<td>$F_{i}$</td>
<td>Digital Input (5 to 6) Function Instance</td>
<td>0 to 4</td>
<td>0</td>
<td>Instance 1 Map 1 Map 2 1326 Offset to next instance (Map 1) equals +20</td>
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<td>10004</td>
<td>uint RWES</td>
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<td>$L_{i}P_{i}$</td>
<td>Limit Menu</td>
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<td>$L_{i}S_{d}$</td>
<td>Limit (1) Sides</td>
<td>Both (13)</td>
<td>Both</td>
<td>Instance 1 Map 1 Map 2 688 728</td>
<td>0x70 (112) 1 5</td>
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<td>$L_{i}h_{y}$</td>
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<td>3.0°F or units 2.0°C</td>
<td>Instance 1 Map 1 Map 2 682 722</td>
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<td>$S_{i}P_{i}L_{h}$</td>
<td>Limit (1) Set Point Limit High</td>
<td>-1,999.000 to 9,999.000</td>
<td>9,999.000</td>
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<td>-1,999.000</td>
<td>Instance 1 Map 1 Map 2 700 738</td>
<td>0x70 (112) 1 0x0A (10)</td>
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<td>$F_{i}$</td>
<td>Output Digital (1 to 4) Function</td>
<td>Off (62)</td>
<td>Output 1 - Alarm</td>
<td>Instance 1 Map 1 Map 2 888 1008</td>
<td>0x6A (106) 1 to 4 5</td>
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<td><img src="https://example.com/param3.png" alt="Image" /></td>
<td>Output Process (3) Retransmit Range Low</td>
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<td><img src="https://example.com/param4.png" alt="Image" /></td>
<td>Output Process (3) Scale Low</td>
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<td><img src="https://example.com/param5.png" alt="Image" /></td>
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<td><img src="https://example.com/param7.png" alt="Image" /></td>
<td>Output Process (3) Calibration Offset</td>
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### Setup Page

#### Alarm Menu

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<th>Modbus Relative Address</th>
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<tr>
<td></td>
<td><strong>Alm</strong></td>
<td><strong>Set</strong></td>
<td><strong>A.ty</strong></td>
<td>Alarm (1 to 4) Type</td>
<td>Select whether the alarm trigger is a fixed value or will track the set point.</td>
<td>Off (62)</td>
<td>Instance 1</td>
<td>0x6D (109)</td>
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<td><strong>Pr.RL</strong></td>
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<td>Offset to next instance (Map 1 &amp; Map 2) equals +60</td>
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<td>Map 1</td>
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<td>Source Function A</td>
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<td><strong>A.hy</strong></td>
<td>Hysteresis</td>
<td>0.001 to 9,999.000°F or units of 0.001 to 5,555.000°C</td>
<td>1.0°F or units of 1.0°C</td>
<td>Instance 1</td>
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<td><strong>A.Lg</strong></td>
<td>Logic</td>
<td>Close On Alarm (17)</td>
<td>Close On Alarm</td>
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<td><strong>S.d</strong></td>
<td>Sides</td>
<td>Both (13)</td>
<td>Both (13)</td>
<td>Instance 1</td>
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</thead>
<tbody>
<tr>
<td><strong>[A.LA]</strong> Alarm (1 to 4) Latching</td>
<td>Turn alarm latching on or off. A latched alarm has to be turned off by the user.</td>
<td>Non-Latching (60)</td>
<td>Non-Latching</td>
<td>Instance 1 Map 1 Map 2 1492 1892</td>
<td>Offset to next instance (Map 1 equals +50, for Map 2 equals +60)</td>
<td>0x6D (109) 1 to 4 7</td>
<td>27</td>
<td>9007</td>
</tr>
<tr>
<td><strong>[A.bL]</strong> Alarm (1 to 4) Blocking</td>
<td>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.</td>
<td>Off (62)</td>
<td>Off</td>
<td>Instance 1 Map 1 Map 2 1494 1894</td>
<td>Offset to next instance (Map 1 equals +50, for Map 2 equals +60)</td>
<td>0x6D (109) 1 to 4 8</td>
<td>28</td>
<td>9008</td>
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<td><strong>[A.Si]</strong> Alarm (1 to 4) Silencing</td>
<td>Turn alarm silencing on to allow the user to disable this alarm.</td>
<td>Off (62)</td>
<td>Off</td>
<td>Instance 1 Map 1 Map 2 1490 1890</td>
<td>Offset to next instance (Map 1 equals +50, for Map 2 equals +60)</td>
<td>0x6D (109) 1 to 4 6</td>
<td>29</td>
<td>9006</td>
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<tr>
<td><strong>[A.dSP]</strong> Alarm (1 to 4) Display</td>
<td>Display an alarm message when an alarm is active.</td>
<td>Off (62)</td>
<td>Off</td>
<td>Instance 1 Map 1 Map 2 1510 1910</td>
<td>Offset to next instance (Map 1 equals +50, for Map 2 equals +60)</td>
<td>0x6D (109) 1 to 4 0x10 (16)</td>
<td>30</td>
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<tr>
<td><strong>[A.dL]</strong> Alarm (1 to 4) Delay</td>
<td>Set the span of time that the alarm will be delayed after the process value exceeds the alarm set point.</td>
<td>0 to 9,999 seconds</td>
<td>0</td>
<td>Instance 1 Map 1 Map 2 1520 1920</td>
<td>Offset to next instance (Map 1 equals +50, for Map 2 equals +60)</td>
<td>0x6D (109) 1 to 4 0x15 (21)</td>
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<tbody>
<tr>
<td>Function Key</td>
<td><em>Function Key (1 to 2)</em></td>
<td><strong>Level</strong></td>
<td>Select what state the Function Key will be in at startup. Pressing the Function Key will toggle the selected action.</td>
<td>2000</td>
<td>1320, 1340</td>
<td>0x6E, 110</td>
<td>1 to 2</td>
<td>10001</td>
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<td><strong>Relative Address</strong></td>
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<td>12, 14</td>
<td>137</td>
<td>3</td>
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<tr>
<td>Function Key</td>
<td><em>Function Key (1 to 2)</em></td>
<td><strong>Digital Input Function</strong></td>
<td>Program the EZ Key to trigger an action. Functions respond to a level state change or an edge level change.</td>
<td>2001</td>
<td>1380, 1382</td>
<td>0x6E, 110</td>
<td>1 to 2</td>
<td>10001</td>
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<td><strong>Function Key (1 to 2)</strong></td>
<td><strong>Instance</strong></td>
<td>Select which instance the EZ Key will affect. If only one instance is available, any selection will affect it.</td>
<td>2002</td>
<td>100, 104</td>
<td>139</td>
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<tr>
<td>Global Menu</td>
<td><strong>Global Display Units</strong></td>
<td>Select which scale to use for temperature.</td>
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<td>2003</td>
<td>50, 54</td>
<td>110</td>
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<td><strong>Global AC Line Frequency</strong></td>
<td>Set the frequency to the applied ac line power source.</td>
<td>2004</td>
<td>50, 60</td>
<td>89</td>
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<td>Turns comms LED on or off for selected comms ports.</td>
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<td>Turns Zone LED on or off based on selection.</td>
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**Note:** Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces.
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<thead>
<tr>
<th>Display</th>
<th>Parameter Name Description</th>
<th>Range</th>
<th>Default</th>
<th>Modbus Relative Address</th>
<th>CIP Class Instance Attribute hex (dec)</th>
<th>Pro- fibus Index</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
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<tbody>
<tr>
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## Setup Page

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<th>Display</th>
<th>Parameter Name Description</th>
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<th>Modbus Relative Address</th>
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<th>Profibus Index</th>
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<th>Data Type &amp; Read/Write</th>
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**Note:** Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces.
Setup Page

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</tbody>
</table>

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Chapter 7: Factory Page

Navigating the Factory Page

To go to the Factory Page from the Home Page, press and hold both the Advance and Reset 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 Reset key to return to the Home 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.

Note:
Some of the listed parameters may not be visible. Parameter visibility is dependent upon controller part number.

---

Custom Setup Menu

- Custom Setup
- Parameter
- Instance ID

Security Setting Menu

- Operations Page
- Password
- Read Lock
- Write Security
- Locked Access Level
- Rolling Password
- User Password
- Administrator Password

Security Setting Menu

- Public Key
- Password

Diagnostics Menu

- Part Number
- Software Revision
- Serial Number
- Date of Manufacture
- IP Actual Address Mode
- IP Fixed Address Part 1
- IP Fixed Address Part 2
- IP Fixed Address Part 3
- IP Fixed Address Part 4

Calibration Menu

- Electrical Measurement
- Electrical Input Offset
- Electrical Input Slope
- Electrical Output Offset
- Electrical Output Slope
### Custom Menu

<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter Name Description</th>
<th>Range</th>
<th>Default</th>
<th>Modbus Relative Address</th>
<th>CIP Class Instance Attribute hex (dec)</th>
<th>Pro-fibus Index</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC_ky</td>
<td>Custom Parameter 1 to 20</td>
<td>Select the parameters that will appear in the Home Page.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>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.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>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.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Scroll through the other Home Page parameters with the Advance Key.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>modifier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[Par]</td>
<td>Custom (1 to 20) Instance ID</td>
<td>Select which instance of the parameter will be selected.</td>
<td>1 to 4</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>14003</td>
<td>- - -</td>
</tr>
</tbody>
</table>

