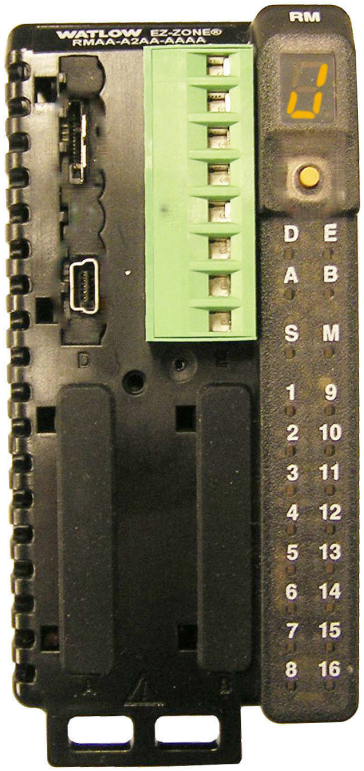
EZ-ZONE® RMA (Access) Module

User's Guide



RMA Module

WATLOW®
Powered by Possibility

TOTAL CUSTOMER SATISFACTION 3 Year Warranty

ISO 9001
Registered Company
Winona, Minnesota USA

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

0600-0072-0000 Rev. B

Made in the U.S.A.

March 2016

Safety Information

- We use note, caution and warning symbols throughout this book to draw your attention to important operational and safety information.
- A "NOTE" marks a short message to alert you to an important detail.
- A "CAUTION" safety alert appears with information that is important for protecting your equipment and performance. Be especially careful to read and follow all cautions that apply to your application.
- A "WARNING" safety alert appears with information that is important for protecting you, others and equipment from damage. Pay very close attention to all warnings that apply to your application.
- The safety alert symbol, ⚠ (an exclamation point in a triangle) precedes a general CAUTION or WARNING statement.
- The electrical hazard symbol, ⚠ (a lightning bolt in a triangle) precedes an electric shock hazard CAUTION or WARNING safety statement. Further explanations follow:

Symbol	Explanation
	CAUTION – Warning or Hazard that needs further explanation than label on unit can provide. Consult User's Guide for further information.
	ESD Sensitive product, use proper grounding and handling techniques when installing or servicing product.
	Unit protected by double/reinforced insulation for shock hazard prevention.
	Do not throw in trash, use proper recycling techniques or consult manufacturer for proper disposal.
	Enclosure made of Polycarbonate material. Use proper recycling techniques or consult manufacturer for proper disposal.
	Unit can be powered with either alternating current (ac) voltage or direct current (dc) voltage.
	Unit is a Listed device per Underwriters Laboratories®. It has been evaluated to United States and Canadian requirements for Process Control Equipment. UL 61010 and CSA C22.2 No. 61010. File E185611 QUYX, QUYX7. See: www.ul.com
	Unit is a Listed device per Underwriters Laboratories®. It has been evaluated to United States and Canadian requirements for Hazardous Locations Class 1 Division II Groups A, B, C and D. ANSI/ISA 12.12.01-2007. File E184390 QUZW, QUZW7. See: www.ul.com

CE	Unit is compliant with European Union directives. See Declaration of Conformity for further details on Directives and Standards used for Compliance.
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
CSA	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
DeviceNet CONFORMANCE TESTED	Unit has been reviewed and approved by ODVA for compliance with DeviceNet communications protocol. See: www.odva.org
EtherNet/IP conformance tested	Unit has been reviewed and approved by ODVA for compliance with Ethernet/IP communications protocol. See: www.odva.org

Warranty

The EZ-ZONE® RMA (Access) 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

1. Call Watlow Customer Service, (507) 454-5300, for a Return Material Authorization (RMA) number before returning any item for repair. If you do not know why the product failed, contact an Application Engineer or Product Manager. All RMA's require:
   - Ship-to address
   - Bill-to address
   - Contact name
   - Phone number

- Method of return shipment
- Your P.O. number
- Detailed description of the problem
- Any special instructions
- Name and phone number of person returning the product.

2. Prior approval and an RMA number from the Customer Service Department is required when returning any product for credit, repair or evaluation. Make sure the RMA number is on the outside of the carton and on all paperwork returned. Ship on a Freight Prepaid basis.
3. After we receive your return, we will examine it and try to verify the reason for returning it.
4. In cases of manufacturing defect, we will enter a repair order, replacement order or issue credit for material returned. In cases of customer 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

TC

Table of Contents

TC

Table of Contents (cont.)

1 Chapter 1: Overview

Available EZ-ZONE RM System Literature and Resources

Document Title and Part Number	Description
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 Controller (RMC) User's Guide, part number: 0600-0070-0000	The RMC module is an advanced integrated controller capable of PID and limit control. This document describes how to configure and program all loops of control and communications.
EZ-ZONE Rail Mount Scanner (RMS) User's Guide, part number: 0600-0071-0000	This module adds monitoring points to the RM system. This document describes common usage and the various types of I/O available.
EZ-ZONE Rail Mount Expansion (RME) User's Guide, part number: 0600-0073-0000	When additional I/O is needed the Expansion module fills the gap. This document describes common usage and the various types of I/O available.
EZ-ZONE Rail Mount Limit (RML) User's Guide, part number: 0600-0075-0000	The RML module will protect against unwanted thermal runaway and over temperature conditions. The User Guide describes configuration, programming and communications capabilities.
EZ-ZONE Remote User Interface (RUI) User's Guide, part number: 0600-0060-0000	The RUI provides a visual LED display to the RM configuration and setup menus. This document illustrates and describes connections and also describes the Home Page for each RM module as viewed from the RUI.
EZ-ZONE RM Specification Sheet, part number: WIN-EZRM-0414	Describes RM hardware options, features, benefits and technical specifications.
Watlow Support Tools DVD, part number: 0601-0001-0000	Contains all related user documents, tutorial videos, application notes, utility tools, etc...

The DVD described above ships with the product and as stated contains all of the literature above as well as much more. If the DVD is not available one can be acquired by contacting Watlow Customer Service at 1-507-454-5300.

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

Your Comments are Appreciated

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

Introduction

The EZ-ZONE® RM Access (RMA) module provides several features (if ordered) for the entire RM product family. To name a few:

- Multiple field bus protocols
- Data logging capabilities (up to 200 data points)
- Real Time Clock with Battery Backup
- Automatically (upon power restoration) re-enable a profile to run after a power loss
- Auto-Configuration Backup

Standard Features and Benefits

Communication Capabilities

- Provides a wide range of protocol choices including Modbus® RTU, EtherNet/IP™, Modbus® TCP, DeviceNet™ and Profibus DP
- Serves as a configuration station
- Provides communication capabilities between the other modules and the PC or PLC
- Stores corresponding module parameter settings for easy auto-configuration of other additional modules or replacement modules
- Serves as a configuration station, which programs initial module setup or automatic programming of modules if swapping out after initial installation
- Provides a USB port for uploading and download-ing configuration or datalog files directly to a PC
- Saves time and increases reliability of parameter setting

On-board Data Logging Memory

- Ensures vital data is retained
- Downloads data files from the controller when-needed eliminating the need for a separate chart recorder

Off-the-Shelf Designed System Solution

- Improves system reliability with a factory inte-grated solution that minimizes inter-module con-nections and potential problems at screw termina-tion points.
- Reduces installation cost
- Eliminates compatibility headaches often encoun-tered with using many different components and brands

Memory for Saving and Restoring User-Defined Parameter Default Settings

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

System Integration is Made EZ with Unmatched Flexibility

- Comes with a wide range of communication op-tions such as Ethernet which makes connecting to PLC's and touchpanel products a snap
- Provides plug and play capabilities with basic Re-mote User Interface (RUI's), see EZK accessory listings
- Free standard bus communications port and free PC software (EZ-ZONE Configurator and Composer)

Modules Allow for Greater Design Flexibility

- The RM System allows for 17 total modules in-cluding an Access module)
- Saves money because you do not pay for any more than you need and don't settle for any less func-tionality than you need

Split-Rail Control (SRC)

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

Agency Certifications: UL® listed, CE, RoHS, W.E.E.E. SEMI F47-0200, Class 1 Div. 2 Rating on Selected Models

- Assures prompt product acceptance
- Reduces panel builder's documentation and agency costs

Removable Connectors

- Assures reliable wiring and reduces service calls
- Simplifies installation
- Provides a terminal option for accepting ring lug connection

Three-Year Warranty

- Demonstrates Watlow's reliability and product support

A Conceptual View of the RM System

The flexibility of the RM family modules and software allows for a large range of configurations. Acquiring a better understanding of the application requirements and then the overall functionality and capabilities of each RM module will help to ensure maximum system performance.

The RM system at a high level can have a total of 17 modules installed, only one of which can be an RMA module and the others (16 maximum) can be any combination of available RM modules. Each installed RM module must have a unique Standard Bus address (factory default for an RMA is J while all other RM modules would be 1) ranging from 1-9, A-F (10 -15) and h (16). Default zone addresses can be changed on any RM module using the button on the face of each module. Ensure that each module has a unique address.

The RMA can be considered an accessory RM module in that by itself it has no PID control loops. However, used in conjunction with an RM Control (RMC), RM High Density (RMH) or an RM Expansion (RME) module, it could be placed in a remote location up to 200 feet away from any of the other RM modules on the network. While in a remote location, the RMA is still fully capable of using all of its features, such as, the real time clock (used with profiles) and data logging. This can be done while also providing communications to / from a master device on the fieldbus network.

Some of the user selectable ordering options are listed below:

1. Class 2 or SELV (Saftey Extra Low Voltage) equivalent Power Supplies:
   - 90-264 Vac to 24Vdc @ 31 watts
   - 90-264 Vac to 24Vdc @ 60 watts
   - 90-264 Vac to 24Vdc @ 91 watts
2. The RMA Module can provide:
   - Multiple field bus protocols
   - Data logging capabilities (up to 200 data points)
   - Real Time Clock with Battery Backup
   - Automatically (upon power restoration) re-enable a profile to run after a power loss
   - Auto-Configuration Backup

Note:

All RM modules can share data over the backplane (local and split rail). Once the system is configured and running, changing zone addresses without careful deliberation may cause disruption in operation.

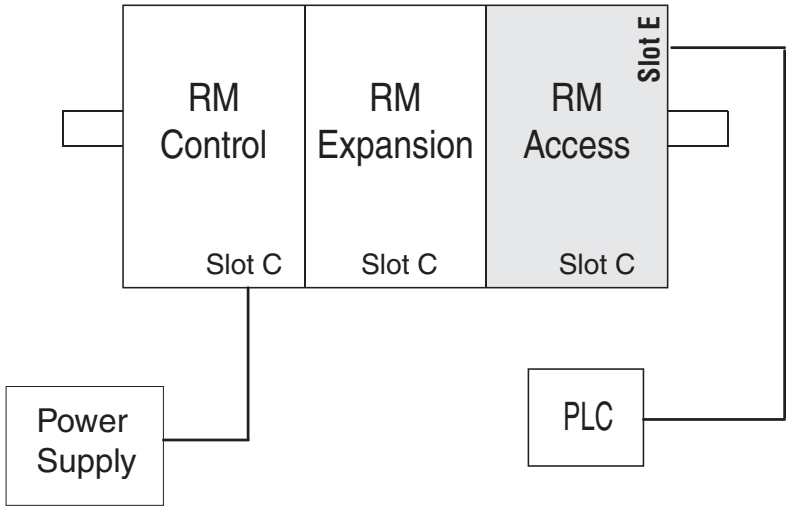
RM System Configurations Using and RMA

Due to the scalability and flexibility in the system components a user has several options available in the way that the hardware can be connected.

RM System Connected to a Programmable Logic Controller (PLC) on a DIN Rail

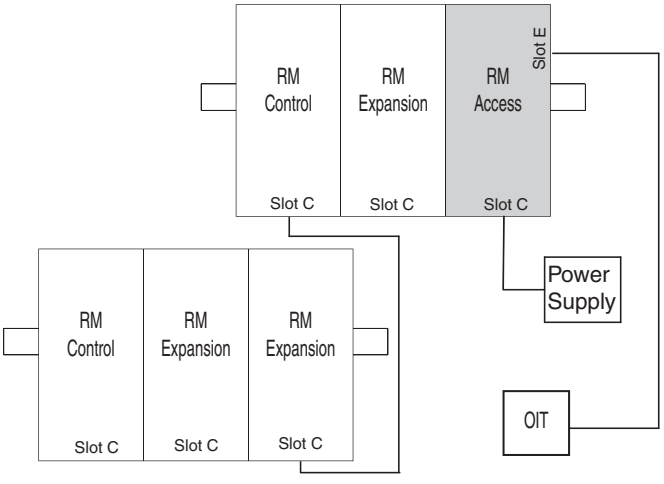
In this configuration, the PLC can be connected to the RM system via the RMA module using one or more available protocols:

1. EtherNet/IP and or Modbus TCP
2. DeviceNet
3. Modbus RTU
4. Profibus DP



RM System Connected to a Split Rail with an Operator Interface Terminal (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 200 feet. In this configuration the OIT can communicate with all modules (maximum 16 modules any combination with one Access module).



