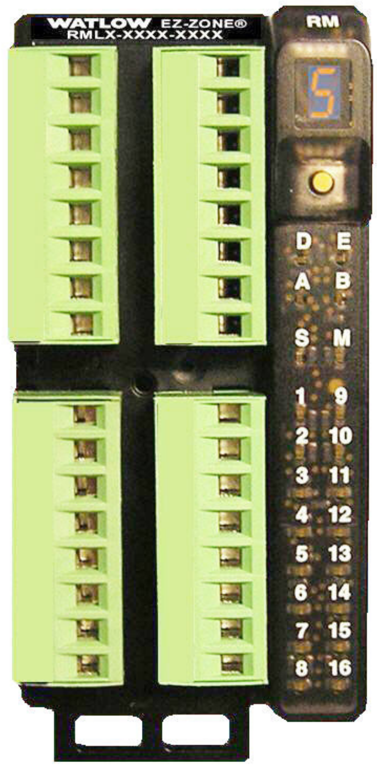
EZ-ZONE® RM Limit Module

User's Guide



RM Limit Module

WATLOW®
Powered by Possibility

TOTAL CUSTOMER SATISFACTION
3 Year Warranty

ISO 9001
Registered Company
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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.
7 PC	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.
c UL us 93RL LISTED PROCESS CONTROL EQUIPMENT	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
FM APPROVED	Unit has been reviewed and approved by Factory Mutual as a Temperature Limit Device per FM Class 3545 standard. See: www.fmglobal.com
CE	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 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 Limit 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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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 High Density (RMH) User's Guide, part number: 0600-0074-0000	This module extends the density of the standard RM modules (number of control loops and I/O points). The User Guide describes common usage, communications and the number I/O points available.
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 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/manuals.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® Rail Mount Limit Module (RML) is used in thermal applications to limit inadvertent over-temperature conditions. The RML controller provides multi-loop (12 loops maximum) safety assurance against instances where over or under temperature runaway conditions could occur from a shorted input sensor or an output device that could fail in a closed position. The RML is recommended for any application where thermal runaway could result in large product scrap costs, affect operator safety, cause damage to equipment, or create a fire hazard.

It just got a whole lot easier to solve the thermal requirements of your system. The EZ-ZONE RML module is provided in a space-saving, rail-mount package and is highly scalable where you only pay for what you need. Ordering options allow for 1 to 12 loops and for those applications that require the ability to configure/monitor over a network the Modbus RTU communication protocol is an option. Other communications protocols are also available (e.g., EtherNet/IP, DeviceNet, Modbus TCP and Profibus DP) when used in conjunction with a Rail Mount Access (RMA) module or when using a Remote User Interface/ Gateway (RUI/GTW).

Standard Features and Benefits

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)

FM Approved Over-under Limit with Auxiliary Outputs

- Increases user and equipment safety for over-under temperature conditions

Parameter Save & Restore Memory

- Reduces service calls and down time

Agency approvals: UL Listed, CSA, CE, RoHS, W.E.E.E. FM

- Assures prompt product acceptance
- Reduces end product documentation costs
- FM approval on Limit Models
- Semi F47-0200

Three-year warranty

- Demonstrates Watlow's reliability and product support

Touch-safe Package

- IP2X increased safety for installers and operators

Removable cage clamp wiring connectors

- Reliable wiring, reduced service calls
- Simplified installation

Programmable Menu System

- Reduces set up time and increases operator efficiency

Full-featured Alarms

- Improves operator recognition of system faults
- Control of auxiliary devices

A Conceptual View of the RML Module

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

It is useful to think of the controller in three parts: inputs, procedures and outputs. Information flows from an input to a procedure to an output when the controller is properly configured. An RML controller can carry out several procedures at the same time, e.g., monitoring for several different alarm situations, monitoring and acting upon digital inputs and driving output devices such as audible alarms, lights and contactors. Each process needs to be thought out carefully and the controller's inputs, procedures and outputs set up properly.

Inputs

The inputs provide the information that any given programmed procedure can act upon. Simply stated, this information may come from an operator pushing a button or from a sensor monitoring the temperature of a part being heated or cooled.

Each analog input typically uses a thermocouple, 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. The settings in the Analog Input Menu (Setup Page) for each analog input must be configured to match the device connected to that input.

Each digital input reads whether a device is active or inactive. An RML 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 in the 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 the limit could trip a contactor removing power from the heating element to avoid damaging the load.

To set up a function, it's important to tell it what source, or instance, to use. For example, if the control is equipped with digital inputs they can be configured 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 RML module can be equipped with up to 7 digital inputs, instance 1 - 6 and or 9. 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 -16) 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 Limit Control an output can be configured to respond to an alarm, i.g., (instance 15) or to a limit condition.

You can assign more than one output to respond to a single instance of a function. For example, alarm 2 could be used to trigger a light connected to output 1 and a siren connected to digital output 5.

Input Events and Output Events

Input events are internal states that are set by the digital inputs. Digital Input 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 reset a tripped limit condition.

Module Limit

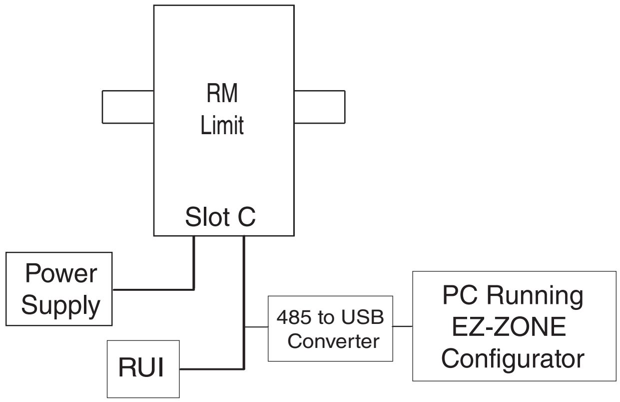
This function allows the user to setup a single output to reflect an energized (safe) or deenergized (tripped) state for the module. If any configured limit is tripped (process value exceeds set point or limit input has malfunctioned), the output assigned to serve as this function will come on. By default (factory settings), output 8 is assigned this function where any output of choice can be configured as such.

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.

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

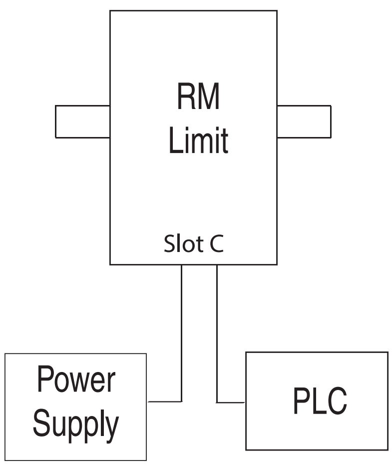
In this configuration the RUI and PC are connected to the RML module via Watlow's Standard Bus where both will be able to talk directly to the RML module.



In the graphic above the PC running EZ-ZONE Configurator software and or the RUI can be used to configure and then monitor the RML and other modules connected to it.

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

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



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

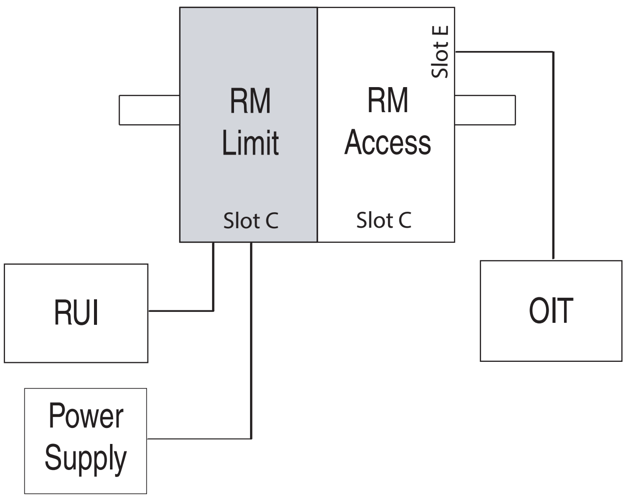
Note:

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 RML 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.

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

In this configuration the RML 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 RML 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

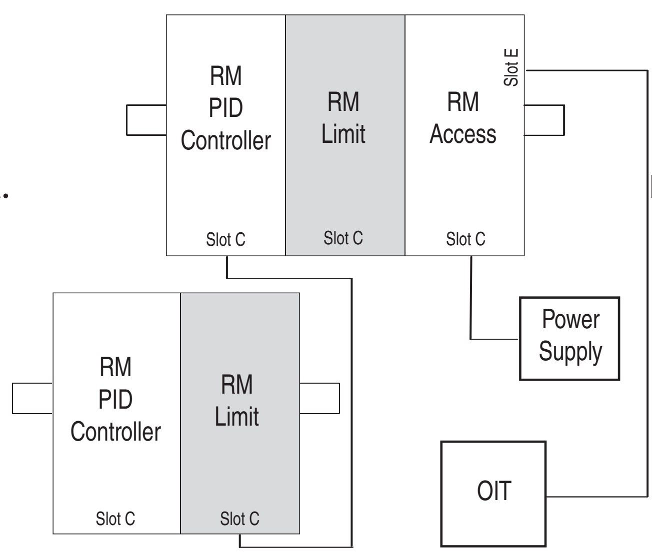


Notice that in the example above that there is an optional RUI connected to the RML along with the OIT. OIT's are not generally used to configure a control but are used more for run-time information. As an alternative for configuration the RUI could be used to configure and monitor in a remote location.

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

RML Connected to a Split Rail with OIT

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

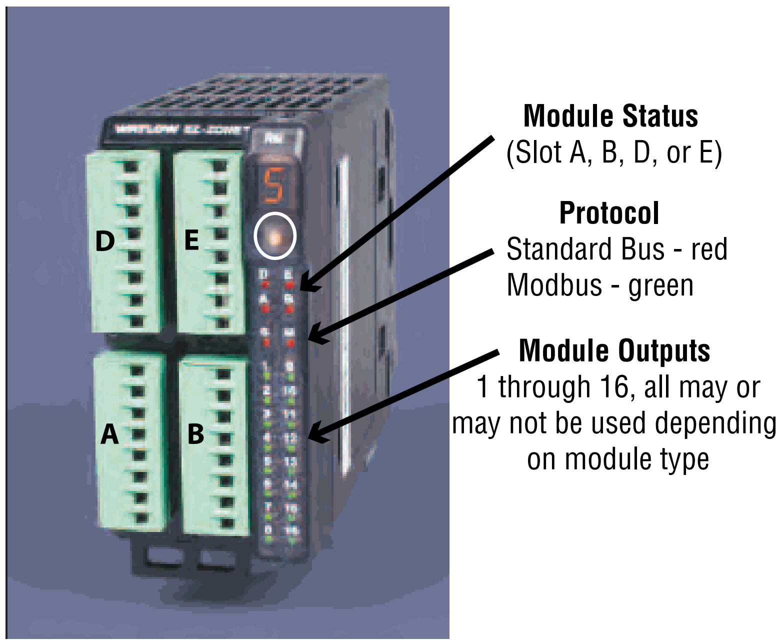


Module Orientation

The picture that follows represents one of several different RM modules. All of them will have four slots on the face (slot A, B, D, and E) and one on the bottom (slot C) not shown. All of these slots are not always used on all modules. On the face of the module there is a button (yellow circle) under the Zone address (5). When pushed and held it has the following functions:

1. For any module, push and hold for ~ 2 seconds to change the Zone address
2. When a module is equipped with the Modbus protocol (RMxxxxxxxxxx1xx) pushing and holding this button for ~ 6 seconds the LED display will return P for protocol. Releasing the button and then pushing it again (within 6 seconds) the display will toggle between M (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 RMA (Access) module is shipped at address J or 17 and is the only module that can have its address set above 16.

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 set limit and alarm set points.

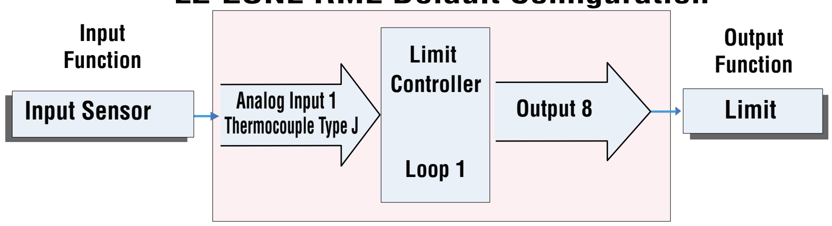
The default RML loop configuration out of the box is shown below:

- Analog Input functions are set to thermocouple, type J (to change go to the Setup Page)
- Limit sides set to both, high and low (to change go to the Setup Page)
- Output 8 set to module limit (to change go to the Setup Page)
- Limit low set point set to 0°F (to change go to the Operations Page)
- Limit high set point set to 0°F (to change go to the Operations Page)
- Limit is deenergized, also referred to as a tripped state

Once the control has been wired and setup, power up the control and change the appropriate limit set points (high and or low) to the desired value (on the RUI push the up and or down arrow key). Once the set point is set to the desired level, reset the limit by using one of the four methods described below:

1. Use a digital input, function key or a variable to reset the limit
2. Using an RUI, push the green Advance Key and then the Infinity Key
3. If RML is equipped with Modbus RTU, send the enumerated value of zero (0) to register 1490, loop 1 (see the Operations Page, Limit Menu)
4. Cycle power on the control

EZ-ZONE RML Default Configuration



Note:

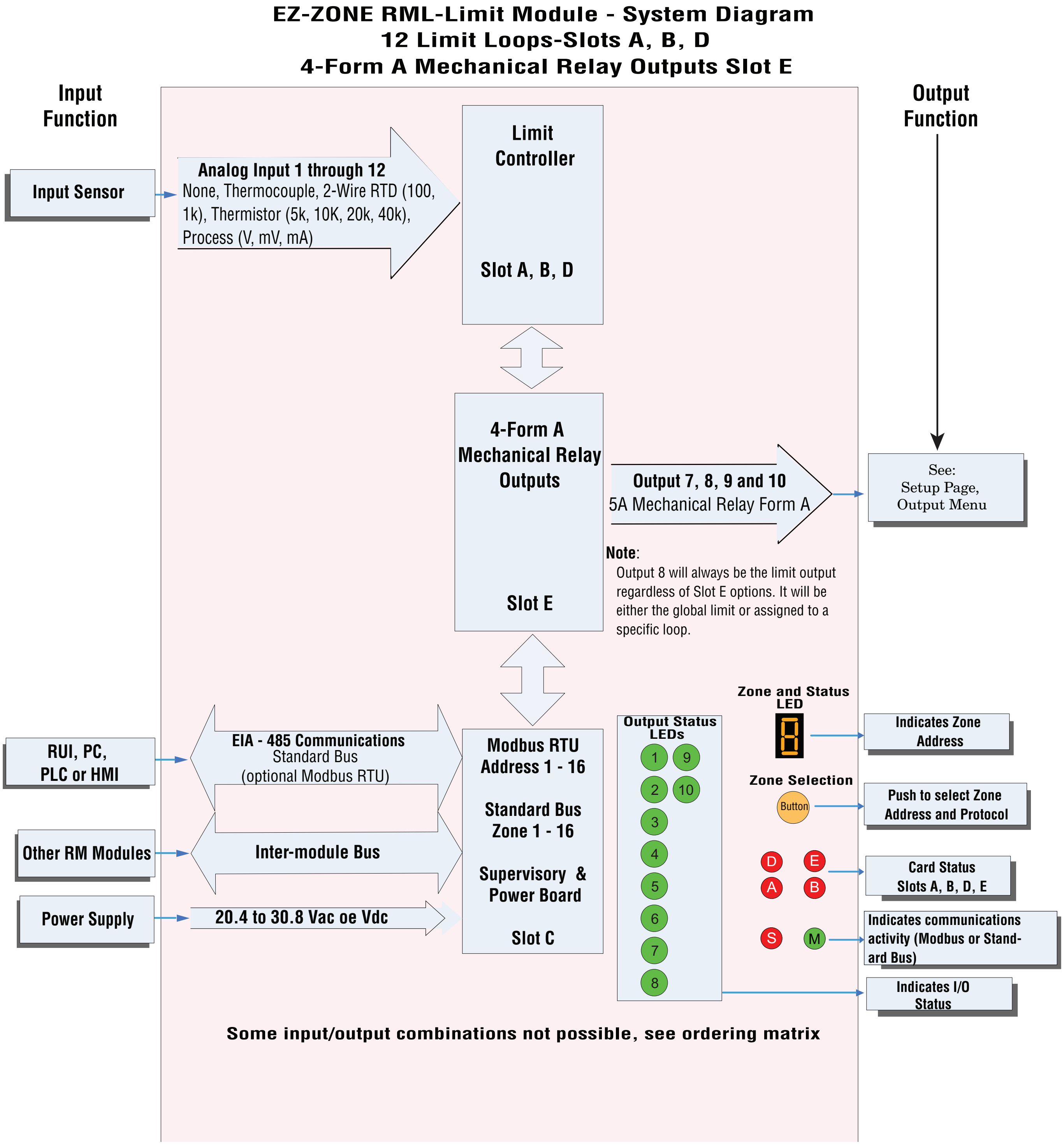
Output 8 will default as a module limit. As a module limit, the LED will be illuminated when one or more limit loops is in a tripped (de-energized) state. When the module is in a safe state the output LED will be off.

The RML 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).

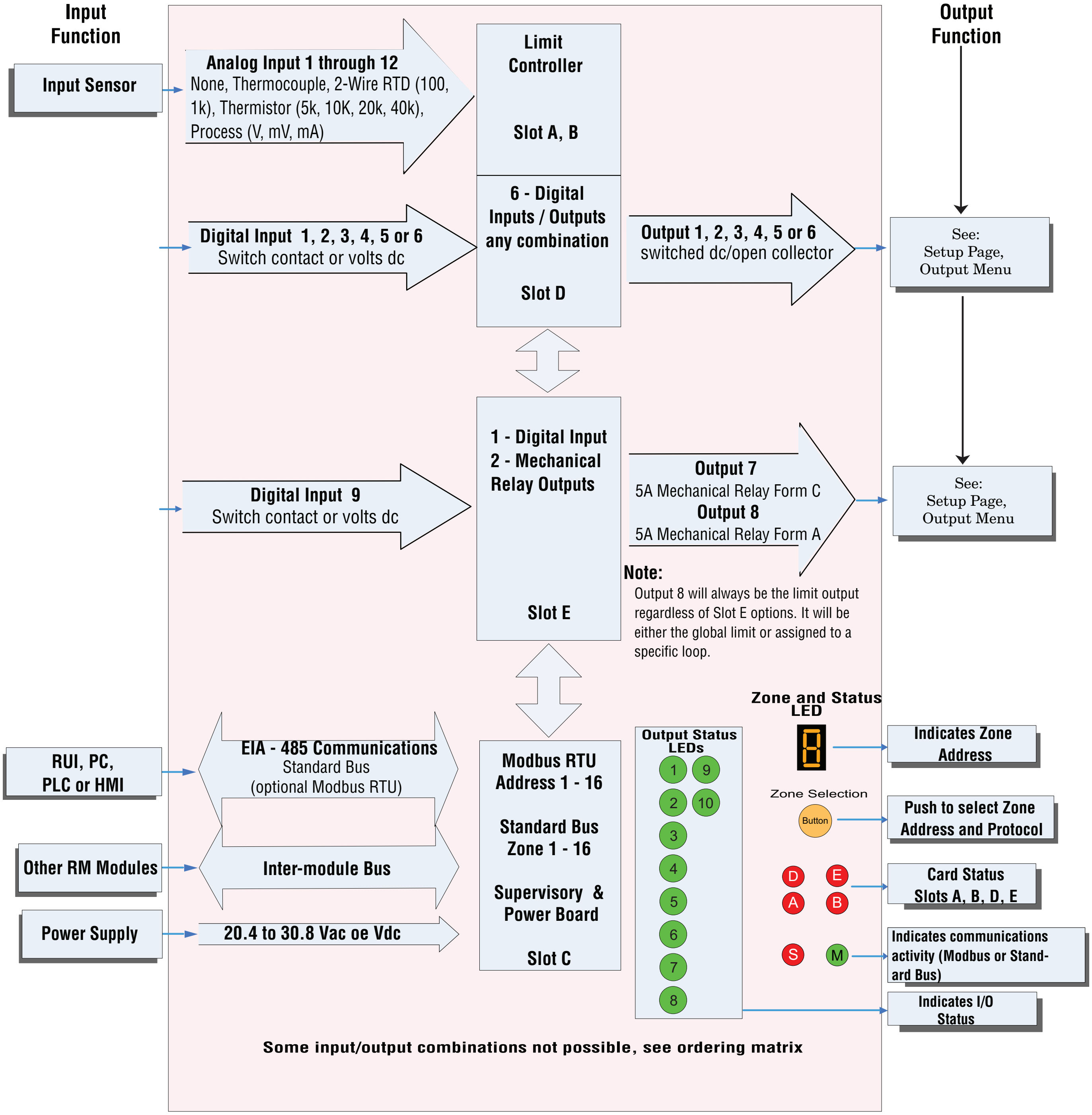
Note:

The menu navigation as described below applies when the RML 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 limit sides (high and or low), change the input type, 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 change the limit high/low set point or perhaps change an alarm set point.
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. **Note:** The Home Page is visible only when using the RUI.	Pushing the green Advance Key ◉ and then the Infinity Key ∞ will reset a limit if tripped (if trip condition no longer exists); or, by pushing the green Advance Key ◉ the limit high and or low set points could be displayed and changed using the up and down keys (▲ ▼).


EZ-ZONE RML-Limit Module - System Diagram
12 Limit Loops-Slots A, B, D
4-Form A Mechanical Relay Outputs Slot E
Input Function
Output Function
Input Sensor
Analog Input 1 through 12
None, Thermocouple, 2-Wire RTD (100, 1k), Thermistor (5k, 10K, 20k, 40k), Process (V, mV, mA)
Limit Controller
Slot A, B, D
4-Form A Mechanical Relay Outputs
Slot E
Output 7, 8, 9 and 10
5A Mechanical Relay Form A
See: Setup Page, Output Menu
Note:
Output 8 will always be the limit output regardless of Slot E options. It will be either the global limit or assigned to a specific loop.
Zone and Status LED
Indicates Zone Address
Output Status LEDs
1
9
2
10
3
4
5
6
7
8
Zone Selection
Button
Push to select Zone Address and Protocol
D
E
A
B
Card Status Slots A, B, D, E
S
M
Indicates communications activity (Modbus or Standard Bus)
Indicates I/O Status
RUI, PC, PLC or HMI
EIA - 485 Communications
Standard Bus
(optional Modbus RTU)
Other RM Modules
Inter-module Bus
Power Supply
20.4 to 30.8 Vac oe Vdc
Modbus RTU Address 1 - 16
Standard Bus Zone 1 - 16
Supervisory & Power Board
Slot C
Some input/output combinations not possible, see ordering matrix

EZ-ZONE RML-Limit Module - System Diagram
6-Digital Inputs or Output Card in Slot D
1-Digital Input/2 Mechanical Relay Outputs Slot E



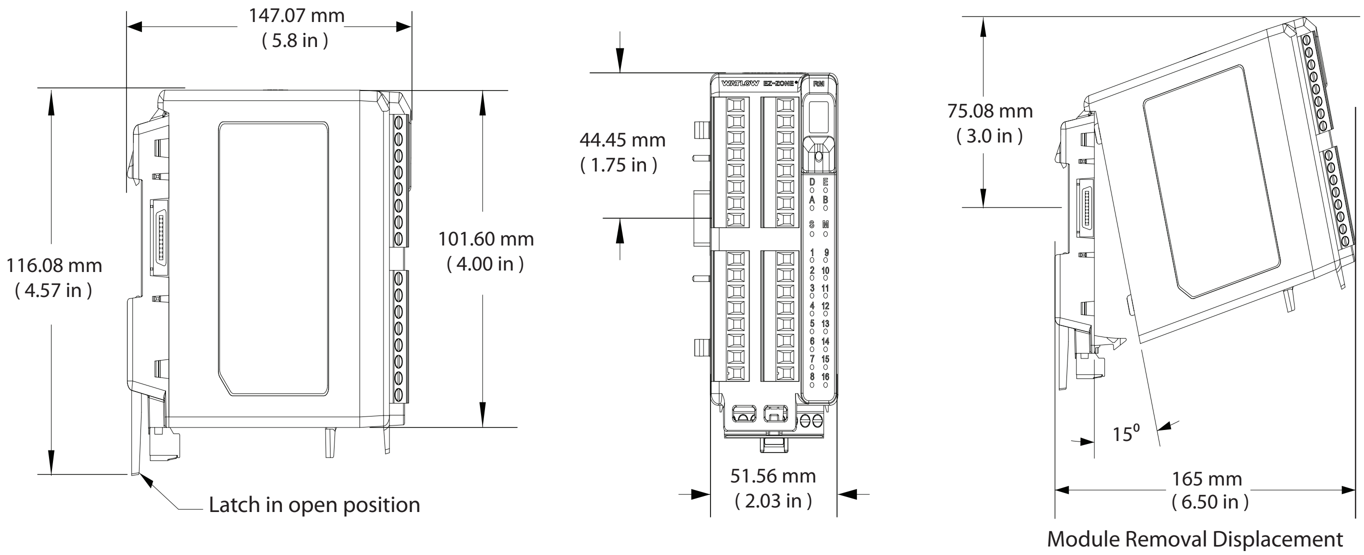
Chapter 2: Install and Wire

Dimensions

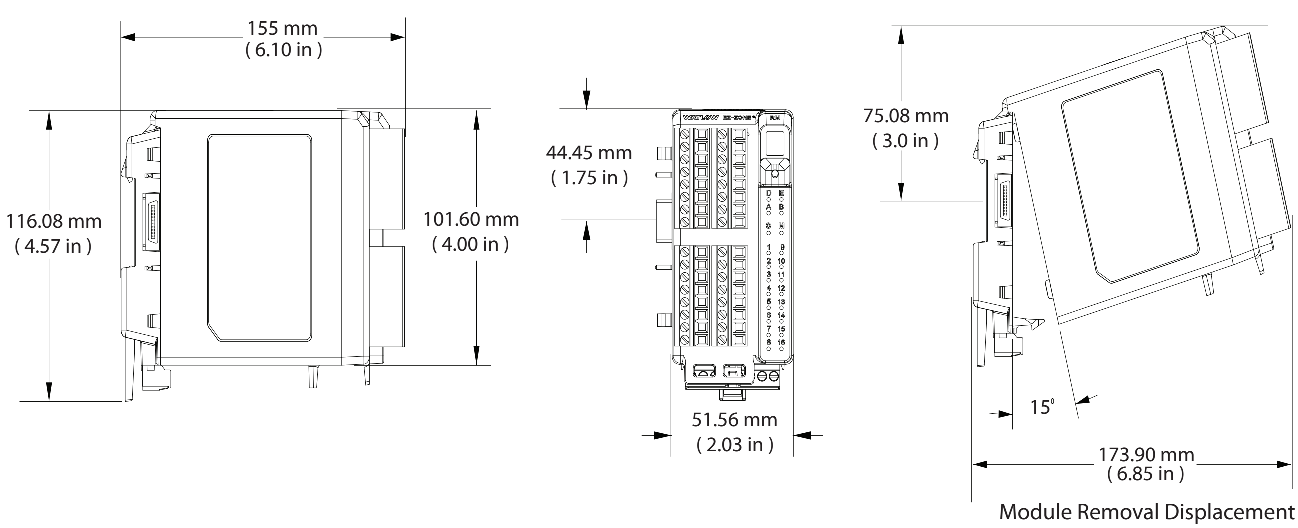
As can be seen below the dimensions of the RML module will change slightly based on the type of connector used.

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

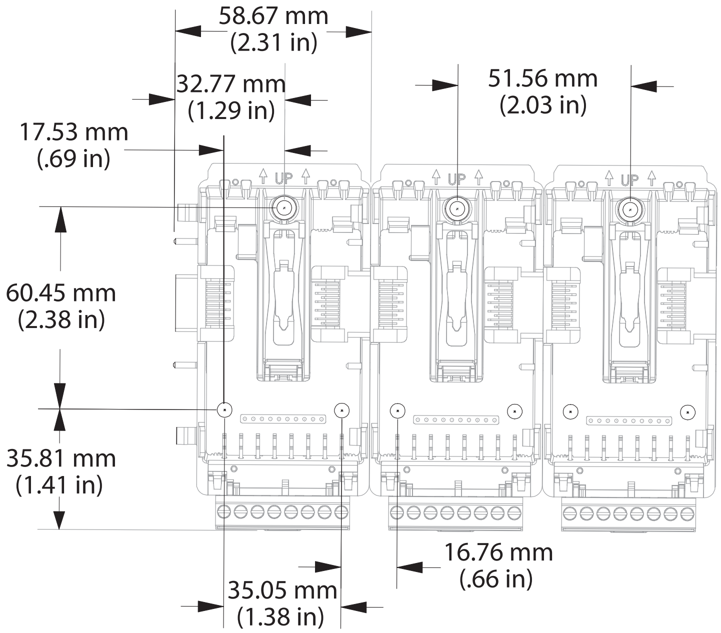


Module Removal Clearance Straight Connectors



Dimensions (cont.)

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



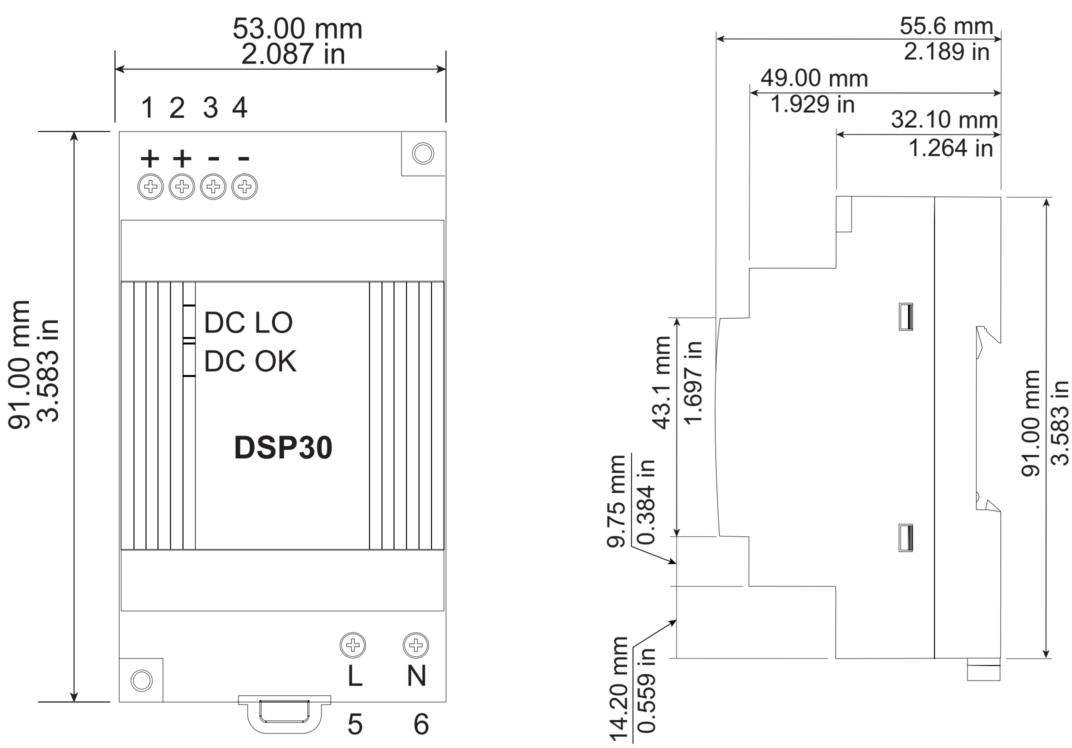
The view above is representative of the modular backplane without the module.

Recommended chassis mount hardware:

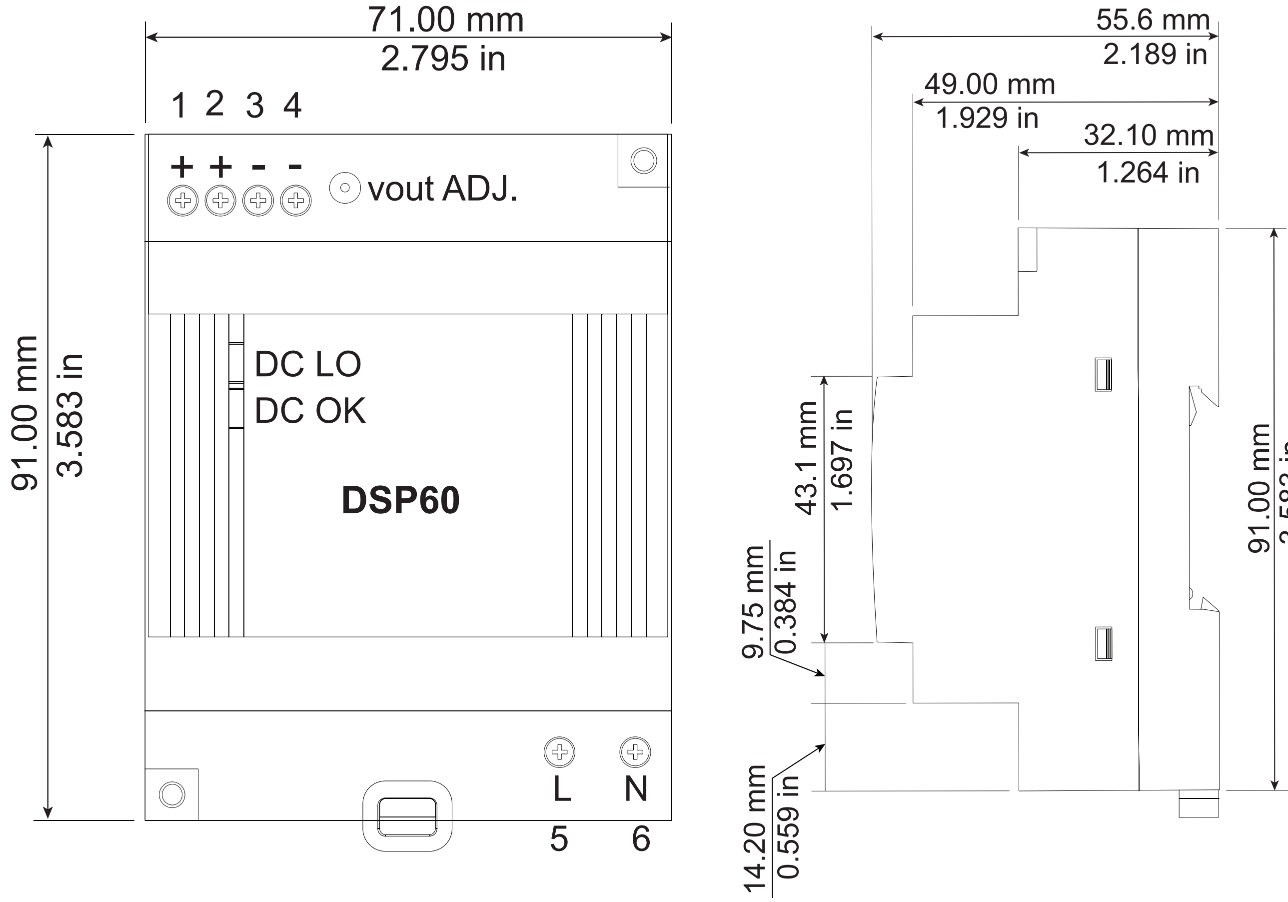
1. #8 screw, 3/4" long
2. Torque to 10 -15 in-lb
3. No washers of any kind

Power Supplies

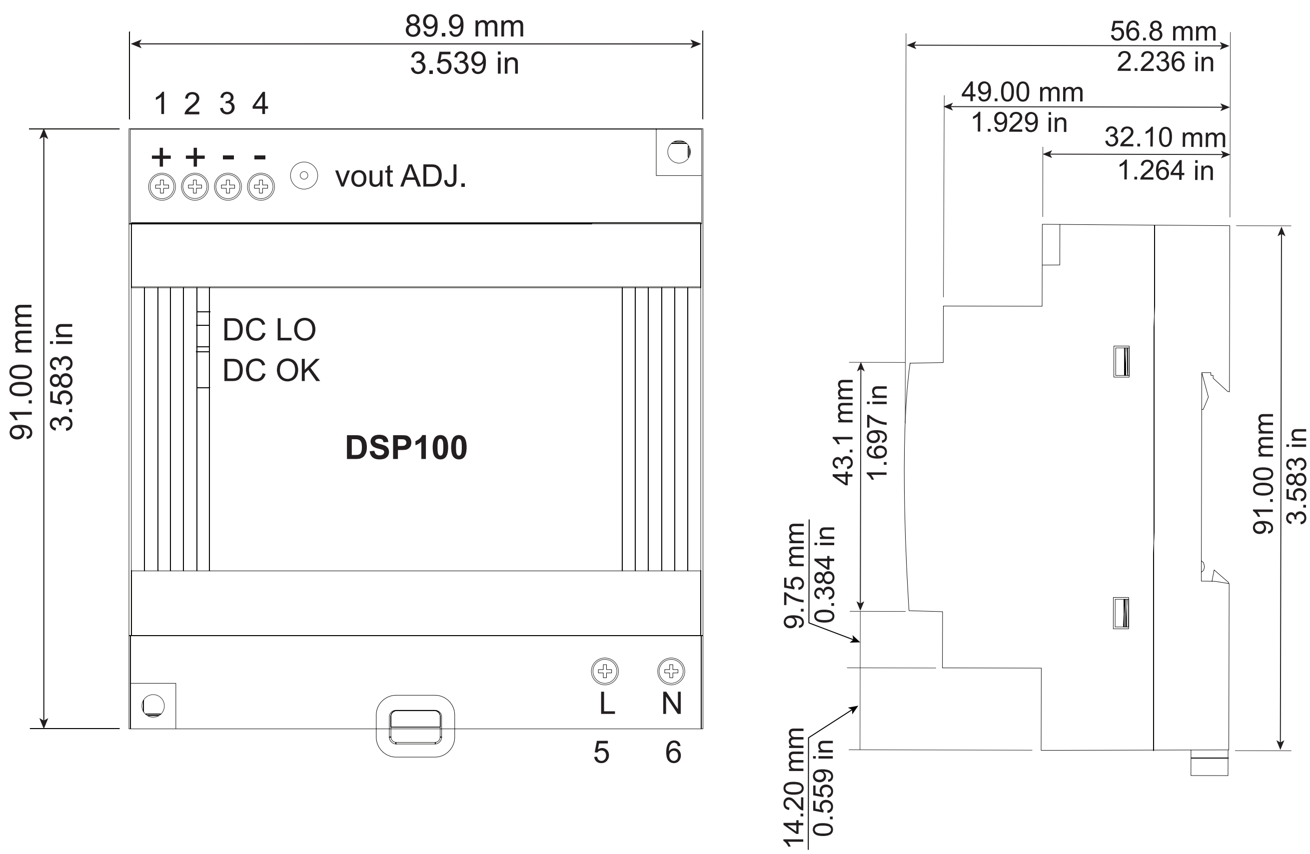
DSP 30



DSP 60



DSP 100



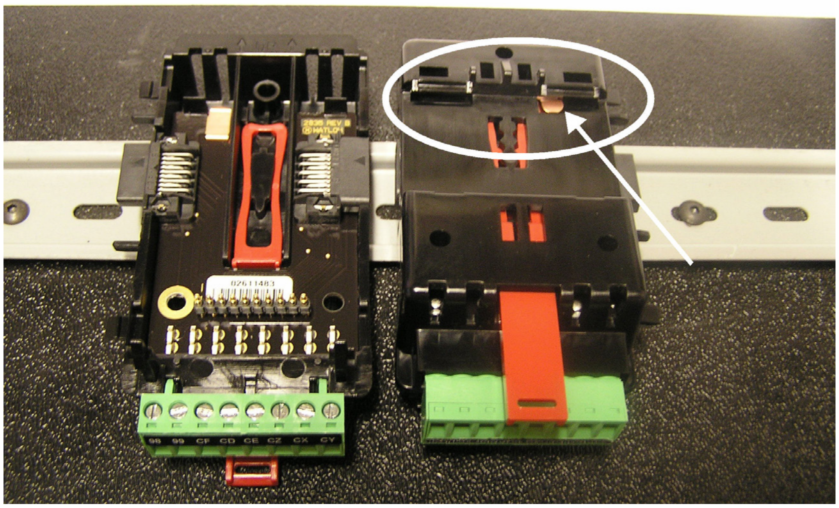
Power Supply Specifications				
		DSP 30	DSP60	DSP100
AC Input Voltage Range	VAC	90 - 264VAC, Class II double insulated (No ground connection required)		
Input Frequency	Hz	47 - 63Hz		
DC Input Voltage range	VDC	120 - 370VDC		
Inrush Current (115 / 230VAC)	A	25 / 50A	30 / 60A	30 / 60A
Output Voltage 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

DIN Rail Installation and Removal

Modular Backplane Connector

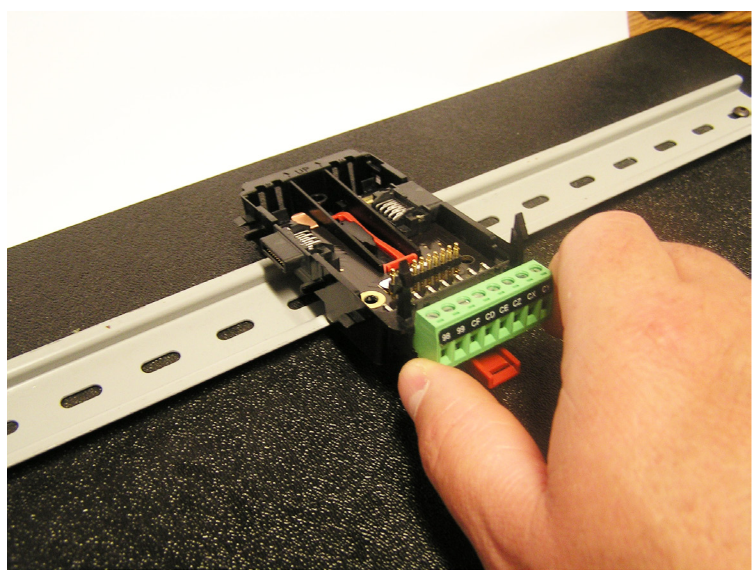
The picture on the right shows the Modular Backplane Connector, both front and rear view. The rear view is bringing in to focus a metal clip. If the DIN rail is grounded the Modular Backplane Connector and the module connected to it will be also (recommended).