**Lock Menu**

<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter Name Description</th>
<th>Range</th>
<th>Default</th>
<th>Modbus Relative Address</th>
<th>CIP Class Instance Attribute hex (dec)</th>
<th>Pro-fibus Index</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>F_ky</td>
<td>Security Setting Operations Page</td>
<td>Change the security level of the Operations Page.</td>
<td>1 to 3</td>
<td>2</td>
<td>Instance 1 Map 1 1832  Map 2 2302 0x67 (103) 1 2</td>
<td>- - -</td>
<td>3002</td>
<td>uint RWE</td>
</tr>
<tr>
<td></td>
<td>Security Setting Password Enable</td>
<td>Turn security features on or off.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>3009</td>
<td>uint RWE</td>
</tr>
<tr>
<td></td>
<td>On</td>
<td>On</td>
<td>On</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>3009</td>
<td>uint RWE</td>
</tr>
<tr>
<td></td>
<td>Security Setting Read Lock</td>
<td>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.</td>
<td>1 to 5</td>
<td>5</td>
<td>Instance 1 Map 1 1848  Map 2 2318 0x67 (103) 1 0x0A (10)</td>
<td>- - -</td>
<td>3010</td>
<td>uint RWE</td>
</tr>
</tbody>
</table>

**Note:**

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

<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter Name</th>
<th>Description</th>
<th>Range</th>
<th>Default</th>
<th>Modbus Relative Address</th>
<th>CIP Class Instance Attribute (dec)</th>
<th>Proﬁbus Index</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLaC</td>
<td>Security Setting</td>
<td>Write Security</td>
<td>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.</td>
<td>0 to 5</td>
<td>5</td>
<td>Instance 1 Map 1 Map 2 1844 2314</td>
<td>0x67 (103) 1 0x0B (11)</td>
<td>- - -</td>
<td>3011</td>
</tr>
<tr>
<td>LoC.L</td>
<td>Security Setting</td>
<td>Locked Access Level</td>
<td>Determines user level menu visibility when security is enabled. See Features section under Password Security.</td>
<td>1 to 5</td>
<td>5</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>3016</td>
</tr>
<tr>
<td>rLL</td>
<td>Security Setting</td>
<td>Rolling Password</td>
<td>When power is cycled a new Public Key will be displayed.</td>
<td>Off</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>3019</td>
</tr>
<tr>
<td>P85u</td>
<td>Security Setting</td>
<td>User Password</td>
<td>Used to acquire access to menus made available through the Locked Access Level setting.</td>
<td>10 to 999</td>
<td>63</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>3017</td>
</tr>
<tr>
<td>P85A</td>
<td>Security Setting</td>
<td>Administrator Password</td>
<td>Used to acquire full access to all menus.</td>
<td>10 to 999</td>
<td>156</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>3018</td>
</tr>
<tr>
<td>ULaC</td>
<td>Unlock Menu</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lade</td>
<td>Security Setting</td>
<td>Public Key</td>
<td>If Rolling Password turned on, generates a random number when power is cycled. If Rolling Password is off fixed number will be displayed.</td>
<td>Customer Specific</td>
<td>0</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>3020</td>
</tr>
<tr>
<td>P85S</td>
<td>Security Setting</td>
<td>Password</td>
<td>Number returned from calculation found in Features section under Password Security.</td>
<td>-1999 to 9999</td>
<td>0</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>3022</td>
</tr>
<tr>
<td>d9</td>
<td>Diagnostic Menu</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pn</td>
<td>Diagnostics</td>
<td>Part Number</td>
<td>Display this controller’s part number.</td>
<td>15 characters</td>
<td>- - -</td>
<td>- - -</td>
<td>0x65 (101) 1 9</td>
<td>115</td>
<td>1009</td>
</tr>
</tbody>
</table>

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## Factory Page

<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter Name Description</th>
<th>Range</th>
<th>Default</th>
<th>Modbus Relative Address</th>
<th>CIP Class Instance Attribute hex (dec)</th>
<th>Profibus Index</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>rEu</code></td>
<td><strong>Diagnostics</strong> Software Revision</td>
<td>1 to 10</td>
<td>- - - -</td>
<td>- - -</td>
<td>0x65 (101) 1 0x11 (17)</td>
<td>116</td>
<td>1003</td>
<td>string R</td>
</tr>
<tr>
<td><code>sLd</code></td>
<td><strong>Diagnostics</strong> Software Build Number</td>
<td>0 to 2,147,483,647</td>
<td>- - -</td>
<td>Instance 1 Map 1 Map 2 8 8</td>
<td>0x65 (101) 1 5</td>
<td>- - -</td>
<td>1005</td>
<td>dint</td>
</tr>
<tr>
<td><code>Sn</code></td>
<td><strong>Diagnostics</strong> Serial Number</td>
<td>0 to 2,147,483,647</td>
<td>- - - -</td>
<td>0x65 (101) 1 0x20 (32)</td>
<td>- - -</td>
<td>- - -</td>
<td>1032</td>
<td>string RWE</td>
</tr>
<tr>
<td><code>dAtE</code></td>
<td><strong>Diagnostics</strong> Date of Manufacture</td>
<td>0 to 2,147,483,647</td>
<td>- - -</td>
<td>Instance 1 Map 1 Map 2 14 14</td>
<td>0x65 (101) 1 8</td>
<td>- - -</td>
<td>1008</td>
<td>dint RWE</td>
</tr>
<tr>
<td><code>iP.AC</code></td>
<td><strong>Diagnostics</strong> IP Address Mode</td>
<td>DHCP (1281) Fixed Address (1284)</td>
<td>DHCP</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>17013</td>
<td>- - -</td>
</tr>
<tr>
<td><code>ip.F1</code></td>
<td><strong>Diagnostics</strong> IP Actual Address Part 1</td>
<td>0 to 255</td>
<td>169</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>17014</td>
<td>- - -</td>
</tr>
<tr>
<td><code>ip.F2</code></td>
<td><strong>Diagnostics</strong> IP Actual Address Part 2</td>
<td>0 to 255</td>
<td>254</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>17015</td>
<td>- - -</td>
</tr>
<tr>
<td><code>ip.F3</code></td>
<td><strong>Diagnostics</strong> IP Actual Address Part 3</td>
<td>0 to 255</td>
<td>1</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>17016</td>
<td>- - -</td>
</tr>
<tr>
<td><code>ip.F4</code></td>
<td><strong>Diagnostics</strong> IP Actual Address Part 4</td>
<td>0 to 255</td>
<td>1</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>17017</td>
<td>- - -</td>
</tr>
<tr>
<td><code>ip.F5</code></td>
<td><strong>Diagnostics</strong> IP Actual Address Part 5</td>
<td>0 to 255</td>
<td>1</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>17018</td>
<td>- - -</td>
</tr>
</tbody>
</table>

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R: Read  
W: Write  
E: EEPROM  
S: User Set
### Factory Page

#### Calibration Menu

<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter Name Description</th>
<th>Range</th>
<th>Default</th>
<th>Modbus Relative Address</th>
<th>CIP Class Instance Attribute hex (dec)</th>
<th>Proﬁbus Index</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>[iP;A6] [ip.P6]</td>
<td>Diagnostics IP Actual Address Part 6</td>
<td>0 to 255</td>
<td>1</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>17019</td>
<td>- - -</td>
</tr>
<tr>
<td>[CRL] [CRL]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Calibration Menu

<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter Name Description</th>
<th>Range</th>
<th>Default</th>
<th>Modbus Relative Address</th>
<th>CIP Class Instance Attribute hex (dec)</th>
<th>Proﬁbus Index</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>[iP;A6] [ip.P6]</td>
<td>Electrical Measurement</td>
<td>-3.4e38 to 3.4e38</td>
<td>0.0</td>
<td>Instance 1 Map 1 Map 2 400 400</td>
<td>0x68 (104) 1</td>
<td>0x15 (21)</td>
<td>4021</td>
<td>float R</td>
</tr>
<tr>
<td>[EL.o] [ELi.o]</td>
<td>Electrical Input Offset</td>
<td>-1,999.000 to 9,999.000</td>
<td>0.0</td>
<td>Instance 1 Map 1 Map 2 378 378</td>
<td>0x68 (104) 1</td>
<td>0xA (10)</td>
<td>4010</td>
<td>float RWES</td>
</tr>
<tr>
<td>[EL.o] [ELi.o]</td>
<td>Electrical Input Slope</td>
<td>-1,999.000 to 9,999.000</td>
<td>1.0</td>
<td>Instance 1 Map 1 Map 2 380 380</td>
<td>0x68 (104) 1</td>
<td>0xB (11)</td>
<td>4011</td>
<td>float RWES</td>
</tr>
<tr>
<td>[EL.o] [ELi.o]</td>
<td>Electrical Output Offset</td>
<td>-1,999.000 to 9,999.000</td>
<td>0.0</td>
<td>Instance 1 Map 1 Map 2 808 928</td>
<td>0x76 (118) 3 5</td>
<td>- - -</td>
<td>18005</td>
<td>float RWES</td>
</tr>
<tr>
<td>[EL.o] [ELi.o]</td>
<td>Electrical Output Slope</td>
<td>-1,999.000 to 9,999.000</td>
<td>1.0</td>
<td>Instance 1 Map 1 Map 2 730 850</td>
<td>0x76 (118) 3 6</td>
<td>- - -</td>
<td>18006</td>
<td>float RWES</td>
</tr>
</tbody>
</table>

**Note:**

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Chapter 8: Features

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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] (Setup Page, Global 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] (Setup Page, Global 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 [ELi;o] (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:

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Low Source</th>
<th>High Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>thermocouple</td>
<td>0.000 mV</td>
<td>50.000 mV</td>
</tr>
<tr>
<td>millivolts</td>
<td>0.000 mV</td>
<td>50.000 mV</td>
</tr>
<tr>
<td>volts</td>
<td>0.000V</td>
<td>10.000V</td>
</tr>
<tr>
<td>milliamps</td>
<td>0.000 mA</td>
<td>20.000 mA</td>
</tr>
<tr>
<td>100 Ω RTD</td>
<td>50.00 Ω</td>
<td>350.00 Ω</td>
</tr>
<tr>
<td>1,000 Ω RTD</td>
<td>500.00 Ω</td>
<td>3,500.00 Ω</td>
</tr>
</tbody>
</table>

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 [Mu] (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 [ELi;o] (Factory Page, Calibration Menu) for this input to the calculated 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 [ELi;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.
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 \( R_u \) (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 \( E_i;S \) (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.