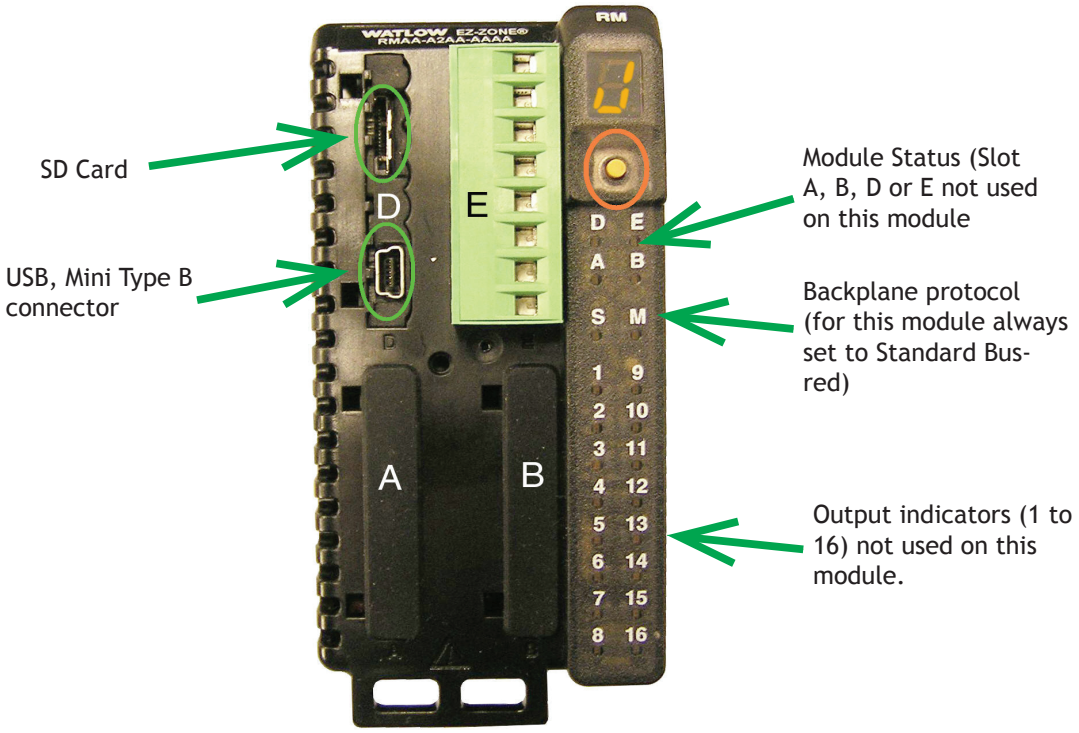
Module Orientation

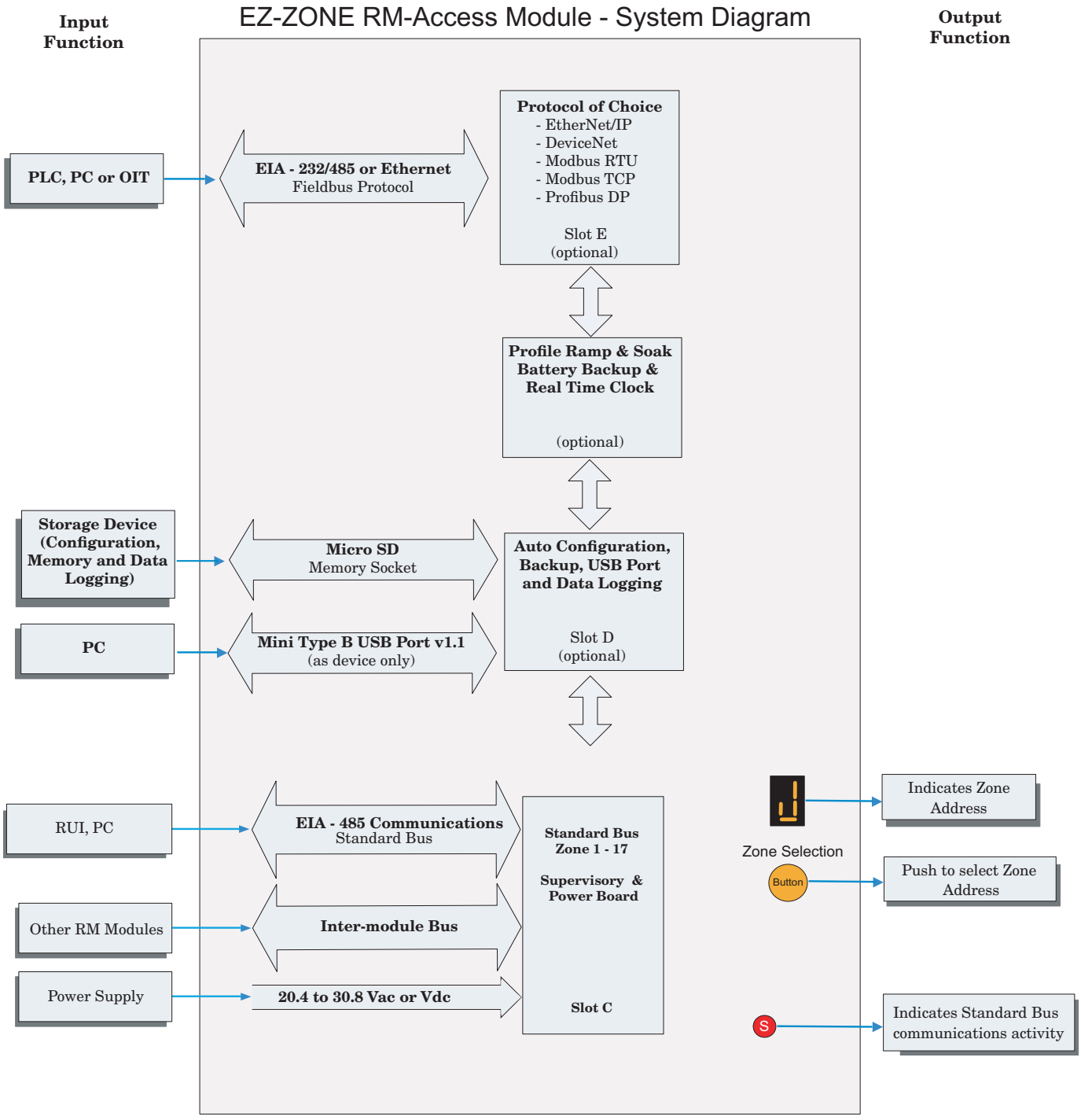
The picture below reflects a front view of an RMA module. Like all RM modules, there are four slots that appear on the face (slot A, B, D, and E) of the module and one on the bottom (slot C) not shown. For this particular module only slots D and E can be used. On the face of the module there is a button (orange circle) under the Zone address J that when pushed and held has the following function:

1. Push and hold for ~ 2 seconds to change the Zone address. Valid addresses range from 1 to 17 (1 - 9, A is 10, b is 11, C is 12, d is 13, E is 14, F is 15, and h is 16). The Access module is shipped (default factory address) at address J or 17

Note:

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




Input Function
EZ-ZONE RM-Access Module - System Diagram
Output Function
PLC, PC or OIT
EIA - 232/485 or Ethernet
Fieldbus Protocol
Protocol of Choice
- EtherNet/IP
- DeviceNet
- Modbus RTU
- Modbus TCP
- Profibus DP
Slot E
(optional)
Profile Ramp & Soak
Battery Backup &
Real Time Clock
(optional)
Storage Device (Configuration, Memory and Data Logging)
Micro SD
Memory Socket
Auto Configuration, Backup, USB Port and Data Logging
Slot D
(optional)
PC
Mini Type B USB Port v1.1
(as device only)
RUI, PC
EIA - 485 Communications
Standard Bus
Standard Bus
Zone 1 - 17
Supervisory &
Power Board
Other RM Modules
Inter-module Bus
Power Supply
20.4 to 30.8 Vac or Vdc
Slot C
Zone Selection
Button
Indicates Zone Address
Push to select Zone Address
S
Indicates Standard Bus communications activity

2 Chapter 2: Install and Wire

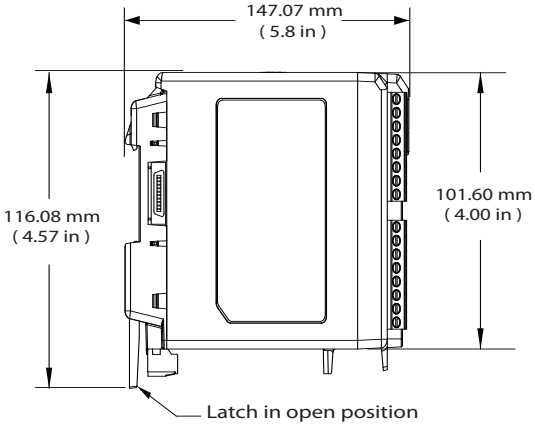
Dimensions

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

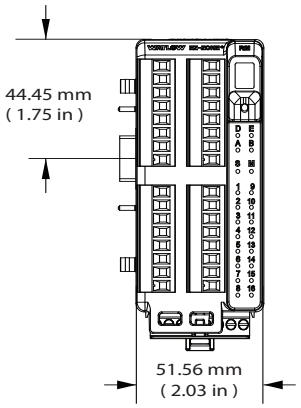
Note:

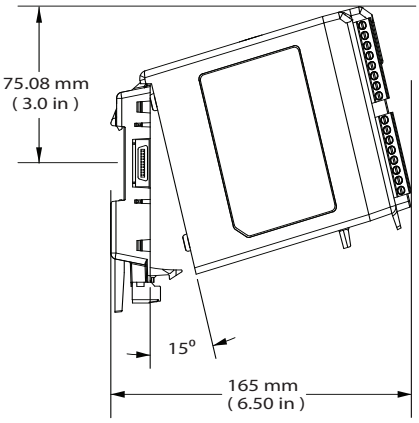
Modules should always be mounted vertically. For easy removal and placement of modules it is recommended that there be a 76.2 mm (3.00 in) clearance on the top, bottom and front of each module.

Module Removal Clearance



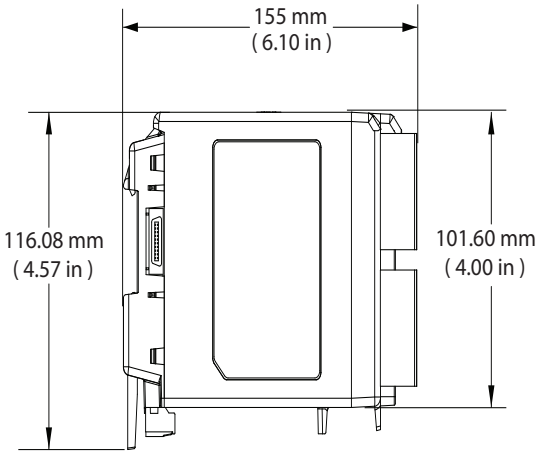
Standard Connectors



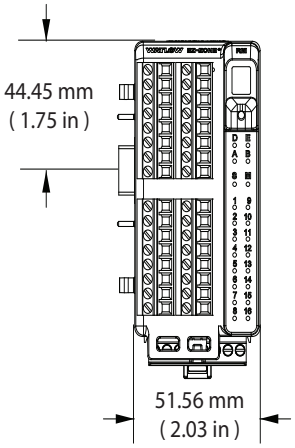


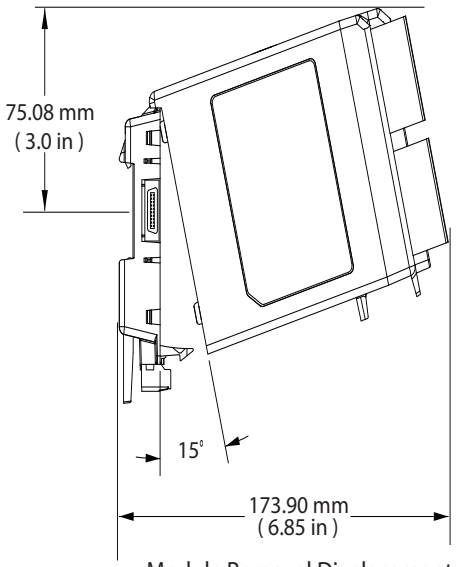
Module Removal Displacement

Module Removal Clearance



Straight Connectors

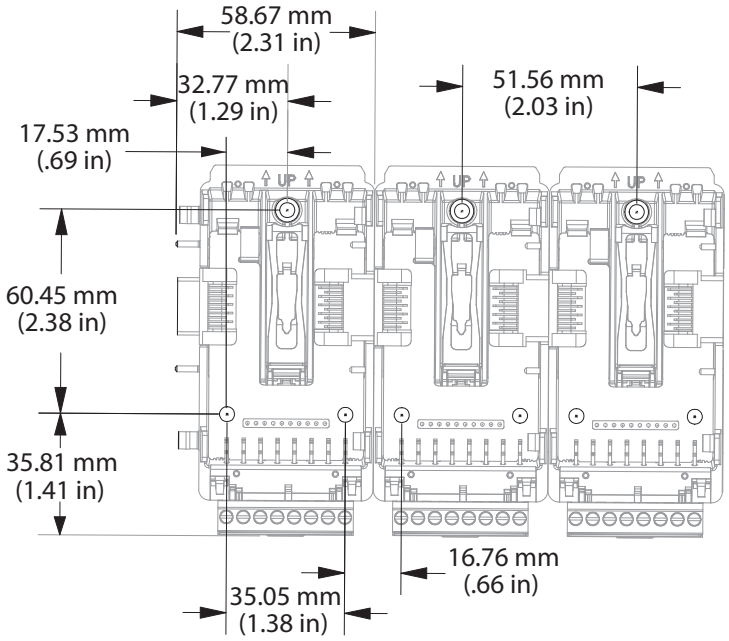




Module Removal Displacement

Dimensions (cont.)

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



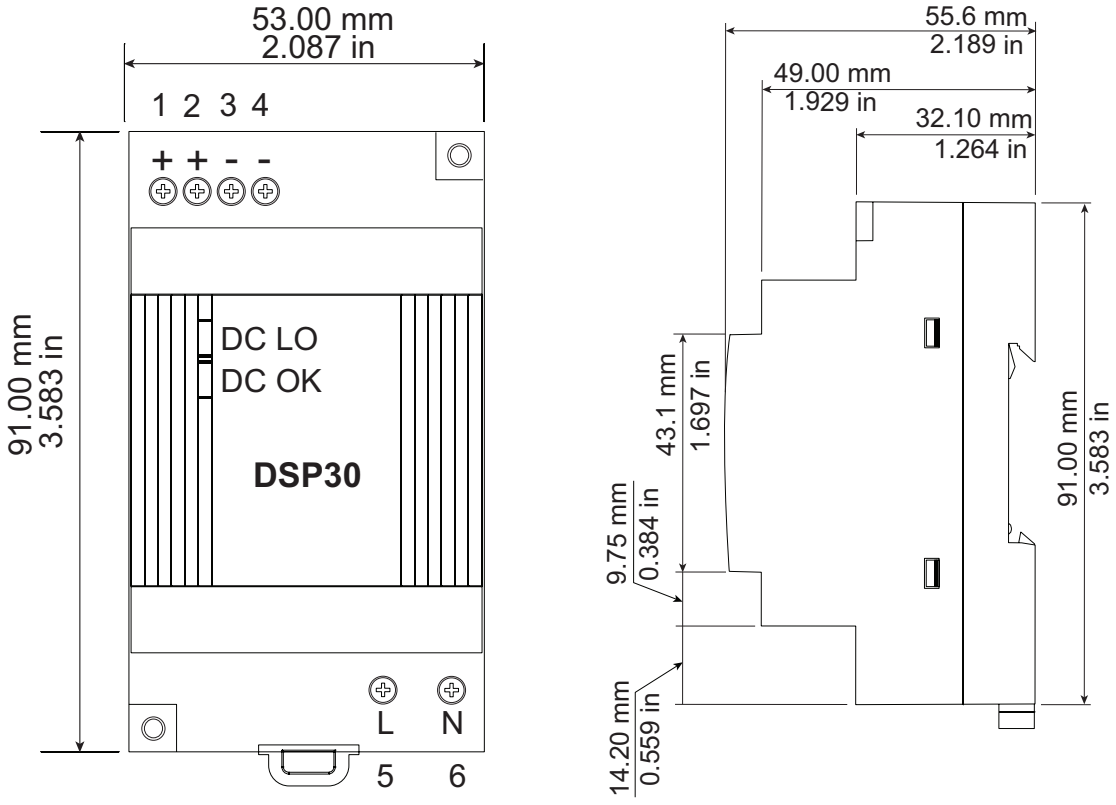
The view above is representative of the modular backplane without the module.

