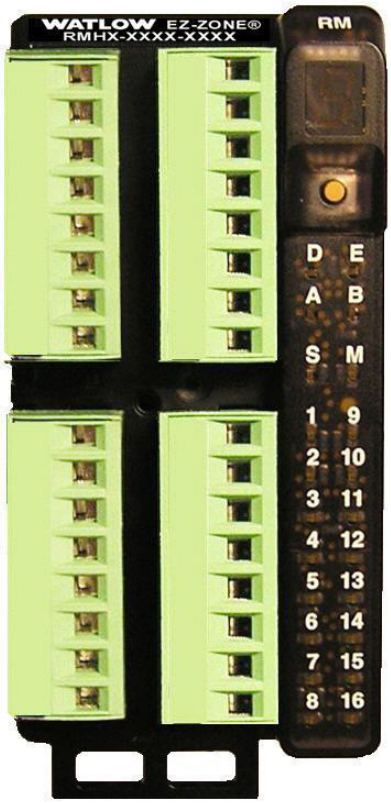
EZ-ZONE® RM High Density Module

User's Guide



RM High Density Module

WATLOW®
Powered by Possibility

TOTAL CUSTOMER SATISFACTION
3 Year Warranty

ISO 9001
Registered Company
Winona, Minnesota USA

1241 Bundy Boulevard., Winona, Minnesota USA 55987
Phone: +1 (507) 454-5300, Fax: +1 (507) 452-4507
http://www.watlow.com

0600-0074-0000 Rev. F

Made in the U.S.A.

March 2016

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:

Symbol	Explanation
	CAUTION – Warning or Hazard that needs further explanation than label on unit can provide. Consult User's Guide for further information..
	ESD Sensitive product, use proper grounding and handling techniques when installing or servicing product.
	Unit protected by double/reinforced insulation for shock hazard prevention.
	Do not throw in trash, use proper recycling techniques or consult manufacturer for proper disposal.
	Enclosure made of Polycarbonate material. Use proper recycling techniques or consult manufacturer for proper disposal.
	Unit can be powered with either alternating current (ac) voltage or direct current (dc) voltage.
	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: www.ul.com
	Unit is a Listed device per Underwriters Laboratories®. It has been evaluated to United States and Canadian requirements for Hazardous Locations Class 1 Division II Groups A, B, C and D. ANSI/ISA 12.12.01-2007. File E184390 QUZW, QUZW7. See: www.ul.com
	Unit is compliant with European Union directives. See Declaration of Conformity for further details on Directives and Standards used for Compliance.
	Unit has been reviewed and approved by Factory Mutual as a Temperature Limit Device per FM Class 3545 standard. See: www.fmglobal.com

	Unit has been reviewed and approved by CSA International for use as Temperature Indicating-Regulating Equipment per CSA C22.2 No. 24. See: www.csa-international.org

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. Watlows' obligations hereunder, at Watlows' option, are limited to replacement, repair or refund of purchase price, and parts which upon examination prove to be defective within the warranty period specified. This warranty does not apply to damage resulting from transportation, alteration, misuse or abuse. The purchaser must use Watlow parts to maintain all listed ratings.

Technical Assistance

If you encounter a problem with your Watlow controller, review your configuration information to verify that your selections are consistent with your application: inputs, outputs, alarms, limits, etc. If the problem persists, you can get technical assistance from your local Watlow representative (see back cover), by e-mailing your questions to wintechsupport@watlow.com or by dialing +1 (507) 494-5656 between 7 a.m. and 5 p.m., Central Standard Time (CST). Ask for for an Applications Engineer. Please have the following information available when calling:

- Complete model number
- All configuration information
- User's 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.

• EZ-ZONE RM is covered by U.S. Patent No. 6,005,577 and Patents Pending

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1 Chapter 1: Overview

Available EZ-ZONE RM System Literature and Resources

Document Title and Part Number	Description
EZ-ZONE Rail Mount Access (RMA) User's Guide, part number: 0600-0072-0000	Describes how to connect the RM system into an industrial network, how to use data logging, module backup and the real-time clock.
EZ-ZONE Rail Mount Controller (RMC) User's Guide, part number: 0600-0070-0000	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.
EZ-ZONE Rail Mount Scanner (RMS) User's Guide, part number: 0600-0071-0000	This module adds monitoring points to the RM system. This document describes common usage and the various types of I/O available.
EZ-ZONE Rail Mount Expansion (RME) User's Guide, part number: 0600-0073-0000	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.
EZ-ZONE Rail Mount Limit (RML) User's Guide, part number: 0600-0075-0000	The RML module will protect against unwanted thermal runaway and over temperature conditions. The User Guide describes configuration, programming and communications capabilities.
EZ-ZONE Remote User Interface (RUI) User's Guide, part number: 0600-0060-0000	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.
EZ-ZONE RM Specification Sheet, part number: WIN-EZRM-0414	Describes RM hardware options, features, benefits and technical specifications.
Watlow Support Tools DVD, part number: 0601-0001-0000	Contains all related user documents, tutorial videos, application notes, utility tools, etc...

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. Once there, simply type in the desired part number (or name) into the search box and download free copies.

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

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

Communication Capabilities

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

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

RMH Modules Allow for Greater Design Flexibility

- Allows PID loops to be added in increments of four. Module can scale from 4 to 16 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 (SMC)

- 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 (SRC)

- Allows modules to be mounted together or mounted remotely from one another (maximum distance 200 feet or 61 meters)
- Shares control operation via SMC 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® listed, CE, RoHS, W.E.E.E. FM, 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 Module

The flexibility of the RMH's software and hardware allows for variation in configurations. Acquiring a better understanding of the controller's overall functionality and capabilities while at the same time planning out how the controller can be used will deliver maximum effectiveness in your application.

It is useful to think of the controller in three parts: inputs, procedures and outputs. Information flows from an input to a procedure to an output when the controller is properly configured. 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

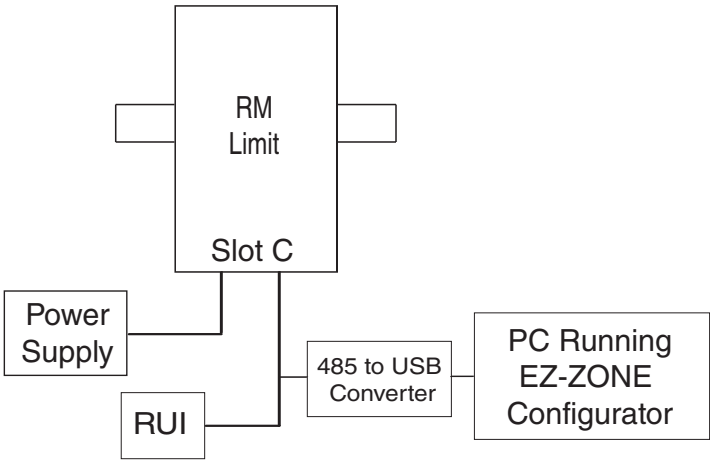
Based on a given input (Digital I/O, Event output, Logic function, etc..) the Action function can cause other functions to occur. To name a few, set alarms to off, silencing alarms and enabling remote set point.

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)

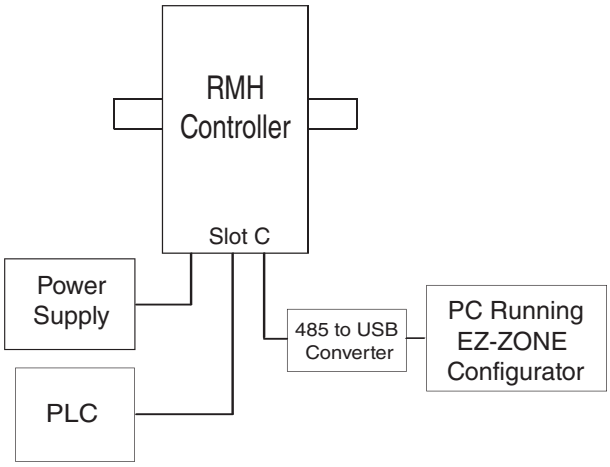
In this configuration the RUI and PC are connected to the RMH module via Watlow's Standard Bus where both will be able to talk directly to the RMH module.



In the graphic above the PC running EZ-ZONE Configurator software and or the RUI can be 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:



In this example, the RMH module and the PLC must be equipped with the Modbus RTU protocol.

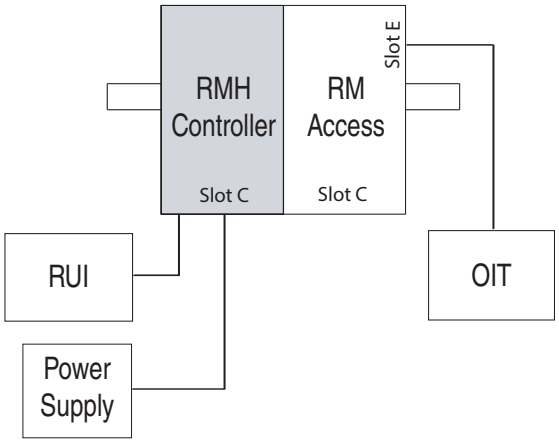
Note:

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 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. Profibus DP

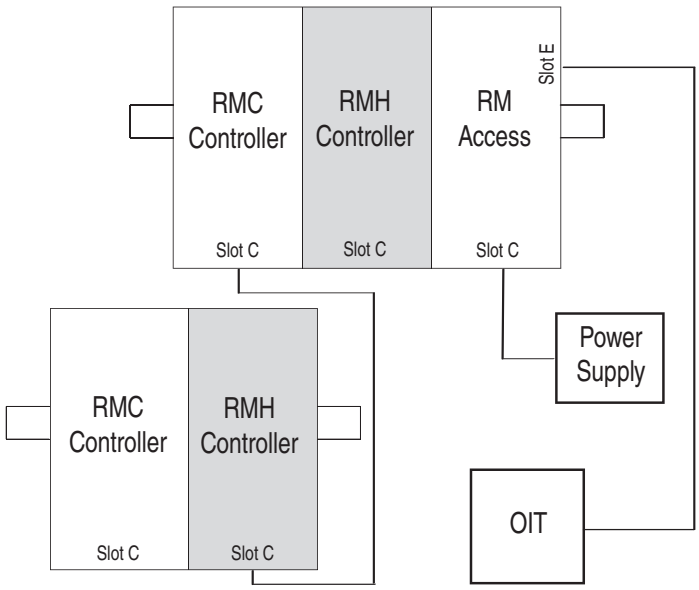


Notice that in the example to the right that there is an *optional* RUI connected to the RMH along with the OIT. OITs' are not generally used to configure a control but are used more for run-time information. As an alternative for configuration the RUI could be used to configure and monitor in a remote location.

One advantage in using an RMA module when communicating on a network is that protocol switching is not needed on the RMH module if using an RUI or EZ-ZONE Configurator software. The protocol of choice used with the RMA can run simultaneously with the Standard Bus protocol.

RMH Connected to a Split Rail with OIT

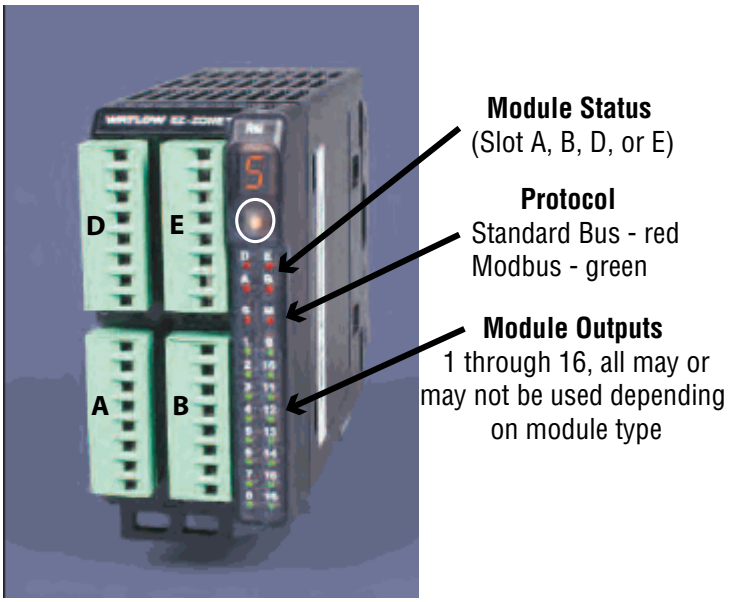
In this configuration both the inter-module bus (backplane communications) and Standard Bus are connected between rails to allow for remote capabilities. It is recommended that the split rail connection not exceed 100 feet. In this configuration the OIT can communicate with all modules (maximum 16 modules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



Module Orientation

The picture below represents one of six possible RM modules. All six 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 (white circle) under the Zone address (5) that when pushed and held has the following functions:

1. For any module, push and hold for approximately 2 seconds. The address will intensify indicating that it can now be changed. Release and repeatedly press to change to the desired unique address.
2. For the control module, if equipped with the Modbus protocol (RMHxxxxxxxxx1xx) pushing and holding this button for approximately 6 seconds will cause the display to reflect P for protocol. Releasing the button and then pushing it again (within 6 seconds), the display will toggle between n (Modbus) and 5 (Standard Bus). Valid addresses for Modbus and Standard bus range from 1 -16 (1-9, A is 10, b is 11, C is 12, d is 13, E is 14, F is 15, and h is 16). The Access module is shipped at address J or 17.



Note:

For correct operation and accuracy, the module must be mounted in a vertical orientation as shown.

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).

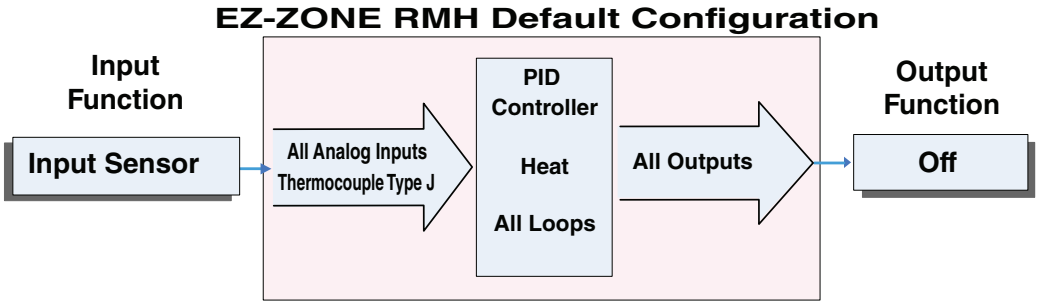
Note:
The menu navigation as described below applies when the RMH is connected to the RUI which is optional equipment.

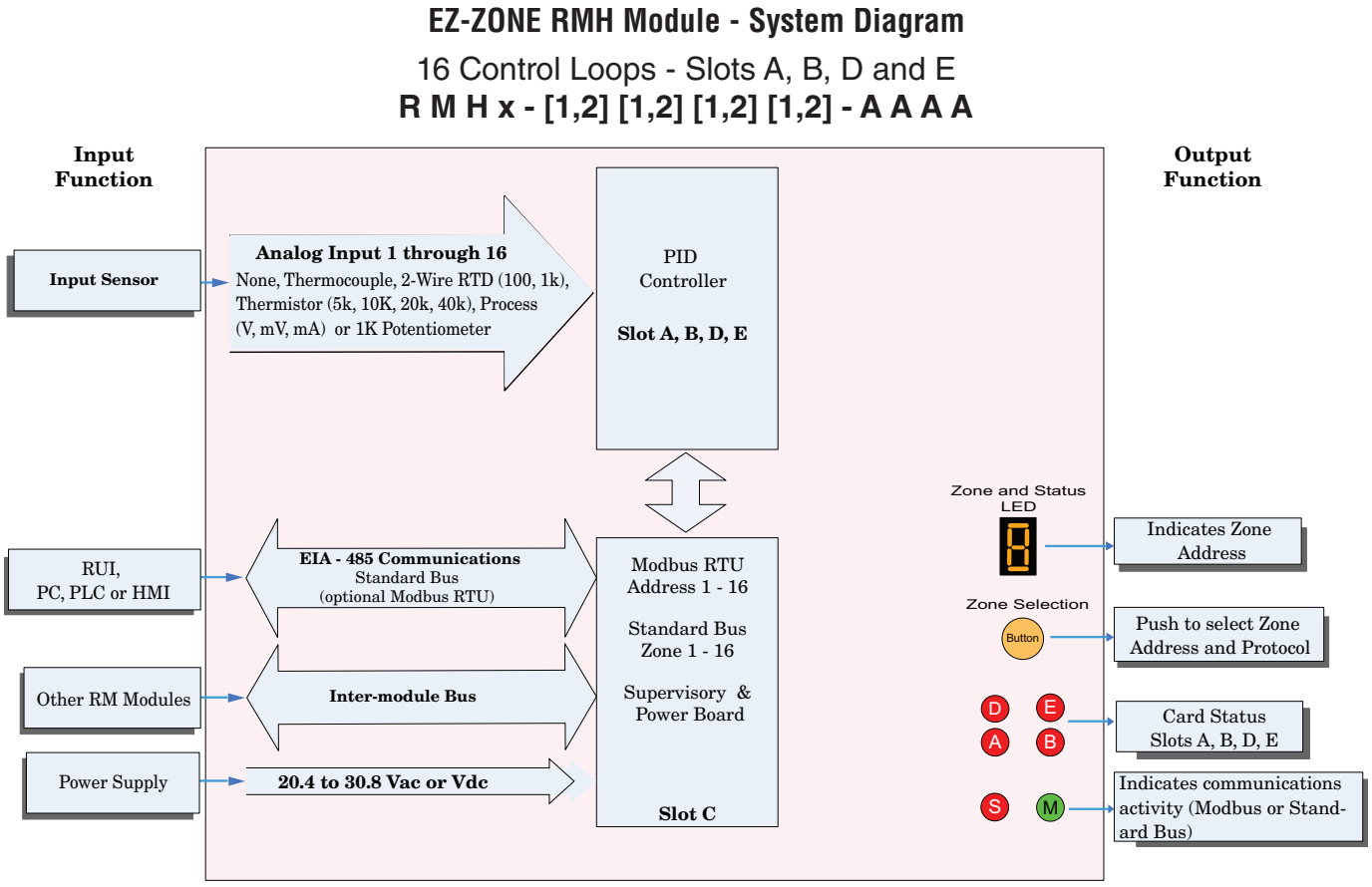
Setup Page Using the RUI, push and hold the up and down keys (▲ ▼) for 6 seconds to enter. (See the Setup Page for further information)	A user would want to setup their control prior to operation. As an example, define the input type, alarm sides (high and or low) or set the output function.
Operations Page Using the RUI push and hold the up and down keys (▲ ▼) for 3 seconds to enter. (See the Operations Page for further information)	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.
Factory Page Using the RUI push and hold the Infinity and the green Advance keys (∞ ◉) for 6 seconds to enter. (See the Factory Page for further information)	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.
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.	Pushing the green Advance Key ◉ will cause the display to show the control mode for loop 1.

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)

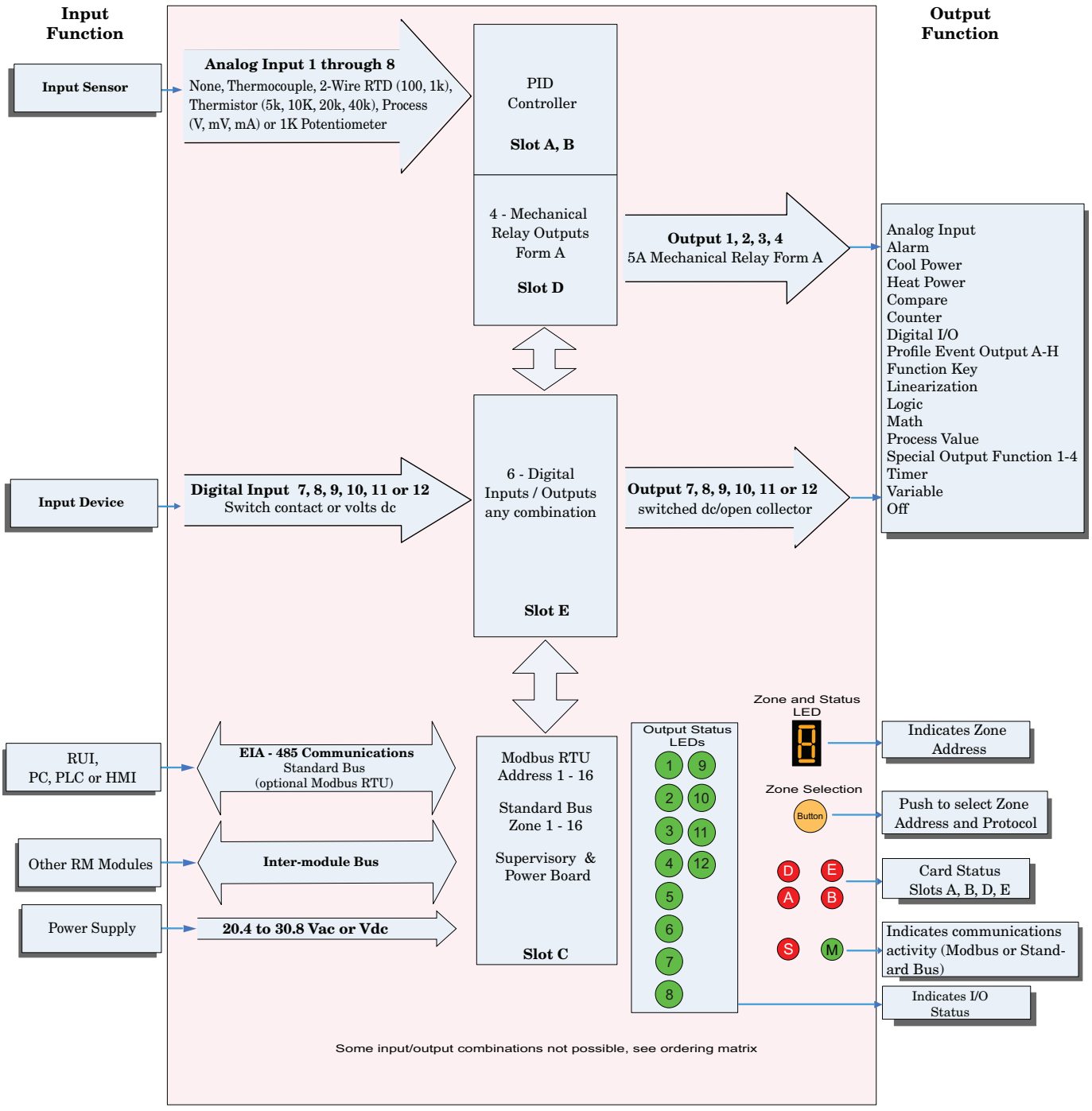
Once the control has been wired and setup, power up the control and change the appropriate set points to the desired value (on the RUI push the up ▲ and or down ▼ arrow key from the Home Page).





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
R M H x - [1,2] [1,2] J C - A A A A



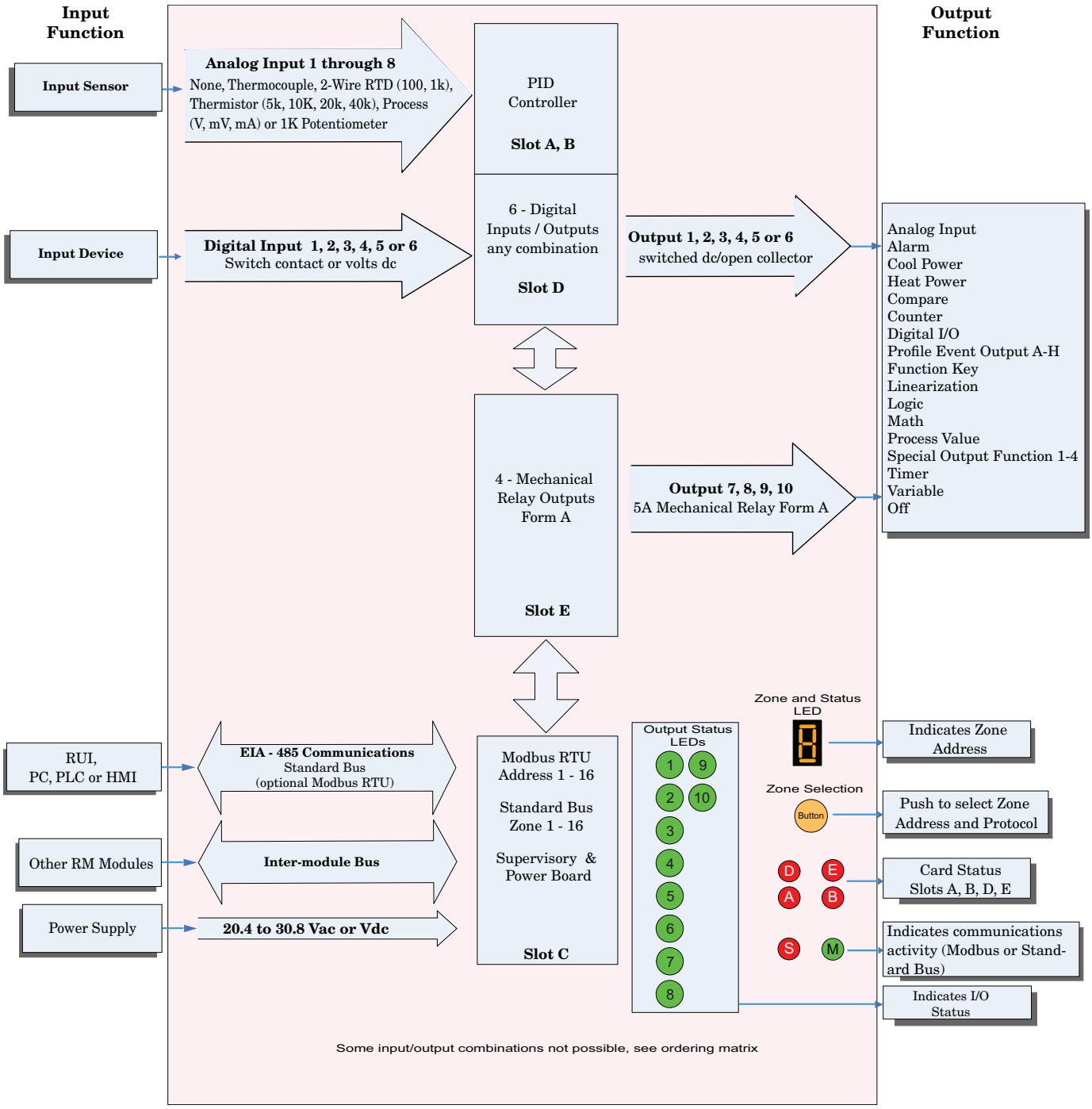
EZ-ZONE RMH Module - System Diagram

8 Control Loops - Slots A, B

6 - Digital I/O - Slot D

4 - Form A Mechanical Relays - Slot E

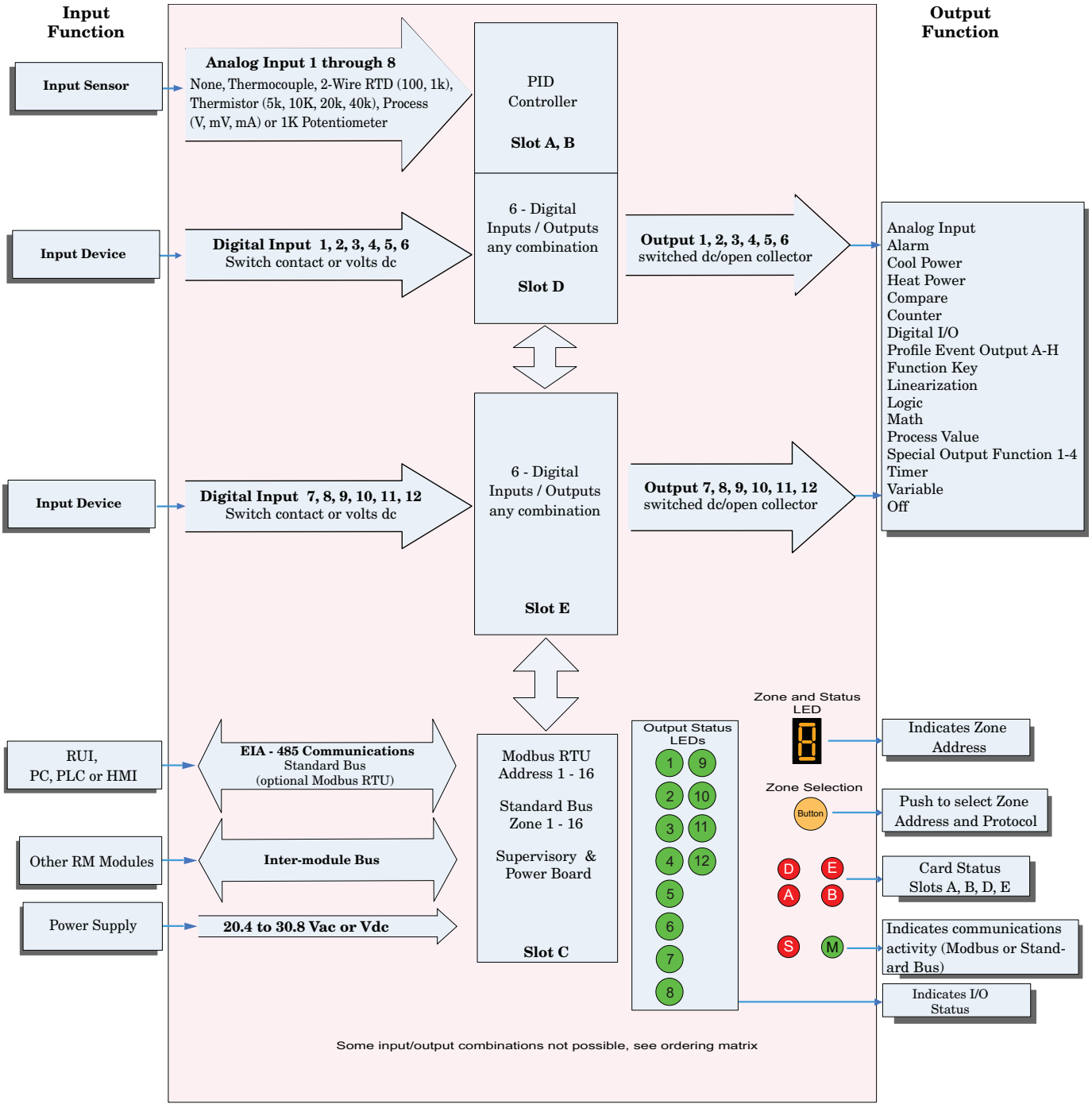
R M H x - [1,2] [1,2] C J - A A A A



EZ-ZONE RMH Module - System Diagram

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

R M H x - [1,2] [1,2] C C - A A A A



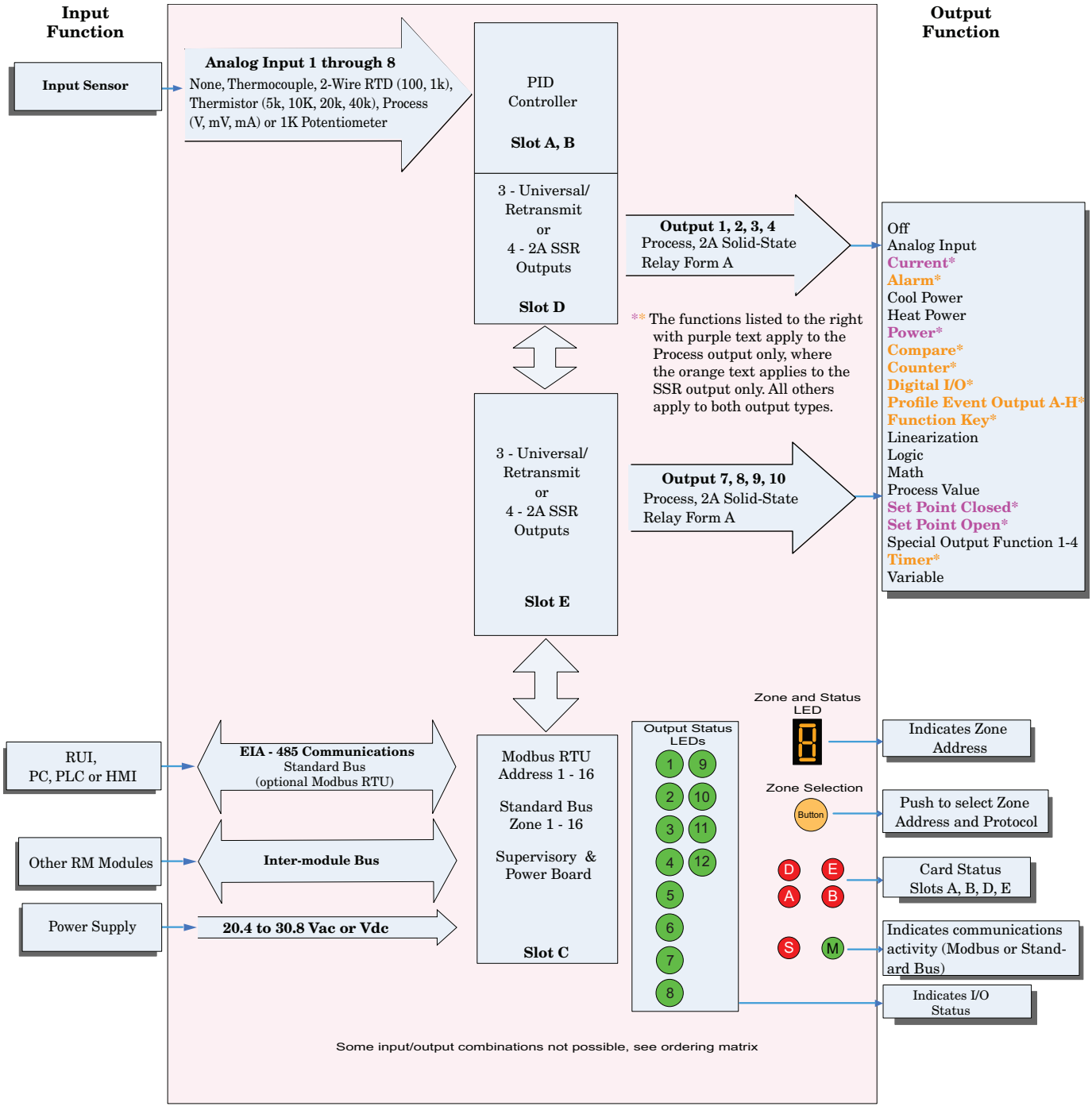
EZ-ZONE RMH Module - System Diagram

8 Control Loops - Slots A, B

3 - Process Outputs - Slot D or E

4 - SSR Outputs - Slot D or E

R M H x **-** [**1,2**] [**1,2**] [**F,L**] [**F,L**] **-** A A A A



2 Chapter 2: Install and Wire

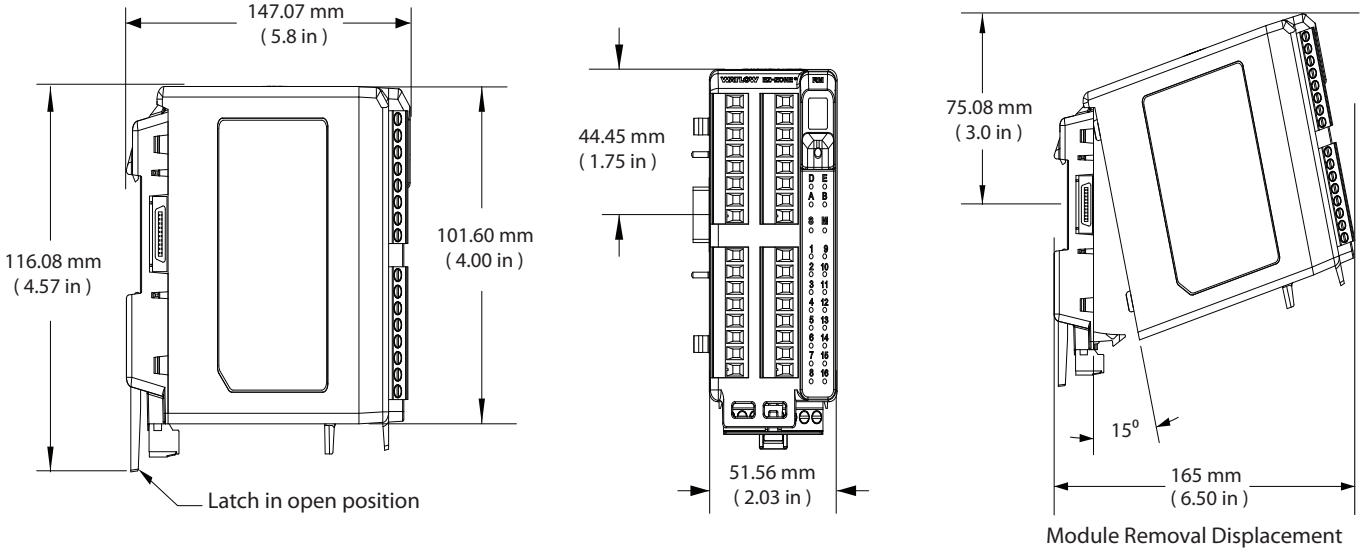
Dimensions

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

Note:

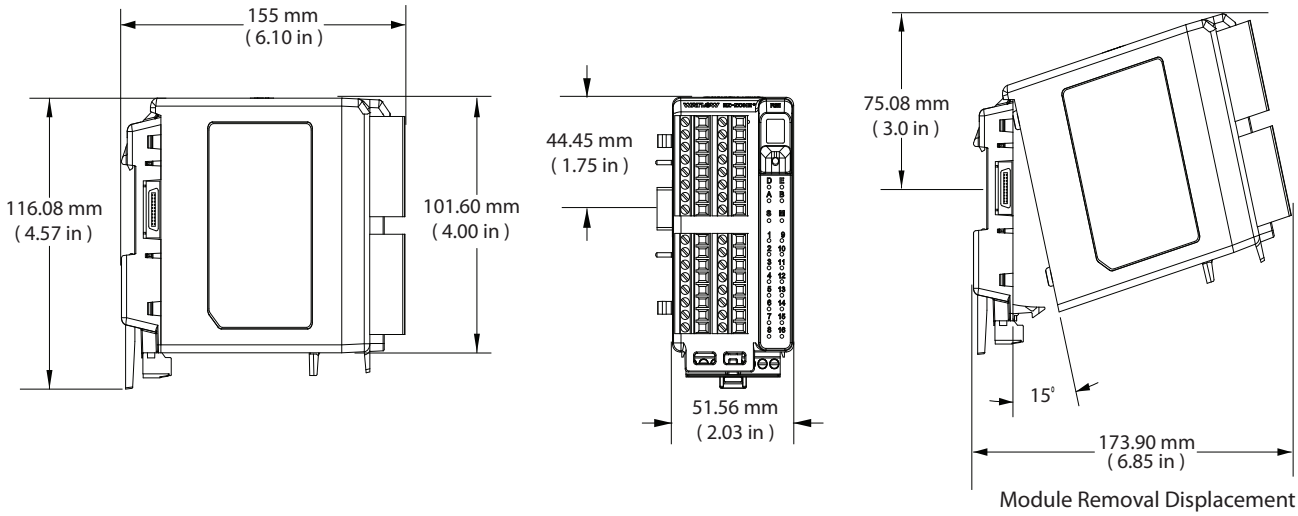
Modules should always be mounted vertically. For easy removal and placement of modules it is recommended that there be a 76.2 mm (3.00 in) clearance on the top, bottom and front of each module.

Module Removal Clearance Standard Connectors



Module Removal Displacement

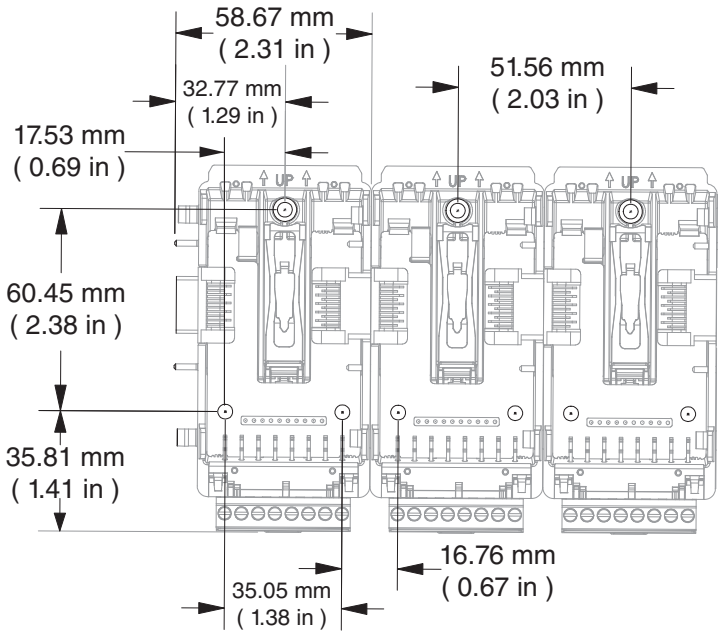
Module Removal Clearance Straight Connectors



Module Removal Displacement

Dimensions (cont.)

Chassis Mount Front View (Module Removed) - Screw Connection Pattern



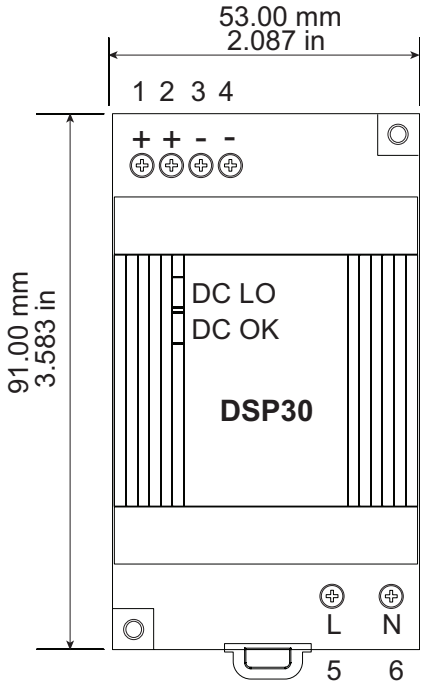
The view above is representative of the modular backplane without the module.

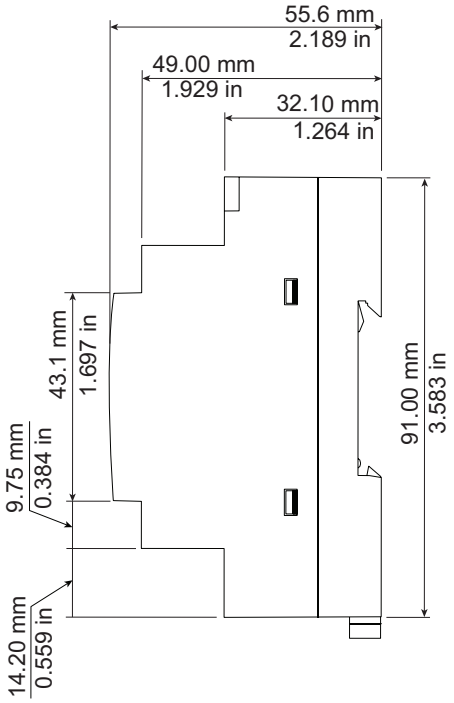
Recommended chassis mount hardware:

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

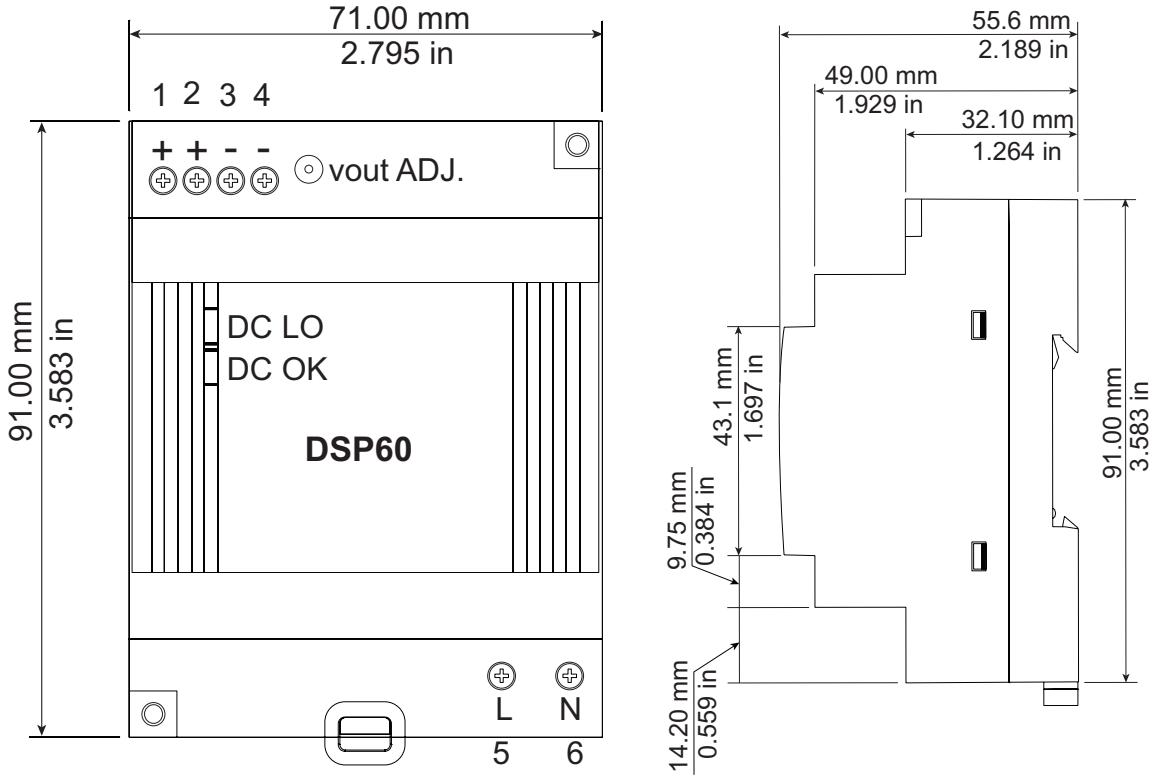
Power Supplies

DSP 30

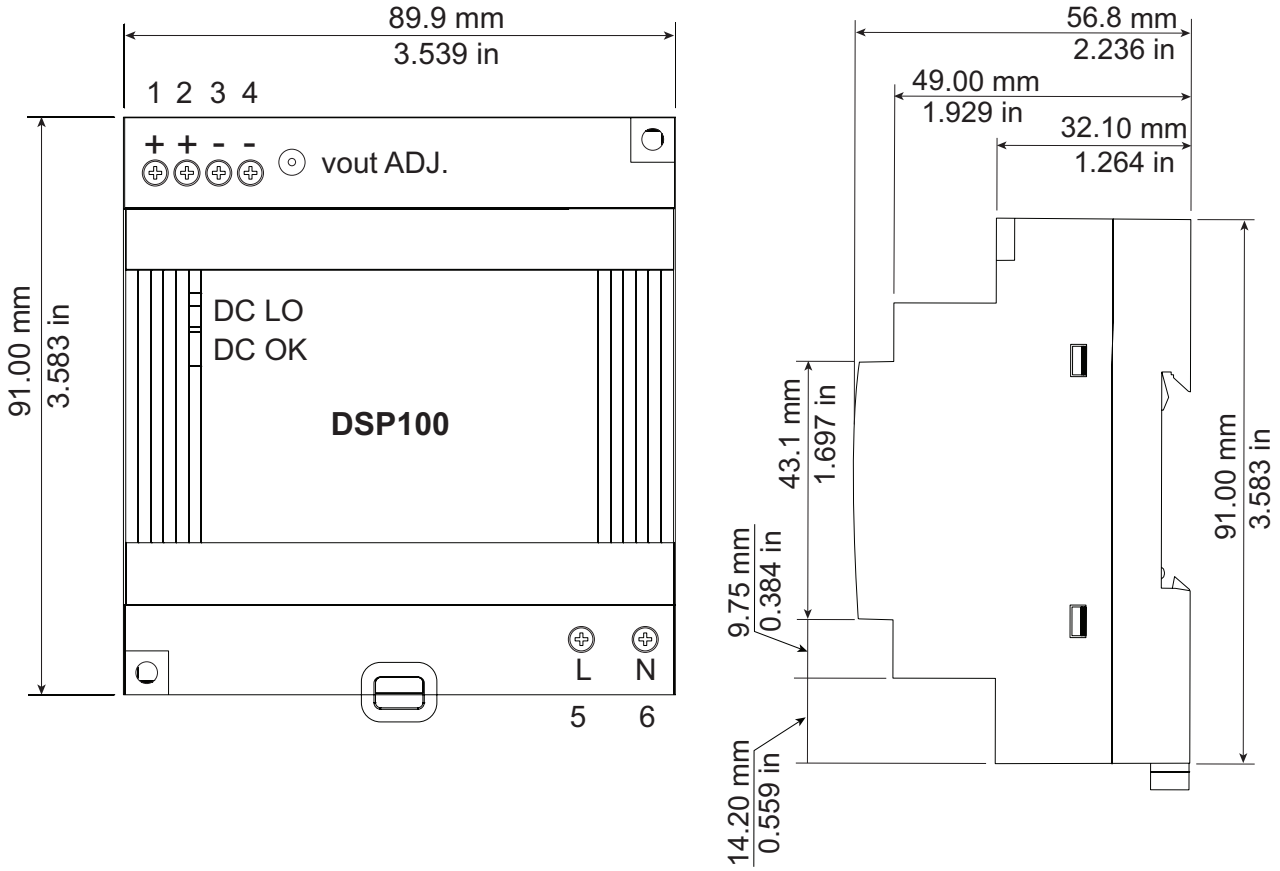




DSP 60



DSP 100



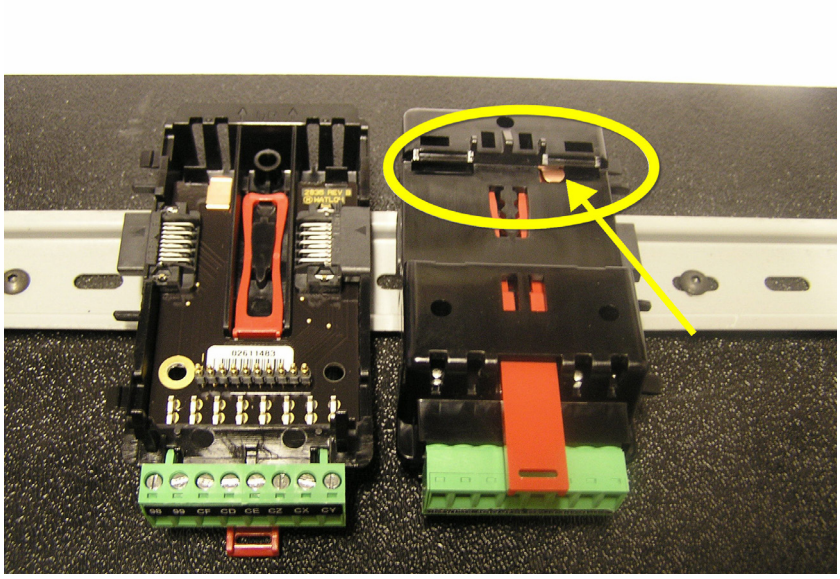
Power Supply Specifications				
		DSP 30	DSP60	DSP100
AC Input Voltage Range	VAC	90 - 264VAC, Class II double insulated (No ground connection required)		
Input Frequency	Hz	47 - 63Hz		
DC Input Voltage range	VDC	120 - 370VDC		
Inrush Current (115 / 230VAC)	A	25 / 50A	30 / 60A	30 / 60A
Output Voltage Accuracy	%	±1% of Nominal		
Over voltage Protection	V	120 - 145%		
LED Indicators	- - - -	Green LED = On, Red LED = DC Output Low		
Operating Temperature	- - - -	-25 to +71°C (Derate linearly 2.5%/°C from 55 to 71°C)		
Storage Temperature	- - - -	-25 to +85°C		
Operating Humidity	- - - -	20 - 95% RH (non condensing)		
Vibration (Operating)	- - - -	IEC 60068-2-6 (Mounting by rail: Random wave, 10-500 Hz, 2G, ea. along X, Y, Z axes 10 min/ cycle, 60 min)		
Safety Agency Approvals		UL1310 Class 2(1), UL508 Listed, UL60950-1, EN60950-1, CE		

For a comprehensive listing of these specifications point your browser to: http://us.tdk-lambda.com/lp/products/dsp-series.htm

RM Installation and Removal on a DIN Rail

Modular Backplane Connector

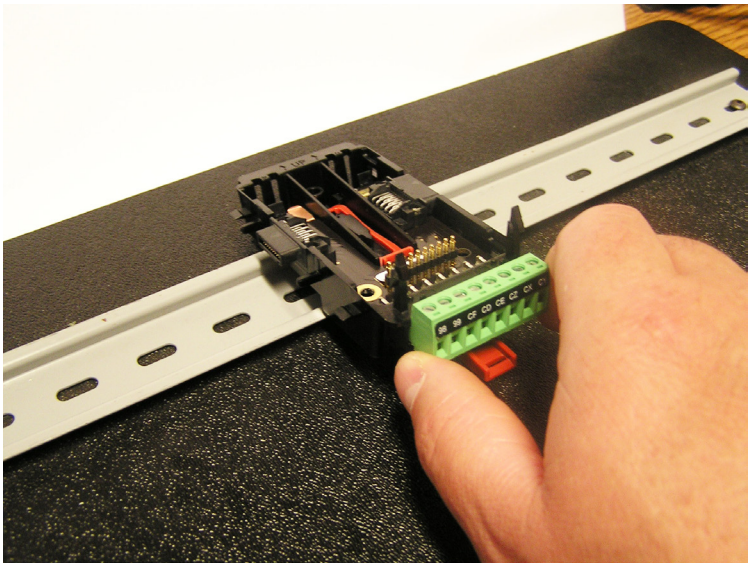
The picture on the right shows the Modular Backplane Connector, both front and rear view. The rear view is bringing in to focus a metal clip. If the DIN rail is grounded the Modular Backplane Connector and the module connected to it will be also (recommended).



Installing the Modular Backplane Connector

To install the backplane follow the steps below:

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)
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).
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).



Note:

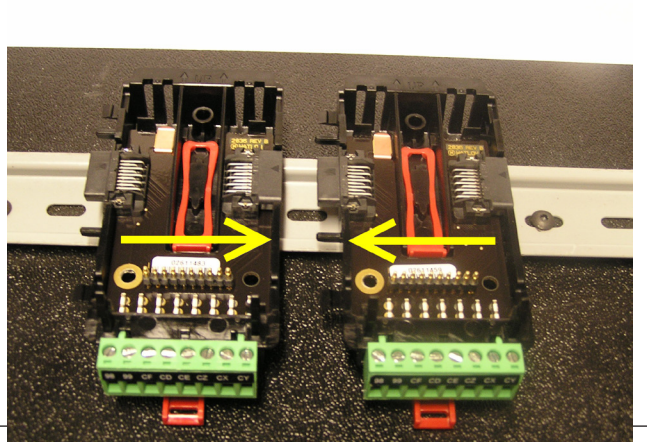
For easy removal and placement of modules it is recommended that there be a 76.2 mm (3.00 in) clearance on the top, bottom and front of each module.

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.

To install backplane connectors follow the steps below:

1. Attach individual modules to the rail separately.
2. Laterally slide the modules together until they touch.
3. 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.

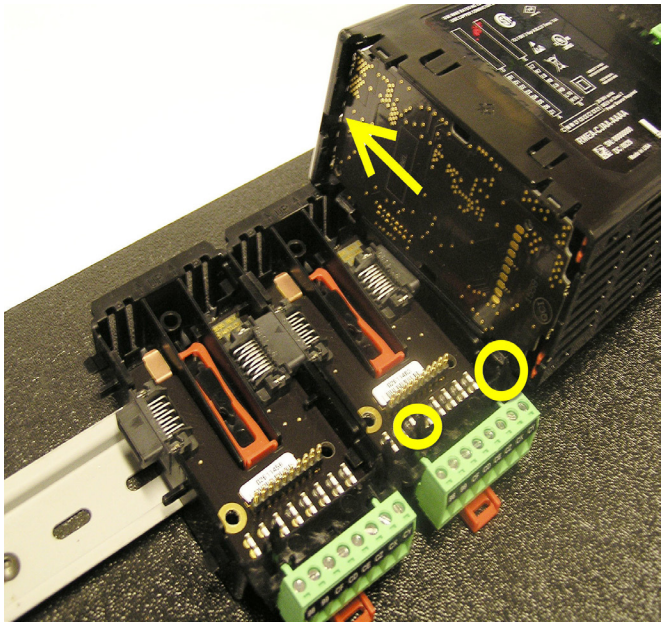


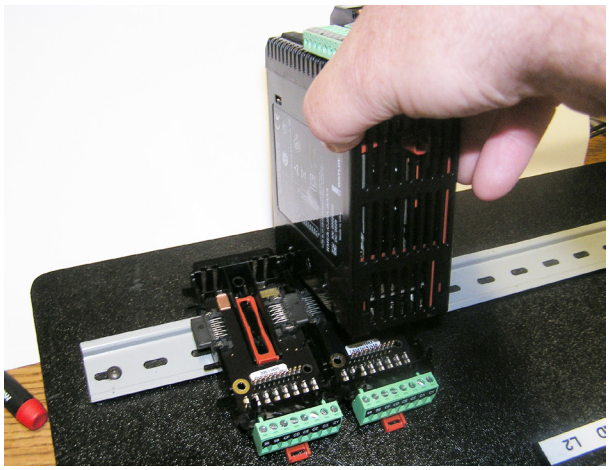
Module Installation

In the picture to the right notice that the arrow is pointing at the top lip of the module (on side).

To install modules on the backplane follow the steps below:

1. Slide the lip of the module over the top of the Modular Backplane Connector and then push down on the rear of the module. The module will then slide over the two posts just above the green connector (see pictures below).

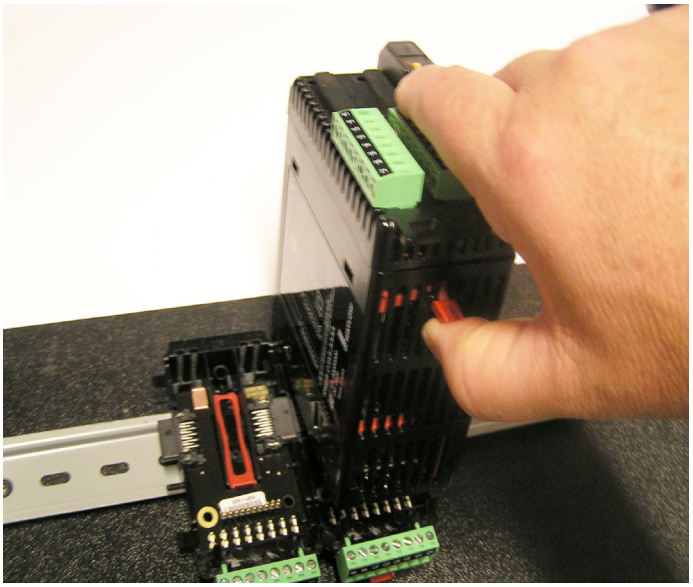




Module Removal

To remove a module from the backplane follow the steps below:

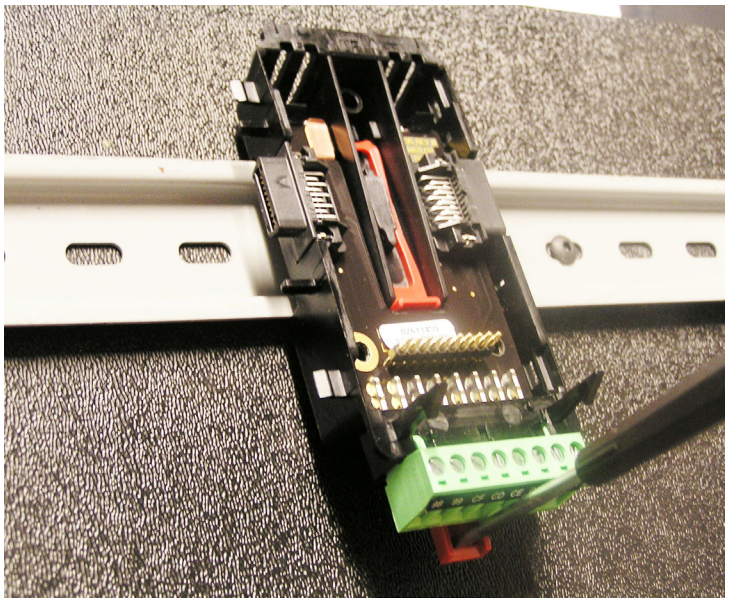
1. Find the red tab protruding from the bottom of the module and pull back on it as shown to the right.
2. Pull back on the red tab, the two mounting posts will then release the module.
3. Lift the module up and slide it up; this will release the module lip from the backplane.



Backplane Removal from DIN Rail

To remove a modular backplane connector from the DIN rail follow the steps below:

1. Insert a screw driver into the red locking tab just behind the green connector.
2. Apply downward pressure on the tab by lifting the screwdriver upwards..
3. When released, the tab will move downward and the connector can then be lifted up off of the DIN rail.