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 \( SE_n \) (Setup Page, Analog Input Menu).

Note:
The EZ-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 \( SPL_L \) and High Set Point \( SPL_h \) (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 measurable 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 \( SL_o \) and Scale High \( SH_h \). Select the displayed range with Range Low \( rL_o \) and Range High \( rH_h \) (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 \( r_{Mt} \) as the Output Function \( F_n \) (Setup Page, Output Menu). Set the output to volts \( u_{oLt} \) or milliamps \( r_{MA} \) 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 Alarms

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

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 Reset 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 (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 (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.

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

Using Lockout to Hide Pages and Menus

If unintentional changes to parameter settings might raise safety concerns or lead to downtime, you 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 four parameters in the Lockout Menu (Factory Page):

- Password Security Enable [PaSE] will turn on or off the Password security feature. (default: off)
- 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)

The table below represents the various levels of lockout for the Set Lockout Security prompt and the Read Lockout Security prompt. The Set Lockout has 6 levels (0-5) of security where the Read Lockout has 5 (1-5). Therefore, level “0” applies to Set Lockout only. “Y” equates to yes (can write/read) where “N” equates to no (cannot write/read). The colored cells differentiate one level from the next.

Using Password Security

It is sometimes desirable to apply a higher level of security to the control where a limited number of menus are visible and not providing access to others without a security password. Without the appropriate password those menus will remain inaccessible. If Password Enabled [PAS,E] in the Factory Page under the Lockout Security [LoC] Menu is set to on, an overriding Password Security will be in effect. When in effect, the only Pages that a User without a password has visibility to are defined in the Locked Access Level [LoC] prompt. On the other hand, a User with a password would have visibility restricted by the Read Lockout Security [rLoC]. As an example, with Password Enabled and the Locked Access Level [LoC] set to 1 and [rLoC] is set to 3, the available Pages for a User without a password would be limited to the Home and Factory Pages (locked level 1). If the User password is entered all pages would be accessible with the exception of the Setup Page as defined by level 3 access.

How to Enable Password Security

Go to the Factory Page by holding down the Reset key and the Advance key for approximately six seconds. Once there push the Down key one time to get to the [LoC] menu. Again push the Advance key until the Password Enabled [PAS,E] prompt is visible. Lastly, push either the up or down key to turn it on. Once on, 4 new prompts will appear:

1. [LoC] Locked Access Level (1 to 5) corresponding to the lockout table above.
2. [rLoC] Rolling Password will change the Customer Code every time power is cycled.
3. [PAS,W] User Password which is needed for a User to acquire access to the control.
4. [PAS,A], Administrator Password which is needed to acquire administrative access to the control.

The Administrator can either change the User and/or the Administrator password or leave them in the default state. Once Password Security is enabled they will no longer be visible to anyone other than the Administrator. As can be seen in the formula that follows either the User or Administrator will need to know what those passwords are to acquire a higher level of access to the control. Back out of this menu by pushing the Reset key. Once out of the menu, the Password Security will be enabled.

How to Acquire Access to the Control

To acquire access to any inaccessible Pages or Menus, go to the Factory Page and enter the [ULoC] menu. Once there follow the steps below:
Note:
If Password Security (Password Enabled) is enabled the two prompts mentioned below in the first step will not be visible. If unknown, call the individual or company that originally setup the control.

1. Acquire either the User Password or the Administrator Password.

2. Push the Advance key one time where the Code prompt will be visible.

Note:
   a. If the the Rolling Password is off push the Advance key one more time where the Password prompt will be displayed. Proceed to either step 7a or 8a. Pushing the Up or Down arrow keys enter either the User or Administrator Password. Once entered, push and hold the Reset key for two seconds to return to the Home Page.
   b. If the Rolling Password was turned on proceed on through steps 3 - 9.

3. Assuming the Code prompt (Public Key) is still visible on the face of the control simply push the Advance key to proceed to the Password prompt. If not find your way back to the Factory Page as described above.

4. Execute the calculation defined below (7b or 8b) for either the User or Administrator.

5. Enter the result of the calculation in the upper display by using the Up and Down arrow keys or use EZ-ZONE Configurator Software.

6. Exit the Factory Page by pushing and holding the Reset key for two seconds.

Formulas used by the User and the Administrator to calculate the Password follows:

Passwords equal:

7. User
   a. If Rolling Password is Off, Password equals User Password.
   b. If Rolling Password is On, Password equals:
      \((\text{Password} \times \text{code}) \mod 929 + 70\)

8. Administrator
   a. If Rolling Password is Off, Password equals User Password.
   b. If Rolling Password is On, Password equals:
      \((\text{Password} \times \text{code}) \mod 997 + 1000\)

Differences Between a User Without Password, User With Password and Administrator Without Password Security

Without Password Security (Password Enabled) being enabled restrictions are applied via Read Lockout exclusively. As discussed in the first paragraph of this section when Password Security is enabled restrictions are applied with the Locked Access Level (Locked Access Level), taking precedence.

- User without a password has Page visibility restricted by the Locked Access Level (Locked Access Level).
- A User with a password has Page visibility restricted by the Read Lockout Security (Read Lockout), never having access to the Lock Menu.
- An Administrator is restricted according to the Read Lockout Security (Read Lockout) however, the Administrator has access to the Lock Menu where the Read Lockout can be changed.
Modbus - Using Programmable Memory Blocks

When using the Modbus protocol, the PML control features a block of addresses that can be configured by the user to provide direct access to a list of 40 user configured parameters. This allows the user easy access to this customized list by reading from or writing to a contiguous block of registers.

To acquire a better understanding of the tables found in the back of this manual (See Appendix: (Modbus Programmable Memory Blocks) please read through the text below which defines the column headers used.

Assembly Definition Addresses
- Fixed addresses used to define the parameter that will be stored in the "Working Addresses", which may also be referred to as a pointer. The value stored in these addresses will reflect (point to) the Modbus address of a parameter within the ST control.

Assembly Working Addresses
- Fixed addresses directly related to their associated "Assembly Definition Addresses" (i.e., Assembly Working Addresses 200 & 201 will assume the parameter pointed to by Assembly Definition Addresses 40 & 41).

When the Modbus address of a target parameter is stored in an "Assembly Definition Address" its corresponding working address will return that parameter's actual value. If it's a writable parameter, writing to its working register will change the parameter's actual value.

As an example, Modbus register 360 contains the Analog Input 1 Process Value (See Operations Page, Analog Input Menu). If the value 360 is loaded into Assembly Definition Address 91, the process value sensed by Analog Input 1 will also be stored in Modbus registers 250 and 251. Note that by default this parameter is also stored in working registers 240 and 241 as well.

The table (See Appendix: Modbus Programmable Memory Blocks) identified as "Assembly Definition Addresses and Assembly Working Addresses" reflects the assemblies and their associated addresses.

CIP - Communications Capabilities

CIP Communications Methodology

To communicate with the ST using CIP an RUI/GTW must be used. Reading or writing when using CIP can be accomplished via explicit and or implicit communications. Explicit communications usually requires the use of a message instruction but there are other ways to do this as well. Implicit communications is also commonly referred to as polled communications. When using implicit communications there is an I/O assembly that would be read or written to; the assemblies are embedded into the ST firmware. Watlow refers to these assemblies as the T to O (Target to Originator) and the O to T (Originator to Target) assemblies where the Target is always the ST and the Originator is the PLC or master on the network. The O to T assembly is made up of 20 (32 bit) members that are user configurable where the T to O assembly consists of 21 (32 bit) members. The first member of the T to O assembly is called the Device Status and cannot be changed. However, the 20 members that follow it are user configurable (See Appendix: CIP Implicit O to T (Originator to Target) Assembly Structure and CIP Implicit T to O (Target to Originator) Assembly Structure).

To change any given member of either assembly simply write the new class, instance and attribute to the member location of choice. As an example, if it were desired to change the 14th member of the O to T assembly from the default parameter (Heat Proportional Band) to Limit Clear Request (see Operations Page, Limit Menu) write the value of 0x70, 0x01 and 0x01 (Class, Instance and Attribute respectively) to 0x77, 0x01 and 0x0E. Once executed, writing a value of zero to this member will reset a limit assuming the condition that caused it is no longer present.
Software Configuration
Using EZ-ZONE® Configurator Software

To enable a user to configure the PML (Limit) control using a personal computer (PC), Watlow has provided free software for your use. If you have not yet obtained a copy of this software insert the CD (Controller Support Tools) into your CD drive and install the software. Alternatively, if you are viewing this document electronically and have a connection to the internet simply click on the link below and download the software from the Watlow web site free of charge.

http://www.watlow.com/products/software/zone_config.cfm

Once the software is installed double click on the EZ-ZONE Configurator icon placed on your desktop during the installation process. If you cannot find the icon follow the steps below to run the software:

1. Move your mouse to the "Start" button
2. Place the mouse over "All Programs"
3. Navigate to the "Watlow" folder and then the sub-folder "EZ-ZONE Configurator"
4. Click on EZ-ZONE Configurator to run.

The first screen that will appear is shown below.

If the PC is already physically connected to the EZ-ZONE PML control click the next button to go online.

Note:
When establishing communications from PC to the EZ-ZONE PML an interface converter will be required. The Standard Bus network uses EIA-485 as the interface. Most PCs today would require a USB to EIA-485 converter. However, some PCs may still be equipped with EIA-232 ports, therefore an EIA-232 to EIA-485 converter would be required.

