EZ-ZONE® RM High Density Module

User’s Guide

RM High Density Module
Safety Information

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

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

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

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

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

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

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Explanation</th>
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<tr>
<td>![Triangle Exclamation]</td>
<td>CAUTION – Warning or Hazard that needs further explanation than label on unit can provide. Consult User’s Guide for further information.</td>
</tr>
<tr>
<td>![Triangle Bolt]</td>
<td>ESD Sensitive product, use proper grounding and handling techniques when installing or servicing product.</td>
</tr>
<tr>
<td>![Triangle Square]</td>
<td>Unit protected by double/reinforced insulation for shock hazard prevention.</td>
</tr>
<tr>
<td>![Triangle Bin]</td>
<td>Do not throw in trash, use proper recycling techniques or consult manufacturer for proper disposal.</td>
</tr>
<tr>
<td>![Triangle Recycle]</td>
<td>Enclosure made of Polycarbonate material. Use proper recycling techniques or consult manufacturer for proper disposal.</td>
</tr>
<tr>
<td>![Triangle Alternate Current]</td>
<td>Unit can be powered with either alternating current (ac) voltage or direct current (dc) voltage.</td>
</tr>
<tr>
<td>![UL Listed]</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 E185611 QUYX, QUYX7. See: <a href="http://www.ul.com">www.ul.com</a></td>
</tr>
<tr>
<td>![UL Process Control Equipment]</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 E184390 QUZW, QUZW7. See: <a href="http://www.ul.com">www.ul.com</a></td>
</tr>
</tbody>
</table>

Warranty

The EZ-ZONE® RM High Density module 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 an Applications Engineer. Please have the following information available when calling:

- Complete model number
- All configuration information
- User’s Guide
- 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 Return Merchandise Authorization number from the Customer Service Department is required when
returning any product for credit, repair or evaluation. Make sure the Return Merchandise Authorization 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 misuse, 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 cannot be repaired, 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.

This EZ-ZONE® RM High Density User’s Guide is copyrighted by Watlow Electric, Inc., © December 2013 with all rights reserved.

EZ-ZONE RM is covered by U.S. Patent No. 6,005,577 and Patents Pending
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<td>EZ-ZONE Rail Mount Access (RMA) User's Guide, part number: 0600-0072-0000</td>
<td>Describes how to connect the RM system into an industrial network, how to use data logging, module backup and the real-time clock.</td>
</tr>
<tr>
<td>EZ-ZONE Rail Mount Controller (RMC) User's Guide, part number: 0600-0070-0000</td>
<td>The RMC module is an advanced integrated controller capable of PID and limit control. This document describes how to configure and program all loops of control and communications.</td>
</tr>
<tr>
<td>EZ-ZONE Rail Mount Scanner (RMS) User's Guide, part number: 0600-0071-0000</td>
<td>This module adds monitoring points to the RM system. This document describes common usage and the various types of I/O available.</td>
</tr>
<tr>
<td>EZ-ZONE Rail Mount Expansion (RME) User's Guide, part number: 0600-0073-0000</td>
<td>When additional I/O is needed the Expansion module fills the gap. This document describes common usage and the various types of I/O available.</td>
</tr>
<tr>
<td>EZ-ZONE Rail Mount Limit (RML) User's Guide, part number: 0600-0075-0000</td>
<td>The RML module will protect against unwanted thermal runaway and over temperature conditions. The User Guide describes configuration, programming and communications capabilities.</td>
</tr>
<tr>
<td>EZ-ZONE Remote User Interface (RUI) User's Guide, part number: 0600-0060-0000</td>
<td>The RUI provides a visual LED display to the RM configuration and setup menus. This document illustrates and describes connections and also describes the Home Page for each RM module as viewed from the RUI.</td>
</tr>
<tr>
<td>EZ-ZONE RM Specification Sheet, part number: WIN-EZRM-1113</td>
<td>Describes RM hardware options, features, benefits and technical specifications.</td>
</tr>
<tr>
<td>Watlow Support Tools DVD, part number: 0601-0001-0000</td>
<td>Contains all related user documents, tutorial videos, application notes, utility tools, etc...</td>
</tr>
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The DVD described above ships with the product and as stated contains all of the literature above as well as much more. If the DVD is not available one can be acquired by contacting Watlow Customer Service at 1-507-454-5300.

As an alternative to the DVD, all of the user documentation described above can also be found on the Watlow website. Click on the following link to find your document of choice: [http://www.watlow.com/literature/index.cfm](http://www.watlow.com/literature/index.cfm). Once there, simply type in the desired part number (or name) into the search box and download free copies. Printed versions of all user documents can also be purchased here as well.

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**Your Comments are Appreciated**

In an effort to continually improve our technical literature and ensure that we are providing information that is useful to you, we would very much appreciate your comments and suggestions. Please send any comments you may have to the following e-mail address: [TechlitComments@watlow.com](mailto:TechlitComments@watlow.com)
Introduction

The EZ-ZONE® RM High Density (RMH) control module provides multi-loop (4 to 16 loops) PID control in a small footprint. The RMH takes the pain out of solving your thermal loop requirements as a stand-alone module or in applications that require distributed control.

It just got a whole lot easier to solve the thermal requirements of your system. The RMH module is provided in a space-saving, rail-mount package and is highly scalable where you only pay for what you need. For those applications that require the ability to configure/monitor the control over a network, Modbus RTU communications is an option. Other communications protocols are also available (e.g., EtherNet/IP, DeviceNet, Modbus TCP and Profinet) when used in conjunction with an RMA module or when using a Remote User Interface/ Gateway (RUI/GTW).

Standard Features and Benefits

PID controller

- Provides two mounting options (DIN rail, chassis mount)
- Reduces wiring time and termination complexity compared to connecting discrete products
- Reduces panel space and installation cost

Communication Capabilities

- Supports network connectivity to a PC or PLC
- Watlow Standard Bus or Modbus® RTU
- Provides plug and play capabilities with basic Remote User Interface (RUI's)
- SpecView for Watlow used over standard bus communications
- Free standard bus communications port and free PC software (EZ-ZONE Configurator)

Additional Control Integration Options

- Includes programmable timer functions
- Includes programmable counter functions
- Allows for simple math and logic programming options

Advanced PID Control Algorithm

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

Integrated Thermal Loop Diagnostics

- Users can easily tell that the entire thermal system is functioning properly
- Provides complete system diagnostics that are far superior to simple discrete level diagnostics
- Allows for flexible synergistic use of hardware, such as using one loop's sensor as a backup to another loop in the event of sensor failure
- Helps prevent load loss or allow for maintenance to be scheduled when more convenient
- Provides notification of system problems to help reduce maintenance and service costs

Off-the-Shelf Designed System Solution

- Improves system reliability with a factory integrated solution that minimizes inter-module connections and potential problems at screw termination points
- Reduces installation cost
- Eliminates compatibility headaches often encountered with using many different components and brands

Controller Handles High Ambient Temperatures

- Operates in an unprecedented temperature range of -18 to 65°C (0 to 149°F) for cabinets and panel enclosures with elevated temperature levels

Memory for Saving and Restoring User-Defined Parameter Default Settings

- Allows customers to save and restore their own defined defaults for machine parameter settings
- Reduces service calls and downtime due to inadvertent end user parameter adjustments

Modules Allow for Greater Design Flexibility

- Allows PID loops to be added in increments of four. Module can scale from 4 to 16 total loops
- Saves money because you do not pay for any more than you need and don’t settle for any less functionality than you need

Synergistic Module Control

- Allows outputs selected for control (heat/cool), alarms or events to be located in any physical module, regardless of which module is connected to the input sensor

Split-Rail Control

- Allows modules to be mounted together or mounted remotely from one another
- Shares control operation via Synergistic Module
Control capability
- Allows individual modules to be mounted closer to the physical input and output devices to which they are wired
- Improves system reliability and lowers wiring costs

Agency Approvals: UL®, CE, RoHS, W.E.E.E. SEMI F47-0200, Class 1 Div. 2 Rating on Selected Models
- Assures prompt product acceptance
- Reduces panel builder's documentation and agency costs

Removable Connectors
- Assures reliable wiring and reduces service calls
- Simplifies installation

Three-Year Warranty
- Demonstrates Watlow's reliability and product support
A Conceptual View of the RMH

The flexibility of the RMH’s software and hardware allows for variation in configurations. Acquiring a better understanding of its 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. An RMH controller can carry out several procedures at the same time, e.g., PID control, monitoring for several different alarm situations, monitoring and acting upon digital inputs and driving output devices such as heaters, audible alarms, lights. 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, RTD or thermistor 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. Each analog input must be configured to match the device connected to that input (see: Analog Input Menu, Setup Page).

Each digital input reads whether a device is active or inactive. An RMH equipped 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 (see: Digital Input/Output 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. Alternatively, if a failure with the primary sensing device should occur sensor backup could be utilized to avoid an unwanted shutdown.

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 to reset an individual alarm or all alarms. If configured as such, the next step would be to define which of the available digital inputs would be tied to the alarm reset function. The RMH module can be equipped with up to 12 digital inputs, instance 1 - 6 and 7 - 12. Once the specific input has been selected simply assign the alarm reset function to it (Setup Page, DIO Menu). The last step would be to define the alarm instance that should be reset. If zero is entered for the alarm instance when the digital input selected above is enabled, all latched alarms without a currently existing alarm condition will be reset. If a specific alarm instance (1 - 24) is selected it will be that instance alone that will be reset.

Note:

Alarms will reset automatically when the condition that caused the alarm goes back to a non-alarm state if the alarm latching prompt is set to non-latching (Setup Page, ALM Menu).

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 an audible alarm.

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 RMH module an output can be configured to respond to the output of the PID algorithm to drive a heater.

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 1 provides the state of input event 1, and Digital Input 2 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.

Actions

Based on a given input (Digital I/O, Event output, Logic function, etc.) the Action function can cause other functions to occur. To name a few, set alarms to off, silencing alarms and enabling remote set point.
A Conceptual View of RM Hardware Configurations

Due to the scalability and flexibility in the RM system a user has several options available in the way that the hardware can be connected. Listed below are a few examples.

RMH Connected to a Remote User Interface (RUI) and a Personal Computer (PC)

In this configuration the RUI and PC are connected to the RMH module via Watlow’s Standard Bus where both will be able to talk directly to the RMH module.

RMH Module Connected to an Operator Interface Terminal (OIT) through an RMA

In this configuration the RMH can be connected to the OIT through the RMA running any of a number of available protocols. The RMA and the OIT must be using the same protocol while the communications from RMA to the RMH module is accomplished over the backplane using Watlow’s Standard Bus protocol. Available protocols in the RMA follow:
1. EtherNet/IP and or Modbus TCP
2. DeviceNet
3. Modbus RTU
4. Profinet DP

Notice that in the example above that there is an optional RUI connected to the RMH along with the OIT. OITs’ are not generally used to configure and then monitor the RMH and other modules connected to it.

RMH Module Connected to a Programmable Logic Controller (PLC) on a DIN Rail

In this configuration the PLC can be connected to the RMH module using the Modbus RTU protocol:

Notice that in the example above that there is an optional RUI connected to the RMH module. If it is intended to use an RUI or a PC using EZ-ZONE Configurator software it will be necessary to switch the protocol on the RMH to Watlow’s Standard Bus to successfully communicate; disconnect all Modbus devices from the network. Once done using the RUI or EZ-ZONE Configurator software, switch the protocol back to Modbus RTU and reconnect all Modbus devices to re-establish communications over Modbus.

Note:
If it is intended to use an RUI or a PC using EZ-ZONE Configurator software it will be necessary to switch the protocol on the RMH to Watlow’s Standard Bus to successfully communicate; disconnect all Modbus devices from the network. Once done using the RUI or EZ-ZONE Configurator software, switch the protocol back to Modbus RTU and reconnect all Modbus devices to re-establish communications over Modbus.

RMH Connected to a Split Rail with OIT

In this configuration both the inter-module bus (backplane communications) and Standard Bus are connected between rails to allow for remote capabilities. It is recommended that the split rail connection not exceed 100 feet. In this configuration the OIT can communicate with all modules (maximum 16 modules any combination with one Access module).
Module Orientation

The picture that follows represents one of several different RM modules. All of them will have four slots on the face (slot A, B, D, and E) and one on the bottom (slot C) not shown. All of these slots are not always used on all modules. On the face of the module there is a button (yellow circle) under the Zone address (\(S\)). When pushed and held it has the following functions:

1. For any module, push and hold for ~ 2 seconds to change the Zone address.
2. When a module is equipped with the Modbus protocol (RMxxxxxxxxxx1xx) pushing and holding this button for ~ 6 seconds the LED display will return \(P\) for protocol. Releasing the button and then pushing it again (within 6 seconds) the display will toggle between \(F\) (Modbus) and \(S\) (Standard Bus). Valid addresses for Modbus and Standard bus range from 1-16 (1, 2, 3, 4, 5, 6, 7, 8, 9, A is 10, B is 11, C is 12, D is 13, E is 14, F is 15, and H is 16). The RMA (Access) module is shipped at address J or 17 and is the only module that can have its address set above 16.
Getting Started Quickly
Consider taking the following steps to quickly commission your control:
- **Wire** and connect the power source to the control
- **Wire** and connect input and output devices to the control
- **Power up** the control and navigate to the Setup Page to configure inputs, outputs, alarms, etc...
- **Once the control is setup**, navigate to the Operations Page to modify set points.

The RMH controller has a page and menu structure that is listed below along with a brief description of its purpose. The menu structure can be easily seen and navigated using **EZ-ZONE Configurator software** or the Remote User Interface (RUI).

**Note:**
The menu navigation as described below applies when the RMH is connected to the RUI which is optional equipment.

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<th>Page</th>
<th>Description</th>
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<tr>
<td><strong>Setup Page</strong></td>
<td>A user would want to setup their control prior to operation. As an example, define the input type, alarm sides (high and or low) or set the output function.</td>
</tr>
<tr>
<td><strong>Operations Page</strong></td>
<td>After setting up the control to reflect your equipment, the Operations Page would be used to monitor or change runtime settings. As an example, the user may want to see the current status (on or off) of an event status in the Action Menu.</td>
</tr>
<tr>
<td><strong>Factory Page</strong></td>
<td>For the most part the Factory Page has no bearing on the control when running. A user may want to enable password protection, view the control part number or perhaps create a custom Home Page.</td>
</tr>
</tbody>
</table>

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**Home Page**
When using the RUI, the control is at the Home Page when initially powered up where it will display the Process Value for loop 1 in the upper display and the set point for loop 1 in the lower display.

**Note:**
The Home Page is visible only when using the RUI.

The default RMH loop configuration out of the box is shown below:
- All Analog Input functions are set to thermocouple, type J (to change go to the Setup Page, Analog Input Menu)
- All Process Value functions are set to off (to change go to the Setup Page, Process Value Menu)
- PID for all loops are set to heat and cool is off (to change go to the Setup Page, Loop Menu)
- All outputs are set to off (to change go to the Setup Page, Output Menu)

Once the control has been wired and setup, power up the control and change the appropriate set points to the desired value (on the RUI push the up or down arrow key from the Home Page).
EZ-ZONE RMH Module - System Diagram

16 Control Loops - Slots A, B, D and E

**RMH x - [1,2] [1,2] [1,2] [1,2] - A A A A**

---

**Input Function**

- Input Sensor
- RUI, PC, PLC or HMI
- Other RM Modules
- Power Supply

**Output Function**

- Indicates Zone Address
- Push to select Zone Address and Protocol
- Card Status Slots A, B, D, E
- Indicates communications activity (Modbus or Standard Bus)

**Analog Input 1 through 16**

- None, Thermocouple, 2-Wire RTD (100, 1k), Thermistor (5k, 10k, 20k, 40k), Process (V, mV, mA) or 1K Potentiometer

**EIA - 485 Communications**

- Standard Bus (optional Modbus RTU)

**Inter-module Bus**

- 20.4 to 30.8 Vac or Vdc

**PID Controller**

- Slot A, B, D, E

**Modbus RTU Address 1 - 16**

- Standard Bus Zone 1 - 16

**Supervisory & Power Board**

- Slot C

**Zone and Status LED**

- Slot A, B, D, E

---
EZ-ZONE RMH Module - System Diagram

8 Control Loops - Slots A, B
4 - Form A Mechanical Relays - Slot D
6 - Digital I/O - Slot E

Input Function

Analog Input 1 through 8
None, Thermocouple, 2-Wire RTD (100, 1k), Thermistor (5k, 10k, 20k, 40k), Process (V, mV, mA) or 1K Potentiometer

Digital Input 7, 8, 9, 10, 11 or 12
Switch contact or volts dc

EIA - 485 Communications
Standard Bus (optional Modbus RTU)

Inter-module Bus

20.4 to 30.8 Vac or Vdc

Output Function

PID Controller
Slot A, B

4 - Mechanical Relay Outputs
Form A
Slot D

Input Sensor

Output 1, 2, 3, 4
5A Mechanical Relay Form A

Output 7, 8, 9, 10, 11 or 12
Switched dc/open collector

Analog Input
Alarm
Cool Power
Heat Power
Compare
Counter
Digital I/O
Profile Event Output A-H
Function Key
Linearization
Logic
Math
Process Value
Special Output Function 1-4
Variable
Timer

Indicates Zone Address

Indicates Zone Address and Protocol

Card Status - Slots A, B, D, E

Indicates communications activity (Modbus or Standard Bus)

Indicates I/O Status

Some input/output combinations not possible, see ordering matrix
EZ-ZONE RMH Module - System Diagram

8 Control Loops - Slots A, B
6 - Digital I/O - Slot D
4 - Form A Mechanical Relays - Slot E

Input Function

Analog Input 1 through 8
None, Thermocouple, 2-Wire RTD (100, 1k), Thermistor (5k, 10k, 20k, 40k), Process (V, mV, mA) or 1K Potentiometer

Digital Input 1, 2, 3, 4, 5 or 6
Switch contact or volts dc

PYD Controller
Slot A, B

6 - Digital Inputs / Outputs
any combination
Slot D

4 - Mechanical Relay Outputs
Form A
Slot E

Output Function

Output 1, 2, 3, 4, 5 or 6
switched dc/open collector

Output 7, 8, 9, 10
5A Mechanical Relay Form A

EIA - 485 Communications
Standard Bus (optional Modbus RTU)

Modbus RTU
Address 1 - 16
Standard Bus Zone 1 - 16
Supervisory & Power Board
Slot C

Some input/output combinations not possible, see ordering matrix

RUI, PC, PLC or HMI

Other RM Modules

Power Supply

Indicates Zone Address

Push to select Zone Address and Protocol

Card Status Slots A, B, D, E

Indicates communications activity (Modbus or Standard Bus)

Indicates I/O Status
EZ-ZONE RMH Module - System Diagram

8 Control Loops - Slots A, B
6 - Digital I/O - Slot D
6 - Digital I/O - Slot E

RMH x - [1,2] [1,2] C C - A A A A

Input Function

Analog Input 1 through 8
None, Thermocouple, 2-Wire RTD (100, 1k),
Thermistor (5k, 10k, 20k, 40k), Process
(V, mV, mA) or 1K Potentiometer

Digital Input 1, 2, 3, 4, 5, 6
Switch contact or volts dc

Digital Input 7, 8, 9, 10, 11, 12
Switch contact or volts dc

Output Function

PID Controller
Slot A, B

6 - Digital Inputs / Outputs any combination
Slot D

6 - Digital Inputs / Outputs any combination
Slot E

Analog Input
Alarm
Cool Power
Heat Power
Compare
Counter
Digital I/O
Profile Event Output A-H
Function Key
Linearization
Logic
Math
Process Value
Special Output Function 1-4
Timer
Variable
Off

Some input/output combinations not possible, see ordering matrix

EIA - 485 Communications
Standard Bus (optional Modbus RTU)

Modbus RTU Address 1 - 16
Standard Bus Zone 1 - 16
Supervisory & Power Board

Output Status LED

Indicates Zone Address

Push to select Zone Address and Protocol

Card Status Slots A, B, D, E

Indicates communications activity (Modbus or Standard Bus)

Indicates I/O Status

20.4 to 30.8 Vac or Vdc

Inter-module Bus

RUI, PC, PLC or HMI

Other RM Modules

Power Supply
EZ-ZONE RMH Module - System Diagram

8 Control Loops - Slots A, B
3 - Process Outputs - Slot D or E
4 - SSR Outputs - Slot D or E

Input Function

Analog Input 1 through 8
None, Thermocouple, 2-Wire RTD (100, 1k),
Thermistor (5k, 10K, 20k, 40k), Process
(V, mV, mA) or 1K Potentiometer

Output Function

Output 1, 2, 3, 4
Process, 2A Solid-State Relay Form A

** The functions listed to the right with purple text apply to the
Process output only, where the orange text applies to the
SSR output only. All others
apply to both output types.

Output 7, 8, 9, 10
Process, 2A Solid-State Relay Form A

Some input/output combinations not possible, see ordering matrix
Chapter 2: Install and Wire

Dimensions

As can be seen below the dimensions of the RM system will change slightly based on the type of connector used.

Module Removal Clearance

Standard Connectors

Module Removal Displacement

Module Removal Clearances

Latch in open position

Straight Connectors

Module Removal Displacement

Watlow EZ-ZONE® RMH Module • 15 • Chapter 2 Install and Wire
Chassis Mount Front View (Module Removed) - Screw Connection Pattern

The view above is representative of the modular backplane without the module.

Recommended chassis mount hardware:

1. #8 screw, 3/4” long
2. Torque to 10 -15 in-lb
3. No washers of any kind
## Power Supplies

### Power Supply Specifications

<table>
<thead>
<tr>
<th></th>
<th>DSP 30</th>
<th>DSP 60</th>
<th>DSP 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC Input Voltage Range</td>
<td>90 - 264VAC, Class II double insulated (No ground connection required)</td>
<td>90 - 264VAC, Class II double insulated (No ground connection required)</td>
<td>90 - 264VAC, Class II double insulated (No ground connection required)</td>
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<tr>
<td>Input Frequency</td>
<td>Hz</td>
<td>47 - 63Hz</td>
<td>47 - 63Hz</td>
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<tr>
<td>DC Input Voltage Range</td>
<td>VDC</td>
<td>120 - 370VDC</td>
<td>120 - 370VDC</td>
</tr>
<tr>
<td>Inrush Current (115/230VAC)</td>
<td>25 / 50A</td>
<td>30 / 60A</td>
<td>30 / 60A</td>
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<tr>
<td>Output Voltage Accuracy</td>
<td>%</td>
<td>±1% of Nominal</td>
<td>±1% of Nominal</td>
</tr>
<tr>
<td>Over voltage Protection</td>
<td>V</td>
<td>120 - 145%</td>
<td>120 - 145%</td>
</tr>
<tr>
<td>LED Indicators</td>
<td>Green LED = On, Red LED = DC Output Low</td>
<td>Green LED = On, Red LED = DC Output Low</td>
<td>Green LED = On, Red LED = DC Output Low</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-25 to +71°C (Derate linearly 2.5%/°C from 55 to 71°C)</td>
<td>-25 to +71°C (Derate linearly 2.5%/°C from 55 to 71°C)</td>
<td>-25 to +71°C (Derate linearly 2.5%/°C from 55 to 71°C)</td>
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<tr>
<td>Storage Temperature</td>
<td>-25 to +85°C</td>
<td>-25 to +85°C</td>
<td>-25 to +85°C</td>
</tr>
<tr>
<td>Operating Humidity</td>
<td>20 - 95% RH (non condensing)</td>
<td>20 - 95% RH (non condensing)</td>
<td>20 - 95% RH (non condensing)</td>
</tr>
<tr>
<td>Vibration (Operating)</td>
<td>IEC 60068-2-6 (Mounting by rail: Random wave, 10-500 Hz, 2G, ea. along X, Y, Z axes 10 min/cycle, 60 min)</td>
<td>IEC 60068-2-6 (Mounting by rail: Random wave, 10-500 Hz, 2G, ea. along X, Y, Z axes 10 min/cycle, 60 min)</td>
<td>IEC 60068-2-6 (Mounting by rail: Random wave, 10-500 Hz, 2G, ea. along X, Y, Z axes 10 min/cycle, 60 min)</td>
</tr>
<tr>
<td>Safety Agency Approvals</td>
<td>UL1310 Class 2(1), UL508 Listed, UL60950-1, EN60950-1, CE</td>
<td>UL1310 Class 2(1), UL508 Listed, UL60950-1, EN60950-1, CE</td>
<td>UL1310 Class 2(1), UL508 Listed, UL60950-1, EN60950-1, CE</td>
</tr>
</tbody>
</table>

For a comprehensive listing of these specifications point your browser to: [http://us.tdk-lambda.com/lp/products/dsp-series.htm](http://us.tdk-lambda.com/lp/products/dsp-series.htm)
RMH Installation and Removal on a DIN Rail

Modular Backplane Connector
The picture on the right shows the Modular Backplane Connector, both front and rear view. The rear view is bringing in to focus a metal clip. If the DIN rail is grounded the Modular Backplane Connector and the module connected to it will be also (recommended).

Installing the Modular Backplane Connector
Step 1
Hook backplane assembly to upper edge of DIN rail, (see rear view above, backplane hook detail that mates with upper rail edge is circled)
Step 2
Next, rotate back plane assembly downward to engage the lower edge of the rail. (Note: Din Rail clipping distance ranges from 1.366 -1.389 inches. The back plane assembly will not latch onto the rail successfully if the rail is out of dimension).
Step 3
For final positioning and locking, the red tab is to be pushed upward to further engage the bottom edge of the rail with an over center snap action latch. (The red locking tab protrudes from the bottom side of the back plane assembly).

Installing Multiple Modular Backplane Connectors
Multiple modules are easily aligned and latched together. Each module includes matched mating geometry that facilitates accurate and consistent interconnections. The recommended method of multi-module attachment is to first attach individual modules to the rail separately and second to laterally slide the modules together until they touch. (Refer to steps 1&2 above). When the multi-module system is attached and laterally positioned to the desired placement the locking tab should be engaged to secure the control system to the rail, (Refer to step 3 above).

Module Installation
In the picture to the right notice that the arrow is pointing at the top lip of the module (on side). When installing the module simply slide this lip over the top of the Modular Backplane Connector and then push down on the rear of the module where it will seat on the two posts just above the green connector.
Module Removal

To remove a module from the Modular Backplane Connector find the red tab protruding from the bottom of the module and pull back on it as shown to the right. While pulling back on the red tab the two mounting posts will release the module where the module can then be lifted up and out of the Modular Backplane Connector.

Removal of the Modular Backplane Connector

A module can be removed from the Modular Backplane Connector by inserting a screw driver into the red locking tab just behind the green connector and applying downward pressure on the tab by lifting the screwdriver upwards. When released, the tab will move downward and the connector can then be lifted up off of the DIN rail.
## High Density Module (R M H x - x x x x - x x x x)

**Inputs**

<table>
<thead>
<tr>
<th>Slot A</th>
<th>Slot B</th>
<th>Slot D</th>
<th>Slot E</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 4</td>
<td>5 - 8</td>
<td>9 - 12</td>
<td>13 - 16</td>
</tr>
<tr>
<td>S1</td>
<td>S5</td>
<td>S9</td>
<td>S13</td>
</tr>
<tr>
<td>R1</td>
<td>R5</td>
<td>R9</td>
<td>R13</td>
</tr>
<tr>
<td>S2</td>
<td>S6</td>
<td>S10</td>
<td>S14</td>
</tr>
<tr>
<td>R2</td>
<td>R6</td>
<td>R10</td>
<td>R14</td>
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<tr>
<td>S3</td>
<td>S7</td>
<td>S11</td>
<td>S15</td>
</tr>
<tr>
<td>R3</td>
<td>R7</td>
<td>R11</td>
<td>R15</td>
</tr>
<tr>
<td>S4</td>
<td>S8</td>
<td>S12</td>
<td>S16</td>
</tr>
<tr>
<td>R4</td>
<td>R8</td>
<td>R12</td>
<td>R16</td>
</tr>
</tbody>
</table>

**Universal, RTD and Thermistor Inputs**

- Universal/Thermistor Input
  - Part # Digits 5, 6, 7
  - Input 1-4: RMH_ - [1,2] _ - _ -
  - Input 5-8: RMH_ - - - [1,2] _ -
  - Input 9-12: RMH_ - _ _ [1,2] _ -
  - Input 13-16: RMH_ _ _ _ [1,2] _ -

**Digital Inputs**

<table>
<thead>
<tr>
<th>- - -</th>
<th>- - -</th>
<th>1 - 6</th>
<th>7-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>- - -</td>
<td>- - -</td>
<td>B1</td>
<td>B7</td>
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<td>- - -</td>
<td>- - -</td>
<td>D1</td>
<td>D7</td>
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<td>Z1</td>
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**Outputs**

<table>
<thead>
<tr>
<th>- - -</th>
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<th>1 - 4</th>
<th>7 - 10</th>
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<tr>
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<td>K4</td>
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</tbody>
</table>

**Quad 5A - Mechanical Relay Form A Outputs**

<table>
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<th>1 - 4</th>
<th>7 - 10</th>
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<td>D9</td>
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<tr>
<td>- - -</td>
<td>- - -</td>
<td>D4</td>
<td>D10</td>
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<tr>
<td>- - -</td>
<td>- - -</td>
<td>D5</td>
<td>D11</td>
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<tr>
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<td>D12</td>
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<td>Z1</td>
<td>Z7</td>
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**Digital Outputs**

<table>
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<th>- - -</th>
<th>1 - 6</th>
<th>7 - 12</th>
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</thead>
<tbody>
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<td>- - -</td>
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<td>- - -</td>
<td>D6</td>
<td>D12</td>
</tr>
<tr>
<td>- - -</td>
<td>- - -</td>
<td>Z1</td>
<td>Z7</td>
</tr>
</tbody>
</table>

**Quad 2A - Solid-State Relay (SSR) Form A Outputs**

<table>
<thead>
<tr>
<th>- - -</th>
<th>- - -</th>
<th>1 - 4</th>
<th>7 - 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>- - -</td>
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<td>L1</td>
<td>L7</td>
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<td>K7</td>
</tr>
<tr>
<td>- - -</td>
<td>- - -</td>
<td>L2</td>
<td>L8</td>
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<tr>
<td>- - -</td>
<td>- - -</td>
<td>L3</td>
<td>L9</td>
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<td>K9</td>
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<tr>
<td>- - -</td>
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<td>L4</td>
<td>L10</td>
</tr>
</tbody>
</table>

---

**Wiring**

- **Inputs**
  - Universal, RTD and Thermistor Inputs
    - Universal/Thermistor Input
      - Part # Digits 5, 6, 7
      - Input 1-4: RMH_ - [1,2] _ - _ -
      - Input 5-8: RMH_ - - - [1,2] _ -
      - Input 9-12: RMH_ - _ _ [1,2] _ -
      - Input 13-16: RMH_ _ _ _ [1,2] _ -

- **Digital Inputs**
  - Part # Digit 7, 8
    - Slot A: Option not valid
    - Slot B: Option not valid
    - Slot D: RMH_ - _ _ [C] _ -
    - Slot E: RMH_ - _ _ [C] _ -

- **Outputs**
  - Mechanical Relay 5 A, Form A
    - Part # Digit 7, 8
      - Slot D: RMH_ - _ _ [J] _ -
      - Slot E: RMH_ - _ _ [J] _ -

- **Digital Outputs**
  - Part # Digit 7, 8
    - Slot A: Option not valid
    - Slot B: Option not valid
    - Slot D: RMH_ - _ _ [C] _ -
    - Slot E: RMH_ - _ _ [C] _ -

- **Quad 2A - Solid-State Relay (SSR) Form A Outputs**
  - Part # Digits 7, 8
    - Slot A: Option not valid
    - Slot B: Option not valid
    - Slot D: RMH_ _ _ _ [L] _ -
    - Slot E: RMH_ _ _ _ [L] _ -
### High Density Module (RMH x - x x x x - x x x)

<table>
<thead>
<tr>
<th>Slot A</th>
<th>Slot B</th>
<th>Slot D</th>
<th>Slot E</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Outputs (cont.)</td>
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<td>- -</td>
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<td>F7</td>
<td>voltage or current -</td>
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<td>- -</td>
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<td>H1</td>
<td>H7</td>
<td>voltage + or current +</td>
</tr>
<tr>
<td>- -</td>
<td>- -</td>
<td>F2</td>
<td>F8</td>
<td>voltage or current -</td>
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<td>- -</td>
<td>- -</td>
<td>H2</td>
<td>H8</td>
<td>voltage + or current +</td>
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<td>- -</td>
<td>- -</td>
<td>F3</td>
<td>F9</td>
<td>voltage or current -</td>
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<tr>
<td>- -</td>
<td>- -</td>
<td>H3</td>
<td>H9</td>
<td>voltage + or current +</td>
</tr>
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</table>

**Tri-State Process/Retransmit Outputs**

<table>
<thead>
<tr>
<th>Slot A</th>
<th>Slot B</th>
<th>Slot D</th>
<th>Slot E</th>
<th>Configuration</th>
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<td></td>
<td>Tri-Process Outputs</td>
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<td>- -</td>
<td></td>
<td></td>
<td>Part # Digits 7, 8</td>
</tr>
<tr>
<td>- -</td>
<td>- -</td>
<td></td>
<td></td>
<td>Slot A: Option not valid</td>
</tr>
<tr>
<td>- -</td>
<td>- -</td>
<td></td>
<td></td>
<td>Slot B: Option not valid</td>
</tr>
<tr>
<td>- -</td>
<td>- -</td>
<td></td>
<td></td>
<td>Slot D: RMH _ - _ _ [F] _ _ _ _</td>
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<td>Slot E: RMH _ - _ _ [F] _ _ _ _</td>
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### Power and Communications

<table>
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<tr>
<th>Slot C</th>
<th>Configuration</th>
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<tr>
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<td>Power input: ac or dc+</td>
</tr>
<tr>
<td>99</td>
<td>Power input: ac or dc-</td>
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<tr>
<td>CF</td>
<td>Standard Bus EIA-485 common</td>
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<tr>
<td>CD</td>
<td>Standard Bus EIA-485 T+R-</td>
</tr>
<tr>
<td>CE</td>
<td>Standard Bus EIA-485 T+/R+</td>
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<tr>
<td>CC</td>
<td>Standard Bus or Modbus EIA-485 common</td>
</tr>
<tr>
<td>CA</td>
<td>Standard Bus or Modbus EIA-485 T+/R-</td>
</tr>
<tr>
<td>CB</td>
<td>Standard Bus or Modbus EIA-485 T+/R+</td>
</tr>
<tr>
<td>CZ</td>
<td>Inter-module Bus</td>
</tr>
<tr>
<td>CX</td>
<td>Inter-module Bus</td>
</tr>
<tr>
<td>CY</td>
<td>Inter-module Bus</td>
</tr>
</tbody>
</table>
**Controller Low Voltage Power Bus**

Controller Power Supply:
- 20.4 to 30.8V (dc)
- 20.4 to 30.8V (ac)

Safety Isolation

Mechanical Relay, Solid-State Relay, Outputs

Safety Isolation

Digital Inputs & Outputs, Process Outputs

Communications Ports

Analog Input 1 - 16

Low-voltage Isolation

Low-voltage Isolation: 42V peak

Safety Isolation: 1,528V (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 in-lb.) 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 digital input-outputs, switched dc/open collector outputs and process outputs to prevent ground loops.