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:

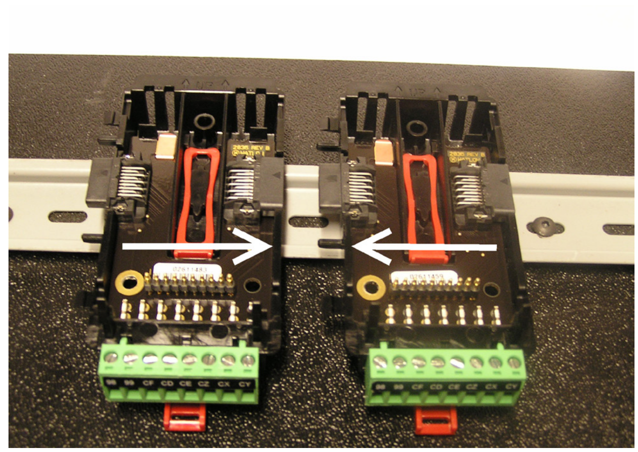
For easy removal and placement of modules it is recommended that there be a 76.2 mm (3.00 in) clearance on the top, bottom and front of each module.

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.

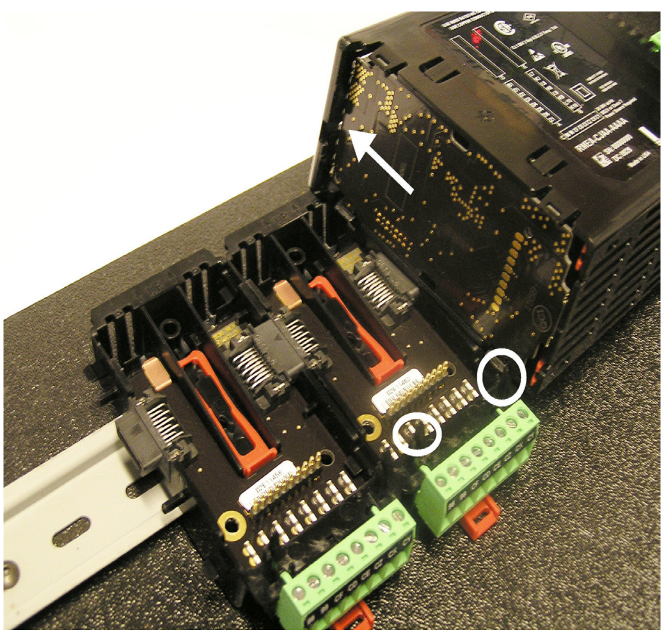


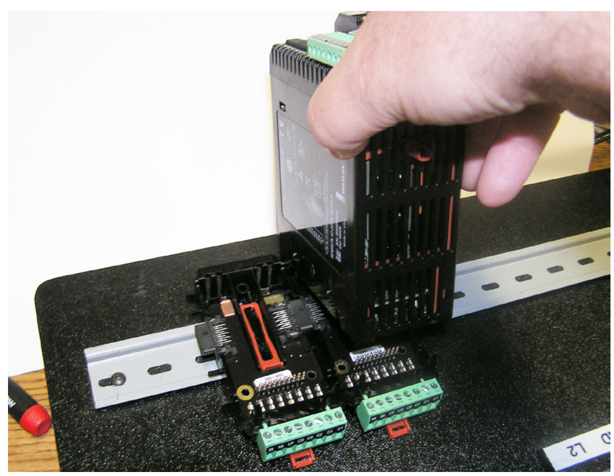
Module Installation

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).

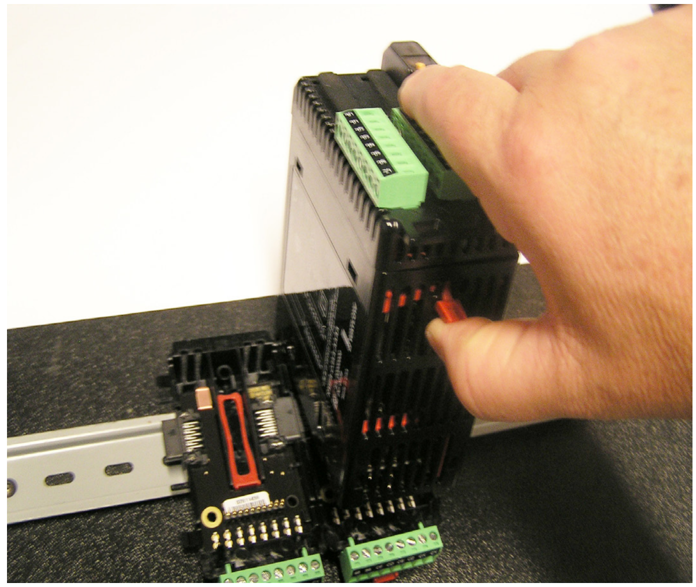




Module Removal

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

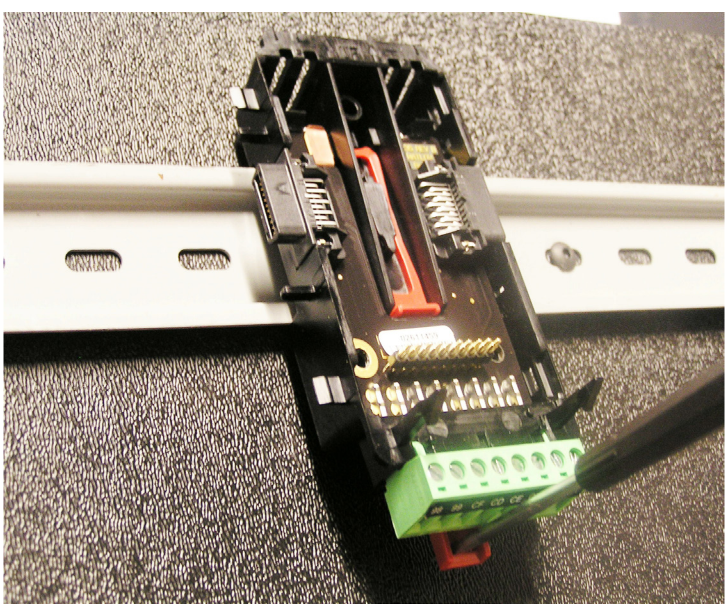
1. Find the red tab protruding from the bottom of the module and pull back on it as shown to the right.
2. Pull back on the red tab, the two mounting posts will then release the module.
3. Lift the module up and slide it up; this will release the module lip from the backplane.



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

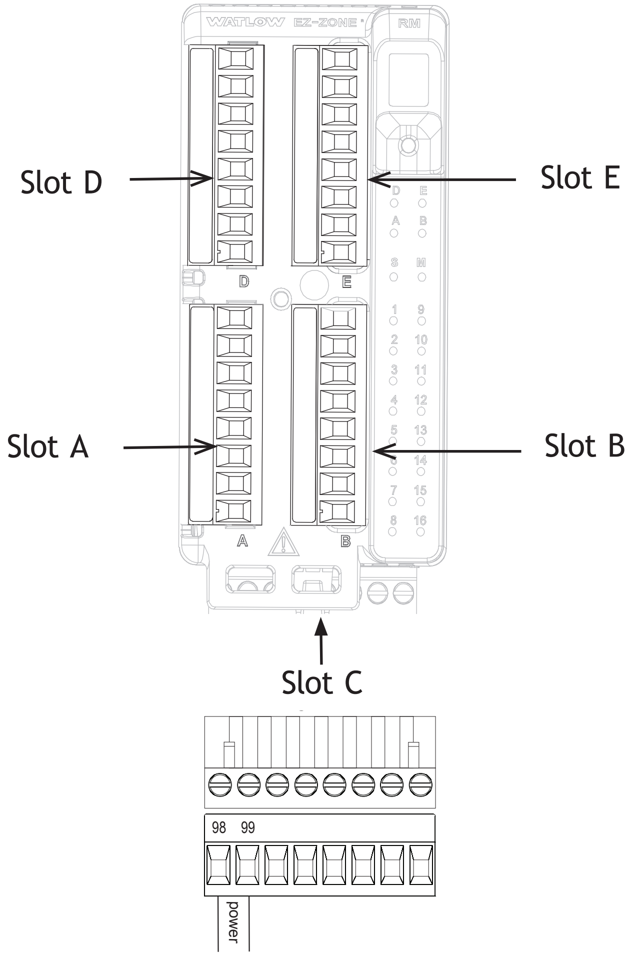
Limit Module (RMLx-xxxx-xxxx)					
Slot A	**Slot B**	**Slot D**	**Slot E**	**Terminal Function**	**Configuration**
Inputs				Universal, RTD and Thermistor Inputs 1 -12	
1 - 4	5 - 8	9 - 12	- - -		
S1	S5	S9	- - -		Universal/Thermistor Input
R1	R5	R9	- - -		Part # Digits 5, 6, 7
S2	S6	S10	- - -	S_ (RTD), thermocouple -, volts -, mA -, potentiometer or thermistor	Input 1-4: RMLx-**(5,6)**xxx-xxxx
R2	R6	R10	- - -		Input 5-8: RMLx-x**(5,6)**xx-xxxx
S3	S7	S11	- - -	R_ (RTD), thermocouple +, volts +, mA +, potentiometer wiper or thermistor	Input 9-12: RMLx-xx**(5,6)**x-xxxx
R3	R7	R11	- - -		
S4	S8	S12	- - -		
R4	R8	R12	- - -		
				Digital Inputs 1 - 6	
- - -	- - -	1 - 6	- - -		
- - -	- - -	B1	- - -	Common	Digital Inputs (DI)
- - -	- - -	D1	- - -	DC +input	Part # Digit 7
- - -	- - -	D2	- - -	DC +input	Slot A: Option not valid
- - -	- - -	D3	- - -	DC +input	Slot B: Option not valid
- - -	- - -	D4	- - -	DC +input	Slot D: RMLx-xx**(C)**x-xxxx
- - -	- - -	D5	- - -	DC +input	Slot E: Option not valid
- - -	- - -	D6	- - -	DC +input	
- - -	- - -	Z1	- - -	Internal Supply	
				Digital Input 9	
- - -	- - -	- - -	9		
- - -	- - -	- - -	- - -		Digital Input (DI)
- - -	- - -	- - -	- - -		Part # Digit 8
- - -	- - -	- - -	- - -		Slot A: Option not valid
- - -	- - -	- - -	- - -		Slot B: Option not valid
- - -	- - -	- - -	- - -		Slot D: Option not valid
- - -	- - -	- - -	- - -		Slot E: RMLx-xxx**(B)-**xxxx
- - -	- - -	- - -	B9	Common	
- - -	- - -	- - -	D9	DC +input	
Outputs				Form A - Mechanical Relay Outputs 1- 4 and 7 - 10	
- - -	- - - -	1 - 4	7 - 10		
- - -	- - -	L1	L7	normally open	Mechanical Relay 5 A, Form A
- - -	- - -	K1	K7	common	Part # Digits 7, 8
- - -	- - -	L2	L8	normally open	Slot D: : RMLx-xx**(J)**x-xxxx
- - -	- - -	K2	K8	common	Slot E: : RMLx-xxx**(J)-**xxxx
- - -	- - -	L3	L9	normally open	
- - -	- - -	K3	K9	common	
- - -	- - -	L4	L10	normally open	
- - -	- - -	K4	K10	common	

Wiring (cont.)

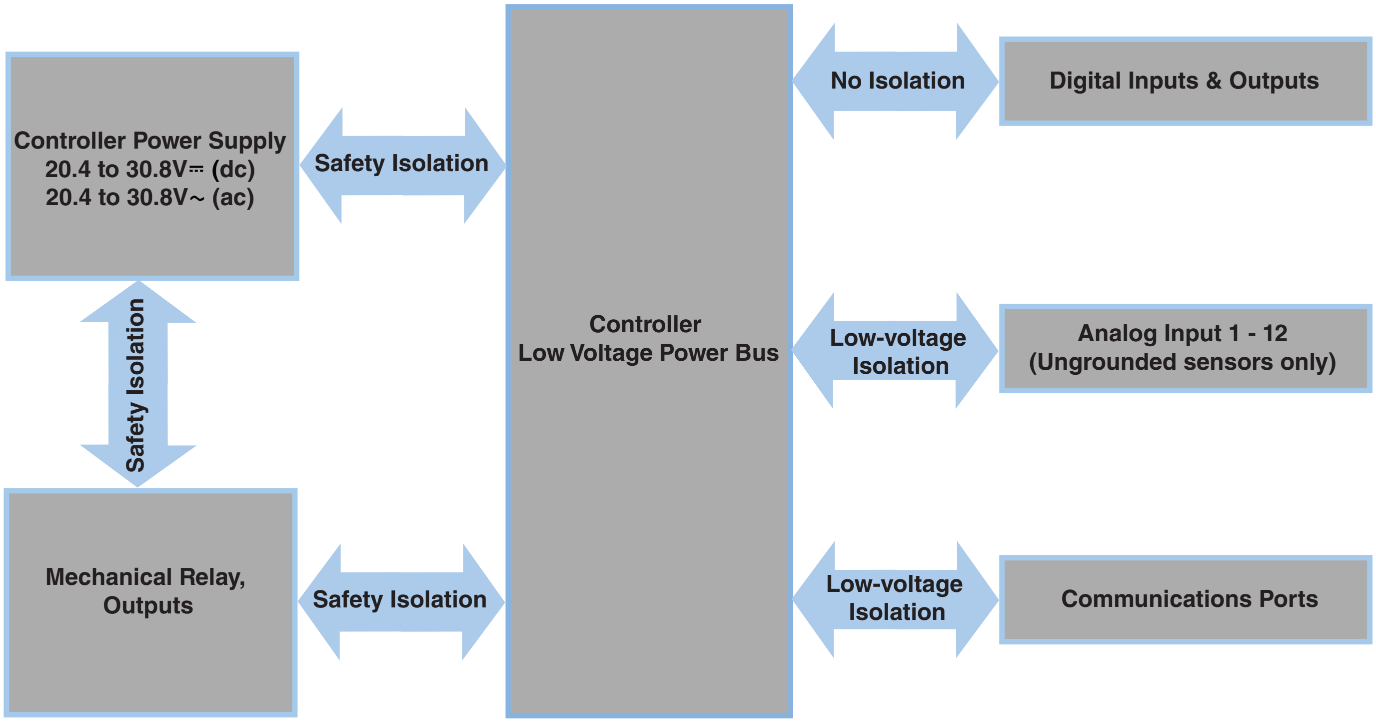
Outputs				Form C - Mechanical Relay Output 7 and Form A - Mechanical Relay Output 8	
Slot A	**Slot B**	**Slot D**	**Slot E**	**Terminal Function**	**Configuration**
- - -	- - - -	- - -	7 - 8		
- -	- -	- -	L7 K7 J7 L8 K8 - - - - - - - - -	normally open common normally closed normally open common	Form C and Form A Relay Outputs Part # Digit 8 Slot A: Option not valid Slot B: Option not valid Slot D: Option not valid Slot E: RMLx-xxx(**B)-**xxxx
				Digital Outputs 1 - 6	
- - -	- - -	1 - 6	- - -		
- -	- -	B1 D1 D2 D3 D4 D5 D6 Z1	- -	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 Slot A: Option not valid Slot B: Option not valid Slot D: RMLx-xx(**C**)x-xxxx Slot E: Option not valid

Power and Communications		
Slot C		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 RMLx-xxxx-x(**A**)xx
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 RMLx-xxxx-x(**1**)xx
CZ CX CY	Inter-module Bus Inter-module Bus Inter-module Bus	Inter-module Bus

RML Module - Front View -
Standard Connector



RML 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)
- 0.57 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.

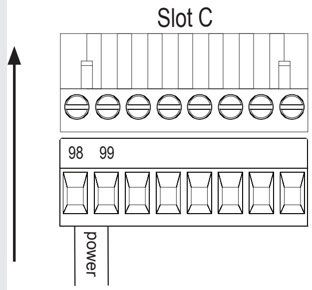
Note:

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

Controller Module Wiring (RMLx-xxxx-xxxx)

Low Power

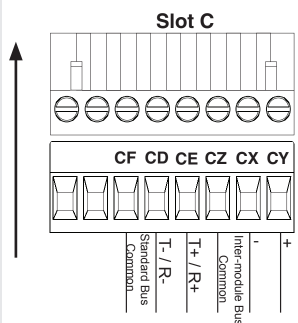
RML - All Model Numbers



- 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

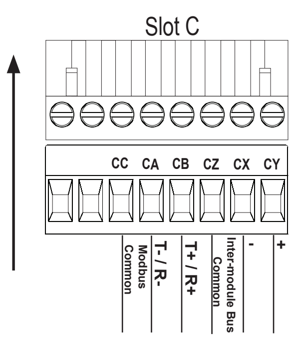
RML Part # Digit 10 is A



- 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

RML 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 mm^2 (30 to 12 AWG) single-wire termination or two 1.31 mm^2 (16 AWG)
- 0.57 Nm (5.0 in-lb.) torque

Note:

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

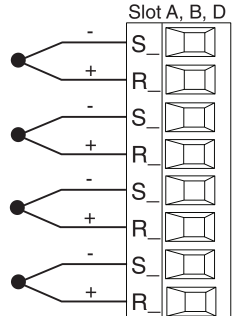
Note:

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

Note:

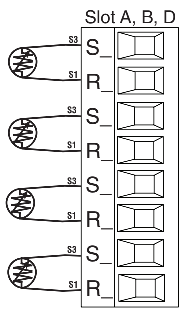
Maintain electrical isolation between digital input-outputs, switched dc/open collector outputs and process outputs to prevent ground loops.

Inputs 1 through 12 Thermocouple — RML Part # Digits 5, 6, 7



- 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: RMLx - (5)xxx - xxxx
- Input 5 - 8: RMLx - x(5)xx - xxxx
- Input 9 - 12: RMLx - xx(5)x - xxxx

Inputs 1 through 12 RTD — RML Part # Digits 5, 6, 7

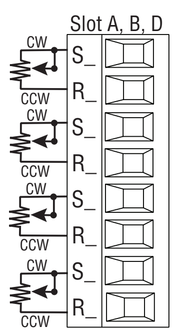


- Platinum, 100 and 1,000 Ω @ 0°C
- Calibration to DIN curve (0.00385 Ω/Ω/°C)
- 20 Ω total lead resistance
- RTD excitation current of 0.09 mA typical. Each ohm of lead resistance may affect the reading by 0.03°C for 100 Ω.

Input 1 - 4: RMLx - (5)xxx - xxxx
Input 5 - 8: RMLx - x(5)xx - xxxx
Input 9 - 12: RMLx - xx(5)x - 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

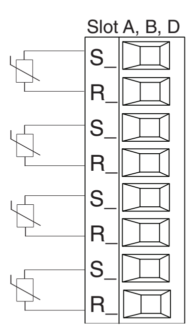
Inputs 1 through 12 Potentiometer — RML Part # Digits 5, 6, 7



- Use a 1 kΩ potentiometer.

Input 1 - 4: RMLx - (5)xxx - xxxx
Input 5 - 8: RMLx - x(5)xx - xxxx
Input 9 - 12: RMLx - xx(5)x - xxxx

Inputs 1 through 12 Thermistor — RML Part # Digits 5, 6, 7



- >20 MΩ input impedance

Input 1 - 4: RMLx - (6)xxx - xxxx
Input 5 - 8: RMLx - x(6)xx - xxxx
Input 9 - 12: RMLx - xx(6)x - xxxx

Warning: ⚠

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

Note:

Maximum wire size termination and torque rating:

- 0.0507 to 3.30 mm² (30 to 12 AWG) single-wire termination or two 1.31 mm² (16 AWG)
- 0.57 Nm (5.0 in-lb.) torque

Note:

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

Note:

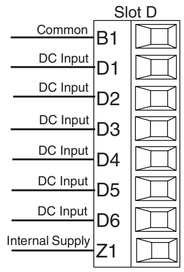
To prevent damage to the controller, do not connect wires to unused terminals.

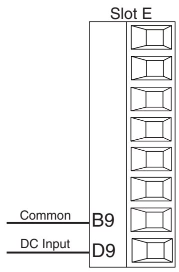
Note:

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

Digital Inputs 1 through 6 and 9

RML Part # Digit 7, 8





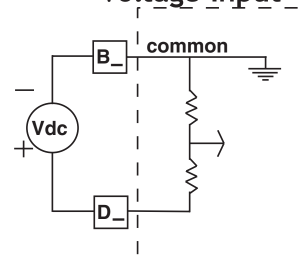
Digital Input Event Conditions

- 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 RMLx-x(C)xx-xxxx
  - Slot E, DI 9 RMLx-xxx(B)-xxxx

Note:

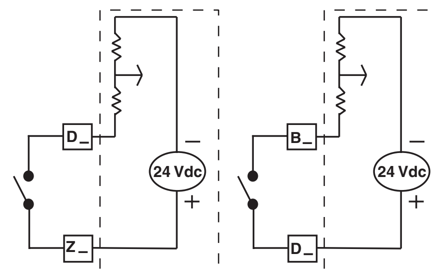
When using a dry contact with Digital Input 9 (Slot E), notice that the connection is made between pins B9 and D9.

Voltage Input



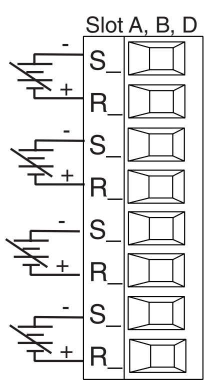
Dry Contact

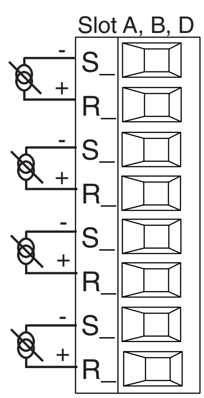
Slot D Slot E



Process Inputs 1 through 12

RML Part # Digits 5, 6, 7





- 0 to 20mA @ 100 Ω input impedance
- 0 to 10V⎓ (dc) @ 20kΩ input impedance
- 0 to 50mV⎓ (dc) @ 20MΩ input impedance
- Scalable

Inputs 1 - 4: RMLx - (5)xxx - xxxx
Input 5 - 8: RMLx - x(5)xx - xxxx
Input 9 - 12: RMLx - xx(5)x - xxxx

Warning: ⚠

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

Note:

Maximum wire size termination and torque rating:

- 0.0507 to 3.30 mm^2 (30 to 12 AWG) single-wire termination or two 1.31 mm^2 (16 AWG)
- 0.57 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:

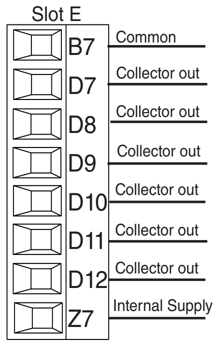
Maintain electrical isolation between digital input-outputs, switched dc/open collector outputs and process outputs to prevent ground loops.

Quencharc Note:

Switching pilot duty inductive loads (relay coils, solenoids, etc.) with the mechanical relay, solid state relay or open collector output options requires use of an R.C. suppressor.

Digital Outputs 1 - 6

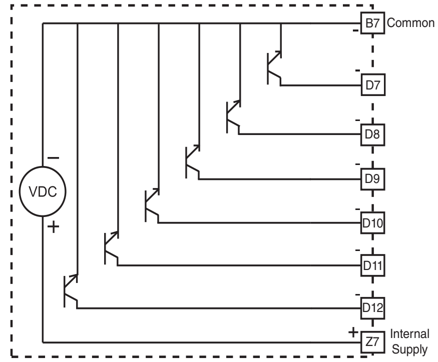
RML Part # Digit 7



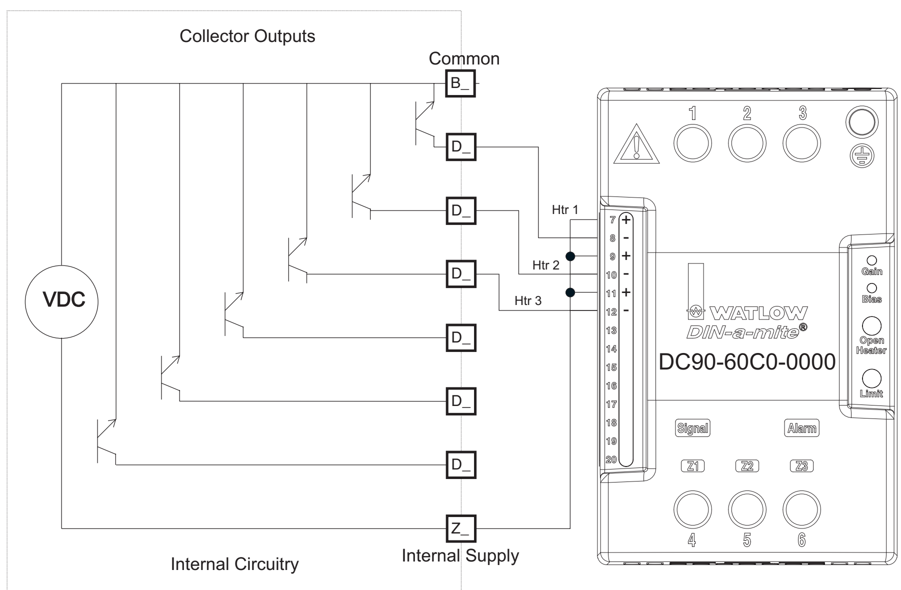
- Maximum switched voltage is 32V⎓ (dc)
- Internal supply provides a constant power output of 750mW
- Maximum output sink current per output is 1.5A (external class 2 or *SELV supply required)
- Total sink current for all outputs not to exceed 8A
- Do not connect outputs in parallel

- Slot D DO 1 - 6 RMLx-xx(**C**)x-xxxx

*Safety Extra Low Voltage



Switched DC Wiring Example Using DO 1-6



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 Z1 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)
- 0.57 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.

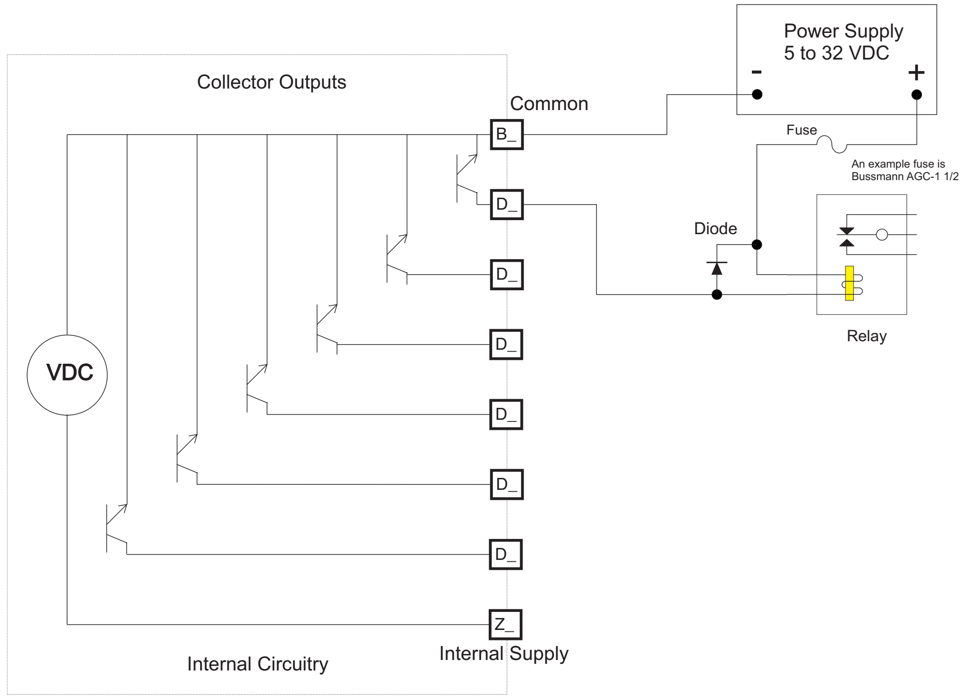
Note:

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

Quencharc Note:

Switching pilot duty inductive loads (relay coils, solenoids, etc.) with the mechanical relay, solid state relay or open collector output options requires use of an R.C. suppressor.

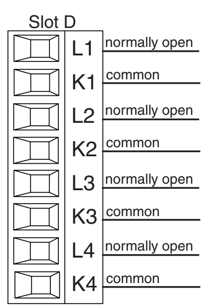
Open Collector Wiring Example Using DO 1-6

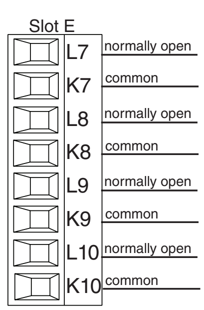


As an open collector output (see graphic below), use an external power supply with the negative wired to B1, the positive to the coil of a pilot mechanical relay and the other side of the coil wired to the output of choice (D_). Each open collector output can sink 1.5 A with the total for all open collector 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

RML Part # Digit 7, 8



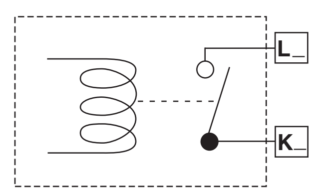


- 5 A at 240V~ (ac) or 30V⎓ (dc) maximum resistive load
- 20 mA at 24V minimum load
- 125 VA pilot duty @ 120/240V~ (ac), 25 VA at 24V~ (ac)
- 100,000 cycles at rated load
- Output does not supply power.
- For use with ac or dc

See Quencharc note.

- Slot D Outputs 1 - 6, RMLx-xx(J)x-xxxx
- Slot E Outputs 7 - 10, RMLx-xxx(J)-xxxx

Mechanical Relay Form A



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)
- 0.57 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:

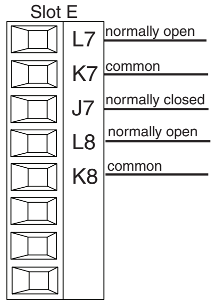
Maintain electrical isolation between digital input-outputs, switched dc/open collector outputs and process outputs to prevent ground loops.

Quencharc Note:

Switching pilot duty inductive loads (relay coils, solenoids, etc.) with the mechanical relay, solid state relay or open collector output options requires use of an R.C. suppressor.

Output 7 and 8 Mechanical Relays, Form A

RML Part # Digit 8

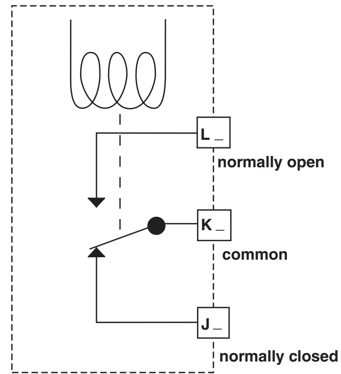


- 5 A at 240V~ (ac) or 30V⎓ (dc) maximum resistive load
- 20 mA at 24V minimum load
- 125 VA pilot duty at 120/240V~ (ac), 25 VA at 24V~ (ac)
- 100,000 cycles at rated load
- Output does not supply power.
- For use with ac or dc

See Quencharc note.

- Slot E Output 7
  RMLx-xxx(B)-xxxx

Mechanical Relay Form C

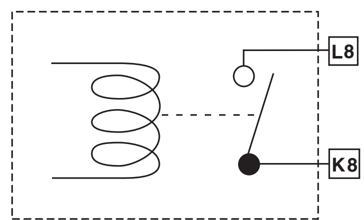


- 5 A at 240V~ (ac) or 30V⎓ (dc) maximum resistive load
- 20 mA at 24V minimum load
- 125 VA pilot duty @ 120/240V~ (ac), 25 VA at 24V~ (ac)
- 100,000 cycles at rated load
- Output does not supply power.
- For use with ac or dc

See Quencharc note.

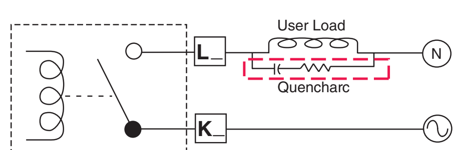
- Slot E Output 8
  RMLx-xxx(B)-xxxx

Mechanical Relay Form A

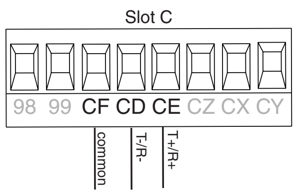


Quencharc Wiring Example

In this example the Quencharc circuit (Watlow part# 0804-0147-0000) is used to protect RML 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 RML outputs.



Standard Bus EIA-485 Communications



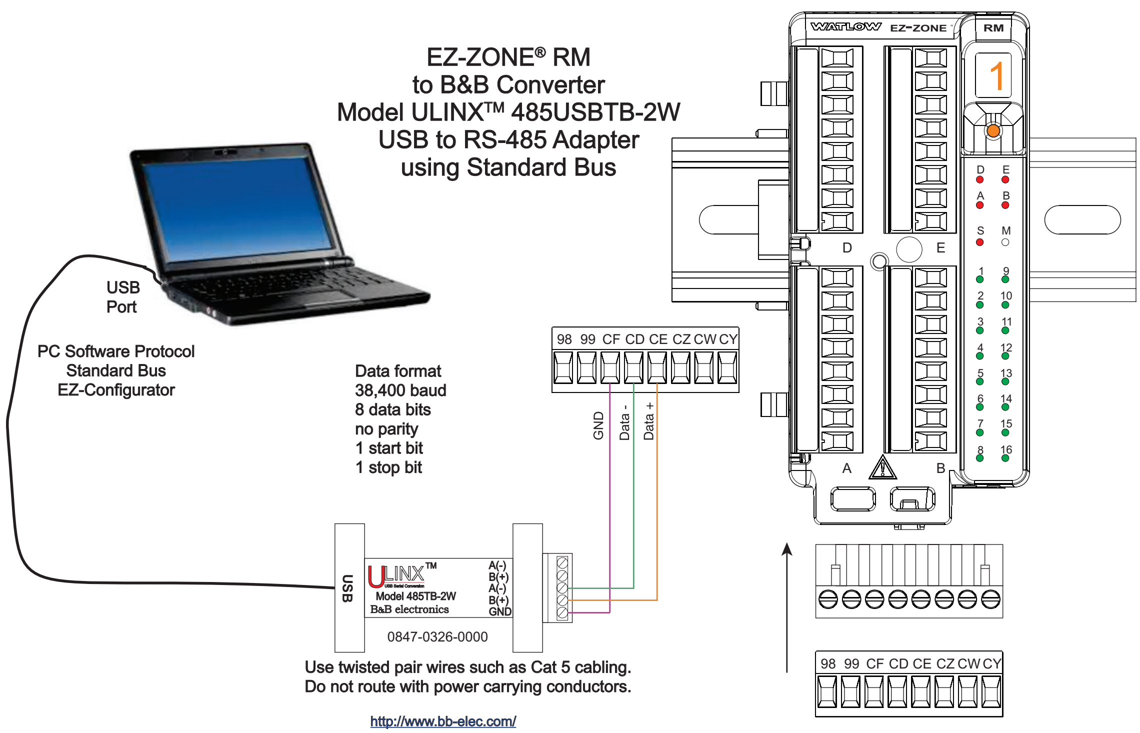
- Wire T-/R- to the A terminal of the EIA-485 port.
- Wire T+/R+ to the B terminal of the EIA-485 port.
- Wire common to the common terminal of the EIA-485 port.
- Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network.
- 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 modules on a network.
- Maximum network length: 1,200 meters (4,000 feet)
- 1/8th unit load on EIA-485 bus

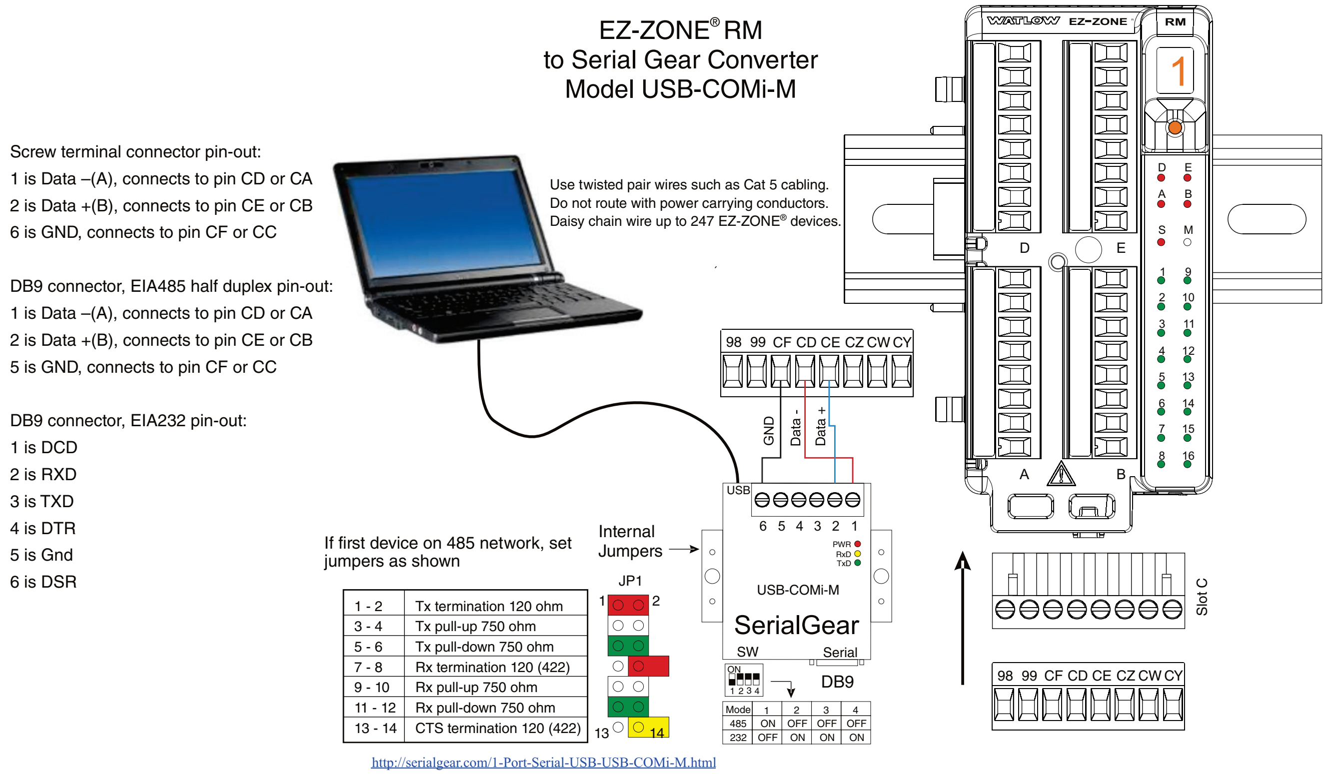
RMLx-xxxx-x(A)xx

*All models include Standard Bus communications

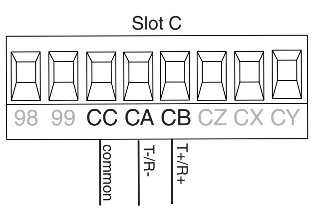
Note:

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.