As can be seen in the above screen shot the software provides the user with the option of downloading a previously saved configuration as well as the ability to create a configuration off-line to download later. The screen shots that follow will take the user online.

After clicking the next button above it is necessary to define the communications port on the PC to use.

The available options allow the user to select "Try them all" or to use a specific known communications port. After installation of your converter if you are not sure which communications port was allocated select "Try them all" and then click next. The screen to follow shows that the software is scanning for devices on the network and that progress is being made.

When complete the software will display all of the available devices found on the network as shown below.
In the previous screen shot the PML is shown highlighted to bring greater clarity to the control in focus. Any EZ-ZONE device on the network will appear in this window and would be available for the purpose of configuration or monitoring. After clicking on the control of choice simply click the next button once again. The next screen appears below.

In the screen shot above notice that the device part number is clearly displayed at the top of the page (green highlight added for emphasis). When multiple EZ-ZONE devices are on the network it is important that the part number be noted prior to configuring so as to avoid making unwanted configuration changes to another control.

Looking closely at the left hand column (Parameter Menus) notice that it displays all of the available menus and associated parameters within the control. The menu structure as laid out within this software follows:
- Setup
- Operations
- Factory

Navigating from one menu to the next is easy and clearly visible. Simply slide the scroll bar up or down to display the menu and parameter of choice. As an alternative, clicking on the negative symbol next to Setup will collapse the Setup Menu where the Operations Menu will appear next and perhaps deliver more clarity for the area of focus by not displaying unwanted menus and parameters. Once the focus is brought to an individual parameter (single click of mouse) as is the case for Analog Input 1 in the left column, all that can be setup related to that parameter will appear in the center column. The grayed out fields in the center column simply mean that this does not apply for the type of sensor selected. As an example, notice that when Thermocouple is selected, RTD Leads does not apply and is therefore grayed out. To speed up the process of configuration notice that at the bottom of the center column there is an option to copy settings. If there is more than one instance of a member and all are to be the same, i.e., Alarms 1 - 4, after configuring Alarm 1 click on "Copy Settings" where a copy from to copy to dialog box will appear allowing for quick duplication of all settings.

Notice too, that by clicking on any of those items in the center column that context sensitive help will appear for that particular item in the right hand column.
Lastly, when the configuration is complete click the "Finish" button at the bottom right of the previous screen shot. The screen that follows this action can be seen below.

Although the PML now contains the configuration (because the previous discussion focused on doing the configuration on-line) it is suggested that after the configuration process is completed that the user save this file on the PC for future use. If for some reason someone inadvertently changed a setting without understanding the impact it would be easy and perhaps faster to download a saved configuration back to the control versus trying to figure out what was changed.

Of course, there is an option to exit without saving a copy to the local hard drive.

After selecting Save above, click the "Finish" button once again. The screen below will then appear.

When saving the configuration note the location where the file will be placed (Saved in) and enter the file name (File name) as well. The default path for saved files follows:

`\Program Files\Watlow\EZ-ZONE CONFIGURATOR\Saved Configurations`

The user can save the file to any folder of choice.
## Troubleshooting Alarms, Errors and Control Issues

<table>
<thead>
<tr>
<th>Indication</th>
<th>Description</th>
<th>Possible Cause(s)</th>
<th>Corrective Action</th>
</tr>
</thead>
</table>
| Alarm won’t 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 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 |
| [AL;E1] Alarm Error | 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 | 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 | 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;E1] 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 with keypad or digital input | 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 |
| [LE;E1] Limit Error | 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 |
| [LE;L1] Limit Low | 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 |
<table>
<thead>
<tr>
<th>Indication</th>
<th>Description</th>
<th>Possible Cause(s)</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limit High</td>
<td>Sensor input above high limit set point</td>
<td>• Temperature is greater than limit set point</td>
<td>• Check cause of over temperature</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Limit outputs latch and require Reset</td>
<td>• Clear limit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Incorrect alarm set point</td>
<td>• Establish correct limit set point</td>
</tr>
<tr>
<td>No Display</td>
<td>No display indication or LED illumination</td>
<td>• Power to controller is off</td>
<td>• Turn on power</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Fuse open</td>
<td>• Replace fuse</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Breaker tripped</td>
<td>• Reset breaker</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Safety interlock switch open</td>
<td>• Close interlock switch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Separate system limit control activated</td>
<td>• Reset limit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Wiring error</td>
<td>• Correct wiring issue</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Incorrect voltage to controller</td>
<td>• Apply correct voltage, check part number</td>
</tr>
<tr>
<td>No Serial Communication</td>
<td>Cannot establish serial communications with the controller</td>
<td>• Address parameter incorrect</td>
<td>• Set unique addresses on network</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Incorrect protocol selected</td>
<td>• Match protocol between devices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Baud rate incorrect</td>
<td>• Match baud rate between devices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Parity incorrect</td>
<td>• Match parity between devices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Wiring error</td>
<td>• Correct wiring issue</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• EIA-485 converter issue</td>
<td>• Check settings or replace converter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Incorrect computer or PLC communications port</td>
<td>• Set correct communication port</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Incorrect software setup</td>
<td>• Correct software setup to match controller</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Termination resistor may be required</td>
<td>• Place 120 Ω resistor across EIA-485 on last controller</td>
</tr>
<tr>
<td>Temperature runaway</td>
<td>Process value continues to increase or decrease past set point.</td>
<td>• Controller output incorrectly programmed</td>
<td>• Verify output function is correct (heat or cool)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Thermocouple reverse wired</td>
<td>• Correct sensor wiring (red wire negative)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Controller output wired incorrectly</td>
<td>• Verify and correct wiring</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Short in heater</td>
<td>• Replace heater</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Power controller connection to controller defective</td>
<td>• Replace or repair power controller</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Controller output defective</td>
<td>• Replace or repair controller</td>
</tr>
<tr>
<td>Device Error</td>
<td>Controller displays internal malfunction message at power up.</td>
<td>• Controller defective</td>
<td>• Replace or repair controller</td>
</tr>
<tr>
<td>Menus inaccessible</td>
<td>Unable to access  Set, Oper, FCaly or Prof menus or particular prompts in Home Page</td>
<td>• Lockout or Security set to incorrect level</td>
<td>• Check lockout setting in Factory Page</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Digital input set to lockout keypad</td>
<td>• Change state of digital input</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Custom parameters incorrect</td>
<td>• Change custom parameters in Factory Page</td>
</tr>
<tr>
<td>EZ-Key/s doesn’t work</td>
<td>EZ-Key does not activate required function</td>
<td>• EZ-Key function incorrect</td>
<td>• Verify EZ-Key function in Setup Menu</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• EZ-Key function instance not correct</td>
<td>• Check that the function instance is correct</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Keypad malfunction</td>
<td>• Replace or repair controller</td>
</tr>
</tbody>
</table>
### Modbus - Programmable Memory Blocks

#### Assembly Definition Addresses and Assembly Working Addresses

<table>
<thead>
<tr>
<th>Assembly Definition Addresses</th>
<th>Assembly Working Addresses</th>
<th>Assembly Definition Addresses</th>
<th>Assembly Working Addresses</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 &amp; 41</td>
<td>200 &amp; 201</td>
<td>80 &amp; 81</td>
<td>240 &amp; 241</td>
</tr>
<tr>
<td>42 &amp; 43</td>
<td>202 &amp; 203</td>
<td>82 &amp; 83</td>
<td>242 &amp; 243</td>
</tr>
<tr>
<td>44 &amp; 45</td>
<td>204 &amp; 205</td>
<td>84 &amp; 85</td>
<td>244 &amp; 245</td>
</tr>
<tr>
<td>46 &amp; 47</td>
<td>206 &amp; 207</td>
<td>86 &amp; 87</td>
<td>246 &amp; 247</td>
</tr>
<tr>
<td>48 &amp; 49</td>
<td>208 &amp; 209</td>
<td>88 &amp; 89</td>
<td>248 &amp; 249</td>
</tr>
<tr>
<td>50 &amp; 51</td>
<td>210 &amp; 211</td>
<td>90 &amp; 91</td>
<td>250 &amp; 251</td>
</tr>
<tr>
<td>52 &amp; 53</td>
<td>212 &amp; 213</td>
<td>92 &amp; 93</td>
<td>252 &amp; 253</td>
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<td>214 &amp; 215</td>
<td>94 &amp; 95</td>
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<td>216 &amp; 217</td>
<td>96 &amp; 97</td>
<td>256 &amp; 257</td>
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<td>218 &amp; 219</td>
<td>98 &amp; 99</td>
<td>258 &amp; 259</td>
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<td>60 &amp; 61</td>
<td>220 &amp; 221</td>
<td>100 &amp; 101</td>
<td>260 &amp; 261</td>
</tr>
<tr>
<td>62 &amp; 63</td>
<td>222 &amp; 223</td>
<td>102 &amp; 103</td>
<td>262 &amp; 263</td>
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<td>64 &amp; 65</td>
<td>224 &amp; 225</td>
<td>104 &amp; 105</td>
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<td>66 &amp; 67</td>
<td>226 &amp; 227</td>
<td>106 &amp; 107</td>
<td>266 &amp; 267</td>
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<td>68 &amp; 69</td>
<td>228 &amp; 229</td>
<td>108 &amp; 109</td>
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<td>70 &amp; 71</td>
<td>230 &amp; 231</td>
<td>110 &amp; 111</td>
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<td>72 &amp; 73</td>
<td>232 &amp; 233</td>
<td>112 &amp; 113</td>
<td>272 &amp; 273</td>
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<td>74 &amp; 75</td>
<td>234 &amp; 235</td>
<td>114 &amp; 115</td>
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<td>76 &amp; 77</td>
<td>236 &amp; 237</td>
<td>116 &amp; 117</td>
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<td>78 &amp; 79</td>
<td>238 &amp; 239</td>
<td>118 &amp; 119</td>
<td>278 &amp; 279</td>
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</tbody>
</table>