Recommended chassis mount hardware:

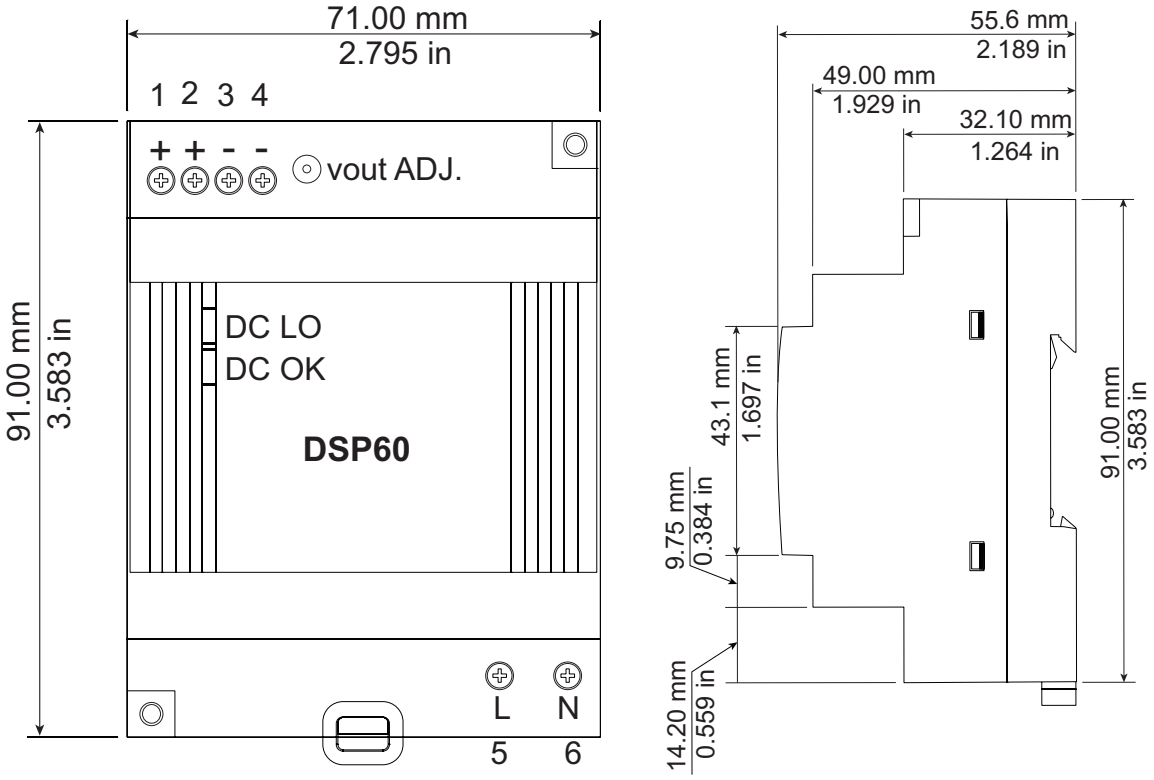
1. #8 screw, 3/4" long
2. Torque to 10 -15 in-lb
3. No washers of any kind

Power Supplies

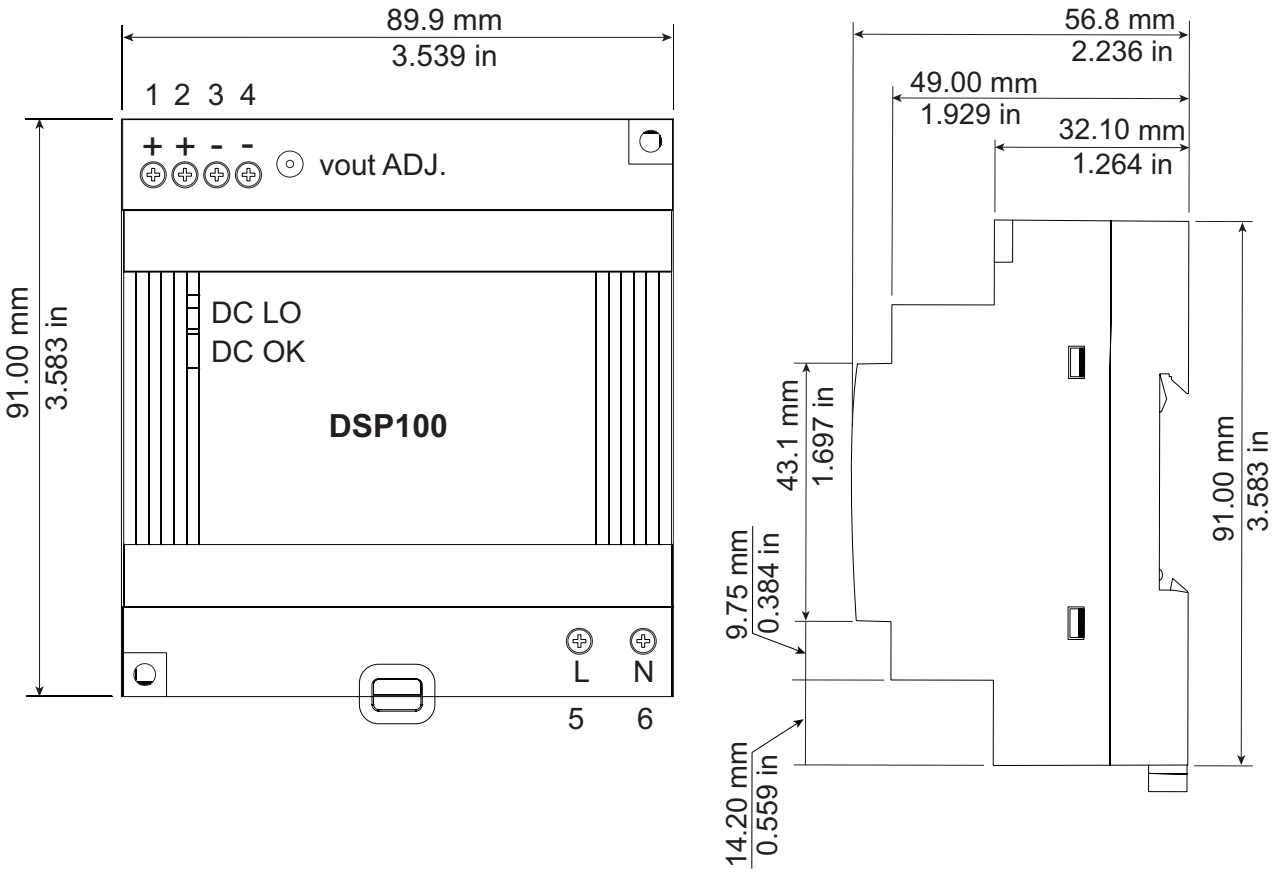
DSP 30



DSP 60



DSP 100



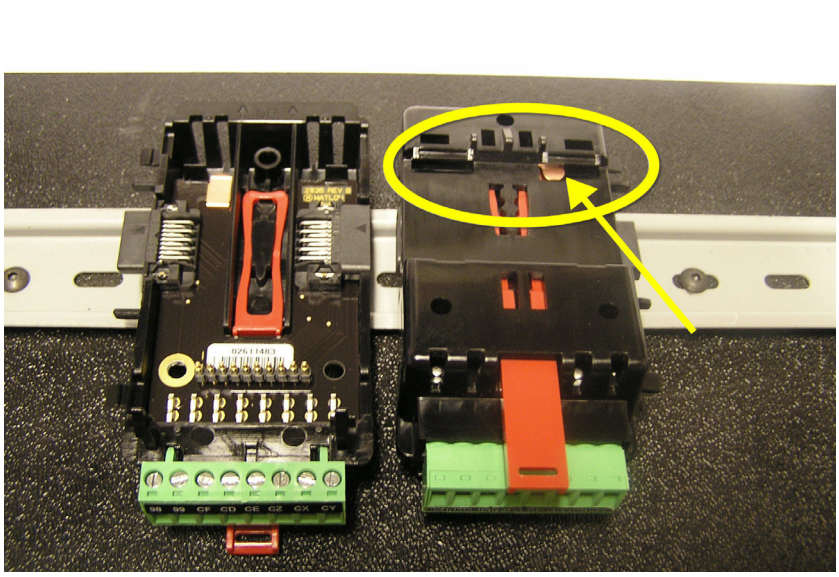
Power Supply Specifications				
		DSP 30	DSP60	DSP100
AC Input Voltage Range	VAC	90 - 264VAC, Class II double insulated (No ground connection required)		
Input Frequency	Hz	47 - 63Hz		
DC Input Voltage range	VDC	120 - 370VDC		
Inrush Current (115 / 230VAC)	A	25 / 50A	30 / 60A	30 / 60A
Output Voltage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

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

RM Installation and Removal on a DIN Rail

Modular Backplane Connector

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



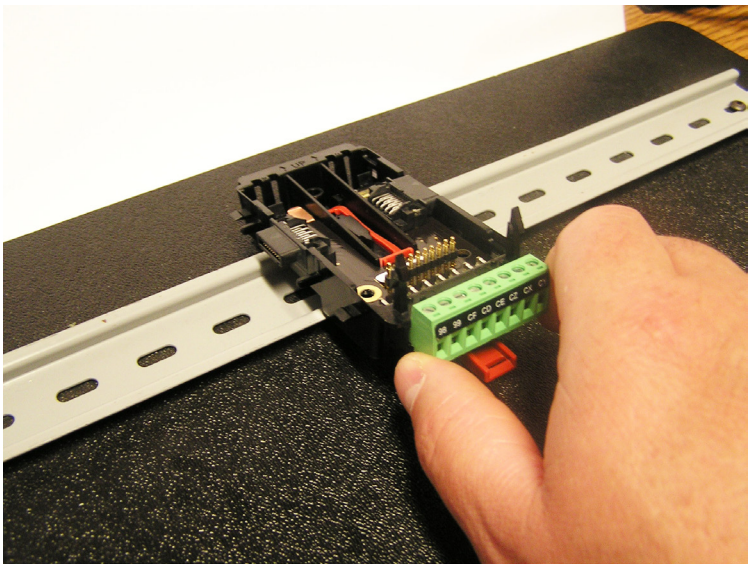
Installing the Modular Backplane Connector

To install the backplane follow the steps below:

1. Hook backplane assembly to upper edge of DIN rail, (see rear view above, backplane hook detail that mates with upper rail edge is circled)
2. Next, rotate back plane assembly downward to engage the lower edge of the rail.

Note:

Din Rail clipping distance ranges from 1.366 -1.389 inches. The back plane assembly will not latch onto the rail successfully if the rail is out of dimension.



3. For final positioning and locking, the red tab is to be pushed upward to further engage the bottom edge of the rail with an over center snap action latch. (The red locking tab protrudes from the bottom side of the back plane assembly).

Note:

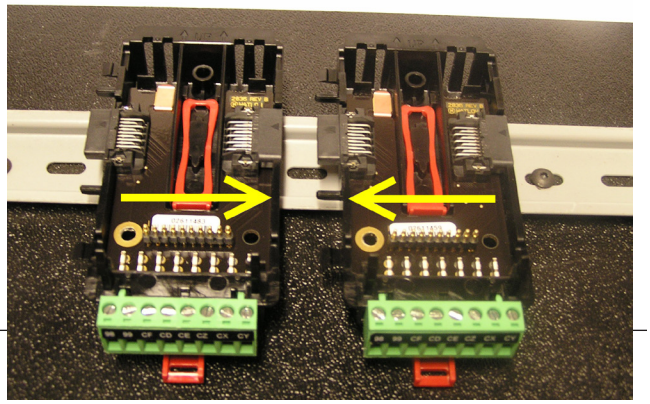
For easy removal and placement of modules it is recommended that there be a 76.2 mm (3.00 in) clearance on the top, bottom and front of each module.

Installing Multiple Modular Backplane Connectors

Multiple modules are easily aligned and latched together. Each module includes matched mating geometry that facilitates accurate and consistent interconnections.

To install backplane connectors follow the steps below:

1. Attach individual modules to the rail separately.
2. Laterally slide the modules together until they touch.
3. When the multi-module system is attached and laterally positioned to the desired placement the locking tab should be engaged to secure the control system to the rail.

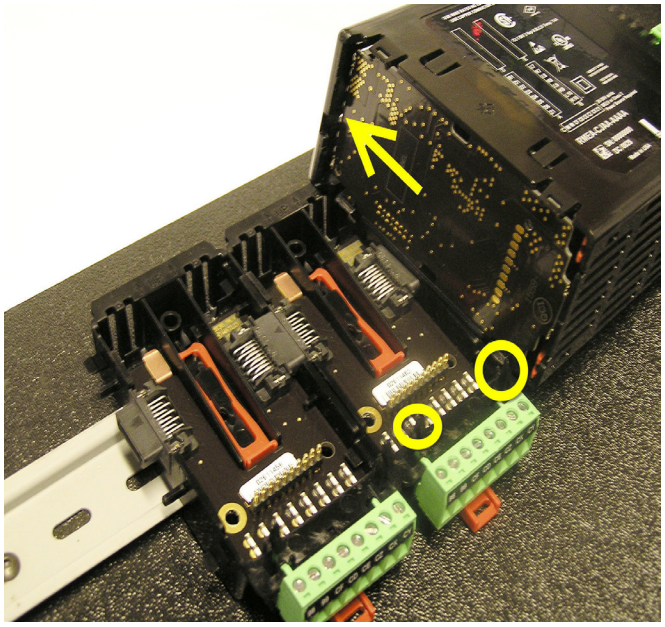


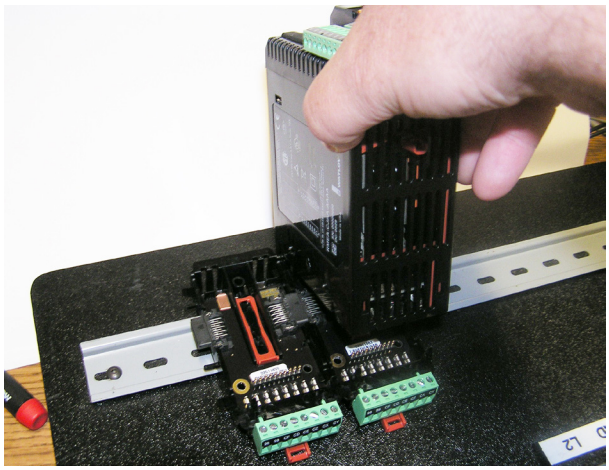
Module Installation

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

To install modules on the backplane follow the steps below:

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



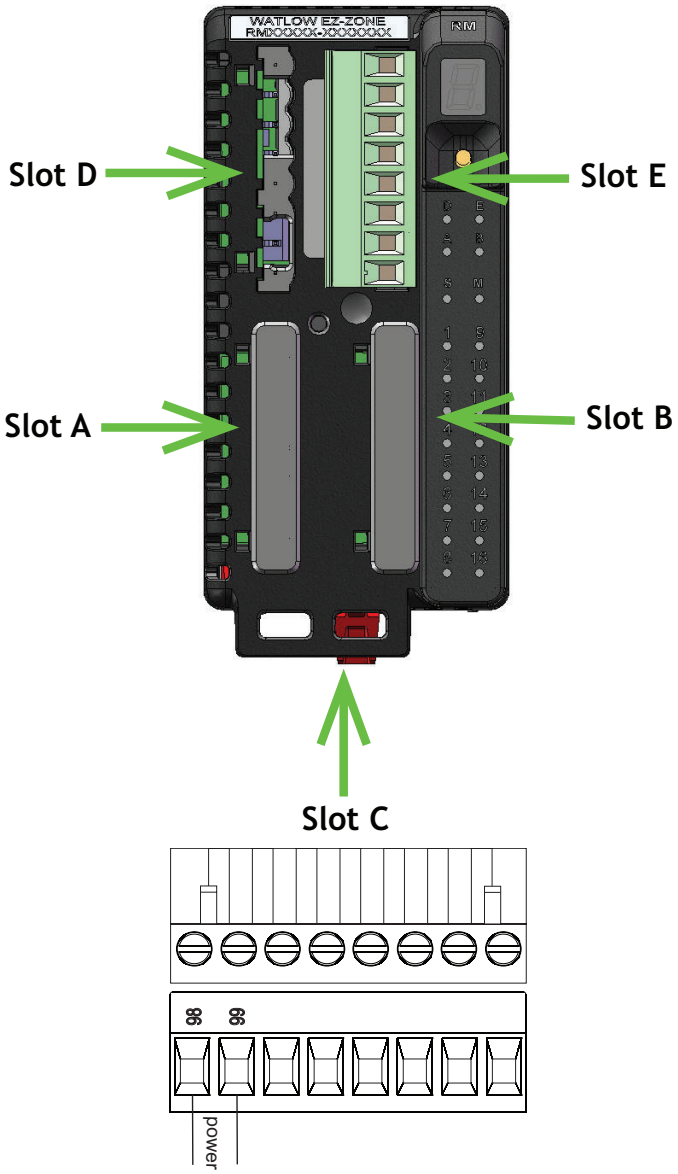


Wiring

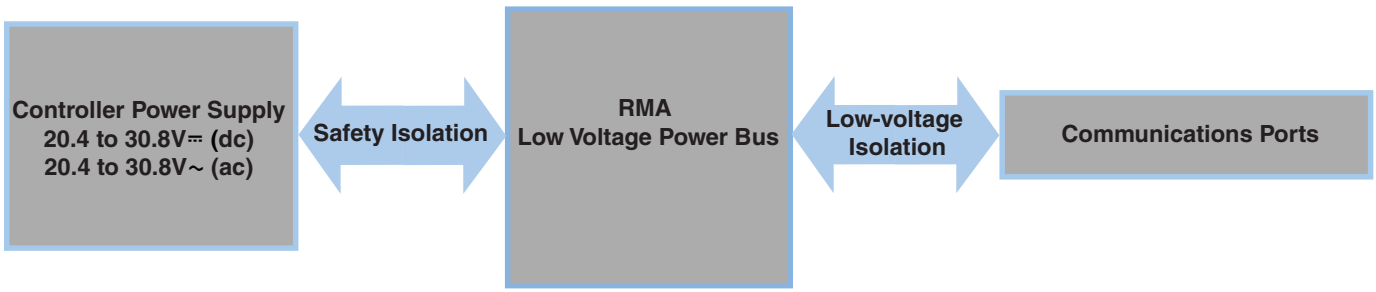
Access Module (RMAx-Axxx-xxxx)					
Slot A	**Slot B**	**Slot D**	**Slot E**	**Terminal Function**	**Configuration**
				Modbus RTU	
- - -	- - -	- - -	CB	Modbus RTU EIA-485 T+/R+	Part # Digit 6
- - -	- - -	- - -	CA	Modbus RTU EIA-485 T-/R-	Slot E: RMAx-A(**2**)xx-xxxx
- - -	- - -	- - -	CC	Modbus RTU EIA-485 common	
- - -	- - -	- - -	CB	Modbus RTU EIA-485 T+/R+	
- - -	- - -	- - -	CA	Modbus RTU EIA-485 T-/R-	
- - -	- - -	- - -	C5	Modbus RTU EIA-232 common	
- - -	- - -	- - -	C3	Modbus RTU EIA-232 DB9/pin 2	
- - -	- - -	- - -	C2	Modbus RTU EIA-232 DB9/pin 3	
				EtherNet/IP and Modbus TCP 10/100	
- - -	- - -	- - -	E8	EtherNet/IP™ and Modbus TCP unused	Part # Digit 6
- - -	- - -	- - -	E7	EtherNet/IP™ and Modbus TCP unused	Slot E: RMAx-A(3)xx-xxxx
- - -	- - -	- - -	E6	EtherNet/IP™ and Modbus TCP receive -	
- - -	- - -	- - -	E5	EtherNet/IP™ and Modbus TCP unused	
- - -	- - -	- - -	E4	EtherNet/IP™ and Modbus TCP unused	
- - -	- - -	- - -	E3	EtherNet/IP™ and Modbus TCP receive +	
- - -	- - -	- - -	E2	EtherNet/IP™ and Modbus TCP transmit -	
- - -	- - -	- - -	E1	EtherNet/IP™ and Modbus TCP transmit +	
				DeviceNet	
- - -	- - -	- - -	V+	DeviceNet™ power	Part # Digit 6
- - -	- - -	- - -	CH	Positive side of DeviceNet™ bus	Slot E: RMAx-A(5)xx-xxxx
- - -	- - -	- - -	SH	Shield interconnect	
- - -	- - -	- - -	CL	Negative side of DeviceNet™ bus	
- - -	- - -	- - -	V-	DeviceNet™ power return	
- - -	- - -	- - -	- - -		
- - -	- - -	- - -	- - -		
- - -	- - -	- - -	- - -		
				Profibus DP	
- - -	- - -	- - -	VP	Voltage Potential	Part # Digit 6
- - -	- - -	- - -	B	EIA-485 T+/R+	Slot E: RMAx-A(**6**)xx-xxxx
- - -	- - -	- - -	A	EIA-485 T-/R-	
- - -	- - -	- - -	DG	Digital ground (common)	
- - -	- - -	- - -	trB	Termination resistor B	
- - -	- - -	- - -	B	EIA-485 T+/R+	
- - -	- - -	- - -	A	EIA-485 T-/R-	
- - -	- - -	- - -	trA	Termination resistor A	

Power & Standard Bus Communications		
Slot C	**Terminal Function**	**Configuration**
98 99	Power input: ac or dc+ Power input: ac or dc-	All
CF CD CE	Standard Bus EIA-485 common Standard Bus EIA-485 T-/R- Standard Bus EIA-485 T+/R+	Standard Bus
CZ CX CY	Inter-module Bus Inter-module Bus Inter-module Bus	Inter-module Bus

RMA Module - Front View
Standard Connector



RMA Isolation Block



Low-voltage Isolation: 42V peak
Safety Isolation: 1,528V~ (ac)

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

Note:
Maximum wire size termination and torque rating:

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

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

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

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

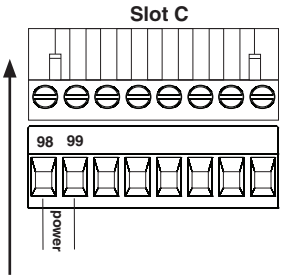
Note:
If the last two digits of the part number are "12", this equipment is suitable for use in CLASS I, DIVISION 2, Groups A, B, C and D or Non-Hazardous locations only. Temperature Code T4

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

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

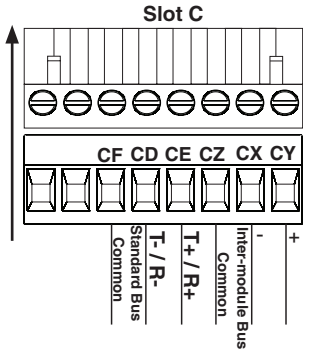
Access Module Wiring (RMAx-xxxx-xxxx)

Low Power



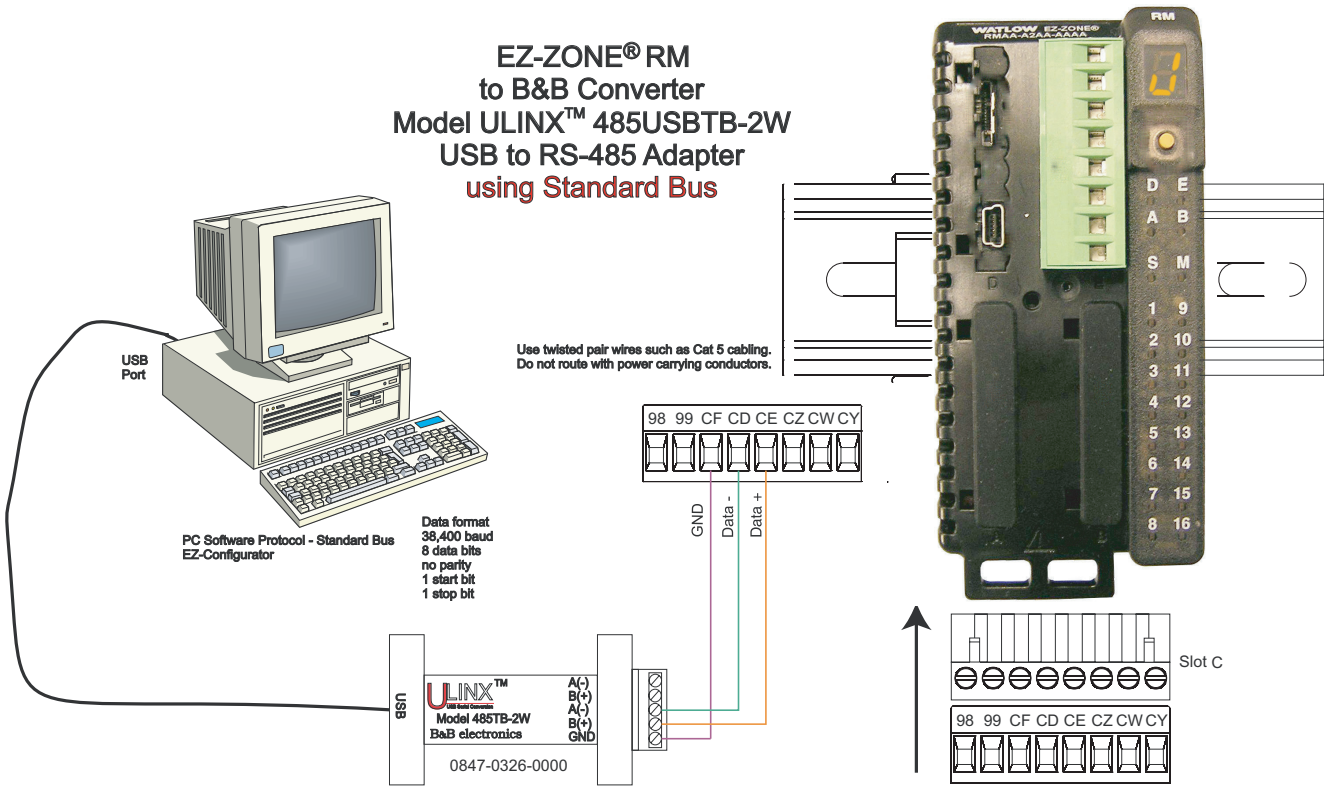
- 20.4 to 30.8 V ~ (ac) / ⎓ (dc) 9VA
- 47 to 63 Hz
- RMA module power consumption, 4 Watts maximum
- 31 Watts maximum power available for P/S part #:0847-0299-0000
- 60 Watts maximum power available for P/S part #:0847-0300-0000
- 91 Watts maximum power available for P/S part #:0847-0301-0000
- Class 2 or Safety Extra Low Voltage (SELV) power source required to meet UL compliance standards

Standard Bus EIA-485 Communications



Note:
Do not connect unpowered USB to EIA-485 converter. Communications may be affected while converter is not connected to the PC.

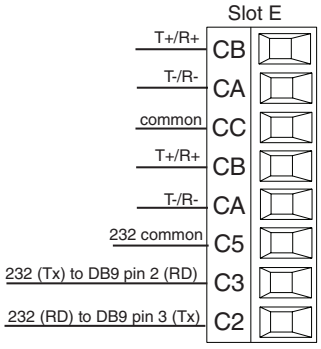
- CF, CD, CE - Standard Bus EIA485 Communications
- CZ, CX, CY - Inter-module Bus EIA485 Communications
- Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network
- Wire T-/R- to the A terminal of the EIA-485 port.
- Wire T+/R+ to the B terminal of the EIA-485 port.
- Wire common to the common terminal of the EIA-485 port.
- Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network.
- A 120 Ω termination resistor may be required across T+/R+ and T-/R-, placed on the last controller on the network.
- Do not connect more than 16 EZ-ZONE RM controllers on a network.
- Maximum network length: 1,200 meters (4,000 feet)
- 1/8th unit load on EIA-485 bus



Note:

Do not connect USB to EIA-485 converter without power. Communications may be affected while converter is not connected to the PC.

EIA-232/485 Modbus RTU Communications



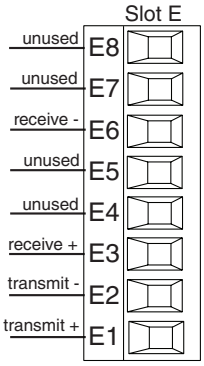
- Wire T-/R- to the A terminal of the EIA-485 port.
- Wire T+/R+ to the B terminal of the EIA-485 port.
- Wire common to the common terminal of the EIA-485 port.
- Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network.
- A termination resistor is required. Place a 120 Ω resistor across T+/R+ and T-/R- of last controller on network.
- Maximum number of devices on a Modbus network is 247.
- Maximum network length: 1,200 meters (4,000 feet)
- Maximum EIA-232 network length: 15 meters (50 feet)
- Do not connect more than one EZ-ZONE RM controller on an EIA-232 network.
- Do not wire to both the EIA-485 and the EIA-232 pins at the same time.
- Two EIA-485 terminals of T/R are provided to assist in daisy-chain wiring.
- 1/8th unit load on EIA-485 bus.

RMA Part # Digit 5 and 6 is A2

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

EtherNet/IP™ and Modbus TCP Communications

RMA Part # Digit 5 and 6 is A3



RJ-45 pin	T568B wire color	Signal	Slot E
8	brown	unused	E8
7	brown and white	unused	E7
6	green	receive -	E6
5	white and blue	unused	E5
4	blue	unused	E4
3	white and green	receive +	E3
2	orange	transmit -	E2
1	white and orange	transmit +	E1

- Do not route network wires with power wires.
- Connect one Ethernet cable per controller to a 10/100 mbps Ethernet switch. Both Modbus TCP and EtherNet/IP™ are available on the network.

Notes:

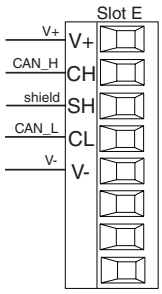
EtherNet/IP™ and Modbus TCP communications to connect with a 10/100 switch.

Notes:

When using EtherNet/IP the RMA module supports implicit and unconnected explicit messaging.