Warning: Explosion Hazard – Substitution of component may impair suitability for CLASS I, DIVISION 2.

Warning: Explosion Hazard - Do not disconnect while the circuit is live or unless the area is known to be free of ignitable concentrations of flammable substances.

High Density Module Wiring (RMHx-xxxx-xxxx)

Low Power
RMH- ALL Model Numbers
• 20.4 to 30.8 V ~ (ac) / = (dc)
• 47 to 63 Hz
• Controller module power consumption, 7 Watts maximum, 14VA
• 31 Watts maximum power available for P/S part #:0847-0299-0000
• 60 Watts maximum power available for P/S part #:0847-0300-0000
• 91 Watts maximum power available for P/S part #:0847-0301-0000
• Class 2 or SELV power source required to meet UL compliance standards

Communications
RMH Part # Digit 10 is A
• CF, CD, CE - Standard Bus EIA485 Communications
• CZ, CX, CY - Inter-module Bus EIA485 Communications
• Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network

Communications
RMH Part # Digit 10 is 1
• CC, CA, CB - Modbus and Standard Bus EIA-485 Communications (selectable via push button under zone address)
• CZ, CX, CY - Inter-module Bus EIA-485 Communications
• Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network

Communications Table
<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 CF</td>
<td>common</td>
</tr>
</tbody>
</table>

Inputs 1 through 16 Thermocouple
RMH Part # Digits 5, 6, 7, 8
• 2K Ω maximum source resistance
• >20 MΩ input impedance
• 3 microampere open-sensor detection
• Thermocouples are polarity sensitive. The negative lead (usually red) must be connected to S terminal
• To reduce errors, the extension wire for thermocouples must be of the same alloy as the thermocouple.
Input 1 - 4 (top to bottom): RMHx-(1)xxx-xxxx
Input 5 - 8 (top to bottom): RMHx-(1)xx-xxxx
Input 9 - 12 (top to bottom): RMHx-xx(1)x-xxxx
Input 13 - 16 (top to bottom): RMHx-xxx(1)-xxxx
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)
- 0.8 Nm (7.0 in-lb.) 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 digital input-outputs, switched dc/open collector outputs and process outputs to prevent ground loops.

Warning: Explosion Hazard – Substitution of component may impair suitability for CLASS I, DIVISION 2.

Warning: Explosion Hazard - Do not disconnect while the circuit is live or unless the area is known to be free of ignitable concentrations of flammable substances.

Inputs 1 through 16 Potentiometer

- Use a 1 kΩ potentiometer.
  Input 1 - 4 (top to bottom): RMHx-(1)xxx-xxxx
  Input 5 - 8 (top to bottom): RMHx-x(1)xx-xxxx
  Input 9 - 12 (top to bottom): RMHx-xx(1)x-xxxx
  Input 13 - 16 (top to bottom): RMHx-xxx(1)-xxxx

Inputs 1 through 16 RTD

- platinum, 100 and 1,000 Ω @ 0°C
- calibration to DIN curve (0.00385 Ω/°C)
- RTD excitation current of 0.09 mA typical. Each ohm of lead resistance may affect the reading by 2.55°C for a 100 ohm platinum sensor or 0.25°C for a 1000 ohm sensor.
  Input 1 - 4 (top to bottom): RMHx-(1)xxx-xxxx
  Input 5 - 8 (top to bottom): RMHx-x(1)xx-xxxx
  Input 9 - 12 (top to bottom): RMHx-xx(1)x-xxxx
  Input 13 - 14 (top to bottom): RMHx-xxx(1)-xxxx

<table>
<thead>
<tr>
<th>AWG</th>
<th>Ohms/1000ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>2.575</td>
</tr>
<tr>
<td>16</td>
<td>4.094</td>
</tr>
<tr>
<td>18</td>
<td>6.510</td>
</tr>
<tr>
<td>20</td>
<td>10.35</td>
</tr>
<tr>
<td>22</td>
<td>16.46</td>
</tr>
<tr>
<td>24</td>
<td>26.17</td>
</tr>
<tr>
<td>26</td>
<td>41.62</td>
</tr>
<tr>
<td>28</td>
<td>66.17</td>
</tr>
</tbody>
</table>

Inputs 1 through 16 Thermistor

- >20 MΩ input impedance

- RMH Part # Digits 5, 6, 7, 8

<table>
<thead>
<tr>
<th>AWG</th>
<th>Ohms/1000ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
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<tr>
<td>28</td>
<td>66.17</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 in-lb.) 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 digital input-outputs, switched dc/open collector outputs and process outputs to prevent ground loops.

Warning: 
Explosion Hazard – Substitution of component may impair suitability for CLASS I, DIVISION 2.

Warning: 
Explosion Hazard - Do not disconnect while the circuit is live or unless the area is known to be free of ignitable concentrations of flammable substances.

Suppressor 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 for AC load or a diode for a DC load.

Process Inputs 1 through 16

RMH Part # Digit 5, 6, 7, 8 is 1
- 0 to 20 mA @ 100 Ω input impedance
- 0 to 10V (dc) @ 20 kΩ input impedance
- 0 to 50 mV (dc) @ 20 MΩ input impedance
- scalable
Slot 1: RMHx-(1)xxxx-xxxx (Inputs 1 to 4)
Slot 2: RMHx-x(1)xx-xxxx (Inputs 5 to 8)
Slot 3: RMHx-xx(1)x-xxxx (Inputs 9 to 12)
Slot 4: RMHx-xxx(1)-xxxx (Inputs 13 to 16)

Digital Inputs 1 through 12

RMH Part # Digit 7, 8 is C

Digital Input Event Conditions
- Voltage
  - Input inactive when < 2V
  - Input active when > 3V
- Dry Contact
  - Input inactive when > 100KΩ
  - Input active when < 50Ω
- Six user configurable digital inputs/outputs per slot
  - Slot D DI 1 - 6 RMHx-xx(C) xx-xxxx
  - Slot E DI 7 - 12 RMHx-xxx(C)-xxxx
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 in-lb.) 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 digital input-outputs, switched dc/open collector outputs and process outputs to prevent ground loops.

Warning: Explosion Hazard – Substitution of component may impair suitability for CLASS I, DIVISION 2.

Warning: Explosion Hazard - Do not disconnect while the circuit is live or unless the area is known to be free of ignitable concentrations of flammable substances.

Suppressor 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 for AC load or a diode for a DC load.

Digital Outputs 1 - 12

RMH Part # Digit 7, 8 is C
- Maximum switched voltage is 32V (dc)
- Internal supply provides a constant power output of 750mW
- Maximum output sink current per output is 1.5A (external class 2 or *SELV supply required)
- Total sink current for all outputs not to exceed 8A
- Do not connect outputs in parallel
  - Slot D DO 1 - 6
    RMH-xx(C)x-xxxx
  - Slot D DO 7 - 12
    RMH-xxx(C)-xxxx

*Safety Extra Low Voltage

Switched DC Wiring Example Using DO 1-12

Note: As a switched DC output; this output is a constant current output delivering 750 mW, current limited to 400 mA. The internal supply does have a maximum open circuit voltage of 22 VDC and minimum open circuit voltage of 19 VDC. Pin Z_ is shared to all digital outputs. This type of output is meant to drive solid state relays, not mechanical relays.
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 in-lb.) 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 digital input-outputs, switched dc/open collector outputs and process outputs to prevent ground loops.

Warning:
Explosion Hazard – Substitution of component may impair suitability for CLASS I, DIVISION 2.

Warning:
Explosion Hazard - Do not disconnect while the circuit is live or unless the area is known to be free of ignitable concentrations of flammable substances.

Open Collector Wiring Example Using DO 1-12

As an open collector output (see graphic below), use an external power supply with the negative wired to B_, the positive to the coil of a pilot mechanical relay and the other side of the coil wired to the output of choice (D_). Each open collector output can sink 1.5 A with the total for all open collector outputs not exceeding 8 amperes. Ensure that a kickback diode is reversed wired across the relay coil to prevent damage to the internal transistor.

Output 1 - 4 and 7 - 10 Mechanical Relay, Form A

RMH Part # Digit 7, 8 is J

- Slot D Outputs 1 - 6
  RMHx-xx(J)x-xxxx
- Slot E Outputs 7 - 10
  RMHx-xxx(J)-xxxx
**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 in-lb.) 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 digital input-outputs, switched dc/open collector outputs and process outputs to prevent ground loops.

**Warning:**

Explosion Hazard – Substitution of component may impair suitability for CLASS I, DIVISION 2.

**Warning:**

Explosion Hazard - Do not disconnect while the circuit is live or unless the area is known to be free of ignitable concentrations of flammable substances.

**Suppressor 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 for AC load or a diode for a DC load.

---

**Quad 2A SSR Outputs 1-4, 7-10**

**Warning:**

Explosion Hazard – Substitution of component may impair suitability for CLASS I, DIVISION 2.

**Tri-Process/Retransmit Outputs 1-3, 7-9**

**Note:**

- Each of the four SSR outputs has internal circuitry that will protect it from over heating. Outputs may be disabled (shut off) automatically if internal temperatures exceed those listed in the graph above. After the output temperature drops approximately 10 °C the outputs will once again be enabled for operation.

---

**Quad 2 Amp SSR Derating Curve**

All Outputs 100% Duty Cycle

---

**Tri-Process/Retransmit Outputs 1-3, 7-9**

**Note:**

- 0 to 20 mA into 400Ω maximum load
- 0 to 10V$^m$ (dc) into 4 kΩ minimum load
- Outputs are scalable
- Output supplies power
- Each output can be independently set for voltage or current.
- Output may be used as retransmit or control.
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 in-lb.) 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 digital input-outputs, switched dc/open collector outputs and process outputs to prevent ground loops.

Warning: 
Explosion Hazard – Substitution of component may impair suitability for CLASS I, DIVISION 2.

Warning: 
Explosion Hazard - Do not disconnect while the circuit is live or unless the area is known to be free of ignitable concentrations of flammable substances.

### Quencharc Wiring Example

- In this example the Quencharc circuit (Watlow part# 0804-0147-0000) is used to protect internal circuitry from the counter electromotive force from the inductive user load when deenergized. It is recommended that this or an equivalent Quencharc be used when connecting inductive loads to outputs.

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

### Modbus-IDA Terminal

<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 CF</td>
<td>common</td>
</tr>
</tbody>
</table>

Note:
Do not leave a USB to EIA-485 converter connected to Standard Bus without power (i.e., disconnecting the USB end from the computer while leaving the converter connected on Standard Bus). Disturbance on the Standard Bus may occur.

Watlow EZ-ZONE® RMH Module • 30 • 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 in-lb.) 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 digital input-outputs, switched dc/open collector outputs and process outputs to prevent ground loops.

Warning: Explosion Hazard – Substitution of component may impair suitability for CLASS I, DIVISION 2.

Warning: Explosion Hazard - Do not disconnect while the circuit is live or unless the area is known to be free of ignitable concentrations of flammable substances.

Note:
Do not leave a USB to EIA-485 converter connected to Standard Bus without power (i.e., disconnecting the USB end from the computer while leaving the converter connected on Standard Bus). Disturbance on the Standard Bus may occur.
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)
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Note: Adjacent terminals may be labeled differently, depending on the model number.

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Warning: Explosion Hazard - Do not disconnect while the circuit is live or unless the area is known to be free of ignitable concentrations of flammable substances.

---

Note: When connecting the USB converter to the PC it is suggested that the Latency Timer be changed from the default of 16 msec to 1 msec. Failure to make this change may cause communication loss between the PC running ZE-ZONE Configurator software and the control.

To modify Latency Timer settings follow the steps below:
1. Navigate to Device Manager.
2. Double click on Ports.
3. Right click on the USB serial port in use and select Properties.
4. Click the tab labeled Port settings and then click the Advance button.

---

![Image of Advanced Settings for COM5 dialog box]

**Advanced Settings for COM5**

- **COM Port Number:** COM5
- **USB Transfer Sizes**
  - Select lower settings to correct performance problems at low baud rates.
  - Select higher settings for faster performance.
  - **Receive (Bytes):** 4096
  - **Transmit (Bytes):** 4096
- **BM Options**
  - Select lower settings to correct response problems.
  - **Latency Timer (msec):** 1
- **Miscellaneous Options**
  - **Minimum Read Timeout (msec):** 0
  - **Minimum Write Timeout (msec):** 0

---

Watlow EZ-ZONE® RMH Module • 32 • Chapter 2 Install and Wire
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 network using Watlow’s Standard Bus and an RUI/Gateway:

A network using Modbus RTU

A termination resistor is 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 Modbus RTU
Connecting and Wiring the Modules

RMH Module Connections

The RMH module can be installed as a stand-alone limit controller or can be interconnected on the DIN rail as shown below with other RM family modules. When modules are connected together as shown, power and communications are shared between modules over the modular backplane interconnection. Therefore, bringing the necessary power and communications wiring to any one connector in slot C is sufficient. The modular backplane interconnect comes standard with every module ordered and is generic in nature, meaning any RM modules shown below on the DIN rail can use it.

Notice in the split rail system diagram that a single power supply is being used across both DIN rails. One notable consideration when designing the hardware layout would be the available power supplied and the loading affect of all of the modules used. Watlow provides three options for power supplies listed below:

1. 90-264 Vac to 24Vdc @ 31 watts (Part #: 0847-0299-0000)
2. 90-264 Vac to 24Vdc @ 60 watts (Part #: 0847-0300-0000)
3. 90-264 Vac to 24Vdc @ 91 watts (Part #: 0847-0301-0000)

With regards to the modular loading affect, maximum power for each RM module is listed below:

1. RMCxxxxx @ 7 watts / 14VA
2. RMEx-xxxx-xxxx @ 7 watts / 14VA
3. RMAx-xxxx-xxxx @ 4 watts / 9VA
4. RMLx-xxxx-xxxx @ 7 watts / 14VA
5. RMHx-xxxx-xxxx @ 7 watts / 14VA
6. RMSx-xxxx-xxxx @ 7 watts / 14VA

So, in the split rail system diagram, the maximum current draw on the supply would be 38 Watts.

- 2 RMC modules consumes 14W
- 1 RMH module consumes 7W
- 1 RME modules consumes 7W
- 1 RMA module consumes 4W
- 1 Remote User Interface consumes 6W

With this power requirement (38 watts) the second or third power supply could be used.

Another hardware configuration scenario that could present itself (graphic not shown) would be a configuration that requires more than one supply. Lets make some assumptions pertaining to the split rail system diagram shown below. The power supply used is the 91W supply. The top DIN rail now has the following modules:

- 2 RMC modules consumes 14W
- 1 RMA consumes 4W
- 11 RME modules consumes 77W
- 2 RMH modules consumes 14W

As can now be seen, the total power requirement exceeds 91W. In this case, another power supply would be required. To incorporate another supply in this system simply disconnect pins 99 and 98 on the remote DIN rail and connect another appropriately sized power supply for the remote modules to those same pins.

When using a split rail configuration ensure that the interconnections for the Inter-module Bus and Standard Bus do not exceed 200 feet. Standard Bus and the Inter-module Buses are different protocols and both are required for split rail configurations. Without having both connected communications between modules would not be possible.

**Note:**
Unit is not provided with a disconnect, use of an external disconnect is required. It should be located in close proximity to the unit and be labeled as the disconnect for the unit.
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 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>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>
</tbody>
</table>
| Data Type R/W           | uint = Unsigned 16 bit integer  
dint = long, 32-bit  
string = ASCII (8 bits per character)  
float = IEEE 754 32-bit  
RWES = Readable  
Writable  
EEPROM (saved)  
User Set (saved)  |

Remote User interface (RUI) 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:

\[
\begin{array}{llll}
1 &= 1 & 0 &= 0 & i &= i & r &= r \\
2 &= 2 & A &= J & 5 &= S \\
3 &= 3 & b &= b & K &= t \\
4 &= 4 & c &= c & L &= L & U &= u \\
5 &= 5 & d &= d & M &= M & v &= v \\
6 &= 6 & E &= E & n &= n & W &= W \\
7 &= 7 & F &= F & o &= o & y &= y \\
8 &= 8 & g &= g & P &= P & Z &= Z \\
9 &= 9 & h &= h & q &= q \\
\end{array}
\]

Note:
The RUI is optional equipment.

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 388 and send that value to the control.

Communication Protocols and Software Tools

All RM modules come with Watlow’s Standard Bus protocol. This protocol is used primarily for inter-module communications but is also used with SpecView by Watlow, LabVIEW and EZ-ZONE Configurator software (free download from Watlow’s web site (http://www.watlow.com). Along with Standard Bus, the RMH module can also be ordered with Modbus RTU (only one protocol can be active at any given time). The RMA (Access) module has options for several different protocols listed below:

- Modbus RTU 232/485
- EtherNet/IP, Modbus TCP
- DeviceNet
- Profibus DP

Modbus RTU Protocol

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 EZ-ZONE controllers 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 and notice that it lists register 380. Because this parameter is a float it is actually represented by registers 381 (low order bytes) and 381 (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, [Config] Menu) from the default low/high [LoHi] to high/low [HiLo].

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, alarms (24), analog inputs (16), etc... The Modbus register shown always represents instance one. Take for an example the Alarm Silencing parameter found in the Setup Page under the Alarm menu. Instance one is shown as address 2670 and +60 is identified as the offset to the next instance. If there was a desire to read or write to the same member instance 3, simply add 120 to 2670 to find its address; in this case, the instance 3 address for Alarm Silencing is 2790.

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

Note:
There are two columns shown in the menus that follow for communications protocols identified as CIP (Common Industrial Protocol) and Profibus. These columns will be useful if this control is used in conjunction with the RMA module or the EZ-ZONE Remote User Interface/Gateway (RUI/GTW) where those protocols can be selected as optional hardware. For this module (RMH), as a secondary protocol beyond Standard Bus, Modbus RTU can be ordered as optional hardware.

To learn more about the RUI/GTW point your browser to the link below and search for keyword EZ-ZONE.
http://www.watlow.com/literature/pti_search.cfm
Chapter 3: Operations Pages

Navigating the Operations Page

To navigate to the Operations Page using the RUI, follow the steps below:

1. 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.

2. Press the Up \( \uparrow \) or Down \( \downarrow \) key to view available menus.

3. Press the Advance Key \( \text{‰} \) to enter the menu of choice.

4. If a submenu exists (more than one instance), press the Up \( \uparrow \) or Down \( \downarrow \) key to select and then press the Advance Key \( \text{‰} \) to enter.

5. Press the Up \( \uparrow \) or Down \( \downarrow \) key to move through available menu prompts.

6. Press the Infinity Key \( \text{ˆ} \) to move backwards through the levels: parameter to submenu; submenu to menu; menu to Home Page.

7. Press and hold the Infinity Key \( \text{ˆ} \) for two seconds to return to the Home Page.

On the following pages, top level menus are identified with a yellow background color.

**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.
Logic Menu

- Logic (1 to 24)
  - Source Value A
  - Source Value B
  - Source Value C
  - Source Value D
  - Source Value E
  - Source Value F
  - Source Value G
  - Source Value H

- Output Value

Math Menu

- Math (1 to 24)
  - Source Value A
  - Source Value B
  - Source Value C
  - Source Value D
  - Source Value E
  - Offset

- Output Value
# RM High Density Module  •  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>Profibus Index</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/ Write</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ai</strong></td>
<td>Analog Input (1 to 16)</td>
<td>View the process value.</td>
<td>-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C</td>
<td>- - -</td>
<td>380 [offset 90]</td>
<td>0x68 (104) 1 to 16 1</td>
<td>0</td>
<td>4001</td>
</tr>
<tr>
<td><strong>Pu.F</strong></td>
<td>Filtered Analog Input Value</td>
<td>View the process value when filtering is turned on.</td>
<td>-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C</td>
<td>- - -</td>
<td>422 [offset 90]</td>
<td>0x68 (104) 1 to 16 0x16 (22)</td>
<td>- - -</td>
<td>4022</td>
</tr>
<tr>
<td><strong>i.Er</strong></td>
<td>Error Status</td>
<td>View the cause of the most recent error.</td>
<td>None</td>
<td>None (61)  Open (65)  Shorted (127) Measurement Error (140) Bad Calibration Data (139) Ambient Error (9) RTD Error (141) Fail (32) Not Sourced (246)</td>
<td>None (61)  Open (65)  Shorted (127) Measurement Error (140) Bad Calibration Data (139) Ambient Error (9) RTD Error (141) Fail (32) Not Sourced (246)</td>
<td>None</td>
<td>382 [offset 90]</td>
<td>0x68 (104) 1 to 16 1</td>
</tr>
<tr>
<td><strong>i.CA</strong></td>
<td>Calibration Offset</td>
<td>Offset the input reading to compensate for lead wire resistance or other factors that cause the input reading to vary from the actual process value.</td>
<td>-1,999.000 to 9,999.000°F or units -1,110.000 to 5,555.000°C</td>
<td>0.0</td>
<td>402 [offset 90]</td>
<td>0x68 (104) 1 to 16 0xC (12)</td>
<td>2</td>
<td>4012</td>
</tr>
<tr>
<td><strong>Pu.E</strong></td>
<td>Clear Latched Input Error</td>
<td>Clear latched input when input error condition no longer exists.</td>
<td>Clear Latch (1221)</td>
<td>Clear Latch (1221)</td>
<td>Clear Latch (1221)</td>
<td>436 [offset 90]</td>
<td>0x68 (104) 1 to 16 0x1D (29)</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.
- If there is only one instance of a menu, no submenus will appear.
### Display Parameters

#### Process Value (1 to 16)

**Source Value C**
- View the value of Source C.
  - Range: -1,999,000 to 9,999,000°F or units
  - Default: -1,129,000 to 5,537,000°C

**Source Value D**
- View the value of Source D.
  - Range: -1,999,000 to 9,999,000°F or units
  - Default: -1,129,000 to 5,537,000°C

**Source Value E**
- View the value of Source E.
  - Range: -1,999,000 to 9,999,000°F or units
  - Default: -1,129,000 to 5,537,000°C

**Offset**
- Set an offset to be applied to this function's output.
  - Range: -1,999,000 to 9,999,000°F or units
  - Default: 0

**Output Value**
- View the value of this function block's output.
  - Range: -1,999,000 to 9,999,000°F or units
  - Default: 0.0

### Digital Input/Output Menu

#### Digital Output (1 to 12)

**Output State**
- View the state of this output.
  - Off (62)
  - On (63)

#### Digital Input (1 to 12)

**Input State**
- View this event input state.
  - Off (62)
  - On (63)

### Action Menu

#### Action (1 to 24)

**Event Input Status**
- View this input state.
  - Off (62)
  - On (63)

### Note:
Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces. If there is only one instance of a menu, no submenus will appear.
### RM High Density Module • 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>Profibus Index</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Monitor Menu</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.c.r [C;MA]</td>
<td>Monitor (1 to 16) Control Mode Active</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>View the control mode currently in effect.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off (62) Auto (10) Manual (54)</td>
<td>Off</td>
<td>4100 [offset 70]</td>
<td>0x97 (151) 1 to 16 2</td>
<td>- - -</td>
<td>8002</td>
<td>uint RWES</td>
</tr>
<tr>
<td>h.p [h.Pr]</td>
<td>Monitor (1 to 16) Heat Power</td>
<td>0.0 to 100.0%</td>
<td>0.0</td>
<td>4124 [offset 70]</td>
<td>0x97 (151) 1 to 16 0x1D (13)</td>
<td>- - -</td>
<td>8111</td>
<td>float RWES</td>
</tr>
<tr>
<td>c.p [C;Pr]</td>
<td>Monitor (1 to 16) Cool Power</td>
<td>-100.0 to 0.0%</td>
<td>0.0</td>
<td>4136 [offset 70]</td>
<td>0x97 (151) 1 to 10 0x16 0xE (14)</td>
<td>- - -</td>
<td>814</td>
<td>float RWES</td>
</tr>
<tr>
<td>c.s [C;SP]</td>
<td>Monitor (1 to 16) Closed Loop Working Set Point</td>
<td>-1,999,000 to 9,999,000°F or units -1,128,000 to 5,537,000°C</td>
<td>75°F</td>
<td>5232 [offset 80]</td>
<td>0x6B (107) 1 to 16 7</td>
<td>- - -</td>
<td>8029</td>
<td>float RWES</td>
</tr>
<tr>
<td>p.u [Pv.A]</td>
<td>Monitor (1 to 16) Process Value Active</td>
<td>-1,999,000 to 9,999,000°F or units -1,128,000 to 5,537,000°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Loop</th>
<th>aPer</th>
<th><strong>Control Loop Menu</strong></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>r.e [r.En]</td>
<td>Control Loop (1 to 16) Remote Enable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enable this loop to switch control to the remote set point.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No (59) Yes (106)</td>
<td>No</td>
<td>5260 [offset 80]</td>
<td>0x6B (107) 1 to 16 0x15 (21)</td>
<td>38</td>
<td>7021</td>
<td>uint RWES</td>
</tr>
<tr>
<td>c.m [C;M]</td>
<td>Control Loop (1 to 16) Control Mode</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select the method that this loop will use to control.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off (62) Auto (10) Manual (54)</td>
<td>Auto</td>
<td>4100 [offset 70]</td>
<td>0x97 (151) 1 to 16 1</td>
<td>53</td>
<td>8001</td>
<td>uint RWES</td>
</tr>
<tr>
<td>a.t [A.tSP]</td>
<td>Control Loop (1 to 16) Autotune Set Point</td>
<td>50 to 200%</td>
<td>90</td>
<td>4138 [offset 70]</td>
<td>0x97 (151) 1 to 16 0x14 (20)</td>
<td>- - -</td>
<td>8025</td>
<td>float RWES</td>
</tr>
<tr>
<td>u.e [AUt]</td>
<td>Control Loop (1 to 16) Autotune Request</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Start an autotune. While the autotune is active, the Home Page of RUI will display the tuning status. When the autotune is complete, the message will clear automatically.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No (59) Yes (106)</td>
<td>No</td>
<td>4140 [offset 70]</td>
<td>0x97 (151) 1 to 16 0x15 (21)</td>
<td>54</td>
<td>8026</td>
<td>uint RW</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Display</th>
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<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>LS [C.SP]</td>
<td>Control Loop (1 to 16) Closed Loop Set Point</td>
<td>Low Set Point to High Set Point (Setup Page)</td>
<td>75.0°F or units 24.0°C</td>
<td>5220 [offset 80]</td>
<td>0x6B (107) 1 to 16 1</td>
<td>39</td>
<td>7001</td>
<td>float RWES</td>
</tr>
<tr>
<td>id5 [id.S]</td>
<td>Control Loop (1 to 16) Idle Set Point</td>
<td>Low Set Point to High Set Point (Setup Page)</td>
<td>75.0°F or units 24.0°C</td>
<td>5236 [offset 80]</td>
<td>0x6B (107) 1 to 16 9</td>
<td>40</td>
<td>7009</td>
<td>float RWES</td>
</tr>
<tr>
<td>hPb [h.Pb]</td>
<td>Control Loop (1 to 16) Heat Proportional Band</td>
<td>0.001 to 9,999.000°F or units 0.001 to 5,555.000°C</td>
<td>25.0°F or units 14.0°C</td>
<td>4110 [offset 70]</td>
<td>0x97 (151) 1 to 16 6</td>
<td>55</td>
<td>8009</td>
<td>float RWES</td>
</tr>
<tr>
<td>hhy [h.hy]</td>
<td>Control Loop (1 to 16) Heat Hysteresis</td>
<td>0.001 to 9,999.000°F or units 0.001 to 5,555.000°C</td>
<td>3.0°F or units 2.0°C</td>
<td>4120 [offset 70]</td>
<td>0x97 (151) 1 to 16 0xB (11)</td>
<td>56</td>
<td>8010</td>
<td>float RWES</td>
</tr>
<tr>
<td>Cpb [C.Pb]</td>
<td>Control Loop (1 to 16) Cool Proportional Band</td>
<td>0.001 to 9,999.000°F or units 0.001 to 5,555.000°C</td>
<td>25.0°F or units 14.0°C</td>
<td>4112 [offset 70]</td>
<td>0x97 (151) 1 to 16 7</td>
<td>57</td>
<td>8012</td>
<td>float RWES</td>
</tr>
<tr>
<td>Chy [C.hy]</td>
<td>Control Loop (1 to 16) Cool Hysteresis</td>
<td>0.001 to 9,999.000°F or units 0.001 to 5,555.000°C</td>
<td>3.0°F or units 2.0°C</td>
<td>4122 [offset 70]</td>
<td>0x97 (151) 1 to 16 0xC (12)</td>
<td>58</td>
<td>8013</td>
<td>float RWES</td>
</tr>
<tr>
<td>ti</td>
<td>Control Loop (1 to 16) Time Integral</td>
<td>0 to 9,999 seconds per repeat</td>
<td>180 seconds per repeat</td>
<td>4114 [offset 70]</td>
<td>0x97 (151) 1 to 16 8</td>
<td>59</td>
<td>8006</td>
<td>float RWES</td>
</tr>
<tr>
<td>td</td>
<td>Control Loop (1 to 16) Time Derivative</td>
<td>0 to 9,999 seconds</td>
<td>0 seconds</td>
<td>4116 [offset 70]</td>
<td>0x97 (151) 1 to 16 9</td>
<td>60</td>
<td>8007</td>
<td>float RWES</td>
</tr>
<tr>
<td>db</td>
<td>Control Loop (1 to 16) Dead Band</td>
<td>-1,000.0 to 1,000.0°F or units -555.556 to 555.556°C</td>
<td>0.0</td>
<td>4118 [offset 70]</td>
<td>0x97 (151) 1 to 16 0xA (10)</td>
<td>61</td>
<td>8008</td>
<td>float RWES</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter Name Description</th>
<th>Range</th>
<th>Default</th>
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<th>Profibus Index</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMH Module</td>
<td>Control Loop (1 to 16) Open Loop Set Point</td>
<td>-100.0 to 100.0%</td>
<td>0.0</td>
<td>5222 [offset 80]</td>
<td>0x6B (107) 1 to16 2</td>
<td>41</td>
<td>7002</td>
<td>float RWES</td>
</tr>
<tr>
<td>RMH Module</td>
<td>Display</td>
<td>Parameter Name Description</td>
<td>Range</td>
<td>Default</td>
<td>Modbus Relative Address</td>
<td>CIP Class Instance Attribute hex (dec)</td>
<td>Profibus Index</td>
<td>Parameter ID</td>
</tr>
<tr>
<td>RMH Module</td>
<td>Control Loop (1 to 16) Open Loop Set Point</td>
<td>-100.0 to 100.0%</td>
<td>0.0</td>
<td>5222 [offset 80]</td>
<td>0x6B (107) 1 to16 2</td>
<td>41</td>
<td>7002</td>
<td>float RWES</td>
</tr>
<tr>
<td>RMH Module</td>
<td>Low Set Point</td>
<td>If Alarm Type (Setup Page, Alarm Menu) is set to:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RMH Module</td>
<td>process</td>
<td>- set the process value that will trigger a low alarm.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RMH Module</td>
<td>deviation</td>
<td>- set the span of units from the closed loop set point that will trigger a low alarm. A negative set point represents a value below closed loop set point. A positive set point represents a value above closed loop set point.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RMH Module</td>
<td>High Set Point</td>
<td>If Alarm Type (Setup Page, Alarm Menu) is set to:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RMH Module</td>
<td>process</td>
<td>- set the process value that will trigger a high alarm.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RMH Module</td>
<td>deviation</td>
<td>- set the span of units from the closed loop set point that will trigger a high alarm.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RMH Module</td>
<td>Clear Request</td>
<td>User interface (RUI) access to clear an alarm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RMH Module</td>
<td>Silence Request</td>
<td>User interface (RUI) access to silence an alarm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RMH Module</td>
<td>State</td>
<td>View state of alarm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RMH Module</td>
<td>Latched</td>
<td>Read this register to determine if the alarm is latched</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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### RM High Density Module • 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>Profibus Index</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Display</td>
<td><strong>Alarm (1 to 24)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td><strong>Silenced</strong></td>
<td>Read this register to determine if the alarm is silenced</td>
<td>No (59) Yes (106) None</td>
<td>2680 [offset 60]</td>
<td>0x6D (109) 1 to 24 0x0B (11)</td>
<td>- - - -</td>
<td>9011 uint R</td>
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<tr>
<td></td>
<td><strong>Clearable</strong></td>
<td>Read to determine if an alarm can be cleared</td>
<td>No (59) Yes (106) None</td>
<td>2682 [offset 60]</td>
<td>0x6D (109) 1 to 24 0xC (12)</td>
<td>- - - -</td>
<td>9012 uint R</td>
<td></td>
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<tr>
<td></td>
<td><strong>Clear Request</strong></td>
<td>Write to this register to clear an alarm</td>
<td>Clear (0) No Change (255) None</td>
<td>2684 [offset 60]</td>
<td>0x6D (109) 1 to 24 0xD (13)</td>
<td>32</td>
<td>9013 uint RW</td>
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<tr>
<td></td>
<td><strong>Silence Request</strong></td>
<td>Write to this register to silence an alarm</td>
<td>Clear (0) No Change (255) None</td>
<td>2686 [offset 60]</td>
<td>0x6D (109) 1 to 24 0x0E (14)</td>
<td>33</td>
<td>9014 uint RW</td>
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<tr>
<td>No Display</td>
<td><strong>Working Process Value</strong></td>
<td>Read process value used by alarms</td>
<td>-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C None</td>
<td>2696 [offset 60]</td>
<td>0x6D (109) 1 to 24 0x0E (14)</td>
<td>- - - -</td>
<td>9019 float R</td>
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<tr>
<td>No Display</td>
<td><strong>Output Value</strong></td>
<td>Read state of alarm output</td>
<td>On (63) Off (62) None</td>
<td>2706 [offset 60]</td>
<td>0x6D (109) 1 to 24 0x18 (24)</td>
<td>- - - -</td>
<td>9024 uint R</td>
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### Linearization 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>
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<tbody>
<tr>
<td>No Display</td>
<td><strong>Linearization (1 to 24)</strong></td>
<td></td>
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<tr>
<td></td>
<td><strong>Source Value A</strong></td>
<td>View the value of Source A.</td>
<td>-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C None</td>
<td>14386 [offset 70]</td>
<td>0x86 (134) 1 to 24 0x0 (4)</td>
<td>- - - -</td>
<td>34004 float R</td>
<td></td>
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<tr>
<td></td>
<td><strong>Offset</strong></td>
<td>Set an offset to be applied to this function’s output.</td>
<td>-1,999.000 to 9,999.000°F or units -1,110.000 to 5,555.000°C 0</td>
<td>14390 [offset 70]</td>
<td>0x86 (134) 1 to 24 0x0 (6)</td>
<td>- - - -</td>
<td>34006 float RWES</td>
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</tr>
<tr>
<td>No Display</td>
<td><strong>Output Value</strong></td>
<td>View the value of this function’s output.</td>
<td>-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C None</td>
<td>14392 [offset 70]</td>
<td>0x86 (134) 1 to 24 0x0 (7)</td>
<td>- - - -</td>
<td>34007 float R</td>
<td></td>
</tr>
<tr>
<td>No Display</td>
<td><strong>Error</strong></td>
<td>Read reported cause for linearization error</td>
<td>None (61) Open (65) Shorted (127) Measurement Error (140) Bad Cal Data (139) Ambient Error (9) RTD Error (141) Fail (32) Math Error (1423) Not Sourced (246) Stale (1617) None</td>
<td>14434 [offset 70]</td>
<td>0x86 (134) 1 to 24 0x0 (28)</td>
<td>- - - -</td>
<td>34028 uint R</td>
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</tr>
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</table>