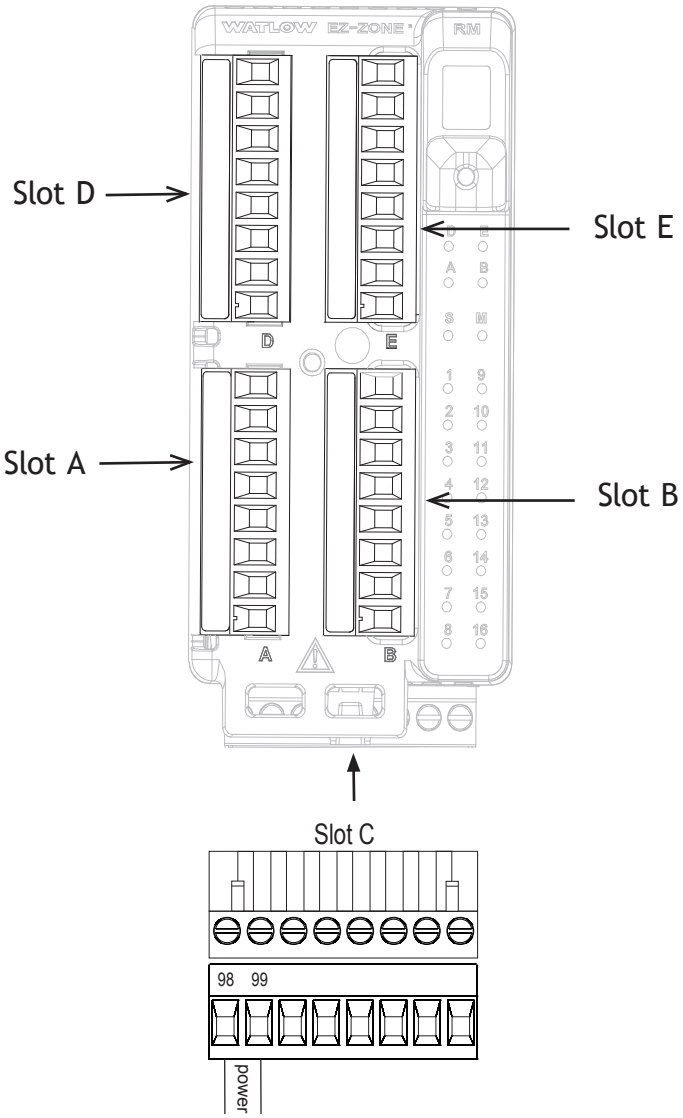
Wiring

High Density Module (R M H x - x x x x - x x x x)					
Slot A	**Slot B**	**Slot D**	**Slot E**	**Terminal Function**	**Configuration**
Inputs				**Universal, RTD and Thermistor Inputs**	
1 - 4	5 - 8	9 - 12	13 - 16		
S1 R1 S2 R2 S3 R3 S4 R4	S5 R5 S6 R6 S7 R7 S8 R8	S9 R9 S10 R10 S11 R11 S12 R12	S13 R13 S14 R14 S15 R15 S16 R16	S_ (RTD), thermocouple -, volts - , mA -, potentiometer wiper or thermistor R_ (RTD), thermocouple +, volts +, mA +, potentiometer or thermistor	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	
- - -	- - -	1 - 6	7-12		
- -	- -	B1 D1 D2 D3 D4 D5 D6 Z1	B7 D7 D8 D9 D10 D11 D12 Z7	Common DC +input DC +input DC +input DC +input DC +input DC +input Internal Supply	Digital Inputs (DI) Part # Digit 7, 8 Slot A: Option not valid Slot B: Option not valid Slot D: RMH _ - _ _ **[C] _** - _ _ _ _ Slot E: RMH _ - _ _ _ **[C]** - _ _ _ _
Outputs				**Quad 5A - Mechanical Relay Form A Outputs**	
- - -	- - - -	1 - 4	7 - 10		
- -	- -	L1 K1 L2 K2 L3 K3 L4 K4	L7 K7 L8 K8 L9 K9 L10 K10	normally open common normally open common normally open common normally open common	Mechanical Relay 5 A, Form A Part # Digits 7, 8 Slot D: : RMH _ - _ _ **[J] _**- _ _ _ _ Slot E: : RMH _ - _ _ _ **[J]** - _ _ _ _
				Digital Outputs	
- - -	- - -	1 - 6	7 - 12		
- -	- -	B1 D1 D2 D3 D4 D5 D6 Z1	B7 D7 D8 D9 D10 D11 D12 Z7	Common open collector/ switched dc open collector/ switched dc open collector/ switched dc open collector/ switched dc open collector/ switched dc open collector/ switched dc Internal Supply	Digital Outputs (DO) Part # Digit 7, 8 Slot A: Option not valid Slot B: Option not valid Slot D: RMH _ _ - _ _ **[C] _**- _ _ _ _ Slot E: RMH _ - _ _ _ **[C]** - _ _ _ _

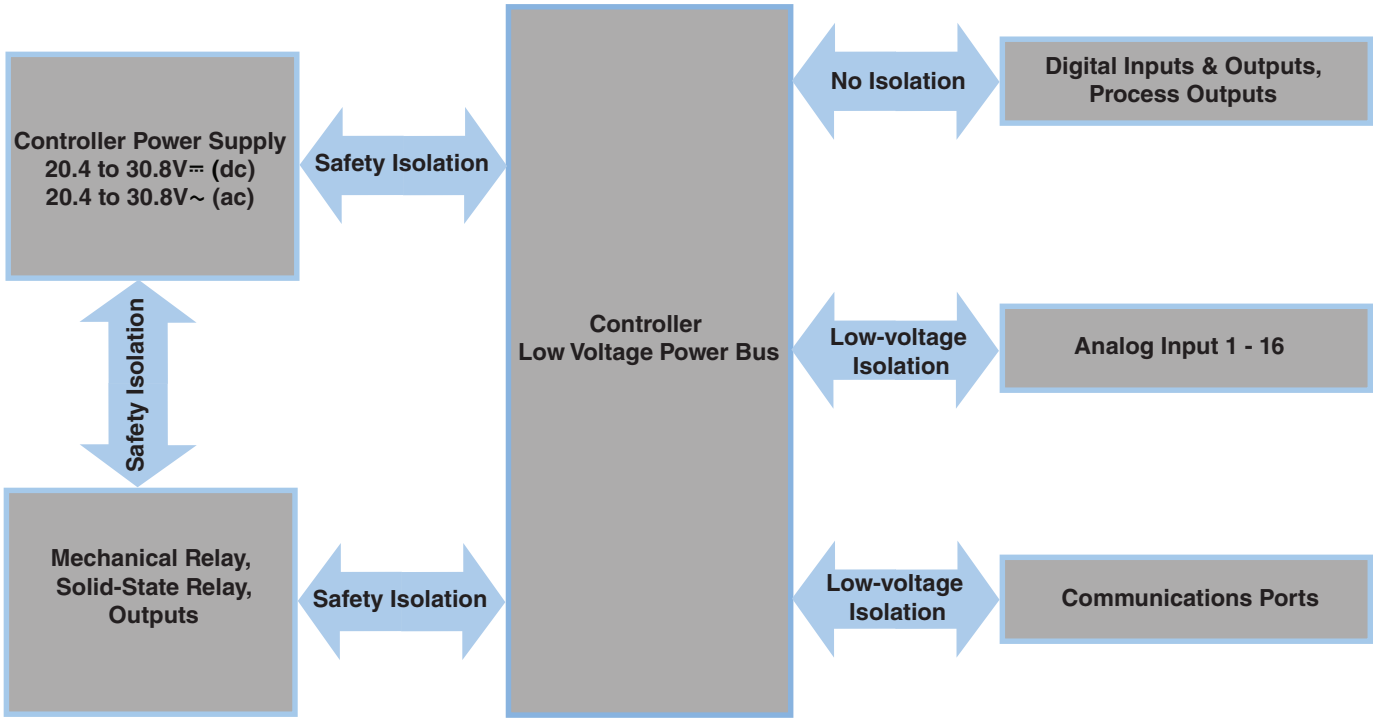
High Density Module (R M H x - x x x x - x x x x)					
Slot A	**Slot B**	**Slot D**	**Slot E**	**Terminal Function**	**Configuration**
Outputs (cont.)				**Quad 2A - Solid-State Relay (SSR) Form A Outputs**	
- - -	- - -	1 - 4	7 - 10		
- - -	- - -	L1	L7	normally open	2A SSR Outputs
- - -	- - -	K1	K7	common	Part # Digits 7, 8
- - -	- - -	L2	L8	normally open	Slot A: Option not valid
- - -	- - -	- - -	- - -	*not used*	Slot B: Option not valid
- - -	- - -	- - -	- - -	*not used*	Slot D: RMH _ - _ _ **[L]** _ - _ _ _ _
- - -	- - -	L3	L9	normally open	Slot E: RMH _ - _ _ _ **[L]** - _ _ _ _
- - -	- - -	K3	K9	common	
- - -	- - -	L4	L10	normally open	
				Tri-State Process/Retransmit Outputs	
- - -	- - -	1 - 3	7 - 9		
- - -	- - -	F1	F7	voltage or current -	Tri-Process Outputs
- - -	- - -	H1	H7	voltage + or current +	Part # Digits 7, 8
- - -	- - -	- - -	- - -	*not used*	Slot A: Option not valid
- - -	- - -	F2	F8	voltage or current -	Slot B: Option not valid
- - -	- - -	H2	H8	voltage + or current +	Slot D: RMH _ - _ _ **[F]** _ - _ _ _ _
- - -	- - -	- - -	- - -	*not used*	Slot E: RMH _ - _ _ _ **[F]** - _ _ _ _
- - -	- - -	F3	F9	voltage or current -	
- - -	- - -	H3	H9	voltage + or current +	

Power and Communications		
Slot C	**Terminal Function**	**Configuration**
98 99	Power input: ac or dc+ Power input: ac or dc-	All
CF CD CE	Standard Bus EIA-485 common Standard Bus EIA-485 T-/R- Standard Bus EIA-485 T+/R+	Standard Bus Part # Digit 10 RMH _ - _ _ _ _ - _ **[A]** _ _
CC CA CB	Standard Bus or Modbus RTU EIA-485 common Standard Bus or Modbus RTU EIA-485 T-/R- Standard Bus or Modbus RTU EIA-485 T+/R+	Standard Bus or Modbus Part # Digit 10 RMH _ - _ _ _ _ - _ **[1] _ _**
CZ CX CY	Inter-module Bus Inter-module Bus Inter-module Bus	Inter-module Bus

RMH Front View
Standard Connector



RMH System Isolation Blocks



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)
- 0.56 Nm (5.0 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.

Note:
If the last two digits of the part number are "12", this equipment is suitable for use in CLASS I, DIVISION 2, Groups A, B, C and D or Non-Hazardous locations only. Temperature Code T4

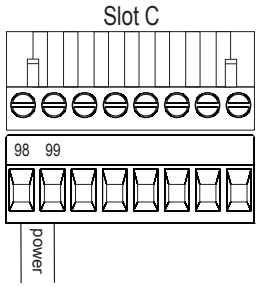
Warning: ⚠
Explosion Hazard – Substitution of component may impair suitability for CLASS I, DIVISION 2.

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

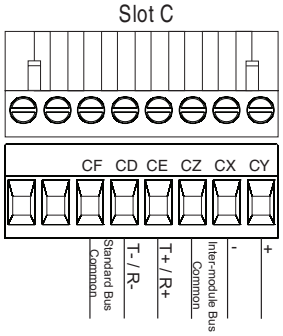
RMH - All Model Numbers



- 20.4 to 30.8 V ~ (ac) / ⎓ (dc) 14VA
- 47 to 63 Hz
- Controller module power consumption, 7 Watts maximum
- 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 Safety Extra Low Voltage (SELV) power source required to meet UL compliance standards

Communications

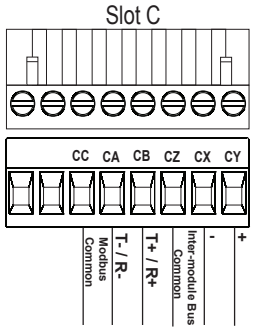
RMH Part # Digit 10 is A



- 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 EIA485 Communications (selectable via push button under zone address)
- 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

Modbus-IDA Terminal	EIA/TIA-485 Name	Watlow Terminal Label	Function
DO	A	CA or CD	T-/R-
D1	B	CB or CE	T+/R+
common	common	CC or CF	common

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)
- 0.56 Nm (5.0 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.

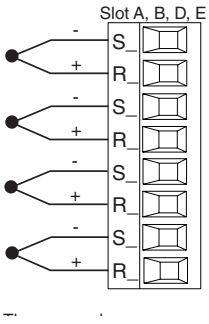
Note:
If the last two digits of the part number are "12", this equipment is suitable for use in CLASS I, DIVISION 2, Groups A, B, C and D or Non-Hazardous locations only. Temperature Code T4

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 Thermocouple

RMH Part # Digits 5, 6, 7, 8

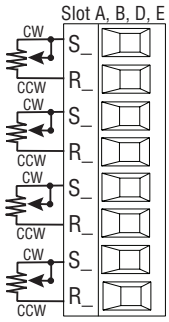


- 2K Ω maximum source resistance
- >20 MΩ input impedance
- 3 microampere open-sensor detection
- Thermocouples are polarity sensitive. The negative lead (usually red) must be connected to S terminal
- To reduce errors, the extension wire for thermocouples must be of the same alloy as the thermocouple.

- Input 1 - 4: RMHx-(1)xxx-xxxx
- Input 5 - 8: RMHx-x(1)xx-xxxx
- Input 9 - 12: RMHx-xx(1)x-xxxx
- Input 13 - 16: RMHx-xxx(1)-xxxx

Inputs 1 through 16 Potentiometer

RMH Part # Digits 5, 6, 7, 8

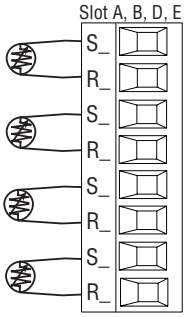


- Use a 1 kΩ potentiometer.

- Input 1 - 4: RMHx-(**1**)xxx-xxxx
- Input 5 - 8: RMHx-x(**1**)xx-xxxx
- Input 9 - 12: RMHx-xx(**1**)x-xxxx
- Input 13 - 16: RMHx-xxx(**1**)-xxxx

Inputs 1 through 16 RTD

RMH Part # Digits 5, 6, 7, 8



- Platinum, 100 and 1,000 Ω @ 0°C
- Calibration to DIN curve (0.00385 Ω/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: RMHx-(**1**)xxx-xxxx
- Input 5 - 8: RMHx-x(**1**)xx-xxxx
- Input 9 - 12: RMHx-xx(**1**)x-xxxx
- Input 13 - 14: RMHx-xxx(**1**)-xxxx

AWG	Ohms/1000ft
14	2.575
16	4.094
18	6.510
20	10.35
22	16.46
24	26.17
26	41.62
28	66.17

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)
- 0.56 Nm (5.0 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.

Note:

If the last two digits of the part number are "12", this equipment is suitable for use in CLASS I, DIVISION 2, Groups A, B, C and D or Non-Hazardous locations only. Temperature Code T4

Warning: ⚠

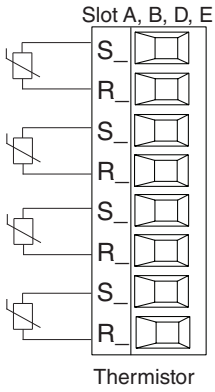
Explosion Hazard – Substitution of component may impair suitability for CLASS I, DIVISION 2.

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 Thermistor

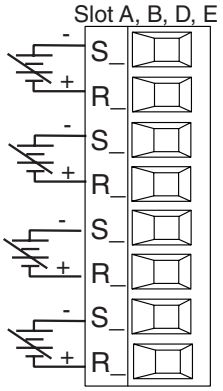
RMH Part # Digits 5, 6, 7, 8

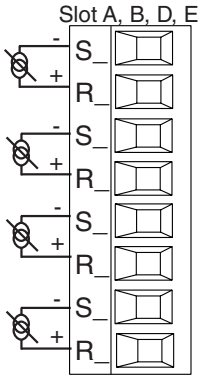


- >20 MΩ input impedance
- Input 1 - 4 : RMHx-(**2**)xxx-xxxx
- Input 5 - 8: RMHx-x(**2**)xx-xxxx
- Input 9 - 12: RMHx-xx(**2**)x-xxxx
- Input 13 - 16: RMHx-xxx(**2**)-xxxx

Process Inputs 1 through 16

RMH Part # Digits 5, 6, 7, 8





- 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
- Inputs 1 - 4: RMHx-(1)xxx-xxxx
- Inputs 5 - 8: RMHx-x(1)xx-xxxx
- Inputs 9 - 12: RMHx-xx(1)x-xxxx
- Inputs 13 - 16: RMHx-xxx(1)-xxxx

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Note:
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- 0.56 Nm (5.0 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.

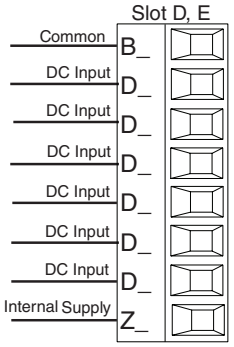
Note:
If the last two digits of the part number are "12", this equipment is suitable for use in CLASS I, DIVISION 2, Groups A, B, C and D or Non-Hazardous locations only. Temperature Code T4

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.

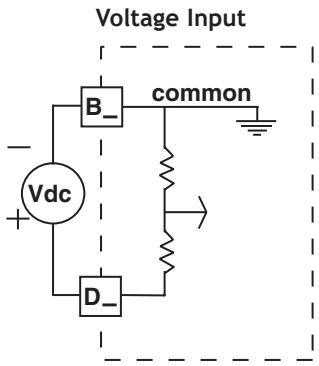
Digital Inputs 1 through 12

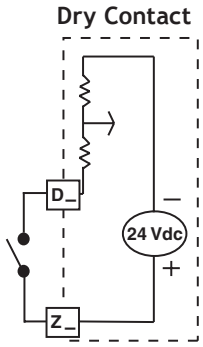
RMH Part # Digit 7, 8 is C



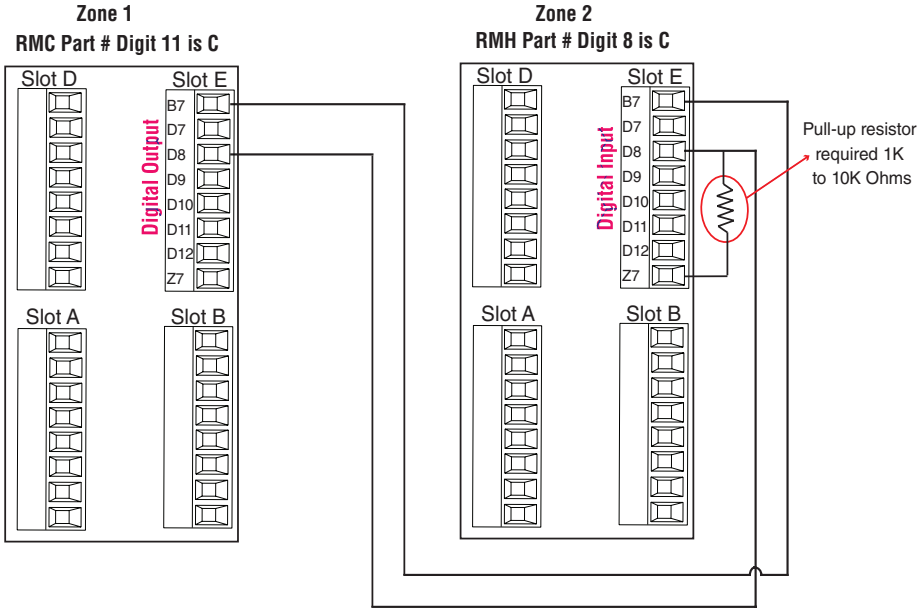
Digital Input Event Conditions

- Dry Contact
  - Input inactive when > 100KΩ
  - Input active when < 50Ω
- Voltage
  - Input inactive when < 2V
  - Input active when > 3V
- 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





Connecting a Digital Output from One Zone to a Digital Input of Another Zone (Zone 1 to Zone 2 in this example)



In the example above, digital output D8 from an RMC module (Zone 1) is connected to the digital input D8 of an RMH module (Zone 2).

Note:
As shown in the graphic above, for this configuration, a pull-up resistor is required.

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)
- 0.56 Nm (5.0 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.

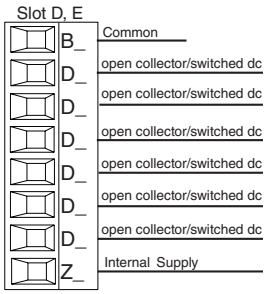
Note:
If the last two digits of the part number are "12", this equipment is suitable for use in CLASS I, DIVISION 2, Groups A, B, C and D or Non-Hazardous locations only. Temperature Code T4

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.

Digital Outputs 1 - 12

RMH Part # Digit 7, 8 is C

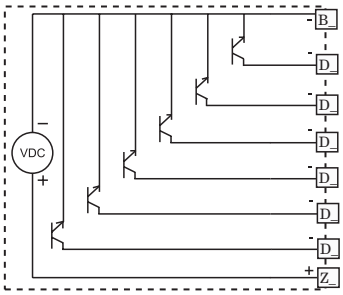


- Maximum switched voltage is 32V⎓ (dc)
- Internal supply provides a constant power output of 750mW
- Maximum output sink current per output is 1.5A (external class 2 or *SELV supply required)
- Total sink current for all outputs not to exceed 8A
- Do not connect outputs in parallel

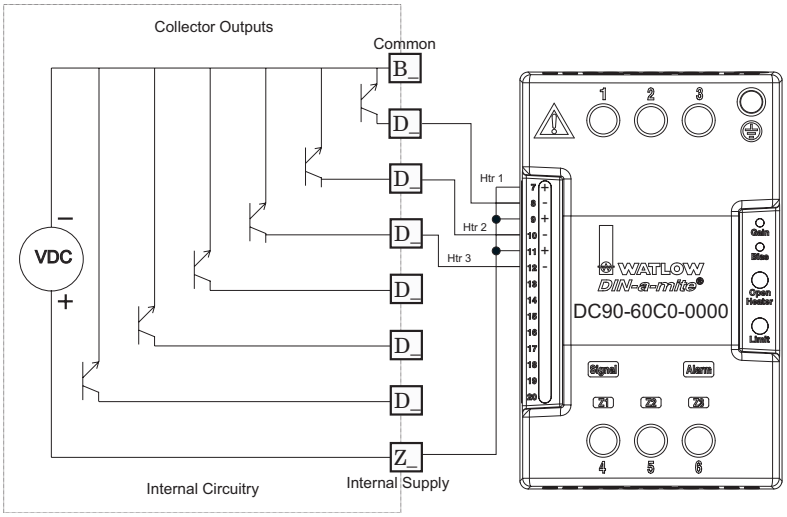
- Outputs 1 - 6
  RMHx-xx(**C**)x-xxxx
- Outputs 7 - 12
  RMHx-xxx(**C**)-xxxx

* Safety Extra Low Voltage

Open Collector/
Switched DC Outputs



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)
- 0.56 Nm (5.0 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.

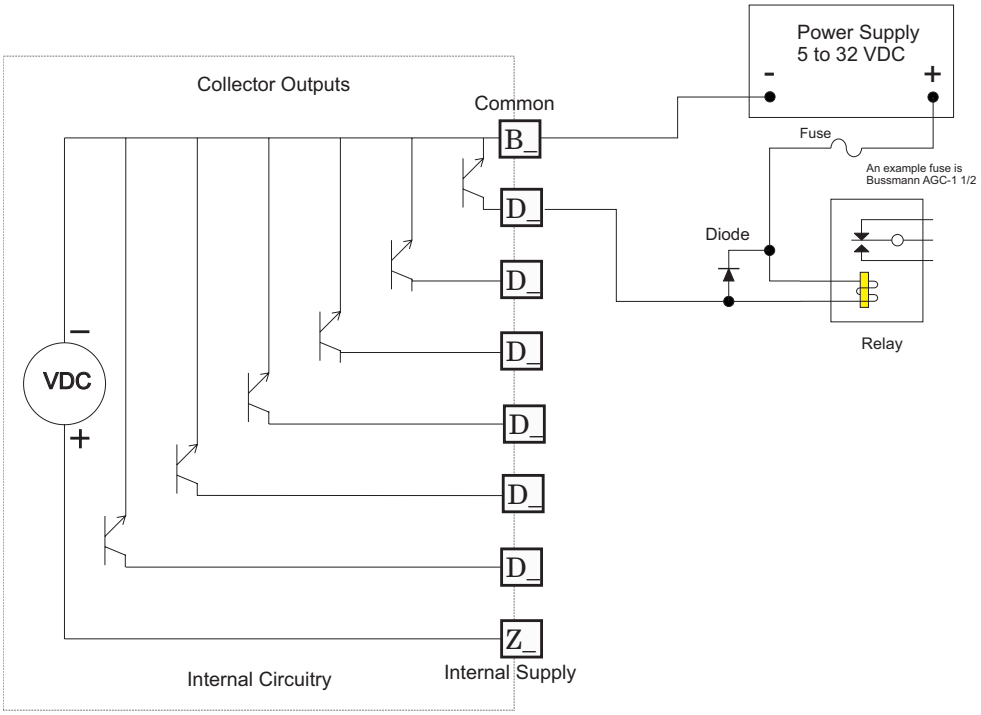
Note:
Maintain electrical isolation between digital input-outputs, switched dc/open collector outputs and process outputs to prevent ground loops.

Note:
If the last two digits of the part number are "12", this equipment is suitable for use in CLASS I, DIVISION 2, Groups A, B, C and D or Non-Hazardous locations only. Temperature Code T4

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.

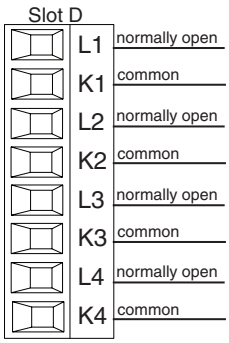
Open Collector Wiring Example Using DO 1-12

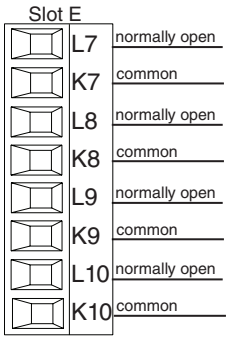


As an open collector output (see graphic below), use an external power supply with the negative wired to B_, the positive to the coil of a pilot mechanical relay and the other side of the coil wired to the output of choice (D_). Each open collector output can sink 1.5 A with the total for all open collector 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

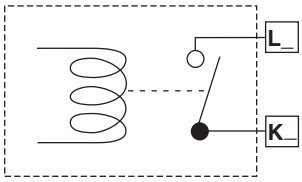




- 5 A at 240V~ (ac) or 30V⎓ (dc) maximum resistive load
- 20 mA at 24V minimum load
- 125 VA pilot duty @ 120/240V~ (ac), 25 VA at 24V~ (ac)
- 100,000 cycles at rated load
- Output does not supply power.
- For use with ac or dc

- See Quencharc note
- Slot D Outputs 1 - 6 RMHx-xx(J)x-xxxx
- Slot E Outputs 7 - 10 RMHx-xxx(J)-xxxx

Mechanical Relay Form A



Internal Circuitry

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)
- 0.56 Nm (5.0 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.

Note:
If the last two digits of the part number are "12", this equipment is suitable for use in CLASS I, DIVISION 2, Groups A, B, C and D or Non-Hazardous locations only. Temperature Code T4

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Warning: ⚠
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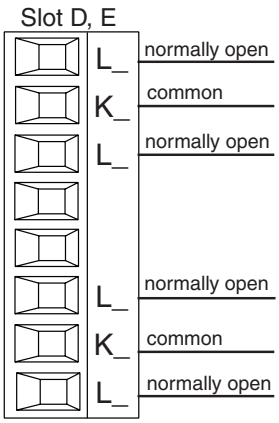
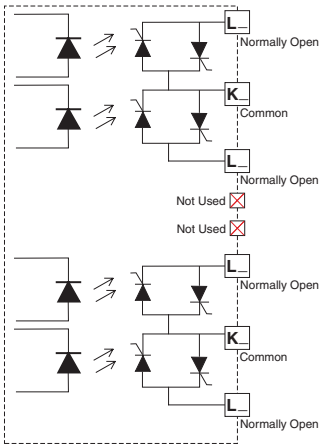
Quad 2A SSR Outputs 1-4, 7-10

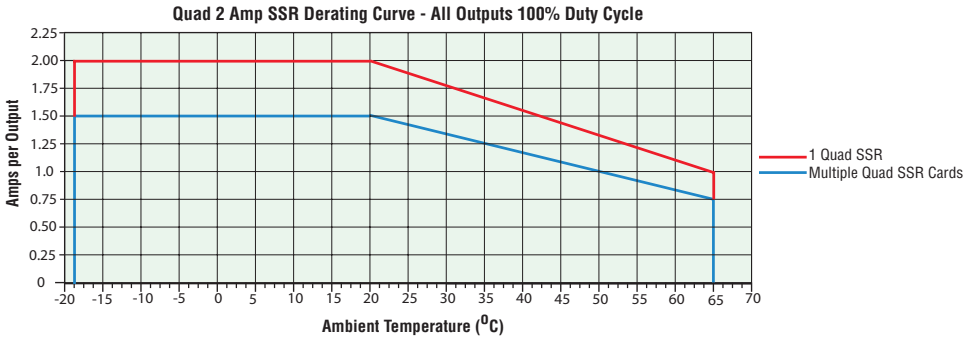
RMH Part # Digit 7, 8



- 2 A at 20 to 264V~ (ac) maximum resistive load
- 50 VA 120/240V~ (ac) pilot duty
- Optical isolation, without contact suppression
- Maximum off state leakage of 105 microamperes
- Output does not supply power.
- Do not use on dc loads.
- N.O., COM, N.O wiring (shared common) between each set of outputs.
- Minimum holding current 10mA

- See Quencharc note.





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.

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)
- 0.56 Nm (5.0 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.

Note:
If the last two digits of the part number are "12", this equipment is suitable for use in CLASS I, DIVISION 2, Groups A, B, C and D or Non-Hazardous locations only. Temperature Code T4

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Warning: ⚠
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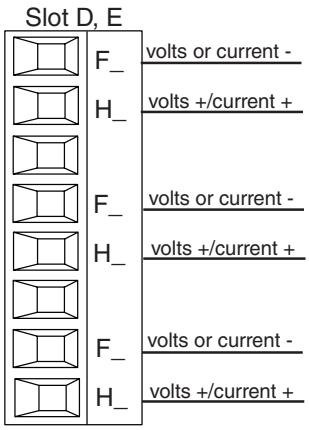
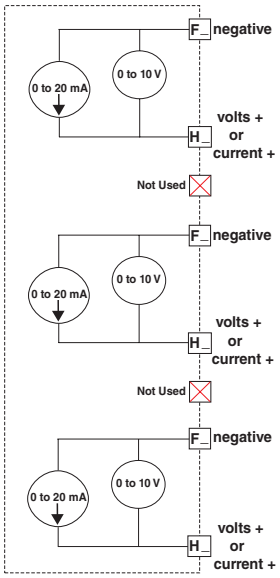
Tri-Process/Retransmit Outputs 1-3, 7-9

RMH Part # Digit 7, 8

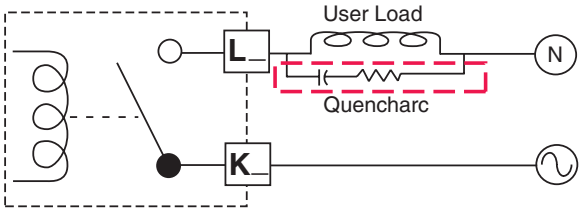


- 0 to 20 mA into 400Ω maximum load
- 0 to 10V⎓ (dc) into 4 kΩ minimum load
- Outputs are scalable
- Output supplies power
- Each output can be independently set for voltage or current.
- Output may be used as retransmit or control.

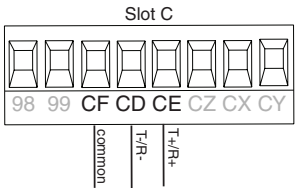


Quencharc Wiring Example

- In this example the Quencharc circuit (Watlow part# 0804-0147-0000) is used to protect internal circuitry from the counter electromagnetic 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.



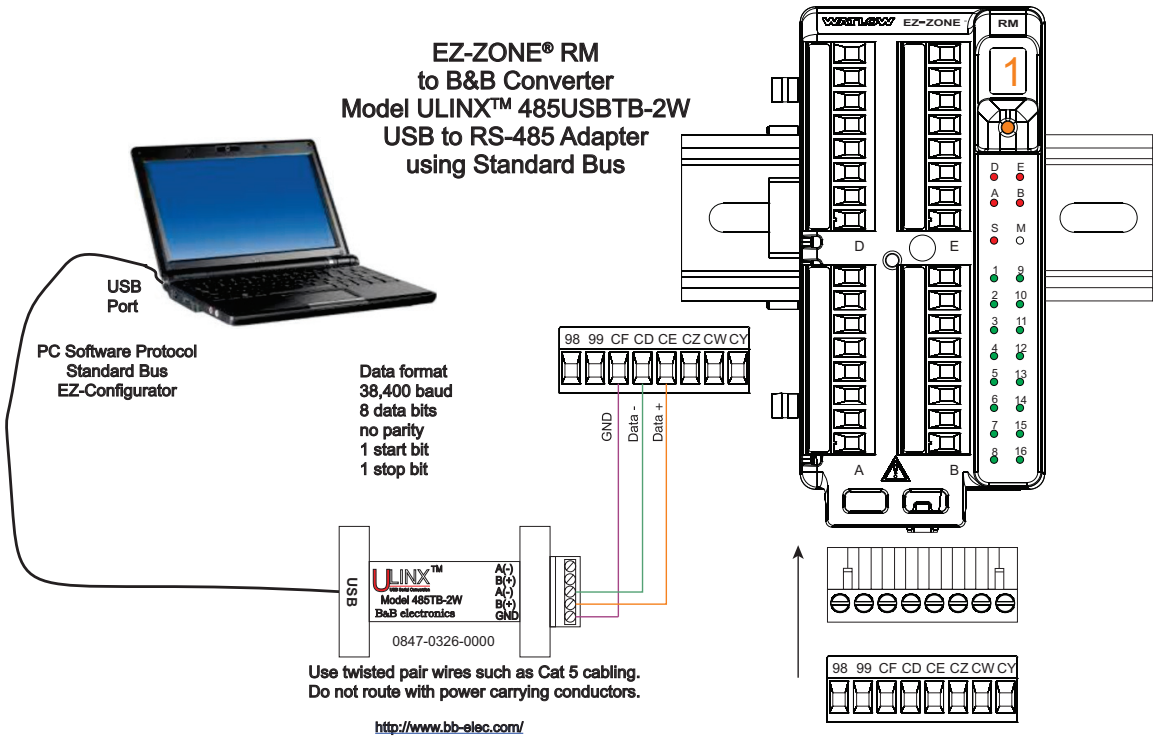
Standard Bus EIA-485 Communications

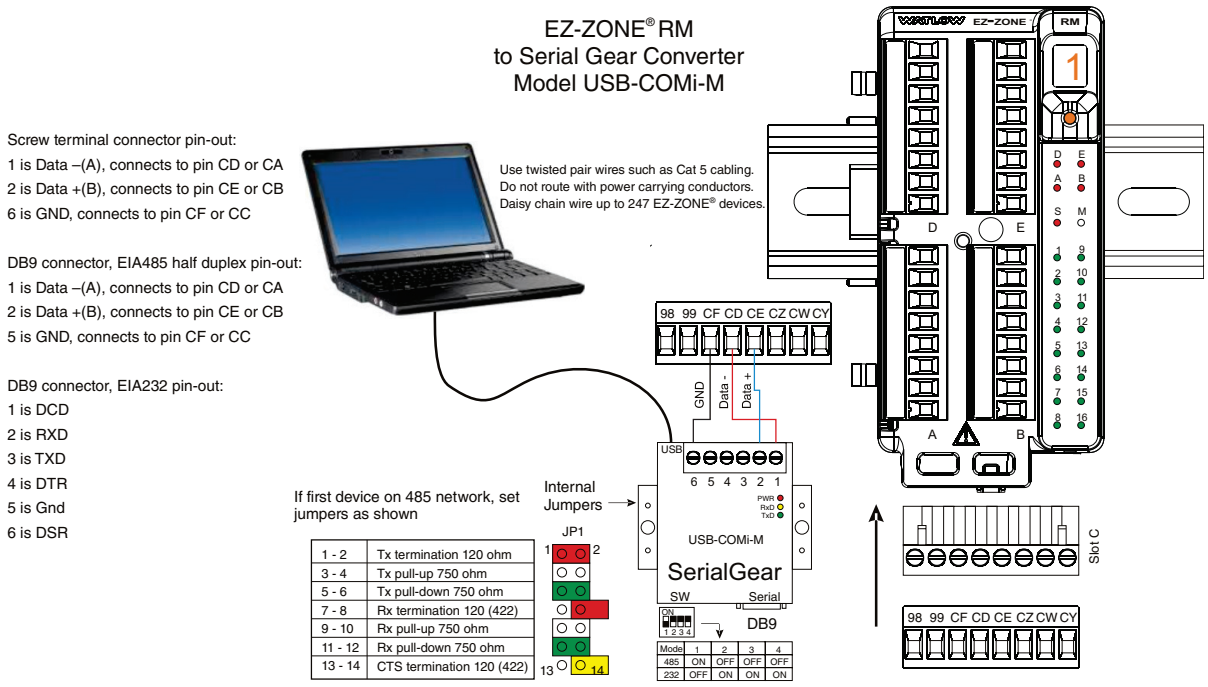


- Wire T-/R- to the A terminal of the EIA-485 port.
- Wire T+/R+ to the B terminal of the EIA-485 port.
- Wire common to the common terminal of the EIA-485 port.
- Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network.
- 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

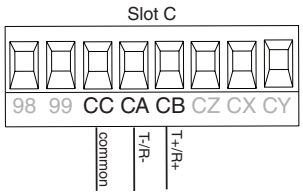
- RMHx-xxxx-x(**A**)xx

***** All models include Standard Bus communications





Modbus RTU or Standard Bus EIA-485 Communications



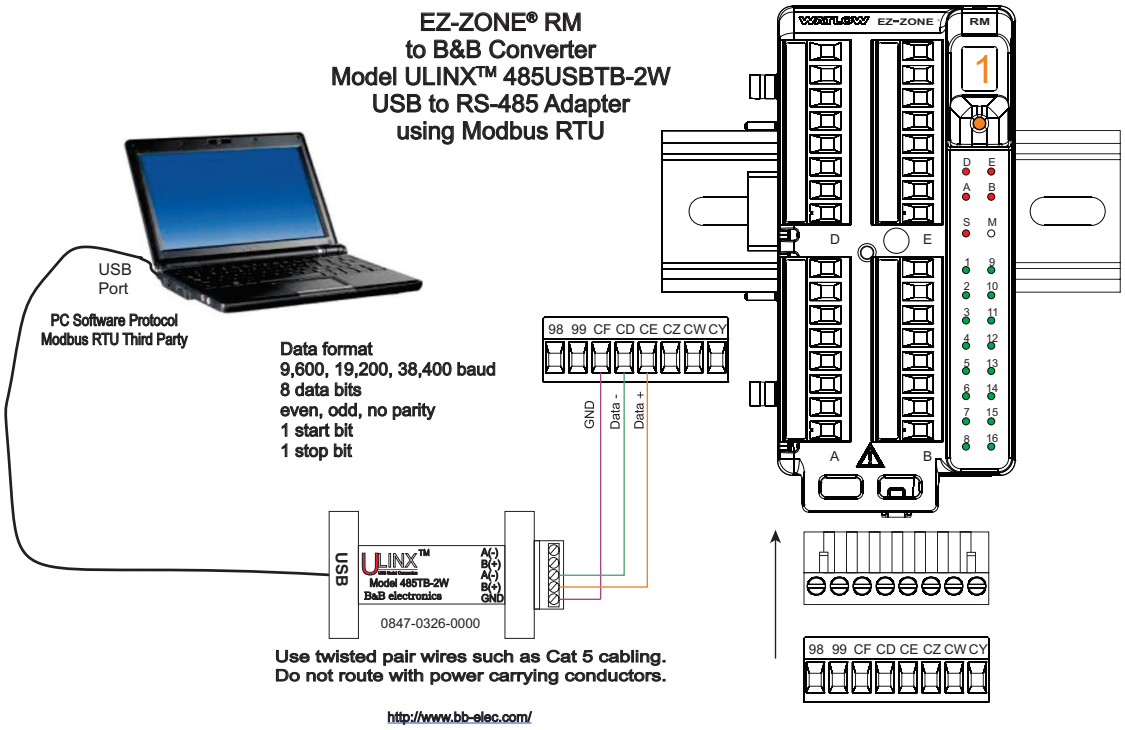
- Wire T-/R- to the A terminal of the EIA-485 port.
- Wire T+/R+ to the B terminal of the EIA-485 port.
- Wire common to the common terminal of the EIA-485 port.
- Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network.
- 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

RMHx-xxxx-x(**1**)xx

Modbus-IDA Terminal	EIA/TIA-485 Name	Watlow Terminal Label	Function
DO	A	CA or CD	T-/R-
D1	B	CB or CE	T+/R+
common	common	CC or CF	common

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.



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.

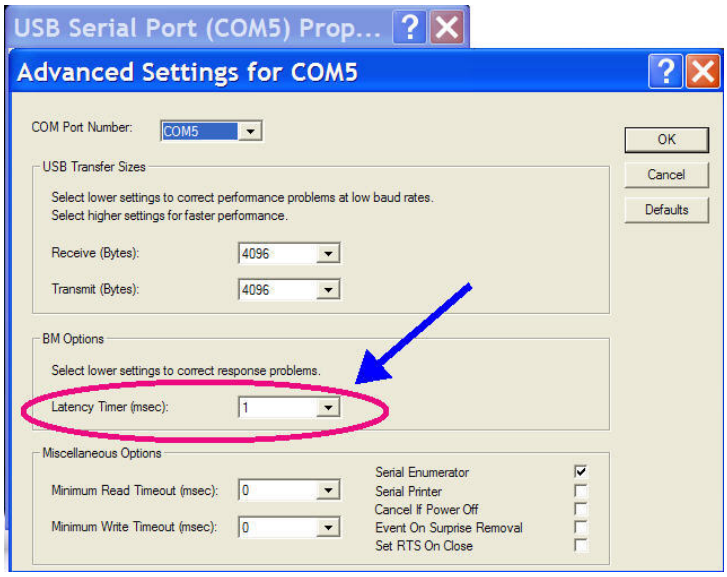
Note:

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 EZ-ZONE Configurator software and the control.

To modify Latency Timer settings follow the steps below:

1. Navigate to Device Manager on the PC.
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.

Graphic to the right shows the advanced settings dialog box for the com port in use.



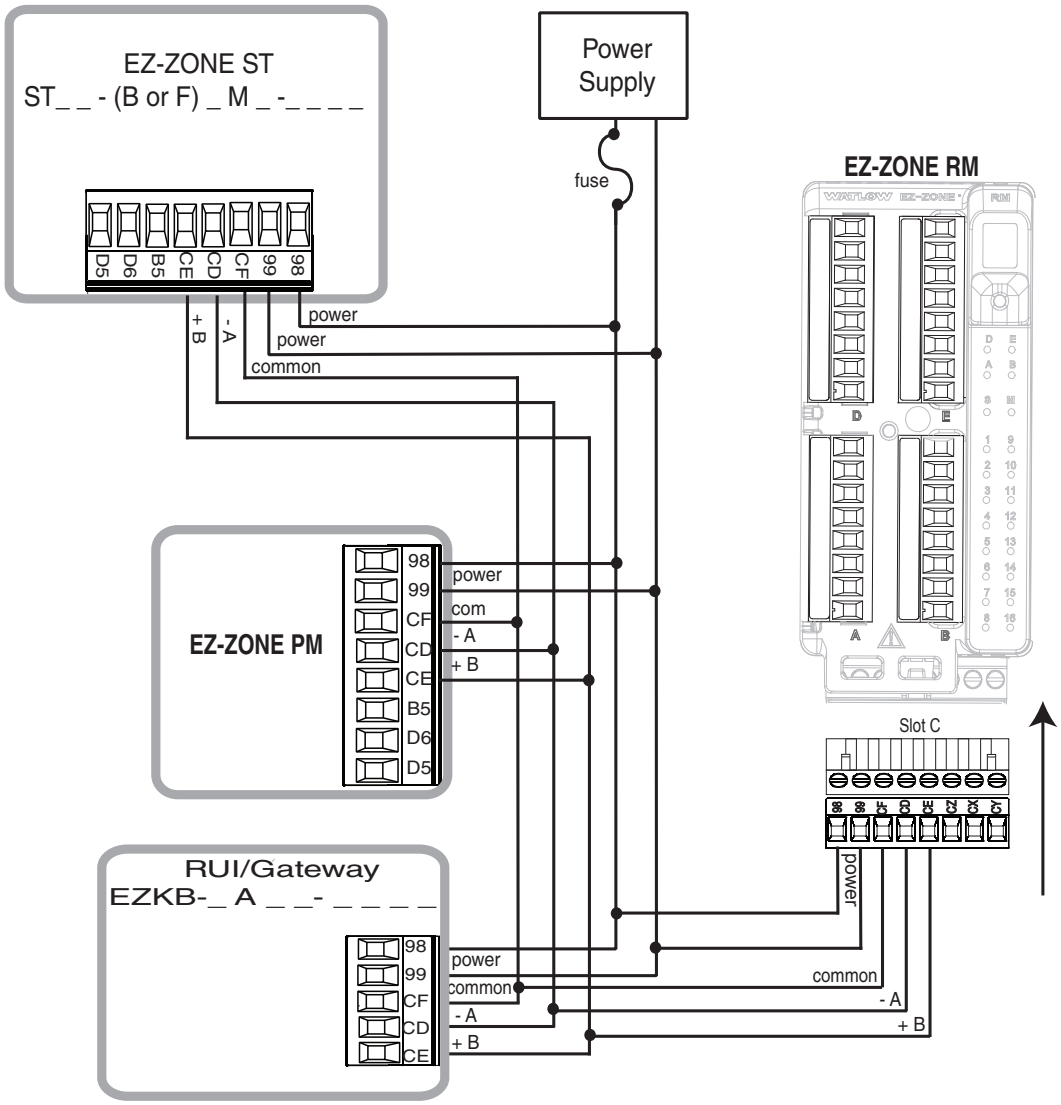
Wiring a Serial EIA-485 Network

Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network. A termination resistor may be required. Place a 120 Ω resistor across T+/R+ and T-/R- of the last controller on a network. Only one protocol per port is available at a time: either Modbus RTU or Standard Bus.

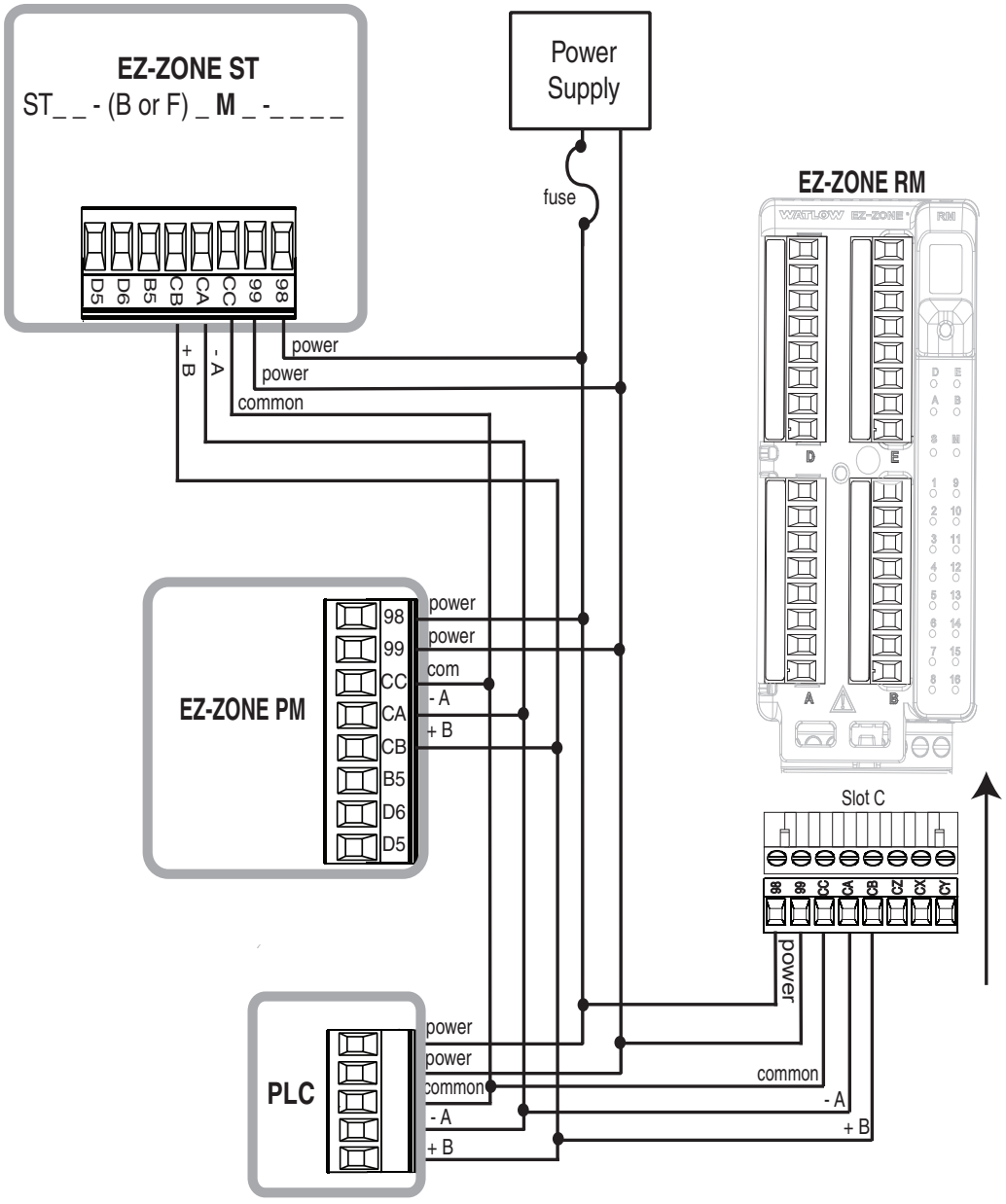
Note:

Termination resistors when used, require a termination resistor at both ends of the network.

A Network Using Watlow's Standard Bus and an RUI/Gateway



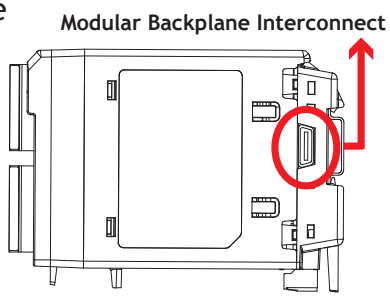
A Network Using Modbus RTU



Connecting the Modules

RM System Connections

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



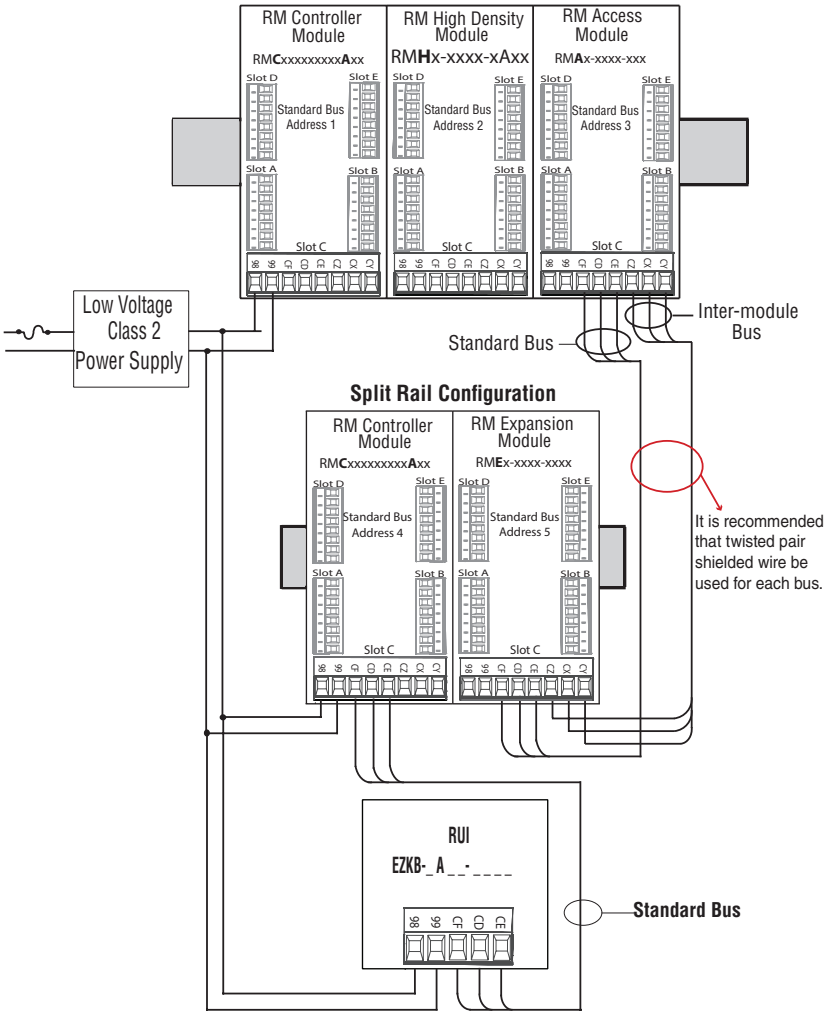
Notice in the split rail system diagram that a single power supply is being used across both DIN rails. One notable consideration when designing the hardware layout would be the available power supplied and the loading affect of all of the modules used. Watlow provides three options for power supplies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

1. RMCxxxxxxxxxxx @ 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.



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

With this power requirement 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 above. 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.

Note:
Connecting power supplies in parallel is not allowed. When power consumption is greater than 91 watts use a split rail configuration.

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:

Header Name	Definition
Display	Visually displayed information from the control.
Parameter Name	Describes the function of the given parameter.
Range	Defines options available for this prompt, i.e., min/max values (numerical), yes/no, etc... (further explanation below).
Default	Values as delivered from the factory.
Modbus Relative Address	Identifies unique parameters using either the Modbus RTU or Modbus TCP protocols (further explanation below).
CIP (Common Industrial Protocol)	If used in conjunction with an RMA module identifies unique parameters using either the DeviceNet or EtherNet/IP protocol (further explanation below).
Profibus Index	If used in conjunction with an RMA module identifies unique parameters using Profibus DP protocol (further explanation below).
Parameter ID	Identifies unique parameters used with other software such as, LabVIEW.
Data Type and Access (R/W)	uint = Unsigned 16 bit integer dint = Signed 32-bit, long string = ASCII (8 bits per character) float = IEEE 754 32-bit RWES = **R**eadable **W**ritable **E**EPROM (saved) **U**ser Set (saved)

Display

When a RM module is used in conjunction with the RUI (optional equipment) visual information from the module 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:

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

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 RMH module Setup Page and look at the Analog Input menu and then the Sensor Type. To turn the sensor off using Modbus simply write the value of 62 (off) to register 388 and send that value to the control.

Note:

With firmware release 9.0 and above, two new parameters (Minimum and Maximum) were added to allow ranges to be opened up to display full values. Unsigned integer may take on a range of 0 to 65,535 and floating point may take on a range of -3.4E+38 to 3.4E+38. Prior to revision 9.0, ranges were clamped to accommodate the seven segment LED display of the RUI. Both of these new parameters can be found in the Setup Page under the Global Menu.

Communication Protocols

All RM modules come with the standard offering of Watlow's Standard Bus protocol used primarily for inter-module communications as well as for configuration using EZ-ZONE Configurator and Composer 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 module has options for several different protocols listed below:

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

To learn more about the RM Access module click on the link below. Once there simply type in RM in the Keyword field. http://www.watlow.com/literature/manuals.cfm

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 controls support 6 digit Modbus registers.

Note:

In this User's Guide, all values shown representing Modbus addresses are added to 400,001 or 40,001 to acquire the absolute address.

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 Controller Operations Page for the Analog Input 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 380 (low order bytes) and 381 (high order bytes). The Modbus specification does not dictate which register should be high or low order so Watlow provides the user the ability to swap this order (Setup Page, Communications Menu) from the default low/high to high/low.

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 Silencing parameter found in the Controller Setup Pages under the Alarm menu. Instance one is shown as address 2670 and the offset to the next instance is identified as +60. If there was a desire to read or write to instance 3 simply add 120 to 2670 to find its address, in this case, the instance 3 address for Alarm Silence is 2790.

RMH _ - _ _ _ _ - _ **[1]** _ _

or

RMA _ - A **[2, 3]** _ _ - A A _

or

EZKB - x [2,3] _ _ - _ _ _ _

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

3 Chapter 3: Operations Pages

RMH Module Operation Page Parameters

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

1. From the Home Page, press both the Up ▲ and Down ▼ keys for three seconds. A1 will appear in the upper display and oPEr will appear in the lower display.
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.

Note:
Some values will be rounded off to fit in the four-character RUI display. Full values can be read with other interfaces. In firmware 9.0 and above, a user may specify ranges greater than may displayed by an RUI. If greater or less than an RUI can display, the display will show Value High uAL.H or Value Low uAL.L.