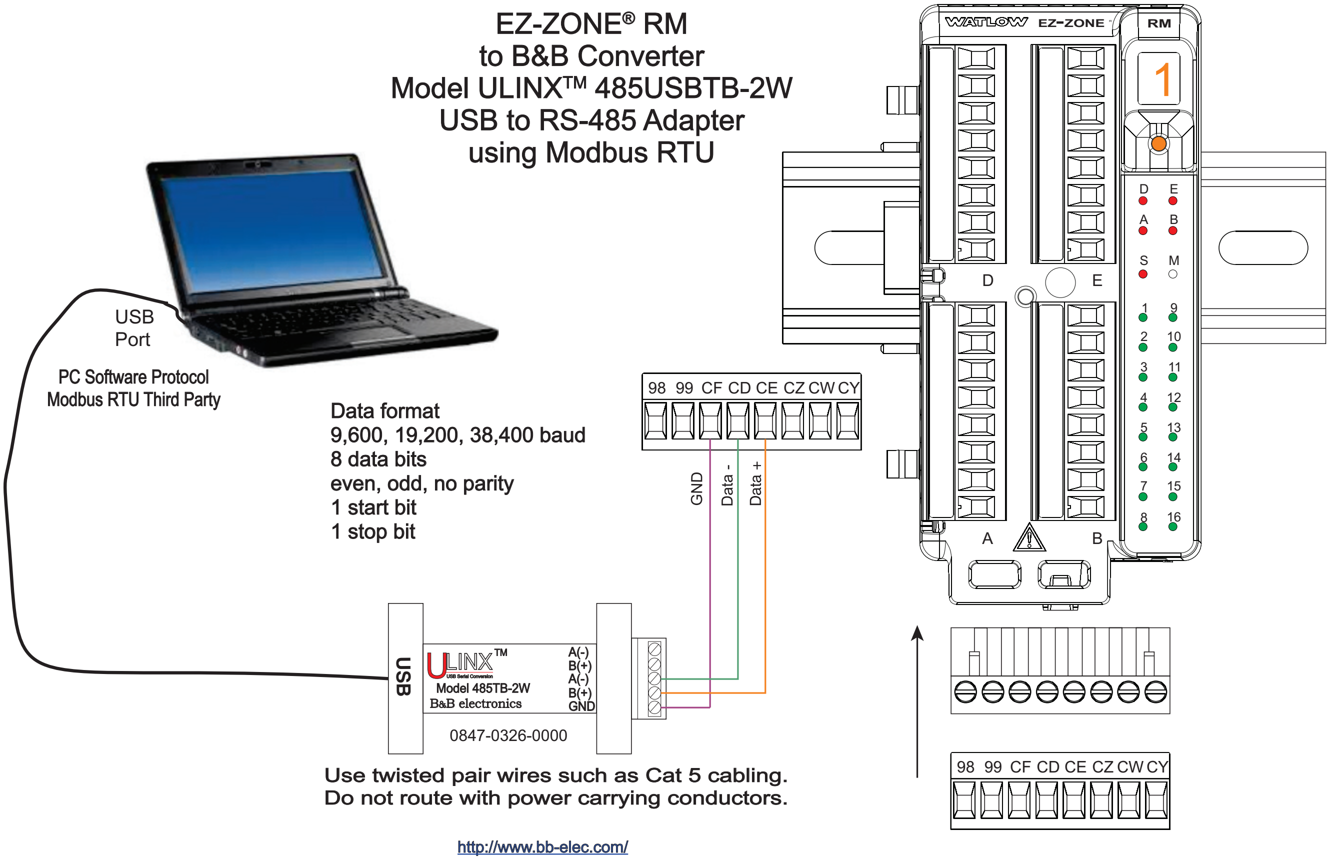
Modbus RTU or Standard Bus EIA-485 Communcations



- • 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

RMLx-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

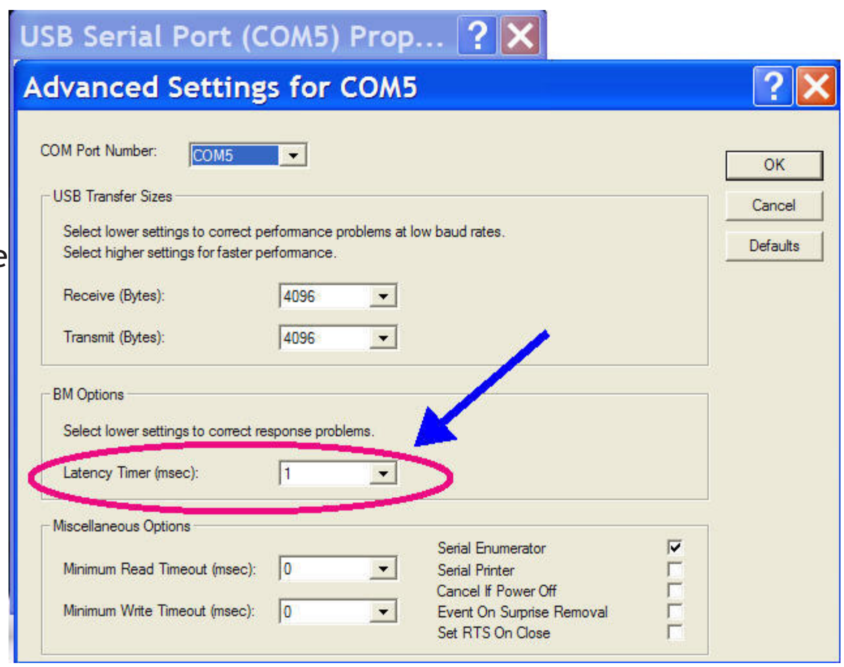


Note:

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:

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 or Composer 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. The graphic above shows the advanced settings dialog box for the com port in use.

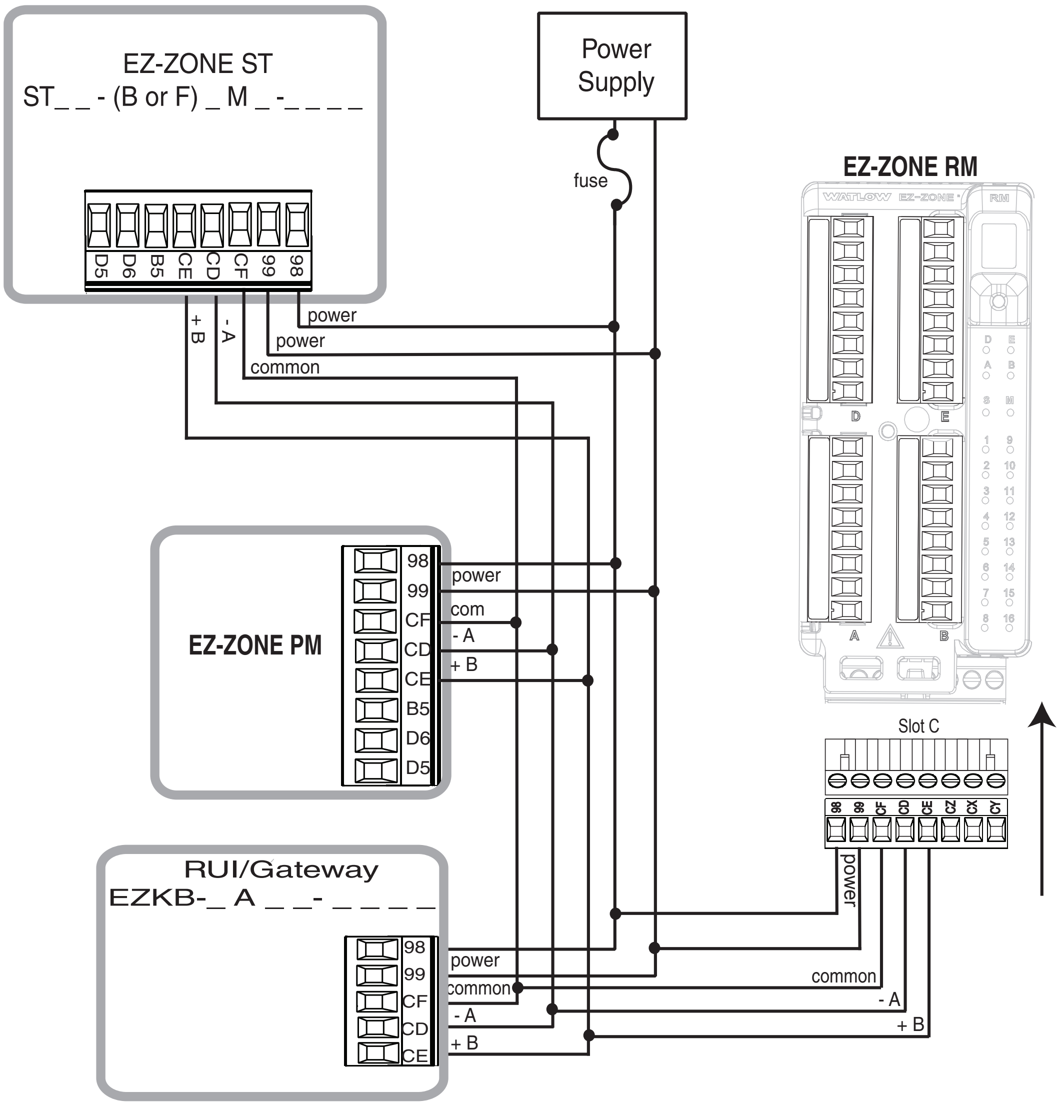
Wiring a Serial EIA-485 Network

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.

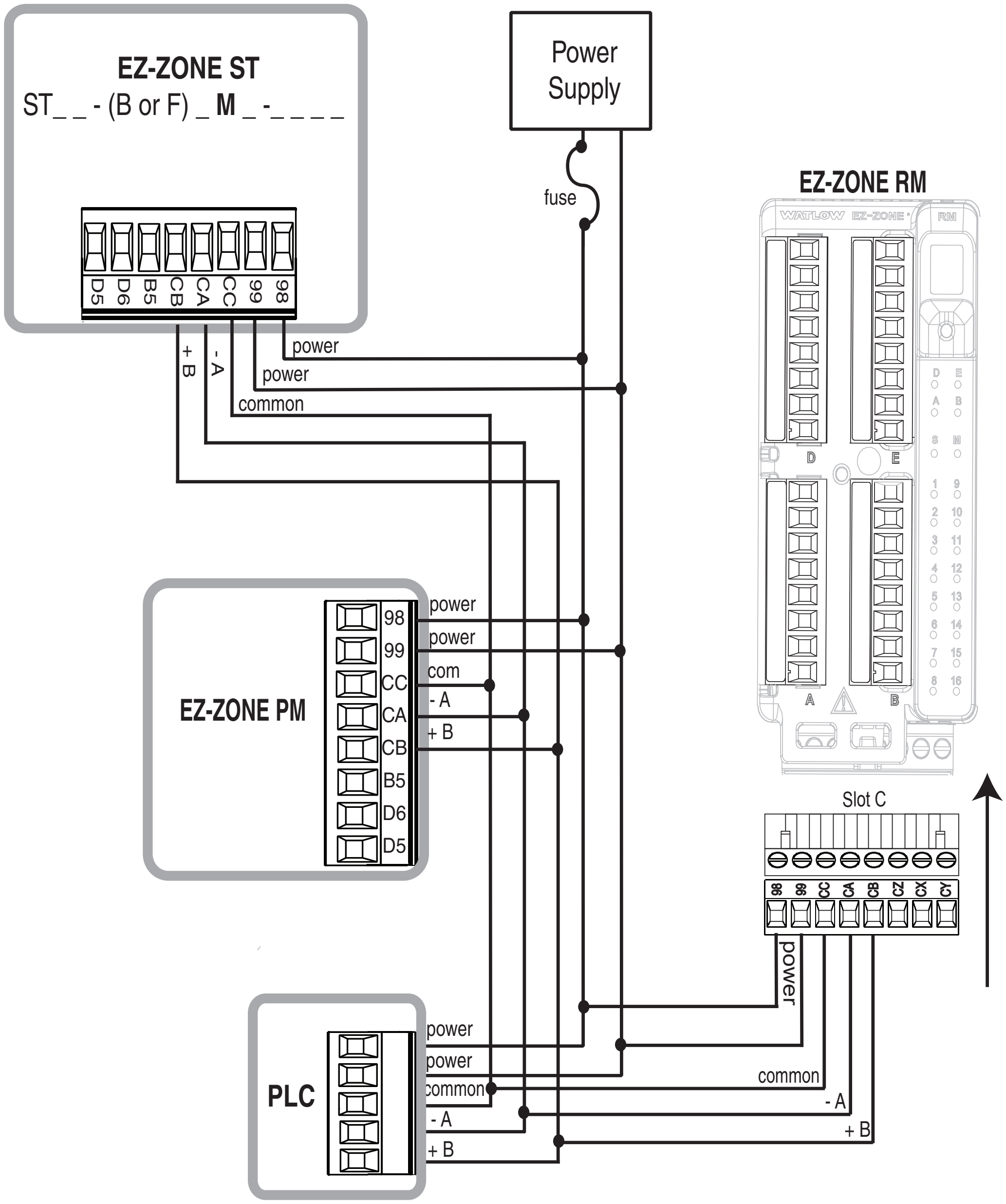
Note:

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



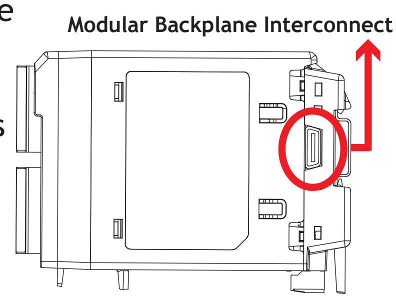
A Network Using Modbus RTU



Connecting the Modules

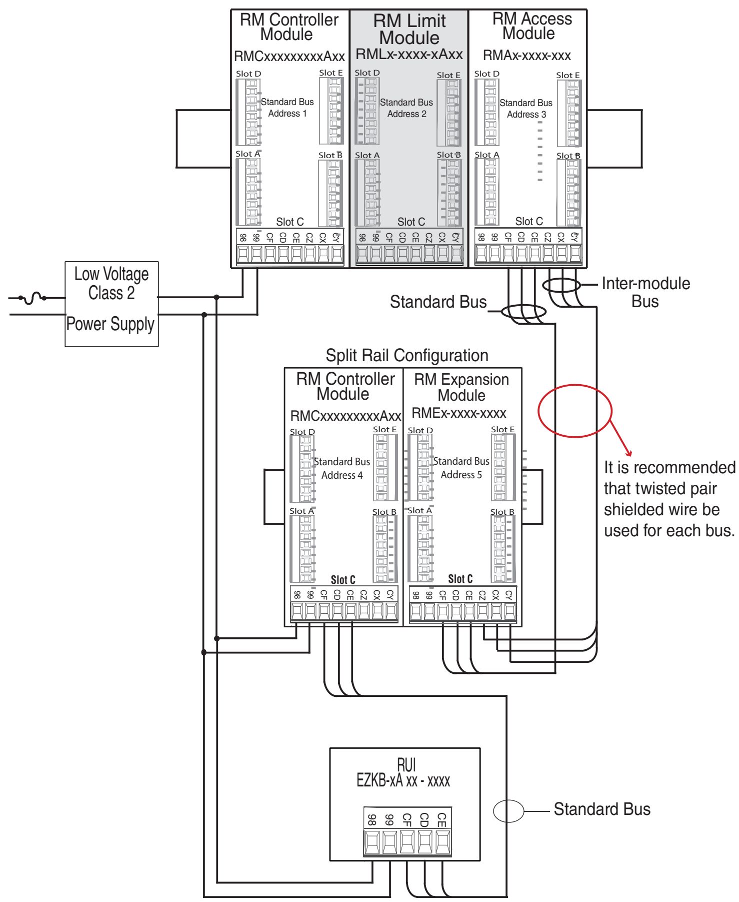
RM System Connections

The RMC 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. RMCxxxxxxxxxxxx @ 7 watts / 14VA
2. RMEx-xxxx-xxxx @ 7 watts / 14VA
3. RMAx-xxxx-xxxx @ 4 watts / 9VA
4. **RMLx-xxxx-xxxx @ 7 watts / 14VA**
5. RMHx-xxxx-xxxx @ 7 watts / 14VA
6. RMSx-xxxx-xxxx @ 7 watts / 14VA

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

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

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

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

- 2 RMC modules consumes 14W
- 1 RMA consumes 4W
- 11 RME modules consumes 77W
- **2 RML 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, Profile 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 the RML module is used in conjunction with the RUI (optional equipment) visual information from the control is displayed to the observer using a fairly standard 7 segment display. Due to the use of this technology, several characters displayed need some interpretation, see the list below:

1 = 1	7 = 7	c, C = c	i = i	o = o	u = u
2 = 2	8 = 8	d = d	J = J	P = P	u = v
3 = 3	9 = 9	E = E	H = K	9 = q	LJ = W
4 = 4	0 = 0	F = F	L = L	r = r	y = y
5 = 5	A = A	9 = g	n7 = M	5 = S	2 = 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 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 418 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 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 or Composer software (free download from Watlow's web site (http://www.watlow.com). Along with Standard Bus, the RML 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. As an example, notice above (under the Range header) the Modbus address identified for Sensor type. Compare this to the value listed for this same parameter found in the Setup Page under the Analog Input Menu.

For parameters listed as float notice that only one (low order) of the two registers is listed, this is true throughout this document. By default, the low order word contains the two low bytes of the 32-bit parameter. As an example, look in the Operations Page for the Analog Input Value. Find the column identified in the header as Modbus and notice that it lists register 410. Because this parameter is a float it is actually represented by registers 410 (low order bytes) and 411 (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 (16), analog inputs (12), etc... The Modbus register shown always represents instance one. Take for an example the Silencing parameter found in the Setup Pages under the Alarm menu. Instance one is shown as address 2540 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 2540 to find its address, in this case, the instance 3 address for Alarm Silence is 2660.

RMLx - xxxx - A**[1]**AA

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.

Chapter 3: Operations Pages

Control 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. A i 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 .

A i
oPEr **Analog Input Menu**
1
A i Analog Input (1 to 12)
A in Analog Input Value
i.Er Input Error
i.CA Calibration Offset

d io
oPEr **Digital Input/Output Menu**
1
d io Digital Input/Output (1 to 6 and 9)
do.S Output State
d i.S Input State

ACt
oPEr Action Menu
1
ACt Action (1 to 16)
E i.S Event Status

L iM
oPEr **Limit Menu**
1
L iM Limit (1 to 4)
LL.S Low Limit Set Point
Lh.S High Limit Set Point

LCr Clear Limit
L.St Limit Status

ALM
oPEr Alarm Menu
1
ALM Alarm (1 to 16)
A.Lo Low Set Point
A.hi High Set Point
A.CLr Clear Alarm
A.Sir Silence Alarm
A.St Alarm State

Lnr
oPEr Linearization Menu
1
Lnr Linearization (1 to 4)
Su.A Source Value A
oFSt Offset
o.v Output Value

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

RM Limit Module • Operations Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Profibus Index**	**Parameter ID**	**Data Type and Access ****
A i oPEr **Analog Input Menu**								
A in Ain	*Analog Input (1 to 12)* **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	- - - -	410 [offset 90]	0x68 (104) 1 to 12 1	0	4001	float R
Pu.F Pu.F	*Analog Input (1 to 12)* **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	- - - -	452 [offset 90]	0x68 (104) 1 to 12 0x16 (22)	- - - -	4022	float R
i.Er i.Er	*Analog Input (1 to 12)* **Error Status** View the cause of the most recent error. If the AttN message is Er.i1 to Er.i9 or Er.10 to Er.12, this parameter will display the cause of the input error.	nonE None (61) OPEn Open (65) Shrt Shorted (127) E.M Measurement Error (140) E.CAL Bad Calibration Data (139) Er.Ab Ambient Error (9) E.rtd RTD Error (141) FAiL Fail (32)	- - - -	412 [offset 90]	0x68 (104) 1 to 12 2	1	4002	uint R
i.CA i.CA	*Analog Input (1 to 12)* **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	432 [offset 90]	0x68 (104) 1 to 12 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 Limit Module • Operations Page								
Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attri-bute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
No Dis-play	*Analog Input (1 to 12)* **Clear Error** Clear latched input when input error condition no longer exists.	Clear Error (1221)	- - - -	466 [offset 90]	0x68 (104) 1 to 12 0x1D (29)	- - - -	4029	uint RW
d io oPEr **Digital Input/Output Menu**								
do.S do.S	*Digital Output (1 to 6 and 9)* **Output State** View the state of this output.	oFF Off (62) on On (63)	- - - -	1862 [offset 30]	0x6A (106) 1 to 9 7	46	6007	uint R
di.S di.S	*Digital Input (1 to 6 and 9)* **Input State** View this event input state.	oFF Off (62) on On (63)	- - - -	1870 [offset 30]	0x6A (106) 1 to 9 0x0B (11)	- - - -	6011	uint R
No Dis-play	*Digital Input (1 to 6 and 9)* **Source Error** View reported cause for input malfunc-tion.	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)	- - - -	1878 [offset 30]	0x6A (106) 1 to 9 0x0F (15)	- - - -	6015	uint R
No Dis-play	*Digital Input (1 to 6 and 9)* **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	- - - -	1874 [offset 30]	0x6A (106) 1 to 9 0x0D (13)	- - - -	6013	float R
ACt oPEr **Action Menu**								
Ei.S Ei.S	*Action (1 to 16)* **Event Input Status** View this input state.	oFF Off (62) on On (63)	- - - -	2218 [offset 20]	0x6E (110) 1 to 16 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 Limit Module • Operations Page

Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type and Access **
No Display	*Function Key (1)* **Function Key State** View current state of function key 1.	Off (62) On (63)	- - - -	- - - -	- - - -	- - - -	3024	uint R
No Display	*Function Key (2)* **Function Key State** View current state of function key 2.	Off (62) On (63)	- - - -	- - - -	- - - -	- - - -	3030	uint R
LiM oPEr **Limit Menu**								
LL.S LL.S	*Limit (1 to 12)* **Low Limit Set Point** Set the low process value that will trigger the limit.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	0.0°F or units -18.0°C	1494 [offset 30]	0x70 (112) 1 to 12 3	38	12003	float RWES
Lh.S Lh.S	*Limit (1 to 12)* **High Limit Set Point** Set the high process value that will trigger the limit.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	0.0°F or units -18.0°C	1496 [offset 30]	0x70 (112) 1 to 12 4	39	12004	float RWES
LCr LCr	*Limit (1 to 12)* **Clear Limit *** Clear limit once limit condition is cleared.	Clear (129) Ignore (204)	- - - -	720 [offset 30]	0x70 (112) 1 to 12 1	- - - -	12001	uint W
L.St L.St	*Limit (1 to 12)* **Status *** Reflects whether or not the limit is in a safe or failed mode..	FAiL Fail (32) SAFE Safe (1667)	- - - -	1514 [offset 30]	0x70 (112) 1 to 12 0x0D (13)	- - - -	12013	uint R
No Display	*Limit (1 to 12)* **Limit State** Clear limit once limit condition is cleared.	Off (62) None (61) Limit High (51) Limit Low (52) Error (225)	- - - -	1500 [offset 30]	0x70 (112) 1 to 12 6	- - - -	12006	uint R
No Display	*Limit (1 to 12)* **Output Value** Current output state.	On (63) Off (62)	- - - -	1502 [offset 30]	0x70 (112) 1 to 0xC (12) 7	- - - -	12007	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 Limit Module • Operations Page								
Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attri-bute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
ALM oPEr **Alarm Menu**								
A.Lo A.Lo	*Alarm (1 to 16)* **Low Set Point** If Type (Setup Page, Alarm Menu) is set to: **Process** - set the process value that will trigger a low alarm.	-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	2532 [offset 60]	0x6D (109) 1 to 16 2	18	9002	float RWES
A.hi A.hi	*Alarm (1 to 16)* **High Set Point** If Type (Setup Page, Alarm Menu) is set to: **Process** - set the process value that will trigger a high alarm.	-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	2530 [offset 60]	0x6D (109) 1 to 16 1	19	9001	float RWES
A.CLr A.CLr	*Alarm (1 to 16)* **Clear Alarm** Write to this register to clear an alarm	0	- - - -	- - - -	- - - -	- - - -	9026	uint W
A.Sir A.Sir	*Alarm (1 to 16)* **Silence Alarm** Write to this register to silence an alarm	0	- - - -	- - - -	- - - -	- - - -	9027	uint W
A.St A.St	*Alarm (1 to 16)* **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)	- - - -	2546 [offset 60]	0x6D (109) 1 to 16 9	- - - -	9009	uint R
No Display	*Alarm (1 to 16)* **Alarm Clearable** Read to see if alarm can be cleared.	no No (59) YES Yes (106)	- - - -	2552 [offset 60]	0x6D (109) 1 to 16 0xC (12)	- - - -	9012	uint R
No Display	*Alarm (1 to 16)* **Silenced** Read to see if alarm is active but has been silenced by Silence Alarm.	Yes (106) No (59)	- - - -	2550 [offset 60]	0x6D (109) 1 to 16 0x0B (11)	- - - -	9011	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 Limit Module • Operations Page

Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attri-bute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
No Dis-play	*Alarm (1 to 16)* **Latched** Read to see if alarm is currently latched.	Yes (106) No (59)	- - - -	2548 [offset 60]	0x6D (109) 1 to 16 0x0A (10)	- - - -	9010	uint R
No Dis-play	*Alarm (1 to 16)* **Clear Request** Write to this register to clear an alarm	Clear (0) No Change (255)	- - - -	2554 [offset 60]	0x6D (109) 1 to 16 0xD (13)	32	9013	uint RW
No Dis-play	*Alarm (1 to 16)* **Silence Request** Write to this register to silence an alarm	Clear (0) No Change (255)	- - - -	2556 [offset 60]	0x6D (109) 1 to 16 0x0E (14)	33	9014	uint RW
No Dis-play	*Alarm (1 to 16)* **Alarm Working Pro-cess 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	- - - -	2566 [offset 60]	0x6D (109) 1 to 16 0x13 (19)	- - - -	9019	float R
No Dis-play	*Alarm (1 to 16)* **Output Value** Read state of alarm output	On (63) Off (62)	- - - -	2576 [offset 60]	0x6D (109) 1 to 16 0x18 (24)	- - - -	9024	uint R
Lnr oPEr **Linearization Menu**								
Su.A Su.A	*Linearization (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	- - - -	7996 [offset 70]	0x86 (134) 1 to 16 4	- - - -	34004	float R
oFSt oFSt	*Linearization (1 to 16)* **Offset** Set an offset to be applied to this func-tion's output.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	0	8000 [offset 70]	0x86 (134) 1 to 16 6	- - - -	34006	float RWES
o.u o.v	*Linearization (1 to 16)* **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	- - - -	8002 [offset 70]	0x86 (134) 1 to 16 7	- - - -	34007	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 Limit Module • Operations Page								
Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type and Access **
No Display	*Linearization (1 to 16)* **Error** View reported cause for Linearization 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)	- - - -	8044 [offset 70]	0x86 (134) 1 to 16 0x1C (28)	- - - -	34028	uint R
CPE oPEr **Compare Menu**								
Su.A Su.A	*Compare (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	- - - -	5922 [offset 40]	0x80 (128) 1 to 16 7	- - - -	28007	float R
Su.b Su.b	*Compare (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	- - - -	5924 [offset 40]	0x80 (128) 1 to 16 8	- - - -	28008	float R
o.u o.v	*Compare (1 to 16)* **Output Value** View the value of this function's output.	oFF Off (62) on On (63)	- - - -	5928 [offset 40]	0x80 (128) 1 to 16 0xA (10)	- - - -	28010	uint R
No Display	*Compare (1 to 16)* **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)	- - - -	5934 [offset 40]	0x80 (128) 1 to 16 0x0D (13)	- - - -	28013	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 Limit Module • Operations Page								
Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type and Access **
tmr oPEr **Timer Menu**								
Su.A Su.A	*Timer (1 to 16)* **Value Source A** View the value of Source A.	oFF Off (62) on On (63)	- - - -	7202 [offset 50]	0x83 (131) 1 to 16 7	- - - -	31007	uint R
Su.b Su.b	*Timer (1 to 16)* **Value Source B** View the value of Source B.	oFF Off (62) on On (63)	- - - -	7204 [offset 50]	0x83 (131) 1 to 16 8	- - - -	31008	uint R
E.t E.t	*Timer (1 to 16)* **Elapsed Time** View the value of this function's elapsed time.	0 to 9,999.000 seconds	- - - -	7220 [offset 50]	0x83 (131) 1 to 16 0x10 (16)	- - - -	31016	float R
o.v o.v	*Timer (1 to 16)* **Output Value** View the value of this function's output.	oFF Off (62) on On (63)	- - - -	7208 [offset 50]	0x83 (131) 1 to 16 0x11 (17)	- - - -	31010	uint R
No Display	*Timer (1 to 16)* **Running** Read to determine if timer is running	Off (62) On (63)	- - - -	7218 [offset 50]	0x83 (131) 1 to 16 0x0F (15)	- - - -	31015	uint R
No Display	*Timer (1 to 16)* **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)	- - - -	7224 [offset 50]	0x83 (131) 1 to 16 0x12 (18)	- - - -	31018	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 Limit Module • Operations Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Profibus Index**	**Parameter ID**	**Data Type and Access ****
Ctr oPEr **Counter Menu**								
Cnt Cnt	*Counter (1 to 16)* **Count** View the function's total count.	0 to 9,999	- - - -	6578 [offset 40]	0x82 (130) 1 to 16 0xF (15)	217	30015	uint R
Su.A Su.A	*Counter (1 to 16)* **Source Value A** View the value of Source A.	oFF Off (62) on On (63)	- - - -	6562 [offset 40]	0x82 (130) 1 to 16 7	- - - -	30007	uint R
Su.b Su.b	*Counter (1 to 16)* **Source Value B** View the value of Source B.	oFF Off (62) on On (63)	- - - -	6564 [offset 40]	0x82 (130) 1 to 16 8	- - - -	30008	uint R
o.u o.v	*Counter (1 to 16)* **Output Value** View the value of this function's output.	oFF Off (62) on On (63)	- - - -	6568 [offset 40]	0x82 (130) 1 to 16 0xA (10)	- - - -	30010	uint R
No Display	*Counter (1 to 16)* **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)	- - - -	6580 [offset 40]	0x82 (130) 1 to 16 0x10 (16)	- - - -	30016	uint R
LgC oPEr **Logic Menu**								
Su.A Su.A	*Logic (1 to 16)* **Source Value A** View the value of Source A.	oFF Off (62) on On (63)	- - - -	4678 [offset 80]	0x7F (127) 1 to 16 0x19 (25)	- - - -	27025	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 Limit Module • Operations Page								
Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type and Access **
Su.b Su.b	*Logic (1 to 16)* **Source Value B** View the value of Source B.	oFF Off (62) on On (63)	- - - -	4680 [offset 80]	0x7F (127) 1 to 16 0x1A (26)	- - - -	27026	uint R
Su.C Su.C	*Logic (1 to 16)* **Source Value C** View the value of Source C.	oFF Off (62) on On (63)	- - - -	4682 [offset 80]	0x7F (127) 1 to 16 0x1B (27)	- - - -	27027	uint R
Su.d Su.d	*Logic (1 to 16)* **Source Value D** View the value of Source D.	oFF Off (62) on On (63)	- - - -	4684 [offset 80]	0x7F (127) 1 to 16 0x1C (28)	- - - -	27028	uint R
Su.E Su.E	*Logic (1 to 16)* **Source Value E** View the value of Source E.	oFF Off (62) on On (63)	- - - -	4686 [offset 80]	0x7F (127) 1 to 16 0x1D (29)	- - - -	27029	uint R
Su.F Su.F	*Logic (1 to 16)* **Source Value F** View the value of Source F.	oFF Off (62) on On (63)	- - - -	4688 [offset 80]	0x7F (127) 1 to 16 0x1E (30)	- - - -	27030	uint R
Su.g Su.g	*Logic (1 to 16)* **Value Source G** View the value of Source G.	oFF Off (62) on On (63)	- - - -	4690 [offset 80]	0x7F (127) 1 to 16 0x1F (31)	- - - -	27031	uint R
Su.h Su.h	*Logic (1 to 16)* **Source Value H** View the value of Source H.	oFF Off (62) on On (63)	- - - -	4692 [offset 80]	0x7F (127) 1 to 16 0x20 (32)	- - - -	27032	uint R
o.v o.v	*Logic (1 to 16)* **Output Value** View the value of this function's output.	oFF Off (62) on On (63)	- - - -	4696 [offset 80]	7F (127) 1 to 16 0x22 (34)	- - - -	27034	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 Limit Module • Operations Page								
Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attri-bute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type and Access **
No Dis-play	*Logic (1 to 16)* **Error** Read reported cause for logic 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)	- - - -	4700 [offset 80]	0x7F (127) 1 to 16 0x24 (36)	- - - -	27036	uint R
MAt oPEr **Math Menu**								
Su.A	*Math (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	- - - -	3540 [offset 70]	0x7D (125) 1 to 16 0x10 (16)	- - - -	25016	float R
Su.b	*Math (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	- - - -	3542 [offset 70]	0x7D (125) 1 to 16 0x11 (17)	- - - -	25017	float R
Su.C	*Math (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	- - - -	3544 [offset 70]	0x7D (125) 1 to 16 0x12 (18)	- - - -	25018	float R
Su.d	*Math (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	- - - -	3546 [offset 70]	0x7D (125) 1 to 16 0x13 (19)	- - - -	25019	float R
Su.E	*Math (1 to 16)* **Source Value E** View the value of Source E.	oFF Off (62) on On (63)	- - - -	3548 [offset 70]	0x7D (125) 1 to 16 0x14 (20)	- - - -	25020	uint R
oFSt	*Math (1 to 16)* **Offset** Set an offset to be applied to this func-tion's output.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	0	3554 [offset 70]	0x7D (125) 1 to 16 0x17 (23)	- - - -	25023	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 Limit Module • Operations Page								
Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type and Access **
o.u o.v	*Math (1 to 16)* **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	- - - -	3552 [offset 70]	0x7D (125) 1 to 16 0x16 (22)	- - - -	25022	float R
No Display	*Math (1 to 16)* **Error** Read reported cause for logic 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)	- - - -	3566 [offset 70]	0x7D (125) 1 to 16 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

RML 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. Ai 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 .