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<tr>
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<th>Parameter Name</th>
<th>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>
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<tbody>
<tr>
<td>[5PE]</td>
<td>aPER.</td>
<td>Compare Menu</td>
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<tr>
<td>[5wR]</td>
<td>[Su.A]</td>
<td>Compare (1 to 24) Source Value A</td>
<td>View the value of Source A.</td>
<td>-1,999.000 to 9,999.000°F or units</td>
<td>11272 [offset 40]</td>
<td>0x80 (128) 1 to 24 7</td>
<td>- - -</td>
<td>28007</td>
<td>float R</td>
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<tr>
<td>[5wB]</td>
<td>[Su.b]</td>
<td>Compare (1 to 24) Source Value B</td>
<td>View the value of Source B.</td>
<td>-1,999.000 to 9,999.000°F or units</td>
<td>11274 [offset 40]</td>
<td>0x80 (128) 1 to 24 8</td>
<td>- - -</td>
<td>28008</td>
<td>float R</td>
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<tr>
<td>[aw]</td>
<td>[o.v]</td>
<td>Compare (1 to 24) Output Value</td>
<td>View the value of this function's output.</td>
<td>- - -</td>
<td>11278 [offset 40]</td>
<td>0x80 (128) 1 to 24 0xA (10)</td>
<td>- - -</td>
<td>28010</td>
<td>uint R</td>
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<tr>
<td>[tMr]</td>
<td>[oPEr]</td>
<td>Timer Menu</td>
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<tr>
<td>[5wR]</td>
<td>[Su.A]</td>
<td>Timer (1 to 24) Value Source A</td>
<td>View the value of Source A.</td>
<td>- - -</td>
<td>13192 [offset 50]</td>
<td>0x83 (131) 1 to 24 7</td>
<td>- - -</td>
<td>31007</td>
<td>uint R</td>
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<tr>
<td>[5wB]</td>
<td>[Su.b]</td>
<td>Timer (1 to 24) Value Source B</td>
<td>View the value of Source B.</td>
<td>- - -</td>
<td>13194 [offset 50]</td>
<td>0x83 (131) 1 to 24 8</td>
<td>- - -</td>
<td>31008</td>
<td>uint R</td>
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<tr>
<td>[E.t]</td>
<td>[E.t]</td>
<td>Timer (1 to 24) Elapsed Time</td>
<td>View the value of this function's elapsed time.</td>
<td>0 to 30,000.0 seconds</td>
<td>13210 [offset 50]</td>
<td>0x83 (131) 1 to 24 0x10 (16)</td>
<td>- - -</td>
<td>31016</td>
<td>float R</td>
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<tr>
<td>[aw]</td>
<td>[o.v]</td>
<td>Timer (1 to 24) Output Value</td>
<td>View the value of this function's output.</td>
<td>- - -</td>
<td>13198 [offset 50]</td>
<td>0x83 (131) 1 to 24 0x11 (17)</td>
<td>- - -</td>
<td>31010</td>
<td>uint R</td>
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<tr>
<td>[tMr]</td>
<td>[oPEr]</td>
<td>Timer (1 to 24) Running</td>
<td>Read to determine if timer is running</td>
<td>Off (62)</td>
<td>13208 [offset 50]</td>
<td>0x83 (131) 1 to 24 0x0F (15)</td>
<td>- - -</td>
<td>31015</td>
<td>uint R</td>
</tr>
</tbody>
</table>

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### Display

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<tr>
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<th>Range</th>
<th>Default</th>
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<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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<td>Timer (1 to 24) Error Read reported cause for timer error</td>
<td>None (61)</td>
<td>None</td>
<td>13214 [offset 50]</td>
<td>0x83 (131) 1 to 24 0x12 (18)</td>
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<td>Open (65)</td>
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<td>Shorted (127)</td>
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<td>Measurement Error (140)</td>
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<td>Bad Cal Data (139)</td>
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<td>Ambient Error (9)</td>
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<td>RTD Error (141)</td>
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<td></td>
<td>Fail (32)</td>
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<td>Math Error (1423)</td>
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<td>Not Sourced (246)</td>
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<td>Stale (1617)</td>
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</table>

### Counter Menu

#### Counter (1 to 24) Count

- View the function's total count.

<table>
<thead>
<tr>
<th>Counter (1 to 24) Count</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></td>
<td>0 to 9,999</td>
<td>12248 [offset 40]</td>
<td>0x82 (130) 1 to 24 0xF (15)</td>
<td>217</td>
<td>30015</td>
<td>uint</td>
<td></td>
</tr>
</tbody>
</table>

#### Counter (1 to 24) Source Value A

- View the value of Source A.

<table>
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<tr>
<th>Counter (1 to 24) Source Value A</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></td>
<td>Off (62)</td>
<td>12232 [offset 40]</td>
<td>0x82 (130) 1 to 24 7</td>
<td>- - - -</td>
<td>30007</td>
<td>uint</td>
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<tr>
<td></td>
<td>On (63)</td>
<td></td>
<td></td>
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#### Counter (1 to 24) Source Value B

- View the value of Source B.

<table>
<thead>
<tr>
<th>Counter (1 to 24) Source Value B</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></td>
<td>Off (62)</td>
<td>12234 [offset 40]</td>
<td>0x82 (130) 1 to 24 8</td>
<td>- - - -</td>
<td>30008</td>
<td>uint</td>
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<tr>
<td></td>
<td>On (63)</td>
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#### Counter (1 to 24) Output Value

- View the value of this function's output.

<table>
<thead>
<tr>
<th>Counter (1 to 24) Output Value</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></td>
<td>Off (62)</td>
<td>12238 [offset 40]</td>
<td>0x82 (130) 1 to 24 0xA (10)</td>
<td>- - - -</td>
<td>30010</td>
<td>uint</td>
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<tr>
<td></td>
<td>On (63)</td>
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### Logic Menu

#### Logic (1 to 24) Source Value A

- View the value of Source A.

<table>
<thead>
<tr>
<th>Logic (1 to 24) Source Value A</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></td>
<td>Off (62)</td>
<td>9388 [offset 80]</td>
<td>0x7F (127) 1 to 24 0x19 (25)</td>
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<td>27025</td>
<td>uint</td>
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<tr>
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#### Logic (1 to 24) Source Value B

- View the value of Source B.

<table>
<thead>
<tr>
<th>Logic (1 to 24) Source Value B</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></td>
<td>Off (62)</td>
<td>9390 [offset 80]</td>
<td>0x7F (127) 1 to 24 0x1A (26)</td>
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<td>27026</td>
<td>uint</td>
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<tr>
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<td>On (63)</td>
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<th>Data Type &amp; Read/Write</th>
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<tbody>
<tr>
<td>Su.C</td>
<td>Logic (1 to 24)</td>
<td></td>
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<td>9392 [offset 80]</td>
<td>0x7f (127) 1 to 24 0x1B (27)</td>
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<td>27027</td>
<td>uint R</td>
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<td>Source Value C</td>
<td>View the value of Source C.</td>
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<td>Su.d</td>
<td>Logic (1 to 24)</td>
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<td></td>
<td>9394 [offset 80]</td>
<td>0x7f (127) 1 to 24 0x1C (28)</td>
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<td>27028</td>
<td>uint R</td>
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<td>View the value of Source D.</td>
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<td>Su.E</td>
<td>Logic (1 to 24)</td>
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<td>Source Value E</td>
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<td>Su.F</td>
<td>Logic (1 to 24)</td>
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<td></td>
<td>9398 [offset 80]</td>
<td>0x7f (127) 1 to 24 0x1E (30)</td>
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<td>Source Value F</td>
<td>View the value of Source F.</td>
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<tr>
<td>Su.g</td>
<td>Logic (1 to 24)</td>
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<td>Value Source G</td>
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<tr>
<td>Su.h</td>
<td>Logic (1 to 24)</td>
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<td>Output Value</td>
<td>View the value of this function's output.</td>
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<tr>
<td></td>
<td>Logic (1 to 24)</td>
<td></td>
<td></td>
<td>9410 [offset 80]</td>
<td>0x7f (127) 1 to 24 0x24 (36)</td>
<td>- - -</td>
<td>27036</td>
<td>uint R</td>
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<td></td>
<td>Error</td>
<td>Read reported cause for logic error</td>
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#### Math 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 Attribute hex (dec)</th>
<th>Profibus Index</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>Su.A</td>
<td>Math (1 to 24)</td>
<td>-1,999.000 to 9,999.000°F or units</td>
<td>-1,128.000 to 5,537.000°C</td>
<td>6570 [offset 70]</td>
<td>0x7D (125) 1 to 24 0x10 (16)</td>
<td>- - -</td>
<td>25016</td>
<td>float RWES</td>
</tr>
<tr>
<td></td>
<td>Source Value A</td>
<td>View the value of Source A.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Su.b</td>
<td>Math (1 to 24)</td>
<td>-1,999.000 to 9,999.000°F or units</td>
<td>-1,128.000 to 5,537.000°C</td>
<td>6572 [offset 70]</td>
<td>0x7D (125) 1 to 24 0x11 (17)</td>
<td>- - -</td>
<td>25017</td>
<td>float RWES</td>
</tr>
<tr>
<td></td>
<td>Source Value B</td>
<td>View the value of Source B.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Su.c</td>
<td>Math (1 to 24)</td>
<td>-1,999.000 to 9,999.000°F or units</td>
<td>-1,128.000 to 5,537.000°C</td>
<td>6574 [offset 70]</td>
<td>0x7D (125) 1 to 24 0x12 (18)</td>
<td>- - -</td>
<td>25018</td>
<td>float RWES</td>
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<tr>
<td></td>
<td>Source Value C</td>
<td>View the value of Source C.</td>
<td></td>
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</tbody>
</table>

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<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>
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<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
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</thead>
<tbody>
<tr>
<td><code>Su.d</code></td>
<td>Math (1 to 24) Source Value D</td>
<td>-1,999,000 to 9,999,000°F or units, -1,128,000 to 5,537,000°C</td>
<td>6576 [offset 70]</td>
<td>0x7D (125) 1 to 24 0x13 (19)</td>
<td>- - -</td>
<td>25019</td>
<td>float RWES</td>
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<tr>
<td><code>Su.E</code></td>
<td>Math (1 to 24) Source Value E</td>
<td>Off (62), On (63)</td>
<td>6578 [offset 70]</td>
<td>0x7D (125) 1 to 24 0x14 (20)</td>
<td>- - -</td>
<td>25020</td>
<td>uint RWES</td>
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<tr>
<td><code>oFSt</code></td>
<td>Math (1 to 24) Offset</td>
<td>-1,999,000 to 9,999,000°F or units, -1,110,000 to 5,555,000°C</td>
<td>0</td>
<td>6584 [offset 70]</td>
<td>0x7D (125) 1 to 24 0x17 (23)</td>
<td>- - -</td>
<td>25023</td>
<td>float RWES</td>
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<tr>
<td><code>o.v</code></td>
<td>Math (1 to 24) Output Value</td>
<td>-1,999,000 to 9,999,000°F or units, -1,128,000 to 5,537,000°C</td>
<td>6582 [offset 70]</td>
<td>0x7D (125) 1 to 24 0x16 (22)</td>
<td>- - -</td>
<td>25022</td>
<td>float RWES</td>
<td></td>
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</table>

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Chapter 4: Setup Pages

Navigating the Setup Page

To navigate to the Setup Page using the RUI, follow the steps below:

1. From the Home Page, press and hold both the Up and Down keys for six seconds. will appear in the upper display and will appear in the lower display.

Note:
If keys are released when is displayed, press the Infinity Key or reset key to exit and repeat until is displayed.

2. Press the Up or Down key to view available menus.

3. Press the Advance Key to enter the menu of choice.

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.
Watlow EZ-ZONE® RMH Module
### RM High Density Module • Setup Page

<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter Name Description</th>
<th>Range</th>
<th>Default</th>
<th>Modbus Relative Address</th>
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</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="SEn" /></td>
<td>Analog Input (1 to 16) Sensor Type</td>
<td>Set the analog sensor type to match the device wired to this input.</td>
<td><strong>Note:</strong> There is no open-sensor detection for process inputs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><img src="image" alt="Lin" /></td>
<td>Analog Input (1 to 16) TC Linearization</td>
<td>Set the linearization to match the thermocouple wired to this input.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><img src="image" alt="Unit" /></td>
<td>Analog Input (1 to 16) Units</td>
<td>Set the type of units the sensor will measure.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="S.Lo" /></td>
<td>Analog Input (1 to 16) Scale Low</td>
<td>Set the low scale for this function block’s output.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="S.hi" /></td>
<td>Analog Input (1 to 16) Scale High</td>
<td>Set the high scale for this function block’s output.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><img src="image" alt="r.Lo" /></td>
<td>Analog Input (1 to 16) Range Low</td>
<td>Set the low range for this function block’s output.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><img src="image" alt="r.hi" /></td>
<td>Analog Input (1 to 16) Range High</td>
<td>Set the high range for this function block’s output.</td>
<td></td>
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</tbody>
</table>

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- If there is only one instance of a menu, no submenus will appear.
- ** These parameters/prompts are available in these menus with firmware revisions 6.0 and above.

R: Read  
W: Write  
E: EEPROM  
S: User Set
## RM High Density Module • Setup Page

<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter Name Description</th>
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<tr>
<td>PEE</td>
<td>Analog Input (1 to 16)</td>
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<td></td>
<td>Process Error Enable</td>
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<td></td>
<td>Turn the Process Error</td>
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<td>Low feature on or off.</td>
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<tr>
<td>PEL</td>
<td>Analog Input (1 to 16)</td>
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<td></td>
<td>Process Error Low Value</td>
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<td>If the process value drops</td>
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<td>below this value, it will</td>
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<td>trigger an input error.</td>
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<td>t.C</td>
<td>Analog Input (1 to 16)</td>
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<td>Thermistor Curve</td>
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<td>Select a curve to apply</td>
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<td>to the thermistor input.</td>
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<td>t.r</td>
<td>Analog Input (1 to 16)</td>
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<td>Resistance Range</td>
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<td>Set the maximum resistance</td>
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<td>of the thermistor input.</td>
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<tr>
<td>F.r.l</td>
<td>Analog Input (1 to 16)</td>
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<td>Filter</td>
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<td>Filtering smooths out the</td>
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<td>process signal to both</td>
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<td>i.Ca</td>
<td>Analog Input (1 to 16)</td>
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<td>Calibration Offset</td>
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<td>to compensate for lead</td>
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<td>wire resistance or other</td>
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<td>factors that cause the</td>
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<td>input reading to vary</td>
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<td>value.</td>
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</tbody>
</table>

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</tr>
</thead>
<tbody>
<tr>
<td><img src="Ain" alt="R" /></td>
<td>Analog Input (1 to 16) Value</td>
<td>-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C</td>
<td>- - -</td>
<td>380 [offset 90]</td>
<td>0x68 (104) 1 to 16 1</td>
<td>0</td>
<td>4001</td>
<td>float-R</td>
</tr>
<tr>
<td><img src="i.Er" alt="iEr" /></td>
<td>Analog Input (1 to 16) Input Error</td>
<td>None (61) Open (65) Shorted (127) Measurement Error (140) Bad Calibration Data (139) Ambient Error (9) RTD Error (141) Fail (32) Not Sourced (246)</td>
<td>None</td>
<td>382 [offset 90]</td>
<td>x68 (104) 1 to 16 1</td>
<td>1</td>
<td>4002</td>
<td>float-R</td>
</tr>
<tr>
<td><img src="Fn" alt="F" /></td>
<td>Process Value (1 to 16) Function</td>
<td>Off (62) Sensor Backup (1201) Average (1367) Crossover (1368) Wet Bulb / Dry Bulb (1369) Switch Over (1370) Differential (1373) Ratio (1374) Add (1375) Multiply (1376) Absolute Difference (1377) Minimum (1378) Maximum (1379) Square Root (1380) Vaisala RH Compensation (1648) Pressure to Altitude (1649)</td>
<td>Off</td>
<td>8260 [offset 70]</td>
<td>0x7E (126) 1 to 16 0x15 (21)</td>
<td>98</td>
<td>26021</td>
<td>uint-RWES</td>
</tr>
<tr>
<td><img src="SFn.A" alt="SFnA" /></td>
<td>Source Function A Process Value (1 to 16)</td>
<td>Analog Input (142) Process Value (241)</td>
<td>None</td>
<td>8220 [offset 70]</td>
<td>0x7E (126) 1 to 16</td>
<td>- - -</td>
<td>26001</td>
<td>uint-RWES</td>
</tr>
</tbody>
</table>

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</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>Process Value (1 to 16) Source Instance A</td>
<td>1 to 250</td>
<td>1</td>
<td>8230 [offset 70]</td>
<td>0x7E (126) 1 to 16 6</td>
<td>- - -</td>
<td>26006</td>
<td>uint RWES</td>
</tr>
<tr>
<td>✓</td>
<td>Process Value (1 to 16) Source Function B</td>
<td>None (61) Analog Input (142) Linearization (238) Math (240) Process Value (241) Variable (245)</td>
<td>None</td>
<td>8222 [offset 70]</td>
<td>0x7E (126) 1 to 16 2</td>
<td>- - -</td>
<td>26002</td>
<td>uint RWES</td>
</tr>
<tr>
<td>✓</td>
<td>Process Value (1 to 16) Source Instance B</td>
<td>1 to 250</td>
<td>1</td>
<td>8232 [offset 70]</td>
<td>0x7E (126) 1 to 16 7</td>
<td>- - -</td>
<td>26007</td>
<td>uint RWES</td>
</tr>
<tr>
<td>✓</td>
<td>Process Value (1 to 16) Source Zone B</td>
<td>0 to 16</td>
<td>0</td>
<td>8242 [offset 70]</td>
<td>0x7E (126) 1 to 16 0x0C (12)</td>
<td>- - -</td>
<td>26012</td>
<td>uint RWES</td>
</tr>
<tr>
<td>✓</td>
<td>Process Value (1 to 16) Source Function C</td>
<td>None (61) Analog Input (142) Linearization (238) Math (240) Process Value (241) Variable (245)</td>
<td>None</td>
<td>8224 [offset 70]</td>
<td>0x7E (126) 1 to 16 3</td>
<td>- - -</td>
<td>26003</td>
<td>uint RWES</td>
</tr>
<tr>
<td>✓</td>
<td>Process Value (1 to 16) Source Instance C</td>
<td>1 to 250</td>
<td>1</td>
<td>8234 [offset 70]</td>
<td>0x7E (126) 1 to 16 8</td>
<td>- - -</td>
<td>26008</td>
<td>uint RWES</td>
</tr>
<tr>
<td>✓</td>
<td>Process Value (1 to 16) Source Zone C</td>
<td>0 to 16</td>
<td>0</td>
<td>8244 [offset 70]</td>
<td>0x7E (126) 1 to 16 0x0D (13)</td>
<td>- - -</td>
<td>26013</td>
<td>uint RWES</td>
</tr>
<tr>
<td>✓</td>
<td>Process Value (1 to 16) Source Function D</td>
<td>None (61) Analog Input (142) Linearization (238) Math (240) Process Value (241) Variable (245)</td>
<td>None</td>
<td>8226 [offset 70]</td>
<td>0x7E (126) 1 to 16 4</td>
<td>- - -</td>
<td>26004</td>
<td>uint RWES</td>
</tr>
<tr>
<td>✓</td>
<td>Process Value (1 to 16) Source Instance D</td>
<td>1 to 250</td>
<td>1</td>
<td>8236 [offset 70]</td>
<td>0x7E (126) 1 to 16 9</td>
<td>- - -</td>
<td>26009</td>
<td>uint RWES</td>
</tr>
<tr>
<td>✓</td>
<td>Process Value (1 to 16) Source Zone D</td>
<td>0 to 16</td>
<td>0</td>
<td>8246 [offset 70]</td>
<td>0x7E (126) 1 to 16 0x0E (14)</td>
<td>- - -</td>
<td>26014</td>
<td>uint RWES</td>
</tr>
</tbody>
</table>

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**Watlow EZ-ZONE® RMH Module • 54 • Chapter 4 Setup Page**
<table>
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<tr>
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<th>Default</th>
<th>Modbus Relative Address</th>
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<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>$Sf_nE$</td>
<td>Process Value (1 to 16) Source Function E Set the type of function that will be used for this source.</td>
<td>None (61)</td>
<td>None</td>
<td>8228 [offset 70]</td>
<td>0x7E (126) 1 to 16 5</td>
<td>- - -</td>
<td>26005</td>
<td>uint RWES</td>
</tr>
<tr>
<td>$5_{E}$</td>
<td>Process Value (1 to 16) Source Instance E Set the instance of the function selected above.</td>
<td>1 to 250</td>
<td>1</td>
<td>8238 [offset 70]</td>
<td>0x7E (126) 1 to 16 0x0A (10)</td>
<td>- - -</td>
<td>26010</td>
<td>uint RWES</td>
</tr>
<tr>
<td>$5_{E}$</td>
<td>Process Value (1 to 16) Source Zone E Set the zone of the function selected above.</td>
<td>0 to 16</td>
<td>0</td>
<td>8248 [offset 70]</td>
<td>0x7E (126) 1 to 16 0x0F (15)</td>
<td>- - -</td>
<td>26015</td>
<td>uint RWES</td>
</tr>
<tr>
<td>$L_{P}$</td>
<td>Process Value (1 to 16) Cross Over Point Enter a value where the Output Value switches from Source A to Source B value. This applies only when the Process function is set to Cross Over.</td>
<td>-1,999.000 to 9,999.000 units or °F</td>
<td>100.0</td>
<td>8266 [offset 70]</td>
<td>0x7E (126) 1 to 16 0x18 (24)</td>
<td>- - -</td>
<td>26024</td>
<td>float RWES</td>
</tr>
<tr>
<td>$L_{b}$</td>
<td>Process Value (1 to 16) Cross Over Band Enter a band centered about the Cross Over Point where Output Value switches from Source A to Source B Value. This applies only when the Process function is set to Cross Over.</td>
<td>-1,999.000 to 9,999.000 units or °F</td>
<td>10.0</td>
<td>8268 [offset 70]</td>
<td>0x7E (126) 1 to 16 0x19 (25)</td>
<td>- - -</td>
<td>26025</td>
<td>float RWES</td>
</tr>
</tbody>
</table>

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Note:
- R: Read
- W: Write
- E: EEPROM
- S: User Set
### RM High Density Module • Setup Page

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td><img src="Punt" alt="Punt" /> <img src="Punt" alt="P.unt" /> <img src="Punt" alt="P:unt" /> <img src="Punt" alt="Punt" /> <img src="Punt" alt="Punt" /></td>
<td>Process Value (1 to 16) Pressure Units Set the units that will be applied to the source.</td>
<td><img src="PSI" alt="PSI" /> Pounds per Square Inch (1671) <img src="MPa" alt="MPa" /> Millibar (1672) <img src="Torr" alt="Torr" /> Torr (1673) <img src="Pa" alt="Pa" /> Pascal (1674) <img src="atm" alt="atm" /> Atmosphere (1675)</td>
<td>PSI</td>
<td>8274 [offset 70]</td>
<td>0x7E (126) 1 to 16 0x1C (28)</td>
<td>- - -</td>
<td>26028</td>
<td>uint RWES</td>
</tr>
<tr>
<td><img src="A.unt" alt="A.unt" /></td>
<td>Process Value (1 to 16) Altitude Units Set the units that will be applied to the source.</td>
<td><img src="HFt" alt="HFt" /> Kilofeet (1677) <img src="Ft" alt="Ft" /> Feet (1676)</td>
<td>HFt</td>
<td>8276 [offset 70]</td>
<td>0x7E (126) 1 to 16 0x1D (29)</td>
<td>- - -</td>
<td>26029</td>
<td>uint RWES</td>
</tr>
<tr>
<td><img src="b.Pr" alt="b.Pr" /></td>
<td>Process Value (1 to 16) Barometric Pressure Set the units that will be applied to the source.</td>
<td>10.0 to 16.0</td>
<td>14.7</td>
<td>8278 [offset 70]</td>
<td>0x7E (126) 1 to 16 0x1E (30)</td>
<td>- - -</td>
<td>26030</td>
<td>float RWES</td>
</tr>
<tr>
<td><img src="Fil" alt="Fil" /></td>
<td>Process Value (1 to 16) Filter Filtering smooths out the output signal of this function block. Increase the time to increase filtering.</td>
<td>0.0 to 60.0 seconds</td>
<td>0.0</td>
<td>8270 [offset 70]</td>
<td>0x7E (126) 1 to 16 0x1A (26)</td>
<td>- - -</td>
<td>26026</td>
<td>float RWES</td>
</tr>
</tbody>
</table>

**Digital Input/Output Menu**

| ![dir](dir) ![d.dir](dir) | Digital Input/Output (1 to 12) Direction Set this function to operate as an input or output. | Output (68) ![iVol](iVol) Input Voltage (193) ![iCon](iCon) Input Dry Contact (44) | Output | 1820 [offset 30] | 0x6A (106) 1 to 12 1 | 72 | 6001 | uint RWES |

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<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Fn</em></td>
<td>Digital Output (1 to 12) Function</td>
<td>Select what function will drive this output.</td>
<td><em>OFF</em>: Off (62)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RWES</td>
</tr>
<tr>
<td></td>
<td>[Fn]</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Analog Input</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>ALM</em>: Alarm (6)</td>
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<tr>
<td></td>
<td><em>COOL</em>: Cool Power ()</td>
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<tr>
<td></td>
<td><em>HEAT</em>: Heat Power ()</td>
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<td></td>
<td><em>COMPARE</em>: Compare (230)</td>
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<td><em>COUNTER</em>: Counter (231)</td>
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<td><em>DIGITAL</em>: Digital I/O (1142)</td>
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<td><em>PROFILE EVENT OUT A</em> (233)</td>
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<td><em>PROFILE EVENT OUT B</em> (234)</td>
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<td><em>PROFILE EVENT OUT C</em> (235)</td>
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<td><em>PROFILE EVENT OUT D</em> (236)</td>
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<td><em>PROFILE EVENT OUT E</em> (247)</td>
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<td><em>PROFILE EVENT OUT F</em> (248)</td>
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<td><em>PROFILE EVENT OUT G</em> (249)</td>
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<td><em>PROFILE EVENT OUT H</em> (250)</td>
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<td></td>
<td><em>FUNCTION KEY</em> (1001)</td>
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<td><em>LINEARIZATION</em> (238)</td>
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<td><em>LOGIC</em> (239)</td>
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<td></td>
<td><em>MATH</em> (240)</td>
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<td><em>PROCESS VALUE</em> (241)</td>
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<td><em>SPECIAL FUNCTION OUT 1</em> (1532)</td>
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<td><em>SPECIAL FUNCTION OUT 2</em> (1533)</td>
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<td></td>
<td><em>SPECIAL FUNCTION OUT 3</em> (1534)</td>
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<td><em>SPECIAL FUNCTION OUT 4</em> (1535)</td>
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<td><em>TIMER</em> (244)</td>
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<td></td>
<td><em>VARIABLE</em> (245)</td>
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<tr>
<td></td>
<td><em>SOURCE ZONE</em></td>
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<td></td>
</tr>
<tr>
<td><em>Fi</em></td>
<td>Digital Output (1 to 12) Function Instance</td>
<td>Set the instance of the function selected above.</td>
<td>1 to 24</td>
<td>1</td>
<td>1830 [offset 30]</td>
<td>0x6A (106)</td>
<td>74</td>
<td>6006</td>
</tr>
<tr>
<td>[Fi]</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>Set the zone of the function selected above.</td>
<td>1842 [offset 30]</td>
<td>0x6A (106)</td>
<td>0x6C (12)</td>
<td>- - -</td>
<td>6012</td>
<td>uint RWES</td>
<td></td>
</tr>
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</thead>
<tbody>
<tr>
<td>[0.Ct]</td>
<td>Digital Output (1 to 12) Control</td>
<td></td>
<td></td>
<td>Fixed Time Base (34)</td>
<td>1822 [offset 30]</td>
<td>0x6A (106)</td>
<td>75</td>
<td>6002 [uint RWES]</td>
</tr>
<tr>
<td></td>
<td>Set the output control type. This parameter is only used with PID control, but can be set anytime.</td>
<td></td>
<td></td>
<td>Variable Time Base (103)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[0.tb]</td>
<td>Digital Output (1 to 12) Time Base</td>
<td>0.1 to 60.0 for switched DC/SSR, 5.0 to 60.0 for mechanical relays</td>
<td>1824 [offset 30]</td>
<td>0x6A (106) 1 to 12 9</td>
<td>76</td>
<td>6003 [float RWES]</td>
<td></td>
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</tr>
<tr>
<td>[0.Lo]</td>
<td>Digital Output (1 to 12) Low Power Scale</td>
<td>0.0 to 100.0</td>
<td>0.0</td>
<td>1836 [offset 30]</td>
<td>0x6A (106) 1 to 12 9</td>
<td>77</td>
<td>6009 [float RWES]</td>
<td></td>
</tr>
<tr>
<td>[0.hi]</td>
<td>Digital Output (1 to 12) High Power Scale</td>
<td>0.0 to 100.0</td>
<td>100.0</td>
<td>1838 [offset 30]</td>
<td>0x6A (106) 1 to 12 0xA (10)</td>
<td>78</td>
<td>6010 [float RWES]</td>
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</tbody>
</table>