A1
oPEr **Analog Input Menu**
1
A1 Analog Input (1 to 16)
A1n Analog Input Value
iEr Input Error
iCA Calibration Offset

Pu
oPEr **Process Value Menu**
1
Pu Process Value (1 to 16)
SuA Source Value A
Sub Source Value B
SuC Source Value C
Sud Source Value D
SuE Source Value E
oFSt Offset
ou Output Value

d1o
oPEr **Digital Input/Output Menu**
1
d1o Digital Input/Output (1 to 12)
doS Output State
diS Input State

ACt
oPEr **Action Menu**
1
ACt Action (1 to 24)
E.S Event Status

mon
oPEr **Monitor Menu**
1
mon Monitor (1 to 16)
C.mA Control Mode Active
hPr Heat Power
CPr Cool Power

LooP
oPEr **Loop Menu**
1
LooP Loop (1 to 16)
r.En Remote Set Point
C.m Control Mode
At SP Autotune Set Point
AUt Autotune
C.SP Set Point
id.S Idle Set Point
hPb Heat Proportional Band
hhy On / Off Heat Hysteresis
CPb Cool Proportional Band
Chy On / Off Cool Hysteresis
t i Time Integral
td Time Derivative
db Dead Band
o.SP Manual Power

ALm
oPEr **Alarm Menu**
1
ALm Alarm (1 to 24)
ALo Low Set Point
Ah i High Set Point
ACLr Clear Alarm *
AS ir Silence Alarm *
ASt Alarm State *

Lnr
oPEr **Linearization Menu**
1
Lnr Linearization (1 to 16)
Su.A Source Value A
oFSt Offset
o.u Output Value

CPE
oPEr **Compare Menu**
1
CPE Compare (1 to 24)
Su.A Source Value A
Su.b Source Value B
o.u Output Value

tmr
oPEr **Timer Menu**
1
tmr Timer (1 to 24)
Su.A Source Value A
Su.b Source Value B
E.t Elapsed Time
o.u Output Value

Ctr
oPEr **Counter Menu**
1
Ctr Counter (1 to 24)
Cnt Count
Su.A Source Value A
Su.b Source Value B
o.u Output Value

LgC
oPEr **Logic Menu**
1
LgC Logic (1 to 24)
Su.A Source Value A
Su.b Source Value B
Su.C Source Value C
Su.d Source Value D
Su.E Source Value E
Su.F Source Value F
Su.g Source Value G
Su.h Source Value H
o.u Output Value

mAt
oPEr **Math Menu**
1
PASr Math (1 to 24)
Su.A Source Value A
Su.b Source Value B
Su.C Source Value C
Su.d Source Value D
Su.E Source Value E
oFSt Offset
o.u Output Value

RM High Density Module • Operations Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
A 1 oPEr **Analog Input Menu**								
A in Ain	*Analog Input (1 to 16)* **Analog Input Value** View the process value. **Note:** Ensure that the Error Status (below) indicates no error (61) when reading this value using a field bus protocol. If an error exists, the last known value prior to the error occurring will be returned.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	- - - -	380 [offset 90]	0x68 (104) 1 to 16 1	0	4001	float R
i.Er i.Er	*Analog Input (1 to 16)* **Input Error** View the cause of the most recent error. If the AtEn message is Er.11 or Er.19 or Er.10 or Er.16, this parameter will display the cause of the input error.	nonE None (61) OPEn Open (65) Shrt Shorted (127) E.rn Measurement Error (140) E.CAL Bad Calibration Data (139) Er.Ab Ambient Error (9) E.rtd RTD Error (141) FAIL Fail (32)	- - - -	382 [offset 90]	0x68 (104) 1 to 16 2	1	4002	uint R
i.CA i.CA	*Analog Input (1 to 16)* **Calibration Offset** 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.	-1,999.000 to 9,999.000°F or units -1,110.555 to 5,555.000°C	0.0	402 [offset 90]	0x68 (104) 1 to 16 0xC (12)	2	4012	float RWES
* 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 • Operations Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
No Dis-play	*Analog Input (1 to 16)* **Filtered Process Value** View the process value when filtering is turned on.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	- - - -	422 [offset 90]	0x68 (104) 1 to 16 0x16 (22)	- - - -	4022	float R
No Dis-play	*Analog Input (1 to 16)* **Clear Error** Clear latched input when input error condition no longer exists.	Clear Error (1221)	- - - -	436 [offset 90]	0x68 (104) 1 to 16 0x1D (29)	- - - -	4029	uint RW
PU oPEr **Process Value Menu**								
SU.A Su.A	*Process Value (1 to 16)* **Source Value A** View the value of Source A.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	- - - -	8250 [offset 70]	0x7E (126) 1 to 16 0x10 (16)	- - - -	26016	float R
SU.b Su.b	*Process Value (1 to 16)* **Source Value B** View the value of Source B.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	- - - -	8252 [offset 70]	0x7E (126) 1 to 16 0x11 (17)	- - - -	26017	float R
SU.C Su.C	*Process Value (1 to 16)* **Source Value C** View the value of Source C.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	- - - -	8254 [offset 70]	0x7E (126) 1 to 16 0x12 (18)	- - - -	26018	float R
SU.d Su.d	*Process Value (1 to 16)* **Source Value D** View the value of Source D.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	- - - -	8256 [offset 70]	0x7E (126) 1 to 16 0x13 (19)	- - - -	26019	float R
SU.E Su.E	*Process Value (1 to 16)* **Source Value E** View the value of Source E.	oFF Off (62) on On (63)	- - - -	8258 [offset 70]	0x7E (126) 1 to 16 0x14 (20)	- - - -	26020	float R
* 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 • Operations Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
oFSt	*Process Value (1 to 16)* **Offset** Set an offset to be applied to this function's output.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	0	8264 [offset 70]	0x7E (126) 1 to 16 0x17 (23)	- - - -	26023	float RWES
o.u o.u	*Process Value (1 to 16)* **Output Value** View the value of this function block's output.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	- - - -	8262 [offset 70]	0x7E (126) 1 to 16 0x16 (22)	- - - -	26022	float R
d io oPEr **Digital Input/Output Menu**								
do.S do.S	*Digital Output (1 to 12)* **Output State** View the state of this output.	oFF Off (62) on On (63)	- - - -	1832 [offset 30]	0x6A (106) 1 to 12 7	46	6007	uint R
di.S di.S	*Digital Input (1 to 12)* **Input State** View this event input state.	oFF Off (62) on On (63)	- - - -	1840 [offset 30]	0x6A (106) 1 to 12 0x0B (11)	- - - -	6011	uint R
No Display	*Digital Input (1 to 12)* **Source Error** View reported cause for input malfunction.	None (61) Open (65) Shorted (127) Measurement error (140) Bad calibration data (139) Ambient error (9) RTD error (14) Fail (32) Math error (1423) Not sourced (246) Stale (1617)	- - - -	1848 [offset 30]	0x6A (106) 1 to 12 0x0F (15)	- - - -	6015	uint R
ACt oPEr **Action Menu**								
Ei.S Ei.S	*Action (1 to 24)* **Event Input Status** View this input state.	oFF Off (62) on On (63)	- - - -	2188 [offset 20]	0x6E (110) 1 to 24 5	140	10005	uint R

* 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 • Operations Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
No Dis-play	*Function Key (1)* **Function Key State** View current state of function key 1.	Off (62) On (63)	- - - -	- - - -	- - - -	- - - -	3024	uint R
No Dis-play	*Function Key (2)* **Function Key State** View current state of function key 2.	Off (62) On (63)	- - - -	- - - -	- - - -	- - - -	3030	uint R
Monitor Menu								
C.mA C.MA	*Monitor (1 to 16)* **Control Mode Active** View the current control mode.	oFF Off (62) Auto (10) mAn Manual (54)	- - - -	4102 [offset 70]	0x97 (151) 1 to 16 2	- - - -	8002	uint R
h.Pr h.Pr	*Monitor (1 to 16)* **Heat Power** View the current heat output level.	0.0 to 100.0%	- - - -	4124 [offset 70]	0x97 (151) 1 to 16 0xD (13)	- - - -	8011	float R
C.Pr C.Pr	*Monitor (1 to 16)* **Cool Power** View the current cool output level.	-100.0 to 0.0%	- - - -	4126 [offset 70]	0x97 (151) 1 to 16 0xE (14)	- - - -	8014	float R
C.SP C.SP	*Monitor (1 to 16)* **Closed Loop Active Set Point** View the set point currently in effect.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	- - - -	5232 [offset 80]	0x6B (107) 1 to 16 7	- - - -	8029	float R
Pv.A Pv.A	*Monitor (1 to 16)* **Process Value Active** View the current filtered process value using the control input.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	- - - -	4156 [offset 70]	0x97 (151) 1 to 16 0x1D (29)	- - - -	8031	float R

* 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 • Operations Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
LooP oPEr **Control Loop Menu**								
r.En r.En	*Control Loop (1 to 16)* **Remote Set Point** Enable this loop to switch control to the remote set point.	no No (59) YES Yes (106)	No	5260 [offset 80]	0x6B (107) 1 to 16 0x15 (21)	38	7021	uint RWES
C.M C.M	*Control Loop (1 to 16)* **Control Mode** Select the method that this loop will use to control.	oFF Off (62) AUto Auto (10) MAn Manual (54)	Auto	4100 [offset 70]	0x97 (151) 1 to 16 1	53	8001	uint RWES
A.tSP A.tSP	*Control Loop (1 to 16)* **Autotune Set Point** Set the set point that the autotune will use, as a per-centage of the current set point.	50.0 to 200.0%	90.0	4138 [offset 70]	0x97 (151) 1 to 16 0x14 (20)	- - - -	8025	float RWES
AUt AUt	*Control Loop (1 to 16)* **Autotune** Start an autotune. While the autotune is ac-tive, the Home Page will display AtUn tUn1 to tUn9 or tU10 to tU16 When the autotune is complete, the message will clear automatically.	no No (59) YES Yes (106)	No	4140 [offset 70]	0x97 (151) 1 to 16 0x15 (21)	54	8026	uint RW
C.SP C.SP	*Control Loop (1 to 16)* **Set Point** Set the closed loop set point that the controller will automatically con-trol to.	Low Set Point to Maximum Set Point (Setup Page)	75.0°F or units 24.0°C	5220 [offset 80]	0x6B (107) 1 to 16 1	39	7001	float RWES

* 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 • Operations Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
id.S id.S	*Control Loop (1 to 16)* **Idle Set Point** Define a set point that can be triggered by an event state.	Low Set Point to High Set Point (Setup Page)	75.0°F or units 24.0°C	5236 [offset 80]	0x6B (107) 1 to 16 9	40	7009	float RWES
h.Pb h.Pb	*Control Loop (1 to 16)* **Heat Proportional Band** Set the PID proportional band for the heat outputs.	0.001 to 9,999.000°F or units 0.001 to 5,555.000°C	25.0°F or units 14.0°C	4110 [offset 70]	0x97 (151) 1 to 16 6	55	8009	float RWES
h.hy h.hy	*Control Loop (1 to 16)* **On / Off Heat Hysteresis** Set the control switching hysteresis for on-off control. This determines how far into the "on" region the process value needs to move before the output turns on.	0.001 to 9,999.000°F or units 0.001 to 5,555.000°C	3.0°F or units 2.0°C	4120 [offset 70]	0x97 (151) 1 to 16 0xB (11)	56	8010	float RWES
C.Pb C.Pb	*Control Loop (1 to 16)* **Cool Proportional Band** Set the PID proportional band for the cool outputs.	0.001 to 9,999.000°F or units 0.001 to 5,555.000°C	25.0°F or units 14.0°C	4112 [offset 70]	0x97 (151) 1 to 16 7	57	8012	float RWES
C.hy C.hy	*Control Loop (1 to 16)* **On / Off Cool Hysteresis** Set the control switching hysteresis for on-off control. This determines how far into the "on" region the process value needs to move before the output turns on.	0.001 to 9,999.000°F or units 0.001 to 5,555.000°C	3.0°F or units 2.0°C	4122 [offset 70]	0x97 (151) 1 to 16 0xC (12)	58	8013	float RWES

* 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 • Operations Page								
Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
t i ti	*Control Loop (1 to 16)* **Time Integral** Set the PID integral for the outputs.	0 to 9,999 seconds per repeat	180 seconds per repeat	4114 [offset 70]	0x97 (151) 1 to 16 8	59	8006	float RWES
t d td	*Control Loop (1 to 16)* **Time Derivative** Set the PID derivative time for the outputs.	0 to 9,999 seconds	0 seconds	4116 [offset 70]	0x97 (151) 1 to 16 9	60	8007	float RWES
d b db	*Control Loop (1 to 16)* **Dead Band** Set the offset to the proportional band. With a negative value, both heating and cooling outputs are active when the process value is near the set point. A positive value keeps heating and cooling outputs from fighting each other.	-1,000.0 to 1,000.0°F or units -556 to 556°C	0.0	4118 [offset 70]	0x97 (151) 1 to 16 0xA (10)	61	8008	float RWES
o.5P o.SP	*Control Loop (1 to 16)* **Manual Power** Set a fixed level of output power when in manual (open-loop) mode.	-100 to 100% (heat and cool) 0 to 100% (heat only) -100 to 0% (cool only)	0.0	5222 [offset 80]	0x6B (107) 1 to 16 2	41	7002	float RWES
No Display	*Control Loop (1 to 16)* **Error State** Read to see if loop is in an error state.	None (61) Open Loop (1274) Reversed Loop (1275)	- - - -	4148 [offset 70]	0x97 (151) 1 to 16 0x19(25)	- - - -	8048	uint R
No Display	*Control Loop (1 to 16)* **Clear Error** Write to this register to clear loop error.	Clear (129) Ignore (204)	Ignore	4150 [offset 70]	0x97 (151) 1 to 16 0x1A(26)	- - - -	8049	uint W
* 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 • Operations Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
No Dis-play	*Control Loop (1 to 16)* **Loop Output Power** View the loop out-put power.	-100.0 to 100.0	- - - -	4128 [offset 70]	0x97 (151) 1 to 16 0x0F (15)	- - - -	8033	float R
ALM oPEr **Alarm Menu**								
ALo A.Lo	*Alarm (1 to 24)* **Low Set Point** If Type (Setup Page, Alarm Menu) is set to: **Process** - set the process value that will trigger a low alarm. **Deviation** - set the span of units from the set point that will trigger a low alarm. A negative set point repre-sents a value below closed loop set point. A positive set point represents a value above closed loop set point.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	32.0°F or units 0.0°C	2662 [offset 60]	0x6D (109) 1 to 24 2	18	9002	float RWES
* 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 • Operations Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
AH i A.hi	*Alarm (1 to 24)* **High Set Point** If Type (Setup Page, Alarm Menu) is set to: **Process** - set the process value that will trigger a high alarm. **Deviation** - set the span of units from the 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.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	300.0 °F or units 150.0 °C	2660 [offset 60]	0x6D (109) 1 to 24 1	19	9001	float RWES
ACLr A.CLr	*Alarm (1 to 24)* **Clear Alarm** Write to this register to clear an alarm	0	- - - -	- - - -	- - - -	- - - -	9026	uint W
AS ir A.Sir	*Alarm (1 to 24)* **Silence Alarm** Write to this register to silence an alarm	0	- - - -	- - - -	- - - -	- - - -	9027	uint W
AST A.St	*Alarm (1 to 24)* **Alarm State** Current state of alarm	Str Startup (88) nonE None (61) bLo Blocked (12) AL.L Alarm Low (8) AL.h Alarm High (7) AL.E Error (28)	- - - -	2676 [offset 60]	0x6D (109) 1 to 24 9	- - - -	9009	uint R
No Display	*Alarm (1 to 24)* **Alarm Clearable** Read to see if alarm can be cleared.	no No (59) YES Yes (106)	- - - -	2682 [offset 60]	0x6D (109) 1 to 24 0xC (12)	- - - -	9012	uint R
* 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 • Operations Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
No Dis-play	*Alarm (1 to 24)* **Silenced** Read to see if alarm is active but has been silenced by Silence Alarm.	Yes (106) No (59)	- - - -	2680 [offset 60]	0x6D (109) 1 to 24 0x0B (11)	- - - -	9011	uint R
No Dis-play	*Alarm (1 to 24)* **Latched** Read to see if alarm is currently latched.	Yes (106) No (59)	- - - -	2678 [offset 60]	0x6D (109) 1 to 24 0x0A (10)	- - - -	9010	uint R
No Dis-play	*Alarm (1 to 24)* **Clear Request** Write to this reg-ister to clear an alarm	Clear (0) No Change (255)	- - - -	2684 [offset 60]	0x6D (109) 1 to 24 0xD (13)	32	9013	uint RW
No Dis-play	*Alarm (1 to 24)* **Silence Request** Write to this reg-ister to silence an alarm	Clear (0) No Change (255)	- - - -	2686 [offset 60]	0x6D (109) 1 to 24 0x0E (14)	33	9014	uint RW
No Dis-play	*Alarm (1 to 24)* **Alarm Working Process Value** Read process value used by alarms	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	- - - -	2696 [offset 60]	0x6D (109) 1 to 24 0x13 (19)	- - - -	9019	float R
No Dis-play	*Alarm (1 to 24)* **Output Value** Read state of alarm output	On (63) Off (62)	- - - -	2706 [offset 60]	0x6D (109) 1 to 24 0x18 (24)	- - - -	9024	uint R
LnrOPEr **Linearization Menu**								
Su.A Su.A	*Linearization (1 to 24)* **Source Value A** View the value of Source A.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	- - - -	14386 [offset 70]	0x86 (134) 1 to 24 4	- - - -	34004	float R
oFSt oFSt	*Linearization (1 to 24)* **Offset** Set an offset to be applied to this function's output.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	0	14390 [offset 70]	0x86 (134) 1 to 24 6	- - - -	34006	float RWES

* These parameters/prompts are available in these menus with firmware revisions 6.0 and above.
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RM High Density Module • Operations Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
o.u o.v	*Linearization (1 to 24)* **Output Value** View the value of this function's output.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	- - - -	14392 [offset 70]	0x86 (134) 1 to 24 7	- - - -	34007	float R
No Dis-play	*Linearization (1 to 24)* **Error** View reported cause for Linear-ization output malfunction.	None (61) Open (65) Shorted (127) Measurement error (140) Bad calibration data (139) Ambient error (9) RTD error (14) Fail (32) Math error (1423) Not sourced (246) Stale (1617) Can't process (1659)	- - - -	14434 [offset 70]	0x86 (134) 1 to 24 0x1C (28)	- - - -	34028	uint R
CPE oPEr **Compare Menu**								
Su.A Su.A	*Compare (1 to 24)* **Source Value A** View the value of Source A.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	- - - -	11272 [offset 40]	0x80 (128) 1 to 24 7	- - - -	28007	float R
Su.b Su.b	*Compare (1 to 24)* **Source Value B** View the value of Source B.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	- - - -	11274 [offset 40]	0x80 (128) 1 to 24 8	- - - -	28008	float R
o.u o.v	*Compare (1 to 24)* **Output Value** View the value of this function's output.	oFF Off (62) on On (63)	- - - -	11278 [offset 40]	0x80 (128) 1 to 24 0xA (10)	- - - -	28010	uint R
* 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 • Operations Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
No Dis-play	*Compare (1 to 24)* **Error** Read reported cause for compare error	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)	- - - -	11284 [offset 40]	0x80 (128) 1 to 24 0x0D (13)	- - - -	28013	uint R
tMr oPEr **Timer Menu**								
Su.A Su.A	*Timer (1 to 24)* **Value Source A** View the value of Source A.	oFF Off (62) on On (63)	- - - -	13192 [offset 50]	0x83 (131) 1 to 24 7	- - - -	31007	uint R
Su.b Su.b	*Timer (1 to 24)* **Value Source B** View the value of Source B.	oFF Off (62) on On (63)	- - - -	13194 [offset 50]	0x83 (131) 1 to 24 8	- - - -	31008	uint R
E.t E.t	*Timer (1 to 24)* **Elapsed Time** View the value of this function's elapsed time.	0 to 9,999.000 sec-onds	- - - -	13210 [offset 50]	0x83 (131) 1 to 24 0x10 (16)	- - - -	31016	float R
o.u o.v	*Timer (1 to 24)* **Output Value** View the value of this function's output.	oFF Off (62) on On (63)	- - - -	13198 [offset 50]	0x83 (131) 1 to 24 0x11 (17)	- - - -	31010	uint R
No Dis-play	*Timer (1 to 24)* **Running** Read to determine if timer is running	Off (62) On (63)	- - - -	13208 [offset 50]	0x83 (131) 1 to 24 0x0F (15)	- - - -	31015	uint R
* 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 • Operations Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
No Dis-play	*Timer (1 to 24)* **Error** Read reported cause for timer error	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)	- - - -	13214 [offset 50]	0x83 (131) 1 to 24 0x12 (18)	- - - -	31018	uint R
CtroPEr **Counter Menu**								
Cnt Cnt	*Counter (1 to 24)* **Count** View the function's total count.	0 to 9,999	- - - -	12248 [offset 40]	0x82 (130) 1 to 24 0xF (15)	217	30015	uint R
Su.A Su.A	*Counter (1 to 24)* **Source Value A** View the value of Source A.	oFF Off (62) on On (63)	- - - -	12232 [offset 40]	0x82 (130) 1 to 24 7	- - - -	30007	uint R
Su.b Su.b	*Counter (1 to 24)* **Source Value B** View the value of Source B.	oFF Off (62) on On (63)	- - - -	12234 [offset 40]	0x82 (130) 1 to 24 8	- - - -	30008	uint R
o.u o.v	*Counter (1 to 24)* **Output Value** View the value of this function's output.	oFF Off (62) on On (63)	- - - -	12238 [offset 40]	0x82 (130) 1 to 24 0xA (10)	- - - -	30010	uint R
No Dis-play	*Counter (1 to 24)* **Error** Read reported cause for counter error	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)	- - - -	12250 [offset 40]	0x82 (130) 1 to 24 0x10 (16)	- - - -	30016	uint R

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RM High Density Module • Operations Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
LGC oPEr **Logic Menu**								
Su.A Su.A	*Logic (1 to 24)* **Source Value A** View the value of Source A.	oFF Off (62) on On (63)	- - - -	9388 [offset 80]	0x7F (127) 1 to 24 0x19 (25)	- - - -	27025	uint R
Su.b Su.b	*Logic (1 to 24)* **Source Value B** View the value of Source B.	oFF Off (62) on On (63)	- - - -	9390 [offset 80]	0x7F (127) 1 to 24 0x1A (26)	- - - -	27026	uint R
Su.C Su.C	*Logic (1 to 24)* **Source Value C** View the value of Source C.	oFF Off (62) on On (63)	- - - -	9392 [offset 80]	0x7F (127) 1 to 24 0x1B (27)	- - - -	27027	uint R
Su.d Su.d	*Logic (1 to 24)* **Source Value D** View the value of Source D.	oFF Off (62) on On (63)	- - - -	9394 [offset 80]	0x7F (127) 1 to 24 0x1C (28)	- - - -	27028	uint R
Su.E Su.E	*Logic (1 to 24)* **Source Value E** View the value of Source E.	oFF Off (62) on On (63)	- - - -	9396 [offset 80]	0x7F (127) 1 to 24 0x1D (29)	- - - -	27029	uint R
Su.F Su.F	*Logic (1 to 24)* **Source Value F** View the value of Source F.	oFF Off (62) on On (63)	- - - -	9398 [offset 80]	0x7F (127) 1 to 24 0x1E (30)	- - - -	27030	uint R
Su.g Su.g	*Logic (1 to 24)* **Value Source G** View the value of Source G.	oFF Off (62) on On (63)	- - - -	9400 [offset 80]	0x7F (127) 1 to 24 0x1F (31)	- - - -	27031	uint R
Su.h Su.h	*Logic (1 to 24)* **Source Value H** View the value of Source H.	oFF Off (62) on On (63)	- - - -	9402 [offset 80]	0x7F (127) 1 to 24 0x20 (32)	- - - -	27032	uint R

* These parameters/prompts are available in these menus with firmware revisions 6.0 and above.
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RM High Density Module • Operations Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
o.u o.v	*Logic (1 to 24)* **Output Value** View the value of this function's output.	oFF Off (62) on On (63)	- - - -	9406 [offset 80]	7F (127) 1 to 24 0x22 (34)	- - - -	27034	uint R
No Dis-play	*Logic (1 to 24)* **Error** Read reported cause for logic er-ror	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)	- - - -	9410 [offset 80]	0x7F (127) 1 to 24 0x24 (36)	- - - -	27036	uint R
MAtH oPEr **Math Menu**								
Su.A Su.A	*Math (1 to 24)* **Source Value A** View the value of Source A.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	- - - -	6570 [offset 70]	0x7D (125) 1 to 24 0x10 (16)	- - - -	25016	float R
Su.b Su.b	*Math (1 to 24)* **Source Value B** View the value of Source B.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	- - - -	6572 [offset 70]	0x7D (125) 1 to 24 0x11 (17)	- - - -	25017	float R
Su.C Su.C	*Math (1 to 24)* **Source Value C** View the value of Source C.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	- - - -	6574 [offset 70]	0x7D (125) 1 to 24 0x12 (18)	- - - -	25018	float R
Su.d Su.d	*Math (1 to 24)* **Source Value D** View the value of Source D.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	- - - -	6576 [offset 70]	0x7D (125) 1 to 24 0x13 (19)	- - - -	25019	float R
Su.E Su.E	*Math (1 to 24)* **Source Value E** View the value of Source E.	oFF Off (62) on On (63)	- - - -	6578 [offset 70]	0x7D (125) 1 to 24 0x14 (20)	- - - -	25020	uint R

* 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 • Operations Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
oFSt oFSt	*Math (1 to 24)* **Offset** Set an offset to be applied to this function's output.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	0	6584 [offset 70]	0x7D (125) 1 to 24 0x17 (23)	- - - -	25023	float RWES
o.u o.v	*Math (1 to 24)* **Output Value** View the value of this function's output.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	- - - -	6582 [offset 70]	0x7D (125) 1 to 24 0x16 (22)	- - - -	25022	float R
No Dis-play	*Math (1 to 24)* **Error** Read reported cause for logic er-ror	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)	- - - -	6596 [offset 70]	0x7D (125) 1 to 24 0x1D (29)	- - - -	25029	uint R
* These parameters/prompts are available in these menus with firmware revisions 6.0 and above. ** R: Read, W: Write, E: EEPROM, S: User Set								

4 Chapter 4: Setup Pages

RMH Module Setup Page Parameters

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. A1 will appear in the upper display and SEt will appear in the lower display.

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

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.

Note:
Some values will be rounded off to fit in the four-character RUI display. Full values can be read with other interfaces. In firmware 9.0 and above, a user may specify ranges greater than may displayed by an RUI. If greater or less than an RUI can display, the display will show Value High uAL.H or Value Low uAL.L.

A1
SEt **Analog Input Menu**
1
A1 Analog Input (1 to 16)
- SEn Sensor Type
- L in TC Linearization
- Unit Units
- S.Lo Scale Low
- S.hi Scale High
- r.Lo Range Low
- r.hi Range High
- P.EE Process Error Enable
- P.EL Process Error Low Value
- t.C Thermistor Curve
- r.r Resistance Range
- Co.A Custom Coefficient A
- Co.b Custom Coefficient B
- Co.C Custom Coefficient C
- FiL Filter
- iEr Input Error Latching
- dEC Display Precision
- iCA Calibration Offset
- A in Analog Input Value *
- iEr Input Error *

PU

SEt **Process Value**

1

PU Process Value (1 to 16)

- Fn Function
- SFnA Source Function A
- S iA Source Instance A
- SFnb Source Function B
- S ib Source Instance B
- S2b Source Zone B
- SFnC Source Function C
- S iC Source Instance C
- S2C Source Zone C
- SFnd Source Function D
- S id Source Instance D
- S2d Source Zone D
- SFnE Source Function E
- S iE Source Instance E
- S2E Source Zone E
- CP Cross Over Point
- Cb Cross Over Band
- P.unt Pressure Units
- A.unt Altitude Units
- bPr Barometric Pressure
- FiL Filter

dio

SEt **Digital Input/Output Menu**

1

dio Digital Input/Output (1 to 12)

- dir Direction
- Fn Function
- Fi **Output** Function Instance
- S2A **Output** Source Zone
- oCt Time Base Type
- otb Fixed Time Base
- oLo Low Power Scale
- oHi High Power Scale

ACt

SEt **Action Menu**

1

ACt Action (1 to 24)

- Fn Action Function
- Fi Function Instance
- SFnA Source Function A
- S iA Source Instance A
- S2A Source Zone A
- LEu Active Level

LooP

SEt **Control Loop Menu**

1

LooP Control Loop (1 to 16)

- SFnA Source Function A
- iSA Source Instance A
- hAG Heat Algorithm
- CAG Cool Algorithm
- CCr Cool Output Curve
- hPb Heat Proportional Band *
- hHy On / Off Heat Hysteresis *
- CPb Cool Proportional Band *
- CHy On / Off Cool Hysteresis *
- ti Time Integral *
- td Time Derivative *
- db Dead Band *
- tEun TRU-TUNE+® Enable
- tbnd TRU-TUNE+ Band
- tGn TRU-TUNE+ Gain
- AtSP Autotune Set Point *
- tAGr Autotune Aggressiveness
- PdL Peltier Delay
- rEn Remote Set Point
- SFnb Source Function B
- S ib Source Instance B
- S2b Source Zone B
- rty Remote Set Point Type
- UFA Auto-to-Manual Power
- FAiL Input Error Power
- PnAn Fixed Power
- LdE Open Loop Detect Enable
- Ldt Open Loop Detect Time
- Ldd Open Loop Detect Deviation
- rP Ramp Action
- r.SC Ramp Scale
- r.rt Ramp Rate
- L.SP Minimum Set Point
- h.SP Maximum Set Point
- C.SP Set Point*
- id.S Idle Set Point *
- SP.Lo Minimum Manual Power
- SP.Hi Maximum Manual Power
- o.SP Manual Power *
- C.Pn Control Mode *

otPt

SEt **Output Menu**

1

otPt Output (1 to 12)

- Fn Function
- Fi Output Function Instance
- S2 **Output** Source Zone
- oCt Time Base Type
- otP Fixed Time Base
- oLo Low Power Scale
- oHi High Power Scale

otPt Output (1 to 3, 7 to 9) process

- oty Output Type
- Fn Function
- Fi Output Function Instance
- S2A Source Zone A
- SLo Scale Low
- SHi Scale High
- rLo Range Low
- rHi Range High
- oCA Calibration Offset

ALMn

SEt **Alarm Menu**

1

ALMn Alarm (1 to 24)

- Aty Type
- Sr.A Alarm Source
- iSA Alarm Source Instance
- S2A Alarm Source Zone
- LooP Control Loop
- AHy Hysteresis

- AL9 Logic
- ASd Sides
- ALo Low Set Point *
- Ah1 High Set Point *
- ALA Latching
- AbL Blocking
- AS1 Silencing
- AdSP Display
- AdL Delay Time
- ACLr Clear Alarm *
- AS1r Silence Alarm *
- ASt Alarm State *

Lnr

SEt **Linearization Menu**

1

Lnr Linearization (1 to 16)

- Fn Function
- SFnA Source Function A
- S1A Source Instance A
- S2A Source Zone A
- Unit Units
- iP.1 Input Point 1
- oP.1 Output Point 1
- iP.2 Input Point 2
- oP.2 Output Point 2
- iP.3 Input Point 3
- oP.3 Output Point 3
- iP.4 Input Point 4
- oP.4 Output Point 4
- iP.5 Input Point 5
- oP.5 Output Point 5
- iP.6 Input Point 6
- oP.6 Output Point 6
- iP.7 Input Point 7
- oP.7 Output Point 7
- iP.8 Input Point 8
- oP.8 Output Point 8
- iP.9 Input Point 9
- oP.9 Output Point 9
- iP.10 Input Point 10
- oP.10 Output Point 10

CPE

SEt **Compare Menu**

1

CPE Compare (1 to 24)

- Fn Function
- toL Tolerance
- SFnA Source Function A
- S1A Source Instance A
- S2A Source Zone A
- SFnb Source Function B
- S1b Source Instance B
- S2b Source Zone B
- Erh Error Handling

tMr

SEt **Timer Menu**

1

tMr Timer (1 to 24)

- Fn Function
- SFnA Source Function A
- S1A Source Instance A
- S2A Source Zone A
- SASA Run Active Level
- SFnb Source Function B
- S1b Source Instance B
- S2b Source Zone B
- SASb Reset Active Level
- t1 Time
- LEu Transmitter Active Level

Ctr

SEt **Counter Menu**

1

Ctr Counter (1 to 24)

- Fn Function
- SFnA Source Function A
- S1A Source Instance A
- S2A Source Zone A
- SASA Count Active Level
- SFnb Source Function B
- S1b Source Instance B
- S2b Source Zone B
- SASb Reset Active Level
- LoAd Load Value
- tr9t Target Value
- LAt Latching

L9C

SEt **Logic Menu**

1

L9C Logic (1 to 24)

- Fn Function
- SFnA Source Function A
- S1A Source Instance A
- S2A Source Zone A
- SFnb Source Function B
- S1b Source Instance B
- S2b Source Zone B
- SFnC Source Function C
- S1C Source Instance C
- S2C Source Zone C
- SFnd Source Function D
- S1d Source Instance D
- S2d Source Zone D
- SFnE Source Function E
- S1E Source Instance E
- S2E Source Zone E
- SFnF Source Function F
- S1F Source Instance F
- S2F Source Zone F
- SFn9 Source Function G
- S19 Source Instance G
- S29 Source Zone G
- SFnh Source Function H
- S1h Source Instance H
- S2H Source Zone H
- Erh Error Handling

MAt

SEt **Math Menu**

1

MAt Math (1 to 24)

- Fn Function
- SFnA Source Function A
- S1A Source Instance A
- S2A Source Zone A
- SFnb Source Function B
- S1b Source Instance B
- S2b Source Zone B
- SFnC Source Function C
- S1C Source Instance C
- S2C Source Zone C
- SFnd Source Function D
- S1d Source Instance D
- S2d Source Zone D
- SFnE Source Function E
- S1E Source Instance E
- S2E Source Zone E
- SLo Scale Low
- Sh1 Scale High
- Unit Units
- rLo Range Low
- rh1 Range High
- Punt Pressure Units
- Aunt Altitude Units

FiL Filter

uAr

SEt **Variable Menu**

1

uAr Variable (1 to 24)

tYPE Data Type

Unit Units

dig Digital

AnLG Analog

GLbL

SEt **Global Menu**

GLbL Global

C_F Display Units

AC.LF AC Line Frequency

MAH Maximum

Min Minimum

dPrS Display Pairs

USr.S Save Settings As

USr.r Restore Settings From

COM

SEt **Communications Menu**

COM Communications

bAUd Baud Rate

PAr Parity

MhL Modbus Word Order

C_F Display Units

nu.S Non-volatile Save

RM High Density Module • Setup Page

Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP - Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
A 1 SEt **Analog Input Menu**								
SEn SEn	*Analog Input (1 to 16)* **Sensor Type** Set the analog sensor type to match the device wired to this input. **Note:** There is no open sensor protection for process inputs.	oFF Off (62) tC Thermocouple (95) mV Millivolts (56) volt Volts dc (104) mA Milliamps dc (112) r0.1H RTD 100 Ω (113) r 1.0H RTD 1,000 Ω (114) Pot Potentiometer 1 kΩ (155) thEr Thermistor (229)	Thermo-couple or Thermis-tor	388 [offset 90]	0x68 (104) 1 to 16 5	3	4005	uint RWES
Lin Lin	*Analog Input (1 to 16)* **TC Linearization** Set the linearization to match the thermocouple wired to this input.	b B (11) C C (15) d D (23) E E (26) F F (30) J J (46) H K (48) n N (58) r R (80) S S (84) t T (93)	J	390 [offset 90]	0x68 (104) 1 to 16 6	4	4006	uint RWES
Unit Unit	*Analog Input (1 to 16)* **Units** Set the type of units the sensor will measure.	AbP Absolute Temperature (1540) rh Relative Humidity (1538) Pro Process (75) PWJr Power (73)	Process	462 [offset 90]	0x68 (104) 1 to 16 0x2A (42)	5	4042	uint RWES
S.Lo S.Lo	*Analog Input (1 to 16)* **Scale Low** Set the low scale for process inputs. This value, in millivolts, volts or milliamps, will correspond to the Range Low output of this function block.	-100.0 to 1,000.0	0.0	408 [offset 90]	0x68 (104) 1 to 16 0xF (15)	6	4015	float RWES

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Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP - Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
S.hi S.hi	*Analog Input (1 to 16)* **Scale High** Set the high scale for process inputs. This value, in millivolts, volts or milliamperes, will correspond to the Range High output of this function block.	-100.0 to 1,000.0	20.0	410 [offset 90]	0x68 (104) 1 to 16 0x10 (16)	7	4016	float RWES
r.Lo r.Lo	*Analog Input (1 to 16)* **Range Low** Set the low range for this function block's output.	-1,999.000 to 9,999.000	0.0	412 [offset 90]	0x68 (104) 1 to 16 0x11 (17)	8	4017	float RWES
r.hi r.hi	*Analog Input (1 to 16)* **Range High** Set the high range for this function block's output.	-1,999.000 to 9,999.000	9,999	414 [offset 90]	0x68 (104) 1 to 16 0x12 (18)	9	4018	float RWES
P.EE P.EE	*Analog Input (1 to 16)* **Process Error Enable** Turn the Process Error Low feature on or off.	oFF Off (62) LobJ Low (53)	Off	438 [offset 90]	0x68 (104) 1 to 16 0x1E (30)	10	4030	uint RWES
P.EL P.EL	*Analog Input (1 to 16)* **Process Error Low Value** If the process value drops below this value, it will trigger an input error.	-100.0 to 1,000.0	0.0	440 [offset 90]	0x68 (104) 1 to 16 0x1F (31)	11	4031	float RWES
t.C t.C	*Analog Input (1 to 16)* **Thermistor Curve** Select a curve to apply to the thermistor input.	A Curve A (1451) b Curve B (1452) C Curve C (1453) CUSt Custom (180)	Curve A	454 [offset 90]	0x68 (104) 1 to 16 0x26 (38)	- - - -	4038	uint RWES
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RM High Density Module • Setup Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
r.r r.r	*Analog Input (1 to 16)* **Resistance Range** Set the maximum resistance of the thermistor input.	5 5K (1448) 10 10K (1360) 20 20K (1361) 40 40K (1449)	40K	452 [offset 90]	0x68 (104) 1 to 16 0x25 (37)	- - - -	4037	uint RWES
Co.A Co.A	*Analog Input (1 to 16)* **Custom Coefficient A** Enter custom Thermistor coeffi-cients.	-3.4e38 to 3.4e38	0	- - - -	- - - -	- - - -	4039	float RWES
Co.b Co.b	*Analog Input (1 to 16)* **Custom Coefficient B** Enter custom Thermistor coeffi-cients.	-3.4e38 to 3.4e38	0	- - - -	- - - -	- - - -	4040	float RWES
Co.C Co.C	*Analog Input (1 to 16)* **Custom Coefficient C** Enter custom Thermistor coeffi-cients.	-3.4e38 to 3.4e38	0	- - - -	- - - -	- - - -	4041	float RWES
FiL FiL	*Analog Input (1 to 16)* **Filter** Filtering smooths out the process signal to both the display and the input. Increase the time to increase filtering. **Note:** Filter does not ap-ply to the Limit sensor but does apply to all other functions.	0.0 to 60.0 seconds	0.5	406 [offset 90]	0x68 (104) 1 to 16 0xE (14)	12	4014	float RWES

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RM High Density Module • Setup Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
i.Er i.Er	*Analog Input (1 to 16)* **Input Error Latching** Turn input error latching on or off. If latching is on, errors must be manually cleared.	oFF Off (62) on On (63)	Off	434 [offset 90]	0x68 (104) 1 to 16 0x1C (28)	- - - -	4028	uint RWES
dEC dEC	*Analog Input (1 to 16)* **Display Precision** Set the precision of the displayed value.	0 Whole (105) 0.0 Tenths (94) 0.00 Hundredths (40) 0.000 Thousandths (96)	Whole	418 [offset 90]	0x68 (104) 1 to 16 0x14 (20)	- - - -	4020	uint RWES
i.CA i.CA	*Analog Input (1 to 16)* **Calibration Offset *** 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.	-1,999.000 to 9,999.000°F or units -1,110.555 to 5,555.000°C	0.0	402 [offset 90]	0x68 (104) 1 to 16 0xC (12)	- - - -	4012	float RWES
Ain Ain	*Analog Input (1 to 16)* **Analog Input Value *** View the process value. **Note:** Ensure that the Error Status (below) indicates no error (61) when reading this value using a field bus protocol. If an error exists, the last known value prior to the error occurring will be returned.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	- - - -	380 [offset 90]	0x68 (104) 1 to 16 1	0	4001	float R
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Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP - Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
i.Er	*Analog Input (1 to 16)* **Input Error *** View the cause of the most recent error.	nonE None (61) OPEn Open (65) Shrt Shorted (127) E.rn Measurement Error (140) E.CAL Bad Calibration Data (139) Er.Ab Ambient Error (9) E.rtd RTD Error (141) FAIL Fail (32)	- - - -	382 [offset 90]	0x68 (104) 1 to 16 2	1	4002	uint R
Pu SEt **Process Value Menu**								
Fn Fn	*Process Value (1 to 16)* **Function** Set the function that will be applied to the source or sources.	oFF Off (62) SbA Sensor Backup (1201) Avg Average (1367) Co Crossover (1368) dwb Wet Bulb Dry Bulb (1369) So Switch Over (1370) diFF Differential (1373) rAt i Ratio (1374) Add Add (1375) rnUL Multiply (1376) Ad iF Absolute Difference (1377) rn in Minimum (1378) rnAH Maximum (1379) root Square Root (1380) uSLA Vaisala RH Compensation (1648) ALt Pressure to Altitude (1649)	Off	8260 [offset 70]	0x7E (126) 1 to 16 0x15 (21)	98	26021	uint RWES
SFnA SFn.A	*Process Value (1 to 16)* **Source Function A** Set the type of function that will be used for this source.	nonE None (61) Ai i Analog Input (142) Lnr Linearization (238) rnAt Math (240) Pu Process Value (241) uAr Variable (245)	Analog Input	8220 [offset 70]	0x7E (126) 1 to 16 1	- - - -	26001	uint RWES

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RM High Density Module • Setup Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
Si.A	*Process Value (1 to 16)* **Source Instance A** Set the instance of the function selected above.	1 to 250	1	8230 [offset 70]	0x7E (126) 1 to 166	- - - -	26006	uint RWES
SFn.b	*Process Value (1 to 16)* **Source Function B** Set the type of function that will be used for this source.	none None (61) AI Analog Input, (142) Lnr Linearization (238) MATH Math (240) Pu Process Value (241) uAr Variable (245)	None	8222 [offset 70]	0x7E (126) 1 to 162	- - - -	26002	uint RWES
Si.b	*Process Value (1 to 16)* **Source Instance B** Set the instance of the function selected above.	1 to 250	1	8232 [offset 70]	0x7E (126) 1 to 167	- - - -	26007	uint RWES
SZ.b	*Process Value (1 to 16)* **Source Zone B** Set the zone of the function selected above.	0 to 24	0	8242 [offset 70]	0x7E (126) 1 to 16 0xC(12)	- - - -	26012	uint RWES
SFn.C	Process Value (1 to 16) Source Function C Set the type of function that will be used for this source.	none None (61) AI Analog Input (142) Lnr Linearization (238) MATH Math (240) Pu Process Value (241) uAr Variable (245)	None	8224 [offset 70]	0x7E (126) 1 to 163	- - - -	26003	uint RWES
Si.C	*Process Value (1 to 16)* **Source Instance C** Set the instance of the function selected above.	1 to 250	1	8234 [offset 70]	0x7E (126) 1 to 168	- - - -	26008	uint RWES
SZ.C	*Process Value (1 to 16)* **Source Zone C** Set the zone of the function selected above.	0 to 24	0	8244 [offset 70]	0x7E (126) 1 to 16 0x0D (13)	- - - -	26013	uint RWES

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Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP - Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
SFnd SFn.d	*Process Value (1 to 16)* **Source Function D** Set the type of function that will be used for this source.	nonE None (61) AI Analog Input, (142) Lnr Linearization (238) MAtH Math (240) Pu Process Value (241) uAr Variable (245)	None	8226 [offset 70]	0x7E (126) 1 to 16 4	- - - -	26004	uint RWES
Sid Si.d	*Process Value (1 to 16)* **Source Instance D** Set the instance of the function selected above.	1 to 250	1	8236 [offset 70]	0x7E (126) 1 to 16 9	- - - -	26009	uint RWES
SZE SZ.E	*Process Value (1 to 16)* **Source Zone D** Set the zone of the function selected above.	0 to 24	0	8246 [offset 60]	0x7E (126) 1 to 16 0x0E (14)	- - - -	26014	uint RWES
SFnE SFn.E	*Process Value (1 to 16)* **Source Function E** Set the type of function that will be used by this source to trigger a switch between Source A and Source B.	nonE None (61) ALM Alarm (6) CPE Compare (230) Ctr Counter (231) dio Digital I/O (1142) EntA Profile Event Out A (233) EntB Profile Event Out B (234) EntC Profile Event Out C (235) EntD Profile Event Out D (236) EntE Profile Event Out E (247) EntF Profile Event Out F (248) EntG Profile Event Out G (249) EntH Profile Event Out H (250) FUn Function Key (1001) LGC Logic (239) tMr Timer (244) uAr Variable (245)	None	8228 [offset 70]	0x7E (126) 1 to 16 5	- - - -	26005	uint RWES

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RM High Density Module • Setup Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
Si.E Si.E	*Process Value (1 to 16)* **Source Instance E** Set the instance of the function selected above.	1 to 250	1	8238 [offset 70]	0x7E (126) 1 to 16 0xA (10)	- - - -	26010	uint RWES
SZ.E SZ.E	*Process Value (1 to 16)* **Source Zone E** Set the zone of the function selected above.	0 to 24	0	8248 [offset 70]	0x7E (126) 1 to 16 0xF (15)	- - - -	26015	uint RWES
C.P C.P	*Process Value (1 to 16)* **Cross Over Point** When the value of source A is <= cross over point - cross-over band divided by 2 then the output value will use source A.	-1999.000 to 9999.000	100.0	8266 [offset 70]	0x7E (126) 1 to 16 0x18 (24)		26024	float RWES
C.b C.b	*Process Value (1 to 16)* **Cross Over Band** The source will transition between Source A and Source B when within this band at a progressive rate	-1999.000 to 9999.000	10.0	8268 [offset 70]	0x7E (126) 1 to 16 0x19 (25)		26025	float RWES
P.unt P.unt	*Process Value (1 - 16)* **Pressure Units** If Process Value function is set for Pressure to Altitude units, define units of measure for conversion.	PSi Pounds per Square Inch (1671) PASc Pascal (1674) AtM Atmosphere (1675) mbr Millibar (1672) torr Torr (1673)	PSI	8274 [offset 70]	0x7E (126) 1 to 16 0x1C (28)	- - - -	26028	uint RWES
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Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
A.unt A.unt	*Process Value (1 - 16)* **Altitude Units** If Process Value function is set for Pressure to Altitude units, define units of measure for con-version.	HFt Kilofeet (1677) Ft Feet (1676)	HFt	8276 [offset 70]	0x7E (126) 1 to 16 0x1D (29)	- - - -	26029	uint RWES
b.Pr b.Pr	*Process Value (1 - 16)* **Barometric Pres-sure** If Process Value function is set for Wet Bulb / Dry Bulb, define pres-sure value used for humidity calcula-tion.	10.0 to 16.0	14.7	8278 [offset 70]	0x7E (126) 1 to 16 0x1E (30)	- - - -	26030	float RWES
FiL FiL	*Process Value (1 to 16)* **Filter** Filtering smooths out the output sig-nal of this function block. Increase the time to increase filtering.	0.0 to 60.0 seconds	0.0	8270 [offset 70]	0x7E (126) 1 to 16 0x1A (26)	- - - -	26026	float RWES
dio SEt **Digital Input/Output Menu**								
dir dir	*Digital Input/Output (1 to 12)* **Direction** Set this function to operate as an input or output.	OtPt Output (68) in Input Voltage (193) iCon Input Dry Contact (44)	Output	1820 [offset 30]	0x6A (106) 1 to 12 1	72	6001	uint RWES

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RM High Density Module • Setup Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
Fn Fn	*Digital Output (1 to 12)* **Function** Select what function will drive this output.	oFF Off (62) A I Analog Input (142) ALM Alarm (6) C.Pr Cool Power (161) h.Pr Heat Power (160) CPE Compare (230) Ctr Counter (231) d io Digital I/O (1142) Ent.A Profile Event Out A (233) Ent.b Profile Event Out B (234) Ent.C Profile Event Out C (235) Ent.d Profile Event Out D (236) Ent.E Profile Event Out E (247) Ent.F Profile Event Out F (248) Ent.9 Profile Event Out G (249) Ent.h Profile Event Out H (250) FUn Function Key (1001) LgC Logic (239) Lnr Linearization (238) MAtH Math (240) Pu Process Value (241) SoF.1 Special Function Output 1 (1532) SoF.2 Special Function Output 2 (1533) SoF.3 Special Function Output 3 (1534) SoF.4 Special Function Output 4 (1535) tMr Timer (244) uAr Variable (245) h.Er Heater Error (184)	Off	1828 [offset 30]	0x 6A (106) 1 to 12 5	73	6005	uint RWES

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Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP - Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
F 1 Fi	*Digital Output (1 to 12)* **Output Function Instance** Set the instance of the function selected above.	1 to 250	1	1830 [offset 30]	0x6A (106) 1 to 12 6	74	6006	uint RWES
SZ SZ	*Digital Output (1 to 12)* **Output Source Zone** Set the zone of the function selected above.	0 to 24	0	1842 [offset 30]	0x6A (106) 1 to 12 0xC (12)	- - - -	6012	uint RWES
o.Ct o.Ct	*Digital Output (1 to 12)* **Time Base Type** Set the output control type. This parameter is only used with PID control, but can be set anytime.	Ftb Fixed Time Base (34) utb Variable Time Base (103)	Fixed Time Base	1822 [offset 30]	0x6A (106) 1 to 12 2	75	6002	uint RWES
o.tb o.tb	*Digital Output (1 to 12)* **Fixed Time Base** Set the time base for fixed-time-base control.	0.1 to 60.0 seconds	1.0	1824 [offset 30]	0x6A (106) 1 to 12 3	76	6003	float RWES
o.Lo o.Lo	*Digital Output (1 to 12)* **Low Power Scale** The power output will never be less than the value specified and will represent the value at which output scaling begins.	0.0 to 100.0	0.0	1836 [offset 30]	0x6A (106) 1 to 12 9	77	6009	float RWES
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Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Profibus Index**	**Parameter ID**	**Data Type and Access ****
o.hi o.hi	*Digital Output (1 to 12)* **High Power Scale** The power output will never be greater than the value specified and will represent the value at which output scaling stops.	0.0 to 100.0	100.0	1838 [offset 30]	0x6A (106) 1 to 12 A (10)	78	6010	float RWES
ACt SEt **Action Menu**								
Fn Fn	*Action (1 to 24)* **Action Function** Set the action that will be triggered by this function.	nonE None (61) USr.r User Set Restore (227) ALM Alarm (6) S iL Silence Alarms (108) AoF Control Loops Off and Alarms to Non-alarm State (220) F.AL Force Alarm to Occur (218) idLE Idle Set Point (107) tUnE Tune (98) MAn Manual (54) oFF Switch Control Loop Off (90) r.En Remote Set Point (216) t.dA TRU-TUNE+® Disable (219)	None	2184 [offset 20]	0x6E (110) 1 to 24 3	113	10003	uint RWES
F i Fi	*Action (1 to 24)* **Function Instance** Set the instance of the function selected above.	0 to 25	0	2186 [offset 20]	0x6E (110) 1 to 24 4	114	10004	uint RWES

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Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
SFnA SFn.A	*Action (1 to 24)* **Source Function A** Set the event or function that will trigger the action.	nonE None (61) ALM7 Alarm (6) CPE Compare (230) Ctr Counter (231) d io Digital I/O (1142) Ent.A Profile Event Out A (233) Ent.b Profile Event Out B (234) Ent.C Profile Event Out C (235) Ent.d Profile Event Out D (236) Ent.E Profile Event Out E (247) Ent.F Profile Event Out F (248) Ent.9 Profile Event Out G (249) Ent.h Profile Event Out H (250) FUn Function Key (1001) L im7 Limit (126) L9C Logic (239) tM7r Timer (244) uAr Variable (245) hEr Heater Error (184)	None	2190 [offset 20]	0x6E (110) 1 to 24 6	- - - -	10006	uint RWES
Si.A	*Action (1 to 24)* **Source Instance A** Set the instance of the function selected above.	1 to 250	1	2182 [offset 20]	0x6E (110) 1 to 24 2	- - - -	10002	uint RWES
SZ.A	*Action (1 to 24)* **Source Zone A** Set the zone of the function selected above.	0 to 24	0	2192 [offset 20]	0x6E (110) 1 to 24 7	- - - -	10007	uint RWES
LEu LEv	*Action (1 to 24)* **Active Level** Set the action that will be considered a true state.	LoUd Low (53) h igh High (37)	High	2180 [offset 20]	0x6E (110) 1 to 24 1	137	10001	uint RWES

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Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
LooP SEt **Control Loop Menu**								
SFn.A SFn.A	*Control Loop (1 to 16)* **Source Function A** Set the type of function that will be used for this source.	nonE None (61) A i Analog Input, (142) Lnr Linearization (238) MAtH Math (240) Pu Process Value (241) uAr Variable (245)	Analog Input	4156 [offset 70]	0x97 (151) 1 to 16 0x1D (29)	- - - -	8050	RWE
iS.A iS.A	*Control Loop (1 to 16)* **Source Instance A** Source Instance A follows the Control Loop and is not changeable	1 to 250	- - - -	- - - -	- - - -	- - - -	8021	R
h.Ag h.Ag	*Control Loop (1 to 16)* **Heat Algorithm** Set the heat control method.	oFF Off (62) P id PID (71) on.oF On-Off (64)	PID	4104 [offset 70]	0x97 (151) 1 to 16 3	62	8003	uint RWES
C.Ag C.Ag	*Control Loop (1 to 16)* **Cool Algorithm** Set the cool control method.	oFF Off (62) P id PID (71) on.oF On-Off (64)	Off	4106 [offset 70]	0x97 (151) 1 to 16 4	63	8004	uint RWES
C.Cr C.Cr	*Control Loop (1 to 16)* **Cool Output Curve** Select a cool output curve to change the responsiveness of the system.	oFF Off (62) Cr.A Non-linear Curve 1 (214) Cr.b Non-linear Curve 2 (215)	Off	4108 [offset 70]	0x97 (151) 1 to 16 5	- - - -	8038	uint RWES
h.Pb h.Pb	*Control Loop (1 to 16)* **Heat Proportional Band *** Set the PID proportional band for the heat outputs.	0.001 to 9,999.000°F or units 0.001 to 5,555.000°C	25.0°F or units 14.0°C	4110 [offset 70]	0x97 (151) 1 to 16 6	55	8009	float RWES

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Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
h.hy h.hy	*Control Loop (1 to 16)* **On / Off Heat Hys-teresis *** Set the control switching hyster-esis for on-off con-trol. This deter-mines how far into the "on" region the process value needs to move before the output turns on.	0.001 to 9,999.000°F or units 0.001 to 5,555.000°C	3.0°F or units 2.0°C	4120 [offset 70]	0x97 (151) 1 to 16 0xB (11)	56	8010	float RWES
C.Pb C.Pb	*Control Loop (1 to 16)* **Cool Proportional Band *** Set the PID pro-portional band for the cool outputs.	0.001 to 9,999.000°F or units 0.001 to 5,555.000°C	25.0°F or units 14.0°C	4112 [offset 70]	0x97 (151) 1 to 16 7	57	8012	float RWES
C.hy C.hy	*Control Loop (1 to 16)* **On / Off Cool Hys-teresis *** Set the control switching hyster-esis for on-off con-trol. This deter-mines how far into the "on" region the process value needs to move before the output turns on.	0.001 to 9,999.000°F or units 0.001 to 5,555.000°C	3.0°F or units 2.0°C	4122 [offset 70]	0x97 (151) 1 to 16 0xC (12)	58	8013	float RWES
t i ti	*Control Loop (1 to 16)* **Time Integral *** Set the PID inte-gral for the out-puts.	0 to 9,999 seconds per re-peat	180 sec-onds per repeat	4114 [offset 70]	0x97 (151) 1 to 16 8	59	8006	float RWES
td td	*Control Loop (1 to 16)* **Time Derivative *** Set the PID deriva-tive time for the outputs.	0 to 9,999 seconds	0 seconds	4116 [offset 70]	0x97 (151) 1 to 16 9	60	8007	float RWES
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Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
db db	*Control Loop (1 to 16)* **Dead Band *** Set the offset to the proportional band. With a negative value, both heating and cooling outputs are active when the process value is near the set point. A positive value keeps heating and cooling outputs from fighting each other.	-1,000.0 to 1,000.0°F or units -556 to 556°C	0.0	4118 [offset 70]	0x97 (151) 1 to 16 0xA (10)	61	8008	float RWES
t.tUn t.tUn	*Control Loop (1 to 16)* **TRU-TUNE+® Enable** Enable or disable the TRU-TUNE+® adaptive tuning feature.	no No (59) YES Yes (106)	No	4130 [offset 70]	0x97 (151) 1 to 16 10 (16)	- - - -	8022	uint RWES
t.bnd t.bnd	*Control Loop (1 to 16)* **TRU-TUNE+® Band** Set the range, centered on the set point, within which TRU-TUNE+® will be in effect. Use this function only if the controller is unable to adaptive tune automatically.	0 to 100	0	4132 [offset 70]	0x97 (151) 1 to 16 0x11 (17)	- - - -	8034	uint RWES
t.gn t.gn	*Control Loop (1 to 16)* **TRU-TUNE+® Gain** Select the responsiveness of the TRU-TUNE+® adaptive tuning calculations. More responsiveness may increase overshoot.	1 to 6	3	4134 [offset 70]	0x97 (151) 1 to 16 0x12 (18)	- - - -	8035	uint RWES

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AtSP A.tSP	*Control Loop (1 to 16)* **Autotune Set Point *** Set the set point that the autotune will use, as a percentage of the current set point.	50.0 to 200.0%	90.0	4138 [offset 70]	0x97 (151) 1 to 16 0x14 (20)	- - - -	8025	float RWES
t.Agr t.Agr	*Control Loop (1 to 16)* **Autotune Aggressiveness** Select the aggressiveness of the autotuning calculations.	Undr Under damped (99) Cr it Critical damped (21) ouEr Over damped (69)	Critical	4136 [offset 70]	0x97 (151) 1 to 16 0x13 (19)	- - - -	8024	uint RWES
P.dL P.dL	*Control Loop (1 to 16)* **Peltier Delay** Set a value that will cause a delay when switching from heat PID mode to cool PID mode.	0.0 to 5.0 seconds	0.0	4154 [offset 70]	0x97 (151) 1 to 16 0x1C (28)	- - - -	8051	float RWES
r.En r.En	*Control Loop (1 to 16)* **Remote Set Point** Set whether this loop will use a remote set point.	no No (59) YES Yes (106)	No	5260 [offset 80]	0x6B (107) 1 to 16 0x15 (21)	38	7021	uint RWES
SFnb SFn.b	*Control Loop (1 to 16)* **Source Function B** Set the function that will provide the remote set point.	nonE None (61) A i Analog Input (142) CUrr Current (22) C.Pr Cool Power (161) h.Pr Heat Power (160) PUJr Power (73) Lnr Linearization (238) MAtH Math (240) Pu Process Value (241) SP.C Set Point Closed (242) SP.o Set Point Open (243) uAr Variable (245)	None	5264 [offset 80]	0x6B (107) 1 to 16 0x17 (23)	- - - -	7023	uint RWES

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Si.b Si.b	*Control Loop (1 to 16)* **Source Instance B** Set the instance of the function selected above.	1 to 250	1	5266 [offset 80]	0x6B (107) 1 to 16 0x18 (24)	- - - -	7024	uint RWES
SZ.b SZ.b	*Control Loop (1 to 16)* **Source Zone B** Set the zone of the function selected above.	0 to 24	0	5270 [offset 80]	0x6B (107) 1 to 16 0x1A (26)	- - - -	7026	uint RWES
r.ty r.ty	*Control Loop (1 to 16)* **Remote Set Point** Set what type of set point will be used.	AUto Auto (10) MAn Manual (54)	Auto	5262 [offset 80]	0x6B (107) 1 to 16 0x16 (22)	- - - -	7022	uint RWES
UFA UFA	*Control Loop (1 to 16)* **Auto-to-Manual** Select what the controller outputs will do when the user switches control to manual mode.	oFF Off, sets output power to 0% (62) bPLS Bumpless transfer, maintains same output power, if it was less than 75% and stable, otherwise 0% (14) MAn Fixed Power, sets output power to Fixed Power setting (54) USEr User, sets output power to last open-loop set point the user entered (100)	User	5242 [offset 80]	0x6B (107) 1 to 16 0xC (12)	- - - -	7012	uint RWES
FAiL FAiL	*Control Loop (1 to 16)* **Input Error Power** Select what the controller outputs will do when an input error switches control to manual mode.	oFF Off, sets output power to 0% (62) bPLS Bumpless transfer, maintains same output power, if it was less than 75% and stable, otherwise 0% (14) MAn Manual Power, sets output power to Fixed Power setting (54) USEr User, sets output power to last open-loop set point the user entered (100)	User	5244 [offset 80]	0x6B (107) 1 to 16 0xD (13)	- - - -	7013	uint RWES

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MAn MAn	*Control Loop (1 to 16)* **Fixed Power** Set the manual output power level that will take effect if an input error failure occurs while User Failure Action is set to Fixed Power.	Set Point Open Loop Limit Low to Set Point Open Loop Limit High (Setup Page)	0.0	5240 [offset 80]	0x6B (107) 1 to 16 0xB (11)	- - - -	7011	float RWES
L.dE L.dE	*Control Loop (1 to 16)* **Open Loop Detect Enable** Select Yes to detect conditions that prevent the process from changing in specified time frame by a specified amount when PID power is at 100%. An open loop detect error will disable the control loop.	no No (59) YES Yes (106)	No	4142 [offset 70]	0x97 (151) 1 to 16 0x16 (22)	64	8039	uint RWES
L.dt L.dt	*Control Loop (1 to 16)* **Open Loop Detect Time** Process must deviate by the Open Loop. Detect Deviation value in this specified time while at 100% PID to prevent an open loop error.	0 to 3,600 seconds	240	4144 [offset 70]	0x97 (151) 1 to 16 0x17 (23)	65	8040	uint RWES
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L.dd L.dd	*Control Loop (1 to 16)* **Open Loop Detect Deviation** Process must deviate by this value in the Open Loop Detect Time while at 100% PID power to prevent an open loop error.	-1,999.000 to 9,999.000°F or units -1,110.555 to 5,555.000°C	10.0°F or units 6.0°C	4146 [offset 70]	0x97 (151) 1 to 16 0x18 (24)	66	8041	float RWES
rP rP	*Control Loop (1 to 16)* **Ramp Action** Select when the controller's set point will ramp to the defined end set point.	oFF Off (62) Str Startup (88) StPt Set Point Change (85) both Both (13)	Off	5246 [offset 80]	0x6B (107) 1 to 16 0xE (14)	- - - -	7014	uint RWES
r.SC r.SC	*Control Loop (1 to 16)* **Ramp Scale** Select the scale of the ramp rate.	hour Hours (39) Min Minutes (57)	Minutes	5248 [offset 80]	0x6B (107) 1 to 16 0xF (15)	- - - -	7015	uint RWES
r.rt r.rt	*Control Loop (1 to 16)* **Ramp Rate** Set the rate for the set point ramp. Set the time units for the rate with the Ramp Scale parameter.	0.0 to 9,999.000°F or units 0.0 to 5,555.000°C	1.0°F or units 1.0°C	5252 [offset 80]	0x6B (107) 1 to 16 0x11 (17)	- - - -	7017	float RWES
L.SP L.SP	*Control Loop (1 to 16)* **Minimum Set Point** Set the minimum value of the closed loop set point range.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	-1,999°F or units -1,128°C	5224 [offset 80]	0x6B (107) 1 to 16 3	52	7003	float RWES