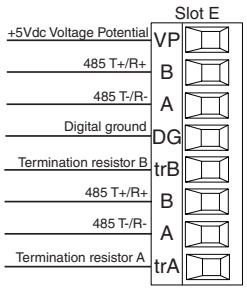
DeviceNet™ Communications

RMA Part # Digit 5 and 6 is A5



Terminal	Signal	Function
V+	V+	DeviceNet™ power
CH	CAN_H	Positive side of DeviceNet™ bus
SH	shield	Shield interconnect
CL	CAN_L	Negative side of DeviceNet™ bus
V-	V-	DeviceNet™ power return

Profibus DP Communications



- Wire T-/R- to the A terminal of the EIA-485 port.
- Wire T+/R+ to the B terminal of the EIA-485 port.
- Wire Digital Ground to the common terminal of the EIA-485 port.
- Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network.
- A termination resistor should be used if this control is the last one on the network.
- If using a 150 Ω cable Watlow provides internal termination. Place a jumper across pins trB and B and trA and A.

RMA Part # Digit 5 and 6 is A6

- If external termination is to be used with a 150 Ω cable place a 390 Ω resistor across pins VP and B, a 220 Ω resistor across pins B and A, and lastly, place a 390 Ω resistor across pins DG and A.
- Do not connect more than 16 EZ-ZONE RM modules on any given segment.
- Maximum EIA-485 network length: 1,200 meters (4,000 feet)
- 1/8th unit load on EIA-485 bus.
- Communications instance 2
- RMAX - A **[6]** X X - A A X X

Note:

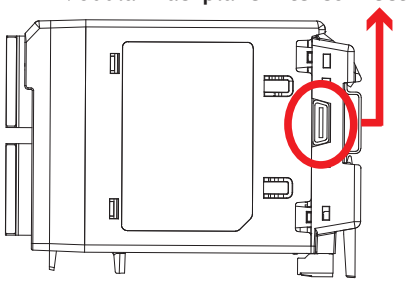
When termination jumpers are in place, there is 392 ohm pull up resistor to 5V and 392 ohm pull down resistor to DP. There is also a 221 ohm resistor between A and B.

Profibus Terminal	EIA/TIA-485 Name	Watlow Terminal Label	Function
VP (Voltage Potential)	- - - -	VP	+5Vdc
B-Line	B	B	T+/R+
A-Line	A	A	T-/R-
DP-GND	common	DG	common

RM System Connections

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

Modular Backplane Interconnect



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
2. RMEx-xxxx-xxxx @ 7 watts
3. RMAx-xxxx-xxxx @ 4 watts

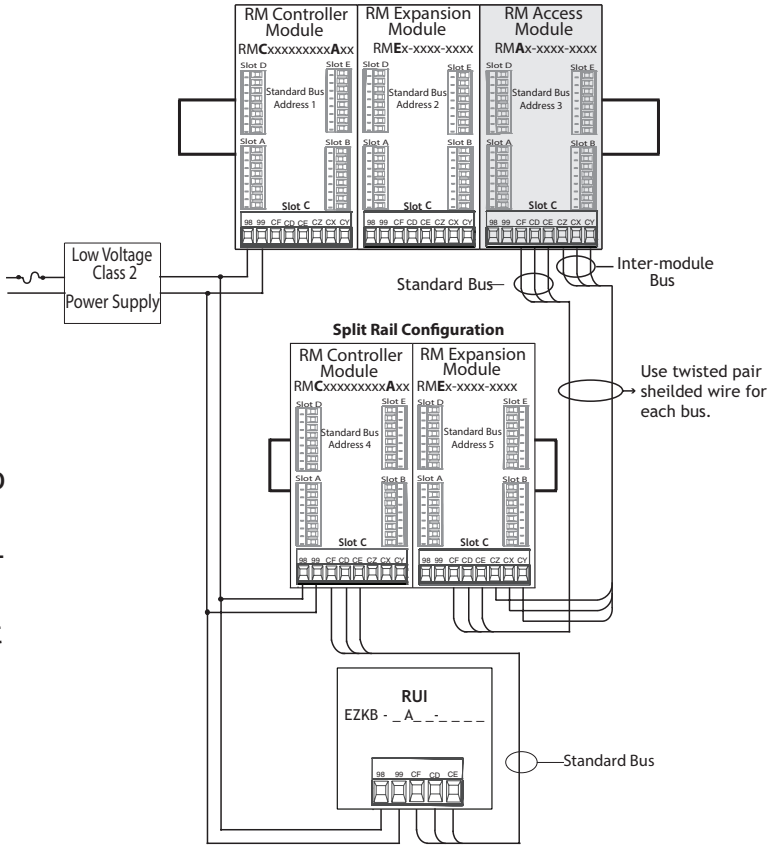
So, in the split rail system diagram, the maximum current draw on the supply would be 38 Watts.

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

With this power requirement the second or third power supply could be used.

Another hardware configuration scenario that could present itself (graphic not shown) would be a configuration that requires more than one supply. Lets make some assumptions pertaining to the split rail system diagram shown 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



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 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.

Note:

Module is not provided with a disconnect, use of an external disconnect is required. It should be located in close proximity to the module and be labeled as the disconnect for the module.

Note:

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

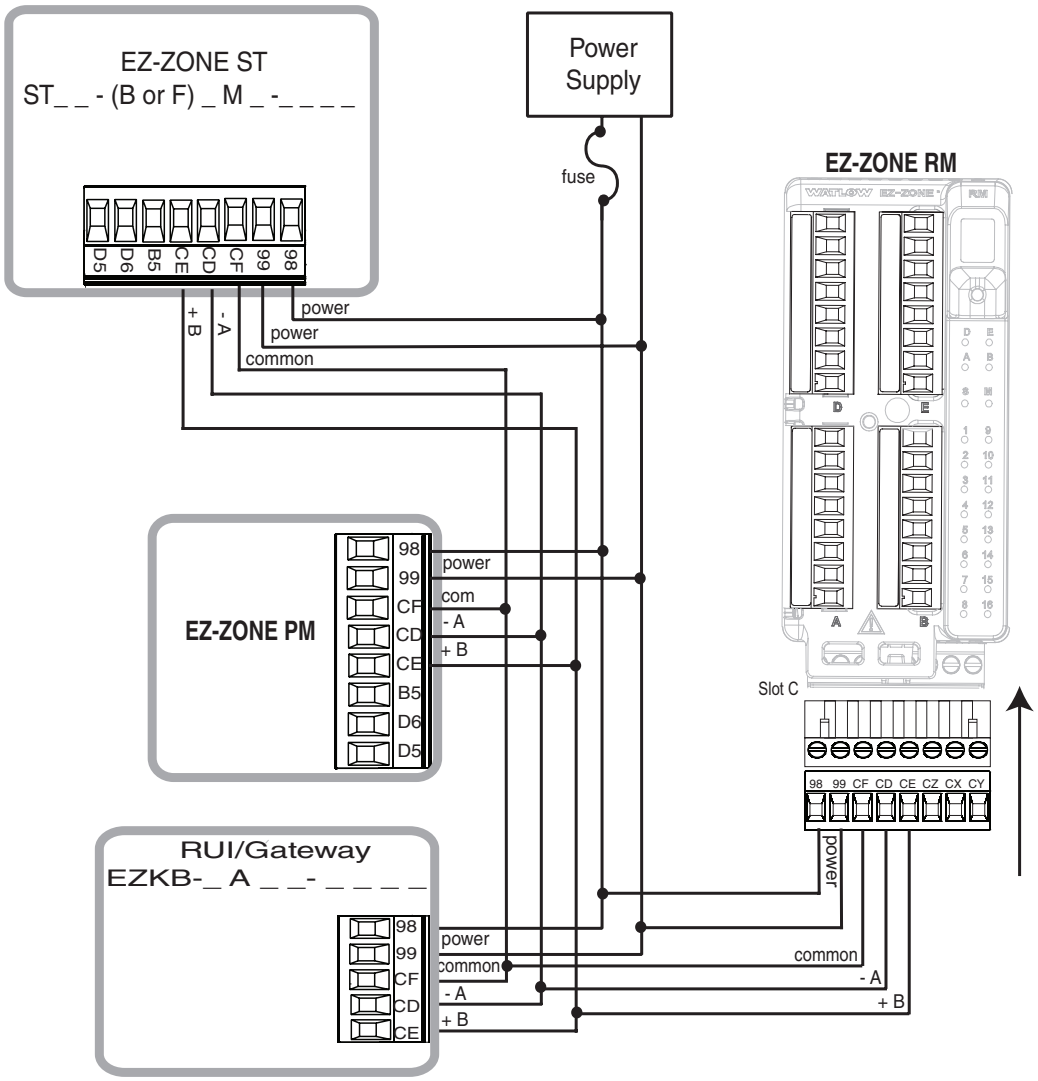
Wiring a Serial EIA-485 Network

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 con-troller on a on a network.

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



Conventions Used in the Menu Pages

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

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

Display

When a RM module is used in conjunction with the RUI (optional equipment) visual information from the module is displayed to the observer using a fairly standard 7 segment display. Due to the use of this technology, several characters displayed need some interpretation, see the list below:

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

Range

Within this column notice that on occasion there will be numbers found within parenthesis. This number represents the enumerated value for that particular selection. Range selections can be made simply by writing the enumerated value of choice using any of the available communications protocols. As an example, turn to the Setup Page and look at the Backup Menu. To **Save** a configuration backup of all connected zones using Modbus simply right the value of 1646 (save) to Modbus register 1270.

Communication Protocols

All RM modules come with the standard offering of Watlow's Standard Bus protocol used primarily for inter-module communications as well as for configuration using EZ-ZONE Configurator and Composer software (free download from Watlow's web site (http://www.watlow.com). Along with Standard Bus, the RMH module can also be ordered with Modbus RTU (only one protocol can be active at any given time). The RMA module has options for several different protocols listed below:

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

To learn more about any of the available RM modules, 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).

Note:

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

For parameters listed as float notice that only one (low order) of the two registers is listed, this is true throughout this document. By default, the low order word contains the two low bytes of the 32-bit parameter. As an example, look in the RMA Setup Page for the Analog parameter under the Variable menu. Find the column identified in the header as Modbus Relative Address, notice that it lists register 1034. Because this parameter is a float it is actually represented by registers 1034 (low order bytes) and 1035 (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 RMA contain more than one instance; such as, Data Log points (200), Gateway Instances (17), etc... The Modbus register shown always represents instance one. Take for an example the Log Point parameter found in the RMA Setup Page under the Log Point menu. Instance one for the Source Function is shown as address 1470 and the offset to the next instance is identified as +16. If there was a desire to read or write to instance 3, simply add 32 to 1470 to find the appropriate address; in this case, Log Point Source Function 3 address would be identified as 1502.

RMA _ - A **[2, 3]** _ _ - A A _ _
To learn more about the Modbus protocol point your browser to http://www.modbus.org.
Common Industrial Protocol (CIP)

DeviceNet & Ethernet/IP

Both DeviceNet and EtherNet/IP use open object based programming tools and are based on the Common Industrial Protocol (CIP). Due to the use of CIP as the foundation of either protocol (DeviceNet or EtherNet/IP), they both use the same addressing scheme and parameter addresses can be found in the column header identified as CIP. There you will find the Class, Instance and Attribute in hexadecimal, (decimal in parenthesis) for both protocols.

Note:
The RMA module equipped with EtherNet/IP supports implicit and unconnected explicit messages.

Data Types Used with CIP

uint = Unsigned 16 bit integer
int = Signed 16-bit
dint = Signed 32-bits, long
real = Float, IEEE 754 32-bit
string = ASCII, 8 bits per character
sint = Signed 8 bits , byte

RMA _ - A **[3]** _ _ - A A _ _
To learn more about the DeviceNet and EtherNet/IP protocol point your browser to http://www.odva.org.

Profibus DP

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

Data Types Used with Profibus DP

word = Unsigned 16 bit
int = Signed 16-bit Integer
dint = Signed 32-bit Integer
real = Float, IEEE 754 32-bit
char = ASCII, 8 bits per character
byte = 8 bits

RMA _ - A **[6]** _ _ - A A _ _
To learn more about the Prfibus DP protocol point your browser to http://www.profibus.org

3 Chapter 3: Operations Page

Access Module Operation Page Parameters

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

1. From the Home Page, press both the Up and Down keys for three seconds. A1 will appear in the upper display and oPEr will appear in the lower display.
2. Press the Up or Down key to view available menus.
3. Press the Advance Key to enter the menu of choice.
4. If a submenu exists (more than one instance), press the Up or Down key to select and then press the Advance Key to enter.
5. Press the Up or Down key to move through available menu prompts.
6. Press the Infinity Key to move backwards through the levels: parameter to submenu, submenu to menu, menu to Home Page.
7. Press and hold the Infinity Key for two seconds to return to the Home Page.

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

Note:
Some of these menus and parameters may not appear, depending on the controller's options. See model number information in the Appendix for more information. If there is only one instance of a menu, no submenus will appear.

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

dLog
oPEr **Data Logging Menu**
- StAt Status
- AMnE Available Logging Memory
- At1 Available Logging Time

bCUP
oPEr **Backup Menu**
- StAt Status
- Zone Zone

bStA
oPEr **Backup Status Menu**
- bStA Backup (1 to 24)
- StAt Status

RM Access Module • Operations Page								
Dis-playy	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type & Read/ Write *
dLo9 oPEr **Data Logging Menu**								
StAt Stat	*Data Logging* **Status** Status indicates the status of the data logging function. OK means logging can be started or can continue. No Memory can indicate the memory card is full or not present.	noM7 No Memory (1637) oH OK (138)	- - - -	1452	0x89 (137) 1 2	50	37002	uint R
A.mE A.ME	*Data Logging* **Available Memory** Available logging memory indicates the remaining space available for logging in megabytes.	0 to 9,999	- - - -	1456	0x89 (137) 1 4	52	37004	uint R
At i A.ti	*Data Logging* **Available Logging Time** Available Logging Time when logging is active, indicates the remaining time that logging can continue in hours. When logging is not active, indicates zero.	0 to 9,999 hours	- - - -	1458	0x89 (137) 1 5	53	37005	uint R
* R: Read, W: Write, E: EEPROM, S: User Set								

RM Access Module • Operations Page								
Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type & Read/ Write *
bCUP oPEr **Backup Menu**								
StAt Stat	*Backup* **Status** Status indicates the status of the configuration backup function. *Off* - means no backup or restore action is running. *Save* - indicates the configuration of a zone is being saved to backup memory. *Restore* - indicates a saved configuration is being restored to a zone. *Monitor* - When backup is set to restore on a change the RMA will check to see if a module serial number has changed. If so, a restore will take place for that module. *Complete* - indicates that the restoration is complete. *Error* - indicates that the last action failed.	oFF Off (62) SAvE Save (1644) rESt Restore (1645) Mon Monitor (1187) CPLt Complete (18) Err Error (28)	Off	1274	0x8A (138) 1 to 6 3	60	38003	uint R
ZonE ZonE	*Backup* **Zone** Current Zone indicates which zone's configuration is being saved or restored or was last saved or restored.	1 to 16	1	1276	0x8A (138) 1 to 0x10 (16) 4	61	38004	uint R
* R: Read, W: Write, E: EEPROM, S: User Set								

RM Access Module • Operations Page

Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Pro-fibus Index	Param-eter ID	Data Type & Read/ Write *
bSEA oPEr **Backup Status Menu**								
StAt Stat	*Backup* **Status** Status indicates the status of the current or most recent backup function performed on the corresponding zone. *None* - means no backup or restore action is running. *OK* - indicates the zone was successfully restored or saved depending on the operation. *No Memory* - indicates memory is full. *No Module* - indicates that a previous image for the module had been saved but while restoring the module is no longer present. *No Image* - indicates there is no backed up image for a module present on Standard Bus. *Error* - indicates that the last action failed.	nonE None (61) oH OK (1644) no.M7 No Memory (1637) no.M7 No Module (1664) no.L9 No Image (1665) Err Error (28)	None	1280 [offset 6]	0x9A (154) 1 to 0x18 (24) 1	94	54001	uint R
* R: Read, W: Write, E: EEPROM, S: User Set								

4 Chapter 4: Setup Pages

Access 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. A 1 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.