### Action Menu

<table>
<thead>
<tr>
<th>Function</th>
<th>Function Instance</th>
<th>Range</th>
<th>Default</th>
<th>Modbus Relative Address</th>
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<th>Profibus Index</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Fn]</td>
<td>Action (1 to 24)</td>
<td>0 to 24</td>
<td>0</td>
<td>2184 [offset 20]</td>
<td>0x6E (110) 1 to 24 4</td>
<td>114</td>
<td>10004 [uint RWES]</td>
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</tr>
<tr>
<td>[Fn]</td>
<td>User Settings Restore (227)</td>
<td>None (61)</td>
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</tr>
<tr>
<td>[Fn]</td>
<td>Alarm Reset (6)</td>
<td>None (61)</td>
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<td></td>
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<tr>
<td>[Fn]</td>
<td>Silence Alarms (108)</td>
<td>None (61)</td>
<td></td>
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<tr>
<td>[Fn]</td>
<td>Control Loops Off and Alarms to Non-alarm State (220)</td>
<td>None (61)</td>
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<td></td>
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</tr>
<tr>
<td>[Fn]</td>
<td>Force Alarm to Occur (218)</td>
<td>None (61)</td>
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<tr>
<td>[Fn]</td>
<td>Idle Set Point Enable, level triggered (107)</td>
<td>None (61)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[Fn]</td>
<td>Tune, edge triggered (98)</td>
<td>None (61)</td>
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</tr>
<tr>
<td>[Fn]</td>
<td>Manual/Auto Mode, level triggered (54)</td>
<td>None (61)</td>
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<tr>
<td>[Fn]</td>
<td>Switch Control Loop Off, level triggered (90)</td>
<td>None (61)</td>
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</tr>
<tr>
<td>[Fn]</td>
<td>Remote Set Point Enable (216)</td>
<td>None (61)</td>
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<tr>
<td>[Fn]</td>
<td>TRU-TUNE+® Disable, level triggered (219)</td>
<td>None (61)</td>
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<tbody>
<tr>
<td><strong>SFNA</strong> [SFn.A]</td>
<td><strong>Action (1 to 24)</strong> <strong>Source Function A</strong> Set the event or function that will trigger the action. <strong>non</strong> None (61) <strong>RP</strong> Alarm (6) <strong>CE</strong> Compare (230) <strong>Cr</strong> Counter (231) <strong>d.i.o</strong> Digital I/O (1142) <strong>EnEA</strong> Profile Event Out A (233) <strong>EnEB</strong> Profile Event Out B (234) <strong>EnEC</strong> Profile Event Out C (235) <strong>EnED</strong> Profile Event Out D (236) <strong>EnEE</strong> Profile Event Out E (247) <strong>EnEF</strong> Profile Event Out F (248) <strong>EnEG</strong> Profile Event Out G (249) <strong>EnEH</strong> Profile Event Out H (250) <strong>Fun</strong> Function Key (1001) <strong>Lm</strong> Limit (126) <strong>Lc</strong> Logic (239) <strong>Tm</strong> Timer (244) <strong>V</strong> Variable (245)</td>
<td>None</td>
<td>2190 [offset 20]</td>
<td>0x6E (110) 1 to 24</td>
<td>- - -</td>
<td>-</td>
<td>10006 uint RWES</td>
<td></td>
</tr>
<tr>
<td><strong>5JR</strong> [Si.A]</td>
<td><strong>Action (1 to 24)</strong> <strong>Source Instance A</strong> Set the instance of the function selected above.</td>
<td>1 to 250</td>
<td>1</td>
<td>2182 [offset 20]</td>
<td>0x6E (110) 1 to 24</td>
<td>- - -</td>
<td>10002 uint RWES</td>
<td></td>
</tr>
<tr>
<td><strong>5ZA</strong> [SZ.A]</td>
<td><strong>Action (1 to 24)</strong> <strong>Source Zone A</strong> Set the zone of the function selected above.</td>
<td>0 to 16</td>
<td>0</td>
<td>2192 [offset 20]</td>
<td>0x6E (110) 1 to 24</td>
<td>- - -</td>
<td>10007 uint RWES</td>
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<tr>
<td><strong>LEw</strong> [LEv]</td>
<td><strong>Action (1 to 24)</strong> <strong>Active Level</strong> Set the action that will be considered a true state. <strong>Lo</strong> Low (53) <strong>h.g.h</strong> High (37)</td>
<td>High</td>
<td>2180 [offset 20]</td>
<td>0x6E (110) 1 to 24</td>
<td>112</td>
<td>10001 uint RWES</td>
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</tbody>
</table>

### Control Loop 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><strong>SFNA</strong> [SFn.A]</td>
<td><strong>Control Loop (1 to 16)</strong> <strong>Source Function A</strong> Set the type of function that will be used for this source. <strong>An</strong> Analog Input (142) <strong>Pr</strong> Process Value (241)</td>
<td></td>
<td></td>
<td>4156 [offset 70]</td>
<td>0x97 (151) 1 to 16 0x1D (29)</td>
<td>- - -</td>
<td>8050 uint RWE</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**
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<th>Display</th>
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<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>![Si.A]</td>
<td>Control Loop (1 to 16) Source Instance A</td>
<td>1 to 16</td>
<td>1</td>
<td>[4104] [offset 70]</td>
<td>0x97 (151) 1 to 16 3</td>
<td>62</td>
<td>8021</td>
<td>uint R</td>
</tr>
<tr>
<td>![h.Ag]</td>
<td>Control Loop (1 to 16) Heat Algorithm</td>
<td>Off (62)</td>
<td>PID (71) On-Off (64)</td>
<td>4104 [offset 70]</td>
<td>0x97 (151) 1 to 16 3</td>
<td>62</td>
<td>8003</td>
<td>uint RWES</td>
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<tr>
<td>![C.Ag]</td>
<td>Control Loop (1 to 16) Cool Algorithm</td>
<td>Off (62)</td>
<td>PID (71) On-Off (64)</td>
<td>4106 [offset 70]</td>
<td>0x97 (151) 1 to 16 4</td>
<td>63</td>
<td>8004</td>
<td>uint RWES</td>
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<tr>
<td>![C.Cr]</td>
<td>Control Loop (1 to 16) Cool Output Curve</td>
<td>Off (62)</td>
<td>Non-linear Curve 1 (214) Non-linear Curve 2 (215)</td>
<td>4108 [offset 70]</td>
<td>0x97 (151) 1 to 16 5</td>
<td>- - -</td>
<td>8038</td>
<td>uint RWES</td>
</tr>
<tr>
<td>![h.Pb]</td>
<td>Control Loop (1 to 16) Heat Proportional Band</td>
<td>0.001 to 9,999.000°F or units 0.001 to 5,555.000°C</td>
<td>25.0°F or units 14.0°C</td>
<td>4110 [offset 70]</td>
<td>0x97 (151) 1 to 16 6</td>
<td>55</td>
<td>8009</td>
<td>float RWES</td>
</tr>
<tr>
<td>![h.hy]</td>
<td>Control Loop (1 to 16) Heat Hysteresis</td>
<td>0.001 to 9,999.000°F or units 0.001 to 5,555.000°C</td>
<td>3.0°F or units 2.0°C</td>
<td>4120 [offset 70]</td>
<td>0x97 (151) 1 to 16 6</td>
<td>56</td>
<td>8010</td>
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<td>![C.Pb]</td>
<td>Control Loop (1 to 16) Cool Proportional Band</td>
<td>0.001 to 9,999.000°F or units 0.001 to 5,555.000°C</td>
<td>25.0°F or units 14.0°C</td>
<td>4112 [offset 70]</td>
<td>0x97 (151) 1 to 16 7</td>
<td>57</td>
<td>8012</td>
<td>float RWES</td>
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<tr>
<td>![C.hy]</td>
<td>Control Loop (1 to 16) Cool Hysteresis</td>
<td>0.001 to 9,999.000°F or units 0.001 to 5,555.000°C</td>
<td>3.0°F or units 2.0°C</td>
<td>4122 [offset 70]</td>
<td>0x97 (151) 1 to 16 8</td>
<td>58</td>
<td>8013</td>
<td>float RWES</td>
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<tr>
<td>![ti]</td>
<td>Control Loop (1 to 16) Time Integral</td>
<td>0 to 9,999 seconds per repeat 180 seconds per repeat</td>
<td>4114 [offset 70]</td>
<td>0x97 (151) 1 to 16 9</td>
<td>59</td>
<td>8006</td>
<td>float RWES</td>
<td></td>
</tr>
<tr>
<td>![td]</td>
<td>Control Loop (1 to 16) Time Derivative</td>
<td>0 to 9,999 seconds</td>
<td>0 seconds</td>
<td>4116 [offset 70]</td>
<td>0x97 (151) 1 to 16 9</td>
<td>60</td>
<td>8007</td>
<td>float RWES</td>
</tr>
</tbody>
</table>

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- ** These parameters/prompts are available in these menus with firmware revisions 6.0 and above.
### Display Parameter Name Description

<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>[db]</td>
<td><strong>Control Loop (1 to 16)</strong> Dead Band</td>
<td>-1,000.0 to 1,000.0 °F or units -555.556 to 555.556 °C</td>
<td>0.0</td>
<td>4118 [offset 70]</td>
<td>0x97 (151) 1 to 16 0xA (10)</td>
<td>61</td>
<td>8008 float RWES</td>
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</tr>
<tr>
<td>[t:Un]</td>
<td><strong>TRU-TUNE+™ Enable</strong></td>
<td>No (59) Yes (106)</td>
<td>No</td>
<td>4130 [offset 70]</td>
<td>0x97 (151) 1 to 16 0x10 (16)</td>
<td>- - - -</td>
<td>8022 uint RWES</td>
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</tr>
<tr>
<td>[t:bnd]</td>
<td><strong>TRU-TUNE+™ Band</strong></td>
<td>0 to 100 °F or units 0 to 55 °C</td>
<td>0</td>
<td>4132 [offset 70]</td>
<td>0x97 (151) 1 to 16 0x11 (17)</td>
<td>- - - -</td>
<td>8034 uint RWES</td>
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<tr>
<td>[t:gn]</td>
<td><strong>TRU-TUNE+™ Gain</strong></td>
<td>1 to 6</td>
<td>3</td>
<td>4134 [offset 70]</td>
<td>0x97 (151) 1 to 16 0x12 (18)</td>
<td>- - - -</td>
<td>8035 uint RWES</td>
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<tr>
<td>[A:tsP]</td>
<td><strong>Autotune Set Point</strong></td>
<td>50.0 to 200.0%</td>
<td>90.0</td>
<td>4138 [offset 70]</td>
<td>0x97 (151) 1 to 16 0x14 (20)</td>
<td>- - - -</td>
<td>8025 float RWES</td>
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<td>[t:Agr]</td>
<td><strong>Autotune Aggressiveness</strong></td>
<td>Under damped (99) Critical damped (21) Over damped (69)</td>
<td>Critical</td>
<td>4136 [offset 70]</td>
<td>0x97 (151) 1 to 16 0x13 (19)</td>
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<td>[P:dL]</td>
<td><strong>Peltier Delay</strong></td>
<td>0.0 to 5.0 seconds</td>
<td>0.0</td>
<td>4154 [offset 70]</td>
<td>0x97 (151) 1 to 16 0x1C (28)</td>
<td>- - - -</td>
<td>8051 float RWES</td>
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</tbody>
</table>

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<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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<tbody>
<tr>
<td>r.En</td>
<td>Control Loop (1 to 16) Remote Enable</td>
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<td></td>
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<td></td>
<td>R: Read</td>
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<tr>
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<td>Enable this loop to switch control to the remote set point.</td>
<td></td>
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<td></td>
<td>W: Write</td>
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<td></td>
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<td>No (59)</td>
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<td>E: EEPROM</td>
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<tr>
<td></td>
<td></td>
<td>Yes (106)</td>
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<td></td>
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<td>S: User Set</td>
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<td>SFnb</td>
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<td>None</td>
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<tr>
<td></td>
<td>Set the type of function that will be used for this source.</td>
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<td>1 to 250</td>
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<td>5266 [offset 80]</td>
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<td>0x6B (107)</td>
<td>1 to 16</td>
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<td>0x15 (21)</td>
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<tr>
<td>rY</td>
<td>Control Loop (1 to 16) Remote Set Point Type</td>
<td></td>
<td>Auto</td>
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<td>Enable this loop to switch control to the remote set point.</td>
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<td>0x6B (107)</td>
<td>1 to 16</td>
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<td>0x16 (22)</td>
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<td>UFA</td>
<td>Control Loop (1 to 16) User Failure Action</td>
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<td>User</td>
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<td>Select what the controller outputs will do when the user switches control to manual mode.</td>
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<td>5242 [offset 80]</td>
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<td>0x6B (107)</td>
<td>1 to 16</td>
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<td>RWES</td>
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</tbody>
</table>

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<th>Range</th>
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<th>Modbus Relative Address</th>
<th>CIP Class</th>
<th>Instance</th>
<th>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><strong>FAIL</strong></td>
<td><strong>Control Loop (1 to 16)</strong> Input Error Failure</td>
<td>Off, sets output power to 0% (62)</td>
<td>User</td>
<td>5244 [offset 80]</td>
<td>0x6B (107) 1 to 16 0x0D (13)</td>
<td>- - - -</td>
<td>7013</td>
<td>uint RWES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bumpless transfer maintains same output power, if it was less than 75% and stable, otherwise</td>
<td>Manual power sets output power to Manual Power setting (33)</td>
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<tr>
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<td>User sets output power to last open-loop set point the user entered (100)</td>
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<tr>
<td><strong>MAn</strong></td>
<td>Control Loop (1 to 16) Manual Power</td>
<td>Set Point Open Loop Limit Low to Set Point Open Loop Limit High (Setup Page)</td>
<td>0.0</td>
<td>5240 [offset 80]</td>
<td>0x6B (107) 1 to 16 0x0B (11)</td>
<td>- - - -</td>
<td>7011</td>
<td>float RWES</td>
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</tr>
<tr>
<td><strong>LDE</strong></td>
<td>Control Loop (1 to 16) Open Loop Detect Enable</td>
<td>No (59)</td>
<td>No</td>
<td>4142 [offset 70]</td>
<td>0x97 (151) 1 to 16 0x16 (22)</td>
<td>64</td>
<td>8039</td>
<td>uint RWES</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Yes (106)</td>
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<td></td>
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</tr>
<tr>
<td><strong>Ldt</strong></td>
<td>Control Loop (1 to 16) Open Loop Detect Time</td>
<td>0 to 3,600 seconds</td>
<td>240</td>
<td>4144 [offset 70]</td>
<td>0x97 (151) 1 to 16 0x17 (23)</td>
<td>65</td>
<td>8040</td>
<td>uint RWES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ldd</strong></td>
<td>Control Loop (1 to 16) Open Loop Detect Deviation</td>
<td>-1,999,000.000°F or units -1,110.555 to 5,555.000°C</td>
<td>10.0°F or units 6.0°C</td>
<td>4146 [offset 70]</td>
<td>0x97 (151) 1 to 16 0x18 (24)</td>
<td>66</td>
<td>8041</td>
<td>float RWES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>rP</strong></td>
<td>Control Loop (1 to 16) Ramp Action</td>
<td>Off (62)</td>
<td>Off</td>
<td>5246 [offset 80]</td>
<td>0x6B (107) 1 to 16 0x0E (14)</td>
<td>- - - -</td>
<td>7014</td>
<td>uint RWES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Startup (88)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Set Point Change (1647)</td>
<td>Both (13)</td>
<td>Both</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SC</strong></td>
<td>Control Loop (1 to 16) Ramp Scale</td>
<td>Hours (39) Minutes (57)</td>
<td>Minutes</td>
<td>5248 [offset 80]</td>
<td>0x6B (107) 1 to 16 0x0F (15)</td>
<td>- - - -</td>
<td>7015</td>
<td>uint RWES</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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## RM High Density Module • Setup Page

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<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><code>c.r.ε</code> [r.r.t]</td>
<td>Control Loop (1 to 16) Ramp Rate</td>
<td>0.0 to 9,999.000°F or units 0.0 to 5,555.000°C</td>
<td>1.0°F or units 1.0°C</td>
<td>5252</td>
<td>0x6B (107) 1 to 16 0x11 (17)</td>
<td>- - -</td>
<td>7017</td>
<td>float RWES</td>
</tr>
<tr>
<td><code>L.S.P</code> [L.SP]</td>
<td>Control Loop (1 to 16) Set Point Closed Low Limit</td>
<td>-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C</td>
<td>-1,999°F or units -1,128°C</td>
<td>5224</td>
<td>0x6B (107) 1 to 16 3</td>
<td>52</td>
<td>7003</td>
<td>float RWES</td>
</tr>
<tr>
<td><code>h.S.P</code> [h.SP]</td>
<td>Control Loop (1 to 16) Set Point Closed Limit High</td>
<td>-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C</td>
<td>-1,999°F or units -1,128°C</td>
<td>5226</td>
<td>0x6B (107) 1 to 16 4</td>
<td>53</td>
<td>7004</td>
<td>float RWES</td>
</tr>
<tr>
<td><code>C.S.P</code> [C.SP]</td>
<td>Control Loop (1 to 16) Closed Loop Set Point</td>
<td>Low Set Point to High Set Point (Setup Page)</td>
<td>75.0°F or units 24.0°C</td>
<td>5220</td>
<td>0x6B (107) 1 to 16 1</td>
<td>49</td>
<td>7001</td>
<td>float RWES</td>
</tr>
<tr>
<td><code>i.d.S</code> [id.S]</td>
<td>Control Loop (1 to 16) Idle Set Point</td>
<td>Low Set Point to High Set Point (Setup Page)</td>
<td>75.0°F or units 24.0°C</td>
<td>5236</td>
<td>0x6B (107) 1 to 16 9</td>
<td>50</td>
<td>7009</td>
<td>float RWES</td>
</tr>
<tr>
<td><code>S.P.L.O</code> [SP.Lo]</td>
<td>Control Loop (1 to 16) Set Point Open Limit Low</td>
<td>-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C</td>
<td>-1,999°F or units -1,128°C</td>
<td>5228</td>
<td>0x6B (107) 1 to 16 5</td>
<td>52</td>
<td>7005</td>
<td>float RWES</td>
</tr>
<tr>
<td><code>S.P.h.I</code> [SP.hi]</td>
<td>Control Loop (1 to 16) Set Point Open Limit High</td>
<td>-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C</td>
<td>-1,999°F or units -1,128°C</td>
<td>5230</td>
<td>0x6B (107) 1 to 16 6</td>
<td>53</td>
<td>7006</td>
<td>float RWES</td>
</tr>
<tr>
<td><code>a.S.P</code> [o.SP]</td>
<td>Control Loop (1 to 16) Open Loop Set Point</td>
<td>-100.0 to 100.0%</td>
<td>0.0</td>
<td>5222</td>
<td>0x6B (107) 1 to 16 2</td>
<td>51</td>
<td>7002</td>
<td>float RWES</td>
</tr>
<tr>
<td><code>C.M</code> [C.M]</td>
<td>Control Loop (1 to 16) Control Mode</td>
<td>Off (62) Auto (10) Manual (54)</td>
<td>Auto</td>
<td>4100</td>
<td>0x97 (151) 1 to 16 1</td>
<td>63</td>
<td>8001</td>
<td>uint RWES</td>
</tr>
</tbody>
</table>

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### Output Menu

**Function**: Select what function will drive this output.

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>OFF</code></td>
<td>Off (62)</td>
</tr>
<tr>
<td><code>R</code></td>
<td>Analog Input</td>
</tr>
<tr>
<td><code>ST</code></td>
<td>Cool Power (161)</td>
</tr>
<tr>
<td><code>TH</code></td>
<td>Heat Power (160)</td>
</tr>
<tr>
<td><code>CP</code></td>
<td>Compare (230)</td>
</tr>
<tr>
<td><code>CT</code></td>
<td>Counter (231)</td>
</tr>
<tr>
<td><code>d</code></td>
<td>Digital I/O (1142)</td>
</tr>
<tr>
<td><code>ENTR</code></td>
<td>Profile Event Out A (233)</td>
</tr>
<tr>
<td><code>ENTB</code></td>
<td>Profile Event Out B (234)</td>
</tr>
<tr>
<td><code>ENTC</code></td>
<td>Profile Event Out C (235)</td>
</tr>
<tr>
<td><code>ENTD</code></td>
<td>Profile Event Out D (236)</td>
</tr>
<tr>
<td><code>ENTE</code></td>
<td>Profile Event Out E (247)</td>
</tr>
<tr>
<td><code>ENTF</code></td>
<td>Profile Event Out F (248)</td>
</tr>
<tr>
<td><code>ENTG</code></td>
<td>Profile Event Out G (249)</td>
</tr>
<tr>
<td><code>ENTH</code></td>
<td>Profile Event Out H (250)</td>
</tr>
<tr>
<td><code>FUN</code></td>
<td>Function Key (1001)</td>
</tr>
<tr>
<td><code>LIN</code></td>
<td>Linearization (238)</td>
</tr>
<tr>
<td><code>LOC</code></td>
<td>Logic (239)</td>
</tr>
<tr>
<td><code>MAT</code></td>
<td>Math (240)</td>
</tr>
<tr>
<td><code>PV</code></td>
<td>Process Value (241)</td>
</tr>
<tr>
<td><code>SF1</code></td>
<td>Special Function Output 1 (1532)</td>
</tr>
<tr>
<td><code>SF2</code></td>
<td>Special Function Output 2 (1533)</td>
</tr>
<tr>
<td><code>SF3</code></td>
<td>Special Function Output 3 (1534)</td>
</tr>
<tr>
<td><code>SF4</code></td>
<td>Special Function Output 4 (1535)</td>
</tr>
<tr>
<td><code>TMR</code></td>
<td>Timer (244)</td>
</tr>
<tr>
<td><code>VAR</code></td>
<td>Variable (245)</td>
</tr>
</tbody>
</table>

**Function Instance**: Set the instance of the function selected above.

<table>
<thead>
<tr>
<th>Instance</th>
<th>1 to 24</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>1</td>
<td>1</td>
<td>1830</td>
<td>0x6A (106)</td>
<td>1 to 12</td>
<td>73</td>
<td>6005</td>
<td>uint RWES</td>
</tr>
</tbody>
</table>

**Source Zone A**: Set the instance of the function selected above.

<table>
<thead>
<tr>
<th>Instance</th>
<th>1 to 16</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>1</td>
<td>0</td>
<td>1842</td>
<td>0x6A (106)</td>
<td>1 to 12</td>
<td>73</td>
<td>6005</td>
<td>uint RWES</td>
</tr>
</tbody>
</table>

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<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>[o.Ct]</td>
<td>Output Digital (1 to 12) Control</td>
<td>Fixed Time Base (34)</td>
<td>1822</td>
<td>0x6A (106) 1 to 12 2</td>
<td>75</td>
<td>6002</td>
<td>uint RWES</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Variable Time Base (103)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[o.tb]</td>
<td>Output Digital (1 to 12) Time Base</td>
<td>0.1 to 60.0 seconds (solid-state relay or switched dc) 5.0 to 60.0 seconds (mechanical relay or no-arc power control)</td>
<td>1824</td>
<td>0x6A (106) 1 to 12 3</td>
<td>76</td>
<td>6003</td>
<td>float RWES</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.1 sec. [SSR &amp; sw dc] 20.0 sec. [mech, relay, no-arc]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[o.Lo]</td>
<td>Output Digital (1 to 12) Low Power Scale</td>
<td>0.0 to 100.0%</td>
<td>1836</td>
<td>0x6A (106) 1 to 12 9</td>
<td>77</td>
<td>6009</td>
<td>float RWES</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[o.hi]</td>
<td>Output Digital (1 to 12) High Power Scale</td>
<td>0.0 to 100.0%</td>
<td>1838</td>
<td>0x6A (106) 1 to 12 0A (10)</td>
<td>78</td>
<td>6010</td>
<td>float RWES</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[o.ty]</td>
<td>Output Process (1 to 3, 7 to 9) Type **</td>
<td>Volts (104)</td>
<td>16540</td>
<td>0x76 (118) 1-3, 7-9 1</td>
<td>- - - -</td>
<td>18001</td>
<td>uint RWES</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Milliamps (112)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
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<th>Profibus Index</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Fn]</td>
<td><strong>Output Process (1 to 3, 7 to 9)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
|        | **Function** **  
Set the type of function that will drive this output.** |       |         | Off (62) | 16542 [offset 60] | 0x76 (118) 1-3, 7-9 2 | - - - - | 18002 | uint RWES |
|        | **R** | Analog Input (142) | Current (22) | 0x76 (118) 1-3, 7-9 4 | 18004 | uint RWES |
|        | **AG** | Analog Input (142) | Voltage (22) | 0x76 (118) 1-3, 7-9 4 | 18004 | uint RWES |
|        | **CP** | Cool Power, Control Loop (161) | 0x76 (118) 1-3, 7-9 4 | 18004 | uint RWES |
|        | **HP** | Heat Power, Control Loop (160) | 0x76 (118) 1-3, 7-9 4 | 18004 | uint RWES |
|        | **PW** | Power, Control Loop (73) | 0x76 (118) 1-3, 7-9 4 | 18004 | uint RWES |
|        | **LR** | Linearization (238) | 0x76 (118) 1-3, 7-9 4 | 18004 | uint RWES |
|        | **BA** | Math (240) | 0x76 (118) 1-3, 7-9 4 | 18004 | uint RWES |
|        | **PI** | Set Point Closed, Control Loop (242) | 0x76 (118) 1-3, 7-9 4 | 18004 | uint RWES |
|        | **PO** | Set Point Open, Control Loop (243) | 0x76 (118) 1-3, 7-9 4 | 18004 | uint RWES |
|        | **SO1** | Special Function Output 1 (1532) | 0x76 (118) 1-3, 7-9 4 | 18004 | uint RWES |
|        | **SO2** | Special Function Output 2 (1533) | 0x76 (118) 1-3, 7-9 4 | 18004 | uint RWES |
|        | **SO3** | Special Function Output 3 (1534) | 0x76 (118) 1-3, 7-9 4 | 18004 | uint RWES |
|        | **SO4** | Special Function Output 4 (1535) | 0x76 (118) 1-3, 7-9 4 | 18004 | uint RWES |
|        | **VR** | Variable (245) | 0x76 (118) 1-3, 7-9 4 | 18004 | uint RWES |
|        | [Fi]   | **Output Process (1 to 3, 7 to 9)** | Function Instance **  
Set the instance of the function selected above.** | 1 to 24 | 16546 [offset 60] | 0x76 (118) 1-3, 7-9 4 | - - - - | 18004 | uint RWES |
|        | **SRZ** | **Output Process (1 to 3, 7 to 9)** | Source Zone A **  
Set the zone of the function selected above.** | 0 to 16 | 16556 [offset 60] | 0x76 (118) 1-3, 7-9 9 | - - - - | 18019 | uint RWES |
|        | **SL** | **Output Process (1 to 3, 7 to 9)** | Scale Low **  
Set the scale low for process output in electrical units. This value, in volts or milliamps, will correspond to 0% PID power output or range low value.** | -100.0 to 100.0 | 16556 [offset 60] | 0x76 (118) 1-3, 7-9 9 | - - - - | 18009 | float RWES |
|        | **SH** | **Output Process (1 to 3, 7 to 9)** | Scale High **  
Set the scale high for process output in electrical units. This value, in volts or milliamps, will correspond to 100% PID power output or range high value.** | -100.0 to 100.0 | 16558 [offset 60] | 0x76 (118) 1-3, 7-9 0xA (10) | - - - - | 18010 | float RWES |

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<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>rLo</td>
<td>Output Process (1 to 3, 7 to 9) Range Low **</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°C</td>
<td>16560 [offset 60]</td>
<td>0x76 (118) 1-3, 7-9 0xB (11)</td>
<td>- - -</td>
<td>18011</td>
<td>float RWES</td>
</tr>
<tr>
<td>rLn</td>
<td>Output Process (1 to 3, 7 to 9) Range High **</td>
<td>-1,999,000 to 9,999,000°F or units -1,128,000 to 5,537,000°C</td>
<td>100°F or units 38°C</td>
<td>16562 [offset 60]</td>
<td>0x76 (118) 1-3, 7-9 0xC (12)</td>
<td>- - -</td>
<td>18012</td>
<td>float RWES</td>
</tr>
<tr>
<td>oCA</td>
<td>Output Process (1 to 3, 7 to 9) Calibration Offset **</td>
<td>-1,999,000 to 9,999,000°F or units -1,110,000 to 5,555,000°C</td>
<td>0.0°F or units 0.0°C</td>
<td>16552 [offset 60]</td>
<td>0x76 (118) 1-3, 7-9 7</td>
<td>- - -</td>
<td>18007</td>
<td>float RWES</td>
</tr>
</tbody>
</table>

### Alarm Menu

<table>
<thead>
<tr>
<th>...4</th>
<th>Alarm (1 to 24)</th>
<th>Alarm Type</th>
<th>Select whether the alarm trigger is a fixed value or will track the set point.</th>
</tr>
</thead>
<tbody>
<tr>
<td>...4</td>
<td>Alarm (1 to 24)</td>
<td>Deviation Alarm (24)</td>
<td>Off (62)</td>
</tr>
<tr>
<td>...4</td>
<td>Alarm (1 to 24)</td>
<td>Process Alarm (76)</td>
<td>Off</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>...4</th>
<th>Alarm (1 to 24)</th>
<th>Analog Input (142)</th>
<th>Off (61)</th>
</tr>
</thead>
<tbody>
<tr>
<td>...4</td>
<td>Alarm (1 to 24)</td>
<td>Current (22)</td>
<td>Off (60)</td>
</tr>
<tr>
<td>...4</td>
<td>Alarm (1 to 24)</td>
<td>Power, Control Loop (73)</td>
<td>Off (59)</td>
</tr>
<tr>
<td>...4</td>
<td>Alarm (1 to 24)</td>
<td>Linearization (238)</td>
<td>Off (58)</td>
</tr>
<tr>
<td>...4</td>
<td>Alarm (1 to 24)</td>
<td>Math (240)</td>
<td>Off (57)</td>
</tr>
<tr>
<td>...4</td>
<td>Alarm (1 to 24)</td>
<td>Process Value (241)</td>
<td>Off (56)</td>
</tr>
<tr>
<td>...4</td>
<td>Alarm (1 to 24)</td>
<td>Variable (245)</td>
<td>Off (55)</td>
</tr>
<tr>
<td>...4</td>
<td>Alarm (1 to 24)</td>
<td>Current Read (179)</td>
<td>Off (54)</td>
</tr>
</tbody>
</table>

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<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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### Linearization Menu

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Watlow EZ-ZONE® RMH Module  •  71  •  Chapter 4 Setup Page
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<td>-1,999.000 to 9,999.000 °F or units</td>
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<td>14396 [offset 70]</td>
<td>0x86 (134) 1 to 24 9</td>
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<td>-1,999.000 to 9,999.000 °F or units</td>
<td>1.0</td>
<td>14416 [offset 70]</td>
<td>0x86 (134) 1 to 24 0xA (19)</td>
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<td>Input Point 3</td>
<td>-1,999.000 to 9,999.000 °F or units</td>
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<td>14398 [offset 70]</td>
<td>0x86 (134) 1 to 24 0xA (10)</td>
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<td>Output Point 3</td>
<td>-1,999.000 to 9,999.000 °F or units</td>
<td>2.0</td>
<td>14418 [offset 70]</td>
<td>0x86 (134) 1 to 24 0xC (20)</td>
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<td>Input Point 4</td>
<td>-1,999.000 to 9,999.000 °F or units</td>
<td>3.0</td>
<td>14400 [offset 70]</td>
<td>0x86 (134) 1 to 24 0x15 (21)</td>
<td>128</td>
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<td>Output Point 4</td>
<td>-1,999.000 to 9,999.000 °F or units</td>
<td>3.0</td>
<td>14420 [offset 70]</td>
<td>0x86 (134) 1 to 24 0xC (21)</td>
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<td>Input Point 5</td>
<td>-1,999.000 to 9,999.000 °F or units</td>
<td>4.0</td>
<td>14402 [offset 70]</td>
<td>0x86 (134) 1 to 24 0xC (12)</td>
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<td>Output Point 5</td>
<td>-1,999.000 to 9,999.000 °F or units</td>
<td>4.0</td>
<td>14422 [offset 70]</td>
<td>0x86 (134) 1 to 24 0xC (22)</td>
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<td>Input Point 6</td>
<td>-1,999.000 to 9,999.000 °F or units</td>
<td>5.0</td>
<td>14404 [offset 70]</td>
<td>0x86 (134) 1 to 24 0xD (13)</td>
<td>132</td>
<td>34013</td>
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<td>Output Point 6</td>
<td>-1,999.000 to 9,999.000 °F or units</td>
<td>5.0</td>
<td>14424 [offset 70]</td>
<td>0x86 (134) 1 to 24 0xD (23)</td>
<td>133</td>
<td>34023</td>
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<td>Linearization (1 to 24)</td>
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<td></td>
<td>Input Point 7</td>
<td>-1,999.000 to 9,999.000 °F or units</td>
<td>6.0</td>
<td>14406 [offset 70]</td>
<td>0x86 (134) 1 to 24 E (14)</td>
<td>134</td>
<td>34014</td>
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<td></td>
<td>Output Point 7</td>
<td>-1,999.000 to 9,999.000 °F or units</td>
<td>6.0</td>
<td>14426 [offset 70]</td>
<td>0x86 (134) 1 to 24 0x18 (24)</td>
<td>135</td>
<td>34024</td>
<td>float RWES</td>
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</tbody>
</table>