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Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP - Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
h.SP h.SP	*Control Loop (1 to 16)* **Maximum Set Point** Set the maximum value of the closed loop set point range.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	9,999°F or units 5,537°C	5266 [offset 80]	0x6B (107) 1 to 16 4	53	7004	float RWES
C.SP C.SP	*Control Loop (1 to 16)* **Set Point *** Set the set point that the controller will automatically control to.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	75.0°F or units 24.0°C	5220 [offset 80]	0x6B (107) 1 to 16 1	49	7001	float RWES
id.S id.S	*Control Loop (1 to 16)* **Idle Set Point *** Set a closed loop set point that can be triggered by an event state.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	75.0°F or units 24.0°C	5236 [offset 80]	0x6B (107) 1 to 16 9	50	7009	float RWES
SP.Lo SP.Lo	*Control Loop (1 to 16)* **Minimum Manual Power** Set the minimum value of the open-loop set point range.	-100.0 to 100.0%	-100	5228 [offset 80]	0x6B (107) 1 to 16 5	52	7005	float RWES
SP.hi SP.hi	*Control Loop (1 to 16)* **Maximum Manual Power** Set the maximum value of the open-loop set point range.	-100.0 to 100.0%	100	5230 [offset 80]	0x6B (107) 1 to 16 6	55	7006	float RWES
o.SP o.SP	*Control Loop (1 to 16)* **Manual Power *** Set a fixed level of output power when in manual (open-loop) mode.	-100.0 to 100.0% (heat and cool) 0 to 100.0% (heat only) -100.0 to 0% (cool only)	0.0	5222 [offset 80]	0x6B (107) 1 to 16 2	51	7002	float RWES

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CLM C.M	*Control Loop (1 to 16)* **Control Mode *** Select the method that this loop will use to control.	oFF Off (62) AUto Auto (10) MAn Manual (54)	Auto	4100 [offset 70]	0x97 (151) 1 to 16 1	63	8001	uint RWES
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oEPt SEt **Output Menu**								
Fn Fn	*Output Digital (1 to 12)* **Function** Select what function will drive this output.	oFF Off (62) A i Analog Input (142) ALM Alarm (6) C.Pr Cool Power (161) h.Pr Heat Power (160) CPE Compare (230) Ctr Counter (231) d io Digital I/O (1142) Ent.A Profile Event Out A (233) Ent.b Profile Event Out B (234) Ent.C Profile Event Out C (235) Ent.d Profile Event Out D (236) Ent.E Profile Event Out E (247) Ent.F Profile Event Out F (248) Ent.g Profile Event Out G (249) Ent.h Profile Event Out H (250) Fun Function Key (1001) LgC Logic (239) Lnr Linearization (238) MAt Math (240) Pu Process Value (241) SoF.1 Special Function Output 1 (1532) SoF.2 Special Function Output 2 (1533) SoF.3 Special Function Output 3 (1534) SoF.4 Special Function Output 4 (1535) tMr Timer (244) uAr Variable (245) hEr Heater Error (184)	off	1828 [offset 30]	0x6A (106) 1 to 12 5	73	6005	uint RWES

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F 1 Fi	*Output Digital (1 to 12)* **Output Function Instance** Set the instance of the function selected above.	1 to 250	1	1830 [offset 30]	0x6A (106) 1 to 12 6	74	6006	uint RWES
[2.A SZ.A	*Output Digital (1 to 12)* **Output Source Zone** Set the instance of the function selected above.	0 to 24	0	1842 [offset 30]	0x6A (106) 1 to 12 0xC (12)	- - - -	6012	uint RWES
o.Ct o.Ct	*Output Digital (1 to 12)* **Time Base Type** Set the output control type. This parameter is only used with PID control, but can be set anytime.	FtB Fixed Time Base (34) utb Variable Time Base (103)	Fixed Time Base	1822 [offset 30]	0x6A (106) 1 to 12 2	75	6002	uint RWES
o.tb o.tb	*Output Digital (1 to 12)* **Fixed Time Base** Set the time base for fixed-time-base control.	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)	1.0 sec. [SSR & sw dc] 20.0 sec. [mech, relay, NO-ARC]	1824 [offset 30]	0x6A (106) 1 to 12 3	76	6003	float RWES
o.Lo o.Lo	*Output Digital (1 to 12)* **Low Power Scale** The power output will never be less than the value specified and will represent the value at which output scaling begins.	0.0 to 100.0%	0.0%	1836 [offset 30]	0x6A (106) 1 to 12 9	77	6009	float RWES

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o.hi	*Output Digital (1 to 12)* **High Power Scale** The power output will never be greater than the value specified and will represent the value at which output scaling stops.	0.0 to 100.0%	100.0%	1838 [offset 30]	0x6A (106) 1 to 12 0xA (10)	78	6010	float RWES
o.ty	*Output Process (1 to 3, 7 to 9)* **Type *** Select whether the process output will operate in volts or milliamps.	volt Volts (104) mA Milliamps (112)	Volts	16540 [offset 60]	0x76 (118) 1-3, 7-9 1	- - - -	18001	uint RWES
Fn	*Output Process (1 to 3, 7 to 9)* **Function** Set the type of function that will drive this output.	oFF Off (62) A1 Analog Input (142) Curr Current (22) C.Pr Cool Power (161) h.Pr Heat Power (160) Pwr Power (73) Lnr Linearization (238) mAt Math (240) Pv Process Value (241) SP.C Set Point Closed (242) SP.o Set Point Open (243) SoF.1 Special Function Output 1 (1532) SoF.2 Special Function Output 2 (1533) SoF.3 Special Function Output 3 (1534) SoF.4 Special Function Output 4 (1535) uAr Variable (245) WAt Wattage (1697) Ld.Vo Load Voltage (1698) Ld.r Load Resistance (1183)	Off	16542 [offset 60]	0x76 (118) 1-3, 7-9 2	- - - -	18002	uint RWES

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F 1 Fi	*Output Process (1 to 3, 7 to 9)* **Output Function Instance *** Set the instance of the function selected above.	1 to 250	1	16546 [offset 60]	0x76 (118) 1-3, 7-9 4	- - - -	18004	uint RWES
2S.A ZS.A	*Output Process (1 to 3, 7 to 9)* **Source Zone A *** Set the zone of the function selected above.	0 to 24	0	16576 [offset 60]	0x76 (118) 1-3, 7-9 0x13 (19)	- - - -	18019	uint RWES
S.Lo S.Lo	*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 the range low value.	-100.0 to 100.0	0.00	16556 [offset 60]	0x76 (118) 1-3, 7-9 9	99	18009	float RWES
S.hi S.hi	*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 0% PID power output or the range high value.	-100.0 to 100.0	10.00	16558 [offset 60]	0x76 (118) 1-3, 7-9 0xA (10)	- - - -	18010	float RWES
r.Lo r.Lo	*Output Process (1 to 3, 7 to 9)* **Range Low *** Use to set the minimum value in process units. This will correspond with the Scale Low value.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	0.0°F or units -18°C	16560 [offset 60]	0x76 (118) 1-3, 7-9 0xB (11)	- - - -	18011	float RWES
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r.hi r.hi	*Output Process (1 to 3, 7 to 9)* **Range High *** Use to set the maximum value in process units. This will correspond with the Scale High value.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	100 F or units 38 C	16562 [offset 60]	0x76 (118) 1-3, 7-9 0xC (12)	- - - -	18012	float RWES
o.CA o.CA	*Output Process (1 to 3, 7 to 9)* **Calibration Offset *** Set an offset value for a process output.	-1,999.000 to 9,999.000°F or units -1,110.555 to 5,555.000°C	0.0°F or units 0.0°C	16552 [offset 60]	0x76 (118) 1-3, 7-9 7	- - - -	18007	float RWES
ALM1 SEt **Alarm Menu**								
Aty A.ty	*Alarm (1 to 24)* **Type** Select whether the alarm trigger is a fixed value or will track the set point.	oFF Off (62) Pr.AL Process Alarm (76) dE.AL Deviation Alarm (24)	Off	2688 [offset 60]	0x6D (109) 1 to 24 0xF (15)	20	9015	uint RWES
Sr.A Sr.A	*Alarm (1 to 24)* **Alarm Source** Select what will trigger this alarm.	nonE None (61) AI Analog Input (142) CUrr Current (22) PUdr Power (73) Lnr Linearization (238) MAtH Math (240) Pu Process Value (241) uAr Variable (245) Cur Current Read is Sample Hold (179) WAtt Wattage (1697) LdUo Load Voltage (1698) Ldr Load Resistance (1183)	Analog Input	2692 [offset 60]	0x6D (109) 1 to 24 0x11 (17)	21	9017	uint RWES
iS.A iS.A	*Alarm (1 to 24)* **Alarm Source Instance** Set the instance of the function selected above.	1 or 250	1	2694 [offset 60]	0x6D (109) 1 to 24 0x12 (18)	22	9018	uint RWES

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SZ.A SZ.A	*Alarm (1 to 24)* **Alarm Source Zone** Set the zone of the function selected above.	0 or 24	0	2708 [offset 60]	0x6D (109) 1 to 24 0x19 (25)	- - - -	9025	uint RWES
LooP Loop	*Alarm (1 to 24)* **Control Loop** Select the loop when deviation alarm is selected above.	1 to 250	1	2704 [offset 60]	0x6D (109) 1 to 24 0x17 (23)	23	9023	uint RWES
A.hy A.hy	*Alarm (1 to 24)* **Hysteresis** Set the hysteresis for an alarm. This determines how far into the safe region the process value needs to move be-fore the alarm can be cleared.	0.001 to 9,999.000°F or units 0.001 to 5,555.000°C	1.0°F or units 1.0°C	2664 [offset 60]	0x6D (109) 1 to 24 3	24	9003	float RWES
A.Lg A.Lg	*Alarm (1 to 24)* **Logic** Select what the output condition will be during the alarm state.	AL.C Close On Alarm (17) AL.o Open On Alarm (66)	Close On Alarm	2668 [offset 60]	0x6D (109) 1 to 24 5	25	9005	uint RWES
A.Sd A.Sd	*Alarm (1 to 24)* **Sides** Select which side or sides will trigger this alarm.	both Both (13) h.igh High (37) Lolu Low (53)	Both	2666 [offset 60]	0x6D (109) 1 to 24 4	26	9004	uint RWES
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AL o A.Lo	*Alarm (1 to 24)* **Low Set Point *** If Alarm Type (Set-up Page, Alarm Menu) is set to: **Process** - set the process value that will trigger a low alarm. **Deviation** - set the span of units from the closed loop set point that will trig-ger a low alarm. A negative set point represents a value below closed loop set point. A positive set point repre-sents a value above closed loop set point.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	32.0°F or units 0.0°C	2662 [offset 60]	0x6D (109) 1 to 24 2	18	9002	float RWES
AH i A.hi	*Alarm (1 to 24)* **High Set Point** If Alarm Type (Set-up Page, Alarm Menu) is set to: **Process** - set the process value that will trigger a high alarm. **Deviation** - set the span of units from the closed loop set point that will trig-ger a low alarm. A negative set point represents a value below closed loop set point. A positive set point repre-sents a value above closed loop set point.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	300.0°F or units 150.0°C	2660 [offset 60]	0x6D (109) 1 to 24 1	19	9001	float RWES

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ALA A.LA	*Alarm (1 to 24)* **Latching** Turn alarm latching on or off. A latched alarm has to be turned off by the user.	nLAt Non-Latching (60) LAt Latching (49)	Non-Latching	2672 [offset 60]	0x6D (109) 1 to 24 7	27	9007	uint RWES
AbL A.bL	*Alarm (1 to 24)* **Blocking** Select when an alarm will be blocked. After startup and/or after the set point changes, the alarm will be blocked until the process value enters the normal range.	oFF Off (62) Str Startup (88) StPt Set Point (85) both Both (13)	Off	2674 [offset 60]	0x6D (109) 1 to 24 8	28	9008	uint RWES
AS i A.Si	*Alarm (1 to 24)* **Silencing** Turn alarm silencing on to allow the user to disable this alarm.	oFF Off (62) on On (63)	Off	2670 [offset 60]	0x6D (109) 1 to 24 6	29	9006	uint RWES
AdSP A.dSP	*Alarm (1 to 24)* **Display** Display an alarm message when an alarm is active.	oFF Off (62) on On (63)	On	2690 [offset 60]	0x6D (109) 1 to 24 0x10 (16)	30	9016	uint RWES
AdL A.dL	*Alarm (1 to 24)* **Delay Time** Set the span of time that the alarm will be delayed after the process value exceeds the alarm set point.	0 to 9,999 seconds	0	2700 [offset 60]	0x6D (109) 1 to 24 0x15 (21)	31	9021	uint RWES
ACLr A.CLr	*Alarm (1 to 24)* **Clear Alarm** Write to this register to clear an alarm	Clear (129) Ignore (204)	Ignore	2684 [offset 60]	0x6D (109) 1 to 24 0x0D (13)	32	9026	uint W

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RM High Density Module • Setup Page

Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP - Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
A.Sir	*Alarm (1 to 24)* **Silence Alarm** Write to this register to silence an alarm	Ignore (204) Silence (108)	Ignore	2686 [offset 60]	0x6D (109) 1 to 24 0x0E (14)	33	9027	uint W
A.St	*Alarm (1 to 24)* **State** Current state of alarm	Str Startup (88) nonE None (61) bLo Blocked (12) AL.L Alarm low (8) AL.h Alarm high (7) AL.E Error (28)	- - - -	2676 [offset 60]	0x6D (109) 1 to 24 9	- - - -	9009	uint R
LnrSEt **Linearization Menu**								
Fn	*Linearization (1 to 16)* **Function** Set how this function will linearize Source A.	oFF Off (62) intr Interpolated (1482) StPd Stepped (1483)	Off	14388 [offset 70]	0x86 (134) 1 to 16 5	120	34005	uint RWES
SFnA	*Linearization (1 to 16)* **Source Function A** Set the type of function that will be used for this source.	nonE None (61) A i Analog Input (142) CUrr Current (22) C.Pr Cool Power (161) h.Pr Heat Power (160) PUdr Power (73) Lnr Linearization (238) MAtH Math (240) Pu Process Value (241) SP.C Set Point Closed (242) SP.o Set Point Open (243) uAr Variable (245)	None	14380 [offset 70]	0x86 (134) 1 to 16 1	- - - -	34001	uint RWES
Si.A	*Linearization (1 to 16)* **Source Instance A** Set the instance of the function selected above.	1 or 250	1	14382 [offset 70]	0x86 (134) 1 to 16 2	- - - -	34002	uint RWES

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RM High Density Module • Setup Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
SZ.A SZ.A	*Linearization (1 to 16)* **Source Zone A** Set the zone of the function selected above.	0 or 16	0	14384 [offset 70]	0x86 (134) 1 to 16 3	- - - -	34003	uint RWES
Unit Unit	*Linearization (1 to 16)* **Units** Set the units of the output value.	Src Source (1539) nonE None (61) AbP Absolute Temperature (1540) rtP Relative Temperature (1541) PWr Power (73) Pro Process (75) rh Relative Humidity (1538)	Source	14436 [offset 70]	0x86 (134) 1 to 16 0x1D (29)	121	34029	uint RWES
ip.1 ip.1	*Linearization (1 to 16)* **Input Point 1** Set the value that will be mapped to output 1.	-1,999.000 to 9,999.000	0.0	14394 [offset 70]	0x86 (134) 1 to 16 8	122	34008	float RWES
op.1 op.1	*Linearization (1 to 16)* **Output Point 1** Set the value that will be mapped to input 1.	-1,999.000 to 9,999.000	0.0	14414 [offset 70]	0x86 (134) 1 to 16 0x12 (18)	123	34018	float RWES
ip.2 ip.2	*Linearization (1 to 16)* **Input Point 2** Set the value that will be mapped to output 2.	-1,999.000 to 9,999.000	1.0	14396 [offset 70]	0x86 (134) 1 to 16 9	124	34009	float RWES
op.2 op.2	*Linearization (1 to 16)* **Output Point 2** Set the value that will be mapped to input 2.	-1,999.000 to 9,999.000	1.0	14416 [offset 70]	0x86 (134) 1 to 16 0x13 (19)	125	34019	float RWES
ip.3 ip.3	*Linearization (1 to 16)* **Input Point 3** Set the value that will be mapped to output 3.	-1,999.000 to 9,999.000	2.0	14398 [offset 70]	0x86 (134) 1 to 16 0xA (10)	126	34010	float RWES

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RM High Density Module • Setup Page								
Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP - Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
oP.3 op.3	*Linearization (1 to 16)* **Output Point 3** Set the value that will be mapped to input 3.	-1,999.000 to 9,999.000	2.0	14418 [offset 70]	0x86 (134) 1 to 16 0x14 (20)	127	34020	float RWES
iP.4 ip.4	*Linearization (1 to 16)* **Input Point 4** Set the value that will be mapped to output 4.	-1,999.000 to 9,999.000	3.0	14400 [offset 70]	0x86 (134) 1 to 16 0xB (11)	128	34011	float RWES
oP.4 op.4	*Linearization (1 to 16)* **Output Point 4** Set the value that will be mapped to input 4.	-1,999.000 to 9,999.000	3.0	14420 [offset 70]	0x86 (134) 1 to 16 0x15 (21)	129	34021	float RWES
iP.5 ip.5	*Linearization (1 to 16)* **Input Point 5** Set the value that will be mapped to output 5.	-1,999.000 to 9,999.000	4.0	14402 [offset 70]	0x86 (134) 1 to 16 0xC (12)	130	34012	float RWES
oP.5 op.5	*Linearization (1 to 16)* **Output Point 5** Set the value that will be mapped to input 5.	-1,999.000 to 9,999.000	4.0	14422 [offset 70]	0x86 (134) 1 to 16 0x16 (22)	131	34022	float RWES
iP.6 ip.6	*Linearization (1 to 16)* **Input Point 6** Set the value that will be mapped to output 6.	-1,999.000 to 9,999.000	5.0	14404 [offset 70]	0x86 (134) 1 to 16 0xD (13)	132	34013	float RWES
oP.6 op.6	*Linearization (1 to 16)* **Output Point 6** Set the value that will be mapped to input 6.	-1,999.000 to 9,999.000	5.0	14424 [offset 70]	0x86 (134) 1 to 16 0x17 (23)	133	34023	float RWES

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RM High Density Module • Setup Page								
Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP - Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
iP.7 ip.7	*Linearization (1 to 16)* **Input Point 7** Set the value that will be mapped to output 7.	-1,999.000 to 9,999.000	6.0	14406 [offset 70]	0x86 (134) 1 to 16 E (14)	134	34014	float RWES
oP.7 op.7	*Linearization (1 to 16)* **Output Point 7** Set the value that will be mapped to input 7.	-1,999.000 to 9,999.000	6.0	14426 [offset 70]	0x86 (134) 1 to 16 0x18 (24)	135	34024	float RWES
iP.8 ip.8	*Linearization (1 to 16)* **Input Point 8** Set the value that will be mapped to output 8.	-1,999.000 to 9,999.000	7.0	14408 [offset 70]	0x86 (134) 1 to 16 0xF (15)	136	34015	float RWES
oP.8 op.8	*Linearization (1 to 16)* **Output Point 8** Set the value that will be mapped to input 8.	-1,999.000 to 9,999.000	7.0	14428 [offset 70]	0x86 (134) 1 to 16 0x19 (25)	137	34025	float RWES
iP.9 ip.9	*Linearization (1 to 16)* **Input Point 9** Set the value that will be mapped to output 9.	-1,999.000 to 9,999.000	8.0	14410 [offset 70]	0x86 (134) 1 to 16 0x10 (16)	138	34016	float RWES
oP.9 op.9	*Linearization (1 to 16)* **Output Point 9** Set the value that will be mapped to input 9.	-1,999.000 to 9,999.000	8.0	14430 [offset 70]	0x86 (134) 1 to 16 0x1A (26)	139	34026	float RWES
iP.10 ip.10	*Linearization (1 to 16)* **Input Point 10** Set the value that will be mapped to output 10.	-1,999.000 to 9,999.000	9.0	14412 [offset 70]	0x86 (134) 1 to 16 0x11 (17)	140	34017	float RWES

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RM High Density Module • Setup Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
oP.10 op.10	*Linearization (1 to 16)* **Output Point 10** Set the value that will be mapped to input 10.	-1,999.000 to 9,999.000	9.0	14432 [offset 70]	0x86 (134) 1 to 16 0x1B (27)	141	34027	float RWES
CPE SEt **Compare Menu**								
Fn Fn	*Compare (1 to 24)* **Function** Set operator that will be used to compare Source A to Source B.	oFF Off (62) gt Greater Than (1435) Lt Less Than (1436) E Equal To (1437) nE Not Equal To (1438) goE Greater or Equal (1439) LoE Less or Equal (1440)	Off	11276 [offset 40]	0x80 (128) 1 to 24 9	171	28009	uint RWES
toL 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
SFnA SFn.A	*Compare (1 to 24)* **Source Function A** Set the type of function that will be used for this source.	nonE None (61) AI Analog Input (142) Curr Current (22) CPr Cool Power (161) hPr Heat Power (160) PwJr Power (73) Lnr Linearization (238) MAtH Math (240) Pu Process Value (241) SP.C Set Point Closed (242) SP.o Set Point Open (243) uAr Variable (245)	None	11260 [offset 40]	0x80 (128) 1 to 24 1	- - - -	28001	uint RWES
SiA Si.A	*Compare (1 to 24)* **Source Instance A** Set the instance of the function selected above.	1 to 250	1	11264 [offset 40]	0x80 (128) 1 to 24 3	- - - -	28003	uint RWES

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RM High Density Module • Setup Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
SZ.A SZ.A	*Compare (1 to 24)* **Source Zone A** Set the zone of the function selected above.	0 to 24	0	11268 [offset 40]	0x80 (128) 1 to 24 5	- - - -	28005	uint RWES
SFn.b SFn.b	*Compare (1 to 24)* **Source Function B** Set the type of function that will be used for this source. This represents the timer reset signal.	nonE None (61) A I Analog Input (142) CUrr Current (22) C.Pr Cool Power (161) h.Pr Heat Power (160) PUJr Power (73) Lnr Linearization (238) MATH Math (240) Pu Process Value (241) SP.C Set Point Closed (242) SP.o Set Point Open (243) uAr Variable (245) WATt Wattage (1697) Ld.Vo Load Voltage (1698) Ldr Load Resistance (1183)	None	11262 [offset 40]	0x80 (128) 1 to 24 2	- - - -	28002	uint RWES
Si.b Si.b	*Compare (1 to 24)* **Source Instance B** Set the instance of the function selected above.	1 to 250	1	11266 [offset 40]	0x80 (128) 1 to 24 4	- - - -	28004	uint RWES
SZ.b SZ.b	*Compare (1 to 24)* **Source Zone B** Set the zone of the function selected above.	0 to 24	0	11270 [offset 40]	0x80 (128) 1 to 24 6	- - - -	28006	uint RWES

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RM High Density Module • Setup Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
Er.h Er.h	*Compare (1 to 24)* **Error Handling** Use Error Handling to select the output value and error output state of this function if it receives an error signal from one or more sources and it cannot determine the output value.	t.9 True Good (1476) t.b True Bad (1477) F.9 False Good (1478) F.b False Bad (1479)	False Bad	11282 [offset 40]	0x80 (128) 1 to 24 0xC (12)	- - - -	28012	uint RWES
tMr SEt **Timer Menu**								
Fn Fn	*Timer (1 to 24)* **Function** Set how the timer will function.	oFF Off (62) on.P On Pulse (1471) dEL Delay (1472) o.S One Shot (1473) rEt Retentive (1474)	Off	13196 [offset 50]	0x83 (131) 1 to 24 9	165	31009	uint RWES
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RM High Density Module • Setup Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
SFn.A SFn.A	*Timer (1 to 24)* **Source Function A** Set the type of function that will be used for this source. This represents the timer run signal.	nonE None (61) ALM Alarm (6) CPE Compare (230) Ctr Counter (231) d io Digital I/O (1142) Ent.A Profile Event Out A (233) Ent.b Profile Event Out B (234) Ent.C Profile Event Out C (235) Ent.d Profile Event Out D (236) Ent.E Profile Event Out E (247) Ent.F Profile Event Out F (248) Ent.G Profile Event Out G (249) Ent.h Profile Event Out H (250) Fun Function Key (1001) LGC Logic (239) SoF.1 Special Function Output 1 (1532) SoF.2 Special Function Output 2 (1533) SoF.3 Special Function Output 3 (1534) SoF.4 Special Function Output 4 (1535) tMr Timer (244) hEr Heater Error (184) uAr Variable (245)	None	13180 [offset 50]	0x83 (131) 1 to 24 1	- - - -	31001	uint RWES
Si.A Si.A	*Timer (1 to 24)* **Source Instance A** Set the instance of the function selected above.	1 to 250	1	13184 [offset 50]	0x83 (131) 1 to 24 3	- - - -	31003	uint RWES
SZ.A SZ.A	*Timer (1 to 24)* **Source Zone A** Set the zone of the function selected above.	0 to 24	0	13188 [offset 50]	0x83 (131) 1 to 24 5	- - - -	31005	uint RWES

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RM High Density Module • Setup Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
SASA SAS.A	*Timer (1 to 24)* **Run Active Level** Set what state will be read as on.	hiGh High (37) LoLo Low (53)	High	13200 [offset 50]	0x83 (131) 1 to 24 0xB (11)	- - - -	31011	uint RWES
SFnb SFn.b	*Timer (1 to 24)* **Source Function B** Set the type of function that will be used to reset a retentive timer.	nonE None (61) ALM Alarm (6) CPE Compare (230) Ctr Counter (231) dio Digital I/O (1142) Ent.A Profile Event Out A (233) Ent.b Profile Event Out B (234) Ent.C Profile Event Out C (235) Ent.d Profile Event Out D (236) Ent.E Profile Event Out E (247) Ent.F Profile Event Out F (248) Ent.G Profile Event Out G (249) Ent.h Profile Event Out H (250) Fun Function Key (1001) LGC Logic (239) SoF.1 Special Function Output 1 (1532) SoF.2 Special Function Output 2 (1533) SoF.3 Special Function Output 3 (1534) SoF.4 Special Function Output 4 (1535) tMr Timer (244) hEr Heater Error (184) uAr Variable (245)	None	13182 [offset 50]	0x83 (131) 1 to 24 2	- - - -	31002	uint RWES
Si.b Si.b	*Timer (1 to 24)* **Source Instance B** Set the instance of the function selected above.	1 to 250	1	13186 [offset 50]	0x83 (131) 1 to 24 4	- - - -	31004	uint RWES

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Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
SZ.b SZ.b	*Timer (1 to 24)* **Source Zone B** Set the zone of the function selected above.	0 to 24	0	13190 [offset 50]	0x83 (131) 1 to 24 6	- - - -	31006	uint RWES
SAS.b SAS.b	*Timer (1 to 24)* **Reset Active Level** Set what state will be read as on.	HIGH High (37) LOW Low (53)	High	13202 [offset 50]	0x83 (131) 1 to 24 0xC (12)	- - - -	31012	uint RWES
ti ti	*Timer (1 to 24)* **Time** Set the time span that will be measured in tenths of a second.	0 to 9,999.000	0.1	13204 [offset 50]	0x83 (131) 1 to 24 0xD (13)	224	31013	float RWES
LEv LEv	*Timer (1 to 24)* **Transmitter Active Level** Set which output state will indicate on.	HIGH High (37) LOW Low (53)	High	13206 [offset 50]	0x83 (131) 1 to 24 0xE (14)	- - - -	31014	uint RWES
CTr SEt **Counter Menu**								
Fn Fn	*Counter (1 to 24)* **Function** Set whether the counter increments or decrements the count value. Decrementing 0 returns 9,999. Incrementing 9,999 returns 0.	UP Up (1456) dn Down (1457)	Up	12236 [offset 40]	0x82 (130) 1 to 24 9	- - - -	30009	uint RWES

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RM High Density Module • Setup Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
SFnA SFn.A	*Counter (1 to 24)* **Source Function A** Set the type of function that will be used for the counter clock signal.	nonE None (61) ALM Alarm (6) CPE Compare (230) Ctr Counter (231) d io Digital I/O (1142) Ent.A Profile Event Out A (233) Ent.b Profile Event Out B (234) Ent.C Profile Event Out C (235) Ent.d Profile Event Out D (236) Ent.E Profile Event Out E (247) Ent.F Profile Event Out F (248) Ent.9 Profile Event Out G (249) Ent.h Profile Event Out H (250) Fun Function Key (1001) LoG Logic (239) tMr Timer (244) hEr Heater Error (184) uAr Variable (245)	None	12220 [offset 40]	0x82 (130) 1 to 24 1	- - - -	30001	uint RWES
SiA Si.A	*Counter (1 to 24)* **Source Instance A** Set the instance of the function selected above.	1 to 250	1	12224 [offset 40]	0x82 (130) 1 to 24 3	- - - -	30003	uint RWES
SZA SZ.A	*Counter (1 to 24)* **Source Zone A** Set the zone of the function selected above.	0 to 24	0	12228 [offset 40]	0x82 (130) 1 to 24 5	- - - -	30005	uint RWES
SASA SAS.A	*Counter (1 to 24)* **Count Active Level** Set what output state will indicate on.	high High (37) Lo Low (53) both Both (130)	High	12240 [offset 40]	0x82 (130) 1 to 24 0xB (11)	- - - -	30011	uint RWES
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Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP - Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
SFn.b SFn.b	*Counter (1 to 24)* **Source Function B** Set the type of function that will be used for the counter load signal.	nonE None (61) ALM7 Alarm (6) CPE Compare (230) Ctr Counter (231) d io Digital I/O (1142) Ent.A Profile Event Out A (233) Ent.b Profile Event Out B (234) Ent.C Profile Event Out C (235) Ent.d Profile Event Out D (236) Ent.E Profile Event Out E (247) Ent.F Profile Event Out F (248) Ent.9 Profile Event Out G (249) Ent.h Profile Event Out H (250) FUn Function Key (1001) L9C Logic (239) tM7r Timer (244) hEr Heater Error (184) uAr Variable (245)	None	12222 [offset 40]	0x82 (130) 1 to 24 2	- - - -	30002	uint RWES
Si.b Si.b	*Counter (1 to 24)* **Source Instance B** Set the instance of the function selected above.	1 to 250	1	12226 [offset 40]	0x82 (130) 1 to 24 4	- - - -	30004	uint RWES
SZ.b SZ.b	*Counter (1 to 24)* **Source Zone B** Set the zone of the function selected above.	0 to 24	0	12230 [offset 40]	0x82 (130) 1 to 24 6	- - - -	30006	uint RWES
SASb SAS.b	*Counter (1 to 24)* **Reset Active Level** Set what output state will indicate on.	hi9h High (37) LoUJ Low (53) both Both (130)	High	12242 [offset 40]	0x82 (130) 1 to 24 0x0C (12)	- - - -	30012	uint RWES
LoAd LoAd	*Counter (1 to 24)* **Load Value** Set the counter's initial value.	0 to 9,999	0	12244 [offset 40]	0x82 (130) 1 to 24 (13)	157	30013	uint RWES

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Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
trgt	*Counter (1 to 24)* **Target Value** Set the value that will turn the output value on.	0 to 9,999	9,999	12246 [offset 40]	0x82 (130) 1 to 24 0xE (14)	158	30014	uint RWES
LAt	*Counter (1 to 24)* **Latching** Output latched.	no No (59) YES Yes (106)	No	12252 [offset 40]	0x82 (130) 1 to 24 0x11 (17)	160	30017	uint RWES
LOG SEt **Logic Menu**								
Fn	*Logic (1 to 24)* **Function** Set the operator that will be used to compare the sources.	oFF Off (62) And And (1426) nAnd Nand (1427) or Or (1442) nor Nor (1443) E Equal To (1437) nE Not Equal To (1438) LAt Latch (1444) rSFF RS Flip-Flop (1693)	Off	9404 [offset 80]	0x7F (127) 1 to 24 0x21 (33)	177	27033	uint RWES
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RM High Density Module • Setup Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
SFn.A SFn.A	*Logic (1 to 24)* **Source Function A** Set the type of function that will be used for this source.	nonE None (61) ALM Alarm (6) CPE Compare (230) Ctr Counter (231) d io Digital I/O (1142) Ent.A Profile Event Out A (233) Ent.b Profile Event Out B (234) Ent.C Profile Event Out C (235) Ent.d Profile Event Out D (236) Ent.E Profile Event Out E (247) Ent.F Profile Event Out F (248) Ent.G Profile Event Out G (249) Ent.h Profile Event Out H (250) Fun Function Key (1001) Lim Limit (126) LGC Logic (239) SoF.1 Special Function Output 1 (1532) SoF.2 Special Function Output 2 (1533) SoF.3 Special Function Output 3 (1534) SoF.4 Special Function Output 4 (1535) tMr Timer (244) hEr Heater Error (184) uAr Variable (245)	None	9340 [offset 80]	0x7F (127) 1 to 24 1	- - - -	27001	uint RWES
Si.A Si.A	*Logic (1 to 24)* **Source Instance A** Set the instance of the function selected above.	1 to 250	1	9356 [offset 80]	0x7F (127) 1 to 24 9	- - - -	27009	uint RWES
SZ.A SZ.A	*Logic (1 to 24)* **Source Zone A** Set the zone of the function selected above.	0 to 24	0	9372 [offset 80]	0x7F (127) 1 to 24 0x11 (17)	- - - -	27017	uint RWES

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RM High Density Module • Setup Page

Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP - Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
SFnb SFn.b	*Logic (1 to 24)* **Source Function B** Set the type of function that will be used for this source.	nonE None (61) ALM7 Alarm (6) CPE Compare (230) Ctr Counter (231) d io Digital I/O (1142) Ent.A Profile Event Out A (233) Ent.b Profile Event Out B (234) Ent.C Profile Event Out C (235) Ent.d Profile Event Out D (236) Ent.E Profile Event Out E (247) Ent.F Profile Event Out F (248) Ent.9 Profile Event Out G (249) Ent.h Profile Event Out H (250) FUn Function Key (1001) L iM7 Limit (126) L9C Logic (239) SoF.1 Special Function Output 1 (1532) SoF.2 Special Function Output 2 (1533) SoF.3 Special Function Output 3 (1534) SoF.4 Special Function Output 4 (1535) tM7r Timer (244) hEr Heater Error (184) uAr Variable (245)	None	9342 [offset 80]	0x7F (127) 1 to 24 2	- - - -	27002	uint RWES
Si.b	*Logic (1 to 24)* **Source Instance B** Set the instance of the function selected above.	1 to 250	1	9358 [offset 80]	0x7F (127) 1 to 24 0xA (10)	- - - -	27010	uint RWES
SZ.b	*Logic (1 to 24)* **Source Zone B** Set the zone of the function selected above	0 to 24	0	9374 [offset 80]	0x7F (127) 1 to 24 0x12 (18)	- - - -	27018	uint RWES

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RM High Density Module • Setup Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
SFn.C SFn.C	*Logic (1 to 24)* **Source Function C** Set the type of function that will be used for this source.	nonE None (61) ALM Alarm (6) CPE Compare (230) Ctr Counter (231) d io Digital I/O (1142) Ent.A Profile Event Out A (233) Ent.b Profile Event Out B (234) Ent.C Profile Event Out C (235) Ent.d Profile Event Out D (236) Ent.E Profile Event Out E (247) Ent.F Profile Event Out F (248) Ent.9 Profile Event Out G (249) Ent.h Profile Event Out H (250) Fun Function Key (1001) Lim Limit (126) LgC Logic (239) SoF.1 Special Function Output 1 (1532) SoF.2 Special Function Output 2 (1533) SoF.3 Special Function Output 3 (1534) SoF.4 Special Function Output 4 (1535) tMr Timer (244) hEr Heater Error (184) uAr Variable (245)	None	9344 [offset 80]	0x7F (127) 1 to 24 3	- - - -	27003	uint RWES
Si.C Si.C	*Logic (1 to 24)* **Source Instance C** Set the instance of the function selected above.	1 to 250	1	9360 [offset 80]	0x7F (127) 1 to 24 0xB (11)	- - - -	27011	uint RWES
SZ.C SZ.C	*Logic (1 to 24)* **Source Zone C** Set the zone of the function selected above.	0 to 24	0	9376 [offset 80]	0x7F (127) 1 to 24 0x13 (19)	- - - -	27019	uint RWES

* These parameters/prompts are available in these menus with firmware revisions 6.0 and above.
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Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP - Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
SFnd SFn.d	*Logic (1 to 24)* **Source Function D** Set the type of function that will be used for this source.	nonE None (61) ALM Alarm (6) CPE Compare (230) Ctr Counter (231) d io Digital I/O (1142) Ent.A Profile Event Out A (233) Ent.b Profile Event Out B (234) Ent.C Profile Event Out C (235) Ent.d Profile Event Out D (236) Ent.E Profile Event Out E (247) Ent.F Profile Event Out F (248) Ent.9 Profile Event Out G (249) Ent.h Profile Event Out H (250) FUn Function Key (1001) L iM Limit (126) L9C Logic (239) SoF.1 Special Function Out-put 1 (1532) SoF.2 Special Function Out-put 2 (1533) SoF.3 Special Function Out-put 3 (1534) SoF.4 Special Function Out-put 4 (1535) tMr Timer (244) hEr Heater Error (184) uAr Variable (245)	None	9346 [offset 80]	0x7F (127) 1 to 24 4	- - - -	27004	uint RWES
S id Si.d	*Logic (1 to 24)* **Source Instance D** Set the instance of the function se-lected above.	1 to 250	1	9362 [offset 80]	0x7F (127) 1 to 24 0xC (12)	- - - -	27012	uint RWES
S2.d SZ.d	*Logic (1 to 24)* **Source Zone D** Set the zone of the function selected above.	0 to 24	0	9378 [offset 80]	0x7F (127) 1 to 24 0x14 (20)	- - - -	27020	uint RWES

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RM High Density Module • Setup Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
SFn.E SFn.E	*Logic (1 to 24)* **Source Function E** Set the type of function that will be used for this source.	nonE None (61) ALM Alarm (6) CPE Compare (230) Ctr Counter (231) d io Digital I/O (1142) Ent.A Profile Event Out A (233) Ent.b Profile Event Out B (234) Ent.C Profile Event Out C (235) Ent.d Profile Event Out D (236) Ent.E Profile Event Out E (247) Ent.F Profile Event Out F (248) Ent.9 Profile Event Out G (249) Ent.h Profile Event Out H (250) Fun Function Key (1001) L iM Limit (126) LgC Logic (239) SoF.1 Special Function Output 1 (1532) SoF.2 Special Function Output 2 (1533) SoF.3 Special Function Output 3 (1534) SoF.4 Special Function Output 4 (1535) tMr Timer (244) hEr Heater Error (184) uAr Variable (245)	None	9348 [offset 80]	0x7F (127) 1 to 24 5	- - - -	27005	uint RWES
Si.E Si.E	*Logic (1 to 24)* **Source Instance E** Set the instance of the function selected above.	1 to 250	1	9364 [offset 80]	0x7F (127) 1 to 24 D (13)	- - - -	27013	uint RWES
SZ.E SZ.E	*Logic (1 to 24)* **Source Zone E** Set the zone of the function selected above.	0 to 24	0	9380 [offset 80]	0x7F (127) 1 to 24 0x15 (21)	- - - -	27021	uint RWES

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RM High Density Module • Setup Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
SFnF SFn.F	*Logic (1 to 24)* **Source Function F** Set the type of function that will be used for this source.	nonE None (61) ALM Alarm (6) CPE Compare (230) Ctr Counter (231) d io Digital I/O (1142) Ent.A Profile Event Out A (233) Ent.b Profile Event Out B (234) Ent.C Profile Event Out C (235) Ent.d Profile Event Out D (236) Ent.E Profile Event Out E (247) Ent.F Profile Event Out F (248) Ent.9 Profile Event Out G (249) Ent.h Profile Event Out H (250) FUn Function Key (1001) L iM Limit (126) LgC Logic (239) SoF.1 Special Function Output 1 (1532) SoF.2 Special Function Output 2 (1533) SoF.3 Special Function Output 3 (1534) SoF.4 Special Function Output 4 (1535) tMr Timer (244) hEr Heater Error (184) uAr Variable (245)	None	9350 [offset 80]	0x7F (127) 1 to 24 6	- - - -	27006	uint RWES
Si.F	*Logic (1 to 24)* **Source Instance F** Set the instance of the function selected above.	1 to 250	1	9366 [offset 80]	0x7F (127) 1 to 24 0xE (14)	- - - -	27014	uint RWES
SZ.F	*Logic (1 to 24)* **Source Zone F** Set the zone of the function selected above.	0 to 24	0	9382 [offset 80]	0x7F (127) 1 to 24 0x16 (22)	- - - -	27022	uint RWES

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Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP - Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
SFn.g SFn.g	*Logic (1 to 24)* **Source Function G** Set the type of function that will be used for this source.	nonE None (61) ALM Alarm (6) CPE Compare (230) Ctr Counter (231) d io Digital I/O (1142) Ent.A Profile Event Out A (233) Ent.b Profile Event Out B (234) Ent.C Profile Event Out C (235) Ent.d Profile Event Out D (236) Ent.E Profile Event Out E (247) Ent.F Profile Event Out F (248) Ent.g Profile Event Out G (249) Ent.h Profile Event Out H (250) Fun Function Key (1001) L iM Limit (126) LgC Logic (239) SoF.1 Special Function Out-put 1 (1532) SoF.2 Special Function Out-put 2 (1533) SoF.3 Special Function Out-put 3 (1534) SoF.4 Special Function Out-put 4 (1535) tMr Timer (244) hEr Heater Error (184) uAr Variable (245)	None	9352 [offset 80]	0x7F (127) 1 to 24 7	- - - -	27007	uint RWES
S i.g Si.g	*Logic (1 to 24)* **Source Instance G** Set the instance of the function se-lected above.	1 to 250	1	9368 [offset 80]	0x7F (127) 1 to 24 0xF (15)	- - - -	27015	uint RWES
SZ.g SZ.g	*Logic (1 to 24)* **Source Zone G** Set the zone of the function selected above.	0 to 24	0	9384 [offset 80]	0x7F (127) 1 to 24 0x17 (23)	- - - -	27023	uint RWES

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Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP - Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
SFnh SFn.h	*Logic (1 to 24)* **Source Function H** Set the type of function that will be used for this source.	nonE None (61) ALM7 Alarm (6) CPE Compare (230) Ctr Counter (231) d io Digital I/O (1142) Ent.A Profile Event Out A (233) Ent.b Profile Event Out B (234) Ent.C Profile Event Out C (235) Ent.d Profile Event Out D (236) Ent.E Profile Event Out E (247) Ent.F Profile Event Out F (248) Ent.9 Profile Event Out G (249) Ent.h Profile Event Out H (250) FUn Function Key (1001) L iM7 Limit (126) L9C Logic (239) SoF.1 Special Function Output 1 (1532) SoF.2 Special Function Output 2 (1533) SoF.3 Special Function Output 3 (1534) SoF.4 Special Function Output 4 (1535) tM7r Timer (244) hEr Heater Error (184) uAr Variable (245)	None	9354 [offset 80]	0x7F (127) 1 to 24 8	- - - -	27008	uint RWES
Si.h	*Logic (1 to 24)* **Source Instance H** Set the instance of the function selected above.	1 to 250	1	9370 [offset 80]	0x7F (127) 1 to 24 0x10 (16)	- - - -	27016	uint RWES
SZ.h	*Logic (1 to 24)* **Source Zone H** Set the zone of the function selected above.	0 to 24	0	9386 [offset 80]	0x7F (127) 1 to 24 0x18 (24)	- - - -	27024	uint RWES

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RM High Density Module • Setup Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
Er.h Er.h	*Logic (1 to 24)* **Error Handling** Use to select the output value and error output state of this function if it receives an error signal from one or more sources and it cannot determine the output value.	t.G True Good (1476) t.b True Bad (1477) F.G False Good (1478) F.b False Bad (1479)	False Bad	9408 [offset 80]	0x7F (127) 1 to 24 0x23 (35)	- - - -	27035	uint RWES
MAt SEt **Math Menu**								
Fn Fn	*Math (1 to 24)* **Function** Set the operator that will be applied to the sources.	oFF Off (62) Avg Average (1367) P.SC Process Scale (1371) d.SC Deviation Scale (1372) So Switch Over (1370) d iFF Differential (1373) rAt i Ratio (1374) Add Add (1375) MUL Multiply (1376) Ad iF Absolute Difference (1377) M in Minimum (1378) MAH Maximum (1379) root Square Root (1380) hold Sample and Hold (1381) ALt Pressure to Altitude (1649) dEvJ Dew Point (1650)	Off	6580 [offset 70]	0x7D (125) 1 to 24 0x15 (21)	103	25021	uint RWES

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RM High Density Module • Setup Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
SFnA SFn.A	*Math (1 to 24)* **Source Function A** Set the type of function that will be used for this source.	nonE None (61) AI Analog Input (142) CUrr Current (22) C.Pr Cool Power (161) h.Pr Heat Power (160) PLJr Power (73) Lnr Linearization (238) MAtH Math (240) Pu Process Value (241) SP.C Set Point Closed (242) SP.o Set Point Open (243) uAr Variable (245) LJAt Wattage (1697) Ld.Uo Load Voltage (1698) Ld.r Load Resistance (1183)	None	6540 [offset 70]	0x7D (125) 1 to 24 1	- - - -	25001	uint RWES
SiA Si.A	*Math (1 to 24)* **Source Instance A** Set the instance of the function selected above.	1 to 250	1	6550 [offset 70]	0x7D (125) 1 to 24 6	- - - -	25006	uint RWES
SZA SZ.A	*Math (1 to 24)* **Source Zone A** Set the zone of the function selected above.	0 to 24	0	6560 [offset 70]	0x7D (125) 1 to 24 0xB (11)	- - - -	25011	uint RWES
SFnb SFn.b	*Math (1 to 24)* **Source Function B** Set the type of function that will be used for this source.	nonE None (61) AI Analog Input (142) CUrr Current (22) C.Pr Cool Power (161) h.Pr Heat Power (160) PLJr Power (73) Lnr Linearization (238) MAtH Math (240) Pu Process Value (241) SP.C Set Point Closed (242) SP.o Set Point Open (243) uAr Variable (245) LJAt Wattage (1697) Ld.Uo Load Voltage (1698) Ld.r Load Resistance (1183)	None	6542 [offset 70]	0x7D (125) 1 to 24 2	- - - -	25002	uint RWES

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RM High Density Module • Setup Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
S i.b Si.b	*Math (1 to 24)* **Source Instance B** Set the instance of the function selected above.	1 to 250	1	6552 [offset 70]	0x7D (125) 1 to 24 7	- - - -	25007	uint RWES
S2.b SZ.b	*Math (1 to 24)* **Source Zone B** Set the zone of the function selected above.	0 to 24	0	6562 [offset 70]	0x7D (125) 1 to 24 0xC (12)	- - - -	25012	uint RWES
SFn.C SFn.C	*Math (1 to 24)* **Source Function C** Set the type of function that will be used for this source.	nonE None (61) A i Analog Input (142) CUrr Current (22) C.Pr Cool Power (161) h.Pr Heat Power (160) PUJr Power (73) Lnr Linearization (238) MAtH Math (240) Pu Process Value (241) SP.C Set Point Closed (242) SP.o Set Point Open (243) uAr Variable (245) WJAt Wattage (1697) Ld.Uo Load Voltage (1698) Ldr Load Resistance (1183)	None	6544 [offset 70]	0x7D (125) 1 to 24 3	- - - -	25003	uint RWES
S i.C Si.C	*Math (1 to 24)* **Source Instance C** Set the instance of the function selected above.	1 to 250	1	6554 [offset 70]	0x7D (125) 1 to 24 8	- - - -	25008	uint RWES
S2.C SZ.C	*Math (1 to 24)* **Source Zone C** Set the zone of the function selected above.	0 to 24	0	6564 [offset 70]	0x7D (125) 1 to 24 0xD (13)	- - - -	25013	uint RWES

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RM High Density Module • Setup Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
SFn.d SFn.d	*Math (1 to 24)* **Source Function D** Set the type of function that will be used for this source.	nonE None (61) A I Analog Input (142) CUrr Current (22) C.Pr Cool Power (161) h.Pr Heat Power (160) PUJr Power (73) Lnr Linearization (238) MATt Math (240) Pu Process Value (241) SP.C Set Point Closed (242) SP.o Set Point Open (243) uAr Variable (245) UJAt Wattage (1697) Ld.Uo Load Voltage (1698) Ld.r Load Resistance (1183)	None	6546 [offset 70]	0x7D (125) 1 to 24 4	- - - -	25004	uint RWES
S id Si.d	*Math (1 to 24)* **Source Instance D** Set the instance of the function selected above.	1 to 250	1	6556 [offset 70]	0x7D (125) 1 to 24 9	- - - -	25009	uint RWES
SZ.d SZ.d	*Math (1 to 24)* **Source Zone D** Set the zone of the function selected above.	0 to 24	0	6566 [offset 70]	0x7D (125) 1 to 24 0xE (14)	- - - -	25014	uint RWES
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Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP - Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
SFn.E SFn.E	*Math (1 to 24)* **Source Function E** Set the type of function that will be used for this source.	nonE None (61) ALM7 Alarm (6) CPE Compare (230) Ctr Counter (231) d io Digital I/O (1142) Ent.A Profile Event Out A (233) Ent.b Profile Event Out B (234) Ent.C Profile Event Out C (235) Ent.d Profile Event Out D (236) Ent.E Profile Event Out E (247) Ent.F Profile Event Out F (248) Ent.9 Profile Event Out G (249) Ent.h Profile Event Out H (250) FUn Function Key (1001) L9C Logic (239) tM7r Timer (244) uAr Variable (245)	None	6548 [offset 70]	0x7D (125) 1 to 24 5	- - - -	25005	uint RWES
Si.E Si.E	*Math (1 to 24)* **Source Instance E** Set the instance of the function selected above.	1 to 250	1	6558 [offset 70]	0x7D (125) 1 to 24 0xA (10)	- - - -	25010	uint RWES
SZ.E SZ.E	*Math (1 to 24)* **Source Zone E** Set the zone of the function selected above.	0 to 24	0	6568 [offset 70]	0x7D (125) 1 to 24 0xF (15)	- - - -	25015	uint RWES
S.Lo S.Lo	*Math (1 to 24)* **Scale Low** If Math function is set to Process Scale, this will scale Source A low value to Range Low setting.	-1,999.000 to 9,999.000	0.0	6586 [offset 70]	0x7D (125) 1 to 24 0x18 (24)	104	25024	float RWES

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Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP - Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
S.hi S.hi	*Math (1 to 24)* **Scale High** If Math function is set to Process Scale, this will scale Source A high value to Range High setting.	-1,999.000 to 9,999.000	1.0	6588 [offset 70]	0x7D (125) 1 to 24 0x19 (25)	105	25025	float RWES
Unit Unit	*Math (1 to 24)* **Units** Set units for Source.	Src Source (1539) none None (61) AbP Absolute Temperature (1540) rtP Relative Temperature (1541) PWr Power (73) Pro Process (75) rh Relative Humidity (1538)	Source	6602 [offset 70]	0x7D (125) 1 to 24 0x20 (32)	- - - -	25032	uint RWES
r.Lo r.Lo	*Math (1 to 24)* **Range Low** If Math function is set to Process Scale, this will output Source A Scale Low value to Range Low setting.	-1,999.000 to 9,999.000	0.0	6590 [offset 70]	0x7D (125) 1 to 24 0x1A (26)	106	25026	float RWES
r.hi r.hi	*Math (1 to 24)* **Range High** If Math function is set to Process Scale, this will output Source A Scale High value to Range High setting.	-1,999.000 to 9,999.000	1.0	6592 [offset 70]	0x7D (125) 1 to 24 0x1B (27)	107	25027	float RWES
P.unt P.unt	*Math (1 to 24)* **Pressure Units** If Math function is set for Pressure to Altitude units, set units of measure for conversion.	PSi Pressure Units (1671) PASc Pascal (1674) Atm Atmosphere (1675) mbr mbar (1672) torr Torr (1673)	Pressure Units	6598 [offset 70]	0x7D (125) 1 to 24 0x1E (30)	- - - -	25030	uint RWES

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Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP - Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
A.unt A.unt	*Math (1 to 24)* **Altitude Units** If Math function is set for Pressure to Altitude units, set units of measure for conversion.	HFt Kilofeet (1671) Ft Feet (1674)	Kilofeet	6600 [offset 70]	0x7D (125) 1 to 24 0x1F (31)	- - - -	25031	uint RWES
FiL FiL	*Math (1 to 24)* **Filter** Filtering smooths out the output signal of this function block. Increase the time to increase filtering.	0.0 to 60.0 seconds	0.0	6594 [offset 70]	0x7D (125) 1 to 24 0x1C (28)	- - - -	25028	float RWES
uAr SEt **Variable Menu**								
tyPE tyPE	*Variable (1 to 24)* **Data Type** Set the variable's data type.	AnLg Analog (1215) dig Digital (1220)	Analog	16060 [offset 20]	0x66 (102) 1 to 24 1	152	2001	uint RWES
Unit Unit	*Variable (1 to 24)* **Units** Set the variable's units.	AtP Absolute Temperature (1540) rtP Relative Temperature (1541) PWr Power (73) Pro Process (75) rh Relative Humidity (1538) nonE None (61)	Absolute Temper-ature	16072 [offset 20]	0x66 (102) 1 to 24 7	- - - -	2007	uint RWES
dig dig	*Variable (1 to 24)* **Digital** Set the variable's value.	oFF Off (62) on On (63)	Off	16062 [offset 20]	0x66 (102) 1 to 24 2	153	2002	uint RWES
AnLg AnLg	*Variable (1 to 24)* **Analog** Set the variable's value.	-1,999.000 to 9,999.000	0.0	16064 [offset 20]	0x66 (102) 1 to 24 3	212	2003	float RWES
No Dis-play	*Variable (1 to 24)* **Output Value**	Off (62) On (63) -1,999.000 to 9,999.000	- - - -	16066 [offset 20]	0x66 (102) 1 to 24 4	- - - -	2004	float R

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Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP - Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
GLbL SEt **Global Menu**								
C_F C_F	*Global* **Display Units** Select which scale to use for temperature.	F °F (30) C °C (15)	°F	368	0x67 (103) 1 5	85	3005	uint RWES
AC.LF AC.LF	*Global* **AC Line Frequency** Set the frequency to the applied ac line power source.	50 50 Hz (3) 60 60 Hz (4)	60 Hz	- - - -	0x65 (101) 1 0x22 (34)	- - - -	1034	uint RWES
MAX MAX	*Global* **Maximum Display Value** Allows ranges to be opened up to display full values. Prior to firmware revision 9.0, ranges were clamped to accommodate the seven segment LED display of the RUI. Typically used with external display devices/software like HMIs and SpecView.	Floating Point [-3.4E+38 to 3.4E+38] Unsigned integer [0 to 65,535]	9999.0	- - - -	0x67 (103) 1 0x2D (45)	- - - -	3045	float RW
Min Min	*Global* **Minimum Display Value** Allows ranges to be opened up to display full values. Prior to firmware revision 9.0, ranges were clamped to accommodate the seven segment LED display of the RUI. Typically used with external display devices/software like HMIs and SpecView.	Floating Point [-3.4E+38 to 3.4E+38] Unsigned integer [0 to 65,535]	-1,999.0	- - - -	0x67 (103) 1 0x2C (44)	- - - -	3044	float RW

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RM High Density Module • Setup Page

Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP - Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
dPrS dPrS	*Global* **Display Pairs** Defines the number of Display Pairs.	1 to 25	1	- - - -	0x67 (103) 1 0x1C (28)	- - - -	3028	uint RWES
USr.S USr.S	*Global* **Save Settings As** Save all of this controller's settings to the selected set that have a Data Type of RWES	SEt 1 User Set 1 (101) nonE None (61)	None	26	0x65 (101) 1 0x0E (14)	93	1014	uint RWE
USr.r USr.r	*Global* **Restore Settings From** Replace all of this controller's settings with another set. * Starting with firmware release 6, there is only one user set.	nonE None (61) SEt 1 User Set 1 (101) FCty Factory (31)	None	24	0x65 (101) 1 0xD (13)	92	1013	uint RWE
CoMM SEt **Communications Menu**								
bAUd bAUd	*Communications* **Baud Rate** Set the speed of this controller's communications to match the speed of the serial network.	9600 9,600 (188) 19.2 19,200 (189) 38.4 38,400 (190)	9,600	6504	0x96 (150) 1 3	- - - -	17002	uint RWE
PAr PAr	*Communications* **Parity** Set the parity of this controller to match the parity of the serial network. **Note:** This applies if 13th digit in part number is equal to one.	nonE None (61) EuEn Even (191) odd Odd (192)	None	6506	0x96 (150) 1 4	- - - -	17003	uint RWE

* 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								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP - Class Instance Attribute hex (dec)**	**Pro-fibus Index**	**Param-eter ID**	**Data Type and Access ****
M.hL M.hL	*Communications* **Modbus Word Order** Select the word order of the two 16-bit words in the floating-point values.	hiLo Word High Low (1330) Lohi Word Low High (1331)	Low High	6508	0x96 (150) 1 5	- - - -	17043	uint RWE
C_F C_F	*Communications* **Display Units** Select which scale to use for temperature passed when using Modbus.	F °F (30) C °C (15)	°F	6510	0x96 (150) 1 6	- - - -	17050	uint RWE
nVS nV.S	*Communications (1)* **Non-volatile Save** If set to Yes all values written to the control will be saved in EEPROM. **Note:** Any value that is changed from the RUI or over a communications port will initiate a write to the EEPROM. Life of EEPROM is approximately one million writes.	YES Yes (106) no No (59)	Yes	6514	0x96 (150) 1 8	198	17051	uint RWE
* These parameters/prompts are available in these menus with firmware revisions 6.0 and above. ** R: Read, W: Write, E: EEPROM, S: User Set								

5 Chapter 5: Factory Pages

RMH Module - Factory Page Parameters

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.