GLbL
SEt **Global Menu**
- dPrS Display Pairs (1 to 10)
- USr.S Save Settings As
- USr.r Restore Settings From

COM1
SEt **Communications Menu**
- Ad.M1 Modbus Address
- bAUd Baud Rate
- PAr Parity
- M1.hL Modbus Word Order
- iP.M1 IP Address Mode
- iP.F1 IP Fixed Address Part 1
- iP.F2 IP Fixed Address Part 2
- iP.F3 IP Fixed Address Part 3
- iP.F4 IP Fixed Address Part 4
- iP.S1 IP Fixed Subnet Part 1
- iP.S2 IP Fixed Subnet Part 2
- iP.S3 IP Fixed Subnet Part 3
- iP.S4 IP Fixed Subnet Part 4
- iP.g1 Fixed IP Gateway Part 1
- iP.g2 Fixed IP Gateway Part 2
- iP.g3 Fixed IP Gateway Part 3
- iP.g4 Fixed IP Gateway Part 4
- M1bE Modbus TCP Enable
- E iPE EtherNet/IP™ Enable
- Add DeviceNet™ Node Address
- BAUd Baud Rate DeviceNet™
- FCE DeviceNet™ Quick Connect Enable
- PAdd Profibus Address
- ALoC Profibus Address Lock
- StAt Profibus Status
- C_F Display Units
- nu.S Non-volatile Save

gtwy
SEt **Local Remote Gateway Menu**
- gtwy Local Remote Gateway (1 to 17)
- dvEn Device Enabled
- dvSt Device Status
- MAoF Modbus Address Offset
- oSt CIP Instance Offset
- Aonb CIP Implicit Assembly Output Member Quantity
- Ainb CIP Implicit Assembly Input Member Quantity
- SoF Profibus Slot Offset

rtC
SEt **Real Time Clock Menu**
- hour Hours
- Min Minutes
- Mon Month
- dAtE Date
- YEAr Year
- doW Day of Week
- t.For Time Format
- d.For Date Format

Pro
SEt **Profile Menu**
- Pot1 Power Off Time

dLog
SEt **Data Logging Menu**
- PErd Period
- F.Act Full Action
- SFnA Source Function A
- SiA Source Instance A
- S2A Source Zone A

LgPt
SEt **Log Point Menu**
- LgPt Log Point (1 to 200)
- SFnA Source Function A
- SiA Source Instance A
- S2A Source Zone A
- dEC Display Precision

bCUP
SEt **Backup Menu**
- SAvE Save
- rESt Restore

uAr
SEt **Variable Menu**
- tYPE Data Type
- Unit Units
- dig Digital
- AnLg Analog

RM Access Module • Setup Page

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write *
GLbL SEt **Global Menu**								
dPrS dPrS	*Global* **Display Pairs** Defines the number of Display Pairs.	1 to 10	1	- - - -	0x6A (103) 1 0x1C (28)	- - - -	3028	uint RWES
USr.S USr.S	*Global* **Save Settings As** Save all of this controller's settings to the selected set.	nonE None (61) SEt 1 User Set 1 (101) SEt2 User Set 2 (102)	- - - -	26	0x65 (101) 1 0x0E (14)	8	1014	uint RWE
USr.r USr.r	*Global* **Restore Settings From** Replace all of this controller's settings with another set.	nonE None (61) SEt 1 User Set 1 (101) SEt2 User Set 2 (102) FCty Factory (31)	- - - -	24	0x65 (101) 1 0x0D (13)	7	1013	uint RWE
CoMM SEt **Communications Menu**								
Ad.M Ad.M	*Communications* **Modbus Address** Set the Modbus address.	1 to 247	1	432	0x96 (150) 2 1	76	17007	uint RWE
bAUd bAUd	*Communications* **Baud Rate** Set the speed of this controller's communications to match the speed of the serial network.	9,600 (188) 19,200 (189) 38,400 (190)	9,600	434	0x96 (150) 2 3	74	17002	uint RWE

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

RM Access Module • Setup Page

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write *
PAr PAr	*Communications* **Parity** Set the parity of this controller to match the parity of the serial network.	nonE None (61) EuEn Even (191) odd Odd (192)	None	436	0x96 (150) 2 4	75	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.	h iLo Word High Low (1330) Loh i Word Low High (1331)	Low High	438	0x96 (150) 2 5	80	17043	uint RWE
iP.M iP.M	*Communications* **IP Address Mode** Select DHCP to let a DHCP server assign an address to this module. **Note:** Power to the module must be cycled after changing the IP address.	dhCP DHCP (1281) F.Add Fixed Address (1284)	DHCP	- - - -	- - - -	77	17012	uint RWE
ip.F1 ip.F1	*Communications* **IP Fixed Address Part 1** Set the IP address of this module. Each device on the network must have a unique address.	0 to 255	169	- - - -	- - - -	- - - -	17014	uint RWE

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RM Access Module • Setup Page

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write *
ip.F2	*Communications* **IP Fixed Address Part 2** Set the IP address of this module. Each device on the network must have a unique address.	0 to 255	254	- - - -	- - - -	- - - -	17015	uint RWE
ip.F3	*Communications* **IP Fixed Address Part 3** Set the IP address of this module. Each device on the network must have a unique address.	0 to 255	1	- - - -	- - - -	- - - -	17016	uint RWE
ip.F4	*Communications* **IP Fixed Address Part 4** Set the IP address of this module. Each device on the network must have a unique address.	0 to 255	1	- - - -	- - - -	- - - -	17017	uint RWE
ip.S1	*Communications* **IP Fixed Subnet Part 1** Set the IP subnet mask for this module.	0 to 255	255	- - - -	- - - -	- - - -	17020	uint RWE
ip.S2	*Communications* **IP Fixed Subnet Part 2** Set the IP subnet mask for this module.	0 to 255	255	- - - -	- - - -	- - - -	17021	uint RWE
ip.S3	*Communications* **IP Fixed Subnet Part 3** Set the IP subnet mask for this module.	0 to 255	0	- - - -	- - - -	- - - -	17022	uint RWE

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RM Access Module • Setup Page

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write *
ip.S4	*Communications* **IP Fixed Subnet Part 4** Set the IP subnet mask for this module.	0 to 255	0	- - - -	- - - -	- - - -	17023	uint RWE
ip.g1	*Communications* **Fixed IP Gateway Part 1**	0 to 255	0	- - - -	- - - -	- - - -	17026	uint RWE
ip.g2	*Communications* **Fixed IP Gateway Part 2**	0 to 255	0	- - - -	- - - -	- - - -	17027	uint RWE
ip.g3	*Communications* **Fixed IP Gateway Part 3**	0 to 255	0	- - - -	- - - -	- - - -	17028	uint RWE
ip.g4	*Communications* **Fixed IP Gateway Part 4**	0 to 255	0	- - - -	- - - -	- - - -	17029	uint RWE
Mb.E	*Communications* **Modbus TCP Enable** Activate Modbus TCP.	no No (59) YES Yes (106)	Yes	- - - -	- - - -	78	17041	uint RWE
EiP.E	*Communications* **EtherNet/IP™ Enable** Activate EtherNet/IP™.	no No (59) YES Yes (106)	Yes	- - - -	- - - -	79	17042	uint RWE
Ad.d	*Communications* **DeviceNet™ Node Address** Set the DeviceNet™ address for this gateway.	0 to 63	63	- - - -	- - - -	83	17052	uint RWE

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RM Access Module • Setup Page

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write *
bAUd bAUd	*Communications* **DeviceNet™ Baud Rate** Set the speed of this gateway's communications to match the speed of the serial network.	125 125 kb 250 250 kb 500 500 kb	125	- - - -	- - - -	84	17053	uint RWE
FC.E FC.E	*Communications* **DeviceNet™ Quick Connect Enable** Allows for immediate communication with the scanner upon power up.	no No (59) YES Yes (106)	No	- - - -	- - - -	- - - -	17054	uint RWE
P.Add P.Add	*Communications* **Profibus DP Address** Set the Profibus address for this gateway.	0 to 126	126	- - - -	- - - -	- - - -	17060	uint RWE
A.Loc A.Loc	*Communications* **Profibus Address Lock** When set to yes the Profibus address cannot be changed using software. Can be changed from the optional RUI.	no No (59) YES Yes (106)	No	- - - -	- - - -	- - - -	17061	uint RWE
StAt Stat	*Communications* **Profibus DP Status** Current Profibus status.	rEdY Ready (1662) rn9 Running (149)	- - - -	- - - -	- - - -	- - - -	17062	uint R

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

RM Access Module • Setup Page

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write *
C_F C_F	*Communications* **Display Units** Select which scale to use for temperature passed over communications port 2.	F F (30) C C (15)	F	440	0x96 (150) 2 6	81	17050	uint RWE
nU.S nU.S	*Communications* **Non-volatile Save** If set to Yes all values written to the control will be saved in EEPROM after approximately 3 seconds. **Note:** The EEPROM allows for approximately one million writes.	no No (59) YES Yes (106)	Yes	444	0x96 (150) 2 8	82	17051	uint RWE
gtwy SEt **Local Remote Gateway Menu**								
du.En du.En	*Local Remote Gateway (1 to 17)* **Device Enabled** When set to yes the gateway attempts to establish a connection with the specified control.	no No (59) YES Yes (106)	No	452 {offset 20}	0x7C (124) 1 to 11 (17) 2	23	24002	uint RWE
du.St du.St	*Local Remote Gateway (1 to 17)* **Device Status** Indicates whether or not a valid connection is made.	oFF Off (62) on On (63)	- - - -	460 {offset 20}	0x7C (124) 1 to 11 (17) 6	- - - -	24006	uint R
* R: Read, W: Write, E: EEPROM, S: User Set								

RM Access Module • Setup Page								
Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write *
rM.oF M.oF	*Local Remote Gateway (1 to 17)* **Modbus Address Offset** When multiple EZ-ZONE controllers are used over Modbus the value entered allows for parameter differentiation from control to the next.	0 to 65,535	0	454 {offset 20}	0x7C (124) 1 to 11 (17) 3	24	24003	uint RWE
oSt oSt	*Local Remote Gateway (1 to 17)* **CIP Instance Offset** When executing explicit messages with multiple EZ-ZONE controllers the number entered allows for differentiation from control to control.	0 to 255	0	456 {offset 20}	0x7C (124) 1 to 11 (17) 4	25	24004	uint RWE
Ao.nb Ao.nb	*Gateway (1 to 17)* **CIP Implicit Assembly Output Member Quantity** The number entered determines the size of the output (produced) assembly.	0 to 40	- - - -	466 {offset 20}	0x7C (124) 1 to 11 (17) 9	26	24009	uint RWE
* R: Read, W: Write, E: EEPROM, S: User Set								

RM Access Module • Setup Page

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write *
A .nb Ai.nb	*Gateway (1 to 17)* **CIP Implicit Assembly Input Member Quantity** The number entered determines the size of the input (consumed) assembly.	0 to 40	- - - -	468 {offset 20}	0x7C (124) 1 to 11 (17) 0x0A (10)	27	24010	uint RWE
S.oF S.of	*Gateway (1 to 17)* **Profibus DP Slot Offset** Set Profibus instance member offset for this Standard Bus controller.	0 to 254	Instance 1 = 0 Instance 2 = 20 Instance 3 = 40 Instance 4 = 60 Instance 5 = 80 Instance 6 = 100 Instance 7 = 120 Instance 8 = 140 Instance 9 = 160 Instance 10 = 180 Instance 11 = 200 Instance 12 = 220 Instance 13 = 240 Instance 14 = 0 Instance 15 = 0 Instance 16 = 0 Instance 17 = 0	- - - -	0x7C (124) 1 to 11 (17) 0x0B (11)	28	24011	uint RWE

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

RM Access Module • Setup Page

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write *
rtC SEt **Real Time Clock Menu**								
hoUr hoUr	*Real Time Clock* **Hours** Set hours for the Real Time Clock (0 = midnight)	0 to 23	- - - -	1428	0x88 (136) 1 3	35	36003	uint RW
mIn Min	*Real Time Clock* **Minutes** Set minutes for the Real Time Clock.	0 to 59	- - - -	1430	0x88 (136) 1 4	36	36004	uint RW
mon Mon	*Real Time Clock* **Month** Set current month for the Real Time Clock.	1 to 12	- - - -	1434	0x88 (136) 1 6	38	36006	uint RW
dAtE dAtE	*Real Time Clock* **Date** Set the current date for the Real Time Clock.	1 to 31	- - - -	1436	0x88 (136) 1 7	39	36010	uint RW
YEAr YEAr	*Real Time Clock* **Year** Set the current year for the Real Time Clock.	2008 to 2100	- - - -	1438	0x88 (136) 1 8	40	36008	uint RW
doUJ doW	*Real Time Clock* **Day of Week** Set the current day of the week for the Real Time Clock.	Sun Sunday (1565) mon Monday (1559) tuE Tuesday (1560) UdEd Wednesday (1561) thUr Thursday (1562) Fr i Friday (1563) SAt Saturday (1564)	- - - -	1426	0x88 (136) 1 2	34	36007	uint RW
* R: Read, W: Write, E: EEPROM, S: User Set								

RM Access Module • Setup Page								
Display	**Parameter name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Profibus Index**	**Parameter ID**	**Data Type & Read/ Write ***
t.For t.For	*Real Time Clock* **Time Format** Use Time Format to select whether time of day is indicated in the data log in hours minutes and seconds HH:MM:SS or simply hours and minutes HH:MM.	HH:MM (1629) HH:MM:SS (1630)	HH:MM	1444	0x88 (136) 1 0x0B (11)	43	36011	uint RW
d.For d.For	*Real Time Clock* **Date Format** Use Date Format to select whether dates in the data log are recorded with month before day MM/DD/YYYY or day before month DD/MM/YYYY.	MM/DD/YYYY (1631) DD/MM/YYYY (1632)	MM/DD/YYYY	1446	0x88 (136) 1 0x0C (12)	44	36012	uint RW
* R: Read, W: Write, E: EEPROM, S: User Set								