#### Assembly Definition Addresses

- **Default Pointers**
  - Registers 40 & 41
    - Pointer 1 = 1880 & 1881 Loop Control Mode
  - Registers 42 & 43
    - Pointer 2 = 2160 & 2161 Closed Loop Set Point
  - Registers 44 & 45
    - Pointer 3 = 2162 & 2163 Open Loop Set Point
  - Registers 46 & 47
    - Pointer 4 = 1480 & 1481 Alarm 1 High Set Point
  - Registers 48 & 49
    - Pointer 5 = 1482 & 1483 Alarm 1 Low Set Point
  - Registers 50 & 51
    - Pointer 6 = 1530 & 1531 Alarm 2 High Set Point
  - Registers 52 & 53
    - Pointer 7 = 1532 & 1533 Alarm 2 Low Set Point
  - Registers 54 & 55
    - Pointer 8 = 1580 & 1581 Alarm 3 High Set Point
  - Registers 56 & 57
    - Pointer 9 = 1582 & 1583 Alarm 3 Low Set Point
  - Registers 58 & 59
    - Pointer 10 = 1630 & 1631 Alarm 4 High Set Point
  - Registers 60 & 61
    - Value of Pointer 1
  - Registers 62 & 63
    - Value of Pointer 2
  - Registers 64 & 65
    - Value of Pointer 3
  - Registers 66 & 67
    - Value of Pointer 4
  - Registers 68 & 69
    - Value of Pointer 5
  - Registers 70 & 71
    - Value of Pointer 6
  - Registers 72 & 73
    - Value of Pointer 7
  - Registers 74 & 75
    - Value of Pointer 8
  - Registers 76 & 77
    - Value of Pointer 9
  - Registers 78 & 79
    - Value of Pointer 10

#### Assembly Working Addresses

- **Default Pointers**
  - Registers 200 & 201
  - Registers 202 & 203
  - Registers 204 & 205
  - Registers 206 & 207
  - Registers 208 & 209
  - Registers 210 & 211
  - Registers 212 & 213
  - Registers 214 & 215
  - Registers 216 & 217
  - Registers 218 & 219
  - Registers 220 & 221
  - Registers 222 & 223
  - Registers 224 & 225
  - Registers 226 & 227
  - Registers 228 & 229
  - Registers 230 & 231
  - Registers 232 & 233
  - Registers 234 & 235
  - Registers 236 & 237
  - Registers 238 & 239

#### Pointer Definitions

- **Pointer 1** = 1880 & 1881 Loop Control Mode
- **Pointer 2** = 2160 & 2161 Closed Loop Set Point
- **Pointer 3** = 2162 & 2163 Open Loop Set Point
- **Pointer 4** = 1480 & 1481 Alarm 1 High Set Point
- **Pointer 5** = 1482 & 1483 Alarm 1 Low Set Point
- **Pointer 6** = 1530 & 1531 Alarm 2 High Set Point
- **Pointer 7** = 1532 & 1533 Alarm 2 Low Set Point
- **Pointer 8** = 1580 & 1581 Alarm 3 High Set Point
- **Pointer 9** = 1582 & 1583 Alarm 3 Low Set Point
- **Pointer 10** = 1630 & 1631 Alarm 4 High Set Point

- **Value of Pointer 11**
- **Value of Pointer 12**
- **Value of Pointer 13**
- **Value of Pointer 14**
- **Value of Pointer 15**
- **Value of Pointer 16**
- **Value of Pointer 17**
- **Value of Pointer 18**
- **Value of Pointer 19**
- **Value of Pointer 20**
### Modbus Default Assembly Structure 80-119

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<thead>
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<th>Assembly Definition</th>
<th>Addresses</th>
<th>Default Pointers</th>
<th>Assembly Working</th>
<th>Addresses</th>
<th>Registers</th>
<th>Default Pointers</th>
<th>Assembly Working</th>
<th>Registers</th>
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<tbody>
<tr>
<td>Registers 80 &amp; 81</td>
<td>Pointer 21 = 390 &amp; 391</td>
<td>Analog Input 1 Process Value</td>
<td>Registers 240 &amp; 241</td>
<td>Value of Pointer 21</td>
<td>Registers 100 &amp; 101</td>
<td>Pointer 31 = 1882 &amp; 1883</td>
<td>Control Mode Active</td>
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<tr>
<td>Registers 84 &amp; 85</td>
<td>Pointer 23 = 440 &amp; 441</td>
<td>Analog Input 2 Process Value</td>
<td>Registers 244 &amp; 245</td>
<td>Value of Pointer 23</td>
<td>Registers 104 &amp; 105</td>
<td>Pointer 33 = 1906 &amp; 1907</td>
<td>Cool Power</td>
<td></td>
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<td>Registers 86 &amp; 87</td>
<td>Pointer 24 = 442 &amp; 443</td>
<td>Analog Input 2 Error Status</td>
<td>Registers 246 &amp; 247</td>
<td>Value of Pointer 24</td>
<td>Registers 106 &amp; 107</td>
<td>Pointer 34 = 690 &amp; 691</td>
<td>Limit State</td>
<td></td>
</tr>
<tr>
<td>Registers 88 &amp; 89</td>
<td>Pointer 25 = 1496 &amp; 1497</td>
<td>Alarm 1 State</td>
<td>Registers 248 &amp; 249</td>
<td>Value of Pointer 25</td>
<td>Registers 108 &amp; 109</td>
<td>Pointer 35 = 2520 &amp; 2521</td>
<td>Profile Start</td>
<td></td>
</tr>
<tr>
<td>Registers 90 &amp; 91</td>
<td>Pointer 26 = 1546 &amp; 1547</td>
<td>Alarm 2 State</td>
<td>Registers 250 &amp; 251</td>
<td>Value of Pointer 26</td>
<td>Registers 110 &amp; 111</td>
<td>Pointer 36 = 2540 &amp; 2541</td>
<td>Profile Action Request</td>
<td></td>
</tr>
<tr>
<td>Registers 92 &amp; 93</td>
<td>Pointer 27 = 1596 &amp; 1597</td>
<td>Alarm 3 State</td>
<td>Registers 252 &amp; 253</td>
<td>Value of Pointer 27</td>
<td>Registers 112 &amp; 113</td>
<td>Pointer 37 = 2524 &amp; 2525</td>
<td>Active File</td>
<td></td>
</tr>
<tr>
<td>Registers 94 &amp; 95</td>
<td>Pointer 28 = 1646 &amp; 1647</td>
<td>Alarm 4 State</td>
<td>Registers 254 &amp; 255</td>
<td>Value of Pointer 28</td>
<td>Registers 114 &amp; 115</td>
<td>Pointer 38 = 2526 &amp; 2527</td>
<td>Active Step</td>
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<tr>
<td>Registers 96 &amp; 97</td>
<td>Pointer 29 = 1328 &amp; 1329</td>
<td>Digital Input 5 Status</td>
<td>Registers 256 &amp; 257</td>
<td>Value of Pointer 29</td>
<td>Registers 116 &amp; 117</td>
<td>Pointer 39 = 2528 &amp; 2529</td>
<td>Active Set Point</td>
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</table>

### Assembly Definition

- **Addresses**
- **Default Pointers**
- **Assembly Working**
- **Registers**
- **Default Pointers**
- **Assembly Working**
- **Registers**
### CIP Implicit O to T (Originator to Target) Assembly Structure