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** These parameters/prompts are available in these menus with firmware revisions 6.0 and above.
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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</th>
<th>Instance</th>
<th>Attribute hex (dec)</th>
<th>Profibus Index</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
</table>
| ![ip.8] | **Linearization (1 to 24)** Input Point 8  
Set the value that will be mapped to output 8. | -1,999,000 to 9,999,000 °F or units  
-1,128.333 to 5537.223 °C | 7.0 | 14408 [offset 70] | 0x86 (134)  
1 to 24  
0x1F (15) | 136 | 34015 | float RWES |
| ![op.8] | **Linearization (1 to 24)** Output Point 8  
Set the value that will be mapped to input 8. | -1,999,000 to 9,999,000 °F or units  
-1,128.333 to 5537.223 °C | 7.0 | 14428 [offset 70] | 0x86 (134)  
1 to 24  
0x19 (25) | 137 | 34025 | float RWES |
| ![ip.9] | **Linearization (1 to 24)** Input Point 9  
Set the value that will be mapped to output 9. | -1,999,000 to 9,999,000 °F or units  
-1,128.333 to 5537.223 °C | 8.0 | 14410 [offset 70] | 0x86 (134)  
1 to 24  
0x10 (16) | 138 | 34016 | float RWES |
| ![op.9] | **Linearization (1 to 24)** Output Point 9  
Set the value that will be mapped to input 9. | -1,999,000 to 9,999,000 °F or units  
-1,128.333 to 5537.223 °C | 8.0 | 14430 [offset 70] | 0x86 (134)  
1 to 24  
0x1A (26) | 139 | 34026 | float RWES |
| ![ip.10] | **Linearization (1 to 24)** Input Point 10  
Set the value that will be mapped to output 10. | -1,999,000 to 9,999,000 °F or units  
-1,128.333 to 5537.223 °C | 9.0 | 14412 [offset 70] | 0x86 (134)  
1 to 24  
0x11 (17) | 140 | 34017 | float RWES |
| ![op.10] | **Linearization (1 to 24)** Output Point 10  
Set the value that will be mapped to input 10. | -1,999,000 to 9,999,000 °F or units  
-1,128.333 to 5537.223 °C | 9.0 | 14432 [offset 70] | 0x86 (134)  
1 to 24  
0x1B (27) | 141 | 34027 | float RWES |

### Compare Menu

| ![Fn] | **Compare (1 to 24)** Function  
Set operator that will be used to compare Source A to Source B. | ![FF] Off (62)  
![GT] Greater Than (1435)  
![LT] Less Than (1436)  
![EQ] Equal To (1437)  
![NE] Not Equal To (1438)  
![GE] Greater or Equal (1439)  
![LE] Less or Equal (1440) | ![FF] Off (62) | Off | 11276 [offset 40] | 0x80 (128)  
1 to 24  
9 | 171 | 28009 | uint RWES |
| ![toL] | **Compare (1 to 24)** Tolerance  
If the difference between Source A and Source B is less than this value the two will appear to be equal. | 0 to 9,999,000 | 0.1 | 11280 [offset 40] | 0x80 (128)  
1 to 24  
0xB (11) | 172 | 28011 | float RWES |

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<th>Parameter Name Description</th>
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<th>Default</th>
<th>Modbus Relative Address</th>
<th>CIP Class</th>
<th>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><strong>SFnR</strong> [SFn.A]</td>
<td><strong>Source Function A</strong></td>
<td>None (61)</td>
<td>None</td>
<td>0x80 (128) 1 to 24</td>
<td>11262 [offset 40]</td>
<td></td>
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<td></td>
<td>28002 <strong>uint RWES</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Source Instance A</strong></td>
<td>1 to 250</td>
<td>1</td>
<td>0x80 (128) 1 to 24</td>
<td>11264 [offset 40]</td>
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<td>28003 <strong>uint RWES</strong></td>
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<tr>
<td></td>
<td><strong>Source Zone A</strong></td>
<td>0 to 16</td>
<td>0</td>
<td>0x80 (128) 1 to 24</td>
<td>11268 [offset 40]</td>
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<td>28005 <strong>uint RWES</strong></td>
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<tr>
<td><strong>SFnb</strong> [SFnb.b]</td>
<td><strong>Source Function B</strong></td>
<td>None (61)</td>
<td>None</td>
<td>0x80 (128) 1 to 24</td>
<td>11262 [offset 40]</td>
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<td>28002 <strong>uint RWES</strong></td>
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<tr>
<td></td>
<td><strong>Source Instance B</strong></td>
<td>1 to 250</td>
<td>1</td>
<td>0x80 (128) 1 to 24</td>
<td>11266 [offset 40]</td>
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<td>28004 <strong>uint RWES</strong></td>
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<tr>
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<td><strong>Source Zone B</strong></td>
<td>0 to 16</td>
<td>0</td>
<td>0x80 (128) 1 to 24</td>
<td>11270 [offset 40]</td>
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<td>28006 <strong>uint RWES</strong></td>
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</tbody>
</table>

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<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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<tbody>
<tr>
<td><strong>Er.h</strong></td>
<td>Compare (1 to 24) <strong>Error Handling</strong> Select output value and error output state when compare cannot be processed</td>
<td><strong>k</strong> True Good (1476)</td>
<td>False Bad</td>
<td>11282 [offset 40]</td>
<td>0x80 (128) 1 to 24 0xC (12)</td>
<td>- - -</td>
<td>28012</td>
<td>uint RWES</td>
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<tr>
<td></td>
<td><strong>k.b</strong> True Bad (1477)</td>
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<td><strong>f.G</strong> False Good (1478)</td>
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<td><strong>f.b</strong> False Bad (1479)</td>
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<td><strong>E.r</strong></td>
<td><strong>5E.k</strong> <strong>Timer Menu</strong></td>
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<tr>
<td><strong>Fn</strong></td>
<td>**Timer (1 to 24) <strong>Function</strong> Set how the timer will function.</td>
<td><strong>aFF</strong> Off (62)</td>
<td>Off</td>
<td>13196 [offset 50]</td>
<td>0x83 (131) 1 to 24 9</td>
<td>165</td>
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<td><strong>aP</strong> On Pulse (1471)</td>
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<td><strong>dEL</strong> Delay (1472)</td>
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<td><strong>a5</strong> One Shot (1473)</td>
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<td><strong>rEk</strong> Retentive (1474)</td>
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<td><strong>Sn.R</strong></td>
<td><strong>SFn.A</strong> <strong>Source Function A</strong> Set the type of function that will be used for this source (run signal).</td>
<td><strong>nOnE</strong> None (61)</td>
<td>None</td>
<td>13180 [offset 50]</td>
<td>0x83 (131) 1 to 24 1</td>
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<td><strong>En.EA</strong> Profile Event Out A (233)</td>
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<td><strong>En.EE</strong> Profile Event Out E (247)</td>
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<td><strong>En.EF</strong> Profile Event Out F (248)</td>
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<td><strong>En.EG</strong> Profile Event Out G (249)</td>
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<td><strong>LG</strong> Logic (239)</td>
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<td><strong>Sf.E1</strong> Special Function Output 1 (1532)</td>
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<td><strong>Sf.E2</strong> Special Function Output 2 (1533)</td>
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<td><strong>Sf.E3</strong> Special Function Output 3 (1534)</td>
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<td><strong>Sf.E4</strong> Special Function Output 4 (1535)</td>
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<td><strong>uAr</strong> Variable (245)</td>
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<tr>
<td><strong>Sn.A</strong></td>
<td>**Timer (1 to 4) <strong>Source Instance A</strong> Set the instance of the function selected above.</td>
<td>1 to 250</td>
<td>1</td>
<td>13184 [offset 50]</td>
<td>0x83 (131) 1 to 24 3</td>
<td>- - -</td>
<td>31003</td>
<td>uint RWES</td>
</tr>
</tbody>
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<th>Data Type &amp; Read/Write</th>
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</thead>
<tbody>
<tr>
<td>52A [SZ.A]</td>
<td>Timer (1 to 4) Source Zone A</td>
<td>0 to 16</td>
<td>0</td>
<td>13188 [offset 50]</td>
<td>0x83 (131) 1 to 24 5</td>
<td>- - -</td>
<td>31005</td>
<td>uint RWES</td>
</tr>
<tr>
<td>53A [SAS.A]</td>
<td>Timer (1 to 4) Source Active State A</td>
<td>High (37) Low (53)</td>
<td>High</td>
<td>13200 [offset 50]</td>
<td>0x83 (131) 1 to 24 0xB (11)</td>
<td>- - -</td>
<td>31011</td>
<td>uint RWES</td>
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<tr>
<td>5.b [Si.b]</td>
<td>Timer (1 to 24) Source Instance B</td>
<td>1 to 250</td>
<td>1</td>
<td>13186 [offset 50]</td>
<td>0x83 (131) 1 to 24 4</td>
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<td>31004</td>
<td>uint RWES</td>
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<tr>
<td>52b [SZ.b]</td>
<td>Timer (1 to 24) Source Zone B</td>
<td>0 to 16</td>
<td>0</td>
<td>13190 [offset 50]</td>
<td>0x83 (131) 1 to 24 6</td>
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<td>31006</td>
<td>uint RWES</td>
</tr>
</tbody>
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<tbody>
<tr>
<td>5Rsb</td>
<td>Timer (1 to 24)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>uint RWES</td>
</tr>
<tr>
<td></td>
<td>Source Active State B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>uint RWES</td>
</tr>
<tr>
<td></td>
<td>Set what state will be read as on.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>8e</td>
<td>Timer (1 to 24)</td>
<td>0.0 to 9,999.0</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>float RWES</td>
</tr>
<tr>
<td></td>
<td>Time</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Set the time span that will be measured.</td>
<td></td>
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</tr>
<tr>
<td>LEu</td>
<td>Timer (1 to 24)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>uint RWES</td>
</tr>
<tr>
<td></td>
<td>Source Active State B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>uint RWES</td>
</tr>
<tr>
<td></td>
<td>Set which output state will indicate on.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Ckr</td>
<td>Counter Menu</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Counter (1 to 24)</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Function</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Set whether the counter increments or decrements the count value. Decrementing 0 returns 9,999. Incrementing 9,999 returns 0.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sfn.A</td>
<td>Source Function A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>uint RWES</td>
</tr>
<tr>
<td></td>
<td>Set the type of function that will be used for the counter clock signal.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sb.A</td>
<td>Counter (1 to 24)</td>
<td>1 to 250</td>
<td>1</td>
<td>12224 [offset 40]</td>
<td>0x82 (130) 1 to 24 9</td>
<td></td>
<td></td>
<td>uint RWES</td>
</tr>
<tr>
<td></td>
<td>Source Instance A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Set the instance of the function selected above.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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</tr>
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<tr>
<td><code>[SZ.A]</code></td>
<td><strong>Counter (1 to 24)</strong> Source Zone A</td>
<td>Set the zone of the function selected above.</td>
<td>0 to 16</td>
<td>0</td>
<td><code>1</code></td>
<td><code>30005</code></td>
<td>uint RWES</td>
<td></td>
</tr>
<tr>
<td><code>[SAS.A]</code></td>
<td><strong>Counter (1 to 24)</strong> Source Active State A</td>
<td>Set what output state will indicate on.</td>
<td>High</td>
<td>12240</td>
<td><code>30011</code></td>
<td>uint RWES</td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>[SFn.b]</code></td>
<td><strong>Counter (1 to 24)</strong> Source Function B</td>
<td>Set the type of function that will be used for the counter load signal.</td>
<td>None</td>
<td>12222</td>
<td><code>30002</code></td>
<td>uint RWES</td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>[Si.b]</code></td>
<td><strong>Counter (1 to 24)</strong> Source Instance B</td>
<td>Set the instance of the function selected above.</td>
<td>1 to 250</td>
<td>1</td>
<td><code>12226</code></td>
<td><code>30004</code></td>
<td>uint RWES</td>
<td></td>
</tr>
<tr>
<td><code>[SZ.b]</code></td>
<td><strong>Counter (1 to 24)</strong> Source Zone B</td>
<td>Set the zone of the function selected above.</td>
<td>0 to 16</td>
<td>0</td>
<td><code>12230</code></td>
<td><code>30006</code></td>
<td>uint RWES</td>
<td></td>
</tr>
<tr>
<td><code>[SAS.b]</code></td>
<td><strong>Counter (1 to 24)</strong> Source Active State B</td>
<td>Set what output state will indicate on.</td>
<td>High</td>
<td>12242</td>
<td><code>30012</code></td>
<td>uint RWES</td>
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</tr>
<tr>
<td><code>[LoAd]</code></td>
<td><strong>Counter (1 to 24)</strong> Load Value</td>
<td>Set the counter’s initial value.</td>
<td>0 to 9,999</td>
<td>0</td>
<td><code>12244</code></td>
<td><code>30013</code></td>
<td>uint RWES</td>
<td></td>
</tr>
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<tbody>
<tr>
<td>[trgt]</td>
<td><strong>Counter (1 to 24)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RWES</td>
</tr>
<tr>
<td></td>
<td><strong>Target Value</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RWES</td>
</tr>
<tr>
<td></td>
<td>Set the value that will turn the output value on.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RWES</td>
</tr>
<tr>
<td>[offset 40]</td>
<td><strong>Counter (1 to 24)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RWES</td>
</tr>
<tr>
<td></td>
<td><strong>Latching</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RWES</td>
</tr>
<tr>
<td></td>
<td>If enabled, output will latch when count equals target value.</td>
<td></td>
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<td></td>
<td></td>
<td>RWES</td>
</tr>
<tr>
<td>[offset 40]</td>
<td><strong>Logic (1 to 24)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RWES</td>
</tr>
<tr>
<td></td>
<td><strong>Function</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RWES</td>
</tr>
<tr>
<td></td>
<td>Set the operator that will be used to compare the sources.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>RWES</td>
</tr>
<tr>
<td></td>
<td><strong>OFF</strong></td>
<td>Off (62)</td>
<td></td>
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<td></td>
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<td>RWES</td>
</tr>
<tr>
<td></td>
<td><strong>And</strong></td>
<td>And (1426)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>RWES</td>
</tr>
<tr>
<td></td>
<td><strong>Nand</strong></td>
<td>Nand (1427)</td>
<td></td>
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<td>RWES</td>
</tr>
<tr>
<td></td>
<td><strong>Or</strong></td>
<td>Or (1442)</td>
<td></td>
<td></td>
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<td></td>
<td>RWES</td>
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<tr>
<td></td>
<td><strong>Nor</strong></td>
<td>Nor (1443)</td>
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<td></td>
<td></td>
<td>RWES</td>
</tr>
<tr>
<td></td>
<td><strong>Equal To</strong></td>
<td>Equal To (1437)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>RWES</td>
</tr>
<tr>
<td></td>
<td><strong>Not Equal To</strong></td>
<td>Not Equal To (1438)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>RWES</td>
</tr>
<tr>
<td></td>
<td><strong>Latch</strong></td>
<td>Latch (1444)</td>
<td></td>
<td></td>
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<td>RWES</td>
</tr>
<tr>
<td></td>
<td><strong>RS Flip-Flop</strong></td>
<td>RS Flip-Flop (1693)</td>
<td></td>
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<td></td>
<td></td>
<td>RWES</td>
</tr>
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<tr>
<td>SFnA</td>
<td>Logic (1 to 24) Source Function A Set the type of function that will be used for this source.</td>
<td>None (61)</td>
<td>None</td>
<td>9340 (offset 80)</td>
<td>0x7F (127)</td>
<td>1 to 24</td>
<td>27001</td>
<td>uint RWES</td>
</tr>
<tr>
<td>SFnA</td>
<td>Logic (1 to 24) Source Instance A Set the instance of the function selected above.</td>
<td>1 to 250</td>
<td>1</td>
<td>9356 (offset 80)</td>
<td>0x7F (127)</td>
<td>1 to 24</td>
<td>27009</td>
<td>uint RWES</td>
</tr>
<tr>
<td>SZnA</td>
<td>Logic (1 to 24) Source Zone A Set the zone of the function selected above.</td>
<td>0 to 16</td>
<td>0</td>
<td>9372 (offset 80)</td>
<td>0x7F (127)</td>
<td>1 to 24</td>
<td>27017</td>
<td>uint RWES</td>
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<tbody>
<tr>
<td>&lt;i&gt;SFn.b&lt;/i&gt;</td>
<td>Logic (1 to 24) &lt;br&gt;&lt;b&gt;Source B Function&lt;/b&gt;&lt;br&gt;Set the type of function that will be used for this source.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>&lt;i&gt;5_Sb&lt;/i&gt;</td>
<td>Logic (1 to 24) &lt;br&gt;&lt;b&gt;Source Instance B&lt;/b&gt;&lt;br&gt;Set the instance of the function selected above.</td>
<td>1 to 250</td>
<td>1</td>
<td>9358 [offset 80]</td>
<td>0x7F (127) 1 to 24</td>
<td>0xA (10)</td>
<td>27010</td>
<td>uint RWES</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>&lt;i&gt;5_SZb&lt;/i&gt;</td>
<td>Logic (1 to 24) &lt;br&gt;&lt;b&gt;Source Zone B&lt;/b&gt;&lt;br&gt;Set the zone of the function selected above</td>
<td>0 to 16</td>
<td>0</td>
<td>9374 [offset 80]</td>
<td>0x7F (127) 1 to 24</td>
<td>0x12 (18)</td>
<td>27018</td>
<td>uint RWES</td>
</tr>
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</table>
| SFnC    | Logic (1 to 24) Source Function C  
Set the type of function that will be used for this source. | None (61)  
Alarm (6)  
Compare (230)  
Counter (231)  
Digital I/O (1142)  
Profile Event Out A (233)  
Profile Event Out B (234)  
Profile Event Out C (235)  
Profile Event Out D (236)  
Profile Event Out E (247)  
Profile Event Out F (248)  
Profile Event Out G (249)  
Profile Event Out H (250)  
Function Key (1001)  
Limit (126)  
Logic (239)  
Special Function Output 1 (1531)  
Special Function Output 2 (1533)  
Special Function Output 3 (1534)  
Special Function Output 4 (1535)  
Timer (244)  
Variable (245) | None | 9344 [offset 80] | 0xF (127) 1 to 24 3 | - - - - | 27003 | uint RWES |

| SIC     | Logic (1 to 24) Source Instance C  
Set the instance of the function selected above. | 1 to 250 | 1 | 9360 [offset 80] | 0xF (127) 1 to 24 0xB (11) | - - - - | 27011 | uint RWES |

| SZC     | Logic (1 to 24) Source Zone C  
Set the zone of the function selected above. | 0 to 16 | 0 | 9376 [offset 80] | 0xF (127) 1 to 24 0x13 (19) | - - - - | 27019 | uint RWES |

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<th>Instance Attribute hex (dec)</th>
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</table>
| $SF_{nd}$ [SFn.d] | **Logic (1 to 24)** **Source Function D**  
Set the type of function that will be used for this source. | 1 to 24 | None (61) | 9346 [offset 80] | 0x7F (127) 1 to 24 | - - - - | 27004 | uint RWES |
| $S_{id}$ [Si.d] | **Logic (1 to 24)** **Source Instance D**  
Set the instance of the function selected above. | 1 to 250 | 1 | 9362 [offset 80] | 0x7F (127) | - - - - | 27012 | uint RWES |
| $S_{zd}$ [SZ.d] | **Logic (1 to 24)** **Source Zone D**  
Set the zone of the function selected above. | 0 to 16 | 0 | 9378 [offset 80] | 0x7F (127) 1 to 24 | - - - - | 27020 | uint RWES |

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<tr>
<td>5F6E[SFn.E]</td>
<td>Logic (1 to 24) Source Function E</td>
<td>None (61)</td>
<td>None</td>
<td>9348 (offset 80)</td>
<td>0x7F (127)</td>
<td>- - - -</td>
<td>27005</td>
<td>uint RWES</td>
</tr>
<tr>
<td>5F6E[Si.E]</td>
<td>Logic (1 to 24) Source Instance E</td>
<td>Set the instance of the function selected above.</td>
<td>1 to 250</td>
<td>1</td>
<td>9364 (offset 80)</td>
<td>0x7F (127)</td>
<td>- - - -</td>
<td>27013</td>
</tr>
<tr>
<td>5F6E[SZ.E]</td>
<td>Logic (1 to 24) Source Zone E</td>
<td>Set the zone of the function selected above.</td>
<td>0 to 16</td>
<td>0</td>
<td>9380 (offset 80)</td>
<td>0x7F (127)</td>
<td>- - - -</td>
<td>27021</td>
</tr>
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<tr>
<td><strong>SFnF</strong> [ SFn.F]</td>
<td><strong>Logic (1 to 24)</strong> <strong>Source Function F</strong> Set the type of function that will be used for this source.</td>
<td>None (61)</td>
<td>None</td>
<td>9350 [offset 80]</td>
<td>0x7F (127) 1 to 24 6</td>
<td>- - - -</td>
<td>27006</td>
<td>uint RWES</td>
</tr>
<tr>
<td><strong>SFnF</strong> [ SFn.F]</td>
<td><strong>Logic (1 to 24)</strong> <strong>Source Instance F</strong> Set the instance of the function selected above.</td>
<td>1 to 250</td>
<td>1</td>
<td>9366 [offset 80]</td>
<td>0x7F (127) 1 to 24 0xF (14)</td>
<td>- - - -</td>
<td>27014</td>
<td>uint RWES</td>
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<tr>
<td><strong>SFnF</strong> [ SFn.F]</td>
<td><strong>Logic (1 to 24)</strong> <strong>Source Zone F</strong> Set the zone of the function selected above.</td>
<td>0 to 16</td>
<td>0</td>
<td>9382 [offset 80]</td>
<td>0x7F (127) 1 to 24 0x16 (22)</td>
<td>- - - -</td>
<td>27022</td>
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</tr>
</tbody>
</table>

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**** These parameters/prompts are available in these menus with firmware revisions 6.0 and above.
### RM High Density Module • Setup Page

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<th>CIP Class Instance Attribute hex (dec)</th>
<th>Profibus Index</th>
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<th>Data Type &amp; Read/Write</th>
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<tr>
<td>SFn.g</td>
<td>Logic (1 to 24) Source Function G</td>
<td></td>
<td>None</td>
<td>None (61)</td>
<td>9352 [offset 80]</td>
<td>0x7F (127)</td>
<td>1 to 24</td>
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</tr>
<tr>
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<td>Set the type of function that will be used for this source.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>S1.g</td>
<td>Logic (1 to 24) Source Instance G</td>
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<td>1</td>
<td>9368 [offset 80]</td>
<td>0x7F (127) 1 to 24 0xF (15)</td>
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<td>27015</td>
<td>uint RWES</td>
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<td></td>
<td>Set the instance of the function selected above.</td>
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<tr>
<td>S2.g</td>
<td>Logic (1 to 24) Source Zone G</td>
<td>0 to 16</td>
<td>0</td>
<td>9384 [offset 80]</td>
<td>0x7F (127) 1 to 24 0x17 (23)</td>
<td>- - - -</td>
<td>27023</td>
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<td>Set the zone of the function selected above.</td>
<td></td>
<td></td>
<td></td>
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</tr>
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---

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## RM High Density Module • Setup Page

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<tr>
<th>Display</th>
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<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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<tbody>
<tr>
<td>[SFn.h]</td>
<td>Logic (1 to 24) Source Function H</td>
<td>None (61)</td>
<td>None</td>
<td>9354 [offset 80]</td>
<td>0x7F (127) 1 to 24</td>
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<td>Logic (1 to 24) Source Zone H</td>
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<td>[Er.h]</td>
<td>Logic (1 to 24) Error Handling</td>
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<td>27035</td>
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### Math Menu

**Function**
- **OFF:** Off (62)
- **Avg:** Average (1367)
- **PSC:** Process Scale (1371)
- **dSC:** Deviation Scale (1372)
- **S0:** Switch Over (1370)
- **FF:** Differential (1373)
- **RP:** Ratio (1374)
- **Add:** Add (1375)
- **MUL:** Multiply (1376)
- **RDIF:** Absolute Difference (1377)
- **P Min:** Minimum (1378)
- **P Max:** Maximum (1379)
- **RS:** Square Root (1380)
- **Hold:** Sample and Hold (1381)
- **RS:** Pressure to Altitude (1349)
- **Diff:** Differential (1373)
- **Ratio:** Ratio (1374)
- **Add:** Add (1375)
- **Multiply:** Multiply (1376)
- **Absolute Difference:** (1377)
- **Square Root:** Square Root (1380)
- **Sample and Hold:** Sample and Hold (1381)
- **Pressure to Altitude:** Pressure to Altitude (1349)

**Parameter Name Description**
- **Math Menu**
- **Display**
- **Parameter Name Description**
- **Range**
- **Default**
- **Modbus Relative Address**
- **CIP Class Instance Attribute hex (dec)**
- **Profibus Index**
- **Parameter ID**
- **Data Type & Read/Write**

<table>
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<tr>
<th>Parameter Name Description</th>
<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>
<tr>
<td>Math (1 to 24)</td>
<td></td>
<td>Function</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Set the operator that will</td>
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<tr>
<td></td>
<td></td>
<td>be applied to the sources.</td>
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<tr>
<td>Math (1 to 24)</td>
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<td>Source Function A</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>Set the type of function</td>
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<td>that will be used for this</td>
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<td></td>
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<td>source.</td>
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</tr>
<tr>
<td>Math (1 to 24)</td>
<td></td>
<td>Source Instance A</td>
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<tr>
<td></td>
<td></td>
<td>Set the instance of the</td>
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<td></td>
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<tr>
<td></td>
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<td>function selected above.</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Math (1 to 24)</td>
<td></td>
<td>Source Zone A</td>
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<tr>
<td></td>
<td></td>
<td>Set the zone of the function</td>
<td></td>
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<td></td>
</tr>
</tbody>
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<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>Instance</th>
<th>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><strong>5Fn.b</strong>&lt;br&gt;[SFn.b]</td>
<td><strong>Math (1 to 24)</strong>&lt;br&gt;<strong>Source Function B</strong>&lt;br&gt;Set the type of function that will be used for this source.</td>
<td>None (61)</td>
<td>None</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>6542</td>
</tr>
<tr>
<td><strong>5S.b</strong>&lt;br&gt;[Si.b]</td>
<td><strong>Math (1 to 24)</strong>&lt;br&gt;<strong>Source Instance B</strong>&lt;br&gt;Set the instance of the function selected above.</td>
<td>1 to 250</td>
<td>1</td>
<td>6552</td>
<td>0x7D (125) 1 to 24 7</td>
<td>- - -</td>
<td>25007</td>
<td>uint RWES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>5S2b</strong>&lt;br&gt;[SZ.b]</td>
<td><strong>Math (1 to 24)</strong>&lt;br&gt;<strong>Source Zone B</strong>&lt;br&gt;Set the zone of the function selected above.</td>
<td>0 to 16</td>
<td>0</td>
<td>6562</td>
<td>0x7D (125) 1 to 24 0xC (12)</td>
<td>- - -</td>
<td>25012</td>
<td>uint RWES</td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>5FnC</strong>&lt;br&gt;[SFn.C]</td>
<td><strong>Math (1 to 24)</strong>&lt;br&gt;<strong>Source Function C</strong>&lt;br&gt;Set the type of function that will be used for this source.</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6544</td>
</tr>
<tr>
<td><strong>5S.C</strong>&lt;br&gt;[Si.C]</td>
<td><strong>Math (1 to 24)</strong>&lt;br&gt;<strong>Source Instance C</strong>&lt;br&gt;Set the instance of the function selected above.</td>
<td>1 to 250</td>
<td>1</td>
<td>6554</td>
<td>0x7D (125) 1 to 24 8</td>
<td>- - -</td>
<td>25008</td>
<td>uint RWES</td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>5S2C</strong>&lt;br&gt;[SZ.C]</td>
<td><strong>Math (1 to 24)</strong>&lt;br&gt;<strong>Source Zone C</strong>&lt;br&gt;Set the zone of the function selected above.</td>
<td>0 to 16</td>
<td>0</td>
<td>6564</td>
<td>0x7D (125) 1 to 24 0xD (13)</td>
<td>- - -</td>
<td>25013</td>
<td>uint RWES</td>
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<td></td>
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</tr>
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</tr>
</thead>
<tbody>
<tr>
<td>$SF_{nd}$</td>
<td>Math (1 to 24) Source Function D</td>
<td>Set the type of function that will be used for this source.</td>
<td>None</td>
<td>None (61)</td>
<td>$[\text{offset 70}]$</td>
<td>6546</td>
<td>0x7D (125) 1 to 24 4</td>
<td>25004</td>
</tr>
<tr>
<td>$Si_{d}$</td>
<td>Math (1 to 24) Source Instance D</td>
<td>Set the instance of the function selected above.</td>
<td>1 to 250</td>
<td>1</td>
<td>$[\text{offset 70}]$</td>
<td>6556</td>
<td>0x7D (125) 1 to 24 9</td>
<td>25009</td>
</tr>
<tr>
<td>$SZ_{d}$</td>
<td>Math (1 to 24) Source Zone D</td>
<td>Set the zone of the function selected above.</td>
<td>0 to 16</td>
<td>0</td>
<td>$[\text{offset 70}]$</td>
<td>6566</td>
<td>0x7D (125) 1 to 24 0x (14)</td>
<td>25014</td>
</tr>
<tr>
<td>$SF_{nE}$</td>
<td>Math (1 to 24) Source Function E</td>
<td>Set the type of function that will be used for this source.</td>
<td>None</td>
<td>None (61)</td>
<td>$[\text{offset 70}]$</td>
<td>6548</td>
<td>0x7D (125) 1 to 24 5</td>
<td>25005</td>
</tr>
</tbody>
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<th>CIP Class</th>
<th>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>S.E</td>
<td>Math (1 to 24) Source Instance E</td>
<td>1 to 250</td>
<td>1</td>
<td>6558 [offset 70]</td>
<td></td>
<td>0x7D (125) 1 to 24 0xA (10)</td>
<td>- - -</td>
<td>25010</td>
<td>uint RWES</td>
</tr>
<tr>
<td>S.E</td>
<td>Math (1 to 24) Source Zone E</td>
<td>0 to 16</td>
<td>0</td>
<td>6568 [offset 70]</td>
<td></td>
<td>0x7D (125) 1 to 24 0xF (15)</td>
<td>- - -</td>
<td>25015</td>
<td>uint RWES</td>
</tr>
<tr>
<td>S.E</td>
<td>Math (1 to 16) Input Scale Low</td>
<td>-1,999.000 to 9,999.000 °F or units -1,128.333 to 5537.223 °C</td>
<td>0.0</td>
<td>6586 [offset 70]</td>
<td></td>
<td>0x7D (125) 1 to 24 0x18 (24)</td>
<td>104</td>
<td>25024</td>
<td>float RWES</td>
</tr>
<tr>
<td>S.E</td>
<td>Math (1 to 24) Input Scale High</td>
<td>-1,999.000 to 9,999.000 °F or units -1,128.333 to 5537.223 °C</td>
<td>1.0</td>
<td>6588 [offset 70]</td>
<td></td>
<td>0x7D (125) 1 to 24 0x19 (25)</td>
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<td>float RWES</td>
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<tr>
<td>Unit</td>
<td>Units</td>
<td></td>
<td></td>
<td></td>
<td>Source</td>
<td>6602 [offset 70]</td>
<td>- - -</td>
<td>25032</td>
<td>uint RWES</td>
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<tr>
<td>r.Lo</td>
<td>Math (1 to 24) Output Range Low</td>
<td>-1,999.000 to 9,999.000 °F or units -1,128.333 to 5537.223 °C</td>
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<td>6590 [offset 70]</td>
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<td>0x7D (125) 1 to 24 0x1A (26)</td>
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<td>25026</td>
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</tr>
<tr>
<td>r.hi</td>
<td>Math (1 to 24) Output Range High</td>
<td>-1,999.000 to 9,999.000 °F or units -1,128.333 to 5537.223 °C</td>
<td>1.0</td>
<td>6592 [offset 70]</td>
<td></td>
<td>0x7D (125) 1 to 24 0x1B (27)</td>
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<td>25027</td>
<td>float RWES</td>
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<tr>
<td>P.unt</td>
<td>Math (1 to 24) Pressure Units</td>
<td></td>
<td></td>
<td></td>
<td>Pressure</td>
<td>6598 [offset 70]</td>
<td>- - -</td>
<td>25030</td>
<td>uint RWES</td>
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<tr>
<td>A.unt</td>
<td>Math (1 to 24) Altitude Units</td>
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<td></td>
<td></td>
<td>Kilofeet</td>
<td>6600 [offset 70]</td>
<td>- - -</td>
<td>25031</td>
<td>uint RWES</td>
</tr>
</tbody>
</table>

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<th>Parameter Name Description</th>
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<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><img src="FiL" alt="FiL" /> <img src="FiL" alt="FiL" /> Math (1 to 24)</td>
<td>Filter</td>
<td>Filtering smooths out the output signal of this function block. Increase the time to increase filtering.</td>
<td>0.0 to 60.0 seconds</td>
<td>0.0</td>
<td>6594 [offset 70]</td>
<td>0x7D (125) 1 to 24 0x1C (28)</td>
<td>- - -</td>
<td>25028 float RWES</td>
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**Variable Menu**

<table>
<thead>
<tr>
<th>Type [tyPE]</th>
<th>Variable (1 to 24)</th>
<th>Data Type</th>
<th>Analog (1215)</th>
<th>Digital (1220)</th>
<th>Analog</th>
<th>16060 [offset 20]</th>
<th>0x66 (102) 1 to 24</th>
<th>152</th>
<th>2001 uint RWES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit [Un_t]</td>
<td>Variable (1 to 24)</td>
<td>Units</td>
<td>Absolute Temperature (1540)</td>
<td>Relative Temperature (1541)</td>
<td>Absolute Temperature</td>
<td>16072 [offset 20]</td>
<td>0x66 (102) 1 to 24</td>
<td>- - -</td>
<td>2007 uint RWES</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>d . g</th>
<th>Variable (1 to 24)</th>
<th>Digital</th>
<th>Off (62)</th>
<th>On (63)</th>
<th>Off</th>
<th>16062 [offset 20]</th>
<th>0x66 (102) 1 to 24</th>
<th>153</th>
<th>2002 uint RWES</th>
</tr>
</thead>
<tbody>
<tr>
<td>AnLg</td>
<td>Variable (1 to 24)</td>
<td>Analog</td>
<td>-1,999.000 to 9,999.000</td>
<td>None (61)</td>
<td>0.0</td>
<td>16064 [offset 20]</td>
<td>0x66 (102) 1 to 24</td>
<td>212</td>
<td>2003 float RWES</td>
</tr>
</tbody>
</table>

| [ac;LF] AC Line Frequency | Global | Select which scale to use for temperature. | ![FiL](FiL) ![FiL](FiL) 60 Hz (4) | 60 Hz | - - - | 0x65 (101) 1 0x22 (34) | - - - | 1034 uint RWES |
|-----------------------------|--------|------------------------------------------|-------------------------------|-------|--------|-----------------|------------------|-----|----------------|

Note:

- Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces.
- If there is only one instance of a menu, no submenus will appear.
- ** These parameters/prompts are available in these menus with firmware revisions 6.0 and above.
**RM High Density Module**  •  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>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><strong>USr</strong>) [USr.S]</td>
<td><strong>Global User Settings Save</strong></td>
<td>None (61) [SEt1] User Set 1 (101) [SEt2] User Set 2 (102)</td>
<td>None</td>
<td>26</td>
<td>0x65 (101) 1 0x0E (14)</td>
<td>93</td>
<td>1014</td>
<td>uint RWE</td>
<td></td>
</tr>
<tr>
<td><strong>USr</strong>) [USr.r]</td>
<td><strong>Global User Settings Restore</strong></td>
<td>None (61) [SEt1] User Set 1 (101) [SEt2] User Set 2 (102) [FCty] Factory (31)</td>
<td>None</td>
<td>24</td>
<td>0x65 (101) 1 0x0D (13)</td>
<td>92</td>
<td>1013</td>
<td>uint RWE</td>
<td></td>
</tr>
</tbody>
</table>

**Communications Menu**

| **BRd**) [bAUd] | **Baud Rate** | 9,600 (188) 19,200 (189) 38,400 (190) | 9,600 | 6504 | 0x96 (150) 1 3 | - - - | 17002 | uint RWE |
| **PRr**) [PAr] | **Parity** | Even (191) Odd (192) | None | 6506 | 0x96 (150) 1 4 | - - - | 17003 | uint RWE |
| **MhL**) [M.hL] | **Modbus Word Order** | Word Hi/Lo (1330) Word Low/Hi (1331) | Low High | 6508 | 0x96 (150) 1 5 | - - - | 17043 | uint RWE |
| **C.F**) [C.F] | **Display Units** | °F (30) °C (15) | °F | 6510 | 0x96 (150) 1 6 | - - - | 17050 | uint RWE |
| **nUS**) [nVS] | **Non-volatile Save** | Yes (106) No (59) | Yes | 6514 | 0x96 (150) 1 8 | 198 | 17051 | uint RWE |

**Note:**

- Some values will be rounded off to fit in the four-character display. Full values can be read with other interfaces.
- If there is only one instance of a menu, no submenus will appear.
- These parameters/prompts are available in these menus with firmware revisions 6.0 and above.