RM Access Module • Setup Page

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write *
Pro SEt **Profile Menu**								
Pot 1 Poti	*Profile Menu* **Power Off Time** Use Power Off Time to set the maximum length of a power interruption in seconds after which profiles should be allowed to continue running. If the power is out for longer than this setting, profiles will be terminated when the power is restored. Set this to zero (0) if profiles should terminate regardless of how long the power has been off.	0 to 9,999	0	- - - -	0x7A (122) 1 0x49 (73)	18	22073	uint RWE
dLo9 SEt **Data Logging Menu**								
PErd PErd	*Data Logging* **Period** Use Period to set the time in seconds between when records are entered in the data log.	1 to 3,600	10	1450	0x89 (137) 1 1	49	37001	uint RWES
* R: Read, W: Write, E: EEPROM, S: User Set								

RM Access Module • Setup Page

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write *
F.Act F.Act]	*Data Logging* **Full Action** Use Full Action to select whether the data logging function should Stop or begin to Overwrite old data once the data log memory is full.	StoP Stop (1638) our t Overwrite (1639)	Stop	1454	0x89 (137) 1 3	51	37003	uint RWES
SFn.A SFn.A	*Data Logging* **Source Function A** Select a function with a digital output that will be used to start and stop data logging.	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) LgC Logic (239) tMr Timer (244) uAr Variable (245)	Variable	1460	0x89 (137) 1 6	- - - -	37006	uint RWES
S i.A Si.A	*Data Logging* **Source Instance A** Set the instance of the function selected above.	1 to 24	1	1462	0x89 (137) 1 7	- - - -	37007	uint RWES

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

RM Access Module • Setup Page								
Display	**Parameter name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Profibus Index**	**Parameter ID**	**Data Type & Read/ Write ***
52.A SZ.A	*Data Logging* **Source Zone A** Set the zone of the function selected above. Set Source Zone A to zero to select a source in the Access Module such as Variable 1.	0 to 16	0	1464	0x89 (137) 1 8	- - - -	37008	uint RWES
* R: Read, W: Write, E: EEPROM, S: User Set								

RM Access Module • Setup Page

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write *
L9Pt SEt **Log Point Menu**								
SFnA SFn.A	*Log Point (1 to 200)* **Source Function A** Select the source of the point to be logged.	nonE None (61) AI Analog Input, (142) CUrr Current (22) C.Pr Cool Power (161) h.Pr Heat Power (160) PUdr Power (73) Lnr Linearization (238) MAtH Math (240) Pu Process Value (241) SP.C Set Point Closed (242) SP.o Set Point Open (243) uAr Variable (245) 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.9 Profile Event Out G (249) Ent.h Profile Event Out H (250) FUn Function Key (1001) LIM 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)	None	1470 [offset 16]	0x8B (139) 1 to C8 (200) 1	66	39001	uint RWES

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

RM Access Module • Setup Page

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write *
Si.A	*Log Point (1 to 200)* **Source Instance A** Select the instance of the source identified above.	1 to 24	1	1472 [offset 16]	0x8B (139) 1 to C8 (200) 2	67	39002	uint RWES
SZ.A	*Log Point (1 to 200)* **Source Zone A** Select the zone of the source identified above.	0 to 16	0	1474 [offset 16]	0x8B (139) 1 to C8 (200) 3	68	39003	uint RWES
dEC	*Log Point (1 to 200)* **Display Precision** Use Display Precision to set how many decimal places to log for the selected item.	Src Source (1539) 0 Whole (105) 0.0 Tenths (94) 0.00 Hundredths (40) 0.000 Thousandths (96)	Source	1482 [offset 16]	0x8B (139) 1 to C8 (200) 7	69	39007	uint RWES
No Display	*Log Point (1 to 200)* **Value** Reflects the present value of the logged point.	-1999.000 to 9,999.000	- - - -	1476 [offset 16]	0x8B (139) 1 to C8 (200) 4	- - - -	39004	float R
No Display	*Log Point (1 to 200)* **Error** View reported cause for log point malfunction.	None (61) Open (65) Shorted (127) Measurement Error (149) Bad Calibration Data (139) Ambient Error (9) RTD Error (141) Fail (32) Math Error (1423) Not Sourced (246) Stale (1617)	- - - -	1484 [offset 16]	0x8B (139) 1 to C8 (200) 8	- - - -	39008	uint R

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RM Access Module • Setup Page								
Display	**Parameter name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Profibus Index**	**Parameter ID**	**Data Type & Read/ Write ***
bCUP SEt **Backup Menu**								
SAuE SAvE	*Backup* **Save** Set Save to Now to save the configuration of the other zones (modules) in the backup memory. The setting indicates Off when the save action is completed. It can take between 15 and 45 minutes to save the settings of each module.	oFF Off (62) noUd Now (1646)	Off	1270	0x8A (138) 1 1	58	38001	uint RW
* R: Read, W: Write, E: EEPROM, S: User Set								

RM Access Module • Setup Page

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write *
rESt rEst	*Backup* **Restore** Set Restore to Now to restore the configuration of the other zones (modules) to the settings saved in the backup memory. Select Change to have the configuration feature automatically restore settings whenever a module is replaced with a like (same part number but different serial number) module. The setting indicates Off when the save action is completed. It can take between 15 and 45 minutes to restore the settings of each module. **Note:** During the time it takes to restore the settings the other modules and other features remain active unless turned off by the user. The system may not perform as desired until all the settings are restored.	oFF Off (62) noUJ Now (1646) Chg Change (1647)	Off	1272	0x8A (138) 1 2	59	38002	uint RW

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RM Access Module • Setup Page

Display	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write *
uAr SEt **Variable Menu**								
tYPE tyPE	*Variable* **Data Type** Set the variable's data type.	AnLg Analog (1215) dig Digital (1220)	Analog	1030 [offset 20]	0x66 (102) 1 1	13	2001	uint RWES
Unit Unit	*Variable (1 to 8)* **Units** Set the variable's units. **Note:** Units are always in degrees F when used for temperature	AtP Absolute Temperature (1540) rtP Relative Temperature (1541) PWr Power (73) Pro Process (75) rh Relative Humidity (1538) nonE None (61)	Absolute Temperature	1042 [offset 20]	0x66 (102) 1 to 8 7	- - - -	2007	uint RWES
dig dig	*Variable* **Digital** Set the variable's value.	on On (63) oFF Off (62)	Off	1032 [offset 20]	0x66 (102) 1 2	14	2002	uint RWES
AnLg AnLg	*Variable* **Analog** Set the variable's value.	-1,999.000 to 9,999.000	- - - -	1034 [offset 20]	0x66 (102) 1 3	15	2003	float RWES
No Display	*Variable* **Output Value** Reflects the present value of the logged point..	-999.999 to 9,999.999	- - - -	1036 [offset 16]	0x66 (102) 1 4	- - - -	2004	float R
* R: Read, W: Write, E: EEPROM, S: User Set								

5 Chapter 5: Factory Pages

RMA 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.

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

ULoC
FCty **Security Setting Menu**
- CodE Public Key
- PASS Password

diAG
FCty **Diagnostics Menu**
- Sid Software ID
- SrL Software Release Version
- SPr Software Protoype Version
- SbLd Software Build Number
- Sn Serial Number
- dAtE Date of Manufacture
- iPAC Actual IP Addressing Mode
- iPA1 IP Actual Address Part 1
- iPA2 IP Actual Address Part 2
- iPA3 IP Actual Address Part 3
- iPA4 IP Actual Address Part 4

Access Module • Factory Page

Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write *
LoC FCty **Remote User Interface (RUI) Security Settings**								
LoC.o LoC.o	*RUI Security Setting* **Operations Page** Change the security level of the Operations Page.	1 to 3	2	362	0x67 (103) 1 2	- - - -	3002	uint RWE
PASE PAS.E	*RUI Security Setting* **Password Enable** If set to on, a password is required to change security clearance level or password.	on On (63) oFF Off (62)	Off	- - - -	- - - -	- - - -	3015	uint RWE
rLoC rLoC	*RUI Security Setting* **Read Lock** Set the read security clearance level. The user can access the selected level and all lower levels when using an RUI. If the Write Lockout Security level is higher than the Read Lockout Security, the Read Lockout Security level takes priority.	1 to 5	5	378	0x67 (103) 1 0x0A (10)	- - - -	3010	uint RWE
SLoC SLoC	*RUI Security Setting* **Write Security** Set the write security clearance level. The user can access the selected level and all lower levels when using an RUI. If the Write Lockout Security level is higher than the Read Lockout Security, the Read Lockout Security level takes priority.	0 to 5	5	380	0x67 (103) 1 0x0B (11)	- - - -	3011	uint RWE
* R: Read, W: Write, E: EEPROM, S: User Set								

Access Module • Factory Page								
Display	**Parameter Name Description**	**Range**	**Default**	**Modbus Relative Address**	**CIP Class Instance Attribute hex (dec)**	**Profibus Index**	**Parameter ID**	**Data Type & Read/ Write ***
LoC.L LoC.L	*RUI Security Setting* **Locked Access Level** Determines user level menu visibility when security is enabled. See Features section under Password Security.	1 to 5	5	- - - -	- - - -	- - - -	3016	uint RWE
No Display	*RUI Security Setting* **Locked State** Current level of security	Lock (228) User (1684) Admin (1685)	- - - -	- - - -	- - - -	- - - -	3023	uint R
roLL roLL	*RUI Security Setting* **Rolling Password** If set on, the password changes each time the controller's power is cycled. The Public Key is used to determine the present password changes.	on On (63) oFF Off (62)	Off	- - - -	- - - -	- - - -	3019	uint RWE
PAS.u PAS.u	*RUI Security Setting* **User Password** Set user password - Used to acquire access to menus made available through the Locked Access Level setting.	10 to 999	63	- - - -	- - - -	- - - -	3017	uint RWE
PAS.A PAS.A	*RUI Security Setting* **Administrator Password** Set administrator password - Used to acquire full access to change passwords.	10 to 999	156	- - - -	- - - -	- - - -	3018	uint RWE
* R: Read, W: Write, E: EEPROM, S: User Set								

Access Module • Factory Page

Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write *
ULoC FCty **Remote User Interface (RUI) Security Settings**								
CodE CodE	*RUI Security Setting* **Public Key** The Public Key is used to determine the present password if the password is unknown. If Rolling Password is turned on, this will generate a new random number every time the power is cycled. If Rolling Password is off, a fixed number will be displayed.	Customer Specific	- - - -	- - - -	- - - -	- - - -	3020	uint R
PASS PASS	*RUI Security Setting* **Password** If password is enabled, enter password here to access lock settings or password changes.	-1999 to 9999	0	- - - -	- - - -	- - - -	3022	int RW
diAG FCty **Diagnostics Menu**								
S.id S.id	*Diagnostics Menu* **Software ID**	0 to 2,147,483,647	- - - -	- - - -	0x65 (101) 1 2	- - - -	1002	dint R
S.rL S.rL	*Diagnostics Menu* **Software Release Version**	0 to 2,147,483,647	- - - -	- - - -	0x65 (101) 1 3	- - - -	1003	dint R
S.Pr S.Pr	*Diagnostics Menu* **Software Prototype Version**	0 to 2,147,483,647	- - - -	- - - -	0x65 (101) 1 4	- - - -	1004	dint R
S.bLd S.bLd	*Diagnostics Menu* **Software Build Number** Display the firmware build number.	0 to 2,147,483,647	- - - -	- - - -	0x65 (101) 1 5	- - - -	1005	dint R

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

Access Module • Factory Page

Display	Parameter Name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Parameter ID	Data Type & Read/ Write *
Sn Sn	*Diagnostics Menu* **Serial Number** Display the serial number.	0 to 2,147,483,647	- - - -	- - - -	0x65 (101) 1 7	- - - -	1007	dint R
dAtE dAtE	*Diagnostics Menu* **Date of Manufacture** Display the date code. Format = YYWW	0 to 2,147,483,647	- - - -	- - - -	0x65 (101) 1 8	- - - -	1008	dint R
iP.AC iP.AC	*Diagnostics Menu* **Actual IP Addressing Mode**	nonE None (61) dhCP DHCP (1281) F.Add Fixed Address (1284) FAiL Fail (32)	DHCP	- - - -	- - - -	- - - -	17013	uint RW
iP.A1 iP.A1	*Diagnostics Menu* **IP Actual Address Part 1**	0 to 255	- - - -	- - - -	- - - -	- - - -	17044	uint R
iP.A2 iP.A2	*Diagnostics Menu* **IP Actual Address Part 2**	0 to 255	- - - -	- - - -	- - - -	- - - -	17045	uint R
iP.A3 iP.A3	*Diagnostics Menu* **IP Actual Address Part 3**	0 to 255	- - - -	- - - -	- - - -	- - - -	17046	uint R
iP.A4 iP.A4	*Diagnostics Menu* **IP Actual Address Part 4**	0 to 255	- - - -	- - - -	- - - -	- - - -	17047	uint R
No Display	*Diagnostics Menu* **Hardware ID**	0 to 2147483647	- - - -	0	0x65 (101) 1 1	- - - -	1001	dint R
No Display	*Diagnostics Menu* **Device Status**	OK (138) Fail (32)	- - - -	30	0x65 (101) 1 0x10 (16)	- - - -	1016	uint R
No Display	*Diagnostics Menu* **Device Name**	0 to 32	EZ-ZONE RM	20	0x65 (101) 1 0x0B (11)	- - - -	1011	string RWE

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

6 Chapter 6: RMA Features

Saving and Restoring Settings Using an RUI

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

After you program the controller and verify proper operation, use Save Settings As USr.S (Setup Page, Global Menu) to save the settings into either of two files in a special section of memory.

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.

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.

Using Password Security

It is sometimes desirable to apply a higher level of security when using an RUI with any of the RM modules where a limited number of menus are visible while also not providing access to others without a security password. Without the appropriate password those menus will remain inaccessible. If Password Enabled PASE in the Factory Page under the Lock 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 LoCL 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 LoCL 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

1. Go to the Factory Page by holding down the Infinity key and the Advance key for approximately six seconds.
2. Again push the Advance key until the Password Enabled PASE prompt is visible. Lastly, push either the up or down key to turn it on.

Once Password Enable is turned on, 4 new prompts will appear:

3. LoCL - Locked Access Level (1 to 5) corresponding to the lockout table above.
4. roLL - Rolling Password will change the Customer Code every time power is cycled.
5. PASu, User Password which is needed for a User to acquire access to the control.
6. PASA, 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 Module

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

Note:
The unlock menu will appear only if the Password Enable prompt has been enabled.

1. Acquire either the User Password PASu or the Administrator Password PASA.
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 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 PASu.
   b. If Rolling Password roLL is On, Password PASS equals: (PASu x code) Mod 929 + 70
8. **Administrator**
   a. If Rolling Password roLL is Off, Password PASS equals User Password PASA.
   b. If Rolling Password roLL is On, Password PASS equals: (PASA 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 LoCL.
- 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.