<table>
<thead>
<tr>
<th>Assembly Members</th>
<th>PM Assembly Class, Instance, Attribute</th>
<th>PM Data Type</th>
<th>Parameter</th>
<th>Parameter Class, Instance, Attribute</th>
<th>PLC Data Type</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>0x77, 0x01, 0x01</td>
<td>DINT</td>
<td>Loop Control Mode</td>
<td>0x97, 0x01, 0x01</td>
<td>DINT</td>
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<tr>
<td>2</td>
<td>0x77, 0x01, 0x02</td>
<td>DINT</td>
<td>Closed Loop Set Point</td>
<td>0x6B, 0x01, 0x01</td>
<td>REAL</td>
</tr>
<tr>
<td>3</td>
<td>0x77, 0x01, 0x03</td>
<td>DINT</td>
<td>Open Loop Set Point</td>
<td>0x6B, 0x01, 0x02</td>
<td>REAL</td>
</tr>
<tr>
<td>4</td>
<td>0x77, 0x01, 0x04</td>
<td>DINT</td>
<td>Alarm 1 - Alarm High Set Point</td>
<td>0x6D, 0x01, 0x01</td>
<td>REAL</td>
</tr>
<tr>
<td>5</td>
<td>0x77, 0x01, 0x05</td>
<td>DINT</td>
<td>Alarm 1 - Alarm Low Set Point</td>
<td>0x6D, 0x01, 0x02</td>
<td>REAL</td>
</tr>
<tr>
<td>6</td>
<td>0x77, 0x01, 0x06</td>
<td>DINT</td>
<td>Alarm 2 - Alarm High Set Point</td>
<td>0x6D, 0x02, 0x01</td>
<td>REAL</td>
</tr>
<tr>
<td>7</td>
<td>0x77, 0x01, 0x07</td>
<td>DINT</td>
<td>Alarm 2 - Alarm Low Set Point</td>
<td>0x6D, 0x02, 0x02</td>
<td>REAL</td>
</tr>
<tr>
<td>8</td>
<td>0x77, 0x01, 0x08</td>
<td>DINT</td>
<td>Alarm 3 - Alarm High Set Point</td>
<td>0x6D, 0x03, 0x01</td>
<td>REAL</td>
</tr>
<tr>
<td>9</td>
<td>0x77, 0x01, 0x09</td>
<td>DINT</td>
<td>Alarm 3 - Alarm Low Set Point</td>
<td>0x6D, 0x03, 0x02</td>
<td>REAL</td>
</tr>
<tr>
<td>10</td>
<td>0x77, 0x01, 0x0A</td>
<td>DINT</td>
<td>Alarm 4 - Alarm High Set Point</td>
<td>0x6D, 0x04, 0x01</td>
<td>REAL</td>
</tr>
<tr>
<td>11</td>
<td>0x77, 0x01, 0x0B</td>
<td>DINT</td>
<td>Alarm 4 - Alarm Low Set Point</td>
<td>0x6D, 0x04, 0x02</td>
<td>REAL</td>
</tr>
<tr>
<td>12</td>
<td>0x77, 0x01, 0x0C</td>
<td>DINT</td>
<td>Profile Action Request</td>
<td>0x7A, 0x01, 0x0B</td>
<td>DINT</td>
</tr>
<tr>
<td>13</td>
<td>0x77, 0x01, 0x0D</td>
<td>DINT</td>
<td>Profile Start</td>
<td>0x7A, 0x01, 0x01</td>
<td>DINT</td>
</tr>
<tr>
<td>14</td>
<td>0x77, 0x01, 0x0E</td>
<td>DINT</td>
<td>Heat Proportional Band</td>
<td>0x97, 0x01, 0x06</td>
<td>REAL</td>
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<tr>
<td>15</td>
<td>0x77, 0x01, 0x0F</td>
<td>DINT</td>
<td>Cool Proportional Band</td>
<td>0x97, 0x01, 0x07</td>
<td>REAL</td>
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<tr>
<td>16</td>
<td>0x77, 0x01, 0x10</td>
<td>DINT</td>
<td>Time Integral</td>
<td>0x97, 0x01, 0x08</td>
<td>REAL</td>
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<tr>
<td>17</td>
<td>0x77, 0x01, 0x11</td>
<td>DINT</td>
<td>Time Derivative</td>
<td>0x97, 0x01, 0x09</td>
<td>REAL</td>
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<tr>
<td>18</td>
<td>0x77, 0x01, 0x12</td>
<td>DINT</td>
<td>Heat Hysteresis</td>
<td>0x97, 0x01, 0x0B</td>
<td>REAL</td>
</tr>
<tr>
<td>19</td>
<td>0x77, 0x01, 0x13</td>
<td>DINT</td>
<td>Cool Hysteresis</td>
<td>0x97, 0x01, 0x0C</td>
<td>REAL</td>
</tr>
<tr>
<td>20</td>
<td>0x77, 0x01, 0x14</td>
<td>DINT</td>
<td>Dead Band</td>
<td>0x97, 0x01, 0x0A</td>
<td>REAL</td>
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### CIP Implicit T to O (Target to Originator) Assembly Structure

<table>
<thead>
<tr>
<th>Assembly Members</th>
<th>PM Assembly Class, Instance, Attribute</th>
<th>PM Data Type</th>
<th>Parameter</th>
<th>Parameter Class, Instance, Attribute</th>
<th>PLC Data Type</th>
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<td>Cannot be changed</td>
<td>Binary</td>
<td>Device Status</td>
<td>none</td>
<td>DINT</td>
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<tr>
<td>2</td>
<td>0x77, 0x02, 0x01</td>
<td>DINT</td>
<td>Analog Input 1, Analog Input Value</td>
<td>0x68, 0x01, 0x01</td>
<td>REAL</td>
</tr>
<tr>
<td>3</td>
<td>0x77, 0x02, 0x02</td>
<td>DINT</td>
<td>Analog Input 1, Input Error</td>
<td>0x68, 0x01, 0x02</td>
<td>REAL</td>
</tr>
<tr>
<td>4</td>
<td>0x77, 0x02, 0x03</td>
<td>DINT</td>
<td>Analog Input 2, Analog Input Value</td>
<td>0x68, 0x02, 0x01</td>
<td>REAL</td>
</tr>
<tr>
<td>5</td>
<td>0x77, 0x02, 0x04</td>
<td>DINT</td>
<td>Analog Input 2, Input Error</td>
<td>0x68, 0x02, 0x02</td>
<td>REAL</td>
</tr>
<tr>
<td>6</td>
<td>0x77, 0x02, 0x05</td>
<td>DINT</td>
<td>Alarm 1, Alarm State</td>
<td>0x6D, 0x01, 0x09</td>
<td>DINT</td>
</tr>
<tr>
<td>7</td>
<td>0x77, 0x02, 0x06</td>
<td>DINT</td>
<td>Alarm 2, Alarm State</td>
<td>0x6D, 0x02, 0x09</td>
<td>DINT</td>
</tr>
<tr>
<td>8</td>
<td>0x77, 0x02, 0x07</td>
<td>DINT</td>
<td>Alarm 3, Alarm State</td>
<td>0x6D, 0x03, 0x09</td>
<td>DINT</td>
</tr>
<tr>
<td>9</td>
<td>0x77, 0x02, 0x08</td>
<td>DINT</td>
<td>Alarm 4, Alarm State</td>
<td>0x09, 0x04, 0x09</td>
<td>DINT</td>
</tr>
<tr>
<td>10</td>
<td>0x77, 0x02, 0x09</td>
<td>DINT</td>
<td>Event Status</td>
<td>0x6E, 0x01, 0x05</td>
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</tr>
<tr>
<td>11</td>
<td>0x77, 0x02, 0x0A</td>
<td>DINT</td>
<td>Event Status</td>
<td>0x6E, 0x02, 0x05</td>
<td>DINT</td>
</tr>
<tr>
<td>12</td>
<td>0x77, 0x02, 0x0B</td>
<td>DINT</td>
<td>Control Mode Active</td>
<td>0x97, 0x01, 0x02</td>
<td>DINT</td>
</tr>
<tr>
<td>13</td>
<td>0x77, 0x02, 0x0C</td>
<td>DINT</td>
<td>Heat Power</td>
<td>0x97, 0x01, 0x0D</td>
<td>REAL</td>
</tr>
<tr>
<td>14</td>
<td>0x77, 0x02, 0x0D</td>
<td>DINT</td>
<td>Cool Power</td>
<td>0x97, 0x01, 0x0E</td>
<td>REAL</td>
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<tr>
<td>15</td>
<td>0x77, 0x02, 0x0E</td>
<td>DINT</td>
<td>Limit State</td>
<td>0x70, 0x01, 0x06</td>
<td>DINT</td>
</tr>
<tr>
<td>16</td>
<td>0x77, 0x02, 0x0F</td>
<td>DINT</td>
<td>Profile Start</td>
<td>0x74, 0x01, 0x01</td>
<td>DINT</td>
</tr>
<tr>
<td>17</td>
<td>0x77, 0x02, 0x10</td>
<td>DINT</td>
<td>Profile Action Request</td>
<td>0x74, 0x01, 0x0B</td>
<td>DINT</td>
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<td>18</td>
<td>0x77, 0x02, 0x11</td>
<td>DINT</td>
<td>Current Profile</td>
<td>0x74, 0x01, 0x03</td>
<td>DINT</td>
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<td>0x77, 0x02, 0x12</td>
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<td>Current Step</td>
<td>0x74, 0x01, 0x04</td>
<td>DINT</td>
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<tr>
<td>20</td>
<td>0x77, 0x02, 0x13</td>
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<td>Active Set Point</td>
<td>0x74, 0x01, 0x05</td>
<td>REAL</td>
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<tr>
<td>21</td>
<td>0x77, 0x02, 0x14</td>
<td>DINT</td>
<td>Step Time Remaining</td>
<td>0x74, 0x01, 0x09</td>
<td>DINT</td>
</tr>
</tbody>
</table>
Specifications

**Line Voltage/Power (Minimum/Maximum Ratings)**
- 85 to 264V~ (ac), 47 to 63Hz
- 20 to 28V~ (ac), 47 to 63Hz
- 12 to 40V (dc)
- 14VA maximum power consumption (PM4, 8 & 9)
- 10VA maximum power consumption (PM3 & 6)
- Data retention upon power failure via non-volatile memory
- Compliant with SEMIF47-0200, FigureR1-1 voltage sag requirements @ 24V – (ac) or higher

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

**Accuracy**
- Calibration accuracy and sensor conformity: ±0.1% of span ±1°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 ±5°F (25±3°C)
- Accuracy span: 1000 °F (540°C) min.
- Temperature stability: ±0.1 °F/°F (±0.1°C/°C) rise in ambient max.