Ai
SEt Analog Input Menu
1
Ai Analog Input (1 to 12)
SEn Sensor Type
Lin 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
i.Er Input Error Latching
dEC Display Precision
i.CA Calibration Offset
Ain Analog Input Value*
i.Er Input Error

d io
SEt **Digital Input/Output Menu**
1
d io Digital Input/Output (1 to 6 and 9)

d ir	Direction
Fn	Function
F i	Output Function Instance
S2.A	Output Source Zone
o.Ct	Time Base Type
o.tb	Fixed Time Base
o.Lo	Low Power Scale
o.hi	High Power Scale

ACt
SEt **Action Menu**
1
ACt Action (1 to 16)

Fn	Action Function
F i	Function Instance
SFn.A	Source Function A
S iA	Source Instance A
S2.A	Source Zone A
LEu	Active Level

L iM
SEt **Limit Menu**
1
L iM Limit (1 to 12)

L.Sd	Sides
L.hy	Hysteresis
SP.Lh	Maximum Set Point
SP.LL	Minimum Set Point
Lh.S	High Limit Set Point*
LL.S	Low Limit Set Point*
SFn.A	Source Function A*
S iA	Source Instance A*
S2.A	Source Zone A *
L.Cr	Clear Limit *
L.St	Limit Status *

otPt
SEt **Output Menu**
1
otPt Output (1 to 10, 7 to 10)

Fn	Function Instance
F i	Output Function Instance
S2	Output Source Zone
o.Ct	Time Base Type
o.tP	Fixed Time Base
o.Lo	Low Power Scale
o.hi	High Power Scale

ALM
SEt **Alarm Menu**
1
ALM Alarm (1 to 16)

A.ty	Type
Sr.A	Alarm Source
iS.A	Alarm Source Instance
S2.A	Alarm Source Zone
A.hy	Hysteresis
A.Lg	Logic
A.Sd	Sides
A.Lo	Low Set Point *
A.hi	High Set Point *
A.LA	Latching
A.bL	Blocking
A.Si	Silencing
A.dSP	Display
A.dL	Delay Time
A.CLr	Clear Alarm *
A.Sir	Silence Alarm *
A.St	Alarm State *

Lnr
SEt **Linearization Menu**
1
Lnr Linearization 1 to 16

Fn	Function
SFn.A	Source Function A
S iA	Source Instance A
S2.A	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 16)

Fn	Function
toL	Tolerance
SFn.A	Source Function A
S iA	Source Instance A
S2.A	Source Zone A
SFn.b	Source Function B
S ib	Source Instance B
S2.b	Source Zone B
Er.h	Error Handling

tMr
SEt **Timer Menu**
1
tMr Timer (1 to 16)

Fn	Function
SFn.A	Source Function A
S iA	Source Instance A
S2.A	Source Zone A
SAS.A	Run Active Level
SFn.b	Source Function B
S ib	Source Instance B
S2.b	Source Zone B
SAS.b	Reset Active Level
ti	Time
LEu	Transmitter Active Level

Ctr
SEt **Counter Menu**
1
Ctr Counter (1 to 16)

Fn	Function
SFn.A	Source Function A
S iA	Source Instance A
S2.A	Source Zone A
SAS.A	Count Active Level
SFn.b	Source Function B
S ib	Source Instance B

S2.b Source Zone B
SAS.b Reset Active Level
LoAd Load Value
tr9t Target Value
LAt Latching

L9C
SEt **Logic Menu**
1
L9C Logic (1 to 16)
Fn Function
SFn.A Source Function A
S i.A Source Instance A
S2.A Source Zone A
SFn.b Source Function B
S i.b Source Instance B
S2.b Source Zone B
SFn.C Source Function C
S i.C Source Instance C
S2.C Source Zone C
SFn.d Source Function D
S i.d Source Instance D
S2.d Source Zone D
SFn.E Source Function E
S i.E Source Instance E
S2.E Source Zone E
SFn.F Source Function F
S i.F Source Instance F
S2.F Source Zone F
SFn.9 Source Function G
S i.9 Source Instance G
S2.9 Source Zone G
SFn.h Source Function H
S i.h Source Instance H
S2.H Source Zone H
Er.h Error Handling

MAt
SEt **Math Menu**
1
MAt Math (1 to 16)
Fn Function
SFn.A Source Function A
S i.A Source Instance A
S2.A Source Zone A
SFn.b Source Function B
S i.b Source Instance B
S2.b Source Zone B
SFn.C Source Function C
S i.C Source Instance C
S2.C Source Zone C
SFn.d Source Function D
S i.d Source Instance D
S2.d Source Zone D
SFn.E Source Function E
S i.E Source Instance E
S2.E Source Zone E
S.Lo Scale Low
S.hi Scale High
Unit Units
r.Lo Range Low
r.hi Range High
P.unt Pressure Units
A.unt Altitude Units
FiL Filter

uAr
SEt **Variable Menu**
1
uAr Variable (1 to 16)
tYPE Data Type
Unit Units
di9 Digital
AnL9 Analog

9LbL
SEt **Global Menu**
9LbL Global
C_F Display Units
AC.LF AC Line Frequency
MAH Maximum
Min Minimum
d.PrS Display Pairs
USr.S Save Settings As
USr.r Restore Settings From

CoM
SEt **Communications Menu**
CoM Communications
bAUd Baud Rate
PAr Parity
M.hL Modbus Word Order
C_F Display Units
nu.S Non-volatile Save

RM Limit 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 i SEt **Analog Input Menu**								
SEn SEn	*Analog Input (1 to 12)* **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) mu Millivolts (56) uoLt Volts dc (104) mA Milliamps dc (112) r0.1H RTD 100 Ω (113) r1.0H RTD 1,000 Ω (114) Pot Potentiometer 1 kΩ (155) tHEr Thermistor (229)	Thermo-couple or Thermis-tor	418 [offset 90]	0x68 (104) 1 to 12 5	3	4005	uint RWES
L in Lin	*Analog Input (1 to 12)* **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	420 [offset 90]	0x68 (104) 1 to 12 6	4	4006	uint RWES
Un it Unit	*Analog Input (1 to 12)* **Units** Set the type of units the sensor will measure.	A.tP Absolute Temperature (1540) rh Relative Humidity (1538) Pro Process (75) PWr Power (73)	Process	492 [offset 90]	0x68 (104) 1 to 12 0x2A (42)	5	4042	uint RWES
S.Lo S.Lo	*Analog Input (1 to 12)* **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	438 [offset 90]	0x68 (104) 1 to 12 0xF (15)	6	4015	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 Limit 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.hi S.hi	*Analog Input (1 to 12)* **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	440 [offset 90]	0x68 (104) 1 to 12 0x10 (16)	7	4016	float RWES
r.Lo r.Lo	*Analog Input (1 to 12)* **Range Low** Set the low range for this function block's output.	-1,128.000 to 5,537.000°C	0.0F -18C	442 [offset 90]	0x68 (104) 1 to 12 0x11 (17)	8	4017	float RWES
r.hi r.hi	*Analog Input (1 to 12)* **Range High** Set the high range for this function block's output.	-1,128.000 to 5,537.000°C	9,999.0 F 5537.0 C	444 [offset 90]	0x68 (104) 1 to 12 0x12 (18)	9	4018	float RWES
P.EE P.EE	*Analog Input (1 to 12)* **Process Error Enable** Turn the Process Error Low feature on or off.	oFF Off (62) LoWd Low (53)	Off	468 [offset 90]	0x68 (104) 1 to 12 0x1E (30)	10	4030	uint RWES
P.EL P.EL	*Analog Input (1 to 12)* **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	470 [offset 90]	0x68 (104) 1 to 12 0x1F (31)	11	4031	float RWES
t.C t.C	*Analog Input (1 to 12)* **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	484 [offset 90]	0x68 (104) 1 to 12 0x26 (38)	- - - -	4038	uint RWES

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RM Limit 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 12)* **Resistance Range** Set the maximum resistance of the thermistor input.	5 5K (1448) 10 10K (1360) 20 20K (1361) 40 40K (1449)	40K	432 [offset 90]	0x68 (104) 1 to 12 0x25 (37)	- - - -	4037	uint RWES
Co.A Co.A	*Analog Input (1 to 12)* **Custom Coeffi-cient A** Enter custom Thermistor coef-ficients.	-3.4e38 to 3.4e38	0	- - - -	- - - -	- - - -	4039	float RWES
Co.b Co.b	*Analog Input (1 to 12)* **Custom Coeffi-cient B** Enter custom Thermistor coef-ficients.	-3.4e38 to 3.4e38	0	- - - -	- - - -	- - - -	4040	float RWES
Co.C Co.C	*Analog Input (1 to 12)* **Custom Coeffi-cient C** Enter custom Thermistor coef-ficients.	-3.4e38 to 3.4e38	0	- - - -	- - - -	- - - -	4041	float RWES
FiL FiL	*Analog Input (1 to 12)* **Filter** Filtering smooths out the process signal to both the display and the input. Increase the time to in-crease filtering. **Note:** Filter does not apply to the Limit sensor but does apply to all other functions.	0.0 to 60.0 seconds	0.5	386 [offset 90]	0x68 (104) 1 to 12 0xE (14)	12	4014	float RWES
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RM Limit 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 12)* **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	414 [offset 90]	0x68 (104) 1 to 12 0x1C (28)	- - - -	4028	uint RWES
dEC dEC	*Analog Input (1 to 12)* **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	398 [offset 90]	0x68 (104) 1 to 12 0x14 (20)	- - - -	4020	uint RWES
i.CA i.CA	*Analog Input (1 to 12)* **Calibration Off-set *** Offset the input reading to com-pensate 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	432 [offset 90]	0x68 (104) 1 to 12 0xC (12)	- - - -	4012	float RWES
Ain Ain	*Analog Input (1 to 12)* **Value *** View the process value. Note: Ensure that the Error Status (be-low) 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	- - - -	410 [offset 90]	0x68 (104) 1 to 12 1	0	4001	float R

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RM Limit 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 12)* **Input Error *** View the cause of the most recent error.	nonE None (61) OPEn Open (65) Shrt Shorted (127) E.M Measurement Error (140) E.CAL Bad Calibration Data (139) Er.Ab Ambient Error (9) E.rtd RTD Error (141) FAiL Fail (32)	- - - -	412 [offset 90]	0x68 (104) 1 to 12 2	1	4002	uint R
dio SEt **Digital Input/Output Menu**								
dir dir	*Digital Input/Output (1 to 6)* **Direction** Set this function to operate as an input or output.	OtPt Output (68) in Input Voltage (193) iCon Input Dry Contact (44)	Output	1850 [offset 30]	0x6A (106) 1 to 6 1	82	6001	uint RWES
dir dir	*Digital Input (9)* **Direction** Set the input type.	in Input Voltage (193) iCon Input Dry Contact (44)	Dry Contact	2090 [offset 30]	0x6A (106) 9 1	82	6001	uint RWES
Fn Fn	*Digital Output (1 to 6)* **Function** Select what function will drive this output.	oFF Off (62) ALM Alarm (6) CPE Compare (230) Ctr Counter (231) dio Digital I/O (1142) FUn Function Key (1001) Lnr Linearization (238) LGC Logic (239) MAt Math (240) tMr Timer (244) uAr Variable (245) h.Er Heater Error (184)	Off	1858 [offset 30]	0x 6A (106) 1 to 6 5	83	6005	uint RWES
Fi Fi	*Digital Output (1 to 6)* **Output Function Instance** Set the instance of the function selected above.	1 to 250	1	1860 [offset 30]	0x6A (106) 1 to 6 6	84	6006	uint RWES

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RM Limit 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	*Digital Output (1 to 6)* **Output Source Zone** Set the zone of the function selected above.		0	1872 [offset 30]	0x6A (106) 1 to 6 0xC (12)	- - - -	6012	uint RWES
o.Ct	*Digital Output (1 to 6)* **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) vtb Variable Time Base (103)	Fixed Time Base	1852 [offset 30]	0x6A (106) 1 to 6 2	85	6002	uint RWES
o.tb	*Digital Output (1 to 6)* **Fixed Time Base** Set the time base for fixed-time-base control.	0.1 to 60.0 seconds	1.0	1854 [offset 30]	0x6A (106) 1 to 6 3	86	6003	float RWES
o.Lo	*Digital Output (1 to 6)* **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	1866 [offset 30]	0x6A (106) 1 to 6 9	87	6009	float RWES
o.hi	*Digital Output (1 to 6)* **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	1868 [offset 30]	0x6A (106) 1 to 6 A (10)	88	6010	float RWES

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RM Limit 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 ****
ACt SEt **Action Menu**								
Fn Fn	*Action (1 to 16)* **Action Function** Set the action that will be triggered by this function.	nonE None (61) USr.r User Set Restore (227) ALM Alarm (6) SiL Silence Alarms (108) AoF Control Loops Off and Alarms to Non-alarm State (220) F.AL Force Alarm to Occur (218)	None	2214 [offset 20]	0x6E (110) 1 to 16 3	138	10003	uint RWES
Fi Fi	*Action (1 to 16)* **Function Instance** Set the instance of the function selected above.	0 to 25	0	2216 [offset 20]	0x6E (110) 1 to 16 4	139	10004	uint RWES
SFn.A SFn.A	*Action (1 to 16)* **Source Function A** Set the event or function that will trigger the action.	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) LiM Limit (126) LgC Logic (239) tMr Timer (244) uAr Variable (245) h.Er Heater Error (184)	None	2220 [offset 20]	0x6E (110) 1 to 16 6	- - - -	10006	uint RWES
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RM Limit 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.A Si.A	*Action (1 to 16)* **Source Instance A** Set the instance of the function selected above.	1 to 250	1	2212 [offset 20]	0x6E (110) 1 to 16 2	- - - -	10002	uint RWES
S2.A SZ.A	*Action (1 to 16)* **Source Zone A** Set the zone of the function selected above.	0 to 24	0	2222 [offset 20]	0x6E (110) 1 to 16 7	- - - -	10007	uint RWES
LEu LEv	*Action (1 to 16)* **Active Level** Set the action that will be considered a true state.	LobW Low (53) high High (37)	High	2230 [offset 20]	0x6E (110) 1 to 16 1	137	10001	uint RWES
L iM SEt **Limit Menu**								
L.Sd L.Sd	*Limit (1 to 12)* **Sides** Select which side or sides of the process value will be monitored.	both Both (13) high High (37) LobW Low (53)	Both	1498 [offset 30]	0x70 (112) 1 to 12 5	40	12005	uint RWES
L.hY L.hy	*Limit (1 to 12)* **Hysteresis** Set the hysteresis for the limit function. This determines how far into the safe range the process value must move before the limit can be cleared.	0.001 to 9,999.000°F or units 0.001 to 5,555.000°C	3.0°F or units 2.0°C	1492 [offset 30]	0x70 (112) 1 to 12 2	41	12002	float RWES
SP.Lh SP.Lh	*Limit (1 to 12)* **Maximum Set Point** Set the high end of the limit set point range.	-1,999.000 to 9,999.000	9,999.000	1506 [offset 30]	0x70 (112) 1 to 12 9	39	12009	float RWES
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RM Limit 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 ****
SP.LL SP.LL	*Limit (1 to 12)* **Minimum Set Point** Set the low end of the limit set point range.	-1,999.000 to 9,999.000	-1,999.000	1508 [offset 30]	0x70 (112) 1 to 12 0xA (10)	38	12010	float RWES
Lh.S Lh.S	*Limit (1 to 12)* **High Limit Set Point *** Set the high process value that will trigger the limit.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	0.0°F or units -18.0°C	1496 [offset 30]	0x70 (112) 1 to 12 4	42	12004	float RWES
LL.S LL.S	*Limit (1 to 12)* **Low Limit Set Point *** Set the low process value that will trigger the limit.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C	0.0°F or units -18.0°C	1494 [offset 30]	0x70 (112) 1 to 12 3	43	12003	float RWES
SFn.A SFn.A	*Limit (1 to 12)* **Source Function A *** Set the source for the limit reset function.	nonE None (61) d io Digital I/O (1142) FUn Function Key (1001) uAr Variable (245)	None	748 [offset 30]	0x70 (112) 1 to 12 0x0F (15)	- - - -	12015	uint RWES
S i.A Si.A	*Limit (1 to 12)* **Source Instance A *** Set the instance of the function selected above.	1 to 250	1	- - - -	0x70 (112) 1 to 12 0x10 (16)	- - - -	12016	uint RWES
SZ.A SZ.A	*Limit (1 to 12)* **Source Zone A *** Set the zone of the function selected above.	0 to 24	0	- - - -	0x70 (112) 1 to 12 0x11 (17)	- - - -	12017	uint RWES
L.Cr LCr	*Limit (1 to 12)* **Clear Limit *** Clear limit once limit condition is safe.	CLr Clear (0) iGnr Ignore (204)	Ignore	720 [offset 30]	0x70 (112) 1 to 12 1	- - - -	12014	uint W

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RM Limit 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 **
L.St L.St	*Limit (1 to 12)* **Limit Status *** Reflects whether or not the limit is in a safe or failed mode.	FAiL Fail (32) SAFE Safe (1667)	- - - -	744 [offset 30]	0x70 (112) 1 to 12 0x0D (13)	- - - -	12013	uint R
otPt SEt Output Menu								
Fn Fn	*Output Digital (1 to 4 and 7 to 10)* **Function** Select what function will drive this output. **Note:** Output 8 is set by default (factory settings) to module limit.	oFF Off (62) Ai Analog Input (142) ALM Alarm (6) C.Pr Cool Power (161) h.Pr Heat Power (160) 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) 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) M.Li Limit (126) LiM Limit (126)	off	1858 [offset 30]	0x6A (106) 1 to 10 5	96	6005	uint RWES

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RM Limit 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 ****
F i Fi	*Output Digital (1 to 4 and 7 to 10)* **Output Function Instance** Set the instance of the function selected above.	1 to 250	1	1860 [offset 30]	0x6A (106) 1 to 10 6	- - - -	6006	uint RWES
SZ.A SZ.A	*Output Digital (1 to 4 and 7 to 10)* **Output Source Zone** Set the instance of the function selected above.	0 to 24	0	1872 [offset 30]	0x6A (106) 1 to 10 0xC (12)	- - - -	6012	uint RWES
o.Ct o.Ct	*Output Digital (1 to 4 and 7 to 10)* **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) vtb Variable Time Base (103)	Fixed Time Base	1852 [offset 30]	0x6A (106) 1 to 10 2	- - - -	6002	uint RWES
o.tb o.tb	*Output Digital (1 to 4 and 7 to 10)* **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]	1854 [offset 30]	0x6A (106) 1 to 10 3	- - - -	6003	float RWES
o.Lo o.Lo	*Output Digital (1 to 4 and 7 to 10)* **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%	1866 [offset 30]	0x6A (106) 1 to 10 9	- - - -	6009	float RWES

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RM Limit 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 **
o.hi	*Output Digital (1 to 4 and 7 to 10)* **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%	1868 [offset 30]	0x6A (106) 1 to 10 0xA (10)	- - - -	6010	float RWES
ALM SEt **Alarm Menu**								
A.ty	*Alarm (1 to 16)* **Type** Select whether the alarm trigger is a fixed value or will track the set point.	Off (62) Process Alarm (76) Deviation Alarm (24)	Off	2558 [offset 60]	0x6D (109) 1 to 16 0xF (15)	20	9015	uint RWES
Sr.A	*Alarm (1 to 16)* **Alarm Source** Select what will trigger this alarm.	None (61) Analog Input (142) Current (22) PID Power (73) Linearization (238) Math (240) Process Value (241) Variable (245) Current Read is Sample Hold (179) Wattage (1697) Load Voltage (1698) Load Resistance (1183)	Analog Input	2562 [offset 60]	0x6D (109) 1 to 16 0x11 (17)	21	9017	uint RWES
iS.A	*Alarm (1 to 16)* **Alarm Source Instance** Set the instance of the function selected above.	1 to 250	1	2564 [offset 60]	0x6D (109) 1 to 16 0x12 (18)	22	9018	uint RWES

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RM Limit 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 SZ	*Alarm (1 to 16)* **Alarm Source Zone** Set the zone of the function selected above.	0 to 24	0	2578 [offset 60]	0x6D (109) 1 to 16 0x19 (25)	- - - -	9025	uint RWES
A.hy A.hy	*Alarm (1 to 16)* **Hysteresis** Set the hysteresis for an alarm. This determines how far into the safe region the process value needs to move before 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	2534 [offset 60]	0x6D (109) 1 to 16 3	24	9003	float RWES
A.Lg A.Lg	*Alarm (1 to 16)* **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	2538 [offset 60]	0x6D (109) 1 to 16 5	25	9005	uint RWES
A.Sd A.Sd	*Alarm (1 to 16)* **Sides** Select which side or sides will trigger this alarm.	both Both (13) high High (37) LobU Low (53)	Both	2536 [offset 60]	0x6D (109) 1 to 16 4	26	9004	uint RWES
A.Lo A.Lo	*Alarm (1 to 16)* **Low Set Point *** If Alarm Type (Setup Page, Alarm Menu) is set to: **Process** - set the process value that will trigger a low alarm.	-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	2532 [offset 60]	0x6D (109) 1 to 16 2	18	9002	float RWES

* These parameters/prompts are available in these menus with firmware revisions 6.0 and above.
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RM Limit 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.hi A.hi	*Alarm (1 to 16)* **High Set Point** If Alarm Type (Setup Page, Alarm Menu) is set to: **Process** - set the process value that will trigger a high alarm.	-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	2530 [offset 60]	0x6D (109) 1 to 16 1	19	9001	float RWES
A.LA A.LA	*Alarm (1 to 16)* **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	2542 [offset 60]	0x6D (109) 1 to 16 7	27	9007	uint RWES
A.bL A.bL	*Alarm (1 to 16)* **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	2544 [offset 60]	0x6D (109) 1 to 16 8	28	9008	uint RWES
A.Si A.Si	*Alarm (1 to 16)* **Silencing** Turn alarm silencing on to allow the user to disable this alarm.	oFF Off (62) on On (63)	Off	2540 [offset 60]	0x6D (109) 1 to 16 6	29	9006	uint RWES
A.dSP A.dSP	*Alarm (1 to 16)* **Display** Display an alarm message when an alarm is active.	oFF Off (62) on On (63)	On	2560 [offset 60]	0x6D (109) 1 to 16 0x10 (16)	30	9016	uint RWES

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

RM Limit 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.dL A.dL	*Alarm (1 to 16)* **Delay Time** Set the span of time that the alarm will be de-layed after the process value ex-ceeds the alarm set point.	0 to 9,999 seconds	0	2570 [offset 60]	0x6D (109) 1 to 16 0x15 (21)	31	9021	uint RWES
A.CLr A.CLr	*Alarm (1 to 16)* **Clear Alarm** Write to this reg-ister to clear an alarm	0	Ignore	2554 [offset 60]	0x6D (109) 1 to 24 0x0D (13)	32	9026	uint W
A.Sir A.Sir	*Alarm (1 to 16)* **Silence Alarm** Write to this reg-ister to silence an alarm	0	Ignore	2556 [offset 60]	0x6D (109) 1 to 24 0x0E (14)	33	9027	uint W
A.St A.St	*Alarm (1 to 16)* **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)	- - - -	2546 [offset 60]	0x6D (109) 1 to 24 9	- - - -	9009	uint R
Lnr SEt **Linearization Menu**								
Fn Fn	*Linearization (1 to 16)* **Function** Set how this func-tion will linearize Source A.	oFF Off (62) intr Interpolated (1482) StPd Stepped (1483)	Off	7998 [offset 70]	0x86 (134) 1 to 16 5	- - - -	34005	uint 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 Limit 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	*Linearization (1 to 16)* **Source Function A** Set the type of function that will be used for this source.	nonE None (61) uAr Variable (245) SP.o Set Point Open (243) SP.C Set Point Closed (242) Pu Process Value (241) MAt Math (240) Lnr Linearization (238) PWr Power (73) h.Pr Heat Power (160) C.Pr Cool Power (161) CUrr Current (22) Ai Analog Input (142)	None	7990 [offset 70]	0x86 (134) 1 to 16 1	155	34001	uint RWES
Si.A	*Linearization (1 to 16)* **Source Instance A** Set the instance of the function selected above.	1 to 250	1	7992 [offset 70]	0x86 (134) 1 to 16 2	- - - -	34002	uint RWES
SZ.A	*Linearization (1 to 16)* **Source Zone A** Set the zone of the function se-lected above.	0 to 24	0	7994 [offset 70]	0x86 (134) 1 to 16 3	- - - -	34003	uint RWES
Unit	*Linearization (1 to 16)* **Units** Set the units of the output value.	rh Relative Humidity (1538) Pro Process (75) PWr Power (73) r.tP Relative Temperature (1541) A.tP Absolute Temperature (1540) Src Source (1539) nonE None (61)	Source	8046 [offset 70]	0x86 (134) 1 to 16 0x1D (29)	156	34029	uint RWES
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	8004 [offset 70]	0x86 (134) 1 to 16 8	157	34008	float RWES

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RM Limit 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.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	8024 [offset 70]	0x86 (134) 1 to 16 0x12 (18)	158	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	8006 [offset 70]	0x86 (134) 1 to 16 9	159	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	8026 [offset 70]	0x86 (134) 1 to 16 0x13 (19)	160	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	8008 [offset 70]	0x86 (134) 1 to 16 0xA (10)	161	34010	float RWES
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	8028 [offset 70]	0x86 (134) 1 to 16 0x14 (20)	162	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	8010 [offset 70]	0x86 (134) 1 to 16 0xB (11)	163	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	8030 [offset 70]	0x86 (134) 1 to 16 0x15 (21)	164	34021	float RWES
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RM Limit 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.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	8012 [offset 70]	0x86 (134) 1 to 16 0xC (12)	165	34012	float RWES
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	8032 [offset 70]	0x86 (134) 1 to 16 0x16 (22)	166	34022	float RWES
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	8014 [offset 70]	0x86 (134) 1 to 16 0xD (13)	167	34013	float RWES
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	8034 [offset 70]	0x86 (134) 1 to 16 0x17 (23)	168	34023	float RWES
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	8016 [offset 70]	0x86 (134) 1 to 16 E (14)	169	34014	float RWES
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	8036 [offset 70]	0x86 (134) 1 to 16 0x18 (24)	170	34024	float RWES
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	8018 [offset 70]	0x86 (134) 1 to 16 0xF (15)	171	34015	float RWES

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RM Limit 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.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	8038 [offset 70]	0x86 (134) 1 to 16 0x19 (25)	172	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	8020 [offset 70]	0x86 (134) 1 to 16 0x10 (16)	173	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	8040 [offset 70]	0x86 (134) 1 to 16 0x1A (26)	174	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	8022 [offset 70]	0x86 (134) 1 to 16 0x11 (17)	175	34017	float RWES
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	8042 [offset 70]	0x86 (134) 1 to 16 0x1B (27)	176	34027	float RWES
CPE SEt **Compare Menu**								
Fn Fn	*Compare (1 to 16)* **Function** Set operator that will be used to compare Source A to Source B.	oFF Off (62) LoE Less or Equal (1440) GoE Greater or Equal (1439) nE Not Equal To (1438) E Equal To (1437) L.t Less Than (1436) G.t Greater Than (1435)	Off	5926 [offset 40]	0x80 (128) 1 to 16 9	223	28009	uint RWES

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RM Limit 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 ****
tol toL	*Compare (1 to 16)* **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	5930 [offset 40]	0x80 (128) 1 to 16 0xB (11)	230	28011	float RWES
SFn.A SFn.A	*Compare (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) PLUr Power (73) Lnr Linearization (238) MAt Math (240) Pu Process Value (241) SP.C Set Point Closed (242) SP.o Set Point Open (243) uAr Variable (245) UAt Wattage (1697) Ld.Uo Load Voltage (1698) Ld.r Load Resistance (1183)	None	5910 [offset 40]	0x80 (128) 1 to 16 1	- - - -	28001	uint RWES
S i.A Si.A	*Compare (1 to 16)* **Source Instance A** Set the instance of the function selected above.	1 to 250	1	5914 [offset 40]	0x80 (128) 1 to 16 3	- - - -	28003	uint RWES
SZ.A SZ.A	*Compare (1 to 16)* **Source Zone A** Set the zone of the function se-lected above.	0 to 24	0	5918 [offset 40]	0x80 (128) 1 to 16 5	- - - -	28005	uint RWES

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RM Limit 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.b SFn.b	*Compare (1 to 16)* **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) PWr Power (73) Lnr Linearization (238) MAt Math (240) Pu Process Value (241) SP.C Set Point Closed (242) SP.o Set Point Open (243) uAr Variable (245) WAt Wattage (1697) Ld.Uo Load Voltage (1698) Ld.r Load Resistance (1183)	None	5912 [offset 40]	0x80 (128) 1 to 16 2	- - - -	28002	uint RWES
S i.b Si.b	*Compare (1 to 16)* **Source Instance B** Set the instance of the function selected above.	1 to 250	1	5916 [offset 40]	0x80 (128) 1 to 16 4	- - - -	28004	uint RWES
SZ.b SZ.b	*Compare (1 to 16)* **Source Zone B** Set the zone of the function selected above.	0 to 24	0	5920 [offset 40]	0x80 (128) 1 to 16 6	- - - -	28006	uint RWES
Er.h Er.h	*Compare (1 to 16)* **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.g True Good (1476) t.b True Bad (1477) F.g False Good (1478) F.b False Bad (1479)	False Bad	5932 [offset 40]	0x80 (128) 1 to 16 0xC (12)	- - - -	28012	uint RWES
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RM Limit 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 **
tMr SEt **Timer Menu**								
Fn Fn	*Timer (1 to 16)* **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	7206 [offset 50]	0x83 (131) 1 to 16 9	223	31009	uint RWES
SFn.A SFn.A	*Timer (1 to 16)* **Source Function A** Set the type of function that will be used for this source. This rep-resents 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.9 Profile Event Out G (249) Ent.h Profile Event Out H (250) FUn Function Key (1001) 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) tMr Timer (244) h.Er Heater Error (184) uAr Variable (245)	None	7190 [offset 50]	0x83 (131) 1 to 16 1	- - - -	31001	uint RWES
S iA Si.A	*Timer (1 to 16)* **Source Instance A** Set the instance of the function selected above.	1 to 250	1	7194 [offset 50]	0x83 (131) 1 to 16 3	- - - -	31003	uint RWES

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RM Limit 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	*Timer (1 to 16)* **Source Zone A** Set the zone of the function selected above.	0 to 24	0	7198 [offset 50]	0x83 (131) 1 to 16 5	- - - -	31005	uint RWES
SAS.A SAS.A	*Timer (1 to 16)* **Run Active Level** Set what state will be read as on.	hi9h High (37) LoWd Low (53)	High	7210 [offset 50]	0x83 (131) 1 to 16 0xB (11)	- - - -	31011	uint RWES
SFn.b SFn.b	*Timer (1 to 16)* **Source Function B** Set the type of function that will be used to reset a retentive timer.	nonE None (61) ALM Alarm (6) C.Pr Cool Power (161) 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.9 Profile Event Out G (249) Ent.h Profile Event Out H (250) FUn Function Key (1001) 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) tMr Timer (244) h.Er Heater Error (184) uAr Variable (245)	None	7192 [offset 50]	0x83 (131) 1 to 16 2	- - - -	31002	uint RWES
Si.b Si.b	*Timer (1 to 16)* **Source Instance B** Set the instance of the function selected above.	1 to 250	1	7196 [offset 50]	0x83 (131) 1 to 16 4	- - - -	31004	uint RWES
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RM Limit 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 ****
S2.b SZ.b	*Timer (1 to 16)* **Source Zone B** Set the zone of the function selected above.	0 to 24	0	7200 [offset 50]	0x83 (131) 1 to 16 6	- - - -	31006	uint RWES
SAS.b SAS.b	*Timer (1 to 16)* **Reset Active Level** Set what state will be read as on.	high High (37) Low Low (53)	High	7212 [offset 50]	0x83 (131) 1 to 16 0xC (12)	- - - -	31012	uint RWES
t i ti	*Timer (1 to 16)* **Time** Set the time span that will be mea-sured in tenths of a second.	0 to 9,999.000	0.1	7214 [offset 50]	0x83 (131) 1 to 16 0xD (13)	224	31013	float RWES
LEu LEv	*Timer (1 to 16)* **Transmitter Ac-tive Level** Set which output state will indicate on.	high High (37) Low Low (53)	High	7216 [offset 50]	0x83 (131) 1 to 16 0xE (14)	- - - -	31014	uint RWES
Ctr SEt **Counter Menu**								
Fn Fn	*Counter (1 to 16)* **Function** Set whether the counter incre-ments or decre-ments the count value. Decre-menting 0 returns 9,999. Increment-ing 9,999 returns 0.	UP Up (1456) dn Down (1457)	Up	6566 [offset 40]	0x82 (130) 1 to 16 9	- - - -	30009	uint 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 Limit 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	*Counter (1 to 16)* **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) L9C Logic (239) tMr Timer (244) h.Er Heater Error (184) uAr Variable (245)	None	6550 [offset 40]	0x82 (130) 1 to 16 1	- - - -	30001	uint RWES
S i.A Si.A	*Counter (1 to 16)* **Source Instance A** Set the instance of the function selected above.	1 to 250	1	6554 [offset 40]	0x82 (130) 1 to 16 3	- - - -	30003	uint RWES
SZ.A SZ.A	*Counter (1 to 16)* **Source Zone A** Set the zone of the function selected above.	0 to 24	0	6558 [offset 40]	0x82 (130) 1 to 16 5	- - - -	30005	uint RWES
SAS.A SAS.A	*Counter (1 to 16)* **Count Active Level** Set what output state will indicate on.	h i9h High (37) LoW Low (53) both Both (130)	High	6570 [offset 40]	0x82 (130) 1 to 16 0xB (11)	- - - -	30011	uint RWES
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RM Limit 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.b SFn.b	*Counter (1 to 16)* **Source Function B** Set the type of function that will be used for the counter load signal.	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) tMr Timer (244) h.Er Heater Error (184) uAr Variable (245)	None	6552 [offset 40]	0x82 (130) 1 to 16 2	- - - -	30002	uint RWES
Si.b Si.b	*Counter (1 to 16)* **Source Instance B** Set the instance of the function selected above.	1 to 250	1	6556 [offset 40]	0x82 (130) 1 to 16 4	- - - -	30004	uint RWES
SZ.b SZ.b	*Counter (1 to 16)* **Source Zone B** Set the zone of the function selected above.	0 to 24	0	6560 [offset 40]	0x82 (130) 1 to 16 6	- - - -	30006	uint RWES
SAS.b SAS.b	*Counter (1 to 16)* **Reset Active Level** Set what output state will indicate on.	high High (37) Lowd Low (53) both Both (130)	High	6572 [offset 40]	0x82 (130) 1 to 16 0x0C (12)	- - - -	30012	uint RWES
LoAd LoAd	*Counter (1 to 16)* **Load Value** Set the counter's initial value.	0 to 9,999	0	6574 [offset 40]	0x82 (130) 1 to 16 (13)	215	30013	uint RWES
trgt trgt	*Counter (1 to 16)* **Target Value** Set the value that will turn the output value on.	0 to 9,999	9,999	6576 [offset 40]	0x82 (130) 1 to 16 0xE (14)	216	30014	uint RWES

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RM Limit 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 **
LAt LAt	*Counter (1 to 16)* **Latching** Output latched.	no No (59) YES Yes (106)	No	6582 [offset 40]	0x82 (130) 1 to 16 0x11 (17)	218	30017	uint RWES
L9C SEt **Logic Menu**								
Fn Fn	*Logic (1 to 16)* **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) r.SFF RS Flip-Flop (1693)	Off	4694 [offset 80]	0x7F (127) 1 to 16 0x21 (33)	235	27033	uint 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 Limit 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 16)* **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) 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) 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) h.Er Heater Error (184) uAr Variable (245)	None	4630 [offset 80]	0x7F (127) 1 to 16 1	- - - -	27001	uint RWES
Si.A Si.A	*Logic (1 to 16)* **Source Instance A** Set the instance of the function selected above.	1 to 250	1	4646 [offset 80]	0x7F (127) 1 to 16 9	- - - -	27009	uint RWES
SZ.A SZ.A	*Logic (1 to 16)* **Source Zone A** Set the zone of the function se-lected above.	0 to 24	0	4662 [offset 80]	0x7F (127) 1 to 16 0x11 (17)	- - - -	27017	uint 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 Limit 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.b SFn.b	*Logic (1 to 16)* **Source Function B** 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 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) h.Er Heater Error (184) uAr Variable (245)	None	4632 [offset 80]	0x7F (127) 1 to 16 2	- - - -	27002	uint RWES
S i.b Si.b	*Logic (1 to 16)* **Source Instance B** Set the instance of the function selected above.	1 to 250	1	4648 [offset 80]	0x7F (127) 1 to 16 0xA (10)	- - - -	27010	uint RWES
S2.b SZ.b	*Logic (1 to 16)* **Source Zone B** Set the zone of the function selected above	0 to 24	0	4664 [offset 80]	0x7F (127) 1 to 16 0x12 (18)	- - - -	27018	uint 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 Limit 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 16)* **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) 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) 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) h.Er Heater Error (184) uAr Variable (245)	None	4634 [offset 80]	0x7F (127) 1 to 16 3	- - - -	27003	uint RWES
Si.C Si.C	*Logic (1 to 16)* **Source Instance C** Set the instance of the function selected above.	1 to 250	1	4650 [offset 80]	0x7F (127) 1 to 16 0xB (11)	- - - -	27011	uint RWES
SZ.C SZ.C	*Logic (1 to 16)* **Source Zone C** Set the zone of the function selected above.	0 to 24	0	4666 [offset 80]	0x7F (127) 1 to 16 0x13 (19)	- - - -	27019	uint 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 Limit 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	*Logic (1 to 16)* **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 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) h.Er Heater Error (184) uAr Variable (245)	None	4636 [offset 80]	0x7F (127) 1 to 16 4	- - - -	27004	uint RWES
S i.d Si.d	*Logic (1 to 16)* **Source Instance D** Set the instance of the function selected above.	1 to 250	1	4652 [offset 80]	0x7F (127) 1 to 16 0xC (12)	- - - -	27012	uint RWES
SZ.d SZ.d	*Logic (1 to 16)* **Source Zone D** Set the zone of the function se-lected above.	0 to 24	0	4668 [offset 80]	0x7F (127) 1 to 16 0x14 (20)	- - - -	27020	uint 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 Limit 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 16)* **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) 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) 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) h.Er Heater Error (184) uAr Variable (245)	None	4638 [offset 80]	0x7F (127) 1 to 16 5	- - - -	27005	uint RWES
Si.E Si.E	*Logic (1 to 16)* **Source Instance E** Set the instance of the function selected above.	1 to 250	1	4654 [offset 80]	0x7F (127) 1 to 16 D (13)	- - - -	27013	uint RWES
SZ.E SZ.E	*Logic (1 to 16)* **Source Zone E** Set the zone of the function se-lected above.	0 to 24	0	4670 [offset 80]	0x7F (127) 1 to 16 0x15 (21)	- - - -	27021	uint 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 Limit 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.F SFn.F	*Logic (1 to 16)* **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) 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) 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) h.Er Heater Error (184) uAr Variable (245)	None	4640 [offset 80]	0x7F (127) 1 to 16 6	- - - -	27006	uint RWES
Si.F Si.F	*Logic (1 to 16)* **Source Instance F** Set the instance of the function selected above.	1 to 250	1	4656 [offset 80]	0x7F (127) 1 to 16 0xE (14)	- - - -	27014	uint RWES
SF.F SF.F	*Logic (1 to 16)* **Source Zone F** Set the zone of the function selected above.	0 to 24	0	4672 [offset 80]	0x7F (127) 1 to 16 0x16 (22)	- - - -	27022	uint 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 Limit 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.g SFn.g	*Logic (1 to 16)* **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 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) h.Er Heater Error (184) uAr Variable (245)	None	4642 [offset 80]	0x7F (127) 1 to 16 7	- - - -	27007	uint RWES
S i.g Si.g	*Logic (1 to 16)* **Source Instance G** Set the instance of the function selected above.	1 to 250	1	4658 [offset 80]	0x7F (127) 1 to 16 0xF (15)	- - - -	27015	uint RWES
SZ.g SZ.g	*Logic (1 to 16)* **Source Zone G** Set the zone of the function selected above.	0 to 24	0	4674 [offset 80]	0x7F (127) 1 to 16 0x17 (23)	- - - -	27023	uint RWES

* These parameters/prompts are available in these menus with firmware revisions 6.0 and above.
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RM Limit 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.h SFn.h	*Logic (1 to 16)* **Source Function H** 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 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) h.Er Heater Error (184) uAr Variable (245)	None	4644 [offset 80]	0x7F (127) 1 to 16 8	- - - -	27008	uint RWES
S i.h Si.h	*Logic (1 to 16)* **Source Instance H** Set the instance of the function selected above.	1 to 250	1	4660 [offset 80]	0x7F (127) 1 to 16 0x10 (16)	- - - -	27016	uint RWES
SZ.h SZ.h	*Logic (1 to 16)* **Source Zone H** Set the zone of the function se-lected above.	0 to 24	0	4676 [offset 80]	0x7F (127) 1 to 16 0x18 (24)	- - - -	27024	uint 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 Limit 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 16)* **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	4698 [offset 80]	0x7F (127) 1 to 16 0x23 (35)	- - - -	27035	uint RWES
MAt SEt **Math Menu**								
Fn Fn	*Math (1 to 16)* **Function** Set the operator that will be applied to the sources.	oFF Off (62) Aug Average (1367) P.SC Process Scale (1371) d.SC Deviation Scale (1372) So Switch Over (1370) diFF Differential (1373) rAti Ratio (1374) Add Add (1375) MUL Multiply (1376) A.diF Absolute Difference (1377) Min Minimum (1378) MAH Maximum (1379) root Square Root (1380) hold Sample and Hold (1381) ALt Pressure to Altitude (1649) dEW Dew Point (1650)	Off	3550 [offset 70]	0x7D (125) 1 to 16 0x15 (21)	128	25021	uint 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 Limit 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	*Math (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, Control Loop (161) h.Pr Heat Power, Control Loop (160) PWr Power, Control Loop (73) Lnr Linearization (238) MAt Math (240) Pv Process Value (241) SP.C Set Point Closed, Control Loop (242) SP.o Set Point Open, Control Loop (243) vAr Variable (245)	None	3510 [offset 70]	0x7D (125) 1 to 16 1	- - - -	25001	uint RWES
S i.A Si.A	*Math (1 to 16)* **Source Instance A** Set the instance of the function selected above.	1 to 250	1	3520 [offset 70]	0x7D (125) 1 to 16 6	- - - -	25006	uint RWES
SZ.A SZ.A	*Math (1 to 16)* **Source Zone A** Set the zone of the function selected above.	0 to 24	0	3530 [offset 70]	0x7D (125) 1 to 16 0xB (11)	- - - -	25011	uint RWES
SFn.b SFn.b	*Math (1 to 16)* **Source Function B** 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, Control Loop (161) h.Pr Heat Power, Control Loop (160) PWr Power, Control Loop (73) Lnr Linearization (238) MAt Math (240) Pv Process Value (241) SP.C Set Point Closed, Control Loop (242) SP.o Set Point Open, Control Loop (243) vAr Variable (245)	None	3512 [offset 70]	0x7D (125) 1 to 16 2	- - - -	25002	uint RWES