---

Watlow EZ-ZONE® RMH Module  •  93  •  Chapter 4 Setup Page
Chapter 5: Factory Pages

Navigating the Factory Page

To navigate to the Factory Page using the RUI, follow the steps below:

1. From the Home Page, press and hold both the Advance and Infinity keys for six seconds.
2. Press the Up or Down key to view available menus.
3. Press the Advance Key to enter the menu of choice.
4. If a submenu exists (more than one instance), press the Up or Down key to select and then press the Advance Key to enter.

5. Press the Up or Down key to move through available menu prompts.
6. Press the Infinity Key to move backwards through the levels: parameter to submenu; submenu to menu; menu to Home Page.
7. Press and hold the Infinity Key for two seconds to return to the Home Page.

On the following pages, top level menus are identified with a yellow background color.

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.
### Custom Setup Menu

<table>
<thead>
<tr>
<th>Parameter Name Description</th>
<th>Range</th>
<th>Default</th>
<th>Modbus Relative Address</th>
<th>CIP Class Instance</th>
<th>Attribute hex (dec)</th>
<th>Profibus Index</th>
<th>Parameter ID</th>
<th>Data Type &amp; Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>Custom Menu</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RWES</td>
</tr>
<tr>
<td>Parameter 1 to 50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RWES</td>
</tr>
<tr>
<td>Select the parameters that will appear in the Home Page when using the RUI.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RWES</td>
</tr>
<tr>
<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>
<td>RWES</td>
</tr>
<tr>
<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>
<td>RWES</td>
</tr>
<tr>
<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>
<td>RWES</td>
</tr>
<tr>
<td>Custom Menu (1 to 50)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RWES</td>
</tr>
<tr>
<td>Select the parameters that will appear in the Home Page.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RWES</td>
</tr>
<tr>
<td>Note: Some values will be rounded off to fit in the four-character display. Full values can be read with another interface. If there is only one instance of a menu, no submenus will appear.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RWES</td>
</tr>
<tr>
<td>Display</td>
<td>Parameter Name Description</td>
<td>Range</td>
<td>Default</td>
<td>Modbus Relative Address</td>
<td>CIP Class Instance Attribute hex (dec)</td>
<td>Profibus Index</td>
<td>Parameter ID</td>
<td>Data Type &amp; Read/Write</td>
</tr>
<tr>
<td>----------</td>
<td>----------------------------</td>
<td>-------</td>
<td>---------</td>
<td>-------------------------</td>
<td>----------------------------------------</td>
<td>---------------</td>
<td>--------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>LoCo</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>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
</tr>
<tr>
<td>LoC.o</td>
<td>Security Setting Password Enable</td>
<td>Turn security features on or off.</td>
<td>Off</td>
<td>-</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
</tr>
<tr>
<td>LoC.c</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>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
</tr>
<tr>
<td>LoC.o</td>
<td>Security Setting 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>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
</tr>
<tr>
<td>LoC.L</td>
<td>Security Setting 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>- - -</td>
</tr>
<tr>
<td>LoC.o</td>
<td>Security Setting Locked State</td>
<td>Current level of security</td>
<td>Lock (228) User (1684) Admin (1685)</td>
<td>-</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>3023</td>
</tr>
<tr>
<td>LoL.L</td>
<td>Security Setting 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>- - -</td>
</tr>
</tbody>
</table>

Note: Some values will be rounded off to fit in the four-character display. Full values can be read with another interface. If there is only one instance of a menu, no submenus will appear.
## RM High Density Module • Factory Page

### Security Setting Menu

<table>
<thead>
<tr>
<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><strong>[PAS.u]</strong> <strong>Security Setting</strong> <strong>User Password</strong> 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>- - -</td>
<td>- - -</td>
</tr>
<tr>
<td><strong>[PAS.A]</strong> <strong>Security Setting</strong> <strong>Administrator Password</strong> Used to acquire full access to all menus.</td>
<td>10 to 999</td>
<td>156</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
<td>- - -</td>
</tr>
</tbody>
</table>

### Diagnostics Menu

<table>
<thead>
<tr>
<th>Diagnostics Menu 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><strong>Part Number</strong> Display this controller's part number.</td>
<td>24</td>
<td>- - -</td>
<td>0x65 (101) 1</td>
<td>90</td>
<td>1009</td>
<td>string</td>
<td>R</td>
</tr>
<tr>
<td><strong>Device Name</strong> Read the device name.</td>
<td>EZ-ZONE RM</td>
<td>- - -</td>
<td>0x65 (101) 1 0x0B (11)</td>
<td>- - -</td>
<td>1011</td>
<td>string</td>
<td>R</td>
</tr>
<tr>
<td><strong>Device Status</strong> Return hardware status Fail means return to factory.</td>
<td>OK (138) Fail (32)</td>
<td>30</td>
<td>0x65 (101) 1 0x10 (16)</td>
<td>- - -</td>
<td>1016</td>
<td>uint</td>
<td>R</td>
</tr>
<tr>
<td><strong>Software Revision</strong> Display this controller's firmware revision number.</td>
<td>5</td>
<td>4</td>
<td>0x65 (101) 1 to 5 0x11 (17)</td>
<td>91</td>
<td>1017</td>
<td>string</td>
<td>R</td>
</tr>
<tr>
<td><strong>Software Build Number</strong> Display the firmware build number.</td>
<td>- - -</td>
<td>8</td>
<td>0x65 (101) 1 to 5</td>
<td>- - -</td>
<td>1005</td>
<td>signed</td>
<td>32-bit R</td>
</tr>
<tr>
<td><strong>Serial Number</strong> Display the serial number.</td>
<td>- - -</td>
<td>12</td>
<td>0x65 (101) 1</td>
<td>- - -</td>
<td>1032</td>
<td>string</td>
<td>R</td>
</tr>
</tbody>
</table>

Note: Some values will be rounded off to fit in the four-character display. Full values can be read with another interface. If there is only one instance of a menu, no submenus will appear.
## RM High Density Module • 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></td>
<td>Diagnostics Menu</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[dAtE]</td>
<td>Date of Manufacture</td>
<td>- - -</td>
<td>- - -</td>
<td>14</td>
<td>0x65 (101) 1 8</td>
<td>- - -</td>
<td>1008</td>
<td>signed 32-bit R</td>
</tr>
<tr>
<td></td>
<td>Hardware ID</td>
<td>113</td>
<td>113</td>
<td>0</td>
<td>0x65 (101) 1 1</td>
<td>- - -</td>
<td>1001</td>
<td>signed 32-bit R</td>
</tr>
</tbody>
</table>

### Calibration Menu

<table>
<thead>
<tr>
<th>[Mv]</th>
<th>Calibration Menu (1 to 16)</th>
<th>- - -</th>
<th>420 [offset 90]</th>
<th>0x68 (104) 1 to 12 0x15 (21)</th>
<th>- - -</th>
<th>4021</th>
<th>float R</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ELi.o]</td>
<td>Electrical Measurement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Read the raw electrical value for this input in the units corresponding to the Sensor Type (Setup Page, Analog Input Menu) setting.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ELi,S]</td>
<td>Electrical Input Offset</td>
<td>-1,999.000 to 9,999.000</td>
<td>0.0</td>
<td>398 [offset 90]</td>
<td>0x68 (104) 1 to 12 0xA (10)</td>
<td>- - -</td>
<td>4010</td>
</tr>
<tr>
<td></td>
<td>Change this value to calibrate the low end of the input range.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ELi,S]</td>
<td>Electrical Input Slope</td>
<td>-1,999.000 to 9,999.000</td>
<td>1.0</td>
<td>400 [offset 90]</td>
<td>0x68 (104) 1 to 12 0xB (11)</td>
<td>- - -</td>
<td>4011</td>
</tr>
<tr>
<td></td>
<td>Adjust this value to calibrate the slope of the input value.</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 another interface. If there is only one instance of a menu, no submenus will appear.
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  - Proportional plus Integral plus Derivative (PID) Control
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  - Variable Time Base
  - Single Set Point Ramping

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  - Alarm Latching
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  - Alarm Blocking

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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 parameters.

Note:
Starting with firmware release 6, there is only one user set.

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.

Note:
When restoring factory defaults, I/O assemblies for Modbus, DeviceNet, Profinet and Ethernet along with the zone address will be overwritten when restoring factory defaults.

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 [EL;CA] (Operations Page, Analog Input Menu).

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>
<tr>
<td>Thermistor 5K</td>
<td>50.00 Ω</td>
<td>5000.00 Ω</td>
</tr>
<tr>
<td>Thermistor 10K</td>
<td>50.00 Ω</td>
<td>10000.00 Ω</td>
</tr>
<tr>
<td>Thermistor 20K</td>
<td>50.00 Ω</td>
<td>20000.00 Ω</td>
</tr>
<tr>
<td>Thermistor 40K</td>
<td>50.00 Ω</td>
<td>40000.00 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 [EL;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 Input Offset [EL;io] (Factory Page, Calibration Menu) for this input to the offset value.
5. Check the Electrical Measurement to see whether it now matches the signal. If it doesn’t match, adjust Electrical Offset again.
6. Apply the high source signal to the input. Measure the signal to ensure it is accurate.
7. Read the value of Electrical Measurement for that input.
8. Calculate the gain value by dividing the low source signal by this value.
9. Set Electrical Slope [EL;S] (Factory Page, Calibration Menu) for this input to the calculated gain value.
10. Check the Electrical Measurement to see whether it now matches the signal. If it doesn’t match, adjust Electrical Slope again.

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

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 [EL;Mu] (Factory Page, Calibration Menu) for that input.
3. Calculate the offset value by subtracting this value from the low source resistance.
4. Set Electrical Input Offset [EL;io] (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 \( \text{E}_L\text{S} \) (Factory Page, Calibration Menu) for this input to the calculated gain value.
10. Check the Electrical Measurement to see whether it now matches the signal. If it doesn’t match, adjust Electrical Slope again.

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

**Filter Time Constant**

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

Adjust the filter time interval with Filter Time \( \text{FiL} \) (Setup Page, Analog Input Menu). Example: With a filter value of 0.5 seconds, if the process input value instantly changes from 0 to 100 and remained at 100, the display will indicate 100 after five time constants of the filter value or 2.5 seconds.

**Sensor Selection**

You need to configure the controller to match the input device, which is normally a thermocouple, RTD or process transmitter.

Select the sensor type with Sensor Type \( \text{Sen} \) (Setup Page, Analog Input Menu).

**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 limits with Low Set Point \( \text{LSP} \) and High Set Point \( \text{hSP} \) (Setup Page, Loop Menu).

There are two sets of set point low and high limits: one for a closed-loop set point, another for an open-loop set point.

**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 5 V, 1 to 5 V and 0 to 10 V.

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 allow 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 \( \text{SLo} \) and Scale High \( \text{Shi} \). Select the displayed range with Range Low \( \text{rLo} \) and Range High \( \text{rHi} \) (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 \( L \) and Range High \( H \) (Setup Page, Analog Input Menu).

**Linearization**

The linearization function allows a user to re-linearize a value read from an analog input. There are 10 data points used to compensate for differences between the sensor value read (input point) and the desired value (output point). Multiple data points enable compensation for non-linear differences between the sensor readings and target process values over the thermal or process system operating range. Sensor reading differences can be caused by sensor placement, tolerances, an inaccurate sensor or lead resistance.

The user specifies the unit of measurement and then each data point by entering an input point value and a corresponding output point value. Each data point must be incrementally higher than the previous point. The linearization function will interpolate data points linearly in between specified data points.

**Outputs**

**Duplex**

Certain systems require that a single process output control both heating and cooling outputs. An EZ-ZONE® RMH controller with a process output can function as two separate outputs.

With a 4 to 20mA output the heating output will operate from 12 to 20mA (0 to +100 percent) and the cooling output will operate from 12 to 4mA (0 to -100 percent).

In some cases this type of output is required by the device that the EZ-ZONE RMH controls, such as a three-way valve that opens one way with a 12 to 20mA signal and opens the other way with a 4 to 12mA signal. This feature reduces the overall system cost by using a single output to act as two outputs.

Outputs 1 and 3 can be ordered as process outputs. Select duplex \( DUPL \) as the Output Function (Setup Page, Output Menu). Set the output to volts \( VOL \) or milliamps \( MA \) with Output Type \( VOL \). Set the range of the process output with Scale Low \( SL \) and Scale High \( SH \).

**Cool Output Curve**

A nonlinear output curve may improve performance when the response of the output device is nonlinear. If a cool output uses one of the nonlinear curves a PID calculation yields a lower actual output level than a linear output would provide.

These output curves are used in plastics extruder applications: curve 1 for oil-cooled extruders and curve 2 for water-cooled extruders.

Select a nonlinear cool output curve with Cool Output Curve \( CCR \) (Setup Menu, Loop Menu).

**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 milliamperes.

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 to 3 and 7 to 9 can be ordered as process outputs. Assign an analog source to Output Function to accomplish retransmit of a process or set point value.

**Note:**

The active set point is not retransmitted, only the user requested closed loop set point which may not be the closed loop set point in control. Retransmitting a profiling closed loop set point is not allowed.
Control Methods

Output Configuration

Each controller output can be configured as a heat output, a cool output, an alarm output or deactivated. No dependency limitations have been placed on the available combinations. The outputs can be configured in any combination. For instance, all three could be set to cool.

Heat and cool outputs use the set point and operations parameters to determine the output value. All heat and cool outputs use the same set point value. Heat and cool each have their own set of control parameters. All heat outputs use the same set of heat control parameters and all cool outputs use the same set of cool output parameters.

Each alarm output has its own set of configuration parameters and set points, allowing independent operation.

Auto (closed loop) and Manual (open loop) Control

The controller has two basic modes of operation, auto mode and manual mode. Auto mode allows the controller to decide whether to perform closed-loop control or to follow the settings of Input Error Failure (Setup Page, Loop Menu). The manual mode only allows open-loop control. The EZ-ZONE® RMH controller is normally used in the auto mode. The manual mode is usually only used for specialty applications or for troubleshooting.

Manual mode is open-loop control that allows the user to directly set the power level to the controller’s output load. No adjustments of the output power level occur based on temperature or set point in this mode.

In auto mode, the controller monitors the input to determine if closed-loop control is possible. The controller checks to make certain a functioning sensor is providing a valid input signal. If a valid input signal is present, the controller will perform closed-loop control. Closed-loop control uses a process sensor to determine the difference between the process value and the set point. Then the controller applies power to a control output load to reduce that difference.

If a valid input signal is not present, the controller will indicate an input error message in the upper display and [ FAiL ] in the lower display and respond to the failure according to the setting of Input Error Failure (Setup Page, Loop Menu). You can configure the controller to perform a “bumpless” transfer [ bPLS ], switch power to output a preset fixed level [ PnRaA ], or turn the output power off.

Bumpless transfer will allow the controller to transfer to the manual mode using the last power value calculated in the auto mode if the process had stabilized at a ±5 percent output power level for the time interval of Time Integral (Operations Page, Loop) prior to sensor failure, and that power level is less than 75 percent.

Input Error Latching (Setup Page, Analog Input Menu) determines the controller’s response once a valid input signal returns to the controller. If latching is on, then the controller will continue to indicate an input error until the error is cleared. To clear a latched alarm, press the Advance Key [ Er ] then the Up Key [ Er ]

If latching is off, the controller will automatically clear the input error and return to reading the temperature. If the controller was in the auto mode when the input error occurred, it will resume closed-loop control. If the controller was in manual mode when the error occurred, the controller will remain in open-loop control.

The Manual Control Indicator Light % is on when the controller is operating in manual mode.

You can easily switch between modes if the Control Mode [ CFnF ] parameter is selected to appear in the Home Page.

To transfer to manual mode from auto mode, press the Advance Key [ Man ] until [ CFnF ] appears in the lower display. The upper display will display [ RMH ] for auto mode. Use the Up [ Man ] or Down [ Man ] keys to select [ PnRaA ]. The manual set point value will be recalled from the last manual operation.

To transfer to auto mode from manual mode, press the Advance Key [ Man ] until [ CFnF ] appears in the lower display. The upper display will display [ PnRaA ] for manual mode. Use the Up [ Man ] or Down [ Man ] keys to select [ RMH ]. The automatic set point value will be recalled from the last automatic operation.

Changes take effect after three seconds or immediately upon pressing either the Advance Key [ Man ] or the Infinity Key [ Er ].

On-Off Control
On-off control switches the output either full on or full off, depending on the input, set point and hysteresis values. The hysteresis value indicates the amount the process value must deviate from the set point to turn on the output. Increasing the value decreases the number of times the output will cycle. Decreasing hysteresis improves controllability. With hysteresis set to 0, the process value would stay closer to the set point, but the output would switch on and off more frequently, and may result in the output “chattering.” On-off control can be selected with Heat Algorithm \([h;Ag]\) or Cool Algorithm \([c;Ag]\) (Setup Page, Loop Menu). On-off hysteresis can be set with Heat Hysteresis \([h;hY]\) or Cool Hysteresis \([c;hY]\) (Operations Page, Loop Menu).

**Note:**

Input Error Failure Mode \([faIl]\) does not function in on-off control mode. The output goes off.

Some processes need to maintain a temperature or process value closer to the set point than on-off control can provide. Proportional control provides closer control by adjusting the output when the temperature or process value is within a proportional band. When the value is in the band, the controller adjusts the output based on how close the process value is to the set point.

The closer the process value is to the set point, the lower the output power. This is similar to backing off on the gas pedal of a car as you approach a stop sign. It keeps the temperature or process value from swinging as widely as it would with simple on-off control. However, when the system settles down, the temperature or process value tends to “droop” short of the set point.

With proportional control the output power level equals (set point minus process value) divided by the proportional band value.

In an application with one output assigned to heating and another assigned to cooling, each will have a separate proportional parameter. The heating parameter takes effect when the process temperature is lower than the set point, and the cooling parameter takes effect when the process temperature is higher than the set point.

Adjust the proportional band with Heat Proportional Band \([h;Pb]\) or Cool Proportional Band \([c;Pb]\) (Operations Page, Loop Menu).

**Proportional plus Integral (PI) Control**

The droop caused by proportional control can be corrected by adding integral (reset) control. When the system settles down, the integral value is tuned to bring the temperature or process value closer to the set point. Integral determines the speed of the correction, but this may increase the overshoot at startup or when the set point is changed. Too much integral action will make the system unstable. Integral is cleared when the process value is outside of the proportional band.

Adjust the integral with Time Integral \([ti]\) (Operations Page, Loop Menu).

**Proportional plus Integral plus Derivative (PID) Control**

Use derivative (rate) control to minimize the overshoot in a PI-controlled system. Derivative (rate) adjusts the output based on the rate of change in the temperature or process value. Too much derivative (rate) will make the system sluggish.

Derivative action is active only when the process value is within twice the proportional value from the set point.

Adjust the derivative with Time Derivative \([td]\) (Operations Page, Loop Menu).
Dead Band

In a PID application the dead bands above and below the set point can save an application’s energy and wear by maintaining process temperature within acceptable ranges.

Proportional action ceases when the process value is within the dead band. Integral action continues to bring the process temperature to the set point.

Using a positive dead band value keeps the two systems from fighting each other.

When the dead band value is zero, the heating output activates when the temperature drops below the set point, and the cooling output switches on when the temperature exceeds the set point.

When the dead band value is a negative value, both heating and cooling outputs are active when the temperature is near the set point.

Adjust the dead band with Dead Band \[\text{db}\] (Operations Page, Loop Menu).

Variable Time Base

Variable time base is the preferred method for controlling a resistive load, providing a very short time base for longer heater life. Unlike phase-angle firing, variable-time-base switching does not limit the current and voltage applied to the heater.

With variable time base outputs, the PID algorithm calculates an output between 0 and 100%, the output is distributed at a minimum of three ac line cycles. For each grouping of ac line cycles, the controller decides whether the power should be on or off. There is no fixed cycle time since the decision is made for each group of cycles. When used in conjunction with a zero cross (burst fire) device, such as a solid-state power controller, switching is done only at the zero cross of the ac line, which helps reduce electrical noise (RFI).

Variable time base should be used with solid-state power controllers, such as a solid-state relay (SSR) or silicon controlled rectifier (SCR) power controller. Do not use a variable time base output for controlling electromechanical relays, mercury displacement relays, inductive loads or heaters with unusual resistance characteristics.

The combination of variable time base output and a solid-state relay can inexpensively approach the effect of analog, phase-angle fired control.

Select the AC Line Frequency \[\text{AC; LF}\] (Setup Page, Global Menu), 50 or 60 Hz.
Single Set Point Ramping

Ramping protects materials and systems that cannot tolerate rapid temperature changes. The value of the ramp rate is the maximum degrees per minute or hour that the system temperature can change.

Select Ramp Action \([\text{rP}]\) (Setup Page, Loop Menu):

- \([\text{off}]\) ramping not active.
- \([\text{Str}]\) ramp at startup.
- \([\text{StPt}]\) ramp at a set point change.
- \([\text{both}]\) ramp at startup or when the set point changes.

Select whether the rate is in degrees per minute or degrees per hour with Ramp Scale \([\text{rSc}]\). Set the ramping rate with Ramp Rate \([\text{rRt}]\) (Setup Page, Loop Menu).

Alarms

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

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

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

Process and Deviation Alarms

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

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

Select the alarm type with Type \([\text{A}\text{y}]\) (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. The alarm low set point defines the temperature that will trigger a low side alarm. For deviation alarms, a negative set point represents a value below closed loop set point. A positive set point represents a value above closed loop set point. View or change alarm set points with Low Set Point \([\text{A}\text{l}]\) and High Set Point \([\text{A}\text{h}]\) (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 \([\text{A}\text{h}]\) (Setup Page, Alarm Menu).
Alarm Latching

A latched alarm will remain active after the alarm condition has passed. It can only be deactivated by the user.

An active message, such as an alarm message, will cause the RUI display to toggle between the normal settings and the active message in the upper display and [Alt] in the lower display.

Push the Advance Key to display [ignr] in the upper display and the message source in the lower display.

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

See the Keys and Displays chapter and the Home Page chapter for more details.

An alarm that is not latched (self-clearing) will deactivate automatically when the alarm condition has passed.

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

Alarm 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 or higher than the alarm high 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 [A;BL] (Setup Page, Alarm Menu).

Open Loop Detection

When Open Loop Detection is enabled [l;de], the controller will look for the power output to be at 100%. Once there, the control will then begin to monitor the Open Loop Detect Deviation [l;dd] as it relates to the value entered for the Open Loop Detect Time [l;dt]. If the specified time period expires and the deviation does not occur, an Open Loop Error will be triggered. Once the Open Loop Error condition exists the control mode will go off.

Note:
All prompts identified in this section can be found in the Loop Menu of the Setup Page.

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 five parameters in the Lockout Menu (Fac-
1. You can lock out access to the Operations Page parameters may be used in applications:

The following examples show how the Lockout Menu 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 simply differentiate one level from the next.

<table>
<thead>
<tr>
<th>Lockout Security $SLoC$ &amp; $rLoC$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lockout Level</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
</tbody>
</table>

| Home Page (0)                     |
|                                   |
| Y                                 |
| Y                                 |
| Y                                 |
| Y                                 |
| Y                                 |

| Operations Page (2)               |
|                                   |
| N                                 |
| N                                 |
| Y                                 |
| Y                                 |
| Y                                 |

| Setup Page (4)                    |
|                                   |
| N                                 |
| N                                 |
| N                                 |
| N                                 |
| Y                                 |

| Factory Page                      |
|                                   |
| Custom Menu (5)                   |
| N                                 |
| N                                 |
| N                                 |
| N                                 |
| Y                                 |

| Diagnostic Menu (2)               |
|                                   |
| N                                 |
| Y                                 |
| Y                                 |
| Y                                 |
| Y                                 |

| Calibration Menu (5)              |
|                                   |
| N                                 |
| N                                 |
| N                                 |
| N                                 |
| Y                                 |

| Lockout Menu                      |
|                                   |
| $LoCo$                            |
| N                                 |
| Y                                 |
| Y                                 |
| Y                                 |
| Y                                 |
| $LoCP$                            |
| N                                 |
| N                                 |
| Y                                 |
| Y                                 |
| Y                                 |
| $PAS;E$                           |
| N                                 |
| Y                                 |
| Y                                 |
| Y                                 |
| Y                                 |
| $rLoC$                            |
| Y                                 |
| Y                                 |
| Y                                 |
| Y                                 |
| Y                                 |
| $SLoC$                            |
| Y                                 |
| Y                                 |
| Y                                 |
| Y                                 |
| Y                                 |

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

1. You can lock out access to the Operations Page but allow an operator access to the Profile Menu, by changing the default Profile Page and Operations Page security levels. Change Lock Operations Page $LoCo$ to 3 and Lock Profiling Page $LoCP$ to 2. If Set Lockout Security $SLoC$ is set to 2 or higher and the Read Lockout Security $rLoC$ is set to 2, the Profiling Page and Home Pages can be accessed, and all writable parameters can be written to. Pages with security levels greater than 2 will be locked out (inaccessible).

2. If Set Lockout Security $SLoC$ is set to 0 and Read Lockout Security $rLoC$ is set to 5, all pages will be accessible, however, changes will not be allowed on any pages or menus, with one exception: Set Lockout Security $SLoC$ can be changed to a higher level.

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

   In the Factory Page, Lockout Menu, set Read Lockout Security $rLoC$ to 5 and Set Lockout Security $SLoC$ to 0.

4. The operator wants to read and write to the Home Page and Profiling Page, and lock all other pages and menus.

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

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

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


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 $LoCo$ 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 $LoCo$ 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 $LoCo$ 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 Infinity ¯ key and the Advance © key for approximately six seconds. Once there, push the Down © key one time.
to get to the \textcolor{red}{LoC} menu. Again push the Advance \textcolor{blue}{\&} key until the Password Enabled \textcolor{green}{P\textcolor{red}{A}S\textcolor{green}{S}}\textcolor{blue}{E} prompt is visible. Lastly, push either the up or down key to turn it on. Once on, 4 new prompts will appear:

1. \textcolor{red}{LoC.L}, Locked Access Level (1 to 5) corresponding to the lockout table above.
2. \textcolor{red}{roll}, Rolling Password will change the Customer Code every time power is cycled.
3. \textcolor{green}{P\textcolor{red}{A}S\textcolor{green}{S}\textcolor{red}{u}}, User Password which is needed for a User to acquire access to the control.
4. \textcolor{green}{P\textcolor{red}{A}S\textcolor{green}{S}\textcolor{red}{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 Infinity \textcolor{blue}{\&} key. Once out of the menu, the Password Security will be enabled.

\textbf{How to Acquire Access to the Control}

To acquire access to any inaccessible Pages or Menus, go to the Factory Page and enter the \textcolor{red}{LoC} menu. Once there follow the steps below:

\textbf{Note:}

If Password Security (Password Enabled \textcolor{green}{P\textcolor{red}{A}S\textcolor{green}{S}}\textcolor{blue}{E} is On) is enabled the two prompts mentioned below in the first step will not be visible. If unknown, call the individual or company that originally set up the control.

1. Acquire either the User Password \textcolor{green}{P\textcolor{red}{A}S\textcolor{green}{S}\textcolor{red}{u}} or the Administrator Password \textcolor{green}{P\textcolor{red}{A}S\textcolor{red}{S}\textcolor{red}{a}}.
2. Push the Advance \textcolor{blue}{\&} key one time where the Code \textcolor{red}{\textcolor{red}{C}\textcolor{red}{\textcolor{red}{o}\textcolor{red}{d}\textcolor{red}{E}}} prompt will be visible.

\textbf{Note:}

a. If the the Rolling Password is off push the Advance \textcolor{blue}{\&} key one more time where the Password \textcolor{green}{P\textcolor{red}{A}S\textcolor{green}{S}} prompt will be displayed. Proceed to either step 7a or 8a. Pushing the Up \textcolor{blue}{\&} or Down \textcolor{blue}{\&} arrow keys enter either the User or Administrator Password. Once entered, push and hold the Infinity \textcolor{blue}{\&} key for two seconds to return to the Home Page.

b. If the Rolling Password \textcolor{red}{roll} was turned on proceed on through steps 3 - 9.

3. Assuming the Code \textcolor{red}{\textcolor{red}{C}\textcolor{red}{\textcolor{red}{o}\textcolor{red}{d}\textcolor{red}{E}}} prompt (Public Key) is still visible on the face of the control simply push the Advance \textcolor{blue}{\&} to proceed to the Password \textcolor{green}{P\textcolor{red}{A}S\textcolor{green}{S}} 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 play by using the Up \textcolor{blue}{\&} and Down \textcolor{blue}{\&} arrow keys or use EZ-ZONE Configurator Software.