**Agency Approvals**
- UL® Listed to UL® 61010-1 File E185611
- UL® Reviewed to CSA C22.2 No.61010-1-04
- UL® 50Type 4X, NEMA 4X indoor locations, IP66 front panel seal (indoor use only)
- FM Class 3545 File 3029084 temperature limit switches
- CE-See Declaration of Conformity RoHS and W.E.E.E. compliant
- ODVA-EtherNet/IP™ and DeviceNet Compliance
- PM3/6 CSA C22. No. 24 File 158031 Class 4813-02

**Isolated Serial Communications**
- EIA 232/485, Modbus® RTU
- EtherNet/IP™, DeviceNet™ (ODVA certified)
- Modbus® TCP
- Profinbus 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
- >20MΩ input impedance
- >3µA open sensor detection
- Max. of 2KΩ source resistance
- RTD 2 or 3 wire, platinum, 100Ω and 1000Ω @ 0°C calibration to DIN curve (0.00385Ω/°C)
- Process, 0-20mA @ 100Ω , or 0-10V = (dc) @ 20kΩ input impedance; scalable, 0-50mV, 0-1000Ω

**Voltage Input Ranges**
- Accuracy ±10mV ±1 LSD at standard conditions
- Temperature stability ±100 PPM/°C maximum

**Milliamp Input Ranges**
- Accuracy ±20µA ±1 LSD at standard conditions
- Temperature stability ±100 PPM/°C maximum

**Resolution Input Ranges**
- 0 to 10V: 200 µV nominal
- 0 to 20 mA: 0.5 mA nominal
- Potentiometer: 0 to 1,200Ω
- Inverse scaling

<table>
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<th>Input Type</th>
<th>Max Error @ 25 Deg C</th>
<th>Accuracy Range Low</th>
<th>Accuracy Range High</th>
<th>Units</th>
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</thead>
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<td>±1.75</td>
<td>0</td>
<td>750</td>
<td>Deg C</td>
</tr>
<tr>
<td>K</td>
<td>±2.45</td>
<td>-200</td>
<td>1250</td>
<td>Deg C</td>
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<tr>
<td>T (-200 to 350)</td>
<td>±1.55</td>
<td>-200</td>
<td>350</td>
<td>Deg C</td>
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<td>D</td>
<td>±3.32</td>
<td>0</td>
<td>2315</td>
<td>Deg C</td>
</tr>
<tr>
<td>F (PTII)</td>
<td>±2.34</td>
<td>0</td>
<td>1343</td>
<td>Deg C</td>
</tr>
<tr>
<td>RTD, 100 ohm</td>
<td>±2.00</td>
<td>-200</td>
<td>800</td>
<td>Deg C</td>
</tr>
<tr>
<td>RTD, 1000 ohm</td>
<td>±2.00</td>
<td>-200</td>
<td>800</td>
<td>Deg C</td>
</tr>
<tr>
<td>mV</td>
<td>±0.05</td>
<td>-50</td>
<td>50</td>
<td>mV</td>
</tr>
<tr>
<td>Volts</td>
<td>±0.01</td>
<td>0</td>
<td>10</td>
<td>Volts</td>
</tr>
<tr>
<td>mA dc</td>
<td>±0.02</td>
<td>0</td>
<td>20</td>
<td>mAmps DC</td>
</tr>
<tr>
<td>mA ac</td>
<td>±5</td>
<td>-50</td>
<td>50</td>
<td>mAmps AC</td>
</tr>
<tr>
<td>Potentiometer, 1K range</td>
<td>±1</td>
<td>0</td>
<td>1000</td>
<td>Ohms</td>
</tr>
</tbody>
</table>

**Operating Range**

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Range Low</th>
<th>Range High</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>-210</td>
<td>1200</td>
</tr>
<tr>
<td>K</td>
<td>-270</td>
<td>1371</td>
</tr>
<tr>
<td>T</td>
<td>-270</td>
<td>400</td>
</tr>
<tr>
<td>N</td>
<td>-270</td>
<td>1300</td>
</tr>
<tr>
<td>E</td>
<td>-270</td>
<td>1000</td>
</tr>
<tr>
<td>R</td>
<td>-50</td>
<td>1767</td>
</tr>
<tr>
<td>S</td>
<td>-50</td>
<td>1767</td>
</tr>
<tr>
<td>B</td>
<td>-50</td>
<td>1816</td>
</tr>
<tr>
<td>C</td>
<td>0</td>
<td>2315</td>
</tr>
<tr>
<td>D</td>
<td>0</td>
<td>2315</td>
</tr>
<tr>
<td>F (PTII)</td>
<td>0</td>
<td>1343</td>
</tr>
<tr>
<td>RTD (100 ohm)</td>
<td>-200</td>
<td>800</td>
</tr>
<tr>
<td>RTD (1000 ohm)</td>
<td>-200</td>
<td>800</td>
</tr>
<tr>
<td>mV</td>
<td>-50</td>
<td>50</td>
</tr>
<tr>
<td>Volts</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>mA dc</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>mA ac</td>
<td>-50</td>
<td>50</td>
</tr>
<tr>
<td>Potentiometer, 1K range</td>
<td>0</td>
<td>1200</td>
</tr>
<tr>
<td>Resistance, 5K range</td>
<td>0</td>
<td>5000</td>
</tr>
<tr>
<td>Resistance, 10K range</td>
<td>0</td>
<td>10000</td>
</tr>
<tr>
<td>Resistance, 20K range</td>
<td>0</td>
<td>20000</td>
</tr>
<tr>
<td>Resistance, 40K range</td>
<td>0</td>
<td>40000</td>
</tr>
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</table>

Watlow EZ-ZONE® PM Limit Controller • 74 • Appendix
Thermistor Input

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Max Error @ 25 Deg C</th>
<th>Accuracy Range Low</th>
<th>Accuracy Range High</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermistor, 5K range</td>
<td>±5</td>
<td>0</td>
<td>5000 Ohms</td>
<td></td>
</tr>
<tr>
<td>Thermistor, 10K range</td>
<td>±10</td>
<td>0</td>
<td>10000 Ohms</td>
<td></td>
</tr>
<tr>
<td>Thermistor, 20K range</td>
<td>±20</td>
<td>0</td>
<td>20000 Ohms</td>
<td></td>
</tr>
<tr>
<td>Thermistor, 40K range</td>
<td>±40</td>
<td>0</td>
<td>40000 Ohms</td>
<td></td>
</tr>
</tbody>
</table>

- 0 to 40 KΩ, 0 to 20 KΩ, 0 to 10 KΩ, 0 to 5 KΩ
- 2.252 KΩ and 10 KΩ base at 77°F (25°C)
- Linearization curves built in
- Third party Thermistor compatibility requirements

<table>
<thead>
<tr>
<th>Base R @ 25°C</th>
<th>Alpha Techniques</th>
<th>Beta THERM</th>
<th>YSI</th>
<th>Prompt</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.252K</td>
<td>Curve A</td>
<td>2.2K3A</td>
<td>004</td>
<td>A</td>
</tr>
<tr>
<td>10K</td>
<td>Curve A</td>
<td>10K3A</td>
<td>016</td>
<td>B</td>
</tr>
<tr>
<td>10K</td>
<td>Curve C</td>
<td>10K4A</td>
<td>006</td>
<td>C</td>
</tr>
</tbody>
</table>

2 Digital Input/Output Option - 2 DIO
- Digital input update rate 10Hz
  - DC voltage
    - Max. input 36V = 3 mA
    - Min. high state 3 V at 0.25 mA
    - Max. low state 2 V
  - Dry contact
    - Min. open resistance 10 KΩ
    - Max. closed resistance 50 Ω
    - Max. short circuit 20 mA
- Digital output update rate 10 Hz
  - Output voltage 24 V, current limit, Output 6 = 10 mA max., Output 5 = 3 pole DIN-A-MITE® or 24 mA max.

Output Hardware
- Switched dc = 22 to 32V = (dc) @ 30 mA output 1 and 3, 10 mA output 4
- Switched dc/open collector = 30V = (dc) max. @ 100 mA max. current sink
- Solid-State Relay (SSR), Form A, 0.5A @ 24V ~ (ac) min., 264V ~ (ac) max., opto-isolated, without contact suppression, 20 VA 120/240V ~ (ac) pilot duty
- Electromechanical relay, Form C, 5A, 24 to 240V ~ (ac) or 30V = (dc) max., resistive load, 100,000 cycles at rated load, 125 VA pilot duty at 120/240V ~ (ac), 25 VA at 24V ~ (ac)
- Electromechanical relay, Form A, 5A, 24 to 240V ~ (ac) or 30V = (dc) max., resistive load, 100,000 cycles at rated load, 125 VA pilot duty at 120/240V ~ (ac), 25 VA at 24V ~ (ac)
- Universal process/retransmit, Output range selectable:
  - 0 to 10V = (dc) into a min. 1,000Ω load
  - 0 to 20mA into max. 800Ω load
  - dc ranges: 2.5 mV nominal
  - mA ranges: 5 µA nominal

Calibration Accuracy
- dc ranges: ±15 mV
- mA ranges: ±30 µA

Temperature Stability
- 100 ppm/°C

Operator Interface
- Dual 4 digit, 7 segment LED displays
- Advance, Reset, up and down keys, plus optional programmable EZ-KEY(s) depending on model size
- Typical display update rate 1Hz
- RESET key substituted for infinity on all models including the limit control

Dimensions

<table>
<thead>
<tr>
<th>Size</th>
<th>Behind Panel (max.)</th>
<th>Width</th>
<th>Height</th>
<th>Display Character Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/32</td>
<td>101.6 mm (4.00 in)</td>
<td>53.3 mm (2.10 in)</td>
<td>30.9 mm (1.22 in)</td>
<td>left: 7.59 mm (0.299 in) right: 5.90 mm (0.220 in)</td>
</tr>
<tr>
<td>1/4</td>
<td>100.8 mm (3.97 in)</td>
<td>100.3 mm (3.95 in)</td>
<td>100.3 mm (3.95 in)</td>
<td>up: 11.43 mm (0.450 in) middle: 9.53 mm (0.375 in) low: 7.62 mm (0.300 in)</td>
</tr>
<tr>
<td>1/16</td>
<td>101.6 mm (4.00 in)</td>
<td>53.3 mm (2.10 in)</td>
<td>53.3 mm (2.10 in)</td>
<td>up: 10.80 mm (0.425 in) low: 6.98 mm (0.275 in)</td>
</tr>
<tr>
<td>1/8 (H)</td>
<td>101.6 mm (4.00 in)</td>
<td>100.3 mm (3.95 in)</td>
<td>53.9 mm (1.22 in)</td>
<td>top: 11.4 mm (0.450 in) middle: 9.53 mm (0.375 in) bottom: 7.62 mm (0.300 in)</td>
</tr>
<tr>
<td>1/8 (V)</td>
<td>101.6 mm (4.00 in)</td>
<td>53.3 mm (2.10 in)</td>
<td>100.3 mm (3.95 in)</td>
<td>top: 11.4 mm (0.450 in) middle: 9.53 mm (0.375 in) bottom: 7.62 mm (0.300 in)</td>
</tr>
</tbody>
</table>

Weight

<table>
<thead>
<tr>
<th>1/32 DIN (PM3)</th>
<th>1/8 DIN (PM8&amp;9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller: 127 g (4.5 oz.)</td>
<td>Controller: 284 g (10 oz.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1/16 DIN (PM6)</th>
<th>1/4 DIN (PM4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller: 186 g (6.6 oz.)</td>
<td>Controller: 331 g (11.7 oz.)</td>
</tr>
</tbody>
</table>

User Manual
- User manual: 172.82 g (6.11 oz)

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EtherNet/IP™ is a trademark of ControlNet International Ltd. used under license by Open DeviceNet Vendor Association, Inc. (ODVA).