* These parameters/prompts are available in these menus with firmware revisions 6.0 and above.
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RM Limit 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 16)* **Source Instance B** Set the instance of the function selected above.	1 to 250	1	3522 [offset 70]	0x7D (125) 1 to 16 7	- - - -	25007	uint RWES
S2.b SZ.b	*Math (1 to 16)* **Source Zone B** Set the zone of the function selected above.	0 to 24	0	3532 [offset 70]	0x7D (125) 1 to 16 0xC (12)	- - - -	25012	uint RWES
SFn.C SFn.C	*Math (1 to 16)* **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, Control Loop (161) h.Pr Heat Power, Control Loop (160) PUUr Power, Control Loop (73) Lnr Linearization (238) MAt Math (240) Pu Process Value (241) SP.C Set Point Closed, Control Loop (242) SP.o Set Point Open, Control Loop (243) uAr Variable (245)	None	3514 [offset 70]	0x7D (125) 1 to 16 3	- - - -	25003	uint RWES
S i.C Si.C	*Math (1 to 16)* **Source Instance C** Set the instance of the function selected above.	1 to 250	1	3524 [offset 70]	0x7D (125) 1 to 16 8	- - - -	25008	uint RWES
S2.C SZ.C	*Math (1 to 16)* **Source Zone C** Set the zone of the function selected above.	0 to 24	0	3534 [offset 70]	0x7D (125) 1 to 16 0xD (13)	- - - -	25013	uint RWES

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RM Limit 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 16)* **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, Control Loop (161) h.Pr Heat Power, Control Loop (160) PLUr Power, Control Loop (73) Lnr Linearization (238) MAt Math (240) Pu Process Value (241) SP.C Set Point Closed, Control Loop (242) SP.o Set Point Open, Control Loop (243) uAr Variable (245)	None	3516 [offset 70]	0x7D (125) 1 to 16 4	- - - -	25004	uint RWES
S i.d Si.d	*Math (1 to 16)* **Source Instance D** Set the instance of the function selected above.	1 to 250	1	3526 [offset 70]	0x7D (125) 1 to 16 9	- - - -	25009	uint RWES
SZ.d SZ.d	*Math (1 to 16)* **Source Zone D** Set the zone of the function selected above.	0 to 24	0	3536 [offset 70]	0x7D (125) 1 to 16 0xE (14)	- - - -	25014	uint RWES
SFn.E SFn.E	*Math (1 to 16)* **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.g Profile Event Out G (249) Ent.h Profile Event Out H (250) FUn Function Key (1001) LgC Logic (239) tMr Timer (244) uAr Variable (245)	None	3518 [offset 70]	0x7D (125) 1 to 16 5	- - - -	25005	uint 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 Limit 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	*Math (1 to 16)* **Source Instance E** Set the instance of the function selected above.	1 to 250	1	3528 [offset 70]	0x7D (125) 1 to 16 0xA (10)	- - - -	25010	uint RWES
SZ.E	*Math (1 to 16)* **Source Zone E** Set the zone of the function se- lected above.	0 to 24	0	3538 [offset 70]	0x7D (125) 1 to 16 0xF (15)	- - - -	25015	uint RWES
S.Lo	*Math (1 to 16)* **Scale Low** If Math function is set to Process Scale, this will scale Source A low value to Range Low set- ting.	-1,999.000 to 9,999.000	0.0	3556 [offset 70]	0x7D (125) 1 to 16 0x18 (24)	129	25024	float RWES
S.hi	*Math (1 to 16)* **Scale High** If Math function is set to Process Scale, this will scale Source A high value to Range High set- ting.	-1,999.000 to 9,999.000	1.0	3558 [offset 70]	0x7D (125) 1 to 16 0x19 (25)	130	25025	float RWES
r.Lo	*Math (1 to 16)* **Range Low** If Math function is set to Process Scale, this will output Source A Scale Low value to Range Low set- ting.	-1,999.000 to 9,999.000	0.0	3560 [offset 70]	0x7D (125) 1 to 16 0x1A (26)	131	25026	float RWES
r.hi	*Math (1 to 16)* **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	3562 [offset 70]	0x7D (125) 1 to 16 0x1B (27)	132	25027	float RWES

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RM Limit 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 **
P.unt P.unt	*Math (1 to 16)* **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	3568 [offset 70]	0x7D (125) 1 to 16 0x1E (30)	- - - -	25030	uint RWES
A.unt A.unt	*Math (1 to 16)* **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	3570 [offset 70]	0x7D (125) 1 to 16 0x1F (31)	- - - -	25031	uint RWES
FiL FiL	*Math (1 to 16)* **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	3564 [offset 70]	0x7D (125) 1 to 16 0x1C (28)	- - - -	25028	float RWES
uAr SEt **Variable Menu**								
tYPE tyPE	*Variable (1 to 16)* **Data Type** Set the variable's data type.	AnL9 Analog (1215) di9 Digital (1220)	Analog	9110 [offset 20]	0x66 (102) 1 to 16 1	210	2001	uint RWES
Unit Unit	*Variable (1 to 16)* **Units** Set the variable's units. Note: Units are always in degrees F when used for temperature	A.tP Absolute Temperature (1540) r.tP Relative Temperature (1541) PWr Power (73) Pro Process (75) rh Relative Humidity (1538) nonE None (61)	Absolute Temperature	9122 [offset 20]	0x66 (102) 1 to 16 7	- - - -	2007	uint RWES
di9 dig	*Variable (1 to 16)* **Digital** Set the variable's value.	oFF Off (62) on On (63)	Off	9112 [offset 20]	0x66 (102) 1 to 16 2	211	2002	uint 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 Limit 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 **
AnLg	*Variable (1 to 16)* **Analog** Set the variable's value.	-1,999.000 to 9,999.000	0.0	9114 [offset 20]	0x66 (102) 1 to 16 3	212	2003	float RWES
No Dis-play	*Variable (1 to 16)* **Output Value**	Off (62) On (63) -1,999.000 to 9,999.000	- - - -	9116 [offset 20]	0x66 (102) 1 to 16 4	- - - -	2004	float R
9LbL SEt Global Menu								
C_F	*Global* **Display Units** Select which scale to use for tem-perature.	F °F (30) C °C (15)	°F	368	0x67 (103) 1 5	110	3005	uint RWES
AC.LF	*Global* **AC Line Fre-quency** 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	*Global* **Maximum Display Value** Allows ranges to be opened up to display full values. Prior to firmware revision 9.0, ranges were clamped to ac-commodate the seven segment LED display of the RUI. Typi-cally 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

* 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 Limit 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 ****
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 ac-commodate the seven segment LED display of the RUI. Typi-cally 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
dPrS dPrS	*Global* **Display Pairs** Defines the num-ber of Display Pairs.	1 to 15	1	- - - -	0x67 (103) 1 0x1C (28)	- - - -	3028	uint RWES
USr.S USr.S	*Global* **Save Settings As** Save all of this controller's set-tings to the se-lected set that have a Data Type of RWES	SEt 1 User Set 1 (101) nonE None (61)	None	26	0x65 (101) 1 0x0E (14)	118	1014	uint RWE
USr.r USr.r	*Global* **Restore Settings From** Replace all of this controller's settings with an-other set.	nonE None (61) SEt 1 User Set 1 (101) FCty Factory (31) * Starting with firmware re-lease 6, there is only one user set.	None	24	0x65 (101) 1 0xD (13)	117	1013	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 Limit 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 **
CoM 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	3494	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 10th digit in part number is equal to one.	nonE None (61) EuEn Even (191) odd Odd (192)	None	3496	0x96 (150) 1 4	- - - -	17003	uint RWE
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	3498	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	3500	0x96 (150) 1 6	- - - -	17050	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 Limit 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 **
nU.S 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 communica-tions port will initiate a write to the EEPROM. Life of EEPROM is approximately one million writes.	YES Yes (106) no No (59)	Yes	3504	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

Limit 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**
  CUSt Custom Setup (1 to 30)
    PAr Parameter
    iid Instance ID

LoC
FCty **Security Setting Menu**
  LoC Security Setting
    LoC.o Operations Page
    PAS.E Password Enable
    rLoC Read Lock
    SLoC Write Security
    LoC.L Locked Access Level
    roLL Rolling Password
    PAS.u User Password
    PAS.A 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
    S.bld Software Build Number
    Sn Serial Number
    dAtE Date of Manufacture

CAL
FCty **Calibration Menu**
  CAL Calibration (1 to 12)
    Mu Electrical Measurement
    ELi.o Electrical Input Offset
    ELi.S Electrical Input Slope

RM Limit 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 30** Select the parameters that will appear in the Home Page when using the RUI. 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 writ-able one. Scroll through the other Home Page parameters with the Advance Key ‌.	nonE None (61) Pro Process (75) i.CA Calibration Off-set (1196) C_F Display Units (156) USr.r Restore Set-tings From (227) A.Lo Low Set point (42) A.hi High Set point (78) A.hy Hysteresis (97) LL.S Low Limit Set Point (181) Lh.S High Limit Set Point (182) L.hy Hysteresis (183) L.St Limit Status (1668) CUSt Custom Menu (180)	- - - -	- - - -	- - - -	- - - -	14005	uint RWES
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 Security Setting Menu								
LoC.o LoC.o	*Security Setting* **Operations Page** Use to change the re-quired security level clearance required to gain access to the Opera-tions Page.	1 to 3	2	- - - -	- - - -	- - - -	- - - -	unit RWE
** R: Read, W: Write, E: EEPROM, S: User Set								

RM Limit 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.E	*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	*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	- - - -	- - - -	- - - -	- - - -	- - - -
SLoC	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	- - - -	- - - -	- - - -	- - - -	- - - -
** R: Read, W: Write, E: EEPROM, S: User Set								

RM Limit 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 **
LoC.L	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	- - - -	- - - -	- - - -	- - - -	- - - -
No Dis-play	*Security Setting* **Locked State** Current level of security	Lock (228) User (1684) Admin (1685)	- - - -	- - - -	- - - -	- - - -	3023	uint R
roLL	Security Setting **Rolling Password** Applies if Password En-able is ON. When power is cycled a new Public Key will be displayed.	oFF Off on On	Off	- - - -	- - - -	- - - -	- - - -	- - - -
PAS.u	Security Setting **User Password** Applies if Password En-able is ON. Used to ac-quire access to menus made available through the Locked Access Level setting. Do not forget the password as it is required to change Locked Ac-cess Level, Read Lock or Write Security.	10 to 999	63	- - - -	- - - -	- - - -	- - - -	- - - -
PAS.A	*Security Setting* **Administrator Password** Applies if Password En-able is ON. Used to ac-quire 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	- - - -	- - - -	- - - -	- - - -	- - - -
** R: Read, W: Write, E: EEPROM, S: User Set								

RM Limit 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 **
ULoC FCtY **Security Setting Menu**								
CodE CodE	*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	*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	- - - -	- - - -	- - - -	- - - -	- - - -
d iAG FCtY **Diagnostics Menu**								
Pn Pn	*Diagnostics Menu* **Part Number** Display this controller's part number.	24	- - - -	- - - -	0x65 (101) 1 9	66	1009	int RWE
rEu rEv	*Diagnostics Menu* **Software Revision** Display this controller's firmware revision number.	5	- - - -	4	0x65 (101) 1 to 5 0x11 (17)	67	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
** R: Read, W: Write, E: EEPROM, S: User Set								

RM Limit 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 ****
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 Dis-play	Diagnostics Menu **Hardware ID** Read the hardware ID.	23 or 116	23	0	0x65 (101) 1 1	- - - -	1001	signed 32-bit R
No Dis-play	*Diagnostics Menu* **Device Name** Read the device name.	EZ-ZONE RM	- - - -	- - - -	0x65 (101) 1 0x0B (11)	- - - -	1011	string R
No Dis-play	*Diagnostics Menu* **Device Status** Return hardware status Fail means return to fac-tory.	OK (138) Fail (32)	- - - -	30	0x65 (101) 1 0x10 (16)	- - - -	1016	uint R
CAL FCtY **Calibration Menu**								
Mu Mv	*Calibration Menu (1 to 12)* **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		450 [offset 90]	0x68 (104) 1 to 12 0x15 (21)	- - - -	4021	float R
ELi.o ELi.o	*Calibration Menu (1 to 12)* **Electrical Input Offset** Change this value to cali-brate the low end of the input range.	-1,999.000 to 9,999.000	0.0	428 [offset 90]	0x68 (104) 1 to 12 0xA (10)	- - - -	4010	float RWES
ELi.S ELi.S	*Calibration Menu (1 to 12)* **Electrical Input Slope** Adjust this value to cali-brate the slope of the in-put value.	-1,999.000 to 9,999.000	1.0	430 [offset 90]	0x68 (104) 1 to 12 0xB (11)	- - - -	4011	float RWES
** R: Read, W: Write, E: EEPROM, S: User Set								

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Chapter 6: Features

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Saving and Restoring User Settings

Recording setup and operations parameter settings for future reference is very important. If you unintentionally change these, you will need to program the correct settings back into the controller to return the equipment to operational condition.

After you program the controller and verify proper operation, use 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.

Module Limit

This feature allows the user to setup a single output to reflect an energized (safe) or de-energized (tripped) state for the module. The reference to an energized or de-energized state refers to the internal coil that drives the Form A relay. When energized (safe) the contact is closed, when de-energized the contact is open. If any configured limit is tripped (process value exceeds set point or limit input has malfunctioned), the output LED assigned to serve as this function will come on. By default (factory settings), output 8 is assigned this function where any output of choice can be configured as such.

Note:

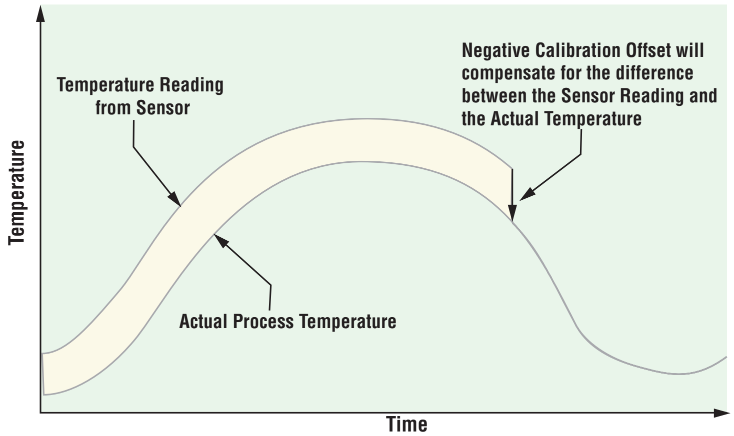
If limit loops exist on the module that are not intended to be used immediately, the loop must be setup to avoid a trip condition. To do this simply jumper the input for the unused loops and then ensure that the set point will never be exceeded (Operations Page, Limit Menu) by the process variable.

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 i.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 i.CA parameter found in the Operations Page oPEr, Analog Input Menu Ai 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.

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

Sensor Type	Low Source	High Source
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 interferes with open thermocouple detection, set Sensor Type SEn in Setup Page SEt, Analog Input Menu Ai to millivolt mu 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.

Follow these steps for a Thermocouple or Process Input:

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 ELi.S to 1.000 and Electrical Input Offset ELi.o to 0.000 (this will cancel any prior user calibration values)
8. Input a Precision Source Low value. Read Electrical Measurement value mu 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 mu 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 ELi.S and Electrical Input Offset ELi.o into the controller.
14. Exit calibration menu.
15. Validate calibration process by utilizing a calibrator connected to the analog input.
16. Enter calibration offset as recorded in step 2 if required to compensate for sensor error.

Follow these steps for an RTD input:

1. Measure the low source resistance to ensure it is accurate. Connect the low source resistance to the input you are calibrating.
2. Read the value of Electrical Measurement mu (Factory Page, Calibration Menu) for that input.

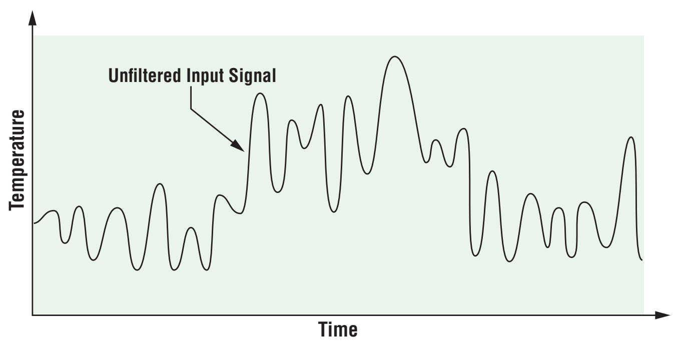
3. Calculate the offset value by subtracting this value from the low source resistance.
4. Set Electrical Input Offset EL i.o (Factory Page, Calibration Menu) for this input to the offset value.
5. Check the Electrical Measurement to see whether it now matches the resistance. If it doesn't match, adjust Electrical Offset again.
6. Measure the high source resistance to ensure it is accurate. Connect the high source resistance to the input.
7. Read the value of Electrical Measurement for that input.
8. Calculate the gain value by dividing the low source signal by this value.
9. Set Electrical Slope EL i.S (Factory Page, Calibration Menu) for this input to the calculated gain value.
10. Check the Electrical Measurement to see whether it now matches the signal. If it doesn't match, adjust Electrical Slope again.

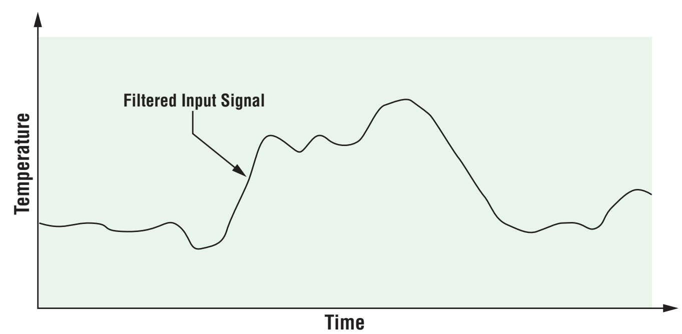
Setting Electrical Input Slope EL i.S to 1.000 and Electrical Input Offset EL i.o to 0.000, restores factory calibration as shipped from factory.

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 F iL (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).

Set Point Low Limit and High Limit

The controller constrains the limit set points (low and high) to a value between a Low Limit Set Point and a High Limit Set Point. Set the set point limits with Minimum Set Point L.SP and Maximum Set Point h.SP (Setup Page, Loop Menu).

Scale High and Scale Low

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

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

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

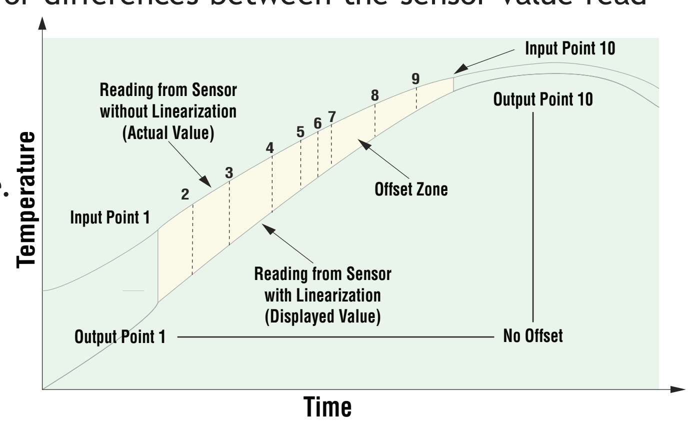
Select the low and high values with Scale Low S.Lo and Scale High S.hi. Select the displayed range with Range Low r.Lo and Range High r.hi (Setup Page, Analog Input Menu).

Range High and Range Low

With a process input, you must choose a value to represent the low and high ends of the current or voltage range. Choosing these values allows the controller's display to be scaled into the actual working units of measurement. For example, the analog input from a humidity transmitter could represent 0 to 100 percent relative humidity as a process signal of 4 to 20 mA. Low scale would be set to 0 to represent 4 mA and high scale set to 100 to represent 20 mA. The indication on the display would then represent percent humidity and range from 0 to 100 percent with an input of 4 to 20 mA. Select the low and high values with Range Low r.Lo and Range High r.hi (Setup Page, Analog Input Menu).

10 Point Linearization

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



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

Alarms

Alarms are activated when the output level, process value or temperature leaves a defined range. A user can configure how and when an alarm is triggered, what action it takes and whether it turns off automatically when the alarm condition is over. Configure alarm outputs in the Setup Page before setting alarm set points. Alarms do not have to be assigned to an output. Alarms can be monitored and controlled through the front panel or by using software.

Process Alarms

A process alarm uses one or two absolute set points to define an alarm condition. Select the type with Type A.ty (Setup Page, Alarm Menu).

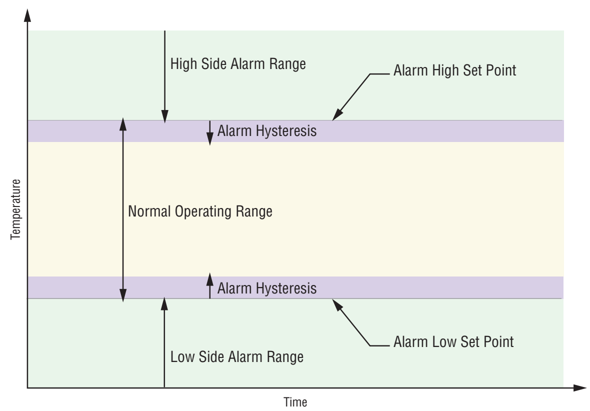
Alarm Set Points

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. View or change alarm set points with Alarm Low A.Lo and High Set Points A.hi (Operations Page, Alarm Menu).

Alarm Hysteresis

An alarm state is triggered when the process value reaches the alarm high or alarm low set point. Alarm hysteresis defines how far the process must return into the normal operating range before the alarm can be cleared.

Alarm hysteresis is a zone inside each alarm set point. This zone is defined by adding the hysteresis value to the alarm low set point or subtracting the hysteresis value from the alarm high set point. View or change alarm hysteresis with Hysteresis A.hy (Setup Page, Alarm Menu).



Alarm Set Points and Hysteresis

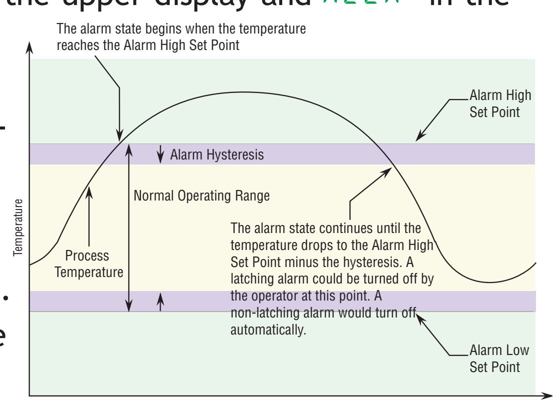
Alarm Latching

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 ignr 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.



Alarm Response with Hysteresis

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 A.LA on or off via the Setup Page, Alarm Menu.

Alarm 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 Attn 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 A.Si on or off via the Setup Page, Alarm Menu.

Alarm 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.

Turn Blocking A.bL on or off via the Setup Page, Alarm Menu.

Using Password Security

It is sometimes desirable to apply a higher level of security to the control where a limited number of menus are visible and not providing access to others without a security password. Without the appropriate password those menus will remain inaccessible. If Password Enabled PAS.E in the Factory Page under the 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 PAS.E is On) is enabled the two prompts mentioned below in the first step will not be visible. If unknown, call the individual or company that originally 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 410 contains the Analog Input 1 Process Value (See Operations Page, Analog Input Menu). If the value 410 is loaded into Assembly Definition Address 91, the process value sensed by analog input 1 will also be stored in Modbus registers 250 and 251. Note that by default all registers are set to Hardware ID.

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

Software Configuration

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 con trols.
- 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 then 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

Using EZ-ZONE Configurator Software

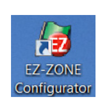
Installing the Software

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:

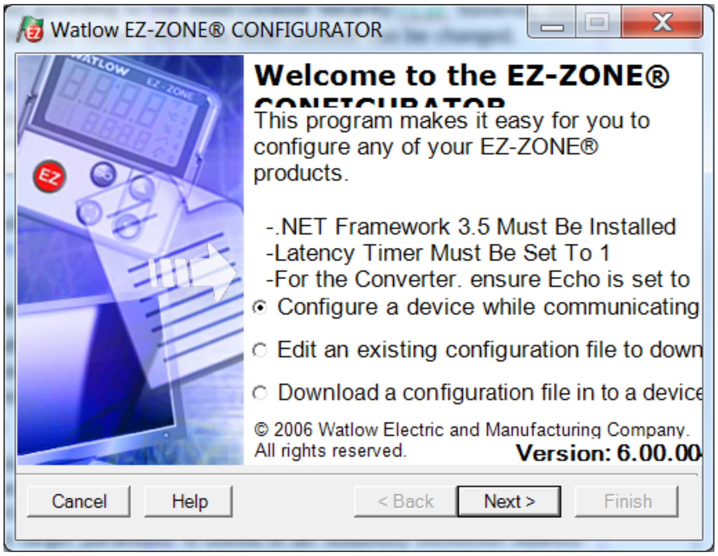
1. Double-click the EZ-ZONE Configurator icon on the desktop.



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.

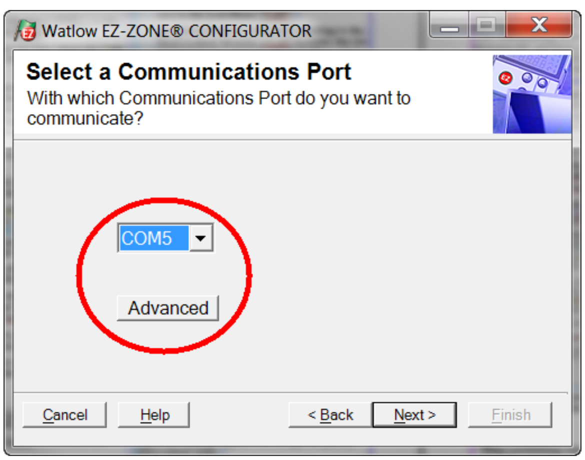


If the PC is already physically connected to the RML module click the next button to go on-line.

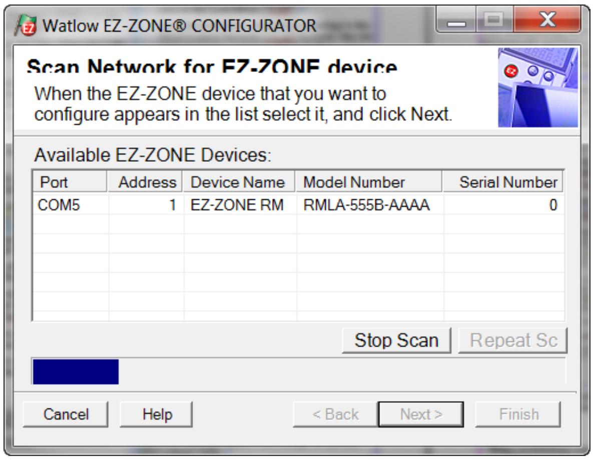
Note:

When establishing communications from PC to the RML 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.

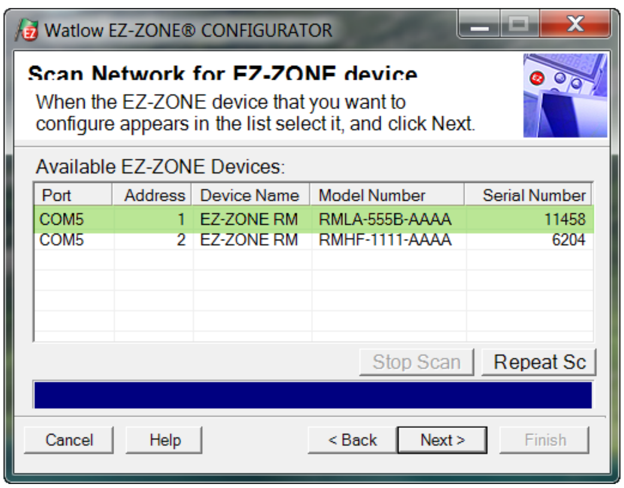
As can be seen in the above screen shot the software provides the user with the option of downloading a previously saved configuration as well as the ability to create a configuration off-line to download later. The screen shots that follow will take the user on-line. After clicking the next button above, it is necessary to define the communications port on the PC to use.



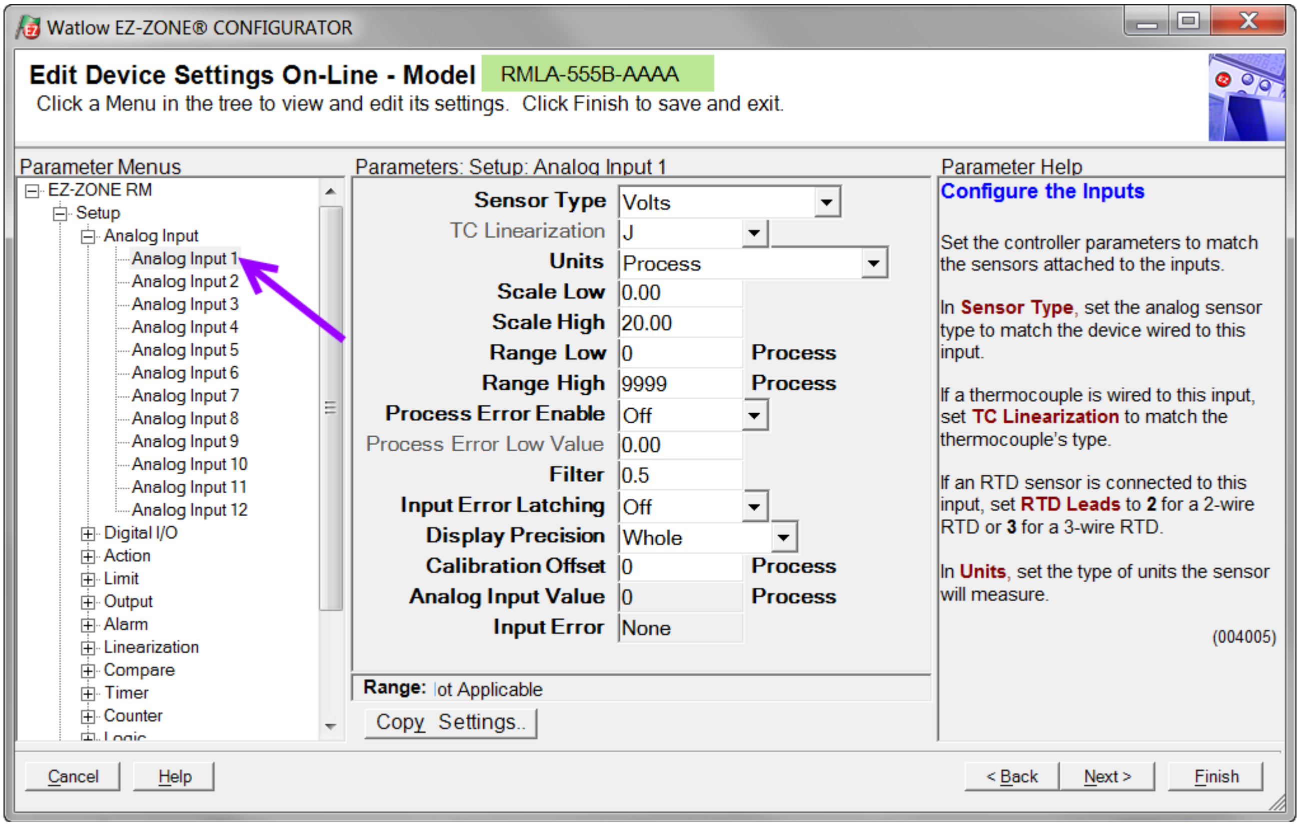
The available options allow the user to click on a drop down box to select a specific known communications port. Clicking on the Advanced button allows the user to define the number of EZ-ZONE devices to look for on the network. After clicking the Next button above, the software will then begin scanning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



In the screen shot above the RML 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.

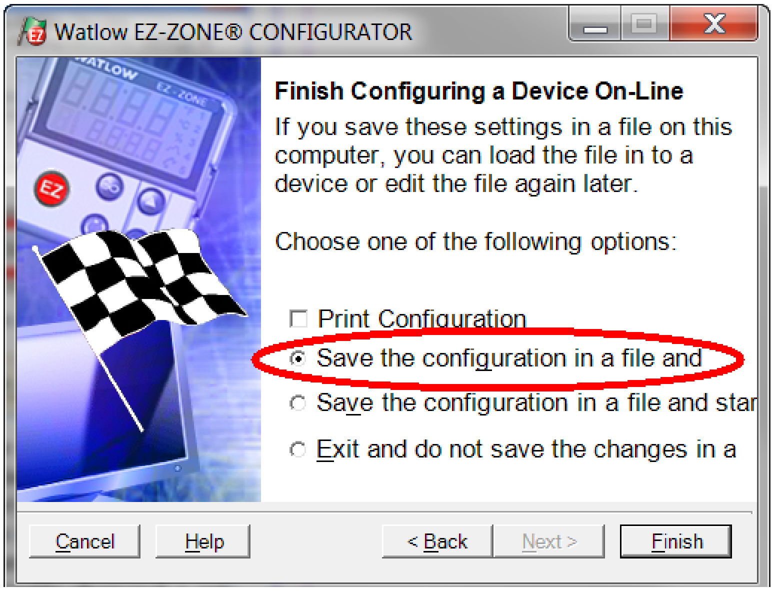


In the screen shot above notice that the device part number is clearly displayed at the top of the page (yellow highlight added for emphasis). When multiple EZ-ZONE devices are on the network it is important that the part number be noted prior to configuring so as to avoid making unwanted configuration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

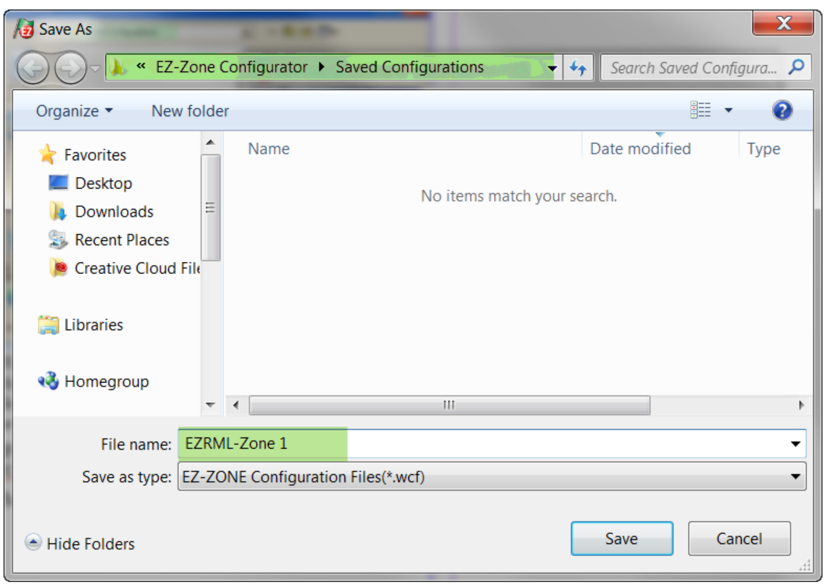
Looking closely at the left hand column (Parameter Menus) notice that it displays all of the available menus and associated parameters within this module. The menu structure as laid out within this software follows:

- 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 Analog Input 1 in the left column, all that can be setup related to that parameter will appear in the center column. The grayed out fields in the center column simply mean that this does not apply for the type of device selected. As an example, notice that when Volts is selected, TC Linearization does not apply and is therefore grayed out. To speed up the process of configuration, notice that at the bottom of the center column there is an option to copy settings. If all Analog Inputs will be configured the same, 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 RML 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

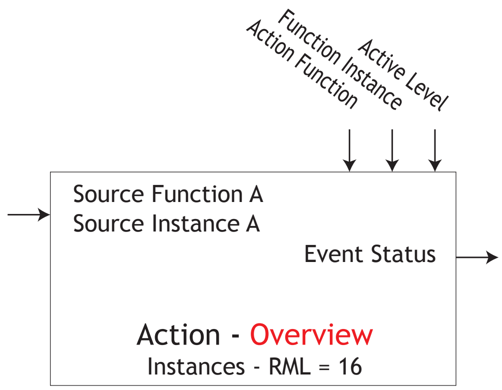
Each of the next several pages graphically shows each of the RMH function blocks. Note that as you view each, you will find text that is black and text that appears gray. The gray text represents inputs that are not currently available based on the functions defined use (red text). For instance, when 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
F i	Function Instance [10004] : 0 to 25
SFn.A	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 i.A	Source Instance A [10002] : 1 to 250
S2.A	Source Zone A [10007] : 0 to 24
LEv	Active Level [10001] : High, Low

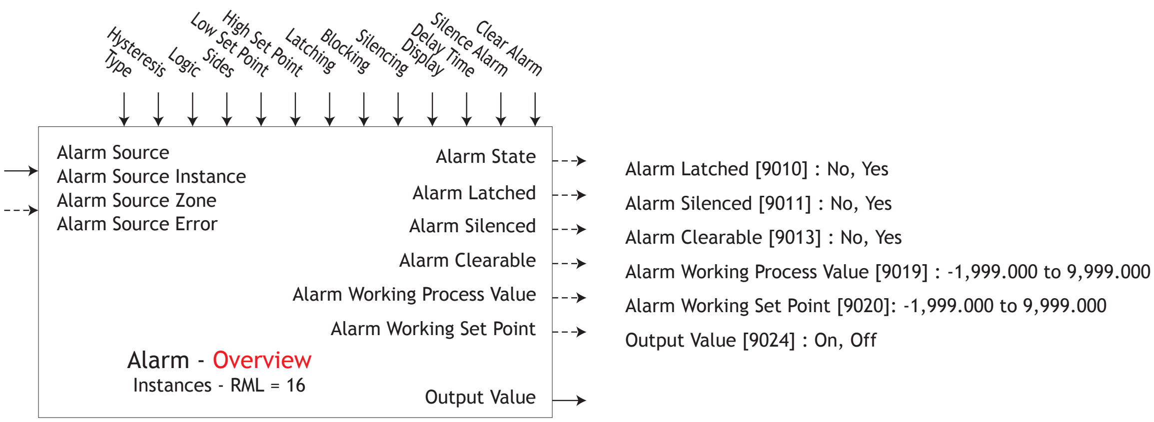
Act Action Menu
oPEr Operations Page

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.