6. Exit the Factory Page by pushing and holding the Infinity \textcolor{blue}{\&} key for two seconds.

\textbf{Formulas used by the User and the Administrator to calculate the Password follows:}

\begin{align*}
\text{Passwords equal:} \\
\text{7. User} & \text{ a. If Rolling Password } \textcolor{red}{roll} \text{ is Off, Password } \textcolor{green}{P\textcolor{red}{A}S\textcolor{green}{S}} \text{ equals User Password } \textcolor{green}{P\textcolor{red}{A}S\textcolor{red}{S}\textcolor{red}{u}}. \\
& \text{ b. If Rolling Password } \textcolor{red}{roll} \text{ is On, Password } \textcolor{green}{P\textcolor{red}{A}S\textcolor{green}{S}} \text{ equals:} \\
& \quad (\textcolor{green}{P\textcolor{red}{A}S\textcolor{red}{u}} \times \text{code}) \mod 929 + 70 \\
\text{8. Administrator} & \text{ a. If Rolling Password } \textcolor{red}{roll} \text{ is Off, Password } \textcolor{green}{P\textcolor{red}{A}S\textcolor{green}{S}} \text{ equals User Password } \textcolor{green}{P\textcolor{red}{A}S\textcolor{red}{S}\textcolor{red}{a}}. \\
& \text{ b. If Rolling Password } \textcolor{red}{roll} \text{ is On, Password } \textcolor{green}{P\textcolor{red}{A}S\textcolor{green}{S}} \text{ equals:} \\
& \quad (\textcolor{green}{P\textcolor{red}{A}S\textcolor{red}{a}} \times \text{code}) \mod 997 + 1000
\end{align*}

\textbf{Differences Between a User Without Password, User With Password and Administrator}

- User without a password is restricted by the Locked Access Level \textcolor{red}{LoC.L}.
- A User with a password is restricted by the Read Lockout Security \textcolor{red}{LoC.L} never having access to the Lock Menu \textcolor{red}{LoC}.
- An Administrator is restricted according to the Read Lockout Security \textcolor{red}{LoC.L} however, the Administrator has access to the Lock Menu where the Read Lockout can be changed.

\textbf{Modbus - Using Programmable Memory Blocks}

When using the Modbus protocol, the RMH features a block of addresses that can be configured by the user to provide direct access to a list of 80 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.

\textbf{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 controller.

**Assembly Working Addresses**

- Fixed addresses directly related to their associated "Assembly Definition Addresses" (e.g., 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 410 contains the Analog Input 1 Process Value (See Operations Page, Analog Input Menu). If the value 410 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 all registers are set to Hardware ID.

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

Using EZ-ZONE® Configurator Software

To enable a user to configure the RMH 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 RMH control click the next button to go online.

Note:
When establishing communications from PC to the RMH control 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 on-line.

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 RMH is shown high-
lighted (address 6) 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. After clicking on Setup and then Analog Input 1 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 (yellow 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 when first entering this screen it displays all of the available Pages (Setup, Operations and Factory) at a high level. After clicking on any of the available pages the sub menus and associated parameters for each will appear as shown above. The Page structure as laid out within this software follows:
- Setup
- Operations
- Factory

Navigating from one Page to the next is easy and clearly visible. Simply clicking on the plus symbol next to Setup will expand the Setup Page where all of the sub-menus will appear next. If a vertical scroll bar appears click on the up or down arrow to view all of the available menus on the selected page. 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 parameter does not apply for the type of sensor selected. As an example, notice that when RTD is selected, TC Linearization 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 operation to copy settings. If Analog Input 1 and 2 are the same type of sensor 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 RMH control 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 than appear.

![Save As Dialog Box](image)

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:

My Documents\Watlow\EZ-ZONE CONFIGURATOR\Saved Configurations

The user can save the file to any folder of choice.
Function Block Descriptions

Each of the next several pages graphically shows each of the RMH function blocks. Note that as you view each you will find text that is black and text that appears gray. The gray text represents inputs that are not currently available based on the function's defined use (red text). For instance when the defined use of the Analog Input function is set for RTD, TC Linearization will appear gray. Ranges specified in units or degrees F, if expressed in degrees C, range is smaller.

Analog Input Function

Note:

This Function configures and connects physical inputs to internal functions. Control Loop primary source instance must match Process Value or Analog Input instance.

### Analog Input Overview

- **Instances**: 1 - 16 per RMH
- **Analog Input Value**
- **Error**

<table>
<thead>
<tr>
<th>Sensor Type (optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off, Thermocouple, Millivolts, Volts, Milliamps, RTD 100 Ohm, RTD 1000 Ohm, 1K Potentiometer, Thermistor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TC Linearization</th>
</tr>
</thead>
<tbody>
<tr>
<td>B, C, D, E, F, J, K, N, R, S, T</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute, Power, Process, Relative</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scale Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>-100.00 to 1000.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1,999,000 to 9,999,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range High</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1,999,000 to 9,999,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Process Error Enable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off, Low</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Process Error Low Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-100.00 to 1,000.00</td>
</tr>
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<table>
<thead>
<tr>
<th>Thermistor Curve</th>
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</thead>
<tbody>
<tr>
<td>Curve A, Curve B, Curve C, Custom</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Resistance Range</th>
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</thead>
<tbody>
<tr>
<td>5k, 10k, 20k, 40k</td>
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<table>
<thead>
<tr>
<th>Filter</th>
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<tbody>
<tr>
<td>0.0 to 60.0 seconds</td>
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</table>

<table>
<thead>
<tr>
<th>Input Error Latching</th>
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</thead>
<tbody>
<tr>
<td>Off, On</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Display Precision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole, Tenths, Hundredths, Thousandths</td>
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</table>

<table>
<thead>
<tr>
<th>Calibration Offset</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1,999,000 to 9,999,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analog Input Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1,999,000 to 9,999,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Not Sourced</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analog Input Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1,999,000 to 9,999,000</td>
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<table>
<thead>
<tr>
<th>Calibration Offset</th>
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</thead>
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<td>-1,999,000 to 9,999,000</td>
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<table>
<thead>
<tr>
<th>Input Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Not Sourced</td>
</tr>
</tbody>
</table>

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Process Value Function

The Process Value (PV) function block accepts multiple inputs and performs a programmed math function to derive an output value with Filter and Offset values applied. It is assumed that no input error conditions apply. Some PV operations must be performed in the user's units. Functions may combine multiple inputs. Those inputs may have incompatible units from a logical point of view. As a result, unless otherwise indicated, the presentation of the output value is the same as Source A. This accommodates temperatures being multiplied, divided and offset by constants and process inputs. Only inputs that have a source associated to them are used in the calculations.

An error, when read, can indicate any of the following: None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Math Error, Not Sourced, Stale

---

Source Function A
Source Instance A
Source Error A
Source Function B
Source Instance B
Source Zone B
Source Error B
Source Function C
Source Instance C
Source Zone C
Source Error C
Source Function D
Source Instance D
Source Zone D
Source Error D
Source Function E
Source Instance E
Source Zone E
Source Error E

---

Process Value Overview

Instances - 16 per RMH

---

Filter
Offset
Pressure Units
Altitude Units
Barometric Pressure
Cross Over Point
Cross Over Band
Function
Filter Offset
Output Value
Error

---

Source Value A
Source Value B
Source Value C
Source Value D
Source Value E

---

Temperature
Humidity
Pressure
Altitude

---

Pressure Units: PSI, Torr, mBar, Atmosphere, Pascal
Altitude Units: Feet, Kilofeet
Barometric Pressure: 10.0 to 16.0
Filter: 0.0 to 60.0 seconds
Offset: -1,999.000 to 9,999.000

---

Source A Value: -1,999.000 to 9,999.000
Source B Value: -1,999.000 to 9,999.000
Source C Value: -1,999.000 to 9,999.000
Source D Value: -1,999.000 to 9,999.000
Source E Value: Off, On

---

Output Value

---

Function: Off, Sensor Backup, Average, Crossover, Wet Bulb/Dry Bulb, Switch Over, Differential, Ratio, Add, Multiply, Absolute Difference, Minimum, Maximum, Square Root, Vaisala RH Compensation, Pressure to Altitude

Filter Offset: -1,999.000 to 9,999.000
Output Value: -1,999.000 to 9,999.000
Output Value = Filter \[ A + \text{Offset} \]
Display units follows Source A

Process Value
- Off

Process Value
- Sensor Backup

Process Value
- Average

Process Value
- Crossover

Output Value = Filter \[ \text{first assigned Source without an error} + \text{Offset} \]

Output Value = Filter \[ (\text{Average } (A + B + C + D)) + \text{Offset} \]
Display units follows the last source that is temperature else follow Source A

If \( A \leq \) Cross Over Point - \( (\text{Cross Over Band} / 2) \) THEN
Output Value = Filter \[ (A + \text{Offset}) \]
If \( A \geq \) Cross Over Point + \( (\text{Cross Over Band} / 2) \) THEN
Output Value = Filter \[ (B + \text{Offset}) \]
Output Value = Filter \[ (A \times X) + (B \times (1-X)) + \text{Offset} \]
Where variable \( X = \) \[ (\text{Cross Over Point} + (\text{Cross Over Band} / 2) \) - \( A) / \text{Cross Over Band} \]
Output Value = Filter \[\text{Calculated Humidity} + \text{Offset}\] where
Source A is the Dry Bulb and Source B is the Wet Bulb.
Note: Wet/Dry bulb temperatures are in degrees F and pressures are in PSI. Output Value is % relative humidity. Useful temperature range is 10 to 350°F.
### Chapter 6 Features

#### Output Value = \( \text{Filter} \left[ (A + B + C + D) + \text{Offset} \right] \)
Display units follow last temperature source else follow Source A

#### Output Value = \( \text{Filter} \left[ |A - B| + \text{Offset} \right] \)
Display units follow Source A plus relative Source B

#### Output Value = \( \text{Filter} \left[ \text{Minimum Value} (A : B : C : D) + \text{Offset} \right] \)
Display units follow Source with minimum value.
### Process Value

- **Maximum**

- **Square Root**

- **Vaisala RH Compensation**

- **Pressure to Altitude**

Output Value = Filter [Maximum Value (A : B : C : D) + Offset]
Display units follows Source with maximum value.

Output Value = Filter [Calculated RH compensated for temperature + Offset].
Note: Source A is RH measured value from an uncompensated Vaisala RH sensor. Source B is temperature of the RH sensor in degrees F. The result is a “corrected” RH measured value. This calculation is effective over the temperature range of -75F to 350F.

Output Value = Filter [Convert Source A in Pressure to Altitude + Offset]
Note: Pressure Altitude calculation is based on the International Standard Atmosphere 1976. Source A is a pressure signal and needs to be in PSI units for the calculation. The calculation is accurate from sea level to 90,000 feet. The standard is based on an altitude of 0 feet (sea level) pressure of 14.6967 PSI and a temperature of 59 degrees F. Result of calculation is in feet.
### Linearization Function

An error, when read, can indicate any of the following:
- None
- Open
- Shorted
- Measurement Error
- Bad Cal Data
- Stale
- Ambient Error
- RTD Error
- Fail
- Math Error
- Not Sourced

### Output Function

This function configures and connects physical outputs to internal functions.

**Note:**
- Digital Outputs not included on these sheets

An error, when read, can indicate any of the following:
- None
- Open
- Shorted
- Measurement Error
- Bad Cal Data
- Stale
- Ambient Error
- RTD Error
- Fail
- Math Error
- Not Sourced

### Setup Page

- **Source Error A**
- **Source Zone A**
- **Source Instance A**
- **Source Function A**

**Error**

### Linearization Menu

- **Linearization**
- **Source Error A**
- **Source Zone A**
- **Source Instance A**
- **Source Function A**

**Instances - 24 per RMH**

### Operation Page

- **Output Value**
- **Offset**
- **Source A Value**

**Data**

### Overview

- **Output Function Instance**
- **Output Function**
- **Output Overview**

**Instances - 0 to 8 per RMH**

### Diagrams

- Linearization - Off
- Linearization - Interpolated
- Linearization - Stepped
**Alarm Function**

This function's output changes state when Alarm Source exceeds Alarm Set Point.

An error, when read, can indicate any of the following:
- None
- Open
- Shorted
- Measurement Error
- Bad Cal Data
- Ambient Error
- Fail
- Not Sourced
- Silenced: No, Yes
- Alarm Latched: No, Yes
- Alarm Clearable: No, Yes
- Alarm Working Process Value: -1,999,000 to 9,999,000
- Alarm Working Set Point: -1,999,000 to 9,999,000

The alarm function causes outputs to change state when Alarm Source exceeds alarm set points.

If Alarm Type = Off, Output Value = Off
If Alarm State = None, Alarm Indication = None
Digital Input/Output Function

Note:
Input Value is passed to either profile event inputs or action function blocks.

If Alarm Type = Process THEN Alarm Variable = Process Value

If Alarm Type = Deviation THEN Alarm Variable = Process Value - Closed Loop Set Point + Alarm Set Point

Input Value

Digital Input Function

If an error, when read, can indicate any of the following:
None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Math Error, Not Sourced, Stale
Digital Input/Output Function (cont.)

Output Value is determined by Source A and Digital Output Function

---

Digital Output

Instances 1 - 12 per RMH

---

Action Function

The Action Function selected will execute when Source Function A = ON and Active Level = High. Based on a given input (Digital, Event output, Logic function, etc.), the Action function can cause other functions to occur. To name a few, starting and stopping a profile, silencing alarms, turn control loops off and placing alarms in non-alarm state.

Note:

Action Function selection is module type and part number dependant.

---

Digital Output Value: On, Off

An error, when read, can indicate any of the following:
None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Math Error, Not Sourced, Stale
Control Function

Control Overview

Idle Set Point: -1,999.000 to 9,999.000
Time Derivative: 0 to 9,999 seconds
Time Integral: 0 to 9,999 seconds
Cool Hysteresis: 0.001 to 9,999.000
Open Loop Set Point: -100.0 to 100.0 %
Deadband: -1,000.000 to 1,000.000
Set Point Limit: -100.0 to 100.0 %
High Set Point: -1,999.000 to 9,999.000
Low Set Point: -1,999.000 to 9,999.000
Ramp Rate: 0.000 to 9,999.000
Remote Set Point Type: Auto, Manual
Control Mode: Off, Auto, Manual
Remote Set Point Enable: No, Yes
Cool Algorithm: Off, PID, On/Off
Heat Algorithm: Off, PID, On/Off
Cool Algorithm: Off, PID, On/Off
Heat Algorithm: Off, PID, On/Off
Cool Proportional Band: 0.001 to 9,999.000
Heat Proportional Band: 0.001 to 9,999.000
Cool Hysteresis: 0.001 to 9,999.000
Heat Hysteresis: 0.001 to 9,999.000
Set Point Limit: -100.0 to 100.0 %
Open High Set Point: -1,999.000 to 9,999.000
Open Low Set Point: -1,999.000 to 9,999.000
Ramp Scale: Hours, Minutes
Ramp Action: Off, Startup, Set Point, Both
Ramp Rate: 0.000 to 9,999.000
Loop Error Clear Request: Ignore, Clear
Loop Power: -100.0 to 100.0 %
Loop Status: Off, Cross 1 Positive, Cross 1 Negative, Cross 2 Positive, Cross 2 Negative, Cross 3 Positive, Cross 3 Negative, Measuring Max, Measuring Min, Calculating, Complete, Timeout

Note:
Control Loop primary source instance must match Process Value or Analog Input instance
Global Function

### Global Overview
Instances - 1 per RMH

#### Display Units
- F
- C

#### AC Line Frequency
- 50 Hz
- 60 Hz

#### Display Pairs
- 1 to 10

#### User Settings Save
- None
- User Set 1
- User Set 2

#### User Settings Restore
- None
- User Set 1
- User Set 2
- Factory

---

Logic Function

<table>
<thead>
<tr>
<th>Source Function A</th>
<th>Source Function B</th>
<th>Source Function C</th>
<th>Source Function D</th>
<th>Source Function E</th>
<th>Source Function F</th>
<th>Source Function G</th>
<th>Source Function H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Value A</td>
<td>Source Value B</td>
<td>Source Value C</td>
<td>Source Value D</td>
<td>Source Value E</td>
<td>Source Value F</td>
<td>Source Value G</td>
<td>Source Value H</td>
</tr>
</tbody>
</table>

#### Logic Overview
Instances - 24 per RMH

---

Function Error Handling

- Off
- On

---

Output Value

---

An error, when read, can indicate any of the following:
- None
- Open
- Shorted
- Measurement Error
- Bad Cal Data
- Ambient Error
- RTD Error
- Fail
- Math Error
- Not Sourced
- Stale

---

Chapter 6 Features
Function Error Handling

A * B + C + D * E * F + G * H = ON

Function Error Handling

A + B + C + D + E + F + G + H = ON
### Logic

**Not Equal**

If $A \neq B \neq C \neq D \neq E \neq F \neq G \neq H$ then ON

**Latch**

Output Value follows A, unless $B = ON$. When input $B$ is on, the output will be latched on.

**RS Flip Flop**

A negative to positive transition on input $A$ sets Output Value ON and a negative to positive transition on input $B$ resets Output Value OFF.
The Math function block accepts multiple inputs and performs a programmed math function to derive an output value with Filter and Offset values applied. Some math operations must be performed in the user’s units. Functions may combine multiple inputs. Those inputs may have incompatible units from a logical point of view. As a result, unless otherwise indicated, the presentation of the output value is the same as Source A. This accommodates temperatures being multiplied, divided and offset by constants and process inputs.

Only inputs pointed to a source are used in the calculations.

An error, when read, can indicate any of the following: None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Math Error, Not Sourced, Stale
<table>
<thead>
<tr>
<th>Source Function A</th>
<th>Source Value A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Instance A</td>
<td>Source Value B</td>
</tr>
<tr>
<td>Source Error A</td>
<td>Source Value C</td>
</tr>
<tr>
<td>Source Zone A</td>
<td>Source Value D</td>
</tr>
<tr>
<td>Source Function B</td>
<td>Source Value E</td>
</tr>
<tr>
<td>Source Instance B</td>
<td>Source Zone B</td>
</tr>
<tr>
<td>Source Error B</td>
<td>Source Zone C</td>
</tr>
<tr>
<td>Source Function C</td>
<td>Source Zone D</td>
</tr>
<tr>
<td>Source Error C</td>
<td>Source Zone E</td>
</tr>
<tr>
<td>Source Zone C</td>
<td>Source Zone F</td>
</tr>
<tr>
<td>Source Function D</td>
<td>Source Zone G</td>
</tr>
<tr>
<td>Source Error D</td>
<td>Source Zone H</td>
</tr>
<tr>
<td>Source Zone D</td>
<td>Source Error E</td>
</tr>
<tr>
<td>Source Function E</td>
<td>Output Value</td>
</tr>
<tr>
<td>Source Instance E</td>
<td>Error</td>
</tr>
<tr>
<td>Source Zone E</td>
<td>Output Value</td>
</tr>
<tr>
<td>Source Error E</td>
<td>Error</td>
</tr>
</tbody>
</table>

Math Off

Output Value = Filter [A + Offset]
Display units follows Source A

Math Average

Output Value = Filter [(Average (A + B + C + D)) + Offset]
Display units follows the last source that is temperature otherwise, it will follow Source A

Math Process Scale

Output Value = Filter [A + Offset]
Output Value = (Range High - Range Low) / (Scale High - Scale Low) * (A - Scale Low) + Range Low + Offset
Scale Low/High and Range Low/High follows Source A display units.

Math Deviation Scale

Output Value = Filter [B + Offset]
Output Value = (Range High - Range Low) / (Scale High - Scale Low) * (A - Scale Low) + Range Low + B + Offset
Scale Low/High and Range Low/High follows Source A display units.
### Math

**Switch Over**

- If \( E = \text{OFF} \), \( \text{Output Value} = \text{Filter} \left[ A + \text{Offset} \right] \)
- If \( E = \text{ON} \), \( \text{Output Value} = \text{Filter} \left[ B + \text{Offset} \right] \)

Display units follows active source.

### Math

**Ratio**

- \( \text{Output Value} = \text{Filter} \left[ \frac{A}{B} + \text{Offset} \right] \)

If display units of Source A = Source B, no display units on output value, else follow Source A.

### Math

**Differential**

- \( \text{Output Value} = \text{Filter} \left[ A - B + \text{Offset} \right] \)

Display units follows Source A plus relative Source B.

### Math

**Add**

- \( \text{Output Value} = \text{Filter} \left[ A + B + C + D + \text{Offset} \right] \)

Display units follows last temperature source else follow Source A.
### Math

<table>
<thead>
<tr>
<th>Math</th>
<th>Source Function A</th>
<th>Source Instance A</th>
<th>Source Zone A</th>
<th>Source Error A</th>
<th>Source Function B</th>
<th>Source Instance B</th>
<th>Source Zone B</th>
<th>Source Error B</th>
<th>Source Function C</th>
<th>Source Instance C</th>
<th>Source Zone C</th>
<th>Source Error C</th>
<th>Source Function D</th>
<th>Source Instance D</th>
<th>Source Zone D</th>
<th>Source Error D</th>
<th>Source Function E</th>
<th>Source Instance E</th>
<th>Source Zone E</th>
<th>Source Error E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute Difference</td>
<td>Source Function A</td>
<td>Source Instance A</td>
<td>Source Zone A</td>
<td>Source Error A</td>
<td>Source Function B</td>
<td>Source Instance B</td>
<td>Source Zone B</td>
<td>Source Error B</td>
<td>Source Function C</td>
<td>Source Instance C</td>
<td>Source Zone C</td>
<td>Source Error C</td>
<td>Source Function D</td>
<td>Source Instance D</td>
<td>Source Zone D</td>
<td>Source Error D</td>
<td>Source Function E</td>
<td>Source Instance E</td>
<td>Source Zone E</td>
<td>Source Error E</td>
</tr>
</tbody>
</table>

Output Value = Filter \([A \times B + C \times D] + \text{Offset}\)
Display units follow last temperature source
else follow Source A

- **Source Function A**
- **Source Instance A**
- **Source Zone A**
- **Source Error A**
- **Source Function B**
- **Source Instance B**
- **Source Zone B**
- **Source Error B**
- **Source Function C**
- **Source Instance C**
- **Source Zone C**
- **Source Error C**
- **Source Function D**
- **Source Instance D**
- **Source Zone D**
- **Source Error D**
- **Source Function E**
- **Source Instance E**
- **Source Zone E**
- **Source Error E**

### Absolute Difference

Output Value = Filter \([A - B] + \text{Offset}\)
Display units follow Source A plus relative Source B
Output Value = Filter [SqrRoot A + Offset]
Display units follows Source A

Note:
Pressure Altitude calculation is based on the International Standard Atmosphere 1976. Source A is a pressure signal and needs to be in PSI units for the calculation. The calculation is accurate from sea level to 90,000 feet. It can be used beyond this range in both directions, but with loss of accuracy. The standard is based on an altitude of 0 feet (sea level) pressure of 14.6967 PSI and a temperature of 59 degrees F. Result of calculation is in feet.
Output Value = Filter [Convert Source A in Pressure to Altitude + Offset]

If E = OFF, Output Value = Filter [A + Offset]
If E = ON, Output Value = Filter [last value of A + Offset]
Display units follows Source A

Note:
For dewpoint, Source A is temperature (F) and Source B is RH (%). Saturation pressure calculation is identical to that used in wet/dry bulb. Result is in degrees F.
Timer Function

Source Function A | Source Value A
---|---
Source Instance A | Source Value B
Source Zone A | Source Error A
Source Error A | Output Value
Source Function B | Error
Source Instance B |
Source Zone B |
Source Error B |

Timer
Overview
Instances: 24 per RMH

Function
Source Function A (Timer Run): None, Alarm, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Logic, Special Function 1 to 4, Timer, Variable
Source Function B (Timer Reset): Digital I/O, Profile Event Out A to H, Function Key, Logic, Special Function Output 1 to 4, Timer, Variable

Source A: 0 to 16 Zone
Source B: 0 to 16 Zone

Source A: 1 to 250 Instance
Source B: 1 to 250 Instance

Source A: Off, On Value
Source B: Off, On Value

Elapsed Time: 0.0 to 9,999.000 seconds
Time: 0 to 9,999 seconds

Output Value = OFF

Function
Output Value = OFF

Active Level: High, Low

An error, when read, can indicate any of the following:
None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Math Error, Not Sourced, Stale
Timer
On Pulse

Timing Diagram of On Pulse with active state rising edge

Source A (Run) \( S_{CA} \)
Source Active State A \( S_{AS} \) : High
Source Value A \( S_{SR} \)

Active Level \( L_E \) : High
Output Value \( o \)

Active Level \( L_E \) : Low
Output Value \( u \)

Elapsed Time \( E_t \)

Time \( t \)

Timing Diagram of On Pulse with active state falling edge

Source A (Run) \( S_{CA} \)
Source Active State A \( S_{AS} \) : Low
Source Value A \( S_{SR} \)

Active Level \( L_E \) : High
Output Value \( o \)

Active Level \( L_E \) : Low
Output Value \( u \)

Elapsed Time \( E_t \)

Time \( t \)
## Chapter 6 Features

### Timer

<table>
<thead>
<tr>
<th>Source Function A</th>
<th>Source Value A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Instance A</td>
<td>Source Value B</td>
</tr>
<tr>
<td>Source Zone A</td>
<td>Elapsed Time</td>
</tr>
<tr>
<td>Source Error A</td>
<td>Output Value</td>
</tr>
<tr>
<td>Source Function B</td>
<td>Error</td>
</tr>
<tr>
<td>Source Instance B</td>
<td>Source Zone B</td>
</tr>
<tr>
<td>Source Error B</td>
<td>Source Zone A</td>
</tr>
</tbody>
</table>

### Delay

Source A

<Diagram of delay functions>

---

The above diagrams illustrate the operation of the Timer and Delay functions in the context of the Watlow EZ-ZONE® RMH Module. The features are designed to control and monitor the state and value of various sources, including active states, function, instance, zone, and error values, with outputs that can be adjusted based on the input conditions.
Chapter 6 Features

Timer

One Shot

Source Function A
Source Instance A
Source Zone A
Source Error A
Source Function B
Source Instance B
Source Zone B
Source Error B

Source Value A
Source Value B
Elapsed Time
Output Value
Error

Active Level
Source Active State A
Source Active State B
Time

Elapsed Time

Output Value

Error
Chapter 6 Features

Timer
Retentive

- Source Function A
- Source Instance A
- Source Zone A
- Source Error A
- Source Function B
- Source Instance B
- Source Zone B
- Source Error B

Source Active State A
Source Active State B
Active Level
Time

Source Value A
Source Value B
Elapsed Time
Output Value
Error

Elapsed Time

Output Value
Counter Function

Function counts up or down from Load Value and produces Output Value = On when Count = Target Value.

Note:
Count value clears on power loss.
Load Value restored on power up.

Counter Operation:
Whenever a prescribed clock transition occurs without an error on source B the count will be equal to the Load Value.

Up Counter:
Whenever a prescribed clock transition occurs without an error on Source B the count will increment by +1. If the count is equal to 9,999 when the transition occurs count will be 1 after transition.

Down Counter:
Whenever a prescribed clock transition occurs without an error on Source B the count will decrement by -1. If the count is equal to 0 when the transition occurs the count will be 9,999 after transition.

An error, when read, can indicate any of the following:
None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Math Error, Not Sourced, Stale

Variable Function

Variable Overview
Instances - 24 per RMH

An error, when read, can indicate any of the following:
None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Math Error, Not Sourced, Stale

Digital

Analog

Data Type: Analog, Digital

Digital Value: On, Off

Analog Value: -1,999.000 to 9,999.000

Units: None, Absolute Temperature, Relative Temperature, Power, Process, Relative Humidity

Output Value: -1,999.000 to 9,999.000 or On or Off

Function passes stored value to output.

An error, when read, can indicate any of the following:
None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Math Error, Not Sourced, Stale
Compare Function

Compare Overview

Source Function A
Source Instance A
Source Zone A
Source Error A

Source Function B
Source Instance B
Source Zone B
Source Error B

Instances - 24 per RMH

Compare

Error Handling

Tolerance

Function

Output Value

Source Value A
Source Value B

A>B, Output Value = ON

Greater Than

Less Than

Equal To

Output Value

Source Value A
Source Value B

A<B, Output Value = ON

A=B, Output Value = ON

Off

No Compare, Output Value = OFF

Error Handling

Function

Source Function A
Source Instance A
Source Zone A
Source Error A

Source Function B
Source Instance B
Source Zone B
Source Error B

A>B, Output Value = ON

Less Than

Equal To

Compare Menu


Tolerance is expressed in same units as Source A.

Requires Source A and Source B to be without errors for function to work.

An error, when read, can indicate any of the following:

None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Math Error, Not Sourced, Stale
## Error Handling Function

### Tolerance

**Output Value** = ON

**Error**

### Compare

**Not Equal To**

<table>
<thead>
<tr>
<th>Source Function A</th>
<th>Source Zone A</th>
<th>Source Error A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Function B</td>
<td>Source Zone B</td>
<td>Source Error B</td>
</tr>
</tbody>
</table>

A not equal B, Output Value = ON

### Compare

**Greater or Equal**

<table>
<thead>
<tr>
<th>Source Function A</th>
<th>Source Zone A</th>
<th>Source Error A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Function B</td>
<td>Source Zone B</td>
<td>Source Error B</td>
</tr>
</tbody>
</table>

A >= B, Output Value = ON

### Compare

**Less or Equal**

<table>
<thead>
<tr>
<th>Source Function A</th>
<th>Source Zone A</th>
<th>Source Error A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Function B</td>
<td>Source Zone B</td>
<td>Source Error B</td>
</tr>
</tbody>
</table>

A <= B, Output Value = ON

---

### Custom Function

**Custom Overview**

- **Instances** - 50 per RMH

### Security Function

**Security Function Block**

**Overview**

- **Instances** - 1 per RMH

**Security Function Block**

- **Factory Page**
- **Custom Menu**

**Parameter**:


**Instance ID**: 1 to 24

**Custom Menu**

**Factory Page**

**Lock Menu**

**Unlock Menu**

**Public Key**

**Password**

**Profiling Page**

**Read Lock**

**Write Security**

**Locked Access Level**

**Rolling Password**

**User Password**

**Administrator Password**

Note:

- Set on a Zone by Zone basis. This is independent of the RUI Security Setting.

If the Password is enabled, the user must enter the Password to get to menus that have been blocked due to lock level settings. Rolling passwords require a new password each time the power has been cycled to the controller. It will be different for every controller. The administrator password is required to change the security settings even if the user enters their password to override the security settings.
Diagnostic Function

Diagnostics Overview

- Part Number
- Software Revision
- Software Build Number
- Serial Number
- Date of Manufacture
- Hardware ID
- Device Status

Instances - 1 per RMH

Device Name: EZ-ZONE RM

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Software Revision</th>
<th>Software Build Number</th>
<th>Serial Number</th>
<th>Date of Manufacture</th>
<th>Hardware ID</th>
<th>Device Status</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

Hardware ID: 113 (RMH)
Device Status: OK, Fail
Device Name: EZ-ZONE RM
Chapter 10: Appendix

Modbus - Programmable Memory Blocks

The Modbus assembly contains 40 pointers to the parameters of your choosing starting at Modbus register 40 (shown on the following page). The pointers are 32-bits long so are stored in two sequential registers. As an example, if we want to move an alias to the analog input of the RMH (register 380) into register 40, we perform a multiple write command (0x10 function) of 380 into register 40 and 381 into register 41 as a single multi-write command.

Once the parameters of choice have been defined and written to the pointer registers, the working registers 200 to 279 then represent those parameters. Therefore, as in the example above, if 380 is in register 40, 381 in register 41, register 200 & 201 contains the 32-bit floating point result for analog input 1.

The screen shot above was taken from a program that can be found on the Watlow Support Tools DVD (shipped with the product) as well as on the Watlow website. On the DVD, it can be found under "Utility Tools" and is identified as "Modbus RTU Diagnostic Program for EZ-ZONE PM, RM and ST". A similar program can be found here as well for a connection utilizing Ethernet TCP.