CUSt
FCtY **Custom Setup Menu**
1
CUSt Custom Setup (1 to 50)
PAr Parameter
inid Instance ID

LoC
FCtY **Security Setting Menu**
LoC Security Setting
LoCo Operations Page
PASE Password
rLoC Read Lock
SLoC Write Security
LoCL Locked Access Level
roLL Rolling Password
PASu User Password
PASA Administrator Password

ULoC
FCtY **Security Setting Menu**
LoC Security Setting
CodE Public Key
PASS Password

diAG
FCtY **Diagnostics Menu**
diAG Diagnostics
Pn Part Number
rEu Software Revision
SbLd Software Build Number
Sn Serial Number
dAtE Date of Manufacture

CAL
FCtY **Calibration Menu**
1
ACt Calibration (1 to 16)
mnu Electrical Measurement
EL io Electrical Input Offset
EL iS Electrical Input Slope

RM High Density Module • Factory Page

Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
CUSt FCty **Custom Setup Menu**								
PAr Par	*Custom Menu* **Parameter 1 to 20** Select the parameters that will appear in the Home Page. 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. 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. Scroll through the other Home Page parameters with the Advance Key .	nonE None Pro Process iCA Input Calibration Offset C_F Display Units USr.r Restore Settings From ALo Low Set Point Ah i High Set Point AhY Hysteresis StPt Set Point AC.Pu Active Process Value AC.SP Active Set Point oP Open Loop Set Point AUt Autotune C.M7 User Control Mode h.Pr Heat Power C.Pr Cool Power t i Time Integral td Time Derivative db Dead Band h.Pb Heat Proportional Band h.hY On / Off Heat Hysteresis C.Pb Cool Proportional Band C.hY On / Off Cool Hysteresis r.rt Ramp Rate t.tun TRU-TUNE+® Enable idLE Idle Set Point CUSt Custom Menu	- - - -	- - - -	- - - -	- - - -	14005	uint RWES

** R: Read, W: Write, E: EEPROM, S: User Set

RM High Density Module • Factory Page

Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
iid iid	*Custom Setup (1 to 20)* **Instance ID** Select the instance of the parameter selected above to be displayed.	1 to 24	- - - -	- - - -	- - - -	- - - -	14003	uint RWES
LoC FCty **Lock Security Setting Menu**								
LoC.o LoC.o	*Lock Security Setting* **Operations Page** Use to change the required security level clearance required to gain access to the Operations Page.	1 to 3	2	- - - -	- - - -	- - - -	- - - -	unit RWE
PASE PAS.E	*Lock Security Setting* **Password Enable** Turn Password Enable ON if a Password access feature is desired. This is in addition to Read Lock or Write Security..	oFF Off on On	Off	- - - -	- - - -	- - - -	- - - -	- - - -
rLoC rLoC	*Lock Security Setting* **Read Lock** Set the read security clearance level. The user can access the selected level and all lower levels. Applies regardless of Password Enable setting. Set the Read Lock clearance level. The user can have read access to the selected level and all lower levels. If the Write Security level is higher than the Read Lock, the Read Lock level takes priority.	1 to 5	5	- - - -	- - - -	- - - -	- - - -	uint RWE
** R: Read, W: Write, E: EEPROM, S: User Set								

RM High Density Module • Factory Page

Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
SLoC SLoC	*Lock Security Setting* **Write Security** Set the write security clearance level. The user can access the selected level and all lower levels. Applies regardless of Password Enable setting. Set the Write Security clearance level. The user can have write access to the selected level and all lower levels. If the Write Security level is higher than the Read Lock, the Read Lock level takes priority.	0 to 5	5	- - - -	- - - -	- - - -	- - - -	uint RWE
LoCL LoC.L	*Lock Security Setting* **Locked Access Level** Determines user level menu visibility when Password is enabled. See Features section under Password Security. This setting is in addition to Read Lock and Write Security. Consider using only Locked Access Level and Set Read Lock and Write Security to 5.	1 to 5	5	- - - -	- - - -	- - - -	- - - -	- - - -
rooL roLL	*Lock Security Setting* **Rolling Password** Applies if Password Enable is ON. When power is cycled a new Public Key will be displayed.	oFF Off on On	Off	- - - -	- - - -	- - - -	- - - -	- - - -
PASu PAS.u	*Lock Security Setting* **User Password** Applies if Password Enable is ON. Used to acquire access to menus made available through the Locked Access Level setting. Do not forget the password as it is required to change Locked Access Level, Read Lock or Write Security.	10 to 999	63	- - - -	- - - -	- - - -	- - - -	- - - -

** R: Read, W: Write, E: EEPROM, S: User Set

RM High Density Module • Factory Page

Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
PAS.A PAS.A	*Lock Security Setting* **Administrator Password** Applies if Password Enable is ON. Used to acquire access to menus made available through the Locked Access Level setting. Do not forget the password as it is required to change Locked Access Level, Read Lock, Write Security and the ability to change the Passwords.	10 to 999	156	- - - -	- - - -	- - - -	- - - -	- - - -
No Display	*Security Setting* **Locked State** Current level of security	Lock (228) User (1684) Admin (1685)	- - - -	- - - -	- - - -	- - - -	3023	uint R
ULoC FCty **Unlock Security Setting Menu**								
CodE CodE	*Unlock Security Setting* **Public Key** If Rolling Password is turned ON, generates a random number when power is cycled. If Rolling Password is OFF, a fixed number will be displayed. The Public Key is only required if the assigned Password is unknown. Provide the key to the OEM or technical support to gain access.	Customer Specific	0	- - - -	- - - -	- - - -	- - - -	- - - -
PASS PASS	*Unlock Security Setting* **Password** Applies if Password Enable is set to ON. Enter the 4-digit assigned password. If unknown, contact your supervisor, the OEM or technical support to gain access.	-1999 to 9999	0	- - - -	- - - -	- - - -	- - - -	- - - -

** R: Read, W: Write, E: EEPROM, S: User Set

RM High Density Module • Factory Page

Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
d iAg FCty **Diagnostics Menu**								
Pn Pn	*Diagnostics Menu* **Part Number** Display this controller's part number.	24	- - - -	- - - -	0x65 (101) 1 9	90	1009	int RWE
rEv rEv	*Diagnostics Menu* **Software Revision** Display this controller's firmware revision number.	5	- - - -	4	0x65 (101) 1 to 5 0x11 (17)	91	1017	int R
S.bLd S.bLd	*Diagnostics Menu* **Software Build Number** Display the firmware build number.	0 to 2,147,483,647	- - - -	8	0x65 (101) 1 to 5 5	- - - -	1005	float R
Sn Sn	*Diagnostics Menu* **Serial Number** Display the serial number.	0 to 2,147,483,647	- - - -	12	0x65 (101) 1 7	- - - -	1032	float RWE
dAtE dAtE	*Diagnostics Menu* **Date of Manufacture** Display the date code.	0 to 2,147,483,647	- - - -	14	0x65 (101) 1 8	- - - -	1008	float RWE
No Display	*Diagnostics Menu* **Hardware ID** Read the hardware ID.	113	113	0	0x65 (101) 1 1	- - - -	1001	signed 32-bit R
No Display	*Diagnostics Menu* **Device Name** Read the device name.	EZ-ZONE RM	- - - -	- - - -	0x65 (101) 1 0x0B (11)	- - - -	1011	string R
No Display	*Diagnostics Menu* **Device Status** Return hardware status Fail means return to factory.	OK (138) Fail (32)	- - - -	30	0x65 (101) 1 0x10 (16)	- - - -	1016	uint R

** R: Read, W: Write, E: EEPROM, S: User Set

RM High Density Module • Factory Page

Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
CAL FCty **Calibration Menu**								
mv Mv	*Calibration Menu (1 to 16)* **Electrical Measurement** Read the raw electrical value for this input in the units corresponding to the Sensor Type (Setup Page, Analog Input Menu) setting.	-3.4e38 to 3.4e38		420 [offset 90]	0x68 (104) 1 to 12 0x15 (21)	- - - -	4021	float R
EL io ELi.o	*Calibration Menu (1 to 16)* **Electrical Input Offset** Change this value to calibrate the low end of the input range.	-1,999.000 to 9,999.000	0.0	398 [offset 90]	0x68 (104) 1 to 12 0xA (10)	- - - -	4010	float RWES
EL iS ELi.S	*Calibration Menu (1 to 16)* **Electrical Input Slope** Adjust this value to calibrate the slope of the input value.	-1,999.000 to 9,999.000	1.0	400 [offset 90]	0x68 (104) 1 to 12 0xB (11)	- - - -	4011	float RWES
ELoo ELo.o	*Calibration Menu (1 to 3 and 7 to 9)* **Electrical Output Offset** Change this value to calibrate the low end of the output range.	-1,999.000 to 9,999.000	0.0	16548 [offset 600]	0x76 (118) 1 to 4 5	- - - -	18005	float RWES
ELoS ELo.S	*Calibration Menu (1 to 3 and 7 to 9)* **Electrical Output Slope** Adjust this value to calibrate the slope of the output value.	-1,999.000 to 9,999.000	1.0	16550 [offset 90]	0x76 (118) 1 to 4 6	- - - -	18006	float RWES
** R: Read, W: Write, E: EEPROM, S: User Set								

6 Chapter 6: Features

6 Chapter 6: Features

Saving and Restoring Settings Using an RUI

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 Save Settings As USr.S (Setup Page, Global Menu) to save the settings into either of two files in a special section of memory.

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

If the settings in the controller are altered and you want to return the controller to the saved values, use Restore Settings From USr.r (Setup Page, Global Menu) to recall the previously saved settings. A digital input or the Function Key via the Action Block can also be configured to restore parameters.

CAUTION: ⚠

If an Action is programmed for User Set Restore, the operator may select Factory Restore and the Digital Input or Function Key may no longer be programmed for User Setting Restore.

Note:
Restoring to factory defaults will overwrite the entirety of the module memory; this would include any customized assemblies used with any of the available communications protocols.

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.

Tuning the PID Parameters

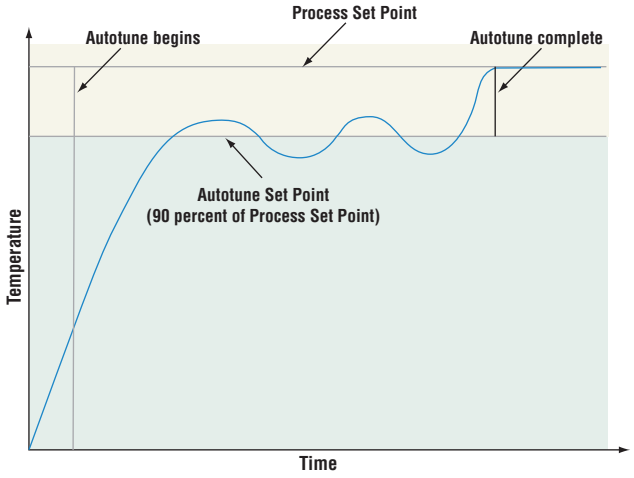
Autotune

When an autotune is performed on the RMH module, the Set Point is used to calculate the tuning set point. For example, if the active set point is 200° and autotune Set Point AtSP (Operations Page, Loop Menu) is set to 90 percent, the autotune function utilizes 180° for tuning. Changing the set point after an autotune has been started has no affect on the current tuning process. Set point changes can occur while the control is auto tuning. When the autotune is initially started it will use the current set point and will disregard all set point changes until the tuning process is complete. Once complete, the controller will then use the new set point. This is why it is a good idea to enter the active set point before initiating an autotune.

Auto tuning calculates the optimum heating and/or cooling PID parameter settings based on the systems response. Autotuning can be enabled whether or not TRU-TUNE+® is enabled. The PID settings generated by the autotune will be used until the autotune feature is rerun, the PID values are manually adjusted or TRU-TUNE+ is enabled.

To initiate an autotune follow the steps below:

1. Using an RUI, from the Home Page, push the up or down keys to enter the desired Set Point or one that is in the middle of the expected range of set points that you want to tune for.
2. Navigate to the Operations Page, Loop Menu (push and hold the up and down arrow for approximately 3 seconds) and select the Autotune Set Point AtSP. The Autotune Set Point is expressed as a percent of the Closed Loop Set Point.
3. Set Autotune Request AUt to YES. If the autotune cannot be completed in 60 minutes, the autotune will time-out and the original settings will take effect.



Once started, the lower RUI display will flash between (tUn1 to tU16) and the set point while the autotuning is underway. The temperature must cross the Autotune Set Point five times to complete the autotuning process. Once complete, the controller controls at the normal set point, using the new parameters.

If you need to adjust the tuning procedures aggressiveness, use Autotune Aggressiveness tAGr (Setup Page, Loop Menu). Select Under Damped Undr to bring the process value to the set point quickly. Select over damped ouEr to bring the process value to the set point with minimal overshoot. Select critical damped Cr it to balance a rapid response with minimal overshoot.

Manual Tuning

In some applications, the autotune process may not provide PID parameters for the process characteristics you desire. If that is the case, you may want to tune the controller manually.

To tune the controller manually follow these steps:

1. Apply power to the controller and establish a set point typically used in your process.
2. Go to the Operations Page, Loop Menu, and set Heat Proportional Band hPb and/or Cool Proportional Band CPb to 5. Set Time Integral ti to 0. Set Time Derivative td to 0.
3. When the system stabilizes, watch the process value. If it fluctuates, increase the Heat Proportional Band or Cool Proportional Band value in 3 to 5° increments until it stabilizes, allowing time for the system to settle between adjustments.
4. When the process has stabilized, watch Heat Power hPb or Cool Power CPb (Operations Page, Monitor Menu). It should be stable ±2%. At this point, the process temperature should also be stable, but it will have stabilized before reaching the set point. The difference between the set point and actual process value can be eliminated with Integral.
5. Start with an Integral value of 6,000 and allow 10 minutes for the process temperature to reach the set point. If it has not, reduce the setting by half and wait another 10 minutes. Continue reducing the setting by half every 10 minutes until the process value equals the set point. If the process becomes unstable, the Integral value is too small. Increase the value until the process stabilizes.
6. Increase Derivative to 0.1. Then increase the set point by 11° to 17°C. Monitor the system's approach to the set point. If the process value overshoots the set point, increase

Derivative to 0.2. Increase the set point by 11° to 17°C and watch the approach to the new set point. If you increase Derivative too much, the approach to the set point will be very sluggish. Repeat as necessary until the system rises to the new set point without overshoot or sluggishness.

For additional information about autotune and PID control, see related features in this chapter.

Autotuning with TRU-TUNE+®

The TRU-TUNE+ adaptive algorithm will optimize the controller's PID values to improve control of dynamic processes. TRU-TUNE+ monitors the Process Value and adjusts the control parameters automatically to keep your process at set point during set point and load changes. When the controller is in the adaptive control mode, it determines the appropriate output signal and, over time, adjusts control parameters to optimize responsiveness and stability. The TRU-TUNE+ feature does not function for on-off control.

The preferred and quickest method for tuning a loop is to establish initial control settings and continue with the adaptive mode to fine tune the settings.

Setting a controller's control mode to tune starts this two-step tuning process. (See Autotuning in this chapter.) This predictive tune determines initial, rough settings for the PID parameters. Then the loop automatically switches to the adaptive mode which fine tunes the PID parameters.

Once the Process Value has been at set point for a suitable period (about 30 minutes for a fast process to roughly two hours for a slower process) and if no further tuning of the PID parameters is desired or needed, TRU-TUNE+ may be turned off. However, keeping the controller in the adaptive mode allows it to automatically adjust to load changes and compensate for differing control characteristics at various set points for processes that are not entirely linear.

Once the PID parameters have been set by the TRU-TUNE+ adaptive algorithm, the process, if shut down for any reason, can be restarted in the adaptive control mode.

Turn TRU-TUNE+ on or off with TRU-TUNE+ Enable tEUn (Setup Page, Loop Menu).

Use TRU-TUNE+ Band tbnd (Setup Page, Loop Menu) to set the range above and below the set point in which adaptive tuning will be active. Adjust this parameter only in the unlikely event that the controller is unable to stabilize at the set point with TRU-TUNE+ Band set to auto (0). This may occur with very fast processes. In that case, set TRU-TUNE+ Band to a large value, such as 100.

Use TRU-TUNE+ Gain tG (Setup Page, Loop Menu) to adjust the responsiveness of the adaptive tuning calculations. Six settings range from 1, with the most aggressive response and most potential overshoot (highest gain), to 6, with the least aggressive response and least potential for overshoot (lowest gain). The default setting, 3, is recommended for loops with thermocouple feedback and moderate response and overshoot potential.

To initiate an autotune using TRU-TUNE+ follow the steps below:

1. Enter the desired set point or one that is in the middle of the expected range of set points that you want to tune for.
4. Enable TRU-TUNE+.
5. Initiate an autotune. (See Autotune above)

When autotuning is complete, the PID parameters should provide good control. As long as the loop is in the adaptive control mode, TRU-TUNE+ continuously tunes to provide the best possible PID control for the process.

WARNING! ⚠

During autotuning, the controller sets the output to 100 percent and attempts to drive the Process Value toward the set point. Enter a set point and heat and cool power limits that are within the safe operating limits of your system.

Inputs

Calibration Offset

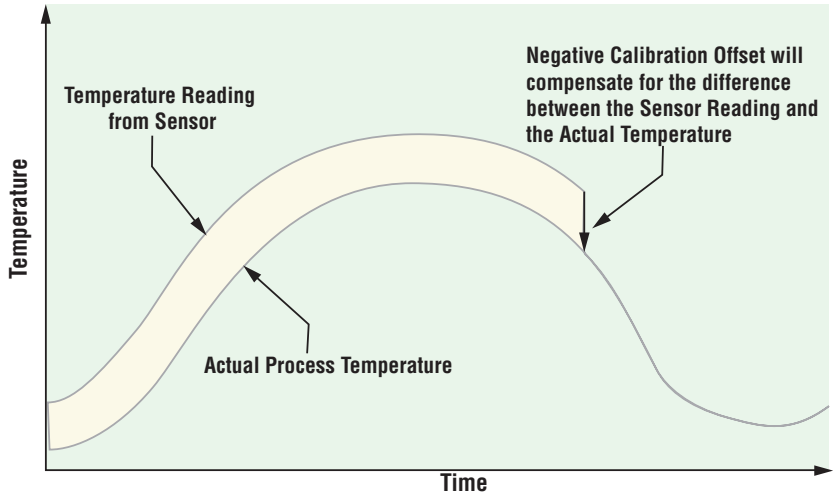
Calibration offset allows a device to compensate for an inaccurate sensor, lead resistance or other factors that affect the input value. A positive offset increases the input value, and a negative offset decreases the input value.

The input offset value can be viewed or changed with Calibration Offset `in.CA` (Operations Page, Analog Input Menu).

Calibration

Before performing any calibration procedure, verify that the displayed readings are not within published specifications by inputting a known value from a precision source to the analog input. Next, subtract the displayed value with the known value and compare this difference to the published accuracy range specification for that type of input.

Use of the Calibration Offset `in.CA` parameter found in the Operations Page `oPEr`, Analog Input Menu `AIn` shifts the readings across the entire displayed range by the offset value. Use this parameter to compensate for sensor error or sensor placement error. Typically this value is set to zero.



Equipment required while performing calibration:

Obtain a precision source for millivolts, volts, milliamperes or resistance depending on the sensor type to be calibrated. Use copper wire only to connect the precision source to the controller's input. Keep leads between the precision source and controller as short as possible to minimize error. In addition, a precision volt/ohm meter capable of reading values to 4 decimal places or better is recommended. Prior to calibration, connect this volt/ohm meter to the precision source to verify accuracy.

Actual input values do NOT have to be exactly the recommended values, but it IS critical that the actual value of the signal connected to the controller be accurately known to at least four digits.

Note:
If using Composer software, all steps to perform calibration are contained with dialog boxes once initiated. Those steps can also be found below if done manually.

Calibration of Analog Inputs:

To calibrate an analog input, you will need to provide a source of two electrical signals or resistance values near the extremes of the range that the application is likely to utilize. See recommended values below:

Sensor Type	Low Source	High Source
thermocouple	0.000 mV	50.000 mV
millivolts	0.000 mV	50.000 mV
volts	0.000V	10.000V
milliamps	0.000 mA	20.000 mA
100 Ω RTD	50.00 Ω	350.00 Ω
1,000 Ω RTD	500.00 Ω	3,500.00 Ω
Thermistor 5K	50.00 Ω	5000.00 Ω
Thermistor 10K	50.00 Ω	10000.00 Ω
Thermistor 20K	50.00 Ω	20000.00 Ω
Thermistor 40K	50.00 Ω	40000.00 Ω

Note:
The user may only calibrate one sensor type. If the calibrator interferences with open thermocouple detection, set Sensor Type SEn in Setup Page SEt, Analog Input Menu Ai to millivolt mV instead of Thermocouple tC to avoid interference between the calibrator and open thermocouple detect circuit for the duration of the calibration process. Be sure to set sensor type back to the thermocouple type utilized.

1. Disconnect the sensor from the controller.
2. Record the Calibration Offset i.CA parameter value in the Operations Page oPEr, Analog Input Menu Ai then set value to zero.
3. Wire the precision source to the appropriate controller input terminals to be calibrated. Do not have any other wires connected to the input terminals. Please refer to the Install and Wiring section of this manual for the appropriate connections.
4. Ensure the controller sensor type is programmed to the appropriate Sensor Type SEn to be utilized in the Setup Page SEt, Analog Input Menu Ai.
5. Enter Factory Page FCty, Calibration Menu CAL via RUI or EZ-ZONE Configurator Software.
6. Select the Calibration CAL input instance to be calibrated. This corresponds to the analog input to be calibrated.
7. Set Electrical Input Slope EL.S to 1.000 and Electrical Input Offset EL.o to 0.000 (this will cancel any prior user calibration values)

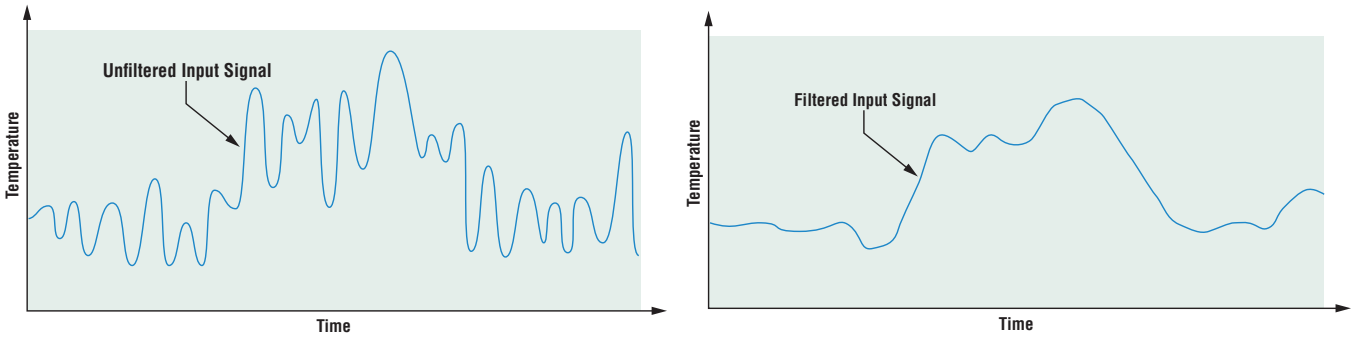
8. Input a Precision Source Low value. Read Electrical Measurement value rMu of controller via EZ-Configurator or RUI. This will be referred to as Electrical Measured Low. Record low value _____
9. Input a Precision Source High value.
10. Read Electrical Measurement value rMu of controller via EZ-Configurator or RUI. This will be referred to as Electrical Measured High. Record high value _____
11. Calculated Electrical Input Slope = (Precision High – Precision Low) / (Electrical Measured High – Electrical Measured Low) Calculated Slope value _____
12. Calculated Electrical Input Offset = Precision Low – (Electrical Input Slope * Measured Low) Calculated Offset value _____
13. Enter the calculated Electrical Input Slope EL.S and Electrical Input Offset EL.o into the controller.
14. Exit calibration menu.
15. Validate calibration process by utilizing a calibrator to the analog input.
16. Enter calibration offset as recorded in step 2 if required to compensate for sensor error.

Setting Electrical Input Slope EL.S to 1.000 and Electrical Input Offset EL.o to 0.000, restores factory calibration as shipped from factory.

Filter Time Constant

Filtering smooths 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 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 SEn (Setup Page, Analog Input Menu).

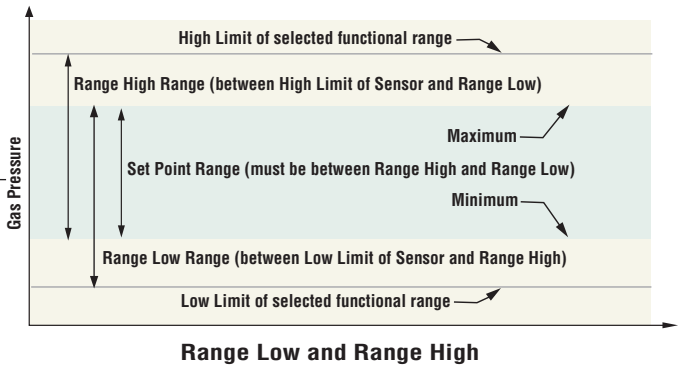
Sensor Backup

The Process Value function can be set for sensor backup which would maintain closed-loop control after an input failure by switching the control input to another input sensor of choice. Turn sensor backup on or off via the Setup Page, Process Value Menu. Source Function A must select a backup sensor from the same module (zone) where Source Function B through D can select a sensor as the backup from another zone (module).

Set Point Low Limit and High Limit

The controller constrains the set point to a value between a minimum and maximum. Set the set point limits with Minimum LSP and Maximum HSP (Setup Page, Loop Menu).

As shown to the right, there are two sets of set points, minimum and maximum (closed-loop set point) and minimum and maximum (open-loop set point, manual power).



Range Low and Range High

Scale High and Scale Low

When an analog input is selected as process voltage or process current input, you must choose the value of voltage or current to be the low and high ends. For example, when using a 4 to 20 mA input, the scale low value would be 4.00 mA and the scale high value would be 20.00 mA. Commonly used scale ranges are: 0 to 20 mA, 4 to 20 mA, 0 to 5V, 1 to 5V and 0 to 10V.

You can create a scale range representing other units for special applications. You can reverse scales from high values to low values for analog input signals that have a reversed action. For example, if 50 psi causes a 4 mA signal and 10 psi causes a 20 mA signal.

Scale low and high low values do not have to match the bounds of the measurement range. These along with range low and high provide for process scaling and can include values not measurable by the controller. Regardless of scaling values, the measured value will be constrained by the electrical measurements of the hardware.

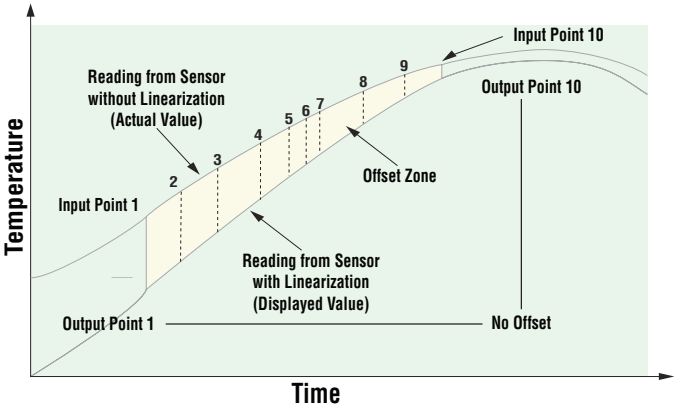
Select the low and high values with Scale Low SLo and Scale High SHi. Select the displayed range with Range Low rLo and Range High rHi (Setup Page, Analog Input Menu).

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 rLo and Range High rHi (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 linerization 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.

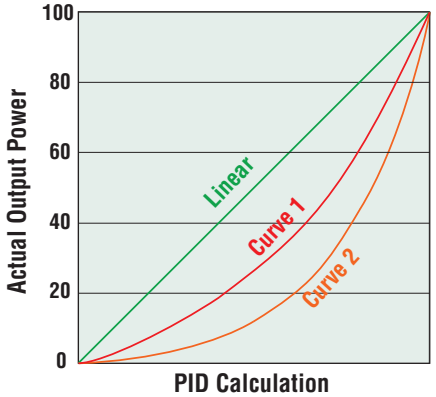
With a 4 to 20mA output the heating output will operate from 12 to 20mA (0 to +100 percent) and the cooling output will operate from 12 to 4mA (0 to -100 percent). In some cases this type of output is required by the device that the EZ-ZONE RMH controls, such as a three-way valve that opens one way with 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 to 3 and 7 to 9 (depending on ordering options) can be ordered as process outputs. Select Power PWDr as the Output Function Fn (Setup Page, Output Menu). For this example, set the Type oTY to milliamps mA. Range Low rLo to -100.00, Range High rHi to +100.00, Scale Low SLo to 4mA and Scale High SHi to 20.00 mA.

Cool Output Curve

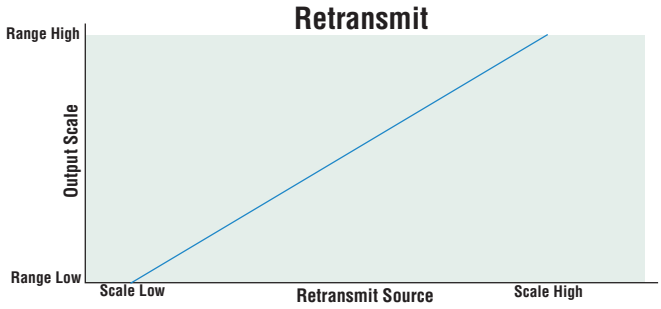
A nonlinear output curve may improve performance when the response of the output device is nonlinear. If a cool output uses one of the nonlinear curves a PID calculation yields a lower actual output level than a linear output would provide. These output curves are used in plastics extruder applications: curve 1 for oil-cooled extruders and curve 2 for water-cooled extruders.

Select a nonlinear cool output curve with Cool Output Curve CLr (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.

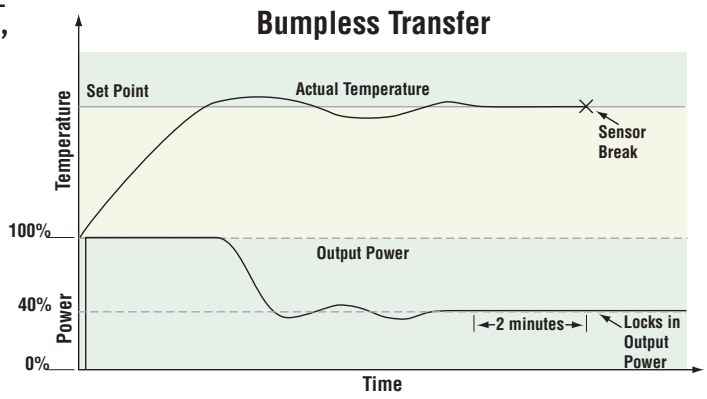
Auto and Manual Control

The controller has two basic modes of operation, auto mode (closed loop) and manual (open loop) mode. Auto mode allows the controller to decide whether to perform closed-loop control or to follow the settings of Input Error Power FAiL (Setup Page, Loop Menu). The manual mode only allows open-loop control. The 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 AtEn in the lower display and respond to the failure according to the setting of Input Error Power FAiL. You can configure the controller to perform a "bumpless" transfer bPLS, switch power to output a preset fixed level MANn, 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 iEr (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 then the Up Key. 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 C.MM parameter is selected to appear in the Home Page.

To transfer to manual mode from auto mode, press the Advance Key until C.MM appears in the lower display. The upper display will display AUto for auto mode. Use the Up or Down keys to select MANn. 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 until C.MM appears in the lower display. The upper display will display MANn for manual mode. Use the Up or Down keys to select AUto. The automatic set point value will be recalled from the last automatic operation.

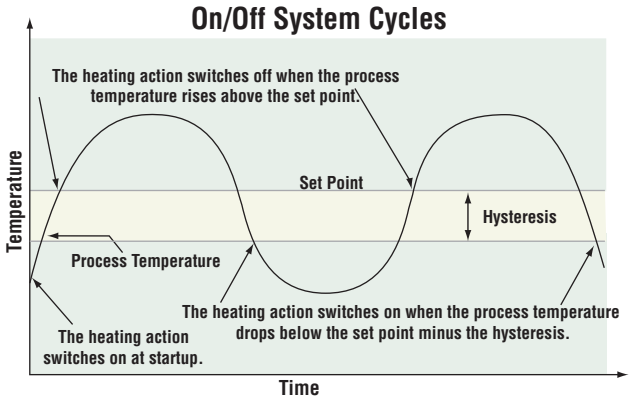
Changes take effect after three seconds or immediately upon pressing either the Advance Key or the Infinity Key.

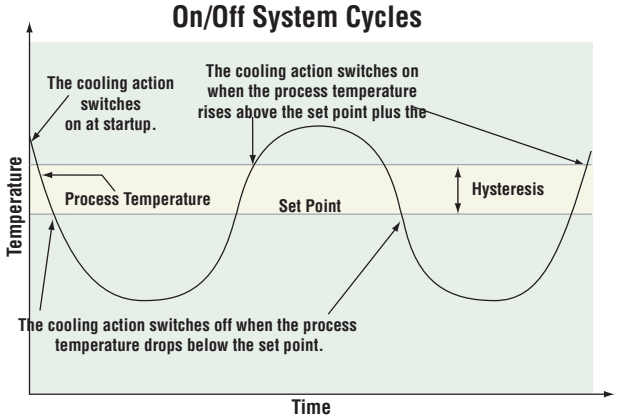
On-Off Control

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 Power Mode FAiL does not function in on-off control mode. The output goes off.

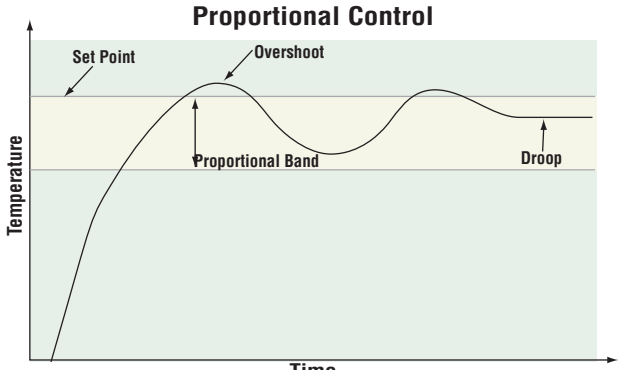




Proportional (P) Control

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 and 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.

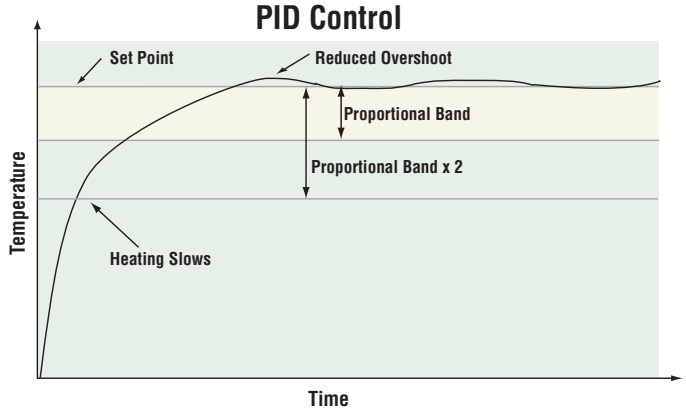
Adjust the integral with Time Integral t.i (Operations Page, Loop Menu).

Proportional, Integral and 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).

PID Control



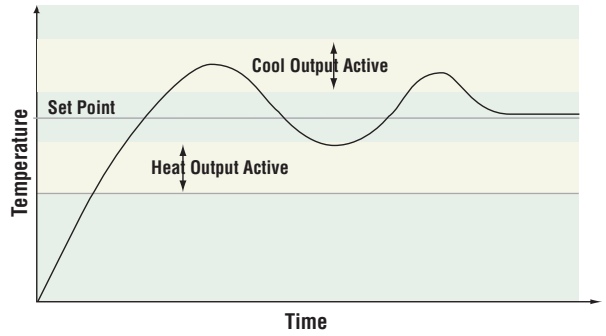
Dead Band

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.

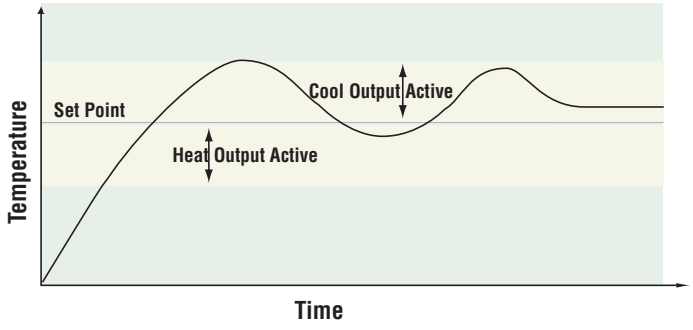
Using a **positive dead band value** keeps the two systems from fighting each other.

Positive Dead Band

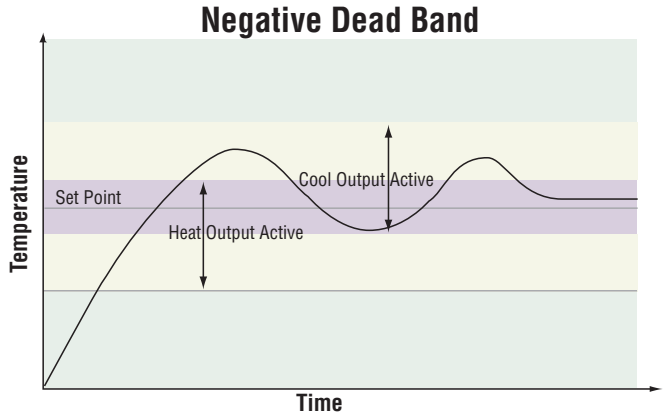


When the **dead band value is zero**, the heating output activates when the temperature drops below the set point, and the cooling output switches on when the temperature exceeds the set point.

Zero Dead Band



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 db (Operations Page, Loop Menu).

Variable Time Base

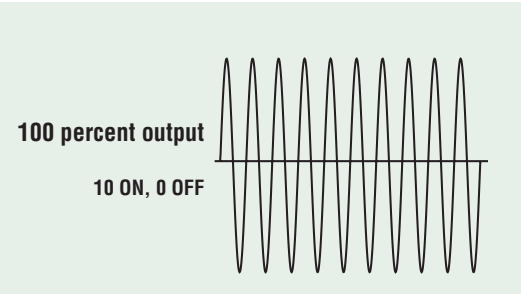
Variable time base is the preferred method for controlling a resistive load, providing a very short time base for longer heater life. Unlike phase-angle firing, variable-time-base switching does not limit the current and voltage applied to the heater.

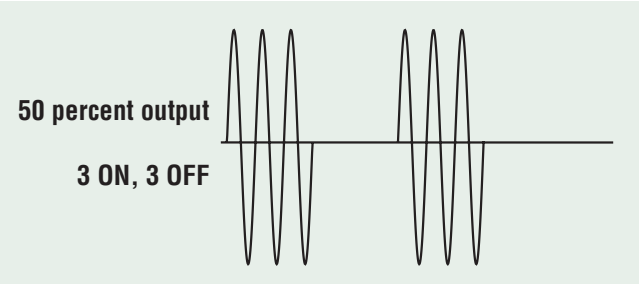
With variable time base outputs, the PID algorithm calculates an output between 0 and 100%, the output is distributed at a minimum of three ac line cycles. For each grouping of ac line cycles, the controller decides whether the power should be on or off. There is no fixed cycle time since the decision 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).

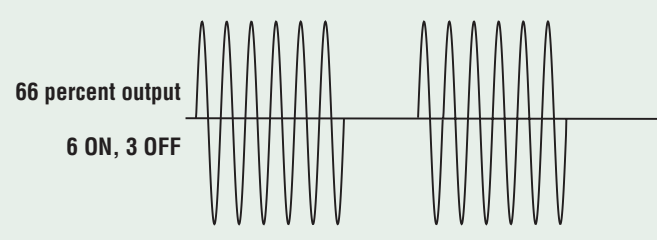
Variable time base should be used with solid-state power controllers, such as a solid-state relay (SSR) or silicon controlled rectifier (SCR) power controller. Do not use a variable time base output for controlling electromechanical relays, mercury displacement relays, inductive loads or heaters with 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 ACLF (Setup Page, Global Menu), 50 or 60 Hz.







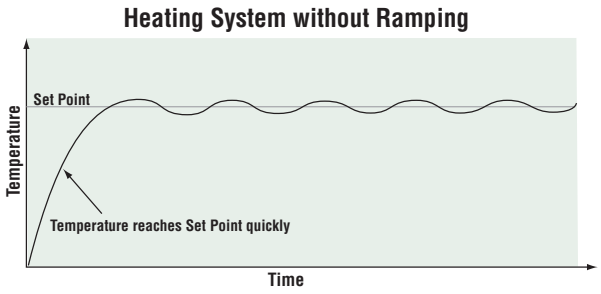
Single Set Point Ramping

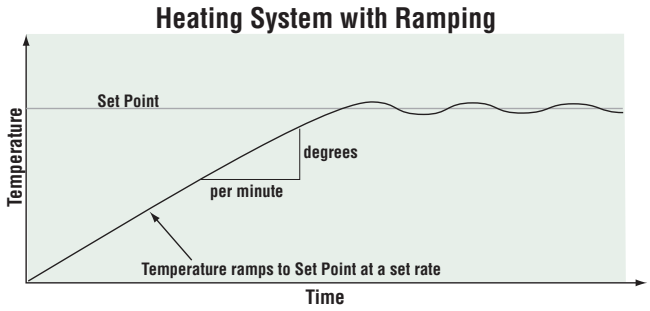
Ramping protects materials and systems that cannot tolerate rapid temperature changes. The value of the ramp rate is the maximum degrees per minute or hour that the system temperature can change.

Select Ramp Action rP (Setup Page, Loop Menu):

- oFF ramping not active.
- Str ramp at startup.
- StPt ramp at a set point change.
- 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 r.SC. Set the ramping rate with Ramp Rate r.rt (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.

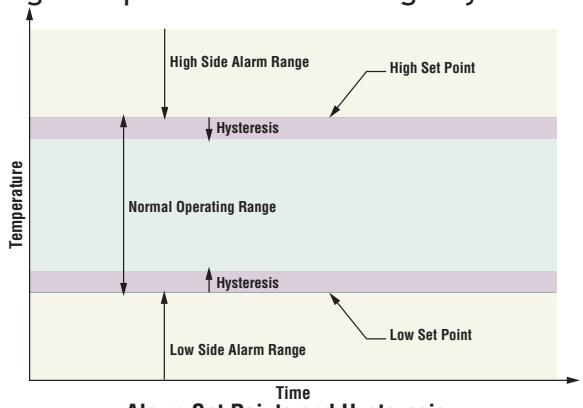
A deviation alarm uses one or two set points that are defined relative to the control set point. High and low alarm set points are calculated by adding or subtracting offset values from the control set point. If the set point changes, the window defined by the alarm set points automatically moves with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

Alarm Set Points

The high set point defines the process value or temperature that will trigger a high side alarm. The 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 Alarm Low AL1 and High Set Points Ah1 (Operations Page, Alarm Menu).

Hysteresis

An alarm state is triggered when the process value reaches the alarm high or low set point. Hysteresis defines how far the process must return into the normal operating range before the alarm can be cleared. Hysteresis is a zone inside each alarm set point. This zone is defined by adding the hysteresis value to the low set point or subtracting the hysteresis value from the high set point. View or change Hysteresis AHY via the Setup Page, Alarm Menu.



Alarm Set Points and Hysteresis

Latching

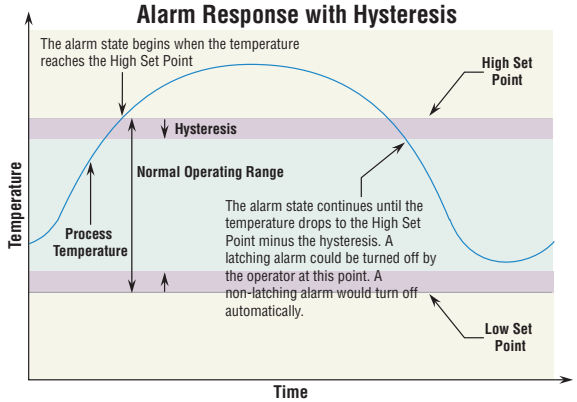
A latched alarm will remain active after the alarm condition has passed. It can only be deactivated by the user and only when the alarm condition no longer exists.

If using an RUI an active message, such as an alarm message, will cause the display to toggle between the normal settings and the active message in the upper display and ATTN in the lower display.

To clear a latched alarm:

1. Push the Advance Key to display SGNR in the upper display and the message source in the lower display.
2. Use the Up or Down keys to scroll through possible responses, such as Clear CLR or Silence SIL.
3. Push the Advance or Infinity key to execute the action.

Without an RUI, a latched alarm can be reset by cycling power to the module or configuring an Action function within the control to perform a reset. Do this by setting the Action Function to alarm and trigger the Action to occur through Source Function A. An alarm that is not latched (self-clearing) will deactivate automatically when the alarm condition has passed. Turn Latching ALA on or off via the Setup Page, Alarm Menu.



Silencing

If silencing is on the operator can disable the alarm output while the controller is in an alarm state. The process value or temperature has to enter the normal operating range beyond the hysteresis zone to activate the alarm output function again.

If using an RUI an active message, such as an alarm message, will cause the display to toggle between the normal settings and the active message in the upper display and AtEn in the lower display.

To silence an alarm:

1. Push the Advance Key to display iGnr in the upper display and the message source in the lower display.
2. Use the Up and Down keys to scroll through possible responses, such as Clear CLr or Silence SiL.
3. Push the Advance or Infinity key to execute the action.

Without an RUI, silencing aa alarm can be accomplished by configuring an Action function within the control to silence the alarm. Do this by setting the Action Function to Silence and trigger the Action to occur through Source Function A. Turn Silencing AS1 on or off via the Setup Page, Alarm Menu.

Blocking

Blocking allows a system to warm up after it has been started up. With blocking on, an alarm is not triggered when the process temperature is initially lower than the low set point or higher than the high set point. The process temperature has to enter the normal operating range beyond the hysteresis zone to activate the alarm function.

If the RMH module has an output that is functioning as a deviation alarm, the alarm is blocked when the set point is changed, until the process value re-enters the normal operating range. Turn Blocking AbL on or off via the Setup Page, Alarm Menu.

Note:

If using current as the alarm source, see the application note below under "Current Sensing".

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 Password Security

It is sometimes desirable to apply a higher level of security when using an RUI with any of the RM modules where a limited number of menus are visible while also 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 LoC Menu is set to on, an overriding Password Security will be in effect. When in effect, the only Pages that a User without a password has visibility to are defined in the Locked Access Level LoC.L prompt. On the other hand, a User with a password would have visibility restricted by the Read Lockout Security rLoC. As an example, with Password Enabled and the Locked Access Level LoC.L 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 LoC menu. Again push the Advance key until the Password Enabled PAS.E prompt is visible. Lastly, push either the up or down key to turn it on. Once on, 4 new prompts will appear:

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

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

How to Acquire Access to the Control

To acquire access to any inaccessible Pages or Menus, go to the Factory Page and enter the ULoC menu. Once there follow the steps below:

Note:
If Password Security (Password Enabled PASE 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 setup the control.

1. Acquire either the User Password PAS.u or the Administrator Password PAS.A.
2. Push the Advance key one time where the Code CodE prompt will be visible.

Note:

a. If the the Rolling Password is off push the Advance key one more time where the Password PASS prompt will be displayed. Proceed to either step 7a or 8a. Pushing the Up or Down arrow keys enter either the User or Administrator Password. Once entered, push and hold the Infinity key for two seconds to return to the Home Page.

b. If the Rolling Password roLL was turned on proceed on through steps 3 - 9.

3. Assuming the Code CodE prompt (Public Key) is still visible on the face of the control simply push the Advance key to proceed to the Password PASS 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 and Down arrow keys or use EZ-ZONE Confgurator Software.
6. Exit the Factory Page by pushing and holding the Infinity key for two seconds.

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

Passwords equal:

7. User
   a. If Rolling Password roLL is Off, Password PASS equals User Password PAS.u.
   b. If Rolling Password roLL is On, Password PASS equals: (PAS.u x code) Mod 929 + 70
8. Administrator
   a. If Rolling Password roLL is Off, Password PASS equals Administrator Password PAS.A.
   b. If Rolling Password roLL is On, Password PASS equals: (PAS.A x code) Mod 997 + 1000

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

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

Modbus - Using Programmable Memory Blocks

When using the Modbus protocol, the RM 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.

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 380 contains the Analog Input 1 Value (See Operations Page, Analog Input Menu). If the value 380 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

To enable a user to configure the RM module using a personal computer (PC), Watlow has provided two different programs free of charge for your use.

- EZ-ZONE Configurator (text based), originally released with the EZ-ZONE family of controls.
- Composer (graphic based), released September 2014.

Note:
RM modules must have firmware revision 9.0 and above to be used with Composer software.

Both programs can be acquired directly from the DVD (Controller Support Tools) which shipped with the controller. Insert the DVD into your DVD drive and select and install the preferred software. Alternatively, if you are viewing this document electronically and have a connection to the internet, simply click on the link below and type either Configurator or Composer into the Keyword field and then click Search to download the software free of charge. http://www.watlow.com/literature/software.cfm

EZ-ZONE Configurator Software

Installing the Software

To install the software:

1. Double-click the filename " EZCv6.exe.
2. After reading the license agreement click the **I accept the terms in the License Agreement** radio button and then click on the **Next** button to proceed.
3. Once the installation is complete, click the **Finish** button.

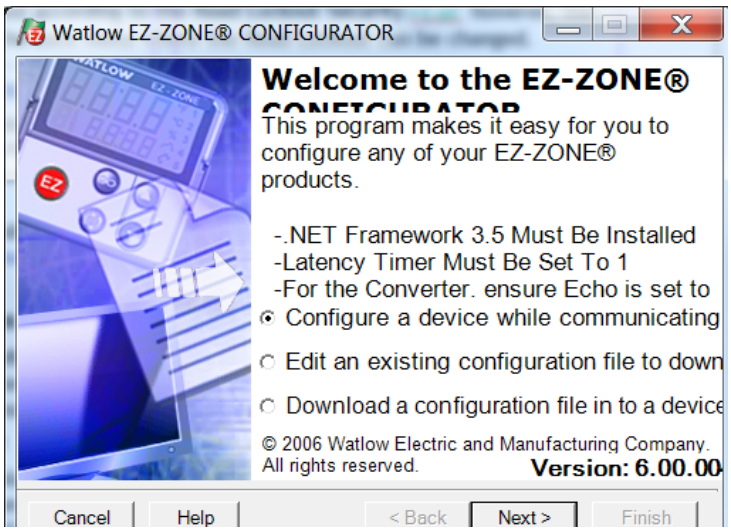
Starting EZ-ZONE Configurator software:

1. Double-click the EZ-ZONE Configurator icon on the desktop.

Or

2. On the task bar, click **Start** and type ez-zone configurator.exe in the search box and then press **Enter**.
3. Once the executable is found double-click the file to run.

The first screen that will appear is shown below.

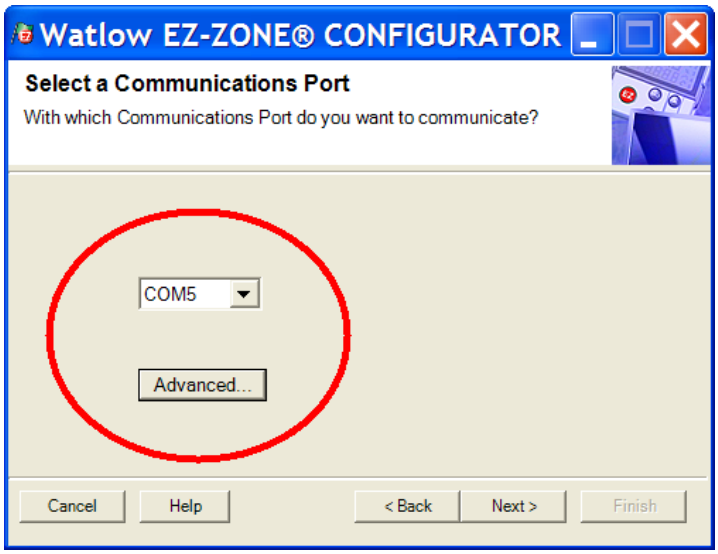


If the PC is already physically connected to the RMH module click the next button to go on-line.

Note:

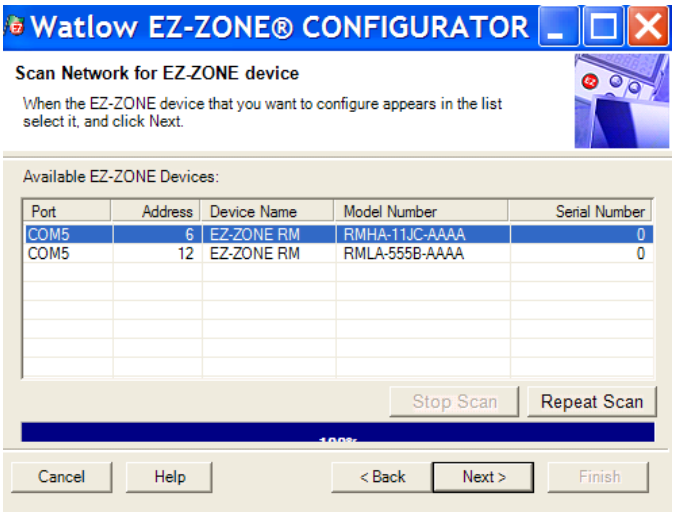
When establishing communications from PC to the RMH module an interface converter will be required. The Standard Bus network uses EIA-485 as the interface. Most PCs today would require a USB to EIA-485 converter. However, some PCs may still be equipped with EIA-232 ports, therefore an EIA-232 to EIA-485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



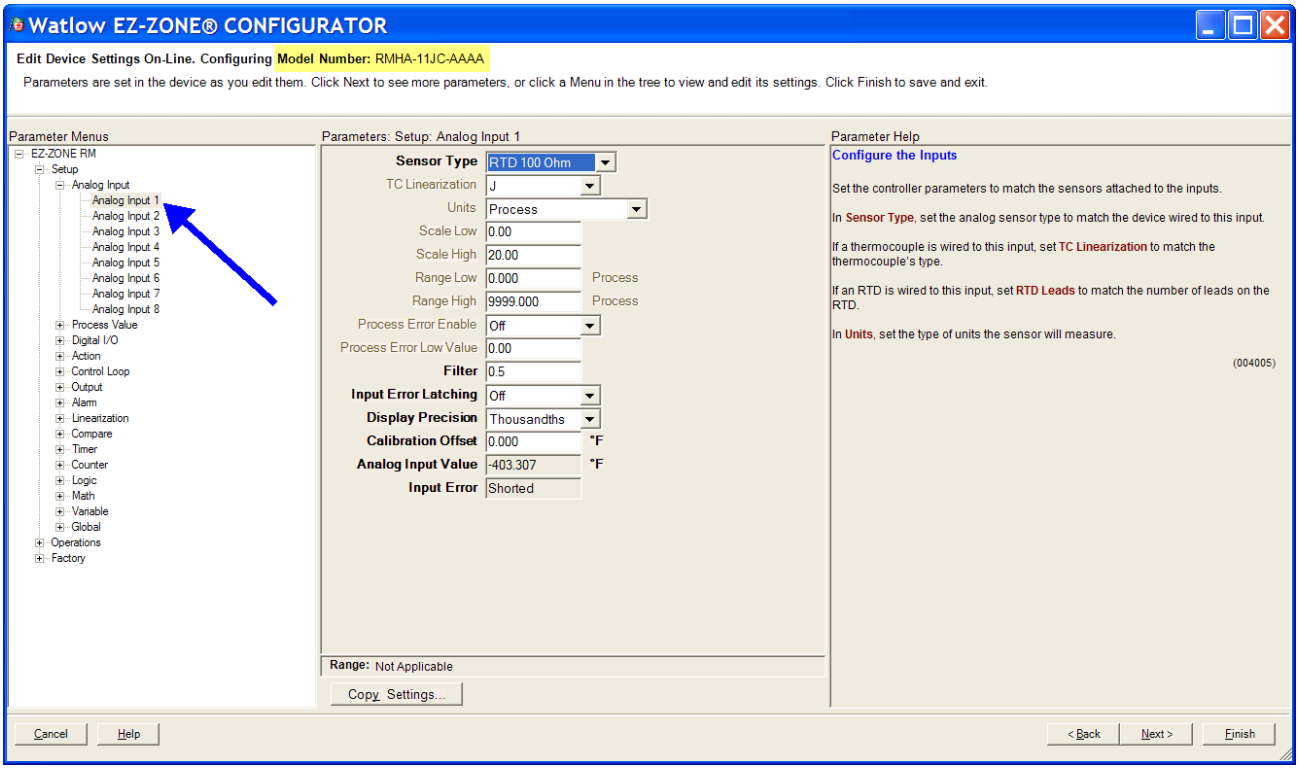
The available options allow the user to click on a drop down box to select a specific known communications port. Clicking on the Advanced button allows the user to define the number of EZ-ZONE devices to look for on the network. After clicking the Next button above, the software will then begin scanning for devices on the network as the screen shot below displays.

When complete the software will display all of the available devices found on the network as shown below.



Using EZ-ZONE Configurator Software

In the screen shot above the RMH is shown highlighted to bring greater clarity to the module 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 module of choice simply click the next button once again. The screen below will appear next.



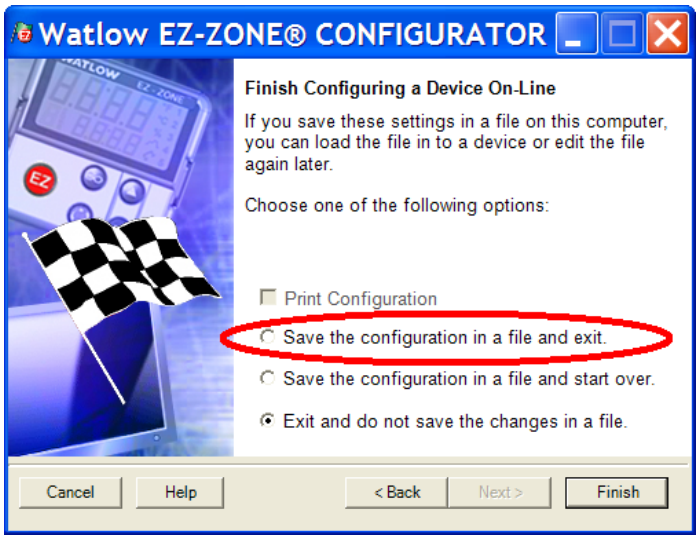
In the screen shot above notice that the device part number is clearly displayed at the top of the page (yellow highlight added for emphasis). When multiple EZ-ZONE devices are on the network it is important that the part number be noted prior to configuring so as to avoid making unwanted configuration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

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

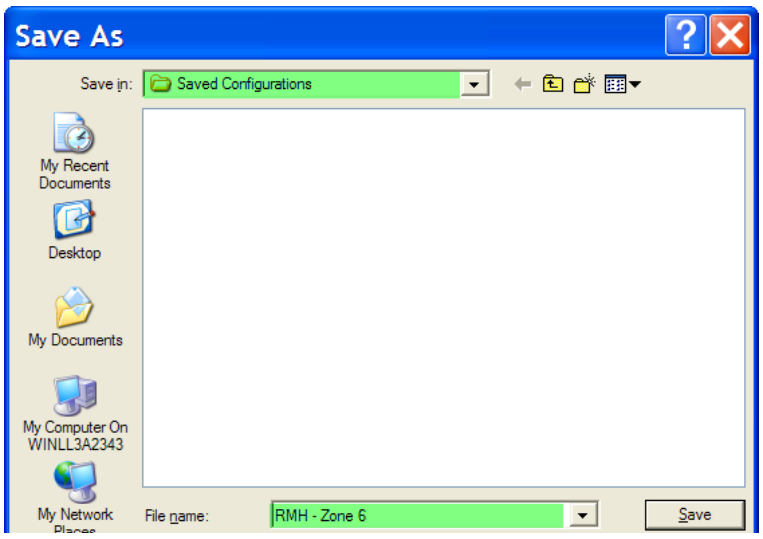
- Setup
- Operations
- Factory

Navigating from one menu to the next is easy and clearly visible. Simply slide the scroll bar up or down to display the menu and parameter of choice. As an alternative, clicking on the negative symbol next to Setup will collapse the Setup Menu where the Operations Menu will appear next and perhaps deliver more clarity for the area of focus by not displaying unwanted menus and parameters. Once the focus is brought to an individual parameter (single click of mouse) as is the case for Digital I/O 1 in the left column, all that can be setup related to that parameter will appear in the center column. The grayed out fields in the center column simply mean that this does not apply for the type of device selected. As an example, notice that when Input Voltage is selected, everything related to the output does not apply and is therefore grayed out. To speed up the process of configuration notice that at the bottom of the center column there is an option to copy settings. If Analog Input 1, 2 and 3 are the same

type of sensor click on "Copy Settings" where a copy from/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 module 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.



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

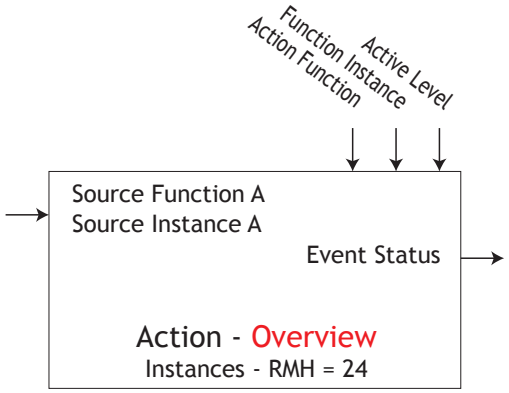
Each of the next several pages graphically shows each of the RMH function blocks. Note that as you view each, you will find text that is black and text that appears gray. The gray text represents inputs that are not currently available based on the functions defined use (red text). For instance, when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

Action Function

The Action Function will cause the action selected to occur with in the module where the action function resides when Source Function A = ON and Active Level = High. 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, 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.



Act	Action Menu
SEt	Setup Page

	Parameter Name [Parameter ID] : Range or Choices
Fn	Action Function [10003] : None, User Set Restore, Alarm, Silence Alarms, Control Loops Off and Alarms to Non-alarm State, Force Alarm to Occur, Idle Set Point, Tune, Manual, Switch Control Loop Off, Remote Set Point, TRU-TUNE+ Disable
F i	Function Instance [10004] : 0 to 25
SFnA	Source Function A [10006] : None, Alarm, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Limit, Logic, Timer, Variable, Heater Error
S iA	Source Instance A [10002] : 1 to 250
S2A	Source Zone A [10007] : 0 to 24
LEu	Active Level [10001] : High, Low

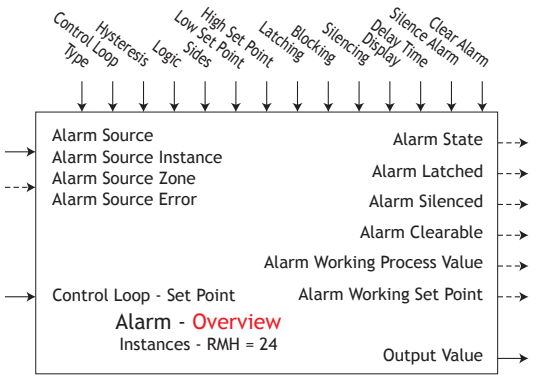
Act	Action Menu
oPEr	Operations Page

E iS	Event Status [10005] : On, Off

Alarm Function

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.