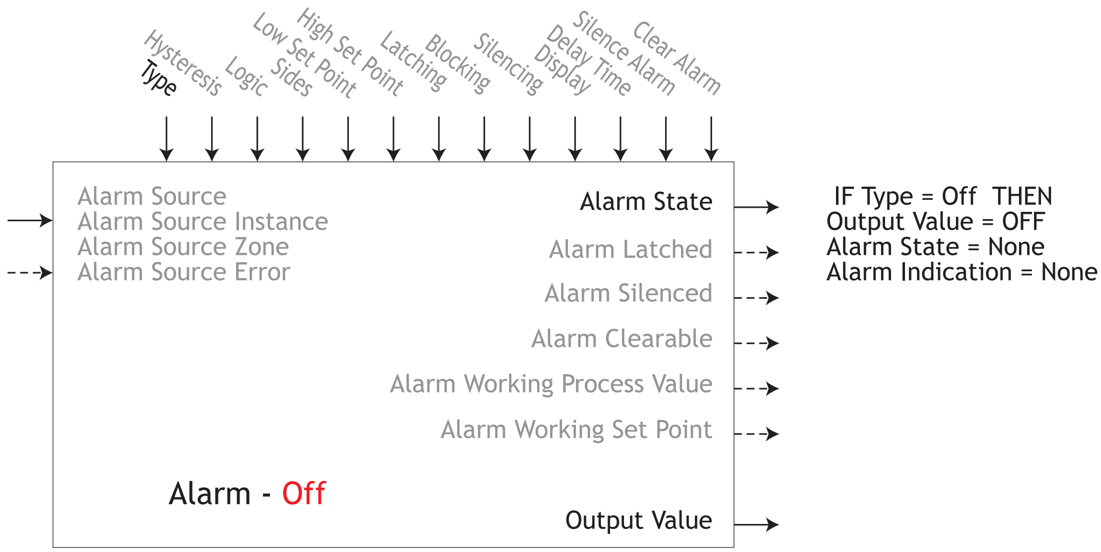
ALM Alarm Menu
SEt Setup Page

	Parameter Name [Parameter ID] : Range or Choices
A.ty	Type [9015] : Off, 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
SZ.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

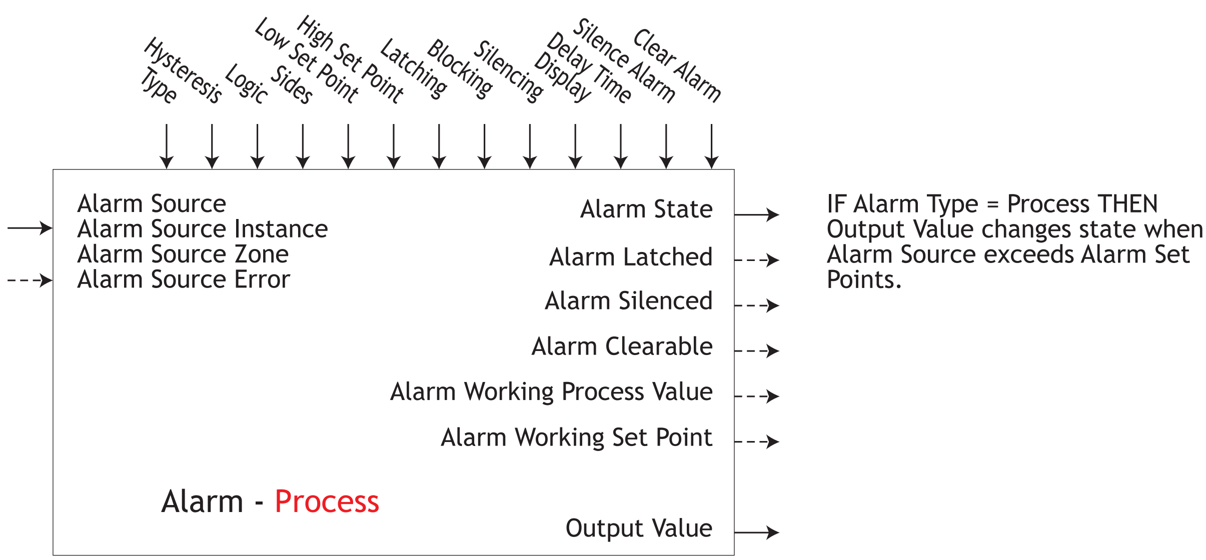
ALM Alarm Menu
oPEr Operations Page

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 (cont.)



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

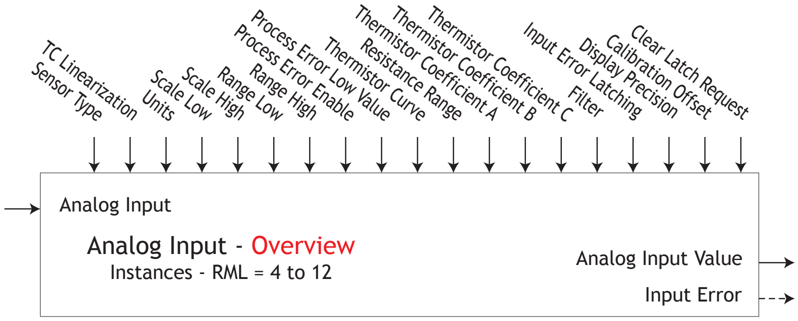


When function = Process THEN
Output Value = True when Alarm Source <= Low Set Point or
>= High Set Point

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.



Ai Analog Input Menu
SEt Setup Page

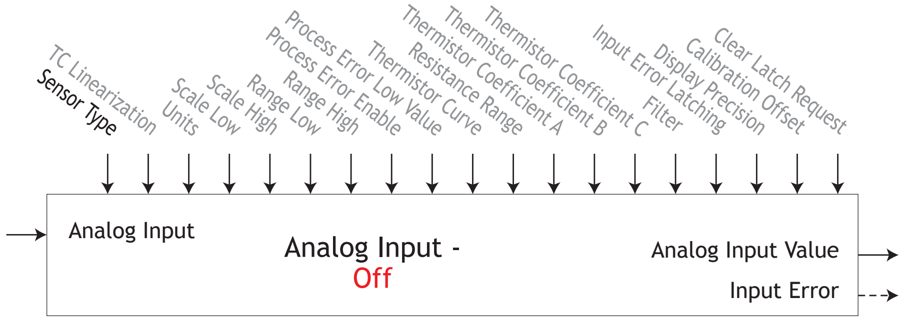
	Parameter Name [Parameter ID] : Range or Choices
SEn	Sensor Type [4005] : Off, Thermocouple, Millivolts, Volts, Milliamps, RTD 100 Ohm, RTD 1000 Ohm, 1K Potentiometer, Thermistor (optional)
Lin	TC Linearization [4006] : B, C, D, E, F, J, K, N, R, S, T
Unit	Units [4042] : Absolute Temperature, Power,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

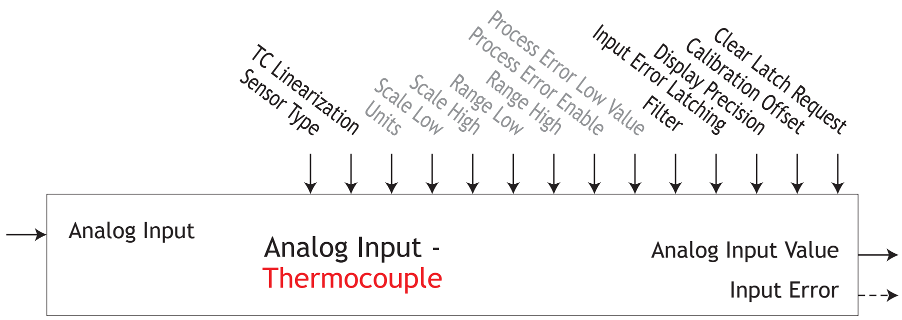
Ai Analog Input Menu
oPEr Operations Page

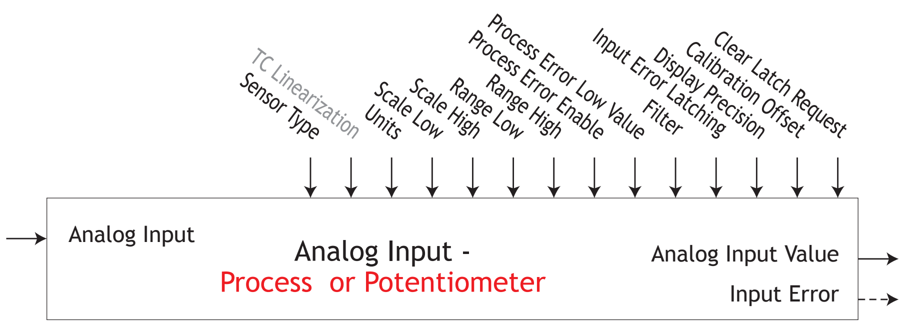
Ain	Analog Input Value [4001] : -1,999.000 to 9,999.000
i.Er	Input Error [4002] : None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Not Sourced
i.CA	Calibration Offset [4012] : -1,999.000 to 9,999.000

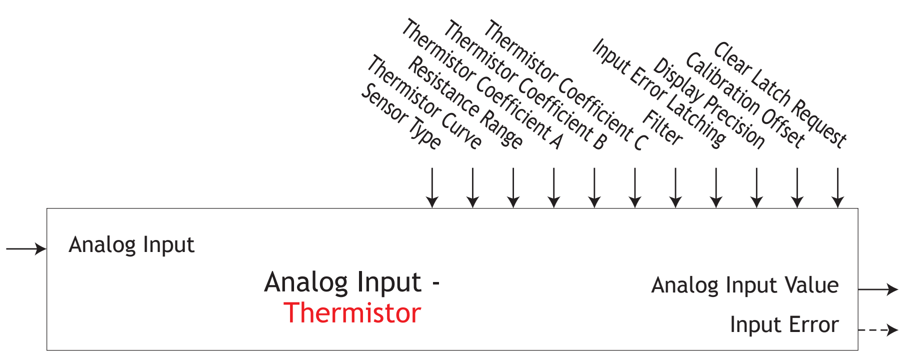
Clear Latch Request [4029] : Clear, Ignore

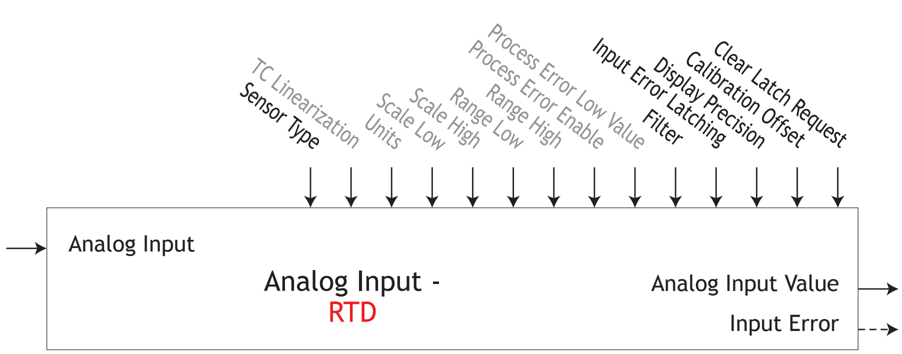
Analog Input (cont.)









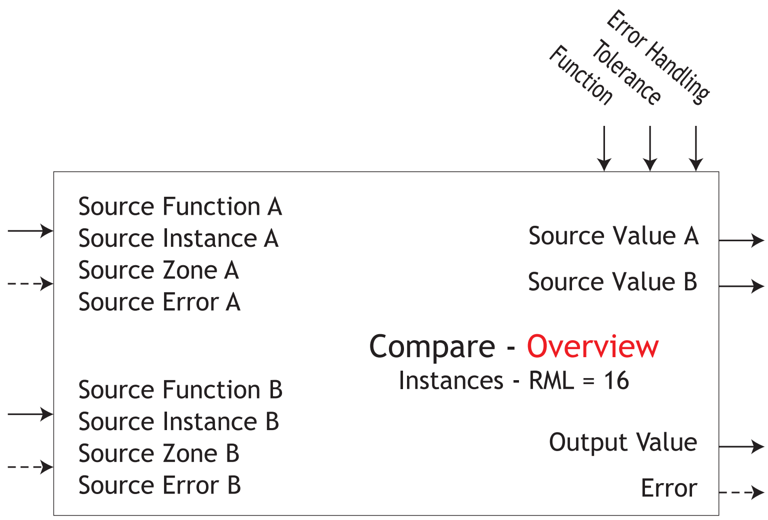


Compare Function

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



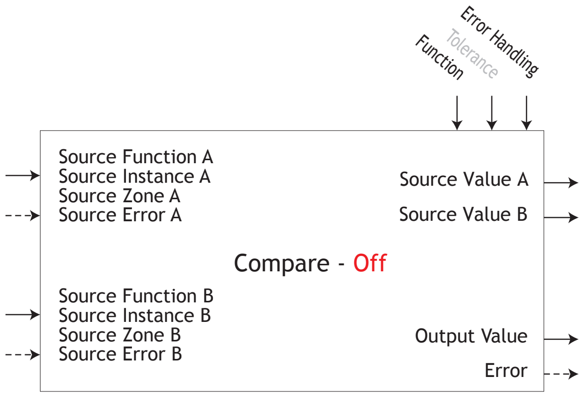
CPE Compare Menu
SEt Setup Page

	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
SFn.A	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 i.A	Source Instance A [28003] : 1 to 250
S2.A	Source Zone A [28005] : 0 to 24
SFn.b	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
S2.b	Source Zone B [28006] : 0 to 24
Er.h	Error Handling [28012] : False Bad, False Good, True Bad, True Good

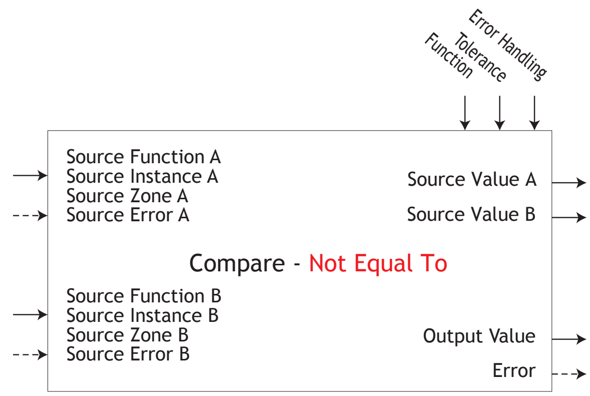
CPE Compare Menu
oPEr Operations Page

Su.A	Source Value A [28007] : -1,999.000 to 9,999.000 units or F
Su.b	Source Value B [28008] : -1,999.000 to 9,999.000 units or F
o.u	Output Value [28010] : Off, On

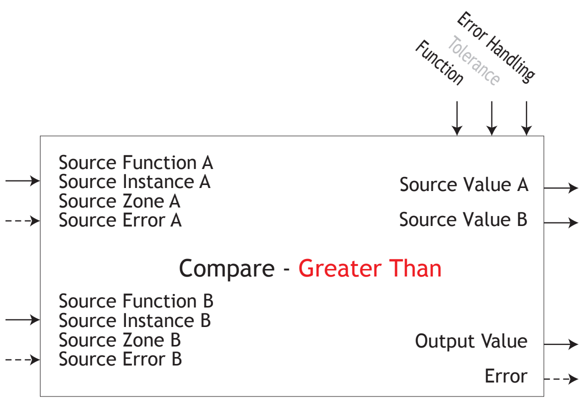
Compare (cont.)



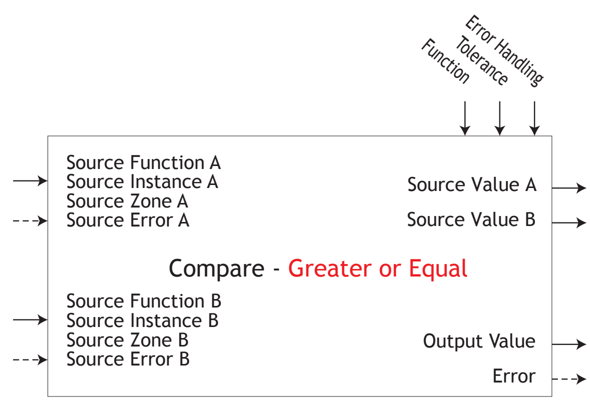
No Compare, Output Value = OFF



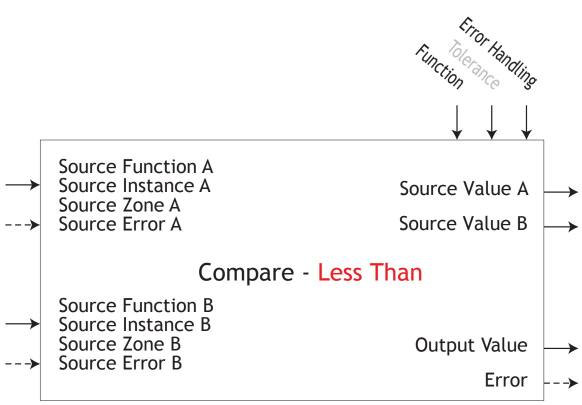
A not equal B, Output Value = ON



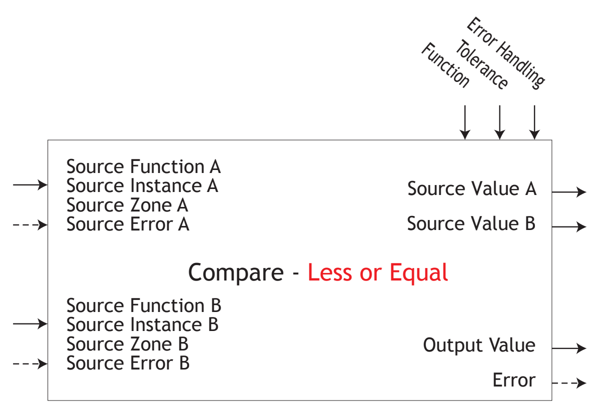
A>B, Output Value = ON



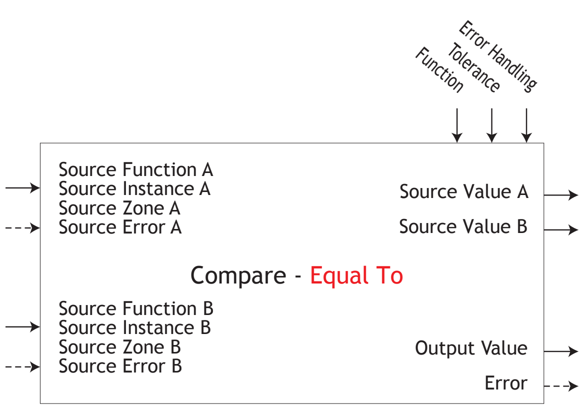
A>=B, Output Value = ON



A<B, Output Value = ON



A<=B, Output Value = ON

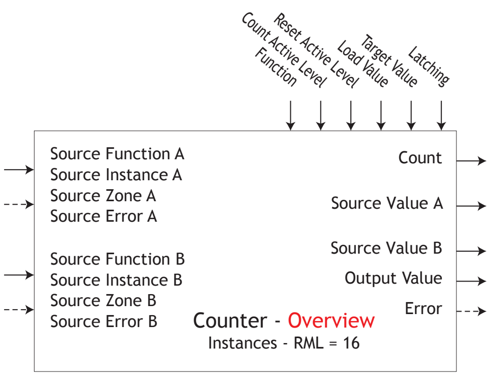


A=B, Output Value = ON

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
SFn.A	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 i.A	Source Instance A [30003] : 1 to 250
SZ.A	Source Zone A [30005] : 0 to 24
SAS.A	Count Active Level [30011] : High, Low, Both
SFn.b	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 i.b	Source Instance B [30004] : 1 to 250
SZ.b	Source Zone B [30006] : 0 to 24
SAS.b	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
Su.A	Source Value A [30007] : Off, On
Su.b	Source Value B [30008] : Off, On
o.u	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.

Parameter
Instance ID

Custom - Overview
Instances - RML = 30

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, Custom, Limit Low Set Point, Limit High Set Point, Limit Hysteresis, Limit Status
iid	Instance ID [14003] : 1 to 24

Diagnostic Function

Diagnostics - Overview
Instances - RML = 1

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

Hardware ID [1001] : 114 (RMC)
Device Name [1011] : EZ-ZONE RM
Device Status [1016] : OK, Fail

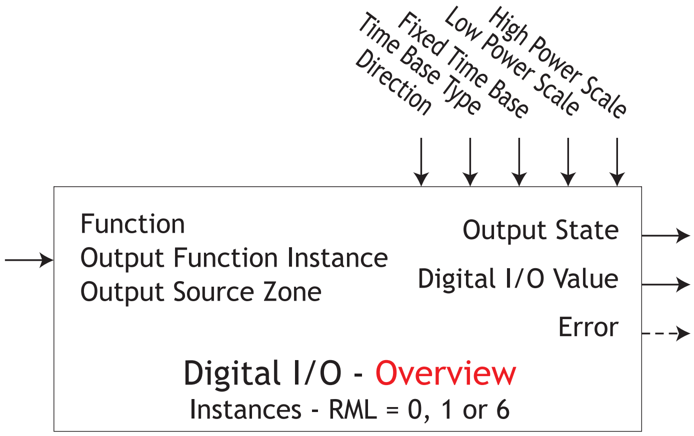
diAg Diagnostics Menu
FAct Factory Page

	Parameter Name [Parameter ID] : Range or Choices
Pn	Part Number [1009] :
rEu	Software Revision [1003] : 9.00, ...
S.bLd	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



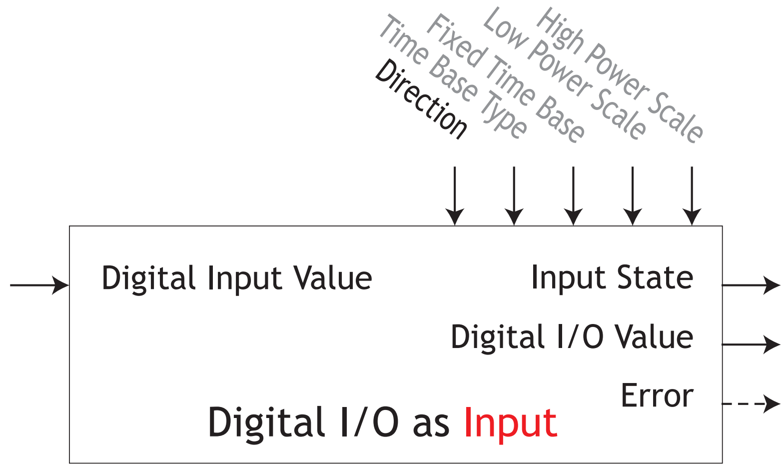
dio Digital I/O Menu
SEt Setup Page

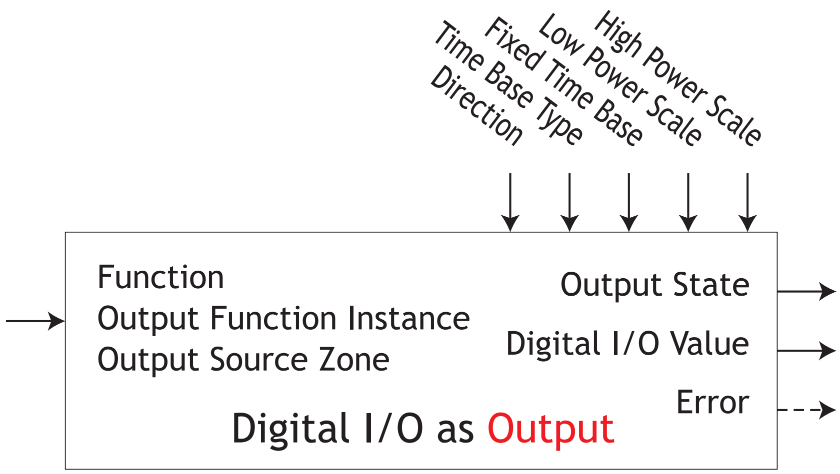
	Parameter Name [Parameter ID] : Range or Choices
dir	Direction [6001] : Output, Input Voltage, Input Dry Contact
Fn	Function [6005] : Off, Analog Input, Alarm, Cool Power, Heat Power, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Logic, Linearization, Math, Process Value, Special Function Output 1 to 4, Timer, Variable
Fi	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.hi	High Power Scale [6010] : 0.0 to 100.0 %

dio Digital I/O Menu
oPEr Operations Page

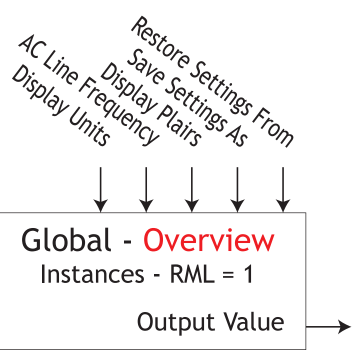
di.S	Input State [6011] : On, Off
do.S	Output State [6007] : On, Off

Digital Input/Output (cont.)





Global Function



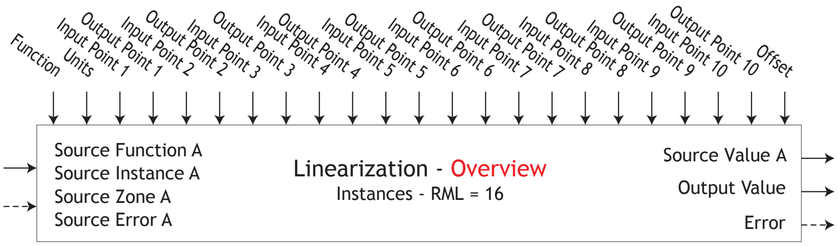
gLbL Global Menu
SEt Setup Page

	Parameter Name [Parameter ID] : Range or Choices
C_F	Display Units [3005] : F, C
AC.LF	AC Line Frequency [1034] : 50 Hz, 60 Hz
d.Pr5	Display Pairs [3028] : 1 to 15
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



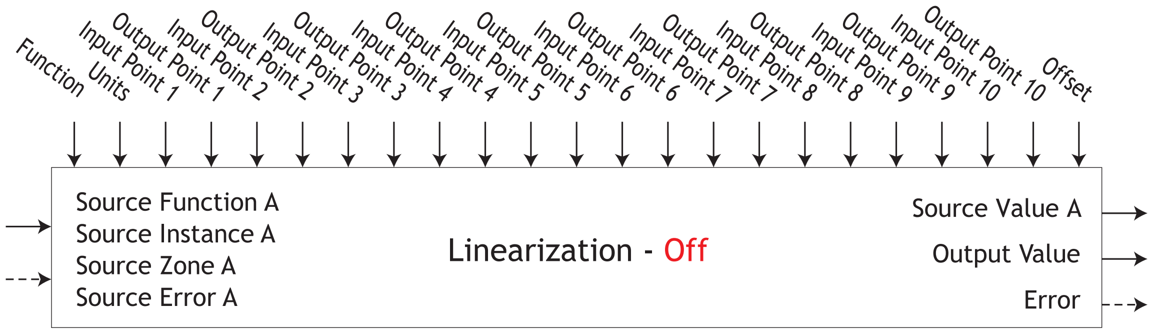
Lnr Linearization Menu
SEt Setup Page

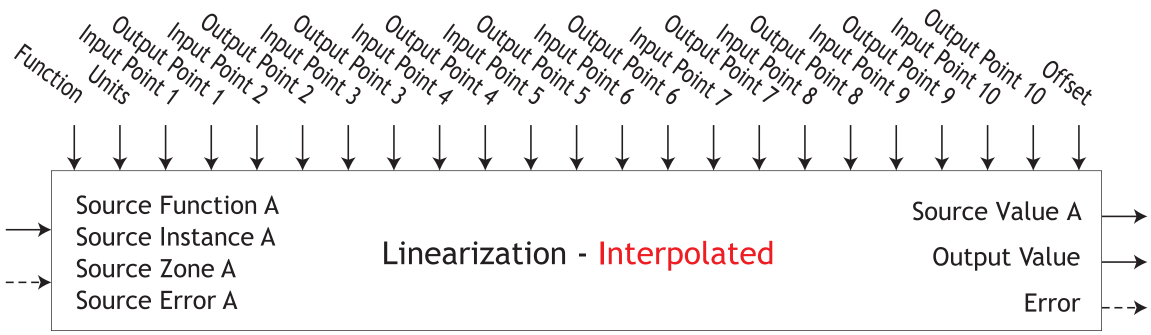
	Parameter Name [Parameter ID] : Range or Choices
Fn	Function [34005] : Off, Interpolated, Stepped
SFn.A	Source Function A [34001] : None, Analog Input, Current, Cool Power, Heat Power, Power, Linearization, Math, Process Value, Set Point Closed, Set Point Open, Variable
S i.A	Source Instance A [34002] : 1 to 24
SZ.A	Source Zone A [34003] : 0 to 16
Unit	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

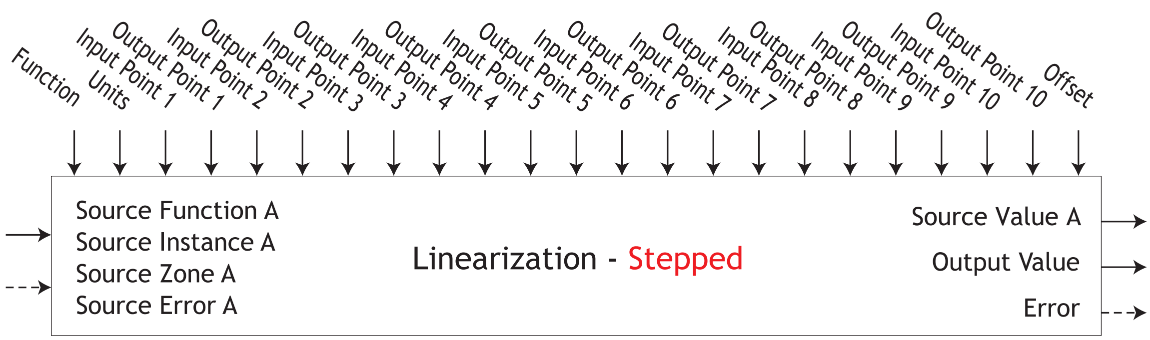
Lnr Linearization Menu
oPEr Operations Page

Su.A	Source Value A [34004] : -1,999.000 to 9,999.000
oFSt	Offset [34006] : -1,999.000 to 9,999.000
o.u	Output Value [34007] : -1,999.000 to 9,999.000

Linearization (cont.)

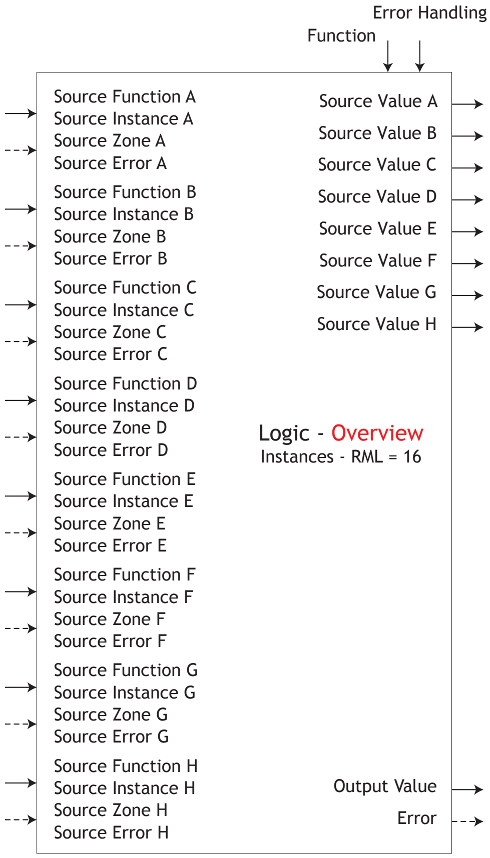






Logic Function

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



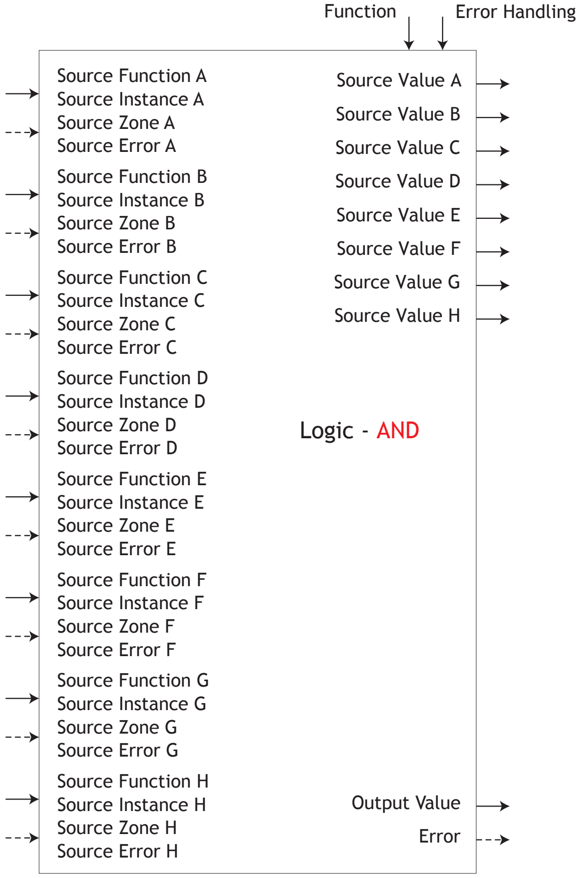
LgC Logic Menu
SEt Setup Page

	Parameter Name [Parameter ID] : Range or Choices
Fn	Function [27033] : Off, AND, OR, Equal To, NAND, NOR, Not Equal To, Latch, RS FlipFlop
SFn.A	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
S iA	Source Instance A [27009] : 1 to 250
SZ.A	Source Zone A [27017] : 0 to 24
SFn.b	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
S ib	Source Instance B [27010] : 1 to 250
SZ.b	Source Zone B [27018] : 0 to 24
SFn.C	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
S iC	Source Instance C [27011] : 1 to 250
SZ.C	Source Zone C [27019] : 0 to 24
SFn.d	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
S id	Source Instance D [27012] : 1 to 250
SZ.d	Source Zone D [27020] : 0 to 24
SFn.E	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
S iE	Source Instance E [27013] : 1 to 250
SZ.E	Source Zone E [27021] : 0 to 24
SFn.F	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
S iF	Source Instance F [27014] : 1 to 250
SZ.F	Source Zone F [27022] : 0 to 24
SFn.g	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
S ig	Source Instance G [27015] : 1 to 250
SZ.g	Source Zone G [27023] : 0 to 250
SFn.h	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
S ih	Source Instance H [27016] : 1 to 250
SZ.h	Source Zone H [27024] : 0 to 24
Er.h	Error Handling [27035] : True Good, True Bad, False Good, False Bad

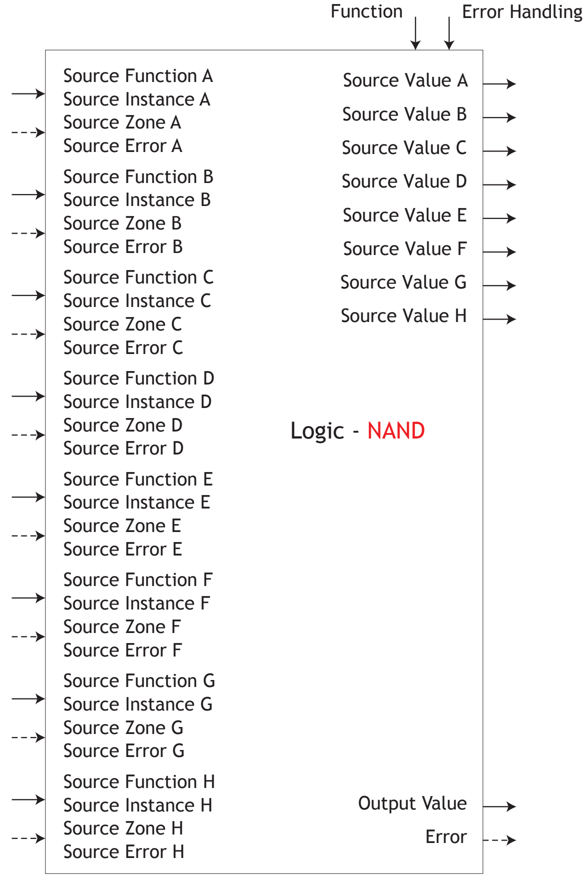
LgC Logic Menu
oPEr Operations Page

Su.A	Source Value A [27025] : Off, On
Su.b	Source Value B [27026] : Off, On
Su.C	Source Value C [27027] : Off, On
Su.d	Source Value D [27028] : Off, On
Su.E	Source Value E [27029] : Off, On
Su.F	Source Value F [27030] : Off, On
Su.g	Source Value G [27031] : Off, On
Su.h	Source Value H [27032] : Off, On
o.u	Output Value [27034] : Off, On

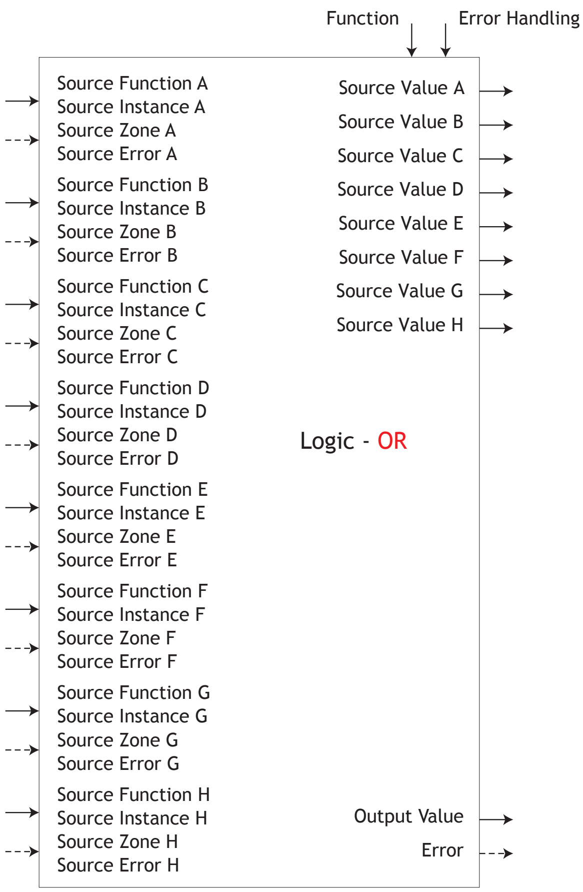
Logic (cont.)