If it is easier to go to the web to acquire this software click on the link below and type "modbus" in the search field where both versions can be found with the same name. http://www.watlow.com/literature/software.cfm
### Assembly Pointer Registers and Assembly Working Registers

<table>
<thead>
<tr>
<th>Definition Addresses</th>
<th>Working Addresses</th>
<th>Definition Addresses</th>
<th>Working Addresses</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 &amp; 41</td>
<td>200 &amp; 201</td>
<td>120 &amp; 121</td>
<td>280 &amp; 281</td>
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<tr>
<td>42 &amp; 43</td>
<td>202 &amp; 203</td>
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<td>198 &amp; 199</td>
<td>358 &amp; 359</td>
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</tbody>
</table>
Modbus Default Assembly Structure 40-119

Assembly Definition Addresses
Default Pointers
Registers 40 & 41
Pointer 1 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 200 & 201
Value of Pointer 1

Assembly Definition Addresses
Default Pointers
Registers 42 & 43
Pointer 2 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 202 & 203
Value of Pointer 2

Assembly Definition Addresses
Default Pointers
Registers 44 & 45
Pointer 3 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 204 & 205
Value of Pointer 3

Assembly Definition Addresses
Default Pointers
Registers 46 & 47
Pointer 4 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 206 & 207
Value of Pointer 4

Assembly Definition Addresses
Default Pointers
Registers 48 & 49
Pointer 5 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 208 & 209
Value of Pointer 5

Assembly Definition Addresses
Default Pointers
Registers 50 & 51
Pointer 6 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 210 & 211
Value of Pointer 6

Assembly Definition Addresses
Default Pointers
Registers 52 & 53
Pointer 7 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 212 & 213
Value of Pointer 7

Assembly Definition Addresses
Default Pointers
Registers 54 & 55
Pointer 8 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 214 & 215
Value of Pointer 8

Assembly Definition Addresses
Default Pointers
Registers 56 & 57
Pointer 9 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 216 & 217
Value of Pointer 9

Assembly Definition Addresses
Default Pointers
Registers 58 & 59
Pointer 10 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 218 & 219
Value of Pointer 10

Assembly Definition Addresses
Default Pointers
Registers 60 & 61
Pointer 11 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 220 & 221
Value of Pointer 11

Assembly Definition Addresses
Default Pointers
Registers 62 & 63
Pointer 12 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 222 & 223
Value of Pointer 12

Assembly Definition Addresses
Default Pointers
Registers 64 & 65
Pointer 13 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 224 & 225
Value of Pointer 13

Assembly Definition Addresses
Default Pointers
Registers 66 & 67
Pointer 14 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 226 & 227
Value of Pointer 14

Assembly Definition Addresses
Default Pointers
Registers 68 & 69
Pointer 15 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 228 & 229
Value of Pointer 15

Assembly Definition Addresses
Default Pointers
Registers 70 & 71
Pointer 16 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 230 & 231
Value of Pointer 16

Assembly Definition Addresses
Default Pointers
Registers 72 & 73
Pointer 17 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 232 & 233
Value of Pointer 17

Assembly Definition Addresses
Default Pointers
Registers 74 & 75
Pointer 18 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 234 & 235
Value of Pointer 18

Assembly Definition Addresses
Default Pointers
Registers 76 & 77
Pointer 19 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 236 & 237
Value of Pointer 19

Assembly Definition Addresses
Default Pointers
Registers 78 & 79
Pointer 20 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 238 & 239
Value of Pointer 20

Assembly Definition Addresses
Default Pointers
Registers 80 & 81
Pointer 21 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 240 & 241
Value of Pointer 21

Assembly Definition Addresses
Default Pointers
Registers 82 & 83
Pointer 22 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 242 & 243
Value of Pointer 22

Assembly Definition Addresses
Default Pointers
Registers 84 & 85
Pointer 23 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 244 & 245
Value of Pointer 23

Assembly Definition Addresses
Default Pointers
Registers 86 & 87
Pointer 24 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 246 & 247
Value of Pointer 24

Assembly Definition Addresses
Default Pointers
Registers 88 & 89
Pointer 25 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 248 & 249
Value of Pointer 25

Assembly Definition Addresses
Default Pointers
Registers 90 & 91
Pointer 26 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 250 & 251
Value of Pointer 26

Assembly Definition Addresses
Default Pointers
Registers 92 & 93
Pointer 27 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 252 & 253
Value of Pointer 27

Assembly Definition Addresses
Default Pointers
Registers 94 & 95
Pointer 28 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 254 & 255
Value of Pointer 28

Assembly Definition Addresses
Default Pointers
Registers 96 & 97
Pointer 29 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 256 & 257
Value of Pointer 29

Assembly Definition Addresses
Default Pointers
Registers 98 & 99
Pointer 30 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 258 & 259
Value of Pointer 30

Assembly Definition Addresses
Default Pointers
Registers 100 & 101
Pointer 31 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 260 & 261
Value of Pointer 31

Assembly Definition Addresses
Default Pointers
Registers 102 & 103
Pointer 32 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 262 & 263
Value of Pointer 32

Assembly Definition Addresses
Default Pointers
Registers 104 & 105
Pointer 33 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 264 & 265
Value of Pointer 33

Assembly Definition Addresses
Default Pointers
Registers 106 & 107
Pointer 34 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 266 & 267
Value of Pointer 34

Assembly Definition Addresses
Default Pointers
Registers 108 & 109
Pointer 35 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 268 & 269
Value of Pointer 35

Assembly Definition Addresses
Default Pointers
Registers 110 & 111
Pointer 36 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 270 & 271
Value of Pointer 36

Assembly Definition Addresses
Default Pointers
Registers 112 & 113
Pointer 37 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 272 & 273
Value of Pointer 37

Assembly Definition Addresses
Default Pointers
Registers 114 & 115
Pointer 38 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 274 & 275
Value of Pointer 38

Assembly Definition Addresses
Default Pointers
Registers 116 & 117
Pointer 39 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 276 & 277
Value of Pointer 39

Assembly Definition Addresses
Default Pointers
Registers 118 & 119
Pointer 40 = 0 & 1
Hardware ID

Assembly Working Addresses
Registers 278 & 279
Value of Pointer 40
Modbus Default Assembly Structure 120-199

Assembly Definition Registers

Default Pointers

Registers 120 & 121

Pointer 41 = 0 & 1 Hardware ID

Registers 280 & 281

Value of Pointer 41

Registers 122 & 123

Pointer 42 = 0 & 1 Hardware ID

Registers 282 & 283

Value of Pointer 42

Registers 124 & 125

Pointer 43 = 0 & 1 Hardware ID

Registers 284 & 285

Value of Pointer 43

Registers 126 & 127

Pointer 44 = 0 & 1 Hardware ID

Registers 286 & 287

Value of Pointer 44

Registers 128 & 129

Pointer 45 = 0 & 1 Hardware ID

Registers 288 & 289

Value of Pointer 45

Registers 130 & 131

Pointer 46 = 0 & 1 Hardware ID

Registers 290 & 291

Value of Pointer 46

Registers 132 & 133

Pointer 47 = 0 & 1 Hardware ID

Registers 292 & 293

Value of Pointer 47

Registers 134 & 135

Pointer 48 = 0 & 1 Hardware ID

Registers 294 & 295

Value of Pointer 48

Registers 136 & 137

Pointer 49 = 0 & 1 Hardware ID

Registers 296 & 297

Value of Pointer 49

Registers 138 & 139

Pointer 50 = 0 & 1 Hardware ID

Registers 298 & 299

Value of Pointer 50

Registers 140 & 141

Pointer 51 = 0 & 1 Hardware ID

Registers 300 & 301

Value of Pointer 51

Registers 142 & 143

Pointer 52 = 0 & 1 Hardware ID

Registers 302 & 303

Value of Pointer 52

Registers 144 & 145

Pointer 53 = 0 & 1 Hardware ID

Registers 304 & 305

Value of Pointer 53

Registers 146 & 147

Pointer 54 = 0 & 1 Hardware ID

Registers 306 & 307

Value of Pointer 54

Registers 148 & 149

Pointer 55 = 0 & 1 Hardware ID

Registers 308 & 309

Value of Pointer 55

Registers 150 & 151

Pointer 56 = 0 & 1 Hardware ID

Registers 310 & 311

Value of Pointer 56

Registers 152 & 153

Pointer 57 = 0 & 1 Hardware ID

Registers 312 & 313

Value of Pointer 57

Registers 154 & 155

Pointer 58 = 0 & 1 Hardware ID

Registers 314 & 315

Value of Pointer 58

Registers 156 & 157

Pointer 59 = 0 & 1 Hardware ID

Registers 316 & 317

Value of Pointer 59

Registers 158 & 159

Pointer 60 = 0 & 1 Hardware ID

Registers 318 & 319

Value of Pointer 60

Assembly Working Registers

Registers 280 & 281

Value of Pointer 41

Registers 282 & 283

Value of Pointer 42

Registers 284 & 285

Value of Pointer 43

Registers 286 & 287

Value of Pointer 44

Registers 288 & 289

Value of Pointer 45

Registers 290 & 291

Value of Pointer 46

Registers 292 & 293

Value of Pointer 47

Registers 294 & 295

Value of Pointer 48

Registers 296 & 297

Value of Pointer 49

Registers 298 & 299

Value of Pointer 50

Registers 300 & 301

Value of Pointer 51

Registers 302 & 303

Value of Pointer 52

Registers 304 & 305

Value of Pointer 53

Registers 306 & 307

Value of Pointer 54

Registers 308 & 309

Value of Pointer 55

Registers 310 & 311

Value of Pointer 56

Registers 312 & 313

Value of Pointer 57

Registers 314 & 315

Value of Pointer 58

Registers 316 & 317

Value of Pointer 59

Registers 318 & 319

Value of Pointer 60

Modbus Default Assembly Structure 120-199

Assembly Definition Registers

Default Pointers

Registers 160 & 161

Pointer 61 = 0 & 1 Hardware ID

Registers 320 & 321

Value of Pointer 61

Registers 162 & 163

Pointer 62 = 0 & 1 Hardware ID

Registers 322 & 323

Value of Pointer 62

Registers 164 & 165

Pointer 63 = 0 & 1 Hardware ID

Registers 324 & 325

Value of Pointer 63

Registers 166 & 167

Pointer 64 = 0 & 1 Hardware ID

Registers 326 & 327

Value of Pointer 64

Registers 168 & 169

Pointer 65 = 0 & 1 Hardware ID

Registers 328 & 329

Value of Pointer 65

Registers 170 & 171

Pointer 66 = 0 & 1 Hardware ID

Registers 330 & 331

Value of Pointer 66

Registers 172 & 173

Pointer 67 = 0 & 1 Hardware ID

Registers 332 & 333

Value of Pointer 67

Registers 174 & 175

Pointer 68 = 0 & 1 Hardware ID

Registers 334 & 335

Value of Pointer 68

Registers 176 & 177

Pointer 69 = 0 & 1 Hardware ID

Registers 336 & 337

Value of Pointer 69

Registers 178 & 179

Pointer 70 = 0 & 1 Hardware ID

Registers 338 & 339

Value of Pointer 70

Registers 180 & 181

Pointer 71 = 0 & 1 Hardware ID

Registers 340 & 341

Value of Pointer 71

Registers 182 & 183

Pointer 72 = 0 & 1 Hardware ID

Registers 342 & 343

Value of Pointer 72

Registers 184 & 185

Pointer 73 = 0 & 1 Hardware ID

Registers 344 & 345

Value of Pointer 73

Registers 186 & 187

Pointer 74 = 0 & 1 Hardware ID

Registers 346 & 347

Value of Pointer 74

Registers 188 & 189

Pointer 75 = 0 & 1 Hardware ID

Registers 348 & 349

Value of Pointer 75

Registers 190 & 191

Pointer 76 = 0 & 1 Hardware ID

Registers 350 & 351

Value of Pointer 76

Registers 192 & 193

Pointer 77 = 0 & 1 Hardware ID

Registers 352 & 353

Value of Pointer 77

Registers 194 & 195

Pointer 78 = 0 & 1 Hardware ID

Registers 354 & 355

Value of Pointer 78

Registers 196 & 197

Pointer 79 = 0 & 1 Hardware ID

Registers 356 & 357

Value of Pointer 79

Registers 198 & 199

Pointer 80 = 0 & 1 Hardware ID

Registers 358 & 359

Value of Pointer 80
## Troubleshooting Alarms, Errors and Module 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 will not clear or reset with keypad or digital input | • Alarm latching is active  
• Alarm set to incorrect output  
• Alarm is set to incorrect source  
• Sensor input is out of alarm set point range  
• Alarm set point is incorrect  
• Alarm is set to incorrect type  
• Digital input function is incorrect | • Reset alarm when process is within range or disable latching  
• Set output to correct alarm source instance  
• Set alarm source to correct input instance  
• Correct cause of sensor input out of alarm range  
• Set alarm set point to correct trip point  
• Set alarm to correct type: process, deviation or power  
• Set digital input function and source instance |
| Alarm won’t occur                    | Alarm will not activate output                   | • Alarm silencing is active  
• Alarm blocking is active  
• Alarm is set to incorrect output  
• Alarm is set to incorrect source  
• Alarm set point is incorrect  
• Alarm is set to incorrect type | • Disable alarm silencing, if required  
• Disable alarm blocking, if required  
• Set output to correct alarm source instance  
• Set alarm source to correct input instance  
• Set alarm set point to correct trip point  
• Set alarm to correct type: process, deviation or power |
| 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 |
| 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 |
| 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 |
<table>
<thead>
<tr>
<th>Indication</th>
<th>Description</th>
<th>Possible Cause(s)</th>
<th>Corrective Action</th>
</tr>
</thead>
</table>
| No Display | No display indication or LED illumination | • Power to controller is off  
• Fuse open  
• Breaker tripped  
• Safety interlock switch open  
• Separate system limit control activated  
• Wiring error  
• Incorrect voltage to controller | • Turn on power  
• Replace fuse  
• Reset breaker  
• Close interlock switch  
• Reset limit  
• Correct wiring issue  
• Apply correct voltage, check part number |
| No Serial Communication | Cannot establish serial communications with the controller | • Address parameter incorrect  
• Incorrect protocol selected  
• Baud rate incorrect  
• Parity incorrect  
• Wiring error  
• EIA-485 converter issue  
• Incorrect computer or PLC communications port  
• Incorrect software setup  
• Wires routed with power cables  
• Termination resistor may be required | • Set unique addresses on network  
• Match protocol between devices  
• Match baud rate between devices  
• Match parity between devices  
• Correct wiring issue  
• Check settings or replace converter  
• Set correct communication port  
• Correct software setup to match controller  
• Route communications wires away from power wires  
• Place 120 Ω resistor across EIA-485 on last controller |
| Device Error | Controller displays internal malfunction message at power up. | • Controller defective  
• Sensor input over driven | • Replace or repair controller  
• Check sensors for ground loops, reverse wiring or out of range values. |
| Heater Error | Heater Error | • Current through load is above current trip set point | • Check that the load current is proper. Correct cause of overcurrent and/or ensure current trip set point is correct. |
| Current Error | Load current incorrect. | • Shorted solid-state or mechanical relay  
• Open solid-state or mechanical relay  
• Current transformer load wire associated to wrong output  
• Defective current transformer or controller  
• Noisy electrical lines | • Replace relay  
• Replace relay  
• Route load wire through current transformer from correct output, and go to the Source Output Instance parameter (Setup Page, Current Menu) to select the output that is driving the load.  
• Replace or repair sensor or controller  
• Route wires appropriately, check for loose connections, add line filters |
| Remote User Interface (RUI) menus inaccessible | Unable to access Set, Oper, Fcty or Prof menus or particular prompts in Home Page | • Security set to incorrect level  
• Digital input set to lockout keypad  
• Custom parameters incorrect | • Check Loc settings in Factory Page  
• Enter appropriate password in ULoc setting in Factory Page  
• Change state of digital input  
• Change custom parameters in Factory Page |
<p>| RUI value to low | Value to low to be displayed in 4 digit LED display &lt;-1999 | • Incorrect setup | • Check scaling of source data |</p>
<table>
<thead>
<tr>
<th>Indication</th>
<th>Description</th>
<th>Possible Cause(s)</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>RUI value to high</td>
<td>Value to high to be displayed in 4 digit LED display &gt;9999</td>
<td>• Incorrect setup</td>
<td>• Check scaling of source data</td>
</tr>
</tbody>
</table>

### Detection of and Rules Around Abnormal Sensor Conditions

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Detection of Abnormal Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Thermocouple</strong></td>
<td></td>
</tr>
<tr>
<td>Shorted</td>
<td>No direct detection, Open loop firmware detection.</td>
</tr>
<tr>
<td>Open</td>
<td>Yes, Parasitic pull-up</td>
</tr>
<tr>
<td>Reversed</td>
<td>Yes, firmware detection</td>
</tr>
<tr>
<td><strong>Current Source</strong></td>
<td></td>
</tr>
<tr>
<td>Shorted</td>
<td>Range limiting only</td>
</tr>
<tr>
<td>Open</td>
<td>Range limiting only</td>
</tr>
<tr>
<td>Reversed</td>
<td>Range limiting only</td>
</tr>
<tr>
<td><strong>Voltage Source</strong></td>
<td></td>
</tr>
<tr>
<td>Open</td>
<td>Range limiting only</td>
</tr>
<tr>
<td>Shorted</td>
<td>Range limiting only</td>
</tr>
<tr>
<td>Reversed</td>
<td>Range limiting only</td>
</tr>
<tr>
<td><strong>RTD</strong></td>
<td></td>
</tr>
<tr>
<td>S1 open</td>
<td>Yes, pulled up.</td>
</tr>
<tr>
<td>S2 open</td>
<td>Not implemented.</td>
</tr>
<tr>
<td>S3 open</td>
<td>Yes, pulled up.</td>
</tr>
<tr>
<td>S1 short to S2</td>
<td>Yes, pulled up.</td>
</tr>
<tr>
<td>S1 short to S3</td>
<td>Yes, pulled down to under range.</td>
</tr>
<tr>
<td>S2 shorted to S3</td>
<td>Not implemented, Possible, monitor S2 voltage.</td>
</tr>
<tr>
<td>S1 and S2 open</td>
<td>Yes, pulled down to under range.</td>
</tr>
<tr>
<td>S1 and S3 open</td>
<td>Yes, S1 pulled up.</td>
</tr>
<tr>
<td>S2 and S3 open</td>
<td>Yes pulled up.</td>
</tr>
<tr>
<td><strong>Thermistor</strong></td>
<td></td>
</tr>
<tr>
<td>S1 open</td>
<td>Yes, pulled up to sensor over range.</td>
</tr>
<tr>
<td>S3 open</td>
<td>Yes, pulled up to sensor over range.</td>
</tr>
<tr>
<td>S1 short to S3</td>
<td>Yes, pulled down to sensor under range.</td>
</tr>
<tr>
<td>S1 and S3 open</td>
<td>Yes, S1 pulled up to sensor over range.</td>
</tr>
</tbody>
</table>
RMH Specifications

Line Voltage/Power
- 20.4 to 30.8V (ac/dc), 50/60Hz, ±5 percent
- Power consumption: 7 W, 14VA
- Any external power supply used should comply with a class 2 or SELV rating.
- Data retention upon power failure via nonvolatile memory
- Compliant with Semi F47-0200, Figure R1-1 voltage sag requirements

Environment
- 0 to 149°F (-18 to 65°C) operating temperature
- -40 to 185°F (-40 to 85°C) storage temperature
- 0 to 90 percent RH, non-condensing
- Rail Mount modules are considered to be open type equipment needing to be installed in a fire and shock protection enclosure, such as a NEMA Type 1 enclosure; unless all circuit connections are Class 2 or SELV (Safety Extra Low Voltage)

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®/EN 61010 listed c-UL C22.2 #61010 File E185611 QUXX, QUXX7
- EN 60529 IP20; RM modules
- UL® 50, Type 4X indoor use, EN 60529 IP66; 1/16 DIN RUI, NEMA 4X
- RoHS by design, W.E.E.
- CE

Serial Communications
- All modules ship with isolated Standard Bus protocol for configuration and communication connection to all other EZ-ZONE products. As an optional feature Modbus RTU can also be ordered.

Optional User Interface (RUI)
- 1/16 DIN
- Dual 4 digit, 7-segment LED displays
- Seven-segment address LED, programmed via push-button switch
- Keys: Advance, infinity, up, down keys, plus an EZ-KEY programmable function key
- Typical display update rate 1Hz

Maximum RMH Configuration
- Up to 16 loops per module with a maximum of 16 modules

Mounting
- DIN-rail specification EN50022, 35 x 7.5 mm (1.38 x 0.30 in.)
- Can be DIN-rail mounted or chassis mounted with customer-supplied fasteners

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>155.0 mm (6.10 in)</td>
<td>453.59 g (16 oz.)</td>
</tr>
<tr>
<td>116.08 mm (4.57 in)</td>
<td></td>
</tr>
</tbody>
</table>

Wiring Termination—Touch-Safe Terminals
- Right angle and front screw type terminal blocks (slots A, B, D, E)
  - Input, power and controller output terminals, touch-safe removable 12 to 30 AWG
  - Wire strip length 7.6 mm (0.30 in.)
  - Torque 0.8N.m (7.0 lb.-in.) right angle, 0.5N.m (4.51lb-in) front terminal block
  - Use solid or stranded copper conductors only

Connector | Dimension “A” (mm/in.) |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>148 (5.80)</td>
</tr>
<tr>
<td>Straight</td>
<td>155 (6.10)</td>
</tr>
</tbody>
</table>

Optional Accessories

Power Supplies
- AC/DC Power supply converter 90-264V~ (ac) to 24V= (dc) volts.
- P/N 0847-0299-0000: 31 W
- P/N 0847-0300-0000: 60 W
- P/N 0847-0301-0000: 91 W

EZ-ZONE RM Product Documentation
- User’s Guide, printed hard copy, P/N 0600-0074-0000
- Watlow Support Tools CD, P/N 0601-0001-0000

Universal Input
- Thermocouple, grounded or ungrounded sensors
- >20MΩ input impedance
- 3µA open sensor detection
- Max. of 2KΩ source resistance
- RTD 2 wire, platinum, 100Ω and 1000Ω @ 0°C calibration to DIN curve (0.00385Ω/Ω/°C)
- Process, 0-20mA @ 100Ω or 0-10V = (dc) @ 20kΩ input impedance; scalable, 0-50mA, 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
- Accuracy ±10mV ±1 LSD at standard conditions
- Temperature stability ±100 PPM/°C maximum

<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>J</td>
<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>
</tr>
<tr>
<td>T</td>
<td>±1.55</td>
<td>-50</td>
<td>350</td>
<td>Deg C</td>
</tr>
<tr>
<td>T</td>
<td>±2.10</td>
<td>-200</td>
<td>-50</td>
<td>Deg C</td>
</tr>
<tr>
<td>N</td>
<td>±2.25</td>
<td>0</td>
<td>1250</td>
<td>Deg C</td>
</tr>
<tr>
<td>E</td>
<td>±2.10</td>
<td>-200</td>
<td>900</td>
<td>Deg C</td>
</tr>
<tr>
<td>R</td>
<td>±3.90</td>
<td>0</td>
<td>1450</td>
<td>Deg C</td>
</tr>
<tr>
<td>S</td>
<td>±3.90</td>
<td>0</td>
<td>1450</td>
<td>Deg C</td>
</tr>
<tr>
<td>B</td>
<td>±2.66</td>
<td>870</td>
<td>1700</td>
<td>Deg C</td>
</tr>
<tr>
<td>C</td>
<td>±3.32</td>
<td>0</td>
<td>2315</td>
<td>Deg C</td>
</tr>
<tr>
<td>D</td>
<td>±3.32</td>
<td>0</td>
<td>2315</td>
<td>Deg C</td>
</tr>
<tr>
<td>F (PTII)</td>
<td>±2.39</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>
</tbody>
</table>
## Input Type

<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>mA ac</td>
<td>±5</td>
<td>0</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>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>-210</td>
<td>1200</td>
<td>DegC</td>
</tr>
<tr>
<td>K</td>
<td>-270</td>
<td>1371</td>
<td>DegC</td>
</tr>
<tr>
<td>T</td>
<td>-270</td>
<td>400</td>
<td>DegC</td>
</tr>
<tr>
<td>N</td>
<td>-270</td>
<td>1300</td>
<td>DegC</td>
</tr>
<tr>
<td>E</td>
<td>-270</td>
<td>1000</td>
<td>DegC</td>
</tr>
<tr>
<td>R</td>
<td>-50</td>
<td>1767</td>
<td>DegC</td>
</tr>
<tr>
<td>S</td>
<td>-50</td>
<td>1767</td>
<td>DegC</td>
</tr>
<tr>
<td>B</td>
<td>-50</td>
<td>1816</td>
<td>DegC</td>
</tr>
<tr>
<td>C</td>
<td>0</td>
<td>2315</td>
<td>DegC</td>
</tr>
<tr>
<td>D</td>
<td>0</td>
<td>2315</td>
<td>DegC</td>
</tr>
<tr>
<td>F (PTI1)</td>
<td>0</td>
<td>1343</td>
<td>DegC</td>
</tr>
<tr>
<td>RTD (100 ohm)</td>
<td>-200</td>
<td>800</td>
<td>DegC</td>
</tr>
<tr>
<td>RTD (1000 ohm)</td>
<td>-200</td>
<td>800</td>
<td>DegC</td>
</tr>
<tr>
<td>mV</td>
<td>0</td>
<td>50</td>
<td>mV</td>
</tr>
<tr>
<td>Volts</td>
<td>0</td>
<td>10</td>
<td>Volts</td>
</tr>
<tr>
<td>mA ac</td>
<td>0</td>
<td>50</td>
<td>mAmps AC</td>
</tr>
<tr>
<td>Resistance, 5K range</td>
<td>0</td>
<td>5000</td>
<td>Ohms</td>
</tr>
<tr>
<td>Resistance, 10K range</td>
<td>0</td>
<td>10000</td>
<td>Ohms</td>
</tr>
<tr>
<td>Resistance, 20K range</td>
<td>0</td>
<td>20000</td>
<td>Ohms</td>
</tr>
<tr>
<td>Resistance, 40K range</td>
<td>0</td>
<td>40000</td>
<td>Ohms</td>
</tr>
<tr>
<td>Resistance, 40K range</td>
<td>0</td>
<td>40000</td>
<td>Ohms</td>
</tr>
<tr>
<td>Potentiometer, 1K range</td>
<td>0</td>
<td>1200</td>
<td>Ohms</td>
</tr>
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### Thermistor Input

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<th>Accuracy Range Low</th>
<th>Accuracy Range High</th>
<th>Units</th>
</tr>
</thead>
<tbody>
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<td>Thermistor, 5K range</td>
<td>±5</td>
<td>0</td>
<td>5000</td>
<td>Ohms</td>
</tr>
<tr>
<td>Thermistor, 10K range</td>
<td>±10</td>
<td>0</td>
<td>10000</td>
<td>Ohms</td>
</tr>
</tbody>
</table>

### Thermistor Input (cont.)

<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, 20K range</td>
<td>±20</td>
<td>0</td>
<td>20000</td>
<td>Ohms</td>
</tr>
<tr>
<td>Thermistor, 40K range</td>
<td>±40</td>
<td>0</td>
<td>40000</td>
<td>Ohms</td>
</tr>
</tbody>
</table>

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

### Base R @ 25°C

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<th>Beta Techniques</th>
<th>YSI</th>
<th>Thermistor Curve</th>
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<td>Curve A</td>
<td>2.2K3A</td>
<td>004</td>
<td>A</td>
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<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>

### Digital Input

- Update rate 10Hz
- DC voltage
  - Max. input 36V at 3mA
  - Min. high state 3V at 0.25mA
  - Max. low state 2V

### Dry Contact

- Update rate 10Hz
- Min. open resistance 10kΩ
- Max. closed resistance 50Ω

### Output Hardware

- Electromechanical relay, Form A, 5A, 24 to 240V~ (ac) or 30V= (dc) max., resistive load, 100,000 cycles at rated load. Requires a min. load of 20mA at 24V, 120/240 V~ (ac) 125VA, 24V~ (ac) 25VA pilot duty
- Digital outputs
  - Update rate 10Hz
  - Switched DC
    - Output voltage 20V= (dc)
    - Max. supply current source 40mA at 20V= (dc) and 80mA at 12V= (dc)
  - Open Collector
    - Switched voltage max.: 32V= (dc)
    - Max. switched current per output: 1.5A
    - Max. switched current for all 6 outputs combined: 8A
- Process/Retransmit Outputs, Range Selectable
  - 0 to 10V = (dc) into a min. 4KΩ load
  - 0 to 20mA into max. 400Ω load

### Thermistor Input

- dc ranges: 0.2mV nominal
- mA ranges: 0.4µA nominal

### Calibration Accuracy

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

### Temperature Stability

- 100 ppm FSR/°C

### Quad Solid-State Relays

- 2A at 20 to 264V~ (ac) maximum resistive load
- 50 VA 120/240V~ (ac) pilot duty

### Programmable Application Blocks

- Actions (events) 24 total
- Alarms 24 total
Control Loops 16 total
Compare 24 total
  Off, greater than, less than, equal, not equal, greater than or equal, less than or equal
Counters 24 total
  Counts up or down loads, predetermined value on load signal. Output is active when count value equals predetermined target value
Logic 24 total
  Off, and, nand, or, nor, equal, not equal, Latch
Linearization 24 total
  Interpolated or stepped relationship
Math 24 total
  Off, average, process scale, deviation scale, differential (subtraction), ratio (divide), add, multiply, absolute difference, min., max., square root, sample and hold
Process Value 16 total
  Off, sensor backup, average, crossover, wet/dry bulb, switch over, differential (subtraction), ratio (divide), add, multiply, absolute difference, min., max., square root
Timers 24 total
  On Pulse produces output of fixed time on active edge of timer run signal
  Delay output is a delayed start of timer run, off at same time
  One Shot oven timer
  Retentive measures timer run signal, output on when accumulated time exceeds target
Variable 24 total
  User value for digital or analog variable

Note:
These specifications are subject to change without prior notice.
# EZ-ZONE Rail-Mount High Density Module Ordering Information

High density module requires a Class 2 or SELV power supply 20.4 to 30.8 V ~ (ac) / ≈ (dc), communication port provided for configuration with EZ-ZONE Configurator software.

## Code Number

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<th>Slot B</th>
<th>Slot D</th>
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<td>H</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Connector Style/Custom Product - Digit

- **A** = Right angle screw connector (standard)
- **F** = Front screw connector
- **S** = Custom

### Slot A - Digit

- **1** = 4 Universal inputs (t/c, 2-wire RTD, 0-10Vdc, 0-20mA, 1K potentiometer) with 4 control loops
- **2** = 4 Thermistor inputs with 4 control loops

### Slot B - Digit

- **A** = None
- **1** = 4 Universal inputs (t/c, 2-wire RTD, 0-10Vdc, 0-20mA, 1K potentiometer) with 4 control loops
- **2** = 4 Thermistor inputs with 4 control loops

### Slot D - Digit

- **A** = None
- **1** = 4 Universal inputs (t/c, 2-wire RTD, 0-10Vdc, 0-20mA, 1K potentiometer) with 4 control loops
- **2** = 4 Thermistor inputs with 4 control loops
- **J** = 4 Mechanical relay 5A, Form A
- **F** = 3 Universal Process/Retransmit outputs
- **L** = 4 SSR’s at 2 amps each
- **C** = 6 Digital I/O

### Slot E - Digit

- **A** = None
- **1** = 4 Universal inputs (t/c, 2-wire RTD, 0-10Vdc, 0-20mA, 1K potentiometer) with 4 control loops
- **2** = 4 Thermistor inputs with 4 control loops
- **J** = 4 Mechanical relay 5A, Form A
- **F** = 3 Universal Process/Retransmit outputs
- **L** = 4 SSR’s at 2 amps each
- **C** = 6 Digital I/O

### Future Options - Digit

- **A** = Standard

### Enhanced Options - Digit

- **A** = Standard Bus
- **1** = Standard Bus and Modbus RTU 485 (selectable via switch)

### Additional Options - Digits

#### Firmware, Overlays, Parameter Settings

- **AA** = Standard
- **AB** = Replacement connectors hardware only, for the entered model number
- **12** = Class 1 Div. 2 (not available with mechanical relay options)
- **XX** = Custom (consult factory)

---

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Modbus® is a registered trademark of Schneider Automation Incorporated.
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Watlow EZ-ZONE® RMH Module

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Declaration of Conformity

EZ Zone Series RM

WATLOW
1241 Bundy Blvd.
Winona, MN 55987 USA

Declares that the following Series RM (Rail Mount) products:
Model Numbers: RM followed by additional letters or numbers describing use of up to four module options of various inputs and outputs or communications.
Classification: Temperature control, Installation Category II, Pollution degree 2
Voltage and Frequency: SELV 24 to 28 V= ac 50/60 Hz or dc
Power Consumption: RMA models 4 Watts, any other RM model 7 Watts
Environmental Rating: IP20

Meet 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 A Emissions (Not for use in a Class B environment without additional filtering).
EN 61000-4-2 2008 Electrostatic Discharge Immunity
EN 61000-4-3 2010 Radiated Field Immunity
EN 61000-4-4 2011 Electrical Fast-Transient / Burst Immunity
EN 61000-4-5 2006 Surge Immunity
EN 61000-4-6 2008 Conducted Immunity
EN 61000-4-11 2004 Voltage Dips, Short Interruptions and Voltage Variations Immunity
EN 61000-3-2 2005 Harmonic Current Emissions
EN 61000-3-3 2005 Voltage Fluctuations and Flicker
SEMI F47 2000 Specification for Semiconductor Sag Immunity Figure R1-1

1 NOTE: To comply with flicker requirements cycle time may need to be up to 160 seconds if load current is at 15A, or the maximum source impedance needs to be < 0.13Ω. Control power input of RM models comply with 61000-3-3 requirements.

2006/95/EC Low-Voltage Directive
EN 61010-1 2010 Safety Requirements of electrical equipment for measurement, control and laboratory use. Part 1: General requirements

Compliant with 2002/95/EC RoHS Directive


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Director of Operations September 2013
Title of Authorized Representative Date of Issue

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