ALM1 Alarm Menu
SEt Setup Page

	Parameter Name [Parameter ID] : Range or Choices
AtY	Type [9015] : Off, Deviation, Process
Sr.A	Alarm Source [9017] : None, Analog Input, Current, Power, Linearization, Math, Process Value, Variable, Current Read, Wattage, Load Voltage, Load Load Resistance
iS.A	Alarm Source Instance [9018] : 1 to 250
S2.A	Alarm Source Zone [9025] : 0 to 24
LooP	Control Loop [9023] : 1 to 250
A.hY	Hysteresis [9003] : 0.001 to 9,999.000
A.LG	Logic [9005] : Close on Alarm, Open on Alarm
A.Sd	Sides [9004] : Both, High, Low
A.Lo	Low Set Point [9002] : -1,999.000 to 9,999.000
A.hi	High Set Point [9001] : -1,999.000 to 9,999.000
LAt	Latching [9007] : Non-Latching, Latching
A.bL	Blocking [9008] : Off, Startup, Set Point, Both
A.Si	Silencing [9006] : Off, On
A.dSP	Display [9016] : Off, On
A.dL	Delay Time [9021] : 0 to 9,999 seconds
A.CLr	Clear Alarm [9026] : Ignore, Clear
A.Sir	Silence Alarm [9027] : Ignore, Silence Alarms
A.St	Alarm State [9009] : Startup, None, Blocked, Alarm Low, Alarm High, Error

ALM1 Alarm Menu
oPEr Operations Page

A.Lo	Low Set Point [9002] : -1,999.000 to 9,999.000
A.hi	High Set Point [9001]: -1,999.000 to 9,999.000
A.CLr	Clear Alarm [9026] : Ignore, Clear
A.Sir	Silence Alarm [9027] : Ignore, Silence Alarms
A.St	Alarm State [9009] : Startup, None, Blocked, Alarm Low, Alarm High, Error

Alarm Latched [9010] : No, Yes

Alarm Silenced [9011] : No, Yes

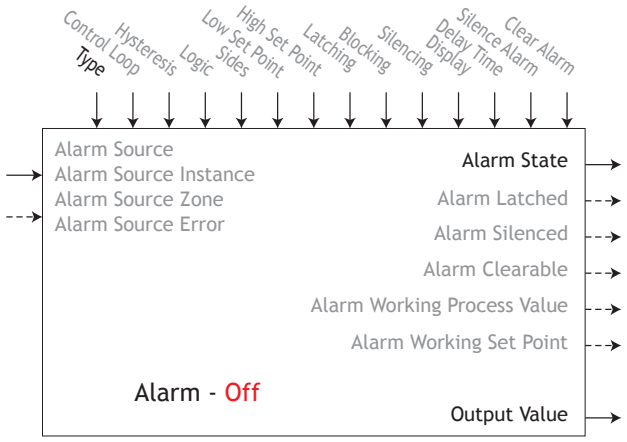
Alarm Clearable [9013] : No, Yes

Alarm Working Process Value [9019] : -1,999.000 to 9,999.000

Alarm Working Set Point [9020]: -1,999.000 to 9,999.000

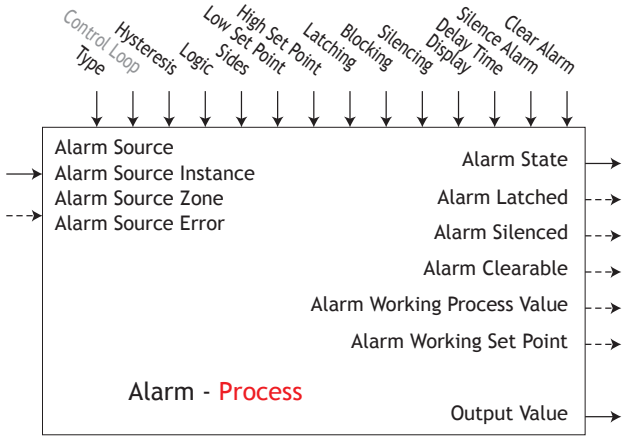
Output Value [9024] : On, Off

Alarm (cont.)



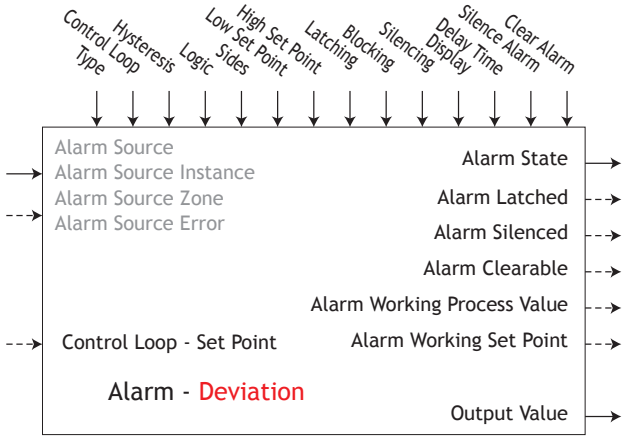
IF Type = Off THEN
Output Value = OFF
Alarm State = None
Alarm Indication = None

When function = Off THEN
Output Value = OFF
Alarm State = None
Alarm Indication = None



IF Alarm Type = Process THEN
Output Value changes state when Alarm Source exceeds Alarm Set Points.

When function = Process THEN
Output Value = True when <= Low Set Point or >= High Set Point



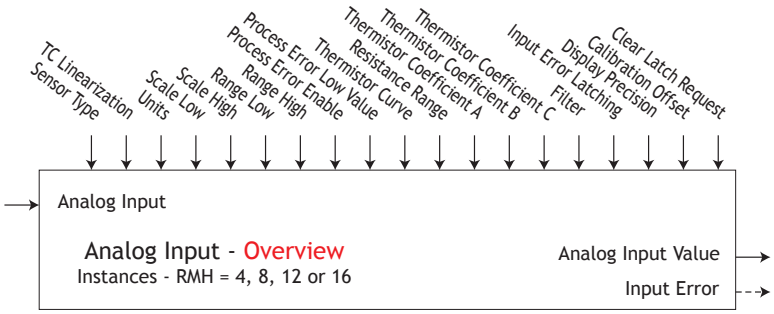
IF Type = Deviation THEN
Output Value changes state when Control Loop Source value exceeds the sum of Closed Loop Set Point plus Alarm Set Points . The Control Loop parameter defines which loop to obtain the closed loop set point value.

When function = Deviation THEN
Output Value = True when Alarm Source - Closed Loop Set Point <= Low Set Point or Alarm Source + Closed High Set Point >= High Set Point

Analog Input Function

Note:

This function configures and connects physical inputs to internal functions. Configure the sensor type to match what is connected. For process inputs such as potentiometer, voltage, or milliampere, set the electrical span using scale low/high and engineering representation range using range low/high. Apply the corresponding units of measure.



A i Analog Input Menu
SEt Setup Page

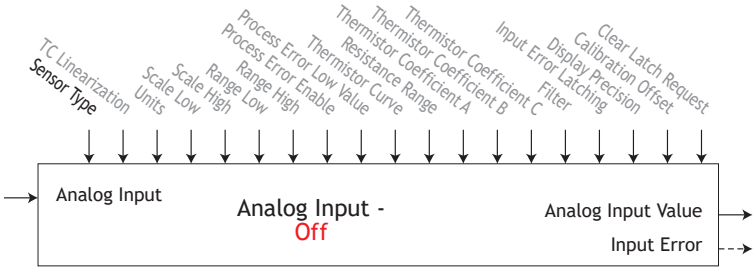
	Parameter Name [Parameter ID] : Range or Choices
SEn	Sensor Type [4005] : Off, Thermocouple, Millivolts, Volts, Milliamps, RTD 100 Ohm, RTD 1000 Ohm, 1K Potentiometer, Thermistor (optional)
L in	TC Linearization [4006] : B, C, D, E, F, J, K, N, R, S, T
Unit	Units [4042] : Absolute Temperature, Power, Process, Relative Humidity
SLo	Scale Low [4015] : -100.00 to 1000.00
Sh i	Scale High [4016] : -100.00 to 1000.00
rLo	Range Low [4017] : -1,999.000 to 9,999.000
rh i	Range High [4018] : -1,999.000 to 9,999.000
PEE	Process Error Enable [4030] : Off, Low
PEL	Process Error Low Value [4031] : -100.00 to 1,000.00
tC	Thermistor Curve [4038] : Curve A, Curve B, Curve C, Custom
CoA	Thermistor Coefficient A [4039] : -1,999.000 to 9,999.000
Cob	Thermistor Coefficient B [4040] : -1,999.000 to 9,999.000
CoC	Thermistor Coefficient C [4041] : -1,999.000 to 9,999.000
rr	Resistance Range [4037] : 5k, 10k, 20k, 40k
FiL	Filter [4014] : 0.0 to 60.0 seconds
iEr	Input Error Latching [4028] : Off, On
dEC	Display Precision [4020] : Whole, Tenths, Hundredths, Thousandths
iCA	Calibration Offset [4012] : -1,999.000 to 9,999.000
Ain	Analog Input Value [4001] : -1,999.000 to 9,999.000
iEr	Input Error [4002] : None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Not Sourced

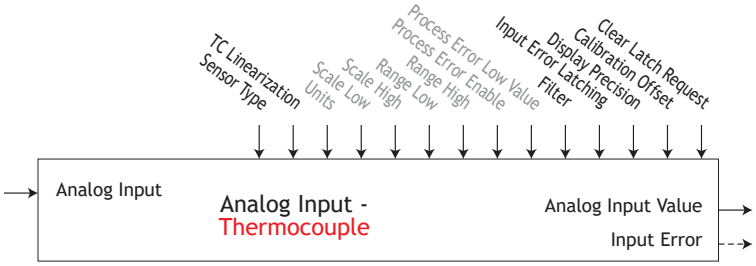
A i Analog Input Menu
oPEr Operations Page

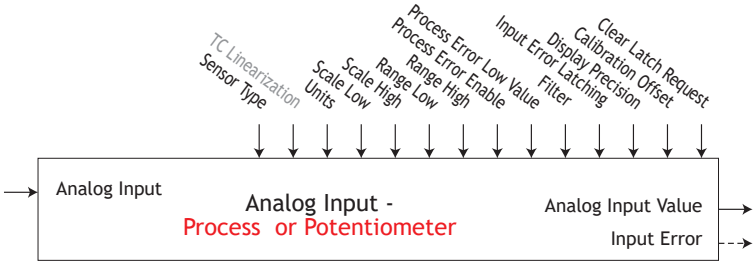
Ain	Analog Input Value [4001] : -1,999.000 to 9,999.000
iEr	Input Error [4002] : None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Not Sourced
iCA	Calibration Offset [4012] : -1,999.000 to 9,999.000

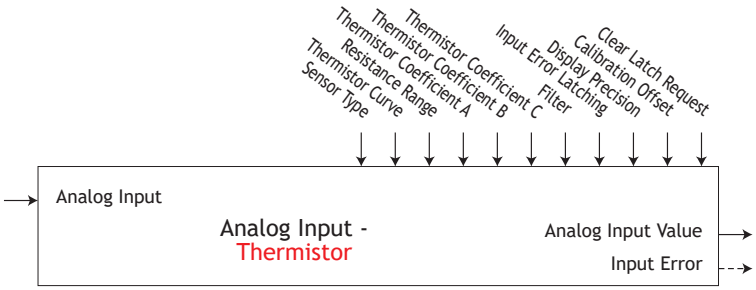
Clear Latch Request [4029] : Clear, Ignore

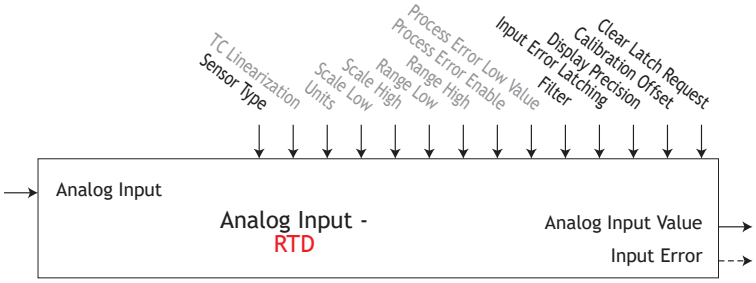
Analog Input (cont.)









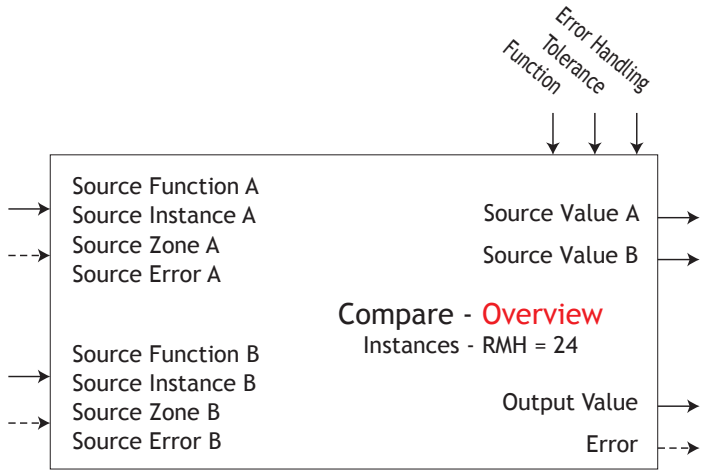


Compare Function

Use the compare function to compare two analog values (A and B) for a condition such as are they equal. If the compare condition is met, the output turns on.

The tolerance is expressed in the same units as Source A and Requires Source A and Source B to be without errors for function to work.

Error [28013] : None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Math Error, Not Sourced, Stale



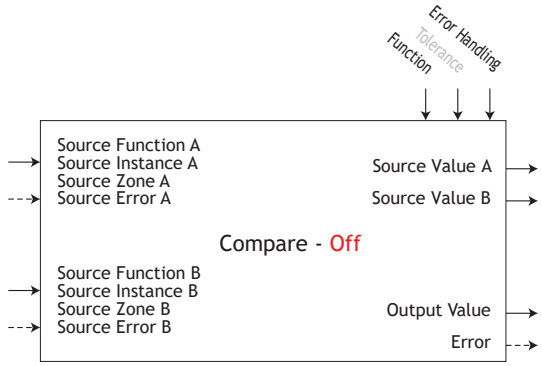
CPE Compare Menu
SEt Setup Page

	Parameter Name [Parameter ID] : Range or Choices
Fn	Function [28009] : Off, Greater Than, Less Than, Equal To, Not Equal To, Greater or Equal, Less or Equal
toL	Tolerance [28011] : 0.0 to 9,999.000 units or F
SFnA	Source Function A [28001] : None, Analog Input, Current, Cool Power, Heat Power, Power, Linearization, Math, Process Value, Set Point Closed, Set Point Open, Variable, Wattage, Load Voltage, Load Resistance
S iA	Source Instance A [28003] : 1 to 250
S2A	Source Zone A [28005] : 0 to 24
SFnb	Source Function B [28002] : None, Analog Input, Current, Cool Power, Heat Power, Power, Linearization, Math, Process Value, Set Point Closed, Set Point Open, Variable, Wattage, Load Voltage, Load Resistance
S ib	Source Instance B [28004] : 1 to 250
S2b	Source Zone B [28006] : 0 to 24
Erh	Error Handling [28012] : False Bad, False Good, True Bad, True Good

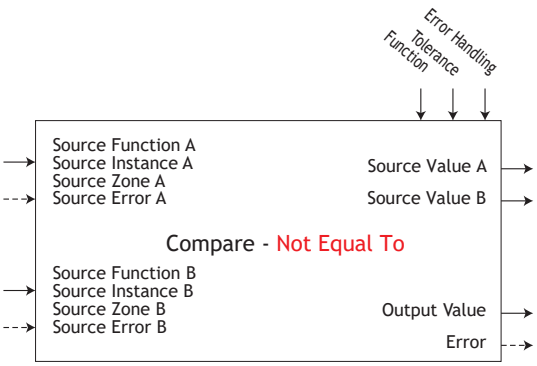
CPE Compare Menu
oPEr Operations Page

SuA	Source Value A [28007] : -1,999.000 to 9,999.000 units or F
Sub	Source Value B [28008] : -1,999.000 to 9,999.000 units or F
ou	Output Value [28010] : Off, On

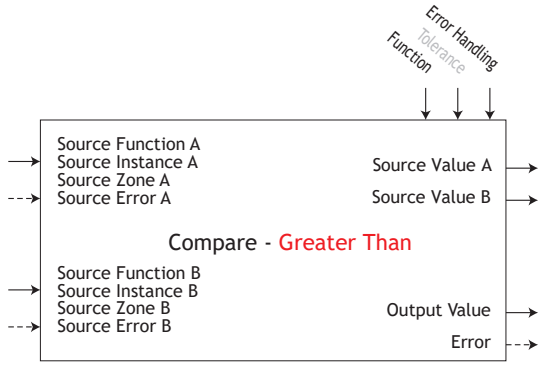
Compare (cont.)



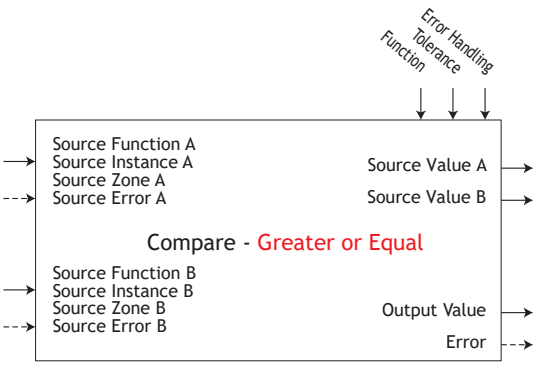
No Compare, Output Value = OFF



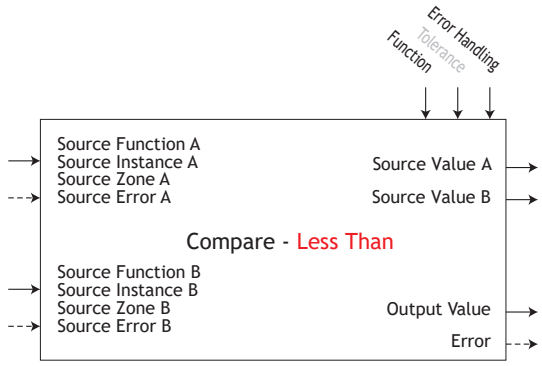
A not equal B, Output Value = ON



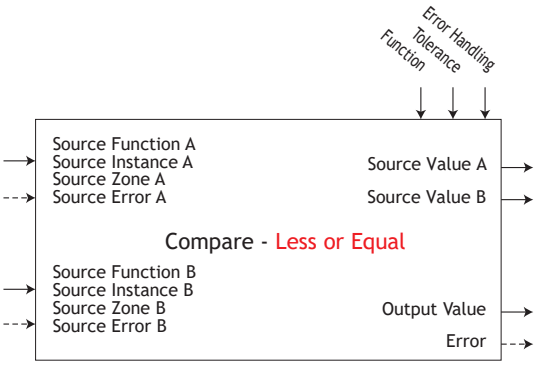
A>B, Output Value = ON



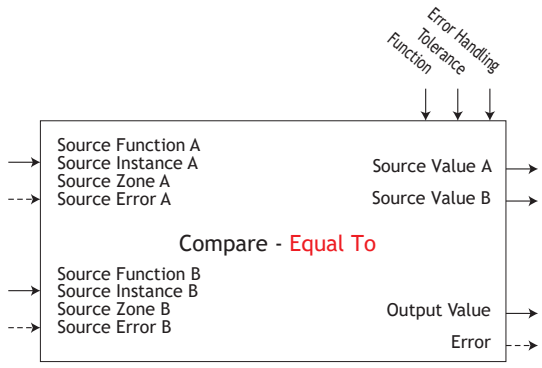
A>=B, Output Value = ON



A<B, Output Value = ON

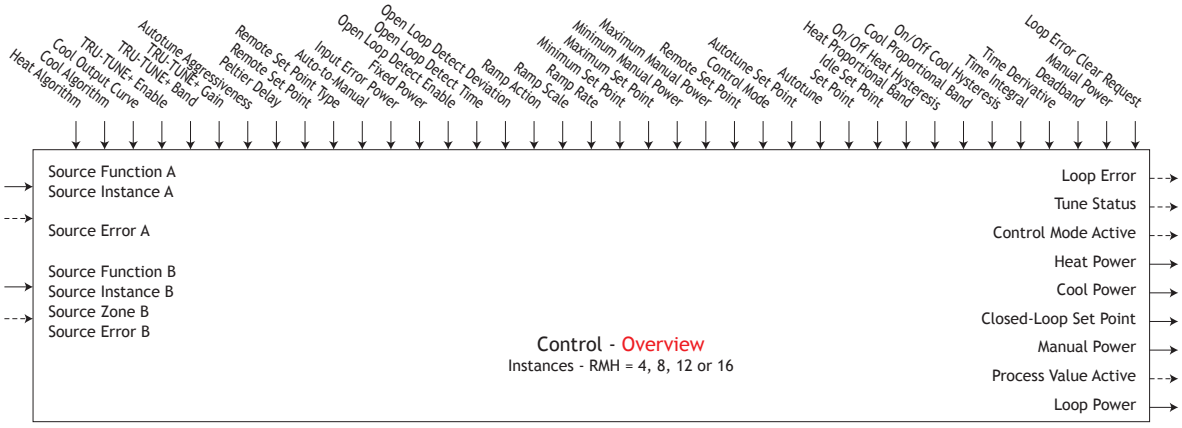


A<=B, Output Value = ON



A=B, Output Value = ON

Control Loop Function



LooP Loop Menu
SEt Setup Page

	Parameter Name [Parameter ID] : Range or Choices
SFnA	Source Function A [8050] :None, Process Value, Analog Input, Linearization, Math, Variable
iSA	Source Instance A [8021] : (not changeable)*
hAG	Heat Algorithm [8003] : Off, PID, On/Off
CAG	Cool Algorithm [8004] : Off, PID, On/Off
CCr	Cool Output Curve [8038] : Off, Non-linear curve 1, ...Non-linear curve 2
hPb	Heat Proportional Band [8009] : 0.001 to 9,999.000
hhY	On/Off Heat Hysteresis [8010] : 0.001 to 9,999.000
CPb	Cool Proportional Band [8012] : 0.001 to 9,999.000
ChY	On/Off Cool Hysteresis [8013] : 0.001 to 9,999.000
t i	Time Integral [8006] : 0 to 9,999 seconds
td	Time Derivative [8007] : 0 to 9,999 seconds
db	Deadband [8008] : -1,000.0 to 1,000.0
tEUn	TRU-TUNE+ Enable [8022] : No, Yes
tbnd	TRU-TUNE+ Band [8034] : 0 to 100
tGn	TRU-TUNE+ Gain [8035] : 1 to 6
AtSP	Autotune Set Point [8025] : 50 to 200 %
tAGr	Autotune Aggressiveness [8024] : Under, Critical, Over
PdL	Peltier Delay [8051] : 0.0 to 5.0
rEn	Remote Set Point [7021] : No, Yes
SFnb	Source Function B [7023] : None, Analog Input, Current, Cool Power, Heat Power, Power, Linearization, Math, Process Value, Set Point Closed, Set Point Open, Variable
S ib	Source Instance B [7024] : 1 to 250
S2b	Source Zone B [7026] : 0 to 24
rtY	Remote Set Point Type [7022] : Auto, Manual
UFA	Auto-to-Manual [7012] : Off, Bumpless Transfer, Fixed Power, User
FA iL	Input Error Power [7013] : Off, Bumpless Transfer, Fixed Power, User
nnAn	Fixed Power [7011] : -100.0 to 100.0 %
LdE	Open Loop Detect Enable [8039] : No, Yes
Ldt	Open Loop Detect Time [8040] : 0 to 3,600 seconds
Ldd	Open Loop Detect Deviation [8041] : -1,999.000 to 9,999.000
rP	Ramp Action [7014] : Off, Startup, Set Point, Both
rSC	Ramp Scale [7015] : Hours, Minutes
rrt	Ramp Rate [7017] : 0.000 to 9,999.000
LSP	Minimum Set Point [7003] : -1,999.000 to 9,999.000
hSP	Maximum Set Point [7004] : -1,999.000 to 9,999.000
CSP	Set Point [7001] : -1,999.000 to 9,999.000
idS	Idle Set Point [7009] : -1,999.000 to 9,999.000
SPLo	Minimum Manual Power [7005] : -100.0 to 100.0 %
SPhi	Maximum Manual Power [7006] : -100.0 to 100.0 %
oSP	Manual Power [7002] : -100.0 to 100.0 %
CMn	Control Mode [8001] : Off, Auto, Manual

nnon Monitor Menu
oPEr Operations Page

	Parameter Name [Parameter ID] : Range or Choices
iSA	Control Mode Active [8002] : Off, Auto, Manual
hAG	Heat Power [8011] : 0.0 to 100.0 %
CPr	Cool Power [8014] : 0.0 to 100.0 %
CSP	Closed-Loop Set Point [8026] : -1,999.000 to 9,999.000
PuA	Process Value Active [8031] : -1,999.000 to 9,999.000

LooP Loop Menu
oPEr Operations Page

rEn	Remote Set Point [7021] : No, Yes
CMn	Control Mode [8001] : Off, Auto, Manual
AtSP	Autotune Set Point [8025] : 50 to 200 %
Aut	Autotune [8026] : No, Yes
CSP	Set Point [7001] : -1,999.000 to 9,999.000
idS	Idle Set Point [7009] : -1,999.000 to 9,999.000
hPb	Heat Proportional Band [8009] : 0.001 to 9,999.000
hhY	On/Off Heat Hysteresis [8010] : 0.001 to 9,999.000
CPb	Cool Proportional Band [8012] : 0.001 to 9,999.000
ChY	On/Off Cool Hysteresis [8013] : 0.001 to 9,999.000
t i	Time Integral [8006] : 0 to 9,999 seconds
td	Time Derivative [8007] : 0 to 9,999 seconds
db	Deadband [8008] : -1,000.000 to 1,000.000
oSP	Manual Power [7002] : -100.0 to 100.0 %

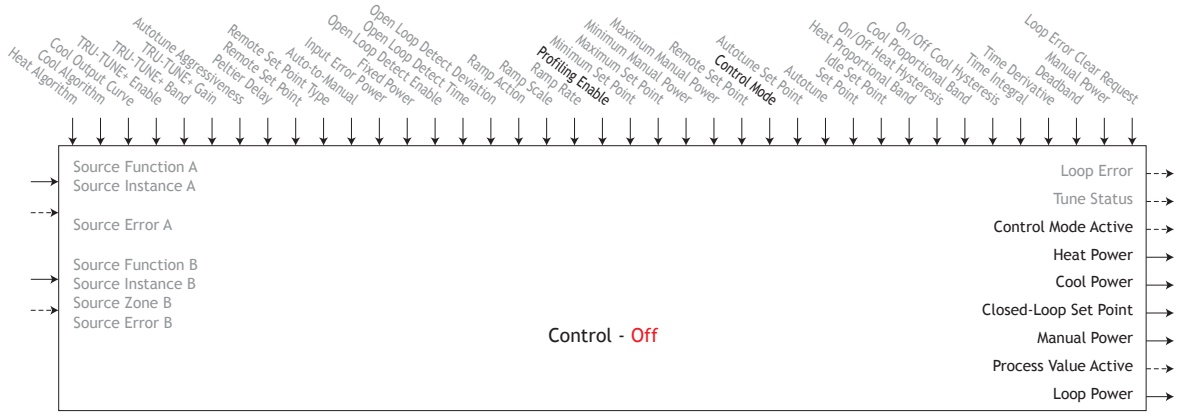
Loop Power [8033] : -100.0 to 100.0 %

Loop Error [8048]: None, Open Loop, Reversed Sensor

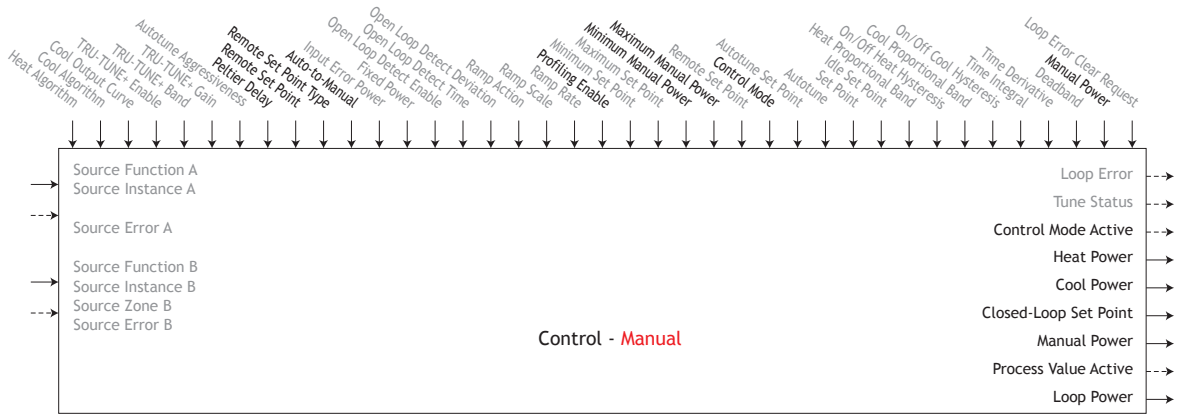
Clear Error [8049] : Ignore, Clear

Tune Status [8027] : 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

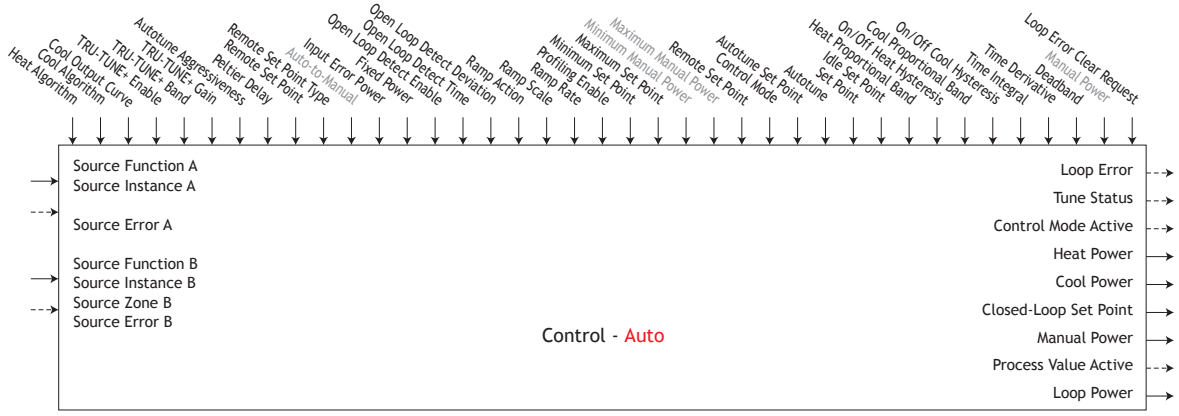
Control Loop (cont.)



If Control Mode = Off : Heat Power, Cool Power and Loop Power = 0%



If Control Mode = Manual :
Manual Power = user entered value
Heat Power, Cool Power and Loop Power = Manual Power

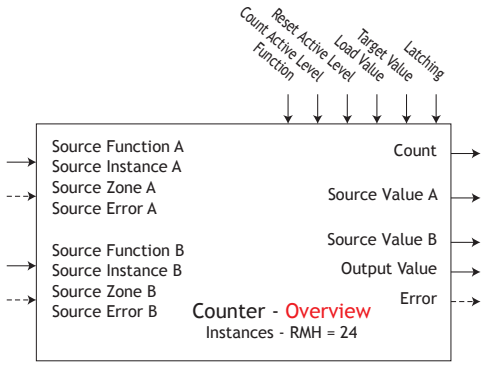


If Control Mode = Auto :
Set Point = user entered value
Heat Power, Cool Power and Loop Power = PID calculated power

Counter Function

Counters increment up or down from a preset value. When the count is equal to the target, the output value will be active.

- Function selects whether the counter increments or decrements the count value. Decrementing to 0 returns 9,999; incrementing to 9,999 returns 0.
- Source Function A selects which type of function increments the Count.
- Source Instance A and Source Zone A select which source to use.
- Count Active Level selects which state increments the Count.
- Source Function B selects which type of function resets the Count to the Load Value .
- Source Instance B and Source Zone B selects which source to use.
- Reset Active Level selects which state resets the Count.
- Load Value sets the counter's initial value. Count is set to this value each time the controller is powered up and each time the counter is reset.
- Target Value sets the value at which the output turns on.
- Latching sets the behavior for the output when Count exceeds the Target Value.
- Error [30016] : None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Math Error, Not Sourced, Stale



`CtR` Counter Menu
`SEt` Setup Page

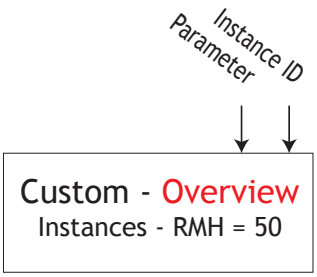
	Parameter Name [Parameter ID] : Range or Choices
`Fn`	Function [30009] : Up, Down
`SFnA`	Source Function A [30001] : None, Alarm, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Logic, Timer, Variable, Heater Error
`S iA`	Source Instance A [30003] : 1 to 250
`S2A`	Source Zone A [30005] : 0 to 24
`SASA`	Count Active Level [30011] : High, Low, Both
`SFnb`	Source Function B [30002] : None, Alarm, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Logic, Timer, Variable, Heater Error
`S ib`	Source Instance B [30004] : 1 to 250
`S2b`	Source Zone B [30006] : 0 to 24
`SASb`	Reset Active Level [30012] : High, Low, Both
`LoAd`	Load Value [30013] : 0 to 9,999
`trgt`	Target Value [30014] : 0 to 9,999
`LAt`	Latching [30017] : No, Yes

`CtR` Counter Menu
`oPEr` Operations Page

`Cnt`	Count [30015] : 0 to 9,999
`SuA`	Source Value A [30007] : Off, On
`Sub`	Source Value B [30008] : Off, On
`ou`	Output Value [30010] : Off, On

Custom Function

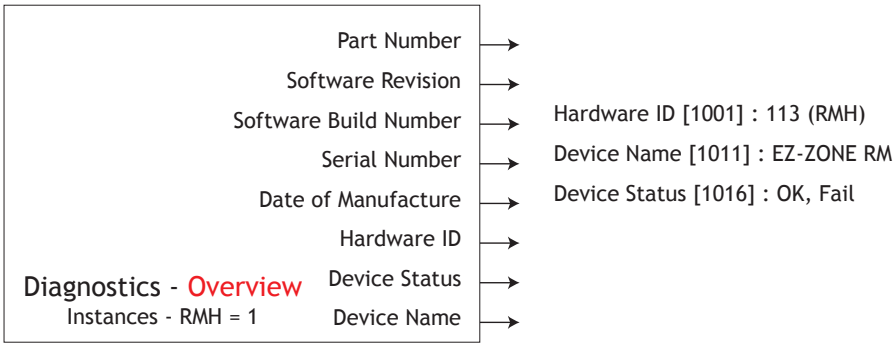
Use custom menu to set the user defined parameters to display at the Home Page of an RUI/ Gateway.



CUSt Custom Menu
FAct Factory Page

	Parameter Name [Parameter ID] : Range or Choices
PAr	Parameter [14005] : None, Process, Calibration Offset, Display Units, User Settings Restore, Alarm Low Set Point, Alarm High Set Point, Alarm Hysteresis, Set Point, Active Process Value, Active Set Point, Open-Loop Set Point, Autotune, Control Mode, Heat Power, Cool Power, Time Integral, Time Derivative, Dead band, Heat Proportional Band, Heat Hysteresis, Cool Proportional Band, Cool Hysteresis, Ramp Rate, TRU-TUNE+ Enable, Idle Set Point, Custom
iid	Instance ID [14003] : 1 to 16

Diagnostic Function



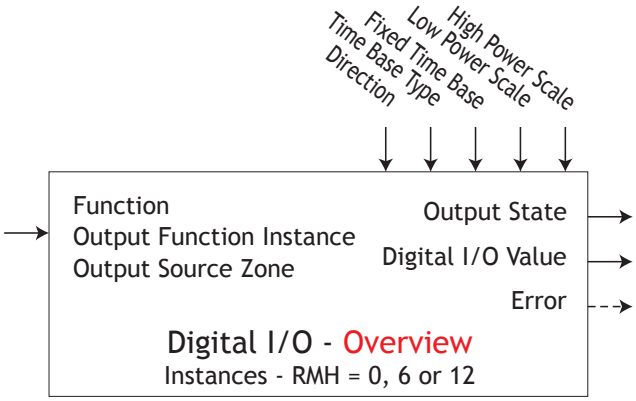
diAG Diagnostics Menu
FAct Factory Page

	Parameter Name [Parameter ID] : Range or Choices
Pn	Part Number [1009] :
rEv	Software Revision [1003] : 9.00, ...
SbLd	Software Build Number [1005] :
Sn	Serial Number [1007] : xxxxxx
dAtE	Date of Manufacture [1008] : YWW

Digital Input/Output Function

The Output Value is determined by Function connection and Direction.

- Error [6015] : None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail,Math Error, Not Sourced, Stale



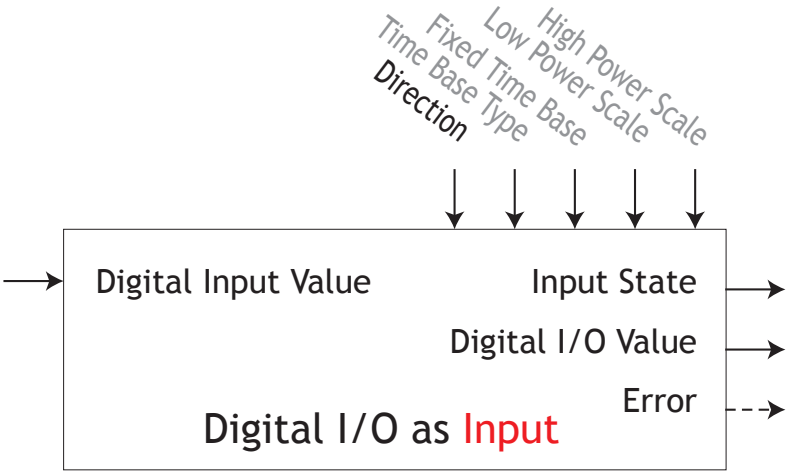
d io Digital I/O Menu
SEt Setup Page

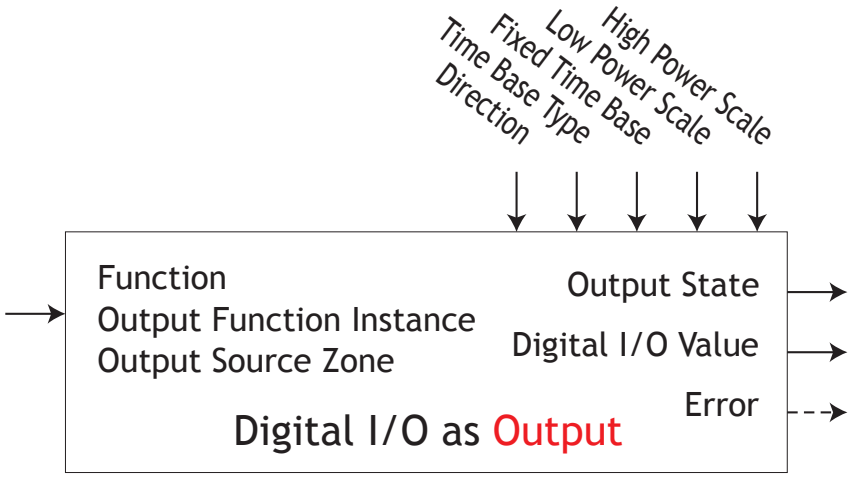
	Parameter Name [Parameter ID] : Range or Choices
dir	Direction [6001] : Output, Input Voltage, Input Dry Contact
Fn	Function [6005] : Off, Analog Input, Alarm, Cool Power, Heat Power, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Logic, Linearization, Math, Process Value, Special Function Output 1 to 4, Timer, Variable
F1	Output Function Instance [6006] : 1 to 24
S2A	Output Source Zone [6012] : 0 to 16
o.Ct	Time Base Type [6002] : Fixed Time Base, Variable Time Base
o.tb	Fixed Time Base [6003] : 0.1 to 60.0 seconds
o.Lo	Low Power Scale [6009] : 0.0 to 100.0 %
o.h1	High Power Scale [6010] : 0.0 to 100.0 %

d io Digital I/O Menu
oPEr Operations Page

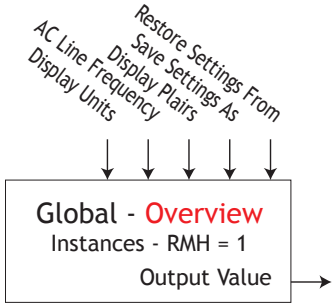
di.S	Input State [6011] : On, Off
do.S	Output State [6007] : On, Off

Digital Input/Output (cont.)





Global Function



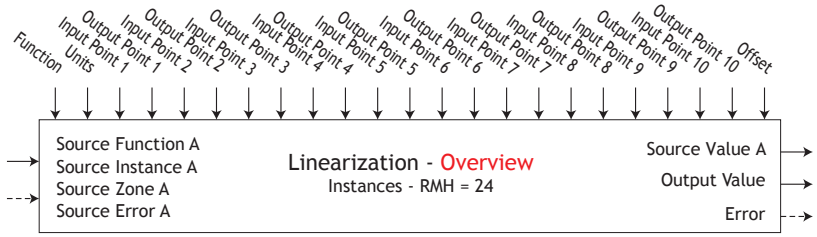
GLbL	Global Menu
SEt	Setup Page

	Parameter Name [Parameter ID] : Range or Choices
C_F	Display Units [3005] : F, C
ACLF	AC Line Frequency [1034] : 50 Hz, 60 Hz
dPrS	Display Pairs [3028] : 1 to 25
USr.S	Save Settings As [1014] : None, User Set 1
USr.r	Restore Settings From [1013] : None, User Set 1, Factory

Linearization Function

This function will take an analog Source A and re-linearize using a 10-point offset, then add Offset and produce an Output Value.

- Error [34028]: None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Math Error, Not Sourced, Stale



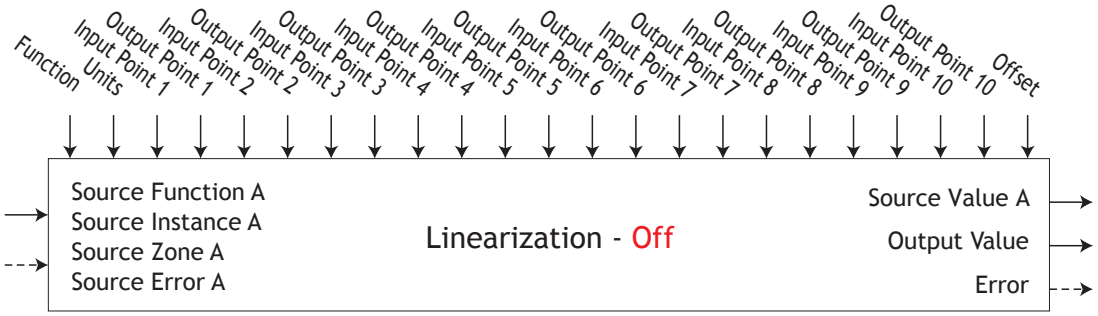
Lnr Linearization Menu
SEt Setup Page

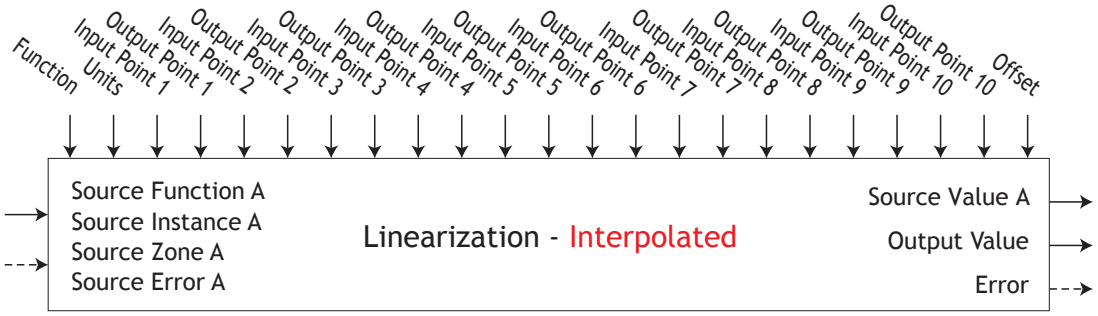
	Parameter Name [Parameter ID] : Range or Choices
Fn	Function [34005] : Off, Interpolated, Stepped
SFnA	Source Function A [34001] : None, Analog Input, Current, Cool Power, Heat Power, Power, Linearization, Math, Process Value, Set Point Closed, Set Point Open, Variable
S iA	Source Instance A [34002] : 1 to 24
S2A	Source Zone A [34003] : 0 to 16
Un it	Units [34029] : Source, None, Absolute Temperature, Relative Temperature, Power, Process, Relative Humidity
iP.1	Input Point 1 [34008] : -1,999.000 to 9,999.000
oP.1	Output Point 1 [34018] : -1,999.000 to 9,999.000
iP.2	Input Point 2 [34009] : -1,999.000 to 9,999.000
oP.2	Output Point 2 [34019] : -1,999.000 to 9,999.000
iP.3	Input Point 3 [34010] : -1,999.000 to 9,999.000
oP.3	Output Point 3 [34020] : -1,999.000 to 9,999.000
iP.4	Input Point 4 [34011] : -1,999.000 to 9,999.000
oP.4	Output Point 4 [34021] : -1,999.000 to 9,999.000
iP.5	Input Point 5 [34012] : -1,999.000 to 9,999.000
oP.5	Output Point 5 [34022] : -1,999.000 to 9,999.000
iP.6	Input Point 6 [34013] : -1,999.000 to 9,999.000
oP.6	Output Point 6 [34023] : -1,999.000 to 9,999.000
iP.7	Input Point 7 [34014] : -1,999.000 to 9,999.000
oP.7	Output Point 7 [34024] : -1,999.000 to 9,999.000
iP.8	Input Point 8 [34015] : -1,999.000 to 9,999.000
oP.8	Output Point 8 [34025] : -1,999.000 to 9,999.000
iP.9	Input Point 9 [34016] : -1,999.000 to 9,999.000
oP.9	Output Point 9 [34026] : -1,999.000 to 9,999.000
iP.10	Input Point 10 [34017] : -1,999.000 to 9,999.000
iP.10	Output Point 10 [34027] : -1,999.000 to 9,999.000

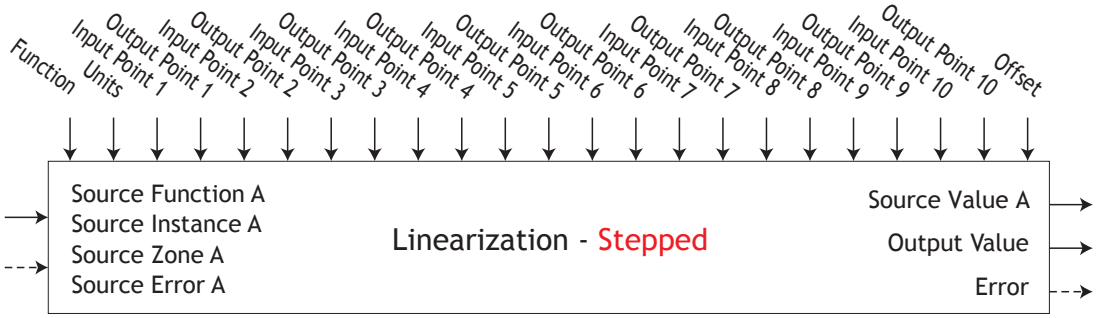
Lnr Linearization Menu
oPEr Operations Page

SuA	Source Value A [34004] : -1,999.000 to 9,999.000
oFSt	Offset [34006] : -1,999.000 to 9,999.000
ou	Output Value [34007] : -1,999.000 to 9,999.000

Linearization (cont.)

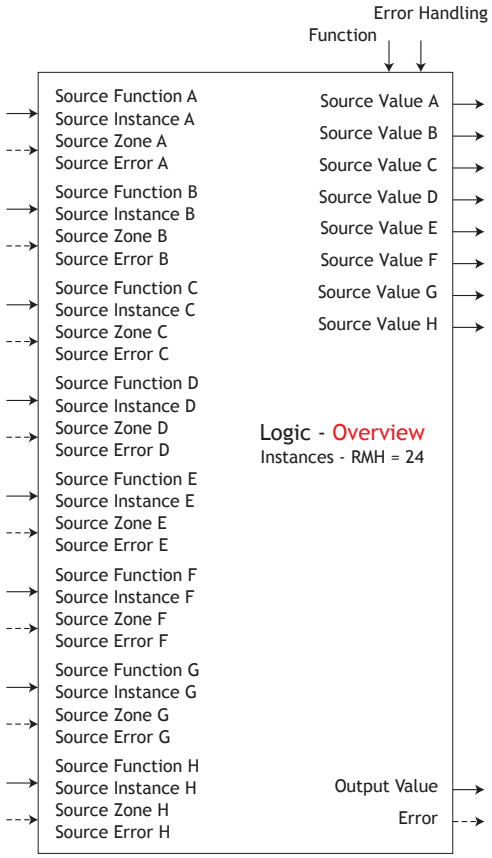






Logic Function

- Error [27036] : None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Math Error, Not Sourced, Stale



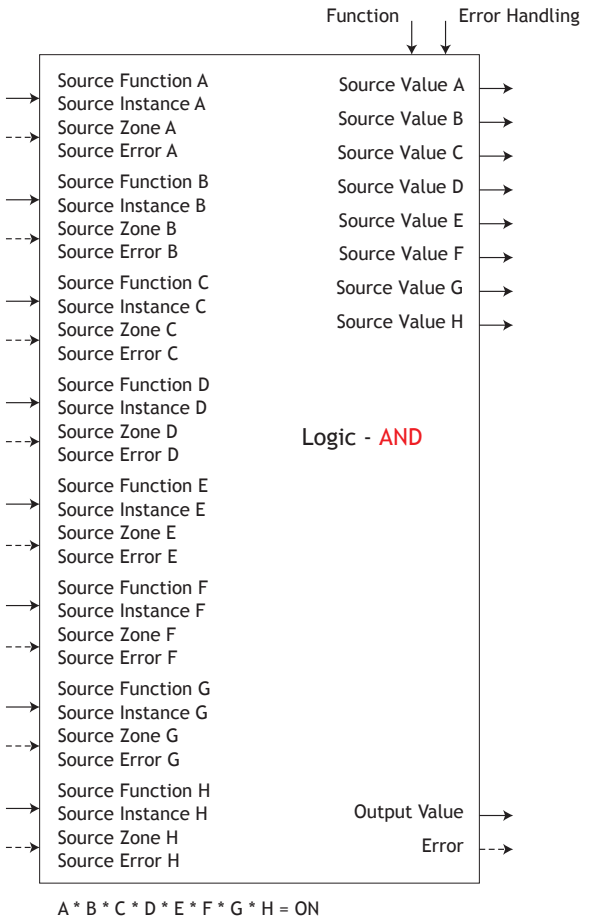
LGC Logic Menu
SEt Setup Page

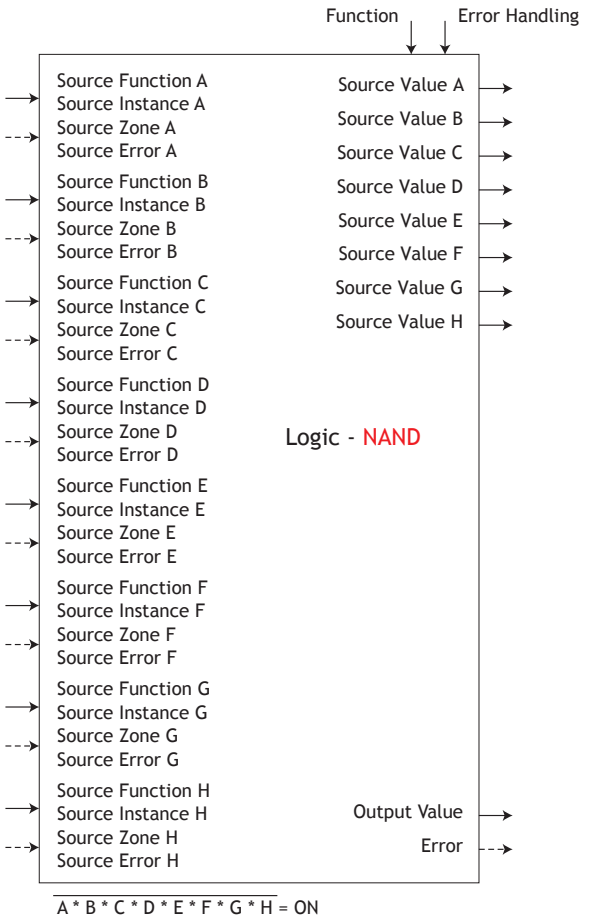
	Parameter Name [Parameter ID] : Range or Choices
Fn	Function [27033] : Off, AND, OR, Equal To, NAND, NOR, Not Equal To, Latch, RS FlipFlop
SFnA	Source Function A [27001] : None, Alarm, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Limit, Logic, Special Function Output 1 to 4, Timer, Variable, Heater Error
SiA	Source Instance A [27009] : 1 to 250
S2A	Source Zone A [27017] : 0 to 24
SFnb	Source Function B [27002] : None, Alarm, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Limit, Logic, Special Function Output 1 to 4, Timer, Variable, Heater Error
Sib	Source Instance B [27010] : 1 to 250
S2b	Source Zone B [27018] : 0 to 24
SFnC	Source Function C [27003] : None, Alarm, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Limit, Logic, Special Function Output 1 to 4, Timer, Variable, Heater Error
SiC	Source Instance C [27011] : 1 to 250
S2C	Source Zone C [27019] : 0 to 24
SFnd	Source Function D [27004] : None, Alarm, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Limit, Logic, Special Function Output 1 to 4, Timer, Variable, Heater Error
Sid	Source Instance D [27012] : 1 to 250
S2d	Source Zone D [27020] : 0 to 24
SFnE	Source Function E [27005] : None, Alarm, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Limit, Logic, Special Function Output 1 to 4, Timer, Variable, Heater Error
SiE	Source Instance E [27013] : 1 to 250
S2E	Source Zone E [27021] : 0 to 24
SFnF	Source Function F [27006] : None, Alarm, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Limit, Logic, Special Function Output 1 to 4, Timer, Variable, Heater Error
SiF	Source Instance F [27014] : 1 to 250
S2F	Source Zone F [27022] : 0 to 24
SFnG	Source Function G [27007] : None, Alarm, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Limit, Logic, Special Function Output 1 to 4, Timer, Variable, Heater Error
SiG	Source Instance G [27015] : 1 to 250
S2G	Source Zone G [27023] : 0 to 250
SFnh	Source Function H [27008] : None, Alarm, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Limit, Logic, Special Function Output 1 to 4, Timer, Variable, Heater Error
Sih	Source Instance H [27016] : 1 to 250
S2h	Source Zone H [27024] : 0 to 24
Erh	Error Handling [27035] : True Good, True Bad, False Good, False Bad

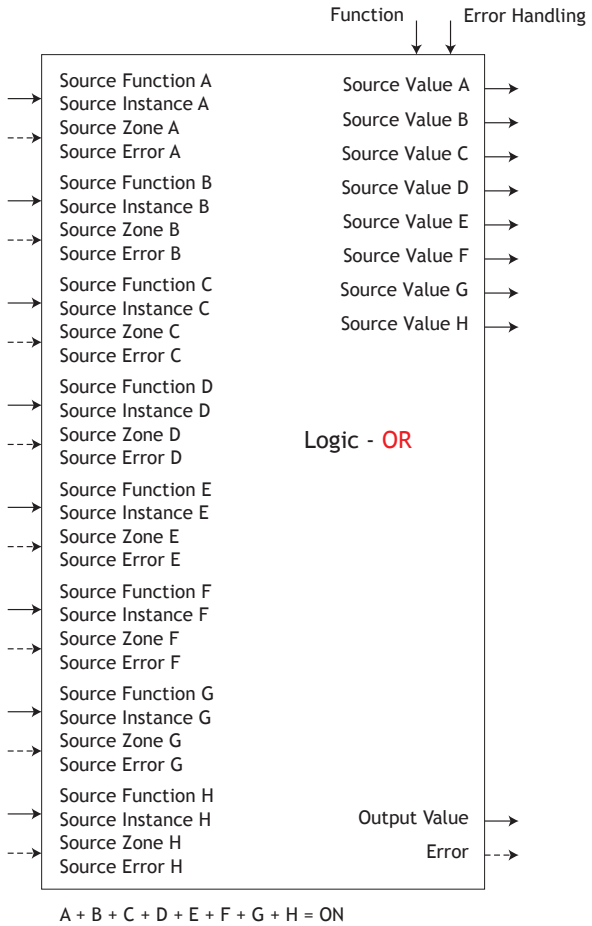
LGC Logic Menu
oPEr Operations Page

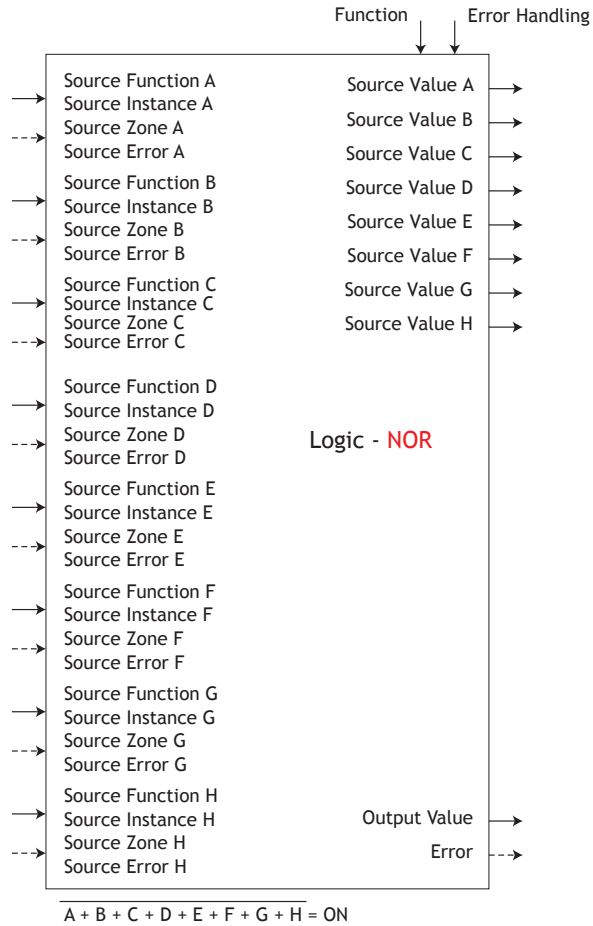
SuA	Source Value A [27025] : Off, On
Sub	Source Value B [27026] : Off, On
SuC	Source Value C [27027] : Off, On
Sud	Source Value D [27028] : Off, On
SuE	Source Value E [27029] : Off, On
SuF	Source Value F [27030] : Off, On
SuG	Source Value G [27031] : Off, On
Suh	Source Value H [27032] : Off, On
ou	Output Value [27034] : Off, On

Logic (cont.)