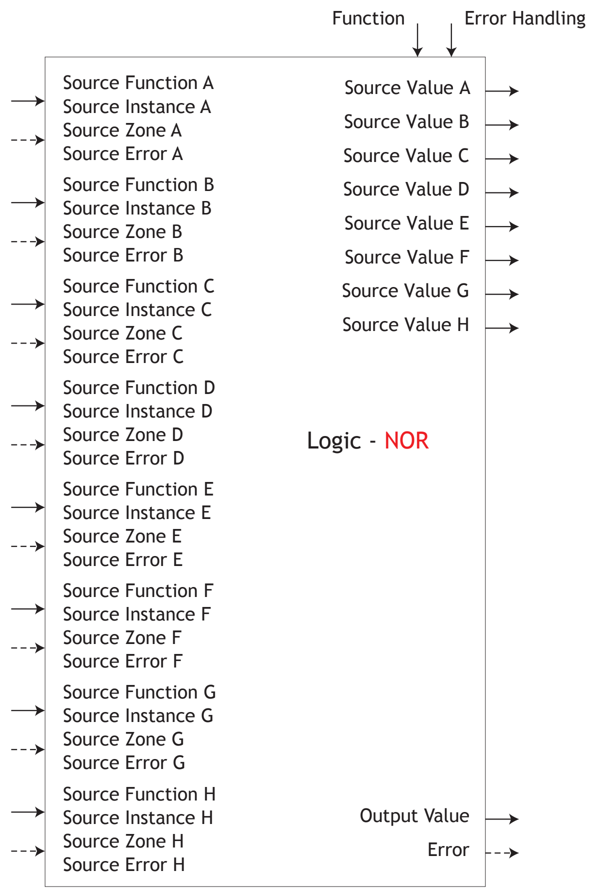
A * B * C * D * E * F * G * H = ON



$\overline{A * B * C * D * E * F * G * H}$ = ON

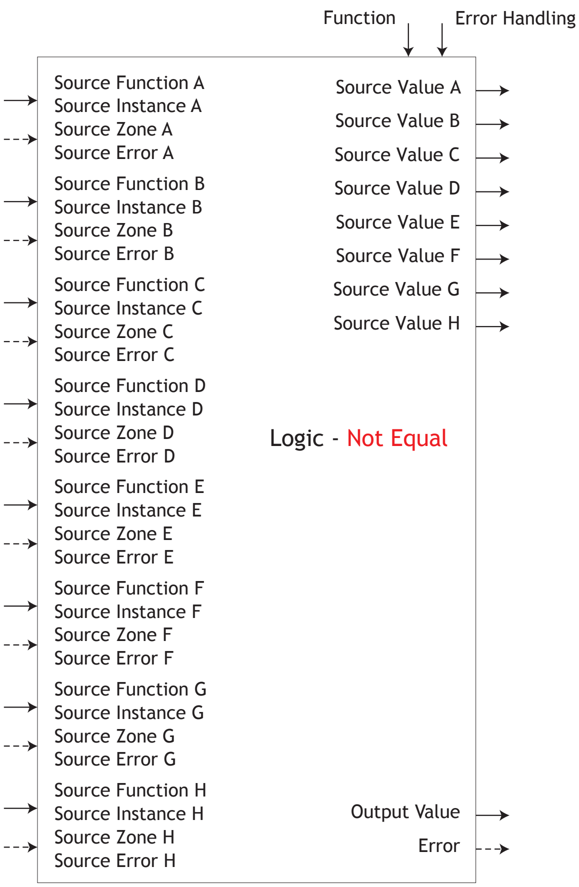


A + B + C + D + E + F + G + H = ON

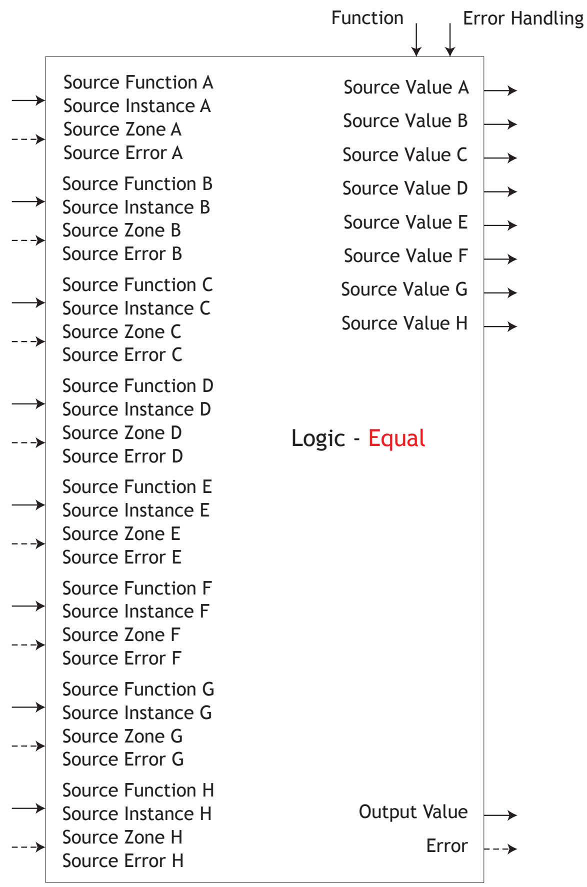


$\overline{A + B + C + D + E + F + G + H}$ = ON

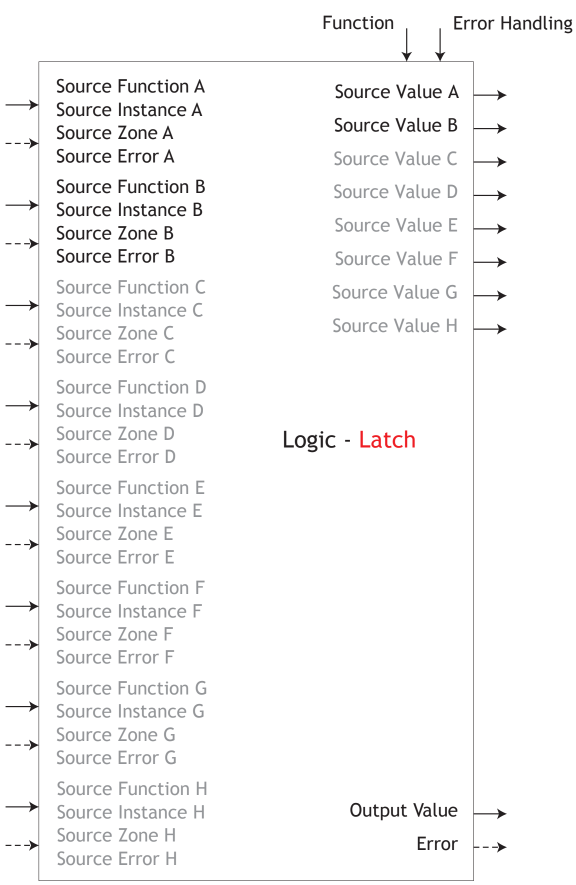
Logic (cont.)



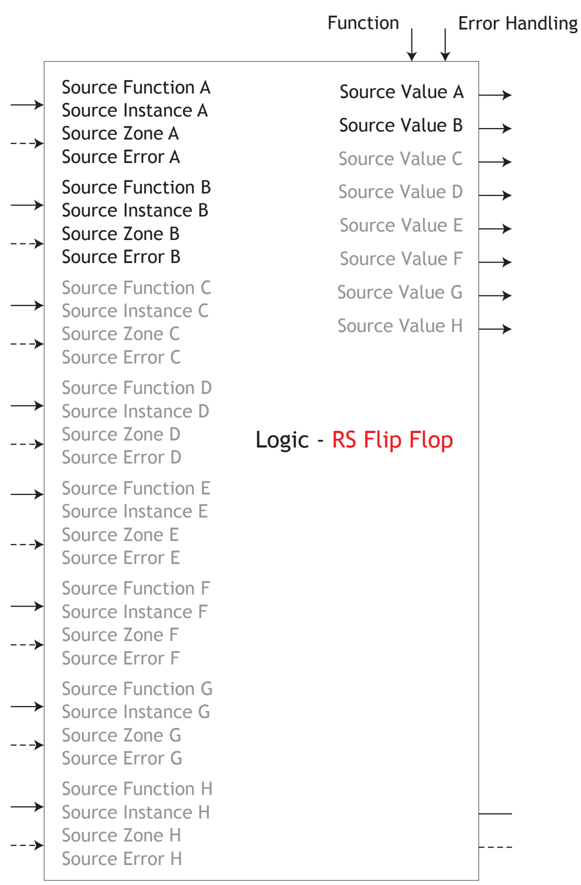
If A ≠ B ≠ C ≠ D ≠ E ≠ F ≠ G ≠ H then ON



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

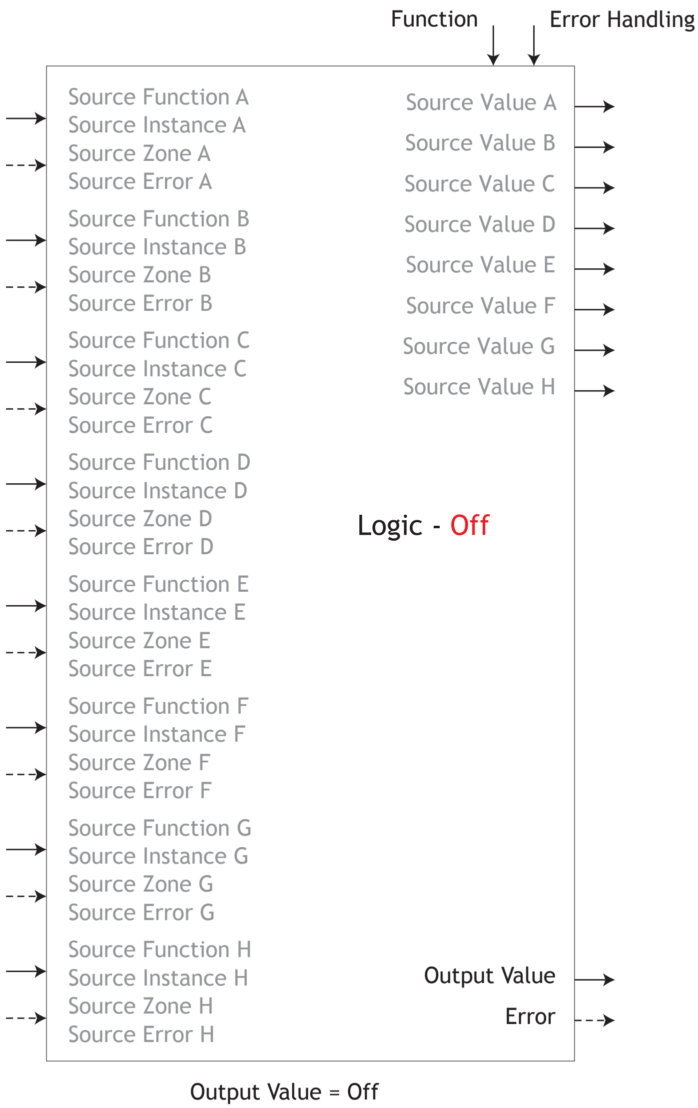


Output Value follows A, unless B = ON
Latch Output while B = ON



A Sets Output Value ON, B Resets Output Value OFF

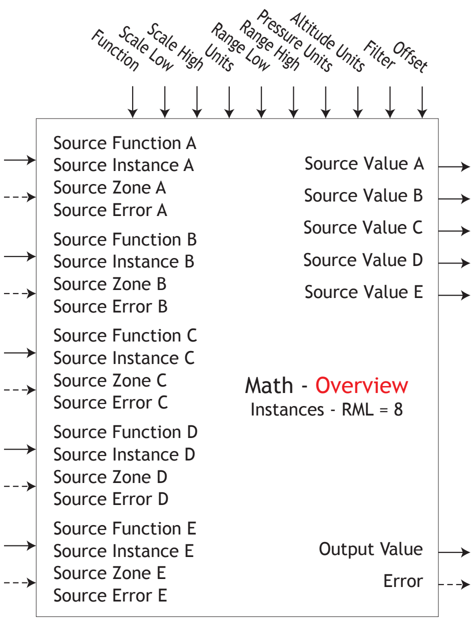
Logic (cont.)


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



MAt Math Menu
SEt Setup Page

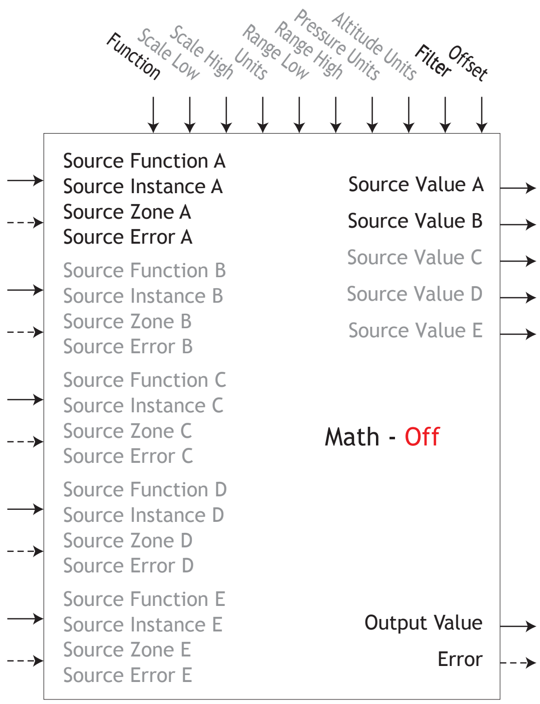
	Parameter Name [Parameter ID] : Range or Choices
Fn	Function [25021] : Off, Average, Process Scale, Deviation Scale, Switch Over, Differential, Ratio, Add, Multiply, Absolute Difference, Minimum, Maximum, Square Root, Sample and Hold, Pressure to Altitude, Dewpoint
SFn.A	Source Function A [25001] : None, 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
SZ.A	Source Zone A [25011] : 0 to 24
SFn.b	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
SZ.b	Source Zone B [25012] : 0 to 24
SFn.C	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
SZ.C	Source Zone C [25013] : 0 to 24
SFn.d	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
SZ.d	Source Zone D [25014] : 0 to 24
SFn.E	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
SZ.E	Source Zone E [25015] : 0 to 24
S.Lo	Scale Low [25024] : -1,999.0 to 9,999.0
S.hi	Scale High [25025] : -1,999.0 to 9,999.0
Unit	Unit [25032] Source, None, Absolute Temperature, Relative Temperature, Power, Process, Relative Humidity
r.Lo	Range Low [25026] : -1,999.0 to 9,999.0
r.hi	Range High [25027] : -1,999.0 to 9,999.0
P.unt	Pressure Units [25030] : PSI, Torr, mBar, Atmosphere, Pascal
A.unt	Altitude Units [25031] : Feet, Kilofeet
FiL	Filter [25028] : 0.0 to 60.0 seconds

MAt Math Menu
oPEr Operations Page

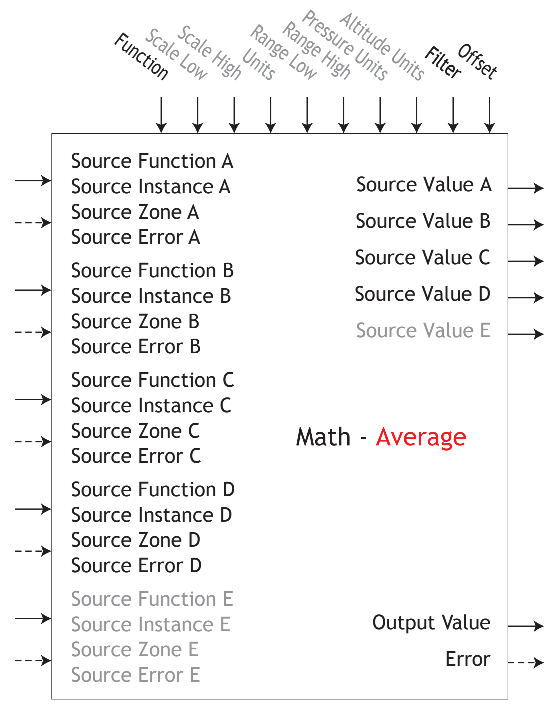
Su.A	Source Value A [25016] : -1,999.000 to 9,999.000
Su.b	Source Value B [25017] : -1,999.000 to 9,999.000
Su.C	Source Value C [25018] : -1,999.000 to 9,999.000
Su.d	Source Value D [25019] : -1,999.000 to 9,999.000
Su.E	Source Value E [25020] : Off, On
o.u	Output Value [25022] : -1,999.000 to 9,999.000
oFSt	Offset [25023] : -1,999.000 to 9,999.000

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

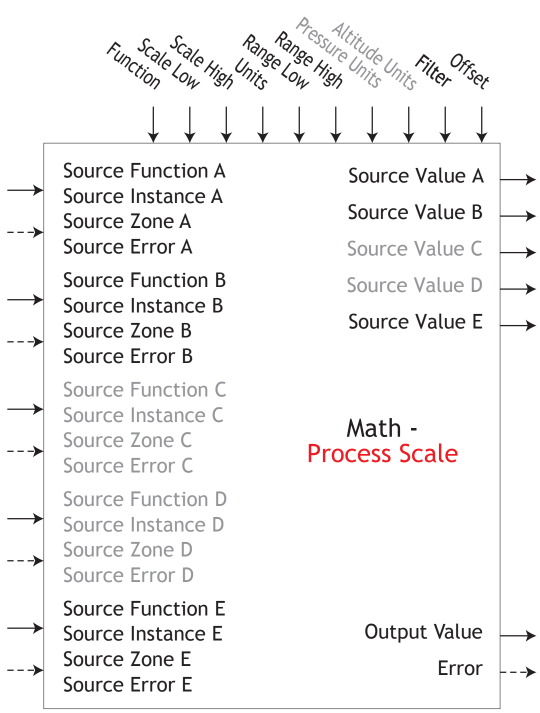
Math (cont.)



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

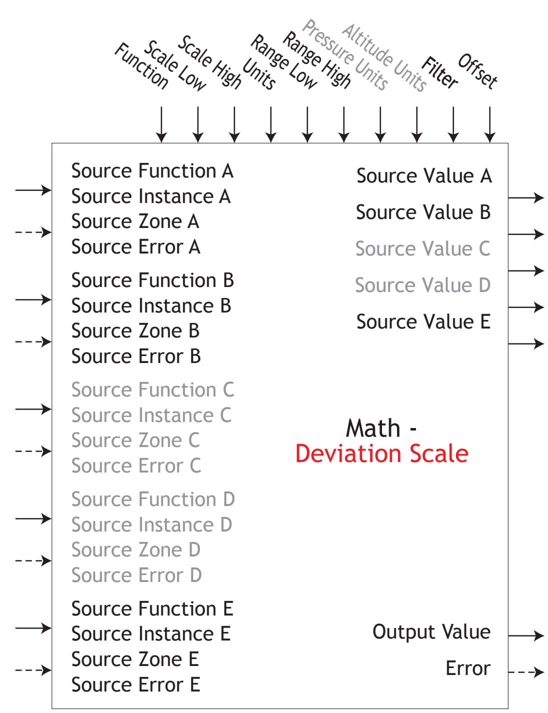


Output Value = Filter [(Average (A + B + C + D)) + Offset]
Display units follows the last source that is temperature else follow Source A



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]

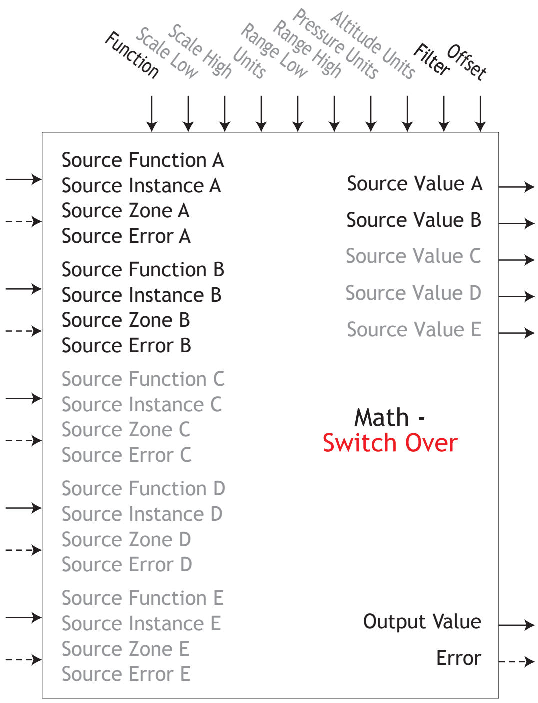
Scale Low/High and Range Low/High follows Source A display units when Units is set to Source, else follow Units setting.



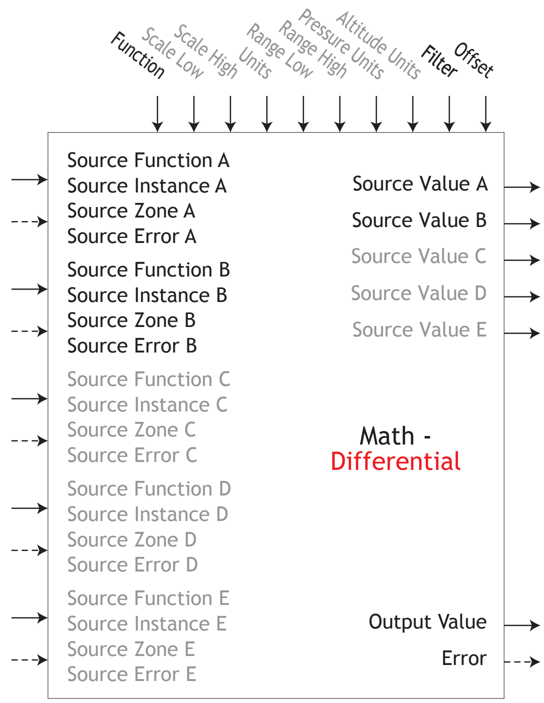
If B = OFF, Output Value = Filter [((Range High - Range Low) / (Scale High - Scale Low)) * (A - Scale Low) + Range Low + B + Offset]
If B = ON, Output Value = Filter [B + Offset]

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

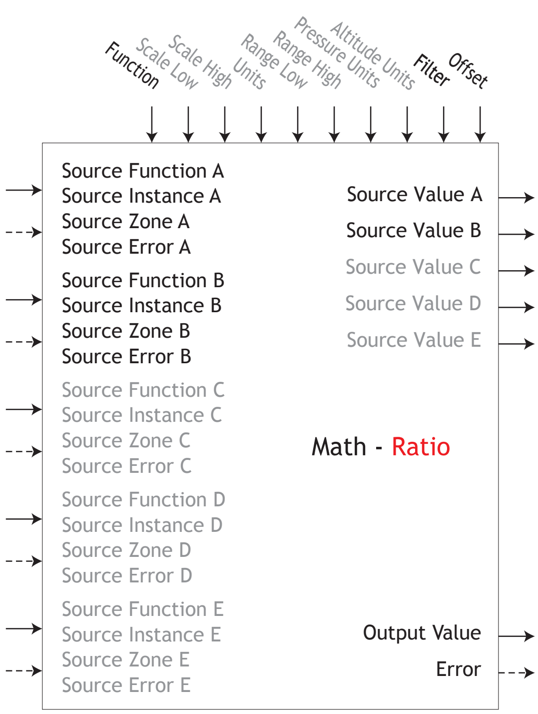
Math (cont.)



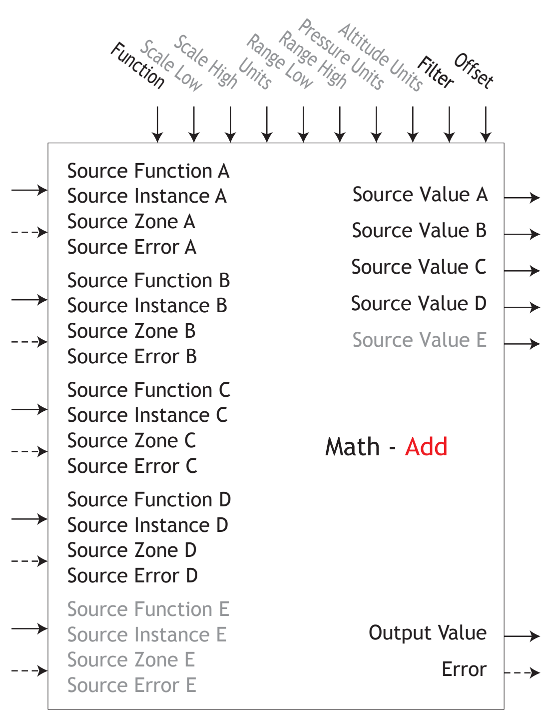
If B = OFF, Output Value = Filter [A + Offset]
If B = ON, Output Value = Filter [B + Offset]
Display units follows active source.



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

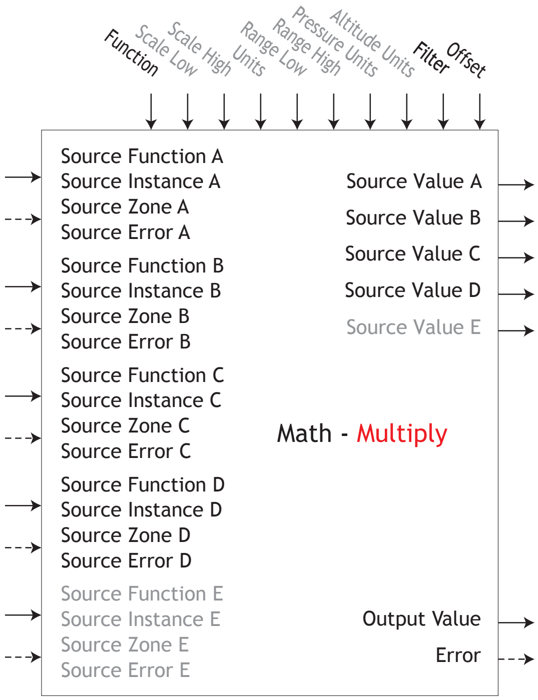


Output Value = Filter [(A / B) + Offset]
If display units of Source A = Source B, no display units on output value, else follow Source A

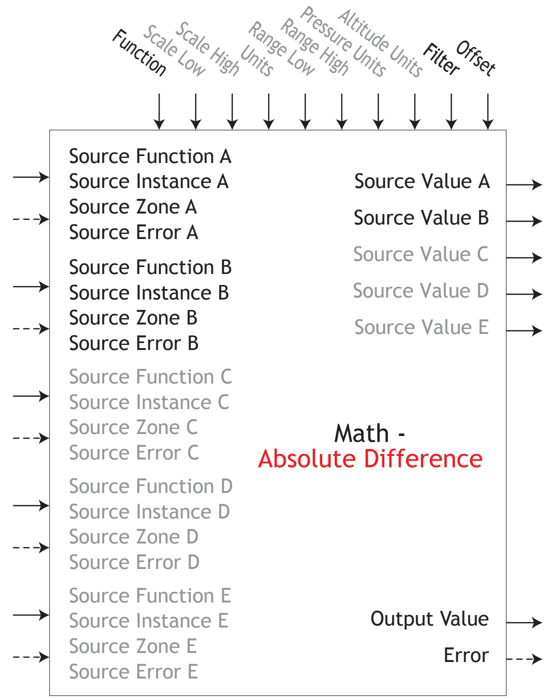


Output Value = Filter [(A + B + C + D) + Offset]
Display units follows last temperature source else follow Source A

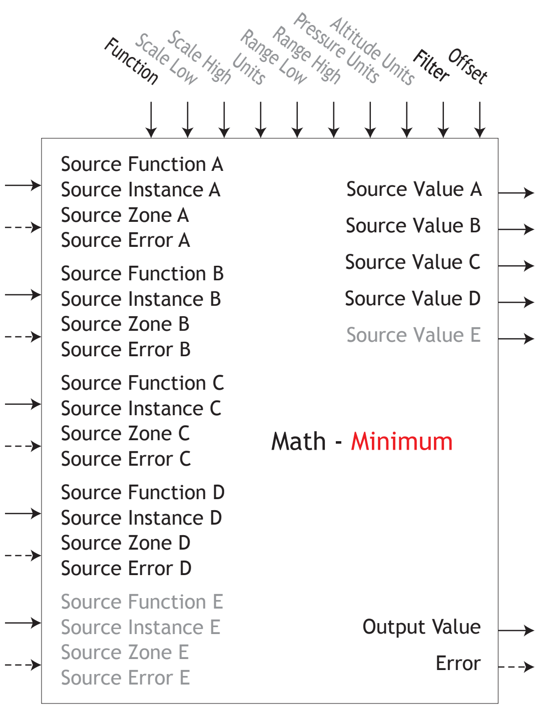
Math (cont.)



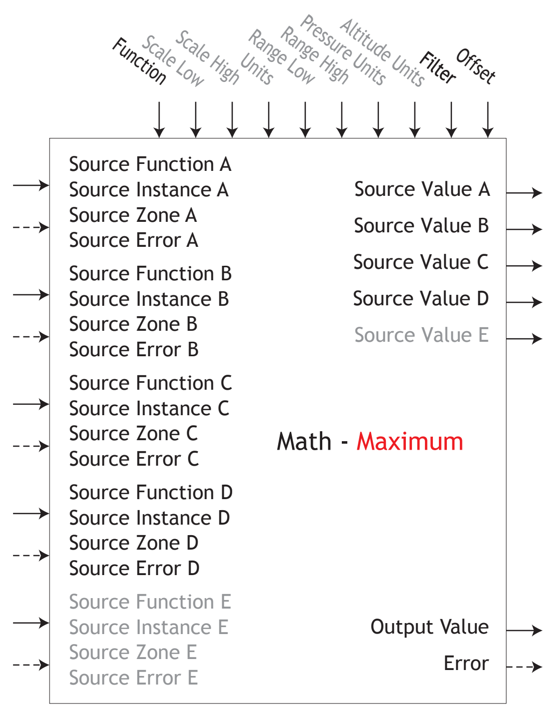
Output Value = Filter [(A * B * C * D) + Offset]
Display units follows last temperature source else follow Source A



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

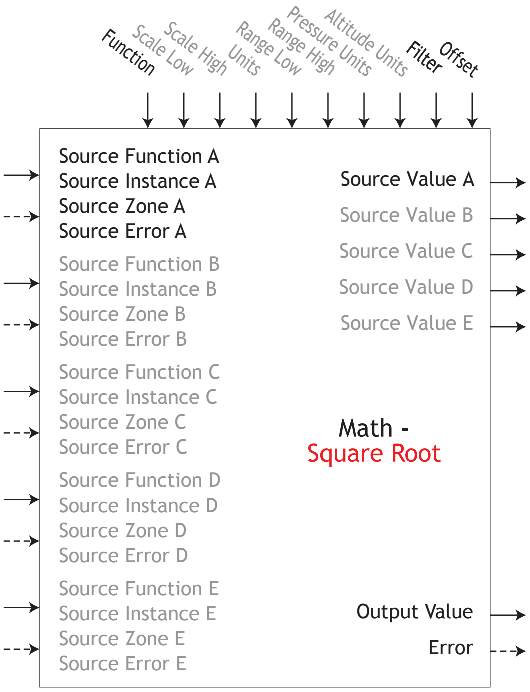


Output Value = Filter [Minimum Value (A : B : C : D) + Offset]
Display units follows Source with minimum value.

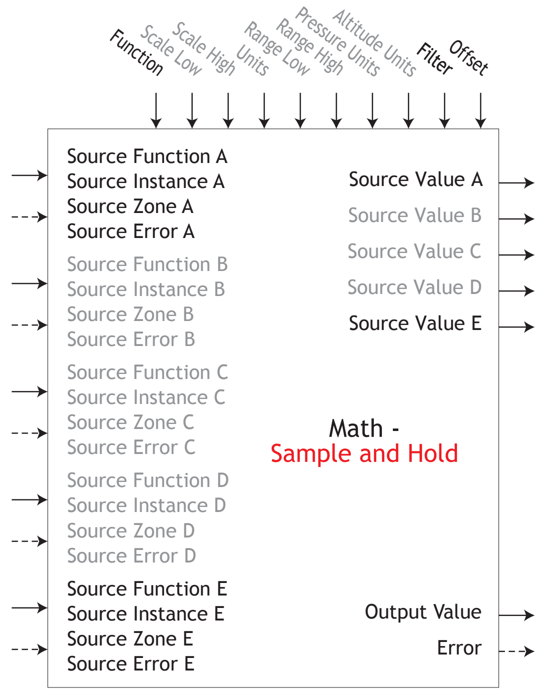


Output Value = Filter [Maximum Value (A : B : C : D) + Offset]
Display units follows Source with maximum value.

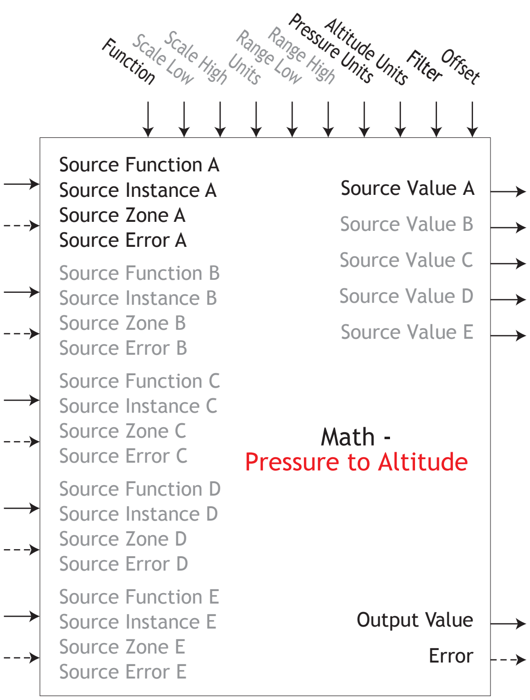
Math (cont.)



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

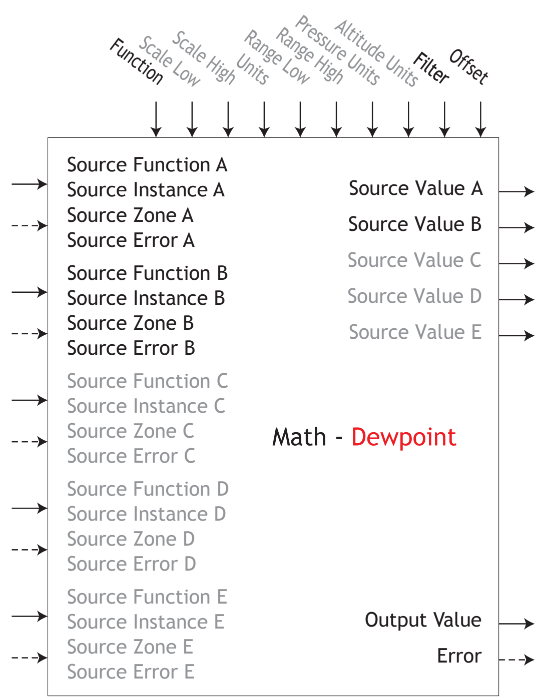


If E = OFF, Output Value = Filter [A + Offset]
If E = ON, Output Value = Filter [last value of A + Offset]
Display units follows Source A



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.

Modbus Address
Baud Rate
Parity
Modbus Word Order
Display Units
Non-Volatile Save

Communications - Modbus RTU
Instances - RML = 0, 1

Com Communications Menu
SEt Setup Page

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

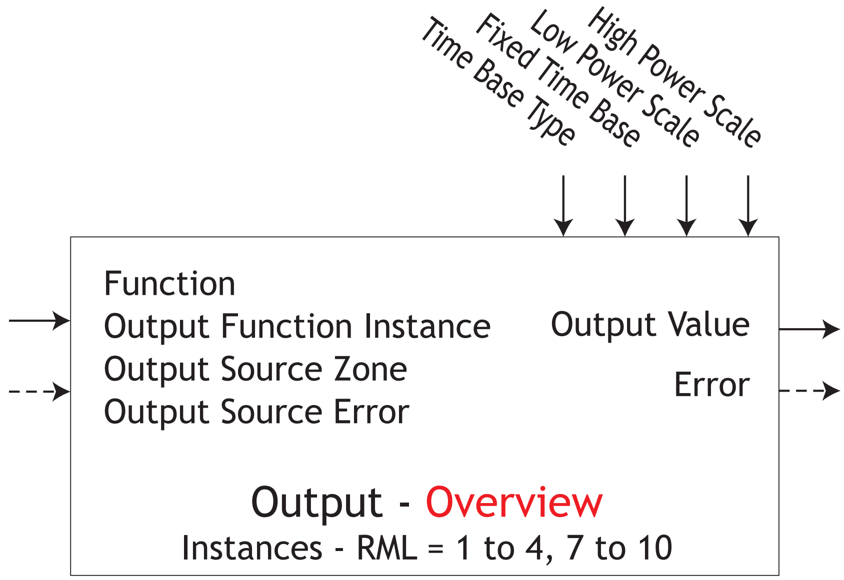
Output Function

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

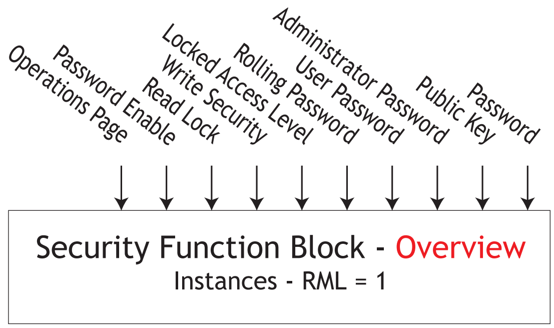


otPt Output Menu
SEt Setup Page

	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, Limit, Heater Error, Module Limit (instance 8)
Fi	Output Function Instance [6006] : 1 to 250
SZ	Output Source Zone [6012] : 0 to 24
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 to 100 %
o.hi	High Power Scale [6010] : 0 to 100 %

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

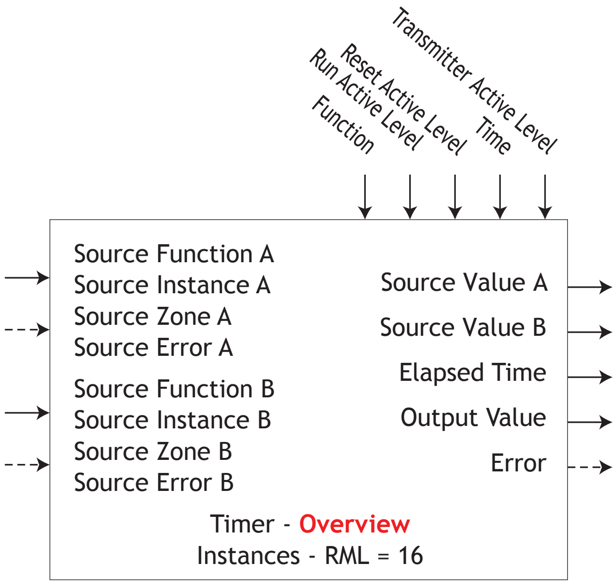
	Parameter Name [Parameter ID] : Range or Choices
LoC.o	Operations Page [3002] : 1 to 3
PAS.E	Password Enable [3015] : Off, On
r.LoC	Read Lock [3010] : 1 to 5
S.LoC	Write Security [3011] : 1 to 5
LoC.L	Locked Access Level [3016] : 1 to 5
roL.L	Rolling Password [3019] : Off, On
PAS.u	User Password [3017] : 10 to 999
PAS.A	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
SFn.A	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 i.A	Source Instance A [31003] : 1 to 250
SZ.A	Source Zone A [31005] : 0 to 24
SAS.A	Run Active Level [31011] : High (rising), Low (falling)
SFn.b	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 i.b	Source Instance B [3104] : 1 to 250
SZ.b	Source Zone B [31006] : 0 to 24
SAS.b	Reset Active Level [31012] : High (rising), Low (falling)
ti	Time [31013] : 0.0 to 9,999.0 seconds
LEv	Active Level [31014] : High, Low

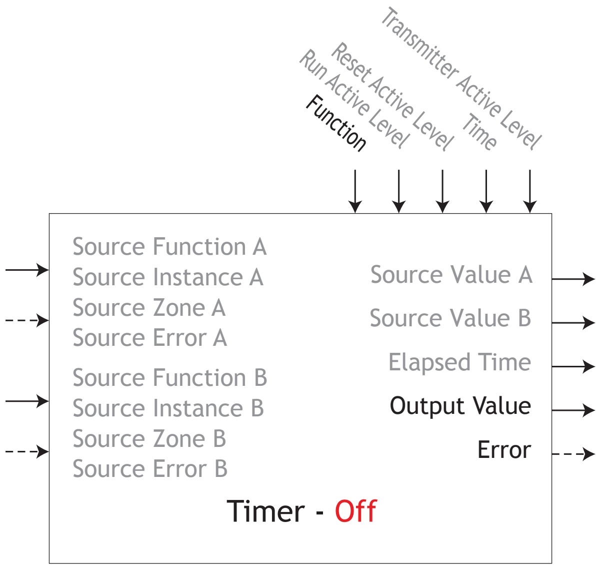
tMr Timer Menu
oPEr Operations Page

Sv.A	Source Value A [31007] : Off, On
Sv.b	Source Value B [31008] : Off, On
E.t	Elapsed Time [31016] : 0.0 to 9,999.0 seconds
o.v	Output Value [31010] : Off, On

Timer (cont.)