UL® is a registered trademark of Underwriters Laboratories Inc.

DeviceNet™ is a trademark of Open DeviceNet Vendors Association.

Note:
These specifications are subject to change without prior notice.
### Ordering Information for Enhanced Limit Controller Models

**Enhanced Limit Controller**
- EZ-ZONE® Enhanced Limit Models
- TRU-TUNE+® Adaptive Tune, red-green 7-segment displays

<table>
<thead>
<tr>
<th>Package Size</th>
<th>6</th>
<th>Panel Mount 1/16 DIN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8</td>
<td>Panel Mount 1/8 DIN</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Panel Mount 1/8 DIN Horizontal</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Panel Mount 1/4 DIN</td>
</tr>
</tbody>
</table>

**Primary Function**
- L Limit Controller with Universal Input
- M Limit Controller with Thermistor
- 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. 24V~ (ac) and 15 to 36V (dc)
4. 24V~ (ac) and 15 to 36V (dc), plus 2 Digital I/O points

**Output 1 and 2 Hardware Options**

<table>
<thead>
<tr>
<th></th>
<th>Output 1</th>
<th>Output 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>AJ</td>
<td>None</td>
<td>Mechanical relay 5 A, form A</td>
</tr>
<tr>
<td>CJ</td>
<td>Switched dc/open collector</td>
<td>Mechanical relay 5 A, form A</td>
</tr>
<tr>
<td>EJ</td>
<td>Mechanical relay 5 A, form C</td>
<td>Mechanical relay 5 A, form A</td>
</tr>
</tbody>
</table>

**Communications Options**
- A None
- 1 EIA 485 Modbus RTU®
- 2 Modbus RTU 232/485
- 3 EtherNet/IP®, Modbus TCP
- 5 DeviceNet
- 6 Profibus

- *Standard Bus EIA-485 always included - all models*

**Future Options**
- A None

**Output 3 and 4 Hardware Options**

<table>
<thead>
<tr>
<th></th>
<th>Output 3</th>
<th>Output 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>AJ</td>
<td>None</td>
<td>Mechanical relay 5 A, form A</td>
</tr>
<tr>
<td>AK</td>
<td>None</td>
<td>Solid-State Relay 0.5 A, form A</td>
</tr>
<tr>
<td>CA</td>
<td>Switched dc/open collector</td>
<td>None</td>
</tr>
<tr>
<td>CC</td>
<td>Switched dc/open collector</td>
<td>Switched dc</td>
</tr>
<tr>
<td>CJ</td>
<td>Switched dc/open collector</td>
<td>Mechanical relay 5 A, form A</td>
</tr>
<tr>
<td>CK</td>
<td>Switched dc/open collector</td>
<td>Solid-State Relay 0.5 A, form A</td>
</tr>
<tr>
<td>EA</td>
<td>Mechanical relay 5 A, form C</td>
<td>None</td>
</tr>
<tr>
<td>EC</td>
<td>Mechanical relay 5 A, form C</td>
<td>Switched dc</td>
</tr>
<tr>
<td>EJ</td>
<td>Mechanical relay 5 A, form C</td>
<td>Mechanical relay 5 A, form A</td>
</tr>
<tr>
<td>EK</td>
<td>Mechanical relay 5 A, form C</td>
<td>Solid-State Relay 0.5 A, form A</td>
</tr>
<tr>
<td>FA</td>
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<td>None</td>
</tr>
<tr>
<td>FC</td>
<td>Universal Process</td>
<td>Switched dc</td>
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<td>FJ</td>
<td>Universal Process</td>
<td>Mechanical relay 5 A, form A</td>
</tr>
<tr>
<td>FK</td>
<td>Universal Process</td>
<td>Solid-State Relay 0.5 A, form A</td>
</tr>
<tr>
<td>KK</td>
<td>Solid-State Relay 0.5 A, form A</td>
<td>Solid-State Relay 0.5 A, form A</td>
</tr>
</tbody>
</table>

- *PM6 only, if communications options 2 - 6 are ordered, option AA must be selected here.*

**Future Options**
- A None

**Custom Options**
- AA Standard EZ-ZONE face plate

**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

#### Limit Controller

**EZ-ZONE® Limit Models**

**TRU-TUNE+® Adaptive Tune, red-green 7-segment displays**

#### Package Size

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<table>
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</thead>
<tbody>
<tr>
<td>3</td>
<td>Panel Mount 1/32 DIN</td>
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<td>6</td>
<td>Panel Mount 1/16 DIN</td>
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<tr>
<td>8</td>
<td>Panel Mount 1/8 DIN Vertical</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>9</td>
<td>Panel Mount 1/8 DIN Horizontal</td>
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<tr>
<td>4</td>
<td>Panel Mount 1/4 DIN</td>
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#### Primary Function

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<tbody>
<tr>
<td>L</td>
<td>Limit Controller with Universal Input</td>
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<tr>
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<td>D</td>
<td>Custom Firmware</td>
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</table>

#### Power Supply, Digital Input/Output

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<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100 to 240V~ (ac)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>100 to 240V~ (ac) plus 2 Digital I/O points</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>3</td>
<td>24V~ (ac) and 15 to 36V= (dc)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>24V~ (ac) and 15 to 36V= (dc), plus 2 Digital I/O points</td>
<td></td>
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#### Output 1 and 2 Hardware Options

**Output 1**

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<table>
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<tr>
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<tbody>
<tr>
<td>AJ</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CJ</td>
<td>Switched dc/open collector</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EJ</td>
<td>Mechanical relay 5 A, form C</td>
<td></td>
<td></td>
<td></td>
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</table>

**Output 2**

<p>| | | | | | | |</p>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mechanical relay 5 A, form A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mechanical relay 5 A, form A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mechanical relay 5 A, form A</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

#### Communications Options

<p>| | | | | | | |</p>
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<thead>
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<th></th>
<th></th>
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<tbody>
<tr>
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<td>None</td>
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</tr>
<tr>
<td>1</td>
<td>EIA 485 Modbus RTU®</td>
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<td></td>
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</tbody>
</table>

- *Standard Bus EIA-485 always included - all models*

#### Future Option

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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AAAA</td>
<td>None</td>
<td></td>
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</tr>
</tbody>
</table>

#### Custom Options

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>AA</td>
<td>Standard EZ-ZONE face plate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Note:**

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Index

[ABL] Alarm Blocking 46, 62
[ACF] AC Line Frequency 47
[ADl] Alarm Delay 46
[ADS] Alarm Display 46
[AIh] Alarm High Set Point 37, 61
[AIy] Alarm Hysteresis 45, 61
[AI] Analog Input Menu 36, 40
[AIO] Implicit Input Assembly 52
[AIO] Implicit Input Assembly Size 52
[ALR] Alarm Latching 46, 62
[ALE] Alarm Low 1 to 4
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Series EZ-ZONE® PM

WATLOW
1241 Bundy Blvd.
Winona, MN 55987 USA

Declares that the following product:
Designation: Series EZ-ZONE® PM (Panel Mount)
Model Numbers: PM (3, 6, 8, 9 or 4)(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, C, H, J or K) (Any three letters or numbers)
Classification: Temperature control, Installation Category II, Pollution degree 2, IP66
Rated Voltage and Frequency: 100 to 240 V~ (ac 50/60 Hz) or 15 to 36 V= dc/ 24 V~ac 50/60 Hz
Rated Power Consumption: 10 VA maximum PM3, PM6 Models.
14 VA maximum PM8, PM9, PM4 Models

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

EN 61326-1 2006 Electrical equipment for measurement, control and laboratory use – EMC requirements (Industrial Immunity, Class B Emissions).
EN 61000-4-2 1996 +A1,A2 Electrostatic Discharge Immunity
EN 61000-4-3 2006 Radiated Field Immunity 10V/M 80–1000 MHz, 3 V/M 1.4–2.7 GHz
EN 61000-4-4 2006 Electrical Fast-Transient / Burst Immunity
EN 61000-4-5 2006 Surge Immunity
EN 61000-4-6 1996 +A1,A2,A3 Conducted Immunity
EN 61000-4-11 2004 Voltage Dips, Short Interruptions and Voltage Variations Immunity
EN 61000-3-2 2006 Harmonic Current Emissions
EN 61000-3-31 2005 Voltage Fluctuations and Flicker
SEMI F47 2000 Specification for Semiconductor Sag Immunity Figure R1-1

1For mechanical relay loads, cycle time may need to be extended up to 160 seconds to meet flicker requirements depending on load switched and source impedance.

2006/95/EC Low-Voltage Directive
EN 61010-1 2001 Safety Requirements of electrical equipment for measurement, control and laboratory use. Part 1: General requirements

Compliant with 2002/95/EC RoHS Directive


Raymond D. Feller III Winona, Minnesota, USA
Name of Authorized Representative Place of Issue
General Manager June 2009
Title of Authorized Representative Date of Issue

Signature of Authorized Representative

CE DOC EZ-ZONE PM-06-09