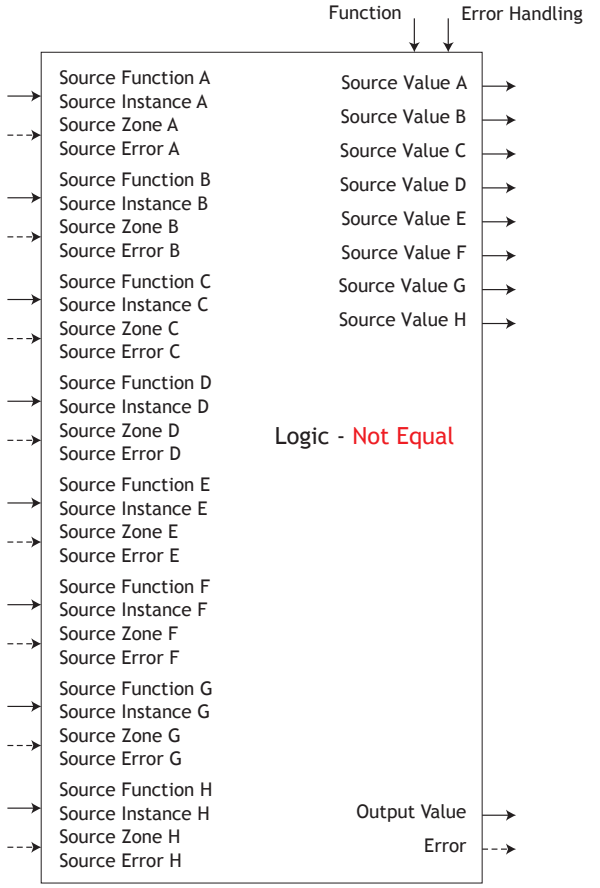

Function
Error Handling
Source Function A
Source Instance A
Source Zone A
Source Error A
Source Function B
Source Instance B
Source Zone B
Source Error B
Source Function C
Source Instance C
Source Zone C
Source Error C
Source Function D
Source Instance D
Source Zone D
Source Error D
Source Function E
Source Instance E
Source Zone E
Source Error E
Source Function F
Source Instance F
Source Zone F
Source Error F
Source Function G
Source Instance G
Source Zone G
Source Error G
Source Function H
Source Instance H
Source Zone H
Source Error H
Source Value A
Source Value B
Source Value C
Source Value D
Source Value E
Source Value F
Source Value G
Source Value H
Logic - AND
Output Value
Error
A * B * C * D * E * F * G * H = ON


Function
Error Handling
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
Source Function F
Source Instance F
Source Zone F
Source Error F
Source Function G
Source Instance G
Source Zone G
Source Error G
Source Function H
Source Instance H
Source Zone H
Source Error H
Source Value A
Source Value B
Source Value C
Source Value D
Source Value E
Source Value F
Source Value G
Source Value H
Logic - NAND
Output Value
Error
$\overline{A * B * C * D * E * F * G * H}$ = ON

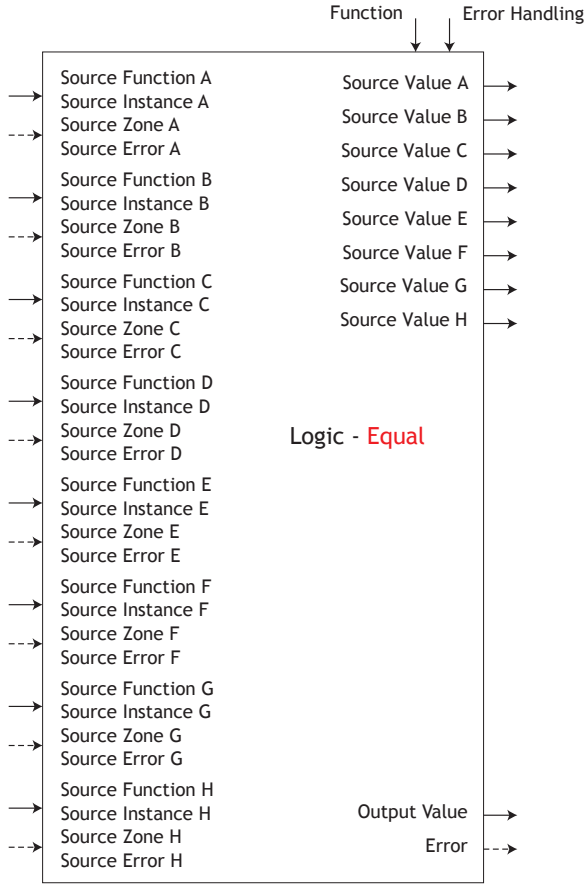

Function
Error Handling
Source Function A
Source Instance A
Source Zone A
Source Error A
Source Function B
Source Instance B
Source Zone B
Source Error B
Source Function C
Source Instance C
Source Zone C
Source Error C
Source Function D
Source Instance D
Source Zone D
Source Error D
Source Function E
Source Instance E
Source Zone E
Source Error E
Source Function F
Source Instance F
Source Zone F
Source Error F
Source Function G
Source Instance G
Source Zone G
Source Error G
Source Function H
Source Instance H
Source Zone H
Source Error H
Source Value A
Source Value B
Source Value C
Source Value D
Source Value E
Source Value F
Source Value G
Source Value H
Logic - OR
Output Value
Error
A + B + C + D + E + F + G + H = ON


Function
Error Handling
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
Source Function F
Source Instance F
Source Zone F
Source Error F
Source Function G
Source Instance G
Source Zone G
Source Error G
Source Function H
Source Instance H
Source Zone H
Source Error H
Source Value A
Source Value B
Source Value C
Source Value D
Source Value E
Source Value F
Source Value G
Source Value H
Logic - NOR
Output Value
Error
$\overline{A + B + C + D + E + F + G + H}$ = ON

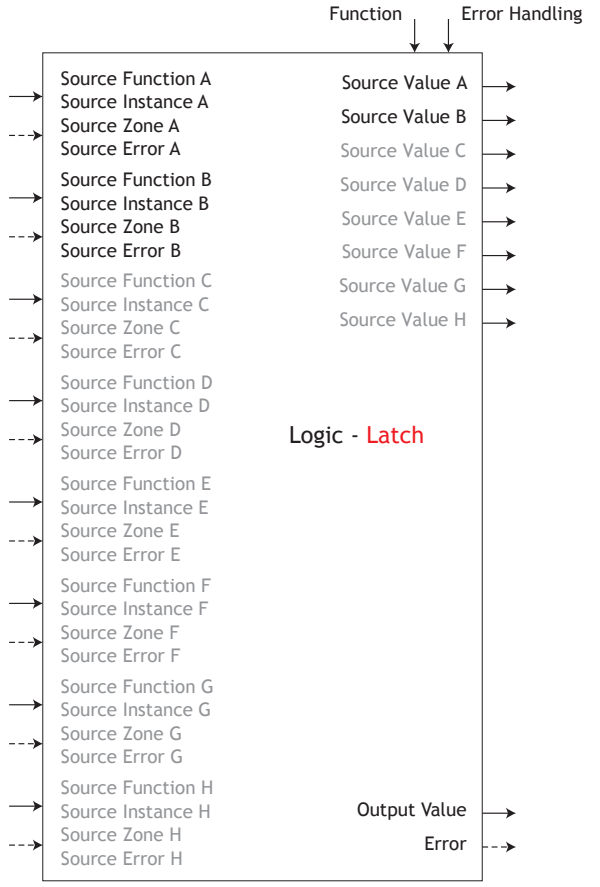
Logic (cont.)



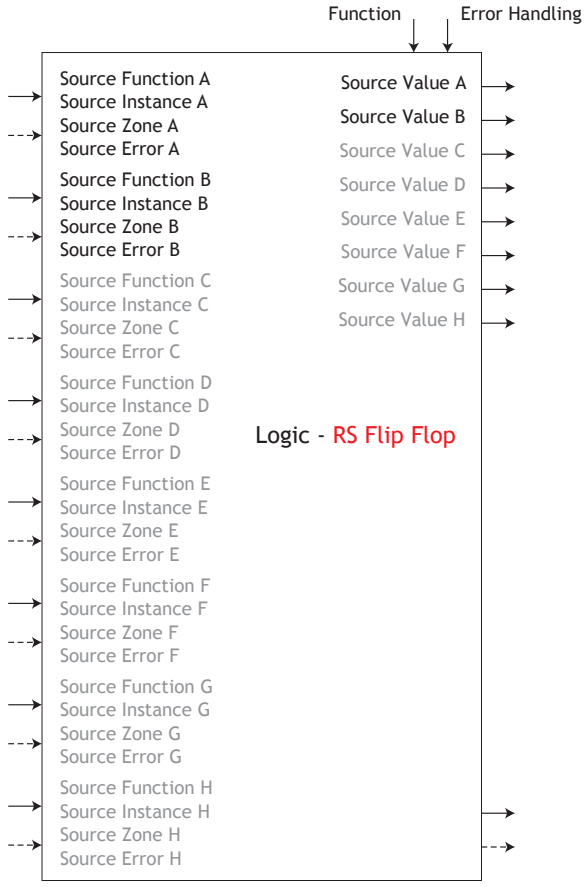
If A ≠ B ≠ C ≠ D ≠ E ≠ F ≠ G ≠ H then ON



If A = B = C = D = E = F = G = H then ON

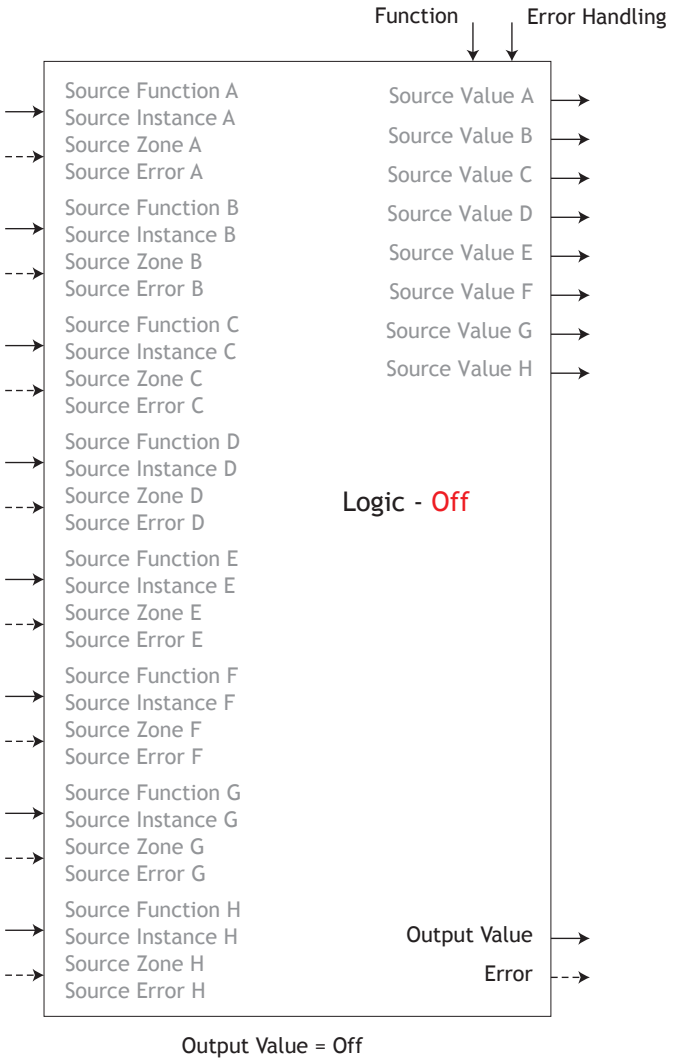


Output Value follows A, unless B = ON
Latch Output while B = ON



A Sets Output Value ON, B Resets Output Value OFF

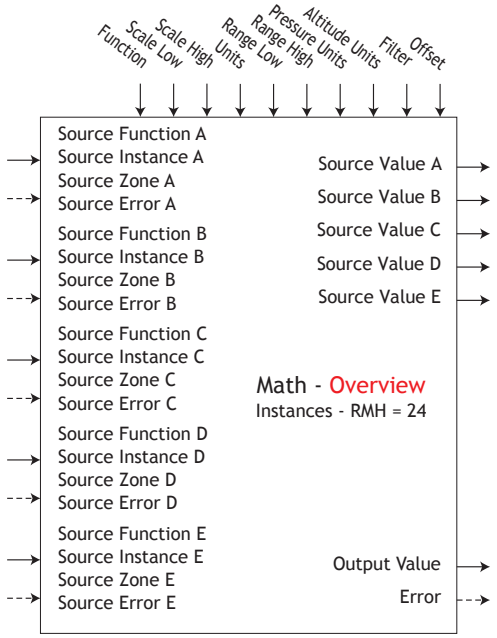
Logic (cont.)


Function
Error Handling
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
Source Function F
Source Instance F
Source Zone F
Source Error F
Source Function G
Source Instance G
Source Zone G
Source Error G
Source Function H
Source Instance H
Source Zone H
Source Error H
Source Value A
Source Value B
Source Value C
Source Value D
Source Value E
Source Value F
Source Value G
Source Value H
Logic - Off
Output Value
Error
Output Value = Off

Math Function

The Math 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 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.

- Error [25029]: None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Math Error, Not Sourced, Stale



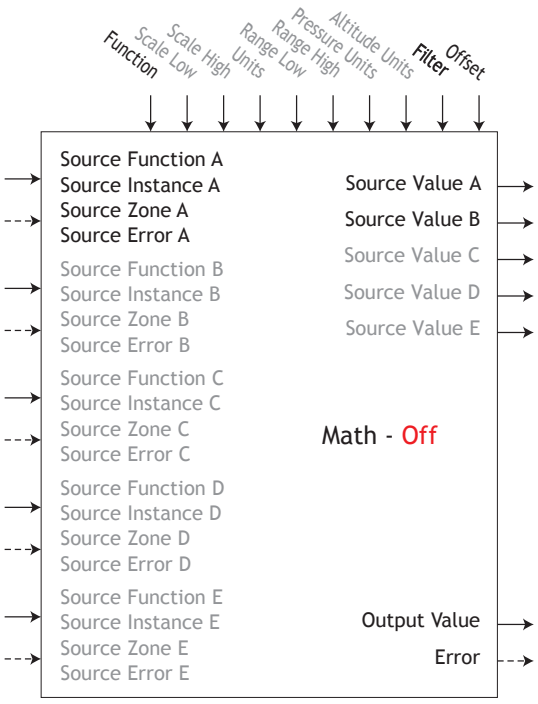
	Parameter Name [Parameter ID] : Range or Choices
Fn	Function [25021] : Off, Average, Process Scale, Deviation Scale, Switch Over, Differential, Ratio, Add, Multiply, Absolute Difference, Minimum, Maximum, Square Root, Sample and Hold, Pressure to Altitude, Dewpoint
SFnA	Source Function A [25001] : None, Analog Input, Current, Cool Power, Heat Power, Power, Linearization, Math, Process Value, Set Point Closed, Set Point Open, Variable, Wattage, Load Voltage, Load Resistance
S iA	Source Instance A [25006] : 1 to 250
S2A	Source Zone A [25011] : 0 to 24
SFnb	Source Function B [25005] : None, Analog Input, Current, Cool Power, Heat Power, Power, Linearization, Math, Process Value, Set Point Closed, Set Point Open, Variable, Wattage, Load Voltage, Load Resistance
S ib	Source Instance B [25007] : 1 to 250
S2b	Source Zone B [25012] : 0 to 24
SFnC	Source Function C [25003] : None, Analog Input, Current, Cool Power, Heat Power, Power, Linearization, Math, Process Value, Set Point Closed, Set Point Open, Variable, Wattage, Load Voltage, Load Resistance
S iC	Source Instance C [25008] : 1 to 250
S2C	Source Zone C [25013] : 0 to 24
SFnd	Source Function D [25004] : None, Analog Input, Current, Cool Power, Heat Power, Power, Linearization, Math, Process Value, Set Point Closed, Set Point Open, Variable, Wattage, Load Voltage, Load Resistance
S id	Source Instance D [25009] : 1 to 250
S2d	Source Zone D [25014] : 0 to 24
SFnE	Source Function E [25005] : None, Alarm, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Logic, Timer, Variable
S iE	Source Instance E [25010] : 1 to 250
S2E	Source Zone E [25015] : 0 to 24
SLo	Scale Low [25024] : -1,999.0 to 9,999.0
Sh i	Scale High [25025] : -1,999.0 to 9,999.0
Unit	Unit [25032] Source, None, Absolute Temperature, Relative Temperature, Power, Process, Relative Humidity
rLo	Range Low [25026] : -1,999.0 to 9,999.0
rh i	Range High [25027] : -1,999.0 to 9,999.0
Punt	Pressure Units [25030] : PSI, Torr, mBar, Atmosphere, Pascal
Aunt	Altitude Units [25031] : Feet, Kilofeet
F iL	Filter [25028] : 0.0 to 60.0 seconds

MATH Math Menu
SEt Setup Page

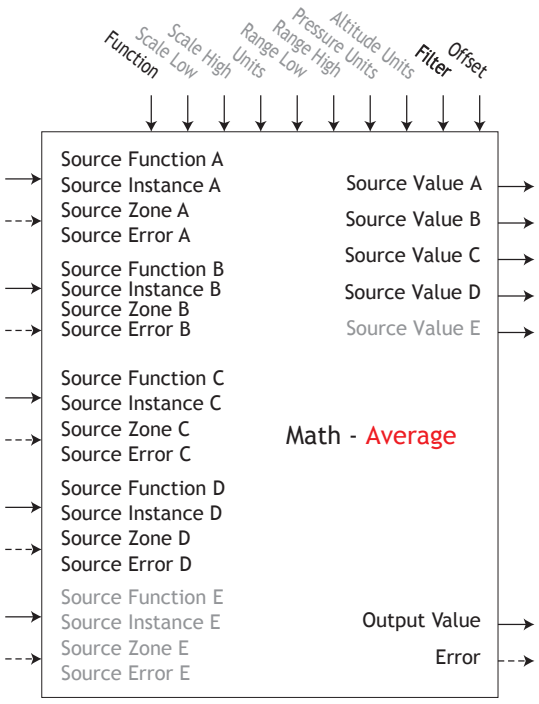
SuA	Source Value A [25016] : -1,999.000 to 9,999.000
Sub	Source Value B [25017] : -1,999.000 to 9,999.000
SuC	Source Value C [25018] : -1,999.000 to 9,999.000
Sud	Source Value D [25019] : -1,999.000 to 9,999.000
SuE	Source Value E [25020] : Off, On
ou	Output Value [25022] : -1,999.000 to 9,999.000
oFSt	Offset [25023] : -1,999.000 to 9,999.000

MATH Math Menu
oPEr Operations Page

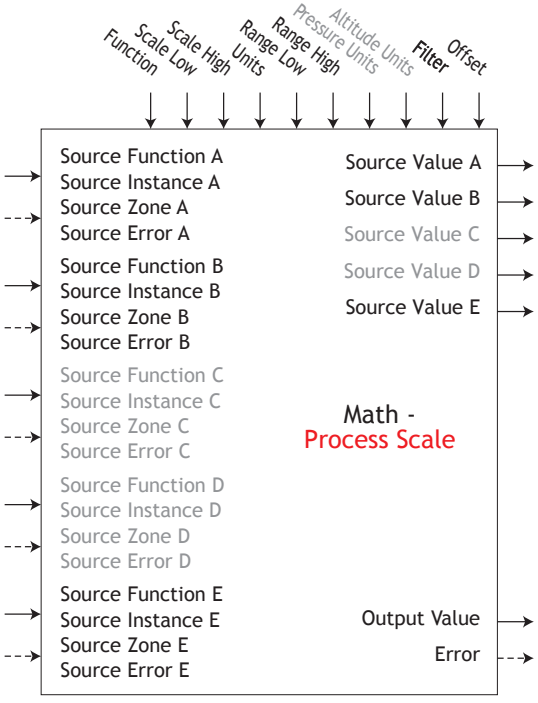
Math (cont.)



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

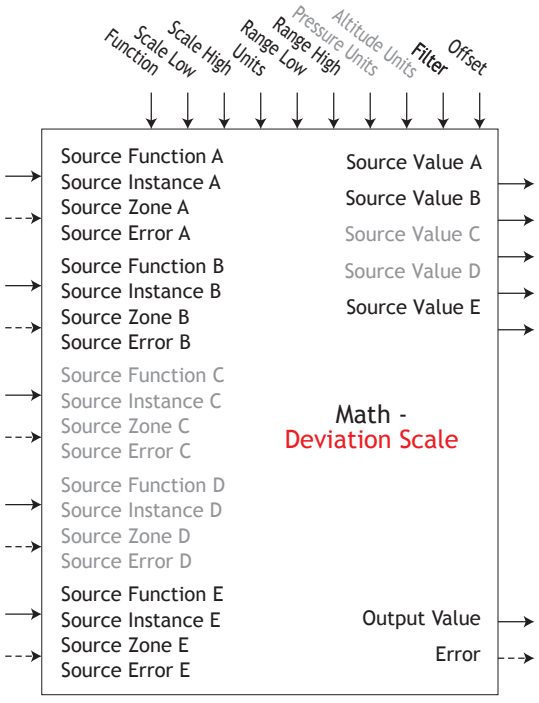


Output Value = Filter [(Average (A + B + C + D)) + Offset]
Display units follows the last source that is temperature else follow Source A



If B = OFF, Output Value = Filter [(Range High - Range Low) / (Scale High - Scale Low) * (A - Scale Low) + Range Low + Offset]
If B = ON, Output Value = Filter [B + Offset]

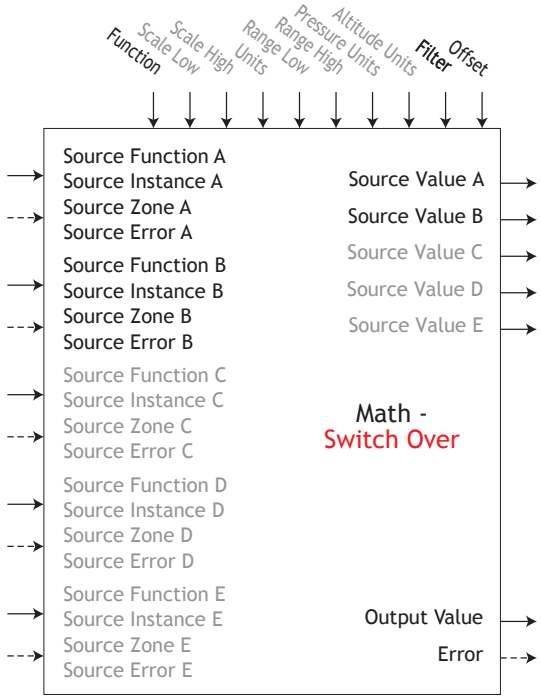
Scale Low/High and Range Low/High follows Source A display units when Units is set to Source, else follow Units setting.



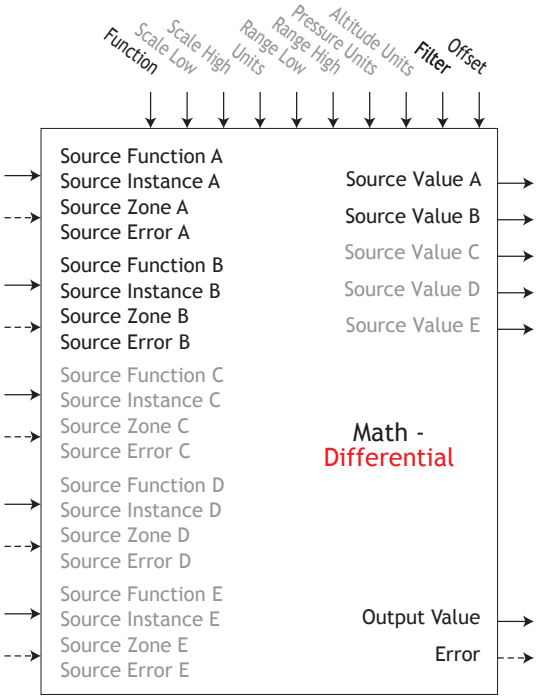
If B = OFF, Output Value = Filter [((Range High - Range Low) / (Scale High - Scale Low)) * (A - Scale Low) + Range Low + B + Offset]
If B = ON, Output Value = Filter [B + Offset]

Scale Low/High and Range Low/High follows Source A display units when Units is set to Source, else follow Units setting.

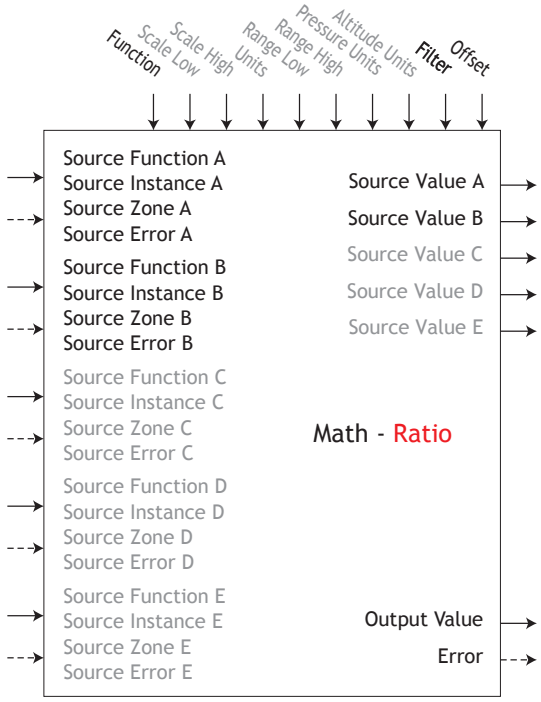
Math (cont.)



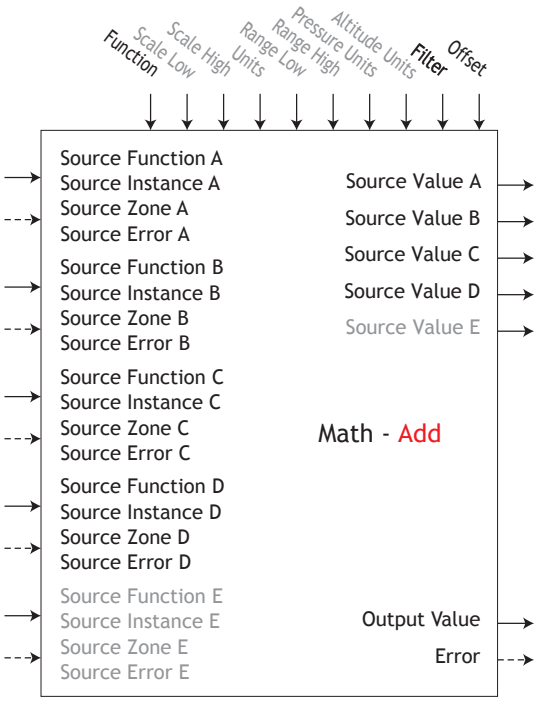
If B = OFF, Output Value = Filter [A + Offset]
If B = ON, Output Value = Filter [B + Offset]
Display units follows active source.



Output Value = Filter [(A - B) + Offset]
Display units follows Source A plus relative Source B

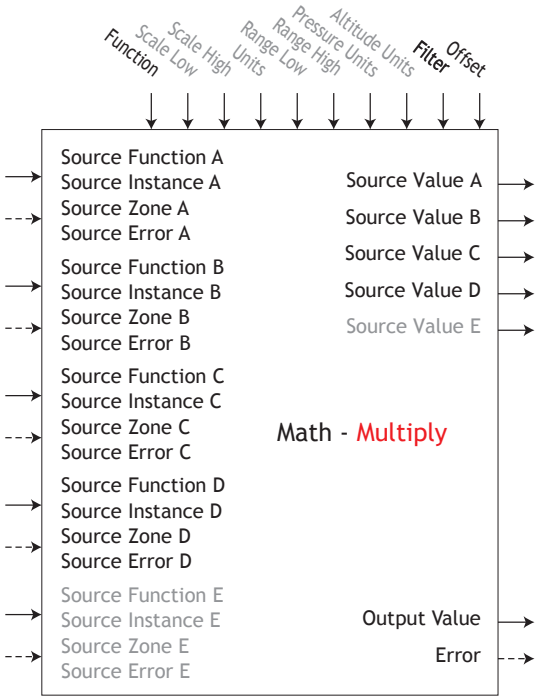


Output Value = Filter [(A / B) + Offset]
If display units of Source A = Source B, no display units on output value, else follow Source A

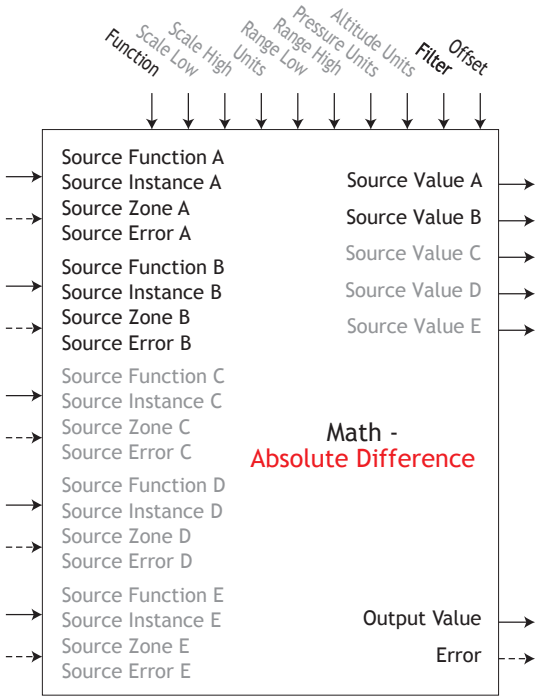


Output Value = Filter [(A + B + C + D) + Offset]
Display units follows last temperature source else follow Source A

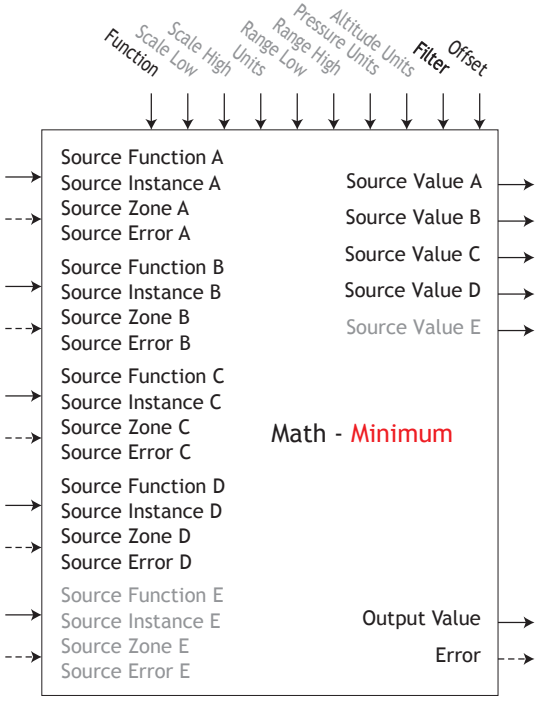
Math (cont.)



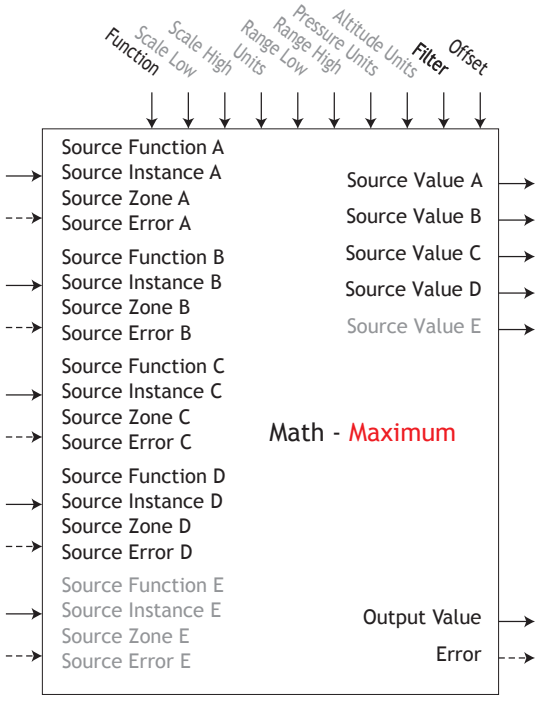
Output Value = Filter [(A * B * C * D) + Offset]
Display units follows last temperature source else follow Source A



Output Value = Filter [| A - B | + Offset]
Display units follow Source A plus relative Source B

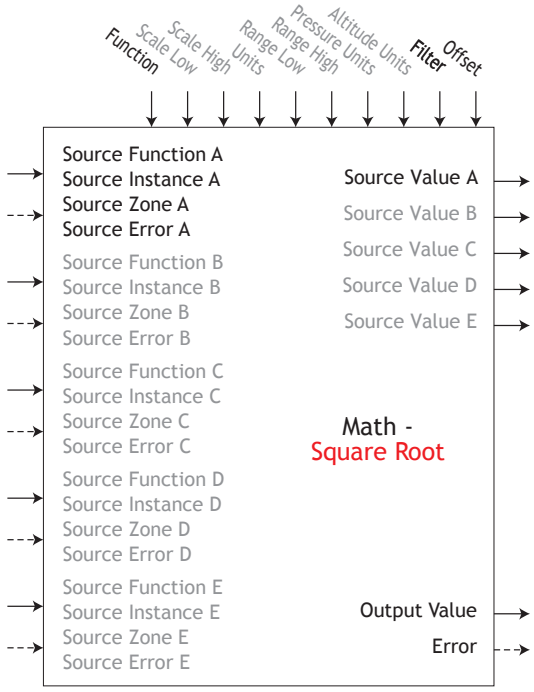


Output Value = Filter [Minimum Value (A : B : C : D) + Offset]
Display units follows Source with minimum value.

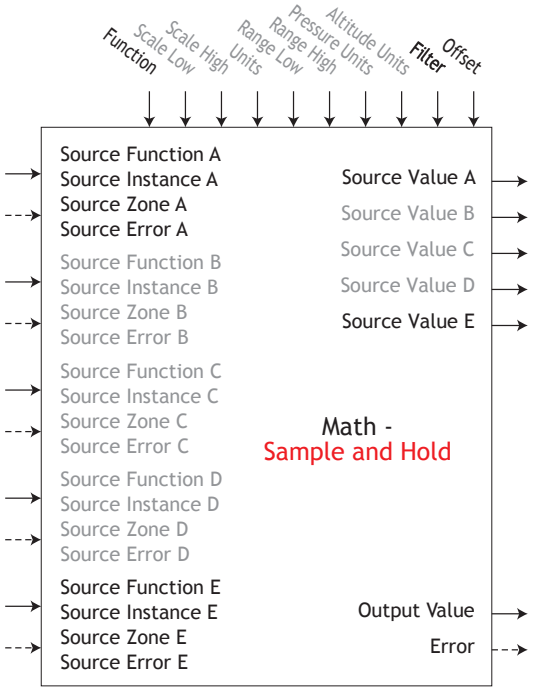


Output Value = Filter [Maximum Value (A : B : C : D) + Offset]
Display units follows Source with maximum value.

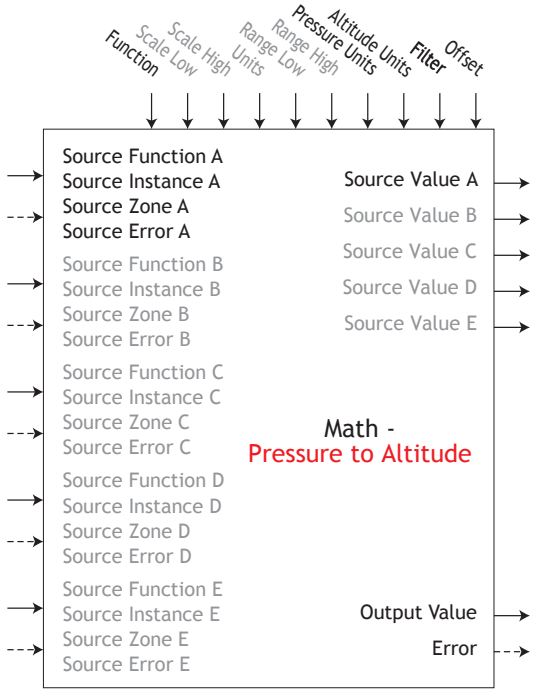
Math (cont.)



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

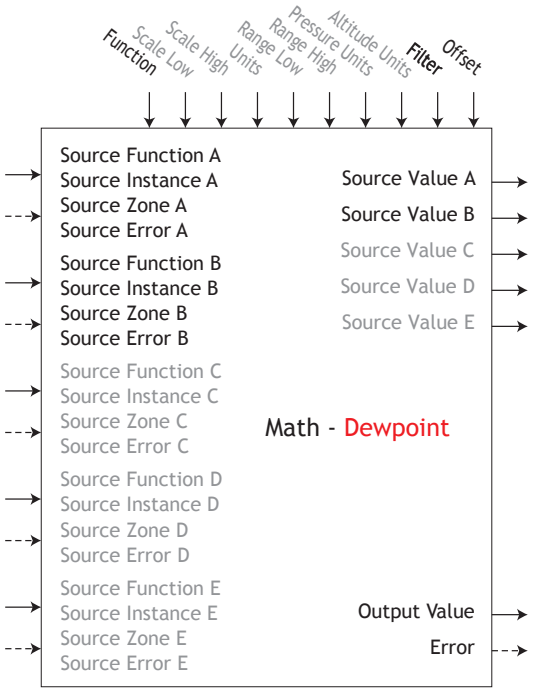


If E = OFF, Output Value = Filter [A + Offset]
If E = ON, Output Value = Filter [last value of A + Offset]
Display units follows Source A



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. 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.



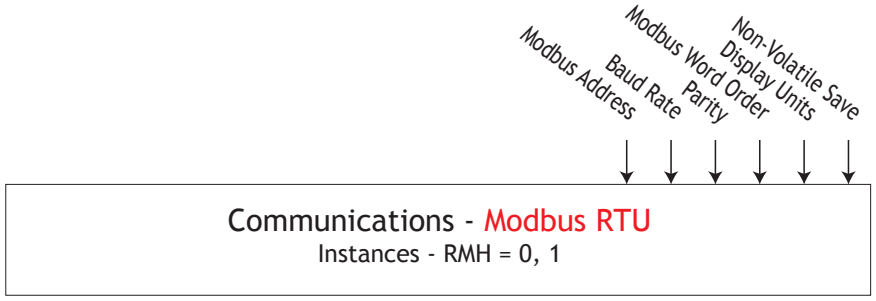
Output Value = Filter [427.26 * (CP * B / 8.8618) / (17.27- (CP * B / 8.8618)) + 32 + Offset]

Source A is used for Calculated Pressure or CP ;

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.

Modbus® Function

Configure the Modbus RTU serial communication settings using these parameters.



	Parameter Name [Parameter ID] : Range or Choices
bAUd	Baud Rate [17002] : 19600, 19200, 38400
PAr	Parity [17003] : None, Even, Odd
MWhL	Modbus Word Order [17043] : Word Low High, Word High Low
C_F	Display Units [17050] : F, C
nUS	Non-Volatile Save [17051] : No, Yes

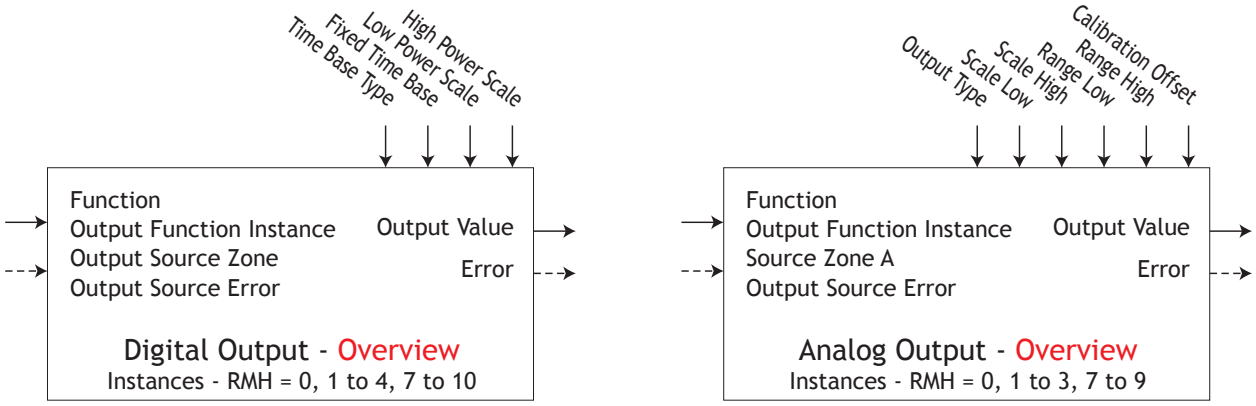
Output Function

This function configures and connects physical outputs to internal functions.

Note:

Digital Outputs not included on these sheets

- Output Value [18019] : 0 to 10.0 volts or 0 to 20.00 milliamperes
- Output Value [6011] : On, Off
- Error: None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Math Error, Not Sourced, Stale



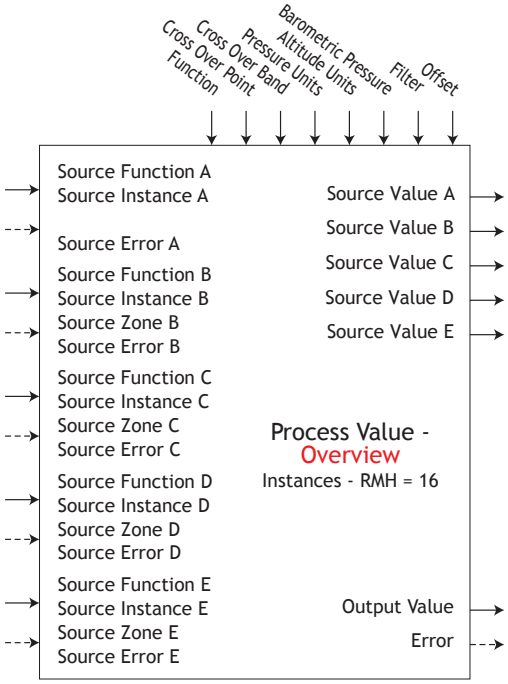
oPt Output Menu
SEt Setup Page

	Parameter Name [Parameter ID] : Range or Choices
Fn	Function [6005] : Off, Analog Input, Alarm, Cool Power, Heat Power, Compare, Counter, Digital I/O. Profile Event Out A to H, Function Key, Logic, Linearization, Math, Process Value, Special Function Output 1 to 4, Timer, Variable, Heater Error
F1	Output Function Instance [6006] : 1 to 250
S2	Output Source Zone [6012] : 0 to 24
oCt	Time Base Type [6002] : Fixed Time Base, Variable Time Base
otb	Fixed Time Base [6003] : 0.1 to 60.0 seconds
oLo	Low Power Scale [6009] : 0 to 100 %
oh1	High Power Scale [6010] : 0 to 100 %
otY	Output Type [18001] : Volts, Milliamps
Fn	Function [18002] : Off, Analog Input, Current, Cool Power, Heat Power, Power, Linearization, Math, Process Value, Set Point Closed, Set Point Open, Special Function Output 1 to 4, Variable, Wattage, Load Voltage, Load Resistance
F1	Output Function Instance [18004] : 1 to 250
S2A	Source Zone A [18019] : 0 to 24
SLo	Scale Low [18009] : 0.0 to 20.00
Sh1	Scale High [18010] : 0.0 to 20.00
rLo	Range Low [18011] : -1,999.000 to 9,999.000
rh1	Range High [18012] : -1,999.000 to 9,999.000
oCA	Calibration Offset [18007] : -1,999.000 to 9,999.000

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 pointed to a source are used in the calculations.

- Error [26027] : None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Math Error, Not Sourced, Stale



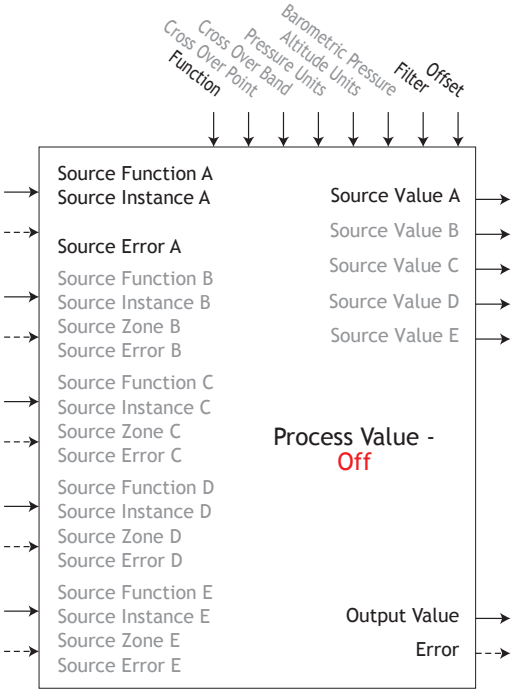
Pu Process Value Menu
SEt Setup Page

	Parameter Name [Parameter ID] : Range or Choices
Fn	Function [26021] : 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
SFnA	Source Function A [26001] : None, Analog Input, Linearization, Math, Process Value, Variable
S iA	Source Instance A [26006] : 1 to 4
SFnb	Source Function B [26002] : None, Analog Input, Linearization, Math, Process Value, Variable
S ib	Source Instance B [26007] : 1 to 250
S2b	Source Zone B [26012] : 0 to 24
SFnC	Source Function C [26003] : None, Analog Input, Linearization, Math, Process Value, Variable
S iC	Source Instance C [26008] : 1 to 250
S2C	Source Zone C [26013] : 0 to 24
SFnd	Source Function D [26004] : None, Analog Input, Linearization, Math, Process Value, Variable
S. id	Source Instance D [26009] : 1 to 250
S2d	Source Zone D [26014] : 0 to 24
SFnE	Source Function E [26005] : None, Alarm, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Logic, Timer, Variable
S iE	Source Instance E [26010] : 1 to 250
S2E	Source Zone E [26015] : 0 to 24
C.P	Cross Over Point [26024] : -1,999.000 to 9,999.000
C.b	Cross Over Band [26025] : -1,999.000 to 9,999.000
P.unt	Pressure Units [26028] : PSI, Torr, mBar, Atmosphere, Pascal
A.unt	Altitude Units [26029] : Feet, Kilofeet
b.Pr	Barometric Pressure [26030] : 10.0 to 16.0
F iL	Filter [26026] : 0.0 to 60.0 seconds

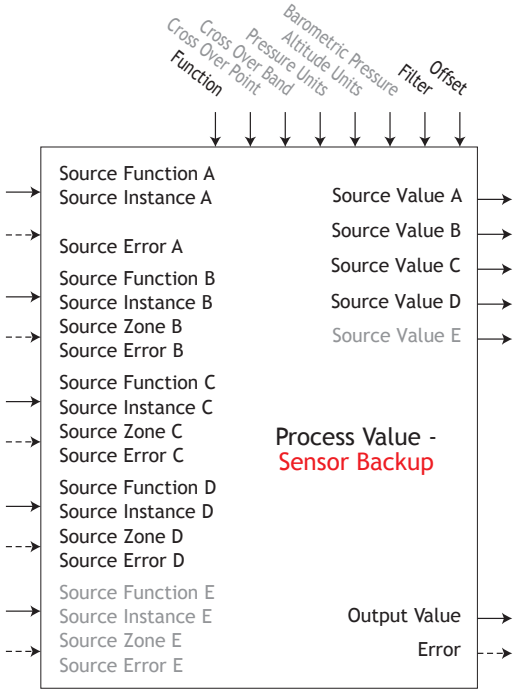
Pu Process Value Menu
oPEr Operations Page

SuA	Source Value A [26016] : -1,999.000 to 9,999.000
Sub	Source Value B [26017] : -1,999.000 to 9,999.000
SuC	Source Value C [26018] : -1,999.000 to 9,999.000
Sud	Source Value D [26019] : -1,999.000 to 9,999.000
SuE	Source Value E [26020] : Off, On
o.u	Offset [26023] : -1,999.000 to 9,999.000
oFSt	Output Value [26022] : -1,999.000 to 9,999.000

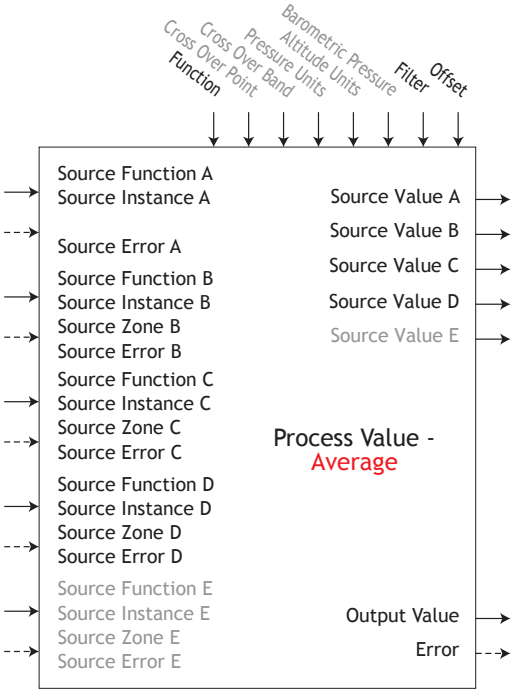
Process Value (cont.)



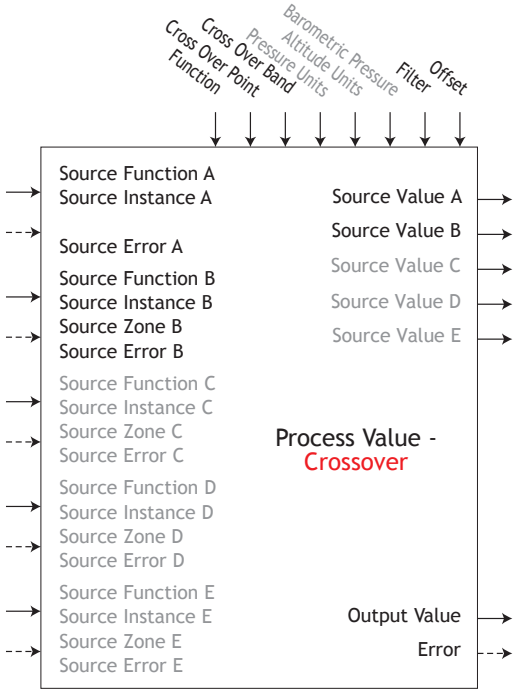
Output Value = Filter [A + Offset]
Display units follows Source A



Output Value = Filter [first assigned Source without an error + Offset]

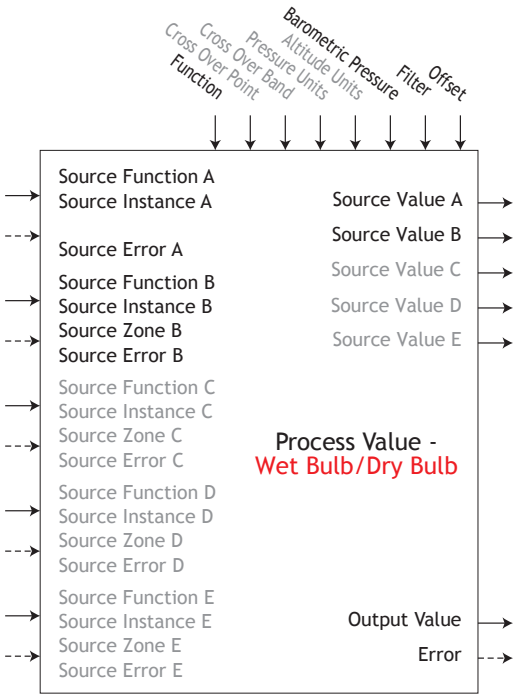


Output Value = Filter [(Average (A + B + C + D)) + Offset]
Display units follows the last source that is temperature else follow Source A

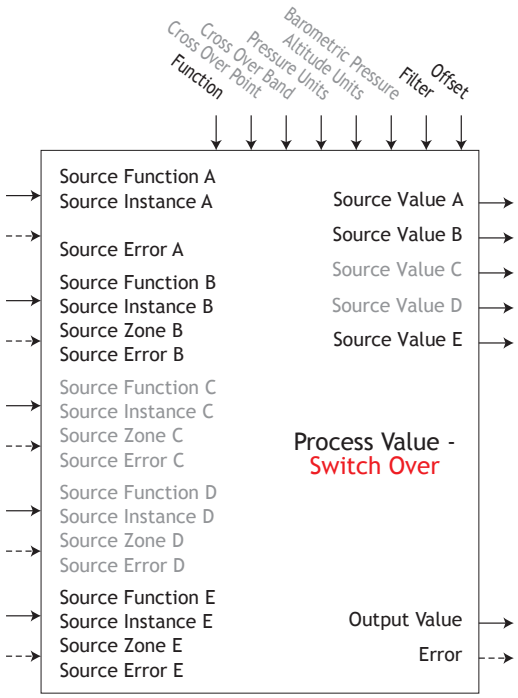


If A <= Cross Over Point - (Cross Over Band / 2) THEN Output Value = Filter [(A + Offset)]
If A >= Cross Over Point + (Cross Over Band / 2) THEN Output Value = Filter[(B + Offset)]
Output Value = Filter [((A * X) + (B * (1-X))) + Offset]
Where variable X = (Cross Over Point + (Cross Over Band / 2) - A) / Cross Over Band

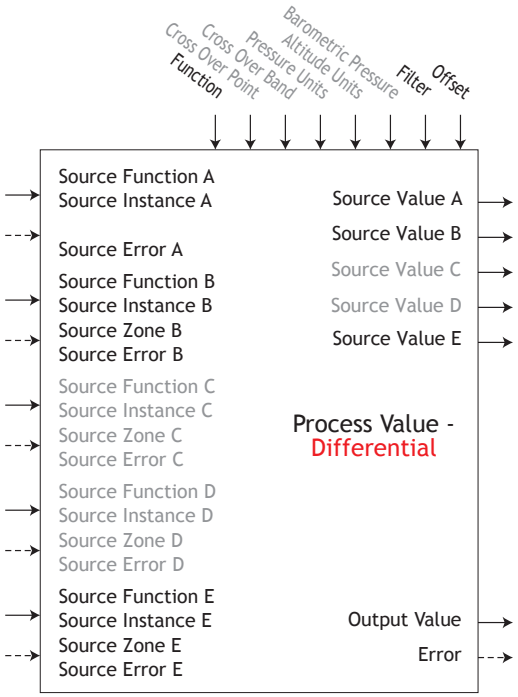
Process Value (cont.)



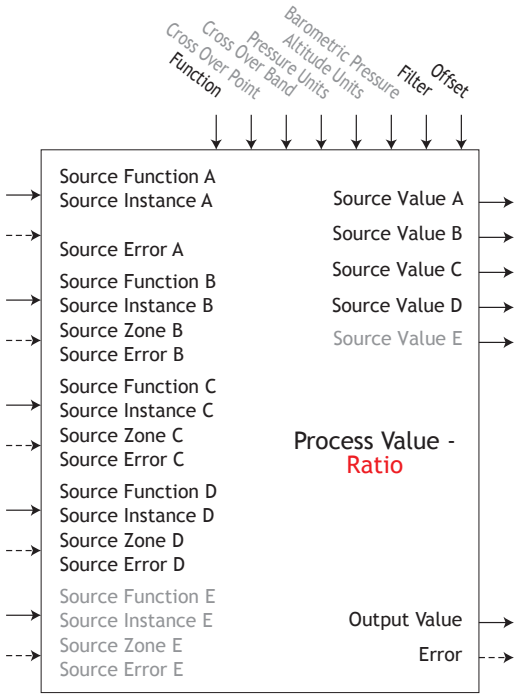
Output Value = Filter [Calculated Humidity + Offset] where Source A is the Dry Bulb and Source B is the Wet Bulb
Note: Wet/Dry bulb temperatures are in degrees F and pressures are in PSI. Output Value is % relative humidity. Useful temperature range is 10 to 350F



If B = OFF, Output Value = Filter [A + Offset]
If B = ON, Output Value = Filter [B + Offset]
Display units follows active source.

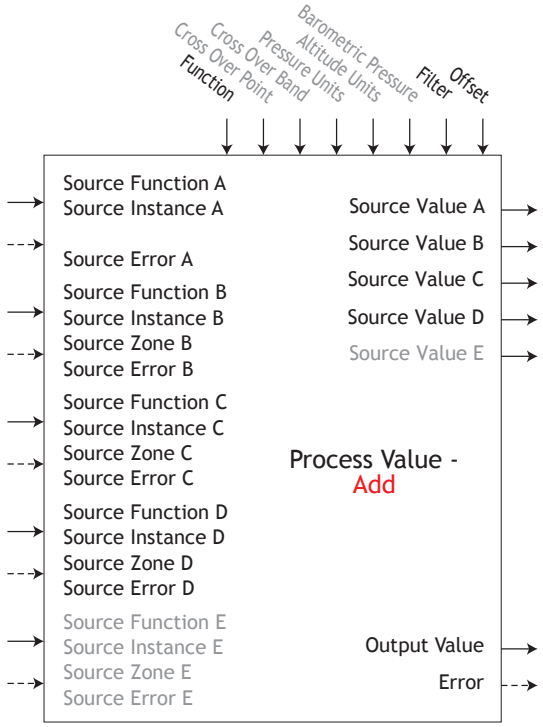


Output Value = Filter [(A - B) + Offset]
Display units follows Source A plus relative Source B

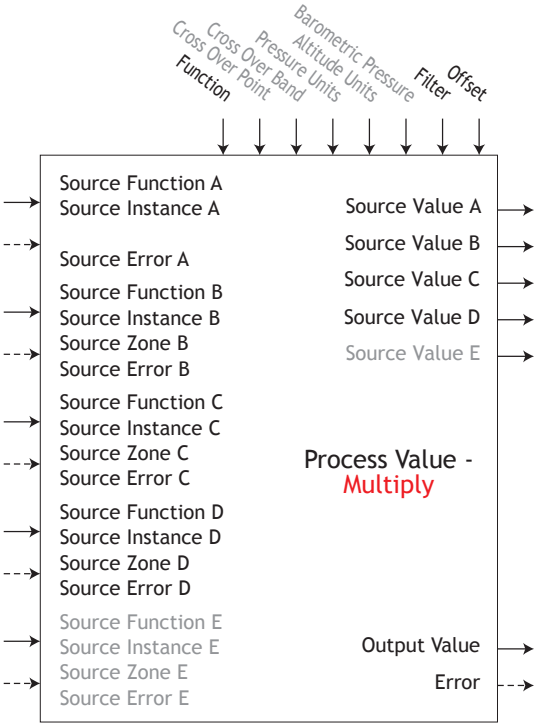


Output Value = Filter [(A / B) + Offset]
If display units of Source A = Source B, no display units on output value, else follow Source A

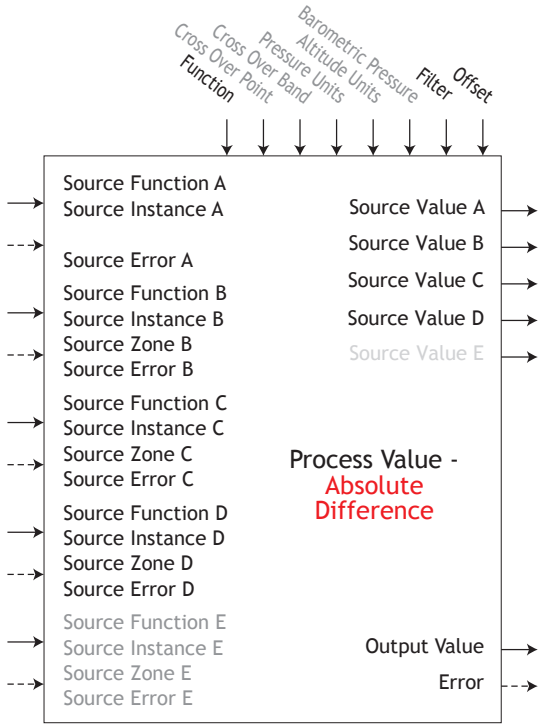
Process Value (cont.)



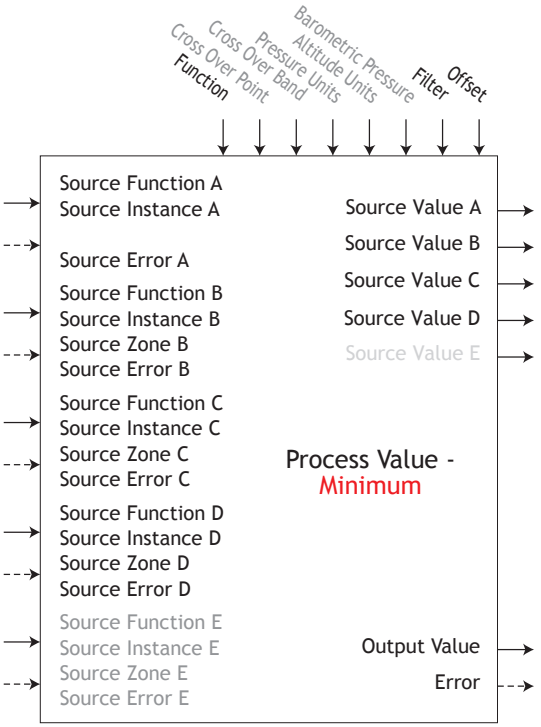
Output Value = Filter [(A + B + C + D) + Offset]
Display units follows last temperature source else follow Source A



Output Value = Filter [(A * B * C * D) + Offset]
Display units follows last temperature source else follow Source A

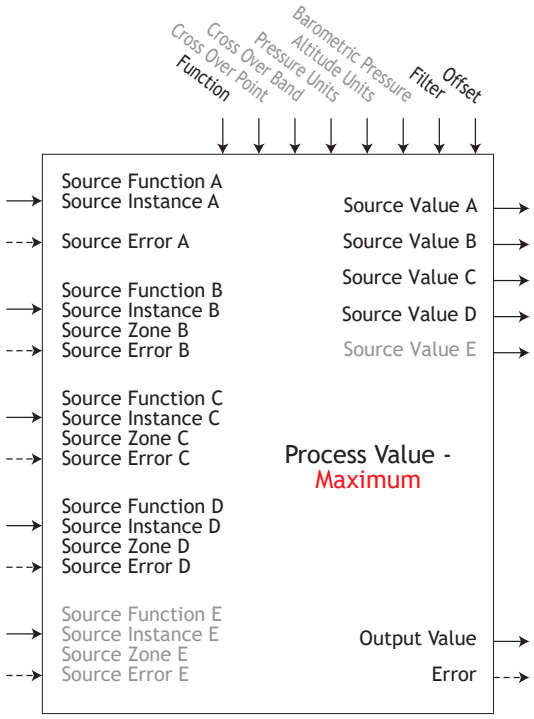


Output Value = Filter [| A - B | + Offset]
Display units follow Source A plus relative Source B

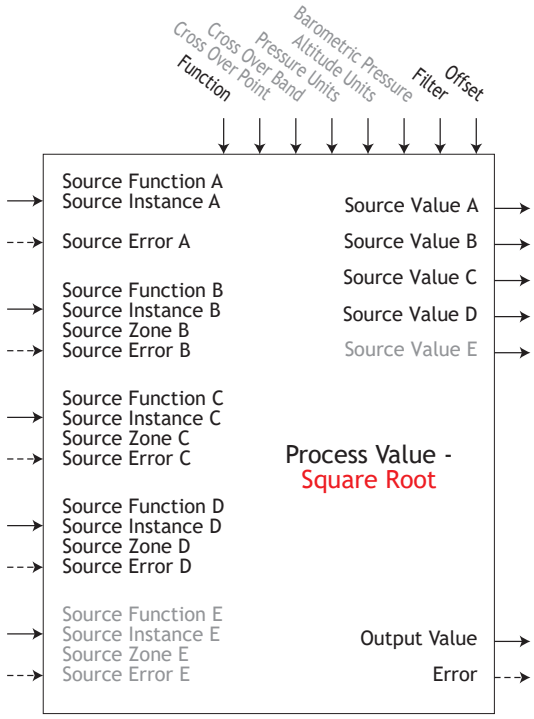


Output Value = Filter [Minimum Value (A : B : C : D) + Offset]
Display units follows Source with minimum value.