Off

Output Value = OFF

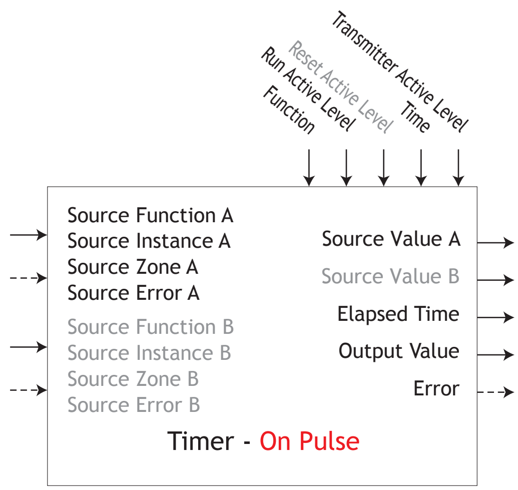


Timer (cont.)

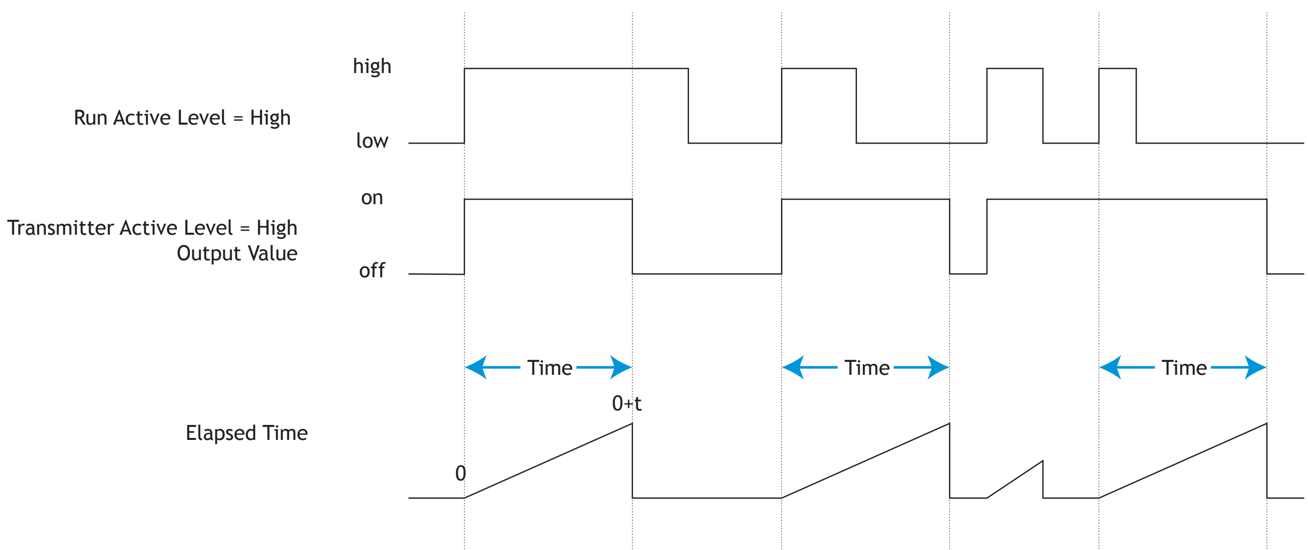
On Pulse

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

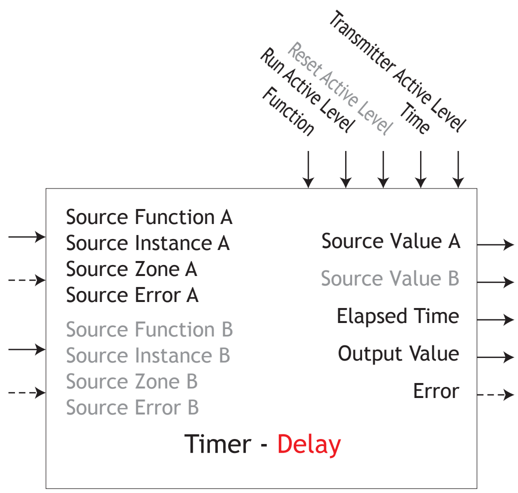


Timer (cont.)

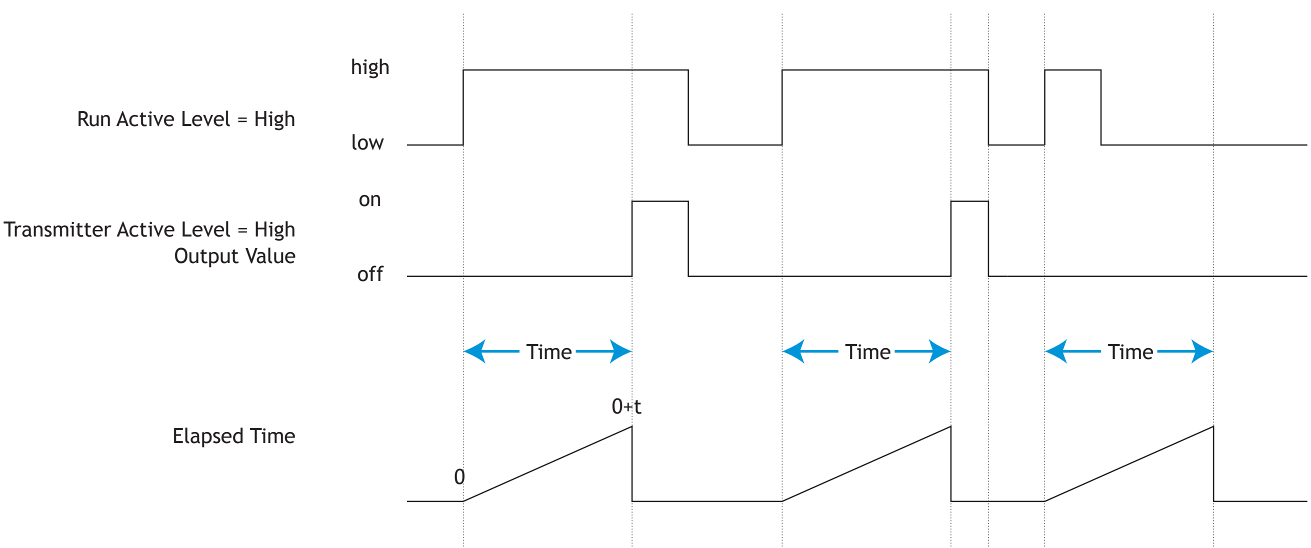
Delay

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

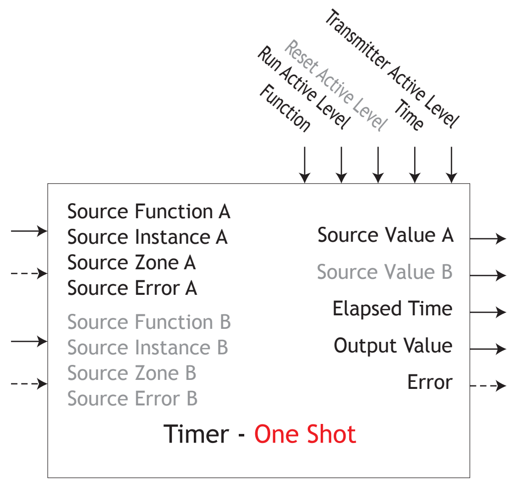


Timer (cont.)

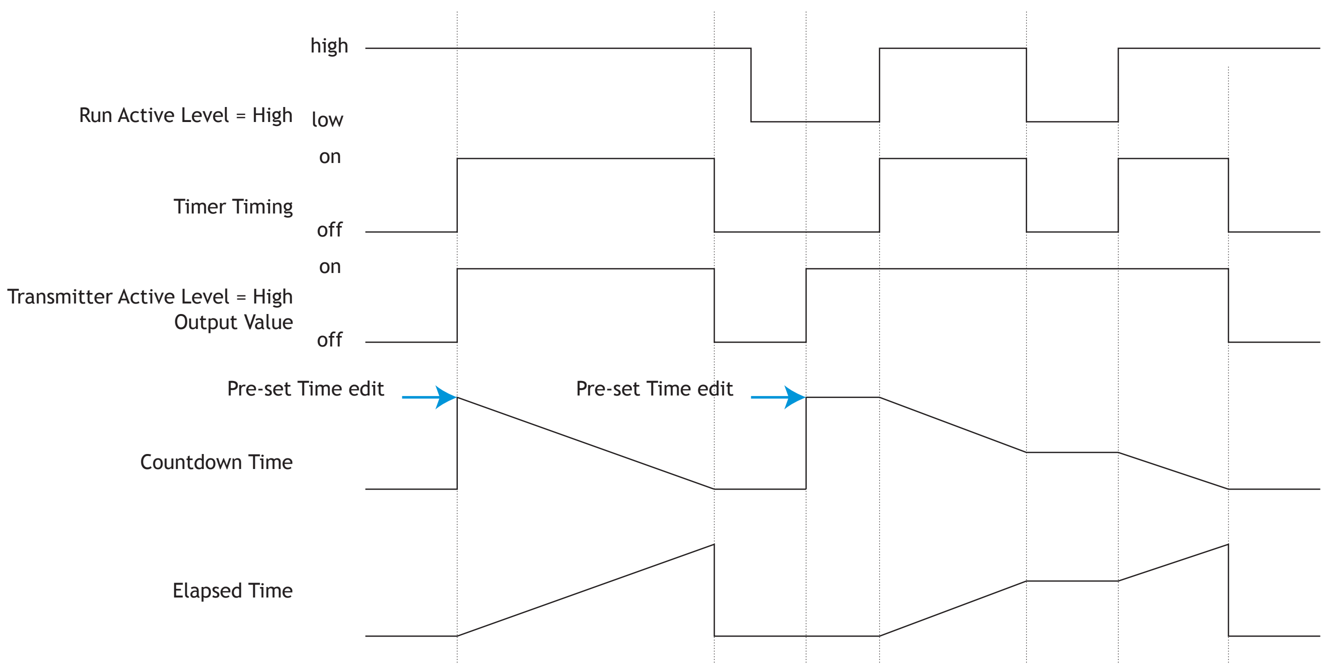
One Shot

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

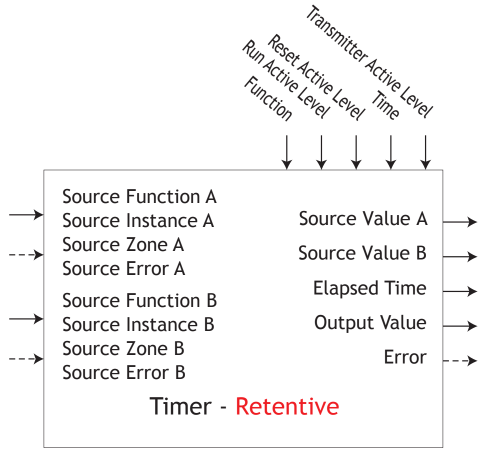


Timer (cont.)

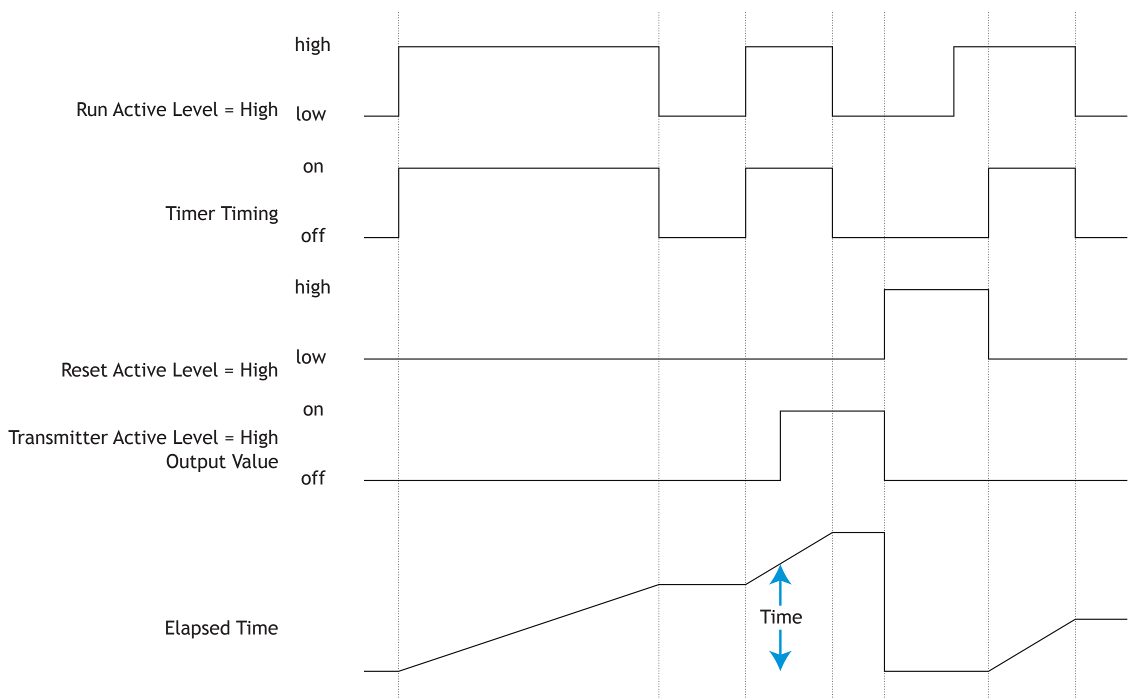
Retentive

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

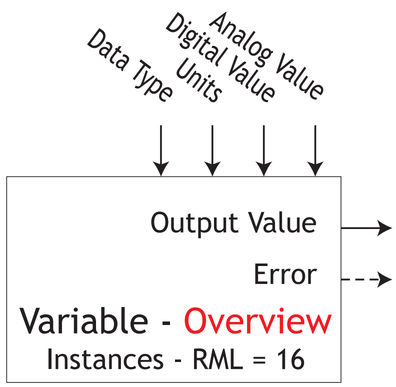


Variable Function

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.

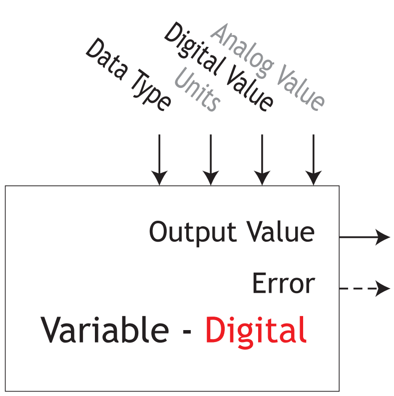
This function simply passes the stored value to its output.

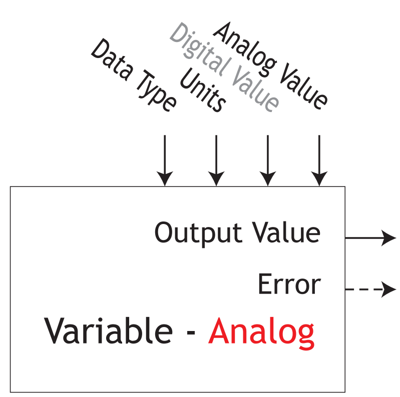
- Error [2005] : None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Error, Fail, Math Error, Not Sourced, Stale
- Output Value [2004] : -1,999.000 to 9,999.000 or On or Off



uAr Variable Menu
SEt Setup Page

	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



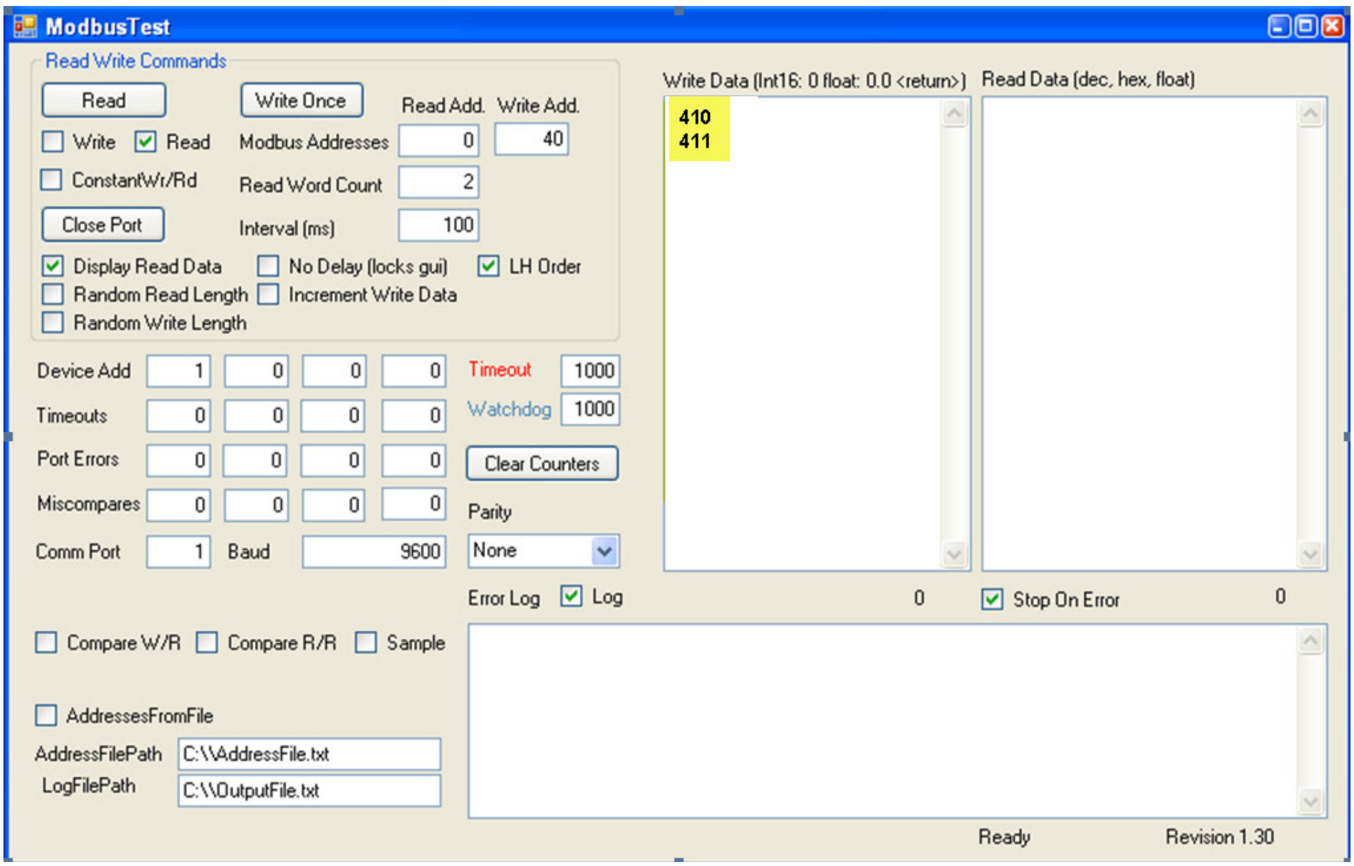


Chapter 8: Appendix

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 the analog input of the RML (register 410) into register 40, we perform a multiple write command (0x10 function) of 410 into register 40 and 411 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 410 is in register 40, 411 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/IP.

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

Pointer Addresses	Working Addresses	Pointer 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

Assembly Definition Addresses Default Pointers		Assembly Working Addresses	
Registers 40 & 41	Pointer 1 = 0 & 1 Hardware ID	Registers 200 & 201	Value of Pointer 1
Registers 42 & 43	Pointer 2 = 0 & 1 Hardware ID	Registers 202 & 203	Value of Pointer 2
Registers 44 & 45	Pointer 3 = 0 & 1 Hardware ID	Registers 204 & 205	Value of Pointer 3
Registers 46 & 47	Pointer 4 = 0 & 1 Hardware ID	Registers 206 & 207	Value of Pointer 4
Registers 48 & 49	Pointer 5 = 0 & 1 Hardware ID	Registers 208 & 209	Value of Pointer 5
Registers 50 & 51	Pointer 6 = 0 & 1 Hardware ID	Registers 210 & 211	Value of Pointer 6
Registers 52 & 53	Pointer 7 = 0 & 1 Hardware ID	Registers 212 & 213	Value of Pointer 7
Registers 54 & 55	Pointer 8 = 0 & 1 Hardware ID	Registers 214 & 215	Value of Pointer 8
Registers 56 & 57	Pointer 9 = 0 & 1 Hardware ID	Registers 216 & 217	Value of Pointer 9
Registers 58 & 59	Pointer 10 = 0 & 1 Hardware ID	Registers 218 & 219	Value of Pointer 10
Registers 60 & 61	Pointer 11 = 0 & 1 Hardware ID	Registers 220 & 221	Value of Pointer 11
Registers 62 & 63	Pointer 12 = 0 & 1 Hardware ID	Registers 222 & 223	Value of Pointer 12
Registers 64 & 65	Pointer 13 = 0 & 1 Hardware ID	Registers 224 & 225	Value of Pointer 13
Registers 66 & 67	Pointer 14 = 0 & 1 Hardware ID	Registers 226 & 227	Value of Pointer 14
Registers 68 & 69	Pointer 15 = 0 & 1 Hardware ID	Registers 228 & 229	Value of Pointer 15
Registers 70 & 71	Pointer 16 = 0 & 1 Hardware ID	Registers 230 & 231	Value of Pointer 16
Registers 72 & 73	Pointer 17 = 0 & 1 Hardware ID	Registers 232 & 233	Value of Pointer 17
Registers 74 & 75	Pointer 18 = 0 & 1 Hardware ID	Registers 234 & 235	Value of Pointer 18
Registers 76 & 77	Pointer 19 = 0 & 1 Hardware ID	Registers 236 & 237	Value of Pointer 19
Registers 78 & 79	Pointer 20 = 0 & 1 Hardware ID	Registers 238 & 239	Value of Pointer 20

Assembly Pointer Addresses Default Pointers		Assembly Working Addresses	
Registers 80 & 81	Pointer 21 = 0 & 1 Hardware ID	Registers 240 & 241	Value of Pointer 21
Registers 82 & 83	Pointer 22 = 0 & 1 Hardware ID	Registers 242 & 243	Value of Pointer 22
Registers 84 & 85	Pointer 23 = 0 & 1 Hardware ID	Registers 244 & 245	Value of Pointer 23
Registers 86 & 87	Pointer 24 = 0 & 1 Hardware ID	Registers 246 & 247	Value of Pointer 24
Registers 88 & 89	Pointer 25 = 0 & 1 Hardware ID	Registers 248 & 249	Value of Pointer 25
Registers 90 & 91	Pointer 26 = 0 & 1 Hardware ID	Registers 250 & 251	Value of Pointer 26
Registers 92 & 93	Pointer 27 = 0 & 1 Hardware ID	Registers 252 & 253	Value of Pointer 27
Registers 94 & 95	Pointer 28 = 0 & 1 Hardware ID	Registers 254 & 256	Value of Pointer 28
Registers 96 & 97	Pointer 29 = 0 & 1 Hardware ID	Registers 256 & 257	Value of Pointer 29
Registers 98 & 99	Pointer 30 = 0 & 1 Hardware ID	Registers 258 & 259	Value of Pointer 30
Registers 100 & 101	Pointer 31 = 0 & 1 Hardware ID	Registers 260 & 261	Value of Pointer 31
Registers 102 & 103	Pointer 32 = 0 & 1 Hardware ID	Registers 262 & 263	Value of Pointer 32
Registers 104 & 105	Pointer 33 = 0 & 1 Hardware ID	Registers 264 & 265	Value of Pointer 33
Registers 106 & 107	Pointer 34 = 0 & 1 Hardware ID	Registers 266 & 267	Value of Pointer 34
Registers 108 & 109	Pointer 35 = 0 & 1 Hardware ID	Registers 268 & 269	Value of Pointer 35
Registers 110 & 111	Pointer 36 = 0 & 1 Hardware ID	Registers 270 & 271	Value of Pointer 36
Registers 112 & 113	Pointer 37 = 0 & 1 Hardware ID	Registers 272 & 273	Value of Pointer 37
Registers 114 & 115	Pointer 38 = 0 & 1 Hardware ID	Registers 274 & 275	Value of Pointer 38
Registers 116 & 117	Pointer 39 = 0 & 1 Hardware ID	Registers 276 & 277	Value of Pointer 39
Registers 118 & 119	Pointer 40 = 0 & 1 Hardware ID	Registers 278 & 279	Value of Pointer 40

Modbus Default Assembly Structure 120-199

Assembly Pointer Registers Default Pointers		Assembly Working Registers	
Registers 120 & 121	Pointer 31 = 0 & 1 Hardware ID	Registers 280 & 281	Value of Pointer 31
Registers 122 & 123	Pointer 32 = 0 & 1 Hardware ID	Registers 282 & 283	Value of Pointer 32
Registers 124 & 125	Pointer 33 = 0 & 1 Hardware ID	Registers284 & 285	Value of Pointer 33
Registers 126 & 127	Pointer 34 = 0 & 1 Hardware ID	Registers 286 & 287	Value of Pointer 34
Registers 128 & 129	Pointer 35 = 0 & 1 Hardware ID	Registers 288 & 289	Value of Pointer 35
Registers 130 & 131	Pointer 36 = 0 & 1 Hardware ID	Registers 290 & 291	Value of Pointer 36
Registers 132 & 133	Pointer 37 = 0 & 1 Hardware ID	Registers 292 & 293	Value of Pointer 37
Registers 134 & 135	Pointer 38 = 0 & 1 Hardware ID	Registers 294 & 295	Value of Pointer 38
Registers 136 & 137	Pointer 39 = 0 & 1 Hardware ID	Registers 296 & 297	Value of Pointer 39
Registers 138 & 139	Pointer 40 = 0 & 1 Hardware ID	Registers 298 & 299	Value of Pointer 40
Registers 140 & 141	Pointer 31 = 0 & 1 Hardware ID	Registers 300 & 301	Value of Pointer 31
Registers 142 & 143	Pointer 32 = 0 & 1 Hardware ID	Registers 302 & 303	Value of Pointer 32
Registers 144 & 145	Pointer 33 = 0 & 1 Hardware ID	Registers 304 & 305	Value of Pointer 33
Registers 146 & 147	Pointer 34 = 0 & 1 Hardware ID	Registers 306 & 307	Value of Pointer 34
Registers 148 & 149	Pointer 35 = 0 & 1 Hardware ID	Registers 308 & 309	Value of Pointer 35
Registers 150 & 151	Pointer 36 = 0 & 1 Hardware ID	Registers 310 & 311	Value of Pointer 36
Registers 152 & 153	Pointer 37 = 0 & 1 Hardware ID	Registers 312 &313	Value of Pointer 37
Registers 154 & 155	Pointer 38 = 0 & 1 Hardware ID	Registers 314 & 315	Value of Pointer 38
Registers 156 & 157	Pointer 39 = 0 & 1 Hardware ID	Registers 316 & 317	Value of Pointer 39
Registers 158 & 159	Pointer 40 = 0 & 1 Hardware ID	Registers 318 & 319	Value of Pointer 40

Assembly Pointer Registers Default Pointers		Assembly Working Registers	
Registers 160 & 161	Pointer 31 = 0 & 1 Hardware ID	Registers 320 & 321	Value of Pointer 31
Registers 162 & 163	Pointer 32 = 0 & 1 Hardware ID	Registers 322 & 323	Value of Pointer 32
Registers 164 & 165	Pointer 33 = 0 & 1 Hardware ID	Registers 324 & 325	Value of Pointer 33
Registers 166 & 167	Pointer 34 = 0 & 1 Hardware ID	Registers 326 & 327	Value of Pointer 34
Registers 168 & 169	Pointer 35 = 0 & 1 Hardware ID	Registers 328 & 329	Value of Pointer 35
Registers 170 & 171	Pointer 36 = 0 & 1 Hardware ID	Registers 330 & 331	Value of Pointer 36
Registers 172 & 173	Pointer 37 = 0 & 1 Hardware ID	Registers 332 & 333	Value of Pointer 37
Registers 174 & 175	Pointer 38 = 0 & 1 Hardware ID	Registers 334 & 335	Value of Pointer 38
Registers 176 & 177	Pointer 39 = 0 & 1 Hardware ID	Registers 336 & 337	Value of Pointer 39
Registers 178 & 179	Pointer 40 = 0 & 1 Hardware ID	Registers 338 & 339	Value of Pointer 40
Registers 180 & 181	Pointer 31 = 0 & 1 Hardware ID	Registers 340 & 341	Value of Pointer 31
Registers 182 & 183	Pointer 32 = 0 & 1 Hardware ID	Registers 342 & 343	Value of Pointer 32
Registers 184 & 185	Pointer 33 = 0 & 1 Hardware ID	Registers 344 & 345	Value of Pointer 33
Registers 186 & 187	Pointer 34 = 0 & 1 Hardware ID	Registers 346 & 347	Value of Pointer 34
Registers 188 & 189	Pointer 35 = 0 & 1 Hardware ID	Registers 348 & 349	Value of Pointer 35
Registers 190 & 191	Pointer 36 = 0 & 1 Hardware ID	Registers 350 & 351	Value of Pointer 36
Registers 192 & 193	Pointer 37 = 0 & 1 Hardware ID	Registers 352 & 353	Value of Pointer 37
Registers 194 & 195	Pointer 38 = 0 & 1 Hardware ID	Registers 354 & 355	Value of Pointer 38
Registers 196 & 197	Pointer 39 = 0 & 1 Hardware ID	Registers 356 & 357	Value of Pointer 39
Registers 198 & 199	Pointer 40 = 0 & 1 Hardware ID	Registers 358 & 359	Value of Pointer 40

Troubleshooting Alarms, Errors and Module Issues

Indication	Description	Possible Cause(s)	Corrective Action
Alarm won't clear or reset	Alarm will not clear or reset with keypad or digital input	• Alarm latching is active • Alarm set to incorrect output • Alarm is set to incorrect source • Sensor input is out of alarm set point range • Alarm set point is incorrect • Alarm is set to incorrect type • Digital input function is incorrect	• Reset alarm when process is within range or disable latching • Set output to correct alarm source instance • Set alarm source to correct input instance • Correct cause of sensor input out of alarm range • Set alarm set point to correct trip point • Set alarm to correct type: process, deviation or power • Set digital input function and source instance
Alarm won't occur	Alarm will not activate output	• Alarm silencing is active • Alarm blocking is active • Alarm is set to incorrect output • Alarm is set to incorrect source • Alarm set point is incorrect • Alarm is set to incorrect type	• Disable alarm silencing, if required • Disable alarm blocking, if required • Set output to correct alarm source instance • Set alarm source to correct input instance • Set alarm set point to correct trip point • Set alarm to correct type: process, deviation or power
Alarm Error AL.E1 AL.E2 AL.E3 AL.E4 AL.E5 AL.E6 AL.E7 AL.E8 AL.E9 AL.10 AL.11 AL.12	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

Indication	Description	Possible Cause(s)	Corrective Action
Alarm Low AL.L1 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	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.h1 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	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
Ambient Error Er.Ab	Sensor does not provide a valid signal to controller	• Ambient error - cold junction circuitry not working	• Return to factory for repair
Error Input Er.i1 Er.i2 Er.i3 Er.i4 Er.i5 Er.i6 Er.i7 Er.i8 Er.i9 Er.10 Er.11 Er.12	Sensor does not provide a valid signal to controller	• Sensor improperly wired or open • Incorrect setting of sensor type • Calibration corrupt	• Correct wiring or replace sensor • Match setting to sensor used • Check calibration of controller
Limit won't clear or reset	Limit will not clear or reset with keypad or digital input	• Sensor input is out of limit set point range • Limit set point is incorrect • Digital input function is incorrect	• Correct cause of sensor input out of limit range • Set limit set point to correct trip point • Set digital input function and source instance
Limit Error Li.E1 Li.E2 Li.E3 Li.E4 Li.E5 Li.E6 Li.E7 Li.E8 Li.E9 Li.10 Li.11 Li.12	Limit state cannot be determined due to lack of sensor input, limit will trip	• Sensor improperly wired or open • Incorrect setting of sensor type • Calibration corrupt	• Correct wiring or replace sensor • Match setting to sensor used • Check calibration of controller

Indication	Description	Possible Cause(s)	Corrective Action
Limit Low Li.L1 Li.L2 Li.L3 Li.L4 Li.L5 Li.L6 Li.L7 Li.L8 Li.L9 Li.10 Li.11 Li.12	Sensor input below low limit set point	• • Temperature is less than limit set point • • • Limit outputs latch and require reset • • Incorrect alarm set point	• • Check cause of under temperature • • Clear limit • • • Establish correct limit set point
Limit High Li.h1 Li.h2 Li.h3 Li.h4 Li.h5 Li.h6 Li.h7 Li.h8 Li.h9 Li.10 Li.11 Li.12	Sensor input above high limit set point	• • Temperature is greater than limit set point • • Limit outputs latch and require reset • • Incorrect alarm set point	• • Check cause of over temperature • • Clear limit • • • Establish correct limit set point
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
Remote User Interface (RUI) menus inaccessible	Unable to access SEt, OPEr or FCty menus or particular prompts in Home Page	• Security set to incorrect level • Digital input set to lockout keypad • Custom parameters incorrect	• Check LoC settings in Factory Page • Change state of digital input • Enter appropriate password in ULoC setting in Factory Page • • 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

Indication	Description	Possible Cause(s)	Corrective Action
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.
S3 open	Yes, pulled up.
S1 short to S3	Yes, pulled down to under range.
S1 and S3 open	Yes, S1 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.

RML 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 requirement

Available (optional) 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® Listed to UL® 61010-1 File E185611
- UL® Reviewed to CSA C22.2 No.61010-1-04
- FM Class 3545 File 3039786 temperature limit switches
- CE - See Declaration of Conformity RoHS and W.E.E.E. compliant

Serial Communications

- All RM modules ship with isolated standard bus protocol for configuration and communication connection to all other EZ-ZONE products, Modbus RTU is optional.

Maximum RM System Configuration

- Maximum system capacity (all RM modules) is 16 with one RM Access (RMA) module.

Maximum Limit Configuration

- Up to 12 loops per module with a maximum of 16 modules

Mounting

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

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 RML 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
- 3μA open sensor detection
- 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
- Response time: 1 second max., accuracy ±1mA typical

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
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

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

Dry Contact

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

Output Hardware

- Electromechanical relay, Form A, 24 to 240VAC or 30VDC max., 5A resistive load, 100,000 cycles at rated load, 120/240 @ 125 VA or 24VAC @ 25VA pilot duty
- Electromechanical relay, Form C, 24 to 240VAC or 30VDC max., 5A resistive load, 100,000 cycles at rated load, 120/240 @ 125 VA or 24VAC @ 25VA 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
- 0 to 10V⎓ (dc) into a min. 1,000Ω load
- 0 to 20mA into max. 800Ω load

Programmable Application Blocks

Actions (events) - 16 total

Alarms - 16 total

Limit Loops - 12 total

Compare - 16 total

Off, greater than, less than, equal, not equal, greater than or equal, less than or equal

Counters - 16 total

Counts up or down loads, predetermined value on load signal. Output is active when count value equals predetermined target value

Logic - 16 total

Off, and, nand, or, nor, equal, not equal, Latch

Linearization - 16 total

Interpolated or stepped relationship

Math - 16 total

Off, average, process scale, deviation scale, differential (subtraction), ratio (divide), add, multiply, absolute difference, min., max., square root, sample and hold

Timers - 16 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 - 16 total

User value for digital or analog variable

Note:

These specifications are subject to change without prior notice.

RML Ordering Information

Limit 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 Limit 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	L		-					-	A		AA

Connector Style/Custom Product - Digit ④

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

Slot A - Digit ⑤

5	=	4 Universal inputs (t/c, 2-wire RTD, 0-10Vdc, 0-20mA) with 4 limit control loops
6	=	4 Thermistor inputs with 4 limit control loops

Slot B - Digit ⑥

A	=	None
5	=	4 Universal inputs (t/c, 2-wire RTD, 0-10Vdc, 0-20mA) with 4 limit control loops
6	=	4 Thermistor inputs with 4 limit control loops

Slot D - Digit ⑦

A	=	None
5	=	4 Universal inputs (t/c, 2-wire RTD, 0-10Vdc, 0-20mA) with 4 limit control loops
6	=	4 Thermistor inputs with 4 limit control loops
J	=	4 Mechanical relay 5A, Form A
C	=	6 Digital I/O

Slot E - Digit ⑧

J	=	4 Mechanical relay 5A, Form A
B	=	1 Digital input and 1 Form C, 1 Form A Mechanical relays

Future Options - Digit ⑨

A	=	Standard

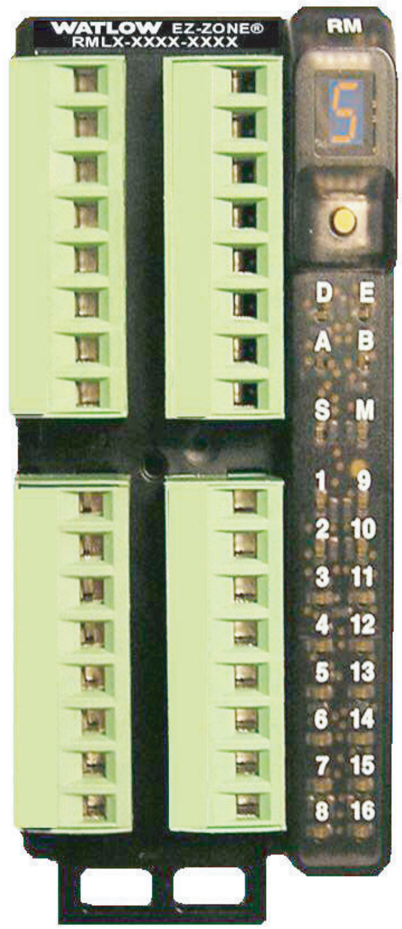
Enhanced Options - Digit ⑩

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
XX	=	Custom (consult factory)



Declaration of Conformity

EZ Zone Series RM

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
Name of Authorized Representative

Winona, Minnesota, USA
Place of Issue

Director of Operations
Title of Authorized Representative

September 2014
Date of Issue

Signature of Authorized Representative

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