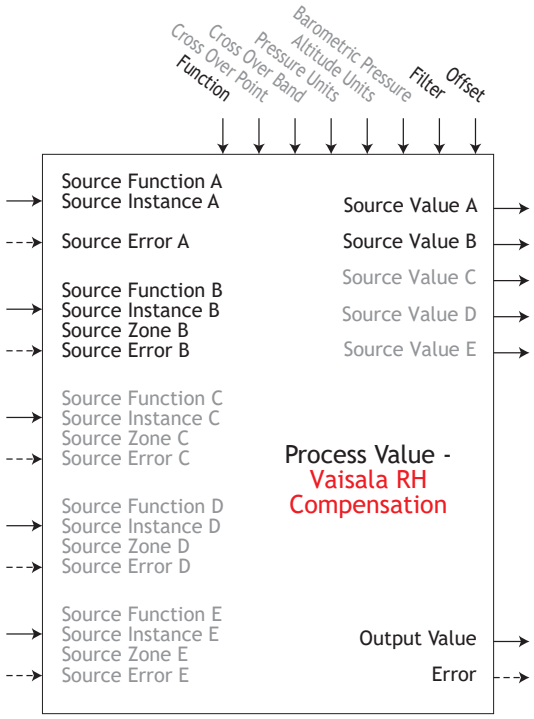
Process Value (cont.)



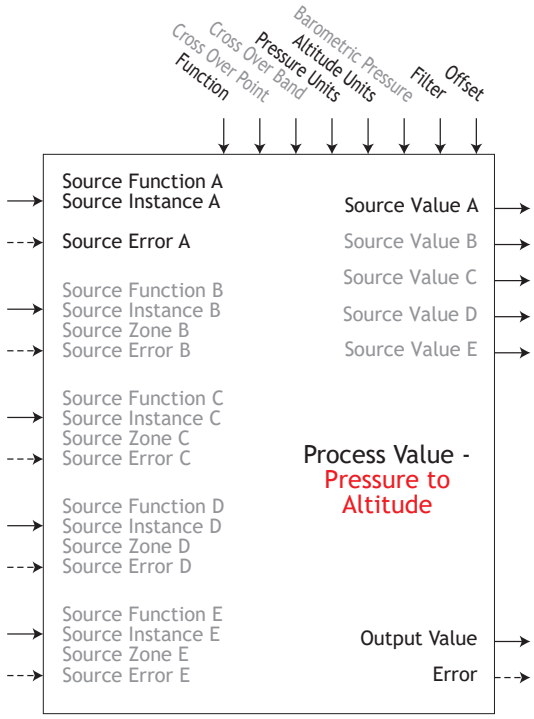
Output Value = Filter [Maximum Value (A : B : C : D) + Offset]
Display units follows Source with maximum value.



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



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.

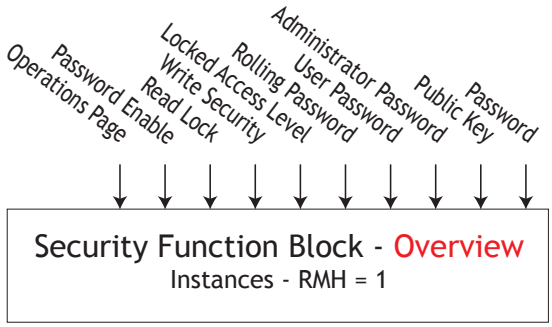


Output Value = Filter [Convert Source A in Pressure to Altitude + Offset]

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.

Security Function

If Password is enabled, the user must enter the Password to get to menus that have been blocked due to lock level settings. Rolling passwords required 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.



LoC Lock Menu
FAct Factory Page

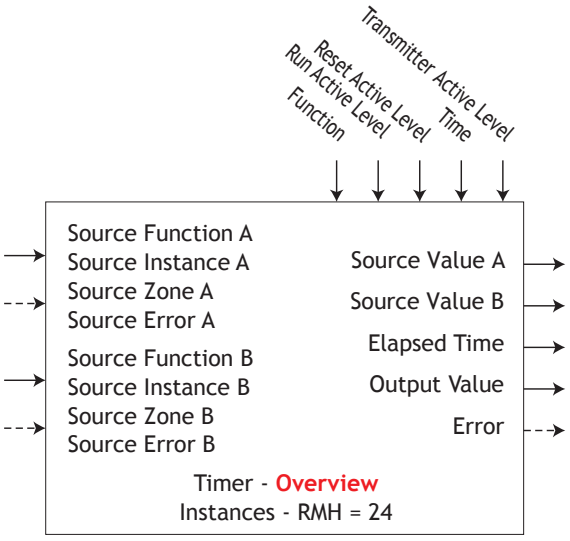
	Parameter Name [Parameter ID] : Range or Choices
LoC.o	Operations Page [3002] : 1 to 3
PASE	Password Enable [3015] : Off, On
r.LoC	Read Lock [3010] : 1 to 5
S.LoC	Write Security [3011] : 1 to 5
LoC.L	Locked Access Level [3016] : 1 to 5
roLL	Rolling Password [3019] : Off, On
PASu	User Password [3017] : 10 to 999
PASA	Administrator Password [3018] : 10 to 999

ULoC Unlock Menu
FAct Factory Page

CodE	Public Key [3020] : 0 to 9999
PASS	Password [3022] : 10 to 999

Timer Function

- Error [31018] = None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Math Error, Not Sourced, Stale
- Running [31015] = Off, ON



tMr Timer Menu
SEt Setup Page

	Parameter Name [Parameter ID] : Range or Choices
Fn	Function [31009] : Off, On Pulse, Delay, One Shot, Retentive
SFnA	Source Function A [31001] : None, Alarm, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Logic, Special Function Output 1 to 4, Timer, Variable
S iA	Source Instance A [31003] : 1 to 250
S2A	Source Zone A [31005] : 0 to 24
SASA	Run Active Level [31011] : High (rising), Low (falling)
SFnb	Source Function B [31002] : None, Alarm, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Logic, Special Function Output 1 to 4, Timer, Variable
S ib	Source Instance B [3104] : 1 to 250
S2b	Source Zone B [31006] : 0 to 24
SASb	Reset Active Level [31012] : High (rising), Low (falling)
t i	Time [31013] : 0.0 to 9,999.0 seconds
LEu	Active Level [31014] : High, Low

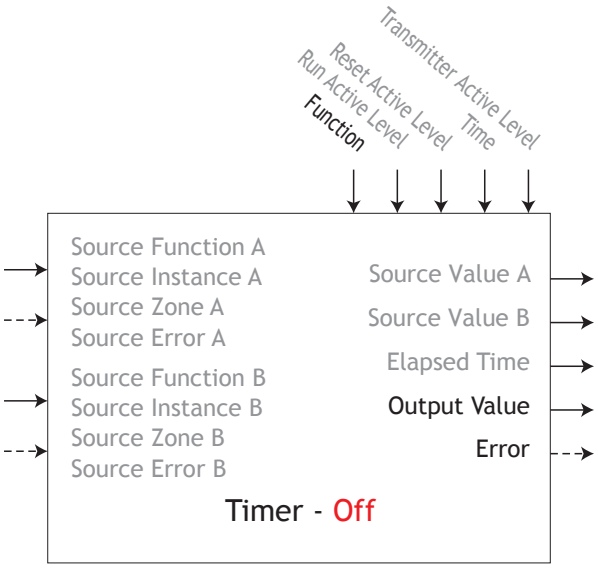
tMr Timer Menu
oPEr Operations Page

SuA	Source Value A [31007] : Off, On
Sub	Source Value B [31008] : Off, On
Et	Elapsed Time [31016] : 0.0 to 9,999.0 seconds
ou	Output Value [31010] : Off, On

Timer (cont.)

Off

Output Value = OFF

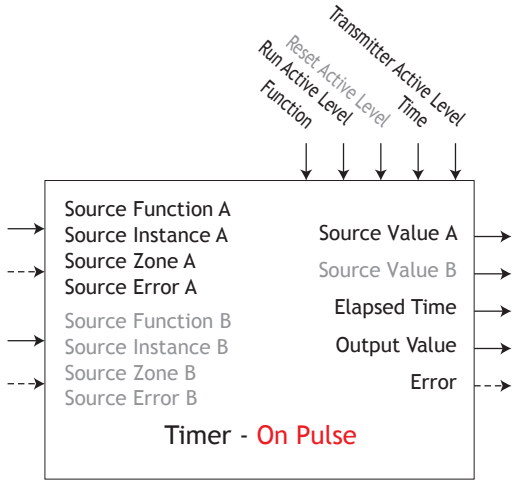


Timer (cont.)

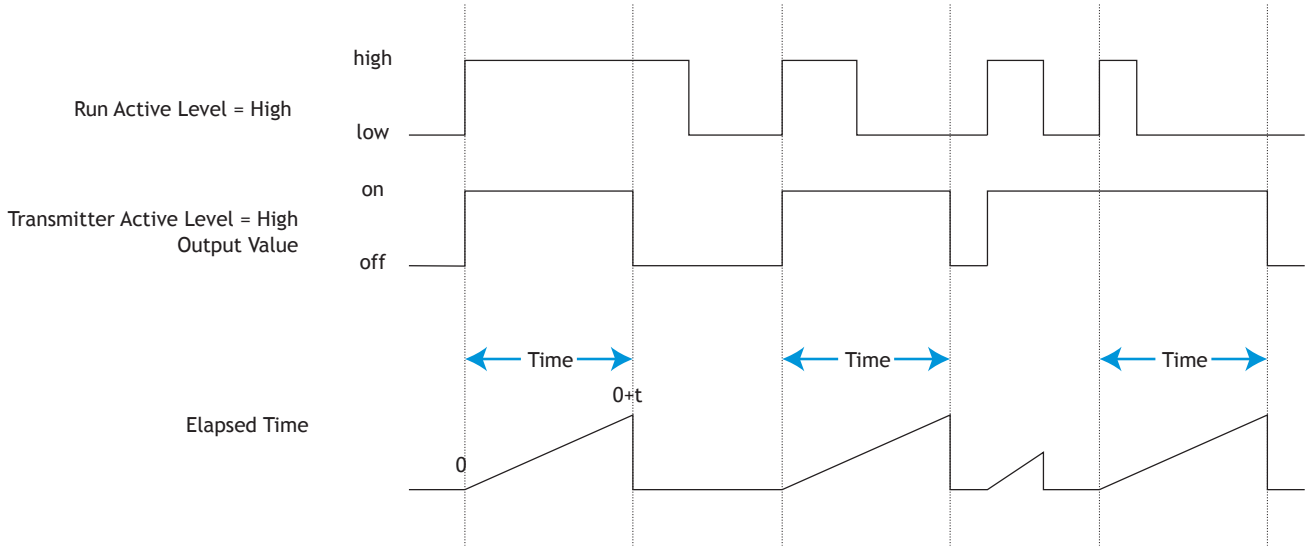
On Pulse

An On Pulse Timer is used to produce an output pulse of a constant duration. It can be used as a minimum on time for compressor control or other devices that do not want excessive cycling. Use Function to select On Pulse.

- On Pulse timers output a pulse of a set duration that is triggered or restarted by the level of Source A.
- Source Function A selects the type of source used for the input.
- Source Instance A and Source Zone A selects which source to use.
- Run Active Level sets which state makes the timer run or reset.
- Time sets the time duration of the output pulse.
- Transmitter Active Level sets which output state indicates the elapsed time is greater than or equal to the Time setting.



Timing Diagram of On Pulse with active state rising edge

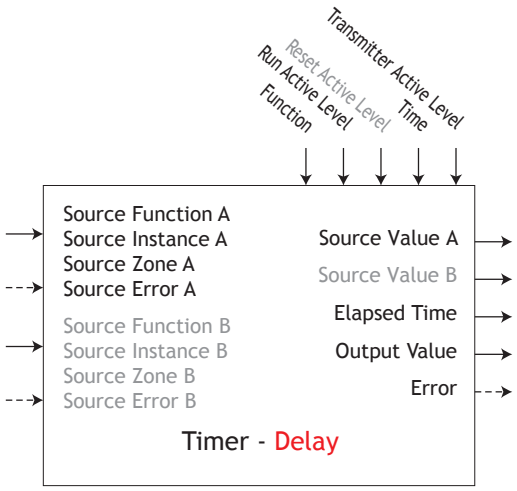


Timer (cont.)

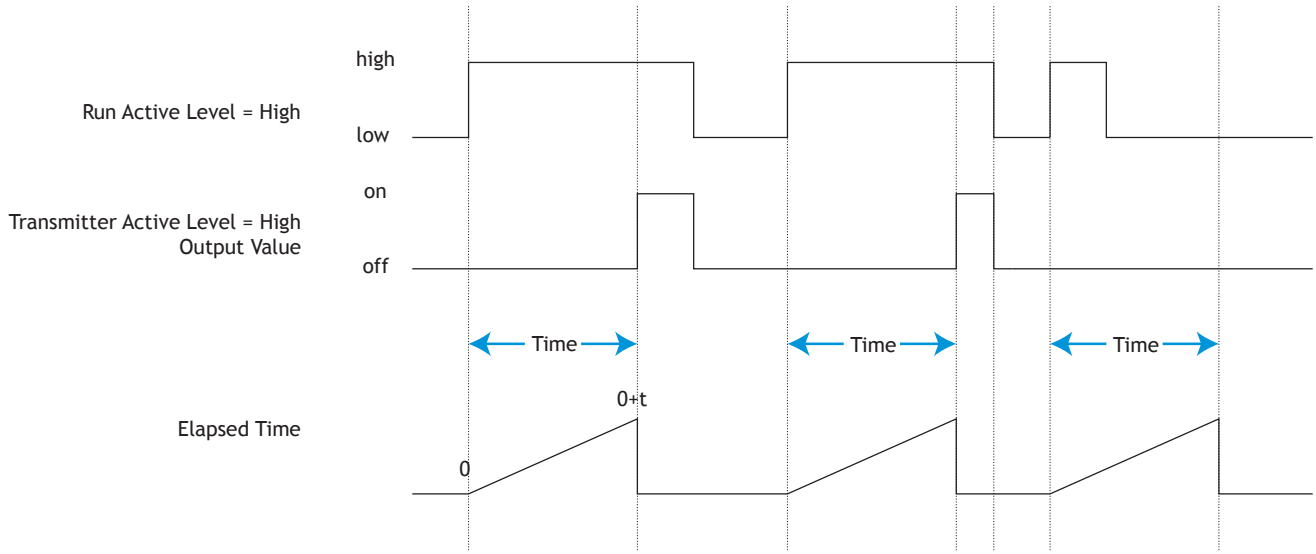
Delay

A delay timer is used to cause a delaying action. The delay can be made to happen on either the leading or trailing edge. This can be used to keep short input pulses from propagating or to have a secondary action occur at a known amount of time after the primary action; such as, turning on successive output devices.

- Use Function to select Delay.
- Delay timers will delay the response of a signal presented to Source A and then switch the output value.
- Source Function A selects the type of source used for the input.
- Source Instance A and Source Zone A selects which source to use.
- Run Active Level sets which state makes the timer run or reset.
- Overlap of run signal to time signal determines output value on time. If run signal is less than time signal, output does not activate.
- Transmitter Active Level sets which output state indicates the run time is greater than the Time setting.



Timing Diagram of Delay with active state rising edge

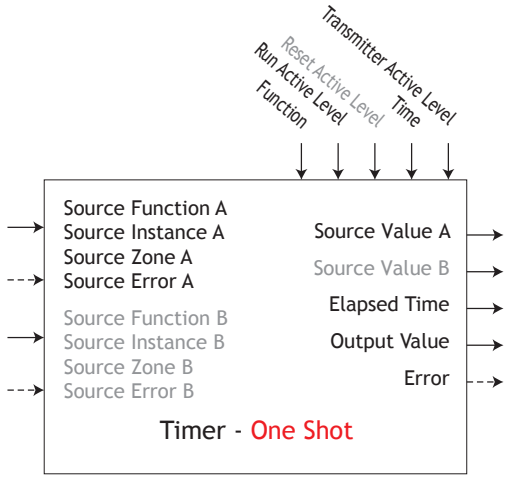


Timer (cont.)

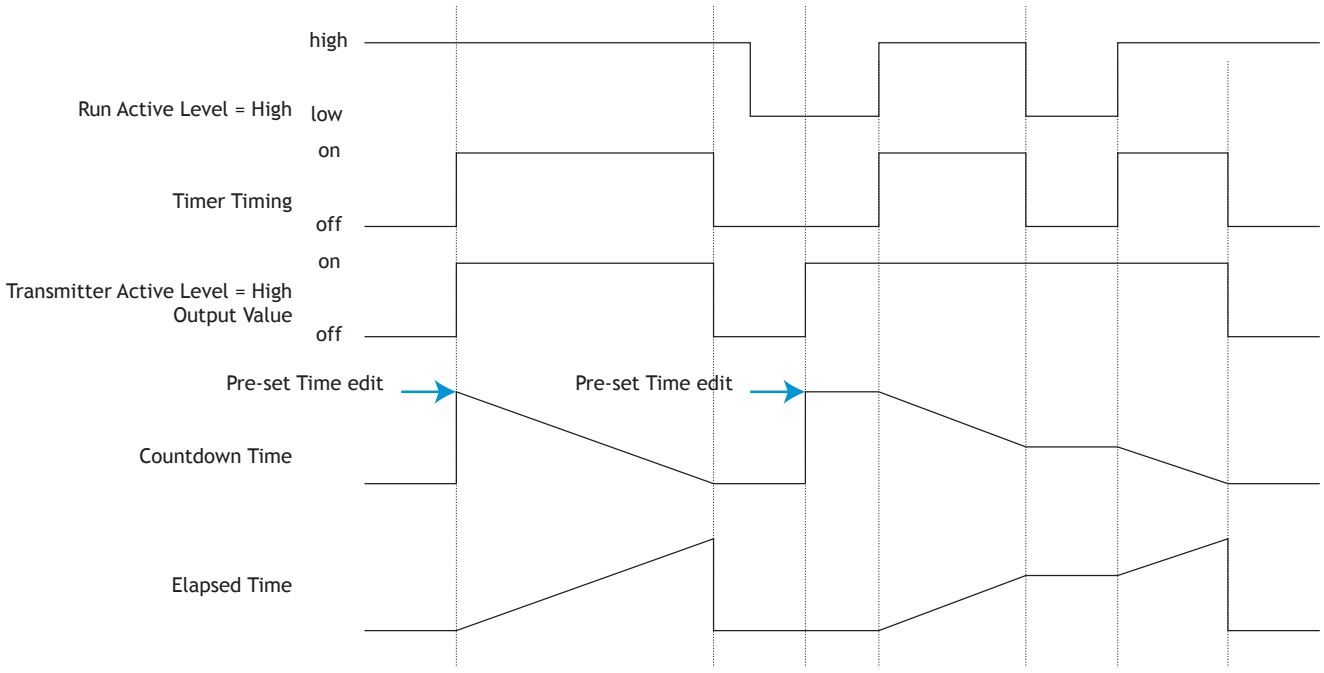
One Shot

The One Shot timer functions like a simple oven timer. The time value gets set by the user and it counts down to zero without retaining the original time (hence the name one-shot). This is intended to be used in applications where the user will manually set different times for each process.

- Use Function to select One Shot.
- One Shot timers count down while Source A is active; otherwise it holds. Preset of Time clears once time is elapsed.
- Source Function A selects the type of source used for the input.
- Source Instance A and Source Zone A selects which source to use.
- Run Active Level sets which state makes the timer count down.
- Transmitter Active Level sets which output state indicates the the timer is in countdown operation.



Timing Diagram of One Shot with active state rising edge

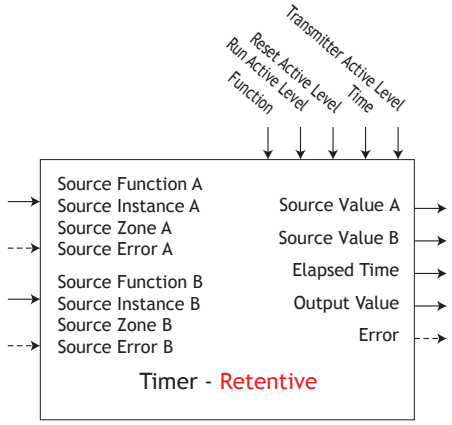


Timer (cont.)

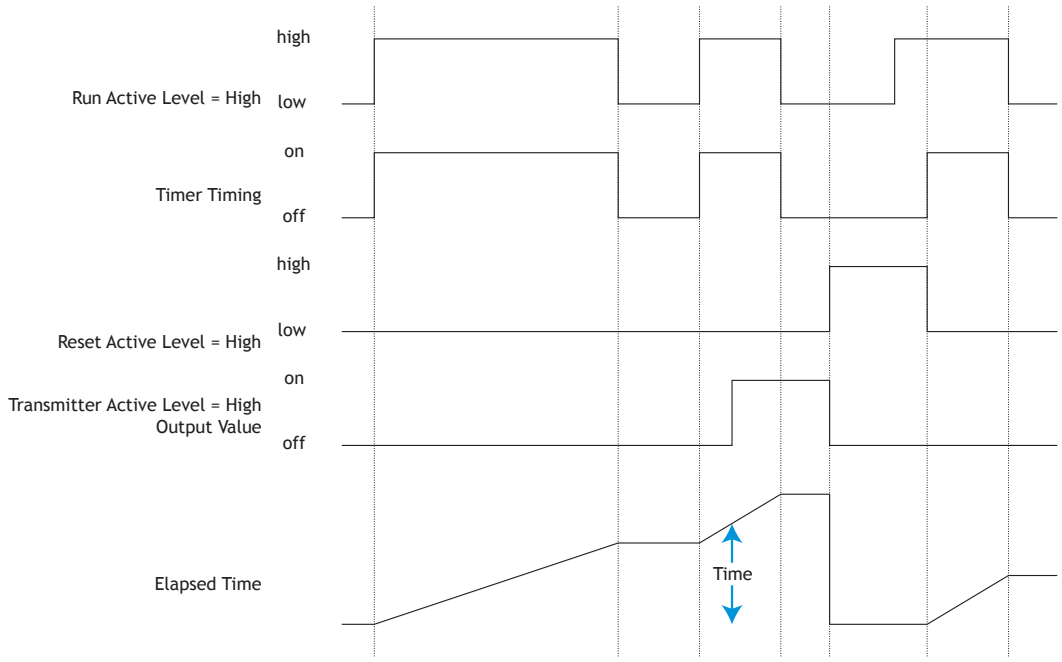
Retentive

A retentive timer is used to keep track of how much time something has been in a particular state. For example, this can be used to time how long something has been in an alarm state or how long it has been since a profile or step ran. The output can be used to trigger an event if the elapsed time has grown excessive.

- Use Function to select Retentive.
- Retentive timers count up from 0 to the Time parameter while Source A is active; otherwise it holds. It can be reset by Source B. The Elapsed time will continue to count up until the maximum value is reached and then rolls over unless a reset pulse is generated.
- Source Function A selects the type of source used for the input.
- Source Instance A and Source Zone A selects which source to use.
- Run Active Level sets which state makes the timer countdown.
- Transmitter Active Level sets which output state indicates the the timer is in countdown operation.



Timing Diagram of Retentive with all active state rising edge

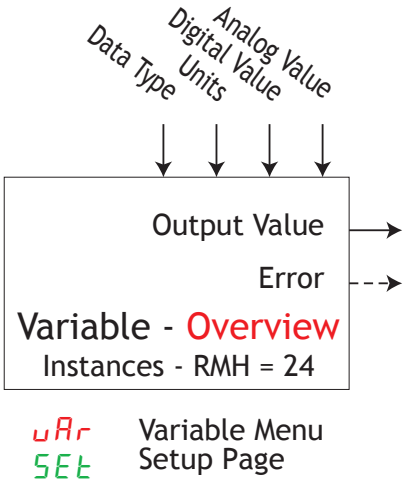


Variable Function

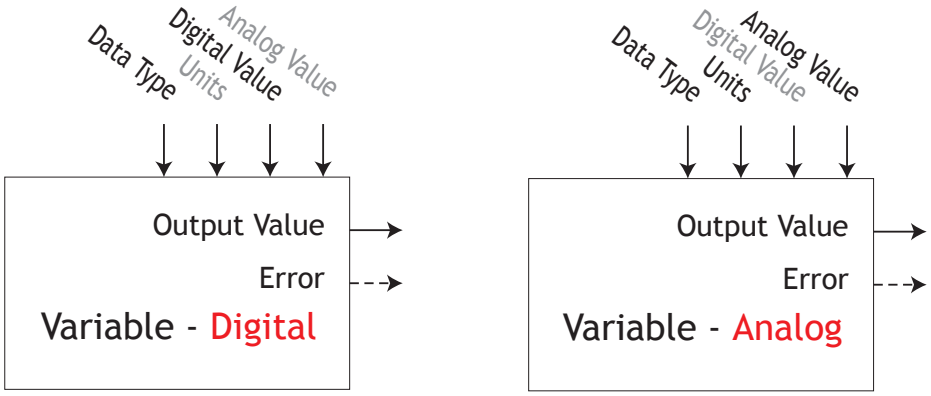
A variable function block is used to store a user supplied value and provide a source input to another function block with that value. As an example, you could use a variable function value as one input to a compare function. The other input to the compare function would determine the output value based on the user's supplied value.

This function simply passes the stored value to its output.

- Error [2005] : None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Math Error, Not Sourced, Stale
- Output Value [2004] : -1,999.000 to 9,999.000 or On or Off



	Parameter Name [Parameter ID] : Range or Choices
tYPE	Data Type [2001] : Analog, Digital
Unit	Units [2007] : None, Absolute Temperature, Relative Temperature, Power, Process, Relative Humidity
diG	Digital Value [2002] : On, Off
AnLG	Analog Value [2003] : -1,999.000 to 9,999.000

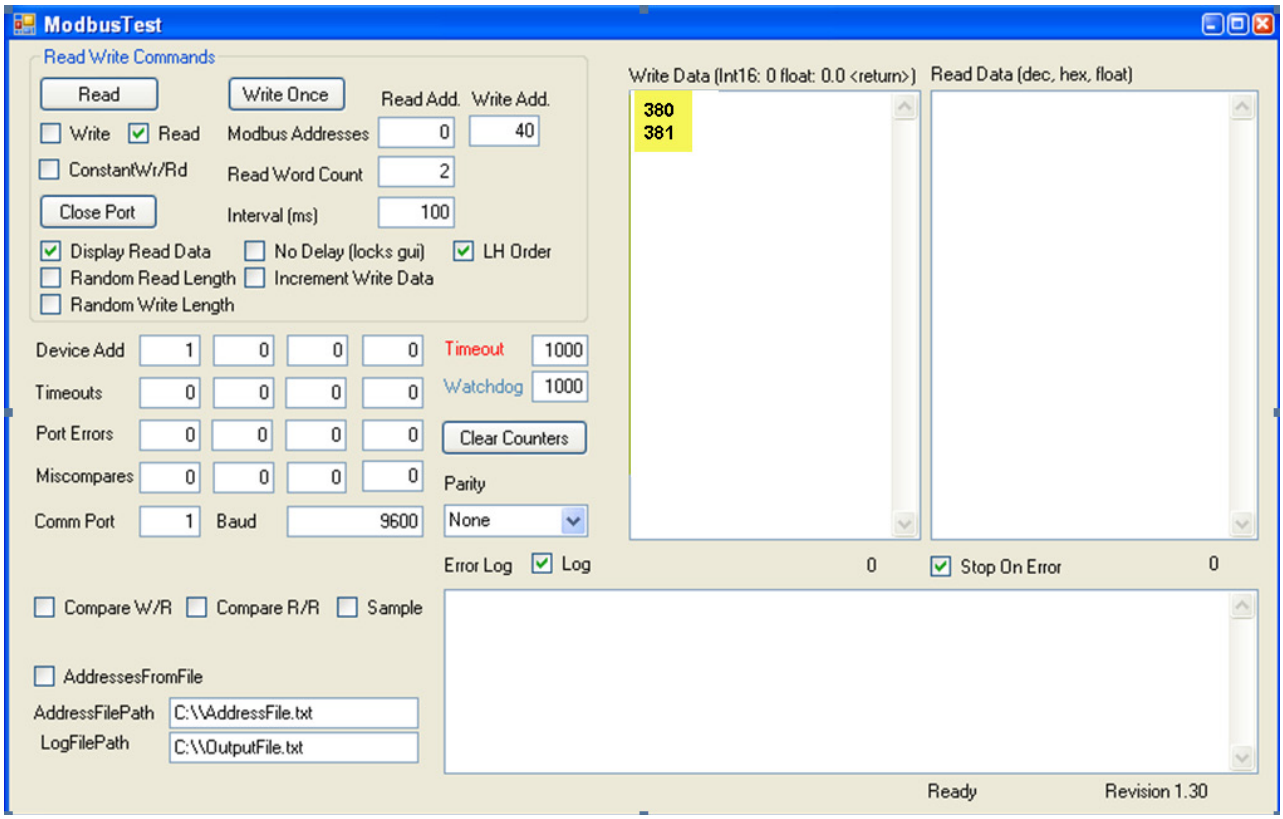


7 Chapter 7: Appendix

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.



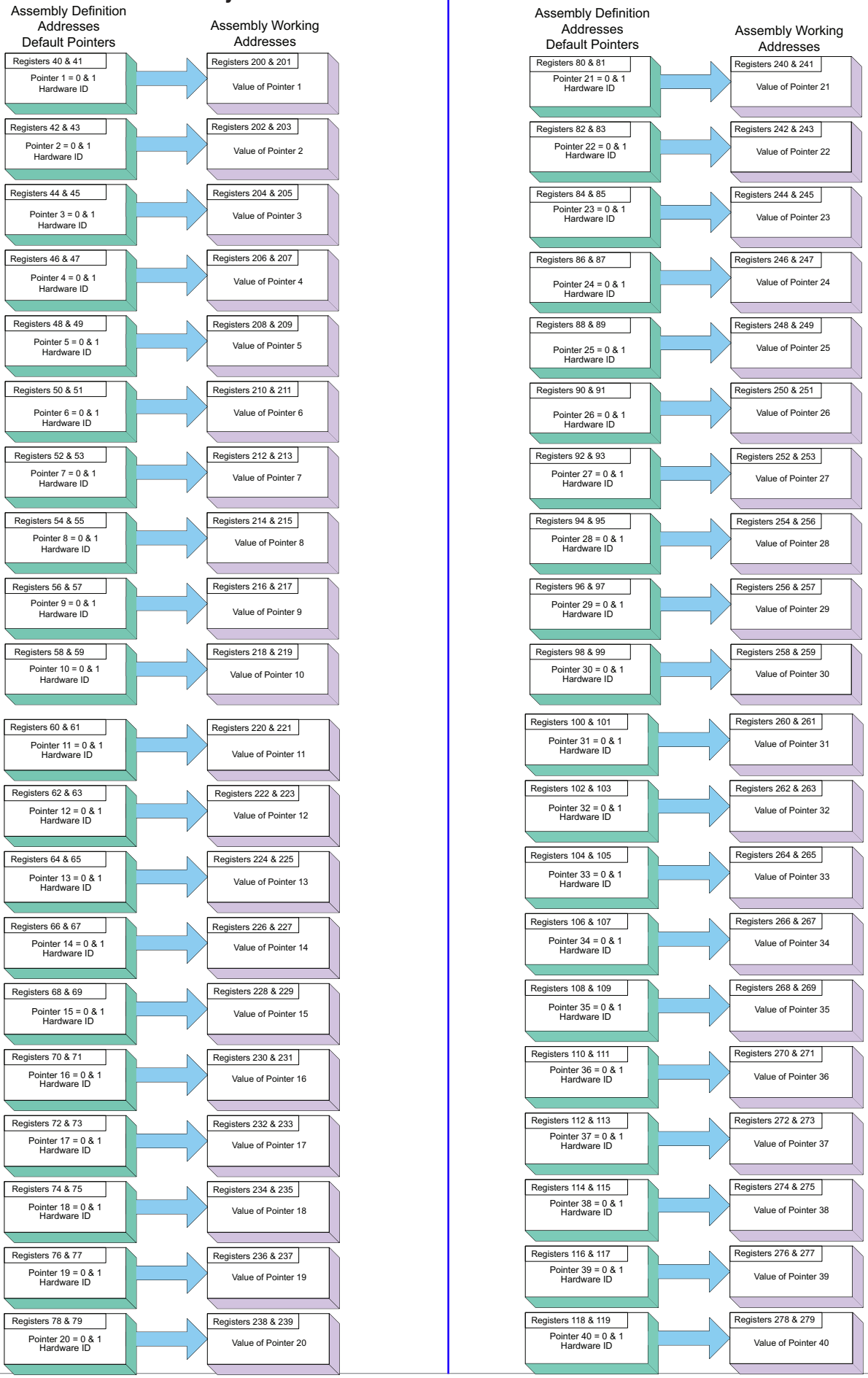
The screen shot above was taken from a program that can be found on the Watlow Support Tools DVD (shipped with the product) as well as on the Watlow website. On the DVD, it can be found under "Utility Tools" and is identified as "Modbus RTU Diagnostic Program for EZ-ZONE PM, RM and ST". A similar program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

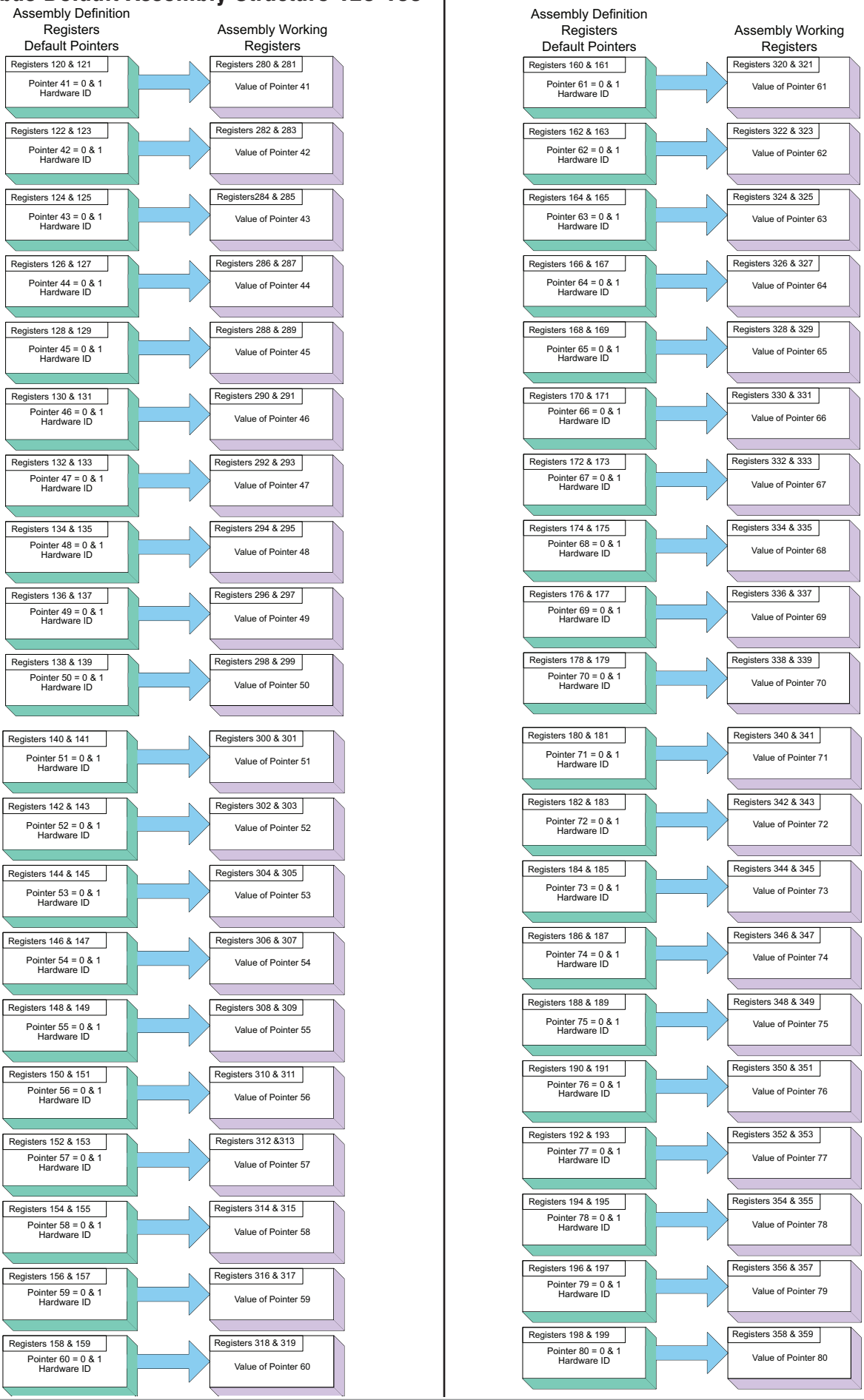
Assembly Pointer Registers and Assembly Working Registers

Definition Addresses	Working Addresses	Definition Addresses	Working Addresses
40 & 41	200 & 201	120 & 121	280 & 281
42 & 43	202 & 203	122 & 123	282 & 283
44 & 45	204 & 205	124 & 125	284 & 285
46 & 47	206 & 207	126 & 127	286 & 287
48 & 49	208 & 209	128 & 129	288 & 289
50 & 51	210 & 211	130 & 131	290 & 291
52 & 53	212 & 213	132 & 133	292 & 293
54 & 55	214 & 215	134 & 135	294 & 295
56 & 57	216 & 217	136 & 137	296 & 297
58 & 59	218 & 219	138 & 139	296 & 299
60 & 61	220 & 221	140 & 141	300 & 301
62 & 63	222 & 223	142 & 143	302 & 303
64 & 65	224 & 225	144 & 145	304 & 305
66 & 67	226 & 227	146 & 147	306 & 307
68 & 69	228 & 229	148 & 149	308 & 309
70 & 71	230 & 231	150 & 151	310 & 311
72 & 73	232 & 233	152 & 153	312 & 313
74 & 75	234 & 235	154 & 155	314 & 315
76 & 77	236 & 237	156 & 157	316 & 317
78 & 79	238 & 239	158 & 159	318 & 319
80 & 81	240 & 241	160 & 161	320 & 321
82 & 83	242 & 243	162 & 163	322 & 323
84 & 85	244 & 245	164 & 165	324 & 325
86 & 87	246 & 247	166 & 167	326 & 327
88 & 89	248 & 249	168 & 169	328 & 329
90 & 91	250 & 251	170 & 171	330 & 331
92 & 93	252 & 253	172 & 173	332 & 333
94 & 95	254 & 255	174 & 175	334 & 335
96 & 97	256 & 257	176 & 177	336 & 337
98 & 99	256 & 259	178 & 179	338 & 339
100 & 101	260 & 261	180 & 181	340 & 341
102 & 103	262 & 263	182 & 183	342 & 343
104 & 105	264 & 265	184 & 185	344 & 345
106 & 107	266 & 267	186 & 187	346 & 347
108 & 109	268 & 269	188 & 189	348 & 349
110 & 111	270 & 271	190 & 191	350 & 351
112 & 113	272 & 273	192 & 193	352 & 353
114 & 115	274 & 275	194 & 195	354 & 355
116 & 117	276 & 277	196 & 197	356 & 357
118 & 119	278 & 279	198 & 199	358 & 359

Modbus Default Assembly Structure 40-119



Modbus Default Assembly Structure 120-199



Troubleshooting Alarms, Errors and Module Issues

Indication	Description	Possible Cause(s)	Corrective Action
Error Input Er.01 Er.02 Er.03 Er.04 Er.05 Er.06 Er.07 Er.08 Er.09 Er.10 Er.11 Er.12 Er.13 Er.14 Er.15 Er.16	Sensor does not provide a valid signal to controller	• Sensor improperly wired or open • Incorrect setting of sensor type • Calibration corrupt	• Correct wiring or replace sensor • Match setting to sensor used • Check calibration of controller
Ambient Error Er.Ab	Sensor does not provide a valid signal to controller	• Cold junction circuitry is not working	• Return to factory
Alarm won't clear or reset	Alarm will not clear or reset with keypad or digital input	• 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	• Silencing is active • 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 silencing, if required • Disable 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

Indication	Description	Possible Cause(s)	Corrective Action
Alarm Error AL.E 1 AL.E2 AL.E3 AL.E4 AL.E5 AL.E6 AL.E7 AL.E8 AL.E9 AL. 10 AL. 11 AL. 12 AL. 13 AL 14 AL 15 AL. 16 AL. 17 AL 18 AL 19 AL.20 AL.2 1 AL 22 AL 23 AL.24	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 AL.L 1 AL.L2 AL.L3 AL.L4 AL.L5 AL.L6 AL.L7 AL.L8 AL.L9 AL. 10 AL. 11 AL. 12 AL. 13 AL 14 AL 15 AL. 16 AL. 17 AL 18 AL 19 AL.20 AL.2 1 AL 22 AL 23 AL.24	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 AL.h 1 AL.h2 AL.h3 AL.h4 AL.h5 AL.h6 AL.h7 AL.h8 AL.h9 AL. 10 AL. 11 AL. 12 AL. 13 AL 14 AL 15 AL. 16 AL. 17 AL 18 AL 19 AL.20 AL.2 1 AL 22 AL 23 AL.24	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

Indication	Description	Possible Cause(s)	Corrective Action
Loop Open Error LP.o1 LP.o2 LP.o3 LP.o4 LP.o5 LP.o6 LP.o7 LP.o8 LP.o9 LP.10 LP.11 LP.12 LP.13 LP.14 LP.15 LP.16	Open Loop Detect is active and the process value did not deviate by a user-selected value in a user specified period with PID power at 100%.	• Setting of Open Loop Detect Time incorrect • Setting of Open Loop Detect Deviation incorrect • Thermal loop is open • Open Loop Detect function not required but activated	• Set correct Open Loop Detect Time for application • Set correct Open Loop Deviation value for application • Determine cause of open thermal loop: misplaced sensors, load failure, loss of power to load, etc. • Deactivate Open Loop Detect feature
Loop Reversed Error LP.r1 LP.r2 LP.r3 LP.r4 LP.r5 LP.r6 LP.r7 LP.r8 LP.r9 LP.10 LP.11 LP.12 LP.13 LP.14 LP.15 LP.16	Open Loop Detect is active and the process value is headed in the wrong direction when the output is activated based on deviation value and user-selected value.	• Setting of Open Loop Detect Time incorrect • Setting of Open Loop Detect Deviation incorrect • Output programmed for incorrect function • Thermocouple sensor wired in reverse polarity	• Set correct Open Loop Detect Time for application • Set correct Open Loop Deviation value for application • Set output function correctly • Wire thermocouple correctly, (red wire is negative)
Ramping rP1 rP2 rP3 rP4 rP5 rP6 rP7 rP8 rP9 rP10 rP11 rP12 rP13 rP14 rP15 rP16	Controller is ramping to new set point	• Ramping feature is activated	• Disable ramping feature if not required
Autotuning tU01 tU02 tU03 tU04 tU05 tU06 tU07 tU08 tU09 tU10 tU11 tU12 tU13 tU14 tU15 tU16	Controller is autotuning the control loop	• User started the autotune function • Digital input is set to start autotune	• Wait until autotune completes or disable autotune feature • Set digital input to function other than autotune, if desired

Indication	Description	Possible Cause(s)	Corrective Action
Process doesn't control to set point	Process is unstable or never reaches set point	• Controller not tuned correctly • Control mode is incorrectly set • Control set point is incorrect	• Perform autotune or manually tune system • Set control mode appropriately (Open vs Closed Loop) • Set control set point in appropriate control mode and check source of set point: remote, idle, profile, closed loop, open loop
Temperature runway	Process value continues to increase or decrease past set point.	• Controller output incorrectly programmed • Thermocouple reverse wired • Controller output wired incorrectly • Short in heater • Power controller connection to controller defective • Controller output defective	• Verify output function is correct (heat or cool) • Correct sensor wiring (red wire negative) • Verify and correct wiring • Replace heater • Replace or repair power controller • Replace or repair controller
No heat/cool action	Output does not activate load	• Output function is incorrectly set • Control mode is incorrectly set • Output is incorrectly wired • Load, power or fuse is open • Control set point is incorrect • Incorrect controller model for application	• Set output function correctly • Set control mode appropriately (Open vs Closed Loop) • Correct output wiring • Correct fault in system • Set control set point in appropriate control mode and check source of set point: remote, idle, profile, closed loop, open loop • Obtain correct controller model for application

Indication	Description	Possible Cause(s)	Corrective Action
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 100 rEtn	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.

Indication	Description	Possible Cause(s)	Corrective Action
Heater Error hEr	Heater Error	• Current through load is above current trip set point • Current through load is below current trip set point	• Check that the load current is proper. Correct cause of overcurrent and/or ensure current trip set point is correct. • Check that the load current is proper. Correct cause of undercurrent and/or ensure current trip set point is correct.
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 lock-out keypad • Custom parameters incorrect	• Check LoC settings in Factory Page - change appropriate password in ULoC setting in Factory Page • Change state of digital input • Change custom parameters in Factory Page
RUI value to low uAL.L	Value to low to be displayed in 4 digit LED display <-1999	• Incorrect setup	• Check scaling of source data
RUI value to high uAL.h	Value to high to be displayed in 4 digit LED display >9999	• Incorrect setup	• Check scaling of source data

Detection of and Rules Around Abnormal Sensor Conditions	
Inputs	**Detection of Abnormal Conditions**
Thermocouple	
Shorted	No direct detection, Open loop firmware detection.
Open	Yes, Parasitic pull-up
Reversed	Yes, firmware detection
Current Source	
Shorted	Range limiting only
Open	Range limiting only
Reversed	Range limiting only
Voltage Source	
Open	Range limiting only
Shorted	Range limiting only
Reversed	Range limiting only
RTD	
S1 open	Yes, pulled up.
S2 open	Not implemented.
S3 open	Yes, pulled up.
S1 short to S2	Yes, pulled up
S1 short to S3	Yes, pulled down to under range.
S2 shorted to S3	Not implemented, Possible, monitor S2 voltage.
S1 and S2 open	Yes, pulled down to under range.
S1 and S3 open	Yes, S1 pulled up.
S2 and S3 open	Yes pulled up.
Thermistor	
S1 open	Yes, pulled up to sensor over range.
S3 open	Yes, pulled up to sensor over range.
S1 short to S3	Yes, pulled down to sensor under range.
S1 and S3 open	Yes, S1 pulled up to sensor over range.

RMH Module 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. (Safety Extra Low Voltage)
- Data retention upon power failure via nonvolatile memory
- Compliant with Semi F47-0200, Figure R1-1 voltage sag requirements

Available 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

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
- RM 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

Accuracy

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

Agency Approvals

- UL®/EN 61010 listed; c-UL C22.2 #61010 File E185611 QUYX, QUYX7
- ANSI/ISA 12.12.01-2007 Hazardous Locations Class 1, Div. 2-Group A, B, C, D Temperature code T4 (optional) File E184390 QUZW, QUZW7
- 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.E.
- CE

Serial Communications

- The RMH module ships with isolated standard bus protocol for configuration and communication connection to all other EZ-ZONE products, Modbus RTU is optional.

Optional User Interface

- Seven-segment address LED, programmed via push-button switch
- Communication activity, 2 LEDs
- Error condition of each loop, 4 LEDs
- Output status indication, 16 LEDs

Maximum RMH System Configuration

- Up to sixteen (16) modules, 256 loops maximum system capacity

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

Dimensions		Weight
155.0 mm (6.10 in)	116.08 mm (4.57 in)	Controller: 453.59 g (16 oz.)

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 0.56 Nm (5.0 lb.-in.) right angle, 0.5 Nm (4.51 lb-in) front terminal block
- Dimensional Drawing
- Use solid or stranded copper conductors only

Connector	Dimension “A” (mm/in.)
Standard	148 (5.80)
Straight	155 (6.10)

Optional Accessories

Remote User Interface (RUI)

- 1/16 DIN
- Dual 4 digit, 7-segment LED displays
- Keys: Advance, infinity, up, down keys, plus an EZ-KEY programmable function key
- Typical display update rate 1Hz

EZ-ZONE RMH Product Documentation

- Watlow Support Tools CD, P/N 0601-0001-0000

Universal Input

- Thermocouple, grounded or ungrounded sensors
  - >20MΩ input impedance
- Max. 2KΩ source resistance
- RTD 2 - wire, platinum, 100Ω and 1000Ω @ 0°C (32°F) calibration to DIN curve (0.00385 Ω/Ω/°C)
- Process, 0-20mA @100Ω, or 0-10V⎓ (dc) @ 20kΩ input impedance; scalable, 0-50mV

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

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

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

Input Type	Max Error @ 25 Deg C	Accuracy Range Low	Accuracy Range High	Units
J	±1.75	0	750	Deg C
K	±2.45	-200	1250	Deg C
T	±1.55	-200	350	Deg C
N	±2.25	0	1250	Deg C
E	±2.10	-200	900	Deg C
R	±3.9	0	1450	Deg C
S	±3.9	0	1450	Deg C
B	±2.66	870	1700	Deg C
C	±3.32	0	2315	Deg C
D	±3.32	0	2315	Deg C
F (PTII)	±2.34	0	1343	Deg C
RTD, 100 ohm	±2.00	-200	800	Deg C
RTD, 1000 ohm	±2.00	-200	800	DegC
mV	±0.05	-50	50	mV
Volts	±0.01	0	10	Volts
mAdc	±0.02	0	20	mAmps DC
mAac	±5	0	50	mAmps AC

Input Type	Max Error @ 25 Deg C	Accuracy Range Low	Accuracy Range High	Units
Potentiometer, 1K range	±1	0	1000	Ohms
Resistance, 5K range	±5	0	5000	Ohms
Resistance, 10K range	±10	0	10000	Ohms
Resistance, 20K range	±20	0	20000	Ohms
Resistance, 40K range	±40	0	40000	Ohms

Operating Range			
Input Type	Range Low	Range High	Units
J	-210	1200	Deg C
K	-270	1371	Deg C
T	-270	400	Deg C
N	-270	1300	Deg C
E	-270	1000	Deg C
R	-50	1767	Deg C
S	-50	1767	Deg C
B	0	1816	Deg C
C	0	2315	Deg C
D	0	2315	Deg C
F (PTII)	0	1343	Deg C
RTD (100 ohm)	-200	800	Deg C
RTD (1000 ohm)	-200	800	Deg C
mV	0	50	mV
Volts	0	10	Volts
mAdc	0	20	mAmps DC
mAac	0	50	mAmps AC
Potentiometer, 1K range	0	1200	Ohms
Resistance, 5K range	0	5000	Ohms
Resistance, 10K range	0	10000	Ohms
Resistance, 20K range	0	20000	Ohms
Resistance, 40K range	0	40000	Ohms

Thermistor Input				
Input Type	Max Error @ 25 Deg C	Accuracy Range Low	Accuracy Range High	Units
Thermistor, 5K range	±5	0	5000	Ohms
Thermistor, 10K range	±10	0	10000	Ohms
Thermistor, 20K range	±20	0	20000	Ohms
Thermistor, 40K range	±40	0	40000	Ohms

- 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 @ 25C	Alpha Techniques	Beta THERM	YSI	Thermistor Curve
2.252K	Curve A	2.2K3A	004	A
10K	Curve A	10K3A	016	B
10K	Curve C	10K4A	006	C

Digital Input

- **DC voltage**
  - Max. input 36V @ 3mA
  - Min. high state 3V at 0.25mA
  - Max. low state 2V
- **Dry contact**
  - Min. open resistance 10KΩ
  - Max. closed resistance 50Ω
  - Max. short circuit 13mA
- Digital input update rate 10Hz

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, 125VA pilot duty
- Digital outputs
  - Update rate 10Hz
  - Switched DC
    - » Output voltage 20V⎓ (dc)
    - » Max. supply current source 40mA at 20V⎓ (dc)
  - Open Collector
    - » Switched voltage max.: 32V⎓ (dc)
    - » Max. switched current per output: 1.5A
    - » Max. switched current for all 6 outputs combined: 8A

- Universal process/retransmit outputs, range selectable:
  - 0 to 10V ⎓(dc) into a min. 1,000Ω load
  - 0 to 20mA into max. 800Ω load

  Resolution
  - » dc ranges: 2.5mV nominal
  - » mA ranges: 5 µA nominal

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

  Temperature Stability
  - » 100 ppm/°C

Quad Solid-State Relays

- Form A, 24V~ (ac) min., 264V~ (ac) max., opto-isolated, without contact suppression
  - Resistive load 2A per output at 20 to 264V~ (ac)
  - 50 VA pilot duty at 120/240 V~ (ac)

Programmable Application Blocks

Actions (events) 24 total

Alarms 24 total

Control Loop 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 16 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

RMH 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

①② EZ-ZONE Rail Mount	③ High Density Module	④ Connector Style/ Custom Product		⑤ Slot A	⑥ Slot B	⑦ Slot D	⑧ Slot E		⑨ Future Options	⑩ Enhanced Options	⑪⑫ Additional Options
RM	H		-					-	A		

Connector Style/Custom Product - Digit ④

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

Slot A - Digit ⑤

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

Slot B - Digit ⑥

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

Slot D - Digit ⑦

A	=	None
1	=	4 Universal inputs (t/c, 2-wire RTD, 0-10Vdc, 0-20mA, 1K pot-entiometer) 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 ⑧

A	=	None
1	=	4 Universal inputs (t/c, 2-wire RTD, 0-10Vdc, 0-20mA, 1K pot-entiometer) 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 ⑨

A	=	Standard

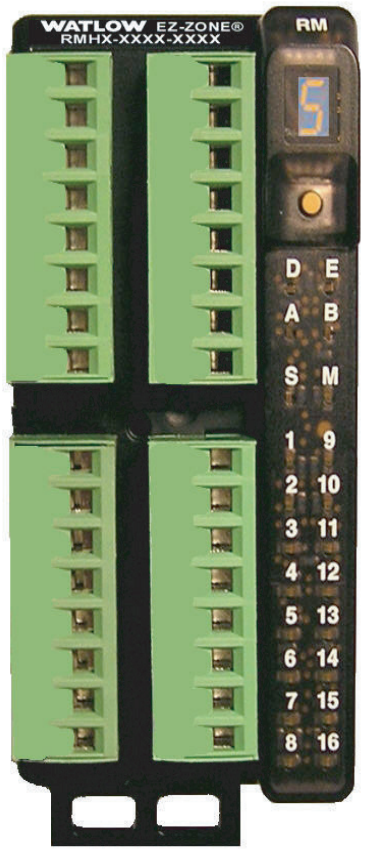
Enhanced Options - Digit ⑩

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

Additional Options - Digits ⑪ ⑫

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)



Declaration of Conformity

EZ Zone Series RM

CE

WATLOW Electric Manufacturing Company ISO 9001 since 1996.
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.

2004/108/EC Electromagnetic Compatibility Directive

EN 61326-1	**2013**	**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	2009	Electrostatic Discharge Immunity
EN 61000-4-3	2010	Radiated Field Immunity
EN 61000-4-4	2012	Electrical Fast-Transient / Burst Immunity
EN 61000-4-5	2006	Surge Immunity (Reviewed to IEC 61000-4-5 2014)
EN 61000-4-6	2014	Conducted Immunity
EN 61000-4-11	2004	Voltage Dips, Short Interruptions and Voltage Variations Immunity
EN 61000-3-2	2009	Harmonic Current Emissions (Reviewed to IEC 61000-3-2 2014)
EN 61000-3-3[1]	2013	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.

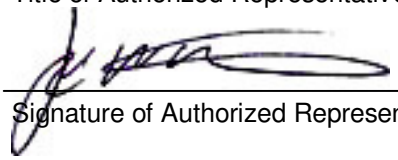
2006/95/EC Low-Voltage Directive

EN 61010-1	**2011**	**Safety Requirements of electrical equipment for measurement, control and laboratory use. Part 1: General requirements**

Compliant with 2011/65/EU RoHS Directive

Per 2012/19/EU W.E.E.E Directive *Please Recycle Properly*

Joe Millanes	Winona, Minnesota, USA
Name of Authorized Representative	Place of Issue
Director of Operations	September 2014
Title of Authorized Representative	Date of Issue



Signature of Authorized Representative

How to Reach Us

Corporate Headquarters

Watlow Electric Manufacturing Company
12001 Lackland Road
St. Louis, MO 63146
Sales: 1-800-WATLOW2
Manufacturing Support: 1-800-4WATLOW
Email: info@watlow.com
Website: www.watlow.com
From outside the USA and Canada:
Tel: +1 (314) 878-4600

Fax: +1 (314) 878-6814

Latin America

Watlow de México S.A. de C.V.
Av. Fundición No. 5
Col. Parques Industriales
Querétaro, Qro. CP-76130
Mexico
Tel: +52 442 217-6235
Fax: +52 442 217-6403

Europe

Watlow France
Tour d'Asnières.
4 Avenue Laurent Cély
92600 Asnières sur Seine
France
Tél: + 33 (0)1 41 32 79 70
Télécopie: + 33(0)1 47 33 36 57
Email: info@watlow.fr
Website: www.watlow.fr

Watlow GmbH
Postfach 11 65, Lauchwasenstr. 1
D-76709 Kronau
Germany
Tel: +49 (0) 7253 9400-0
Fax: +49 (0) 7253 9400-900
Email: info@watlow.de
Website: www.watlow.de

Watlow Italy S.r.l.
Viale Italia 52/54
20094 Corsico MI
Italy
Tel: +39 024588841
Fax: +39 0245869954
Email: italyinfo@watlow.com
Website: www.watlow.it

Watlow Ibérica, S.L.U.
C/Marte 12, Posterior, Local 9
E-28850 Torrejón de Ardoz
Madrid - Spain
T. +34 91 675 12 92
F. +34 91 648 73 80
Email: info@watlow.es
Website: www.watlow.es

Watlow UK Ltd.
Linby Industrial Estate
Linby, Nottingham, NG15 8AA
United Kingdom
Telephone: (0) 115 964 0777
Fax: (0) 115 964 0071
Email: info@watlow.co.uk
Website: www.watlow.co.uk
From outside The United Kingdom:
Tel: +44 115 964 0777
Fax: +44 115 964 0071

Asia and Pacific

Watlow Singapore Pte Ltd.
16 Ayer Rajah Crescent,
#06-03/04,
Singapore 139965
Tel: +65 6773 9488 Fax: +65 6778 0323
Email: info@watlow.com.sg Website: www.watlow.com.sg

Watlow Australia Pty., Ltd.
4/57 Sharps Road
Tullamarine, VIC 3043
Australia
Tel: +61 3 9335 6449
Fax: +61 3 9330 3566
Website: www.watlow.com

Watlow Electric Manufacturing Company (Shanghai) Co. Ltd.
Room 501, Building 10, KIC Plaza
290 Songhu Road, Yangpu District
Shanghai, China 200433
China
Phone
Local: 4006 Watlow (4006 928569)
International: +86 21 3381 0188
Fax: +86 21 6106 1423
Email: info@watlow.cn
Website: www.watlow.cn

ワトロー・ジャパン株式会社
〒101-0047 東京都千代田区内神田1-14-4

四国ビル別館9階
Tel: 03-3518-6630 Fax: 03-3518-6632

Email: infoj@watlow.com Website: www.watlow.co.jp

Watlow Japan Ltd.
1-14-4 Uchikanda, Chiyoda-Ku
Tokyo 101-0047
Japan

Tel: +81-3-3518-6630 Fax: +81-3-3518-6632
Email: infoj@watlow.com Website: www.watlow.co.jp
Watlow Korea Co., Ltd.
#1406, E&C Dream Tower, 46, Yangpyeongdong-3ga
Yeongdeungpo-gu, Seoul 150-103
Republic of Korea
Tel: +82 (2) 2628-5770 Fax: +82 (2) 2628-5771
Website: www.watlow.co.kr

Watlow Malaysia Sdn Bhd
1F-17, IOI Business Park
No.1, Persiaran Puchong Jaya Selatan
Bandar Puchong Jaya
47100 Puchong, Selangor D.E.
Malaysia
Tel: +60 3 8076 8745 Fax: +60 3 8076 7186
Email: vlee@watlow.com
Website: www.watlow.com

瓦特龍電機股份有限公司
80143 高雄市前金區七賢二路189號 10樓之一

電話: 07-2885168 傳真: 07-2885568

Watlow Electric Taiwan Corporation
10F-1 No.189 Chi-Shen 2nd Road Kaohsiung 80143
Taiwan

Your Authorized Watlow Distributor

TOTAL CUSTOMER SATISFACTION
3 Year Warranty