Real Time Clock (RTC)

The RTC is used with the RMC module equipped with the profiling feature and Data Logging (date and time stamp). With a little thought the programmer can use the RTC to synchronize RMC profile engines (using wait-for steps, logic and compare functions)

While executing a profile the application requirements may dictate that if power is lost and then restored that the profile execution automatically terminate or conversely continue where it left off based on how long the power was out. Within the Setup Page under the

Profile Menu a parameter can be found that addresses this need; it is called the "Power Off Time" PoF. This time is defined in seconds and a RTC is required to use this feature. As an example, if the Power Off Time were set to 300 and the power is lost while a profile is executing and then restored before 5 minutes expires, the profile would continue where it was at prior to the loss of power. If the power were to be restored after 300 seconds expires the profile would be terminated.

Data Logging

The RMA module equipped (RMAX-XXX**D**-XXXX)and configured for data logging is capable of recording data points every second to every hour. This setting (Period, PErd) can be found in the Setup Page under the Data Logging Menu. All recording is stored to an SD card on the RMA module where all data points must be from RM modules on the same Inter-module Bus network. The RMA module equipped with this feature is shipped with a 2 GB card. If a user chose to use one of their own there is no limitation with regards to the size of the SD card that can be used.

Along with the setting for the frequency of the writing activity there is another setting that the user will set (Full Action, FAct) that determines how the RMA module will react when the card becomes full, as the name implies. When free memory is less than 1 MB, the card is considered to be full. This setting can also be found on the Setup Page under the Data Logging Menu. There are two actions that can be taken when this condition exists:

1. Stop
2. Overwrite - then delete oldest files first until an additional 1.5 MB is available.

The file name and folder structure as it is stored to the SD card is defined in the RMA firmware and can be seen below. When the file number needs to increment, the current file shall be closed and the new file will be opened. Conditions that can cause the file number to increment:

- RMA module powers up
- RTC date changes
- File size reaches the maximum size of 1 MB
- Number of lines exceeds maximum number of lines supported by Microsoft Excel
- Defined log points are changed
- USB mounts and dismounts the SD card

All files saved to the SD card are in comma delimited format where they can be easily opened using any software package capable of reading *.csv files, such as Microsoft® Excel. After data logging is complete the SD card can be read via an SD card reader or from the RMA module directly. To connect the PC directly to the RMA module simply connect a mini-USB cable to the RMA and a type B (for most computers) USB cable to the PC.

	A	B	C	D	E
1	Date	Time	8-Analog Input1(°F)	8-Analog Input2(°F)	8-Analog Input3(°F)
2	10/21/2010	14:15:11	80.1	81.73	82.29
3	10/21/2010	14:15:12	80.14	81.73	82.29
4	10/21/2010	14:15:13	80.1	81.74	82.29
5	10/21/2010	14:15:14	80.07	81.72	82.27
6	10/21/2010	14:15:15	80.05	81.72	82.29
7	10/21/2010	14:15:16	80.1	81.71	82.29
8	10/21/2010	14:15:17	80.09	81.7	82.3
9	10/21/2010	14:15:19	80.05	81.71	82.3
10	10/21/2010	14:15:20	80.13	81.71	82.29

Note:

All data logging will discontinue after a USB cable is connected from the PC to the RMA module.

Once connected to the SD card, drill down to the data files and simply open it up using your software of choice to see the recorded data. The data below was recorded from an RMC module (zone 8). The date and time formats can be changed (Setup Menu, RTC Menu) along with the precision of the data (Setup Page, Log Point Menu).

Backup

The RMA module equipped with limited backup capabilities (RMAX-XXX**A**-XXXX) can backup no more than 4 RM modules. It will do so from the lowest to highest zone number. Because this option stores the backup information for these modules in the on-board memory of the RMA itself, there are some dependencies that must be considered. All four modules will be backed up if no more than 2 modules has profiling capabilities. If there are more than 2 modules with profiling, the last module will not be backed up. If all 4 have profiling just 2 out of the 4 modules will be backed up. If there is a need to backup all modules the unlimited version must be used. The unlimited version (RMAX-XXX**[B,Y,D]**-XXXX) stores all backup information to the SD card for all RM modules on the Standard Bus network from the lowest to highest zone number.

Note:
While performing a backup if the SD card runs out of memory the backup will occur on zones up to the last zone that fit on the SD Card. For this reason, it would make sense to perform a backup of all RM modules prior to data logging.

Note:
Only parameters associated with a prompt are saved and restored, the same set available through EZ-ZONE Configurator, not User Set 1 or 2.

Note:
Assemblies for any of the RM modules are not backed up.

Restore

If the user sets Restore to Now, all modules that had been previously backed up will be restored from the lowest zone to the highest assuming zone address and the part numbers are the same.

If the user sets Restore to Change, the RMA will restore all modules with a serial number change. For this to occur the zone address and part numbers for the swapped out modules must be identical to those that had been previously backed up.

Software Configuration

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

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

Note:

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

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

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.

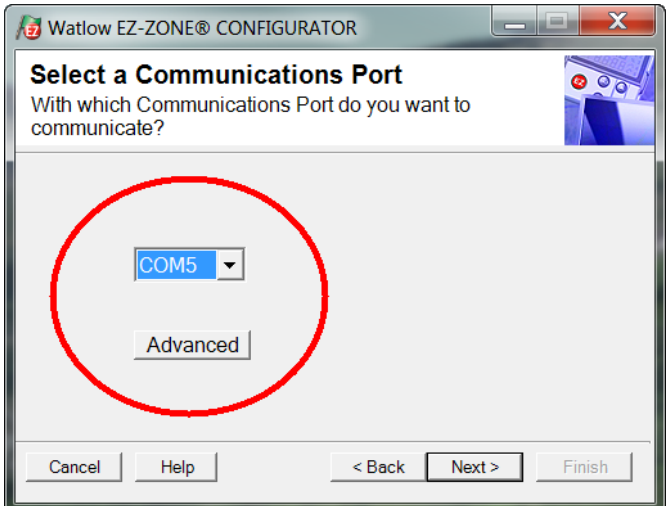
The first screen that will appear is shown below.

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

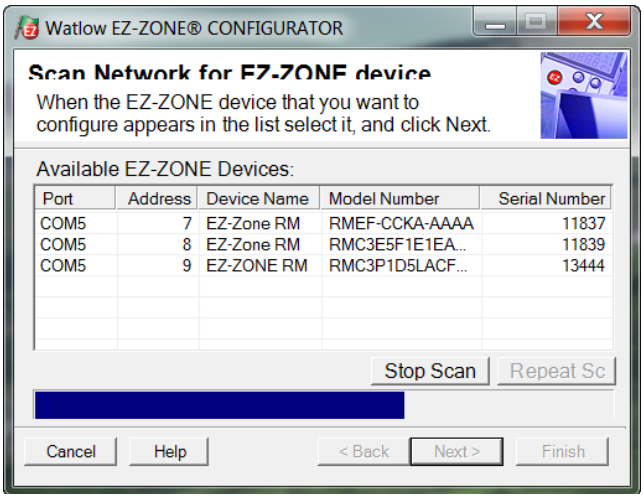
Note:

When establishing communications from PC to the RMA 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.

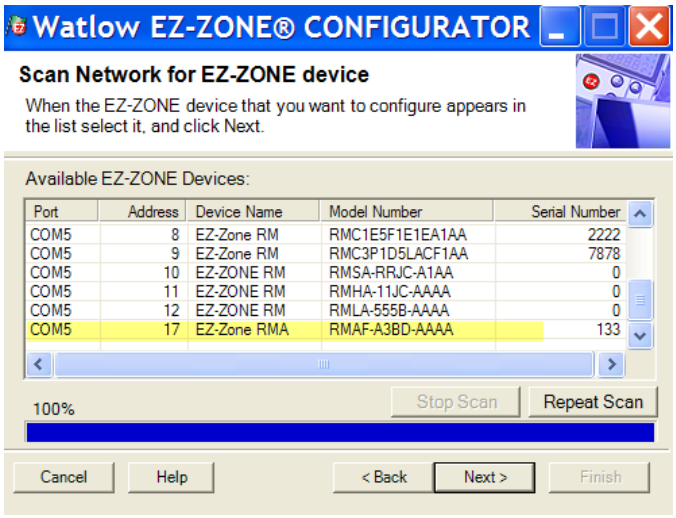
As can be seen in the above screen shot the software provides the user with the option of downloading a previously saved configuration as well as the ability to create a configuration off-line to download later. The screen shots that follow will take the user on-line.
After clicking the next button above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



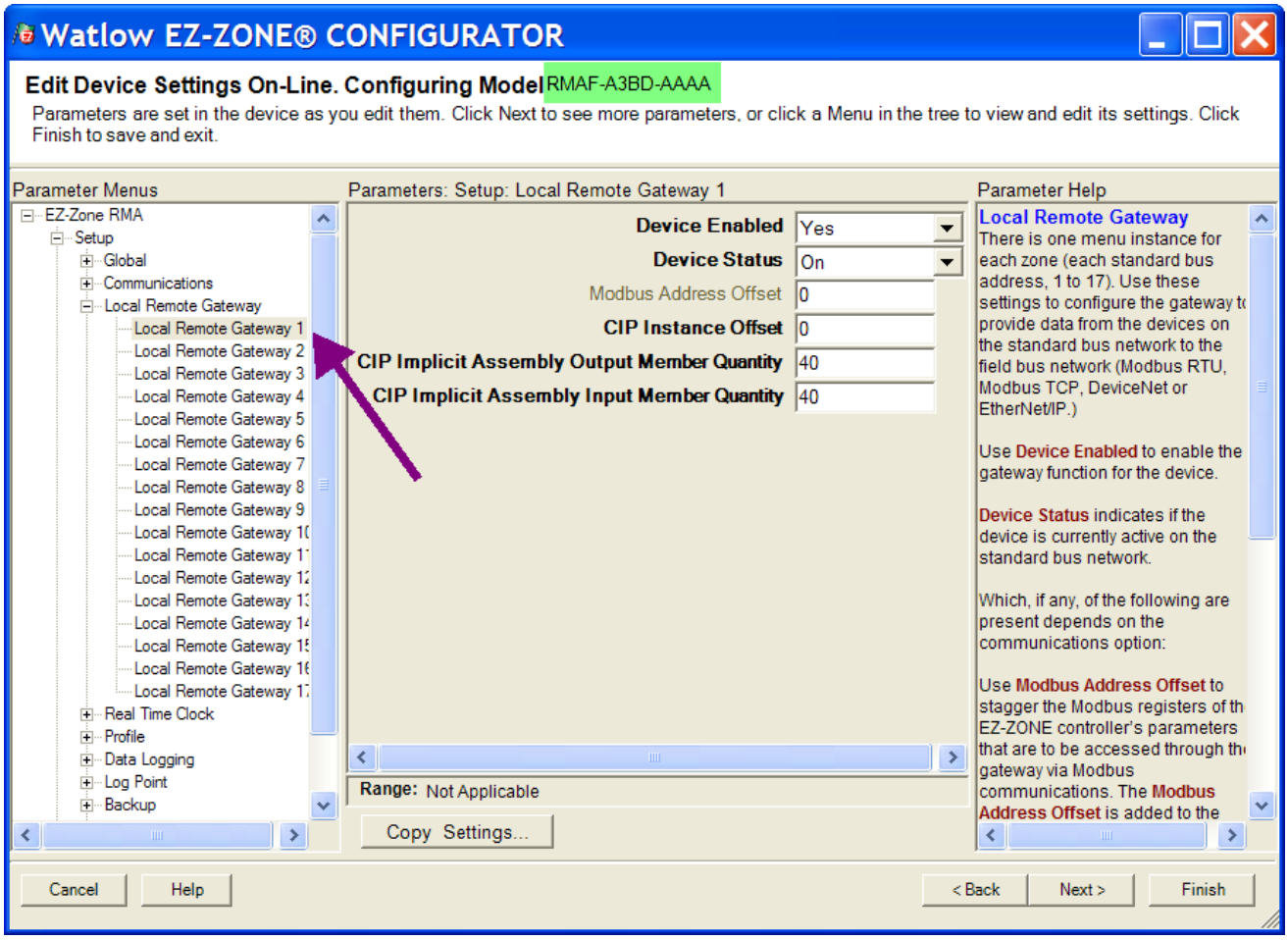
The available options allow the user to select "Try them all" or to use a specific known communications port. After installation of your converter if you are not sure which communications port was allocated select "Try them all" and then click next. The screen to follow shows that the software is scanning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



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



In the previous screen shot the RMA 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 next screen appears below.



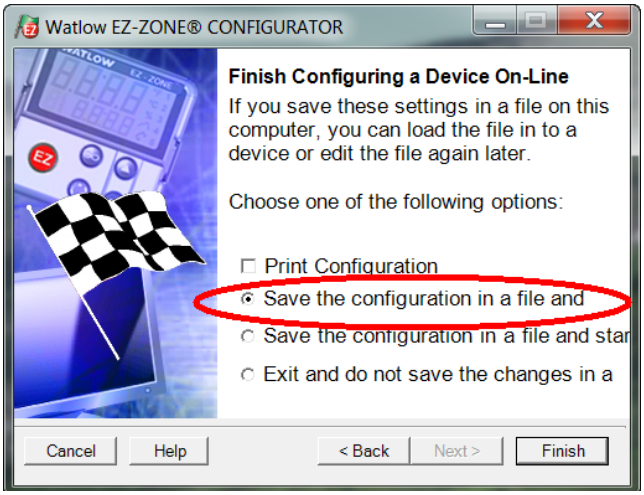
In the screen shot above notice that the device part number is clearly displayed at the top of the page (green highlight added for emphasis). When multiple EZ-ZONE devices are on the network it is important that the part number be noted prior to configuring so as to avoid making unwanted configuration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

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

- Setup
- Operations
- Factory

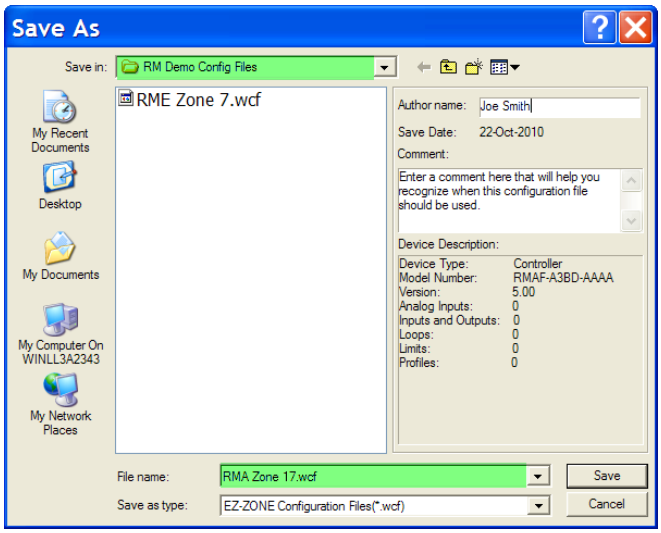
Navigating from one menu to the next is easy and clearly visible. Simply slide the scroll bar up or down to display the menu and parameter of choice. As an alternative, clicking on the negative symbol next to Setup will collapse the Setup Menu where the Operations Menu will appear next and perhaps deliver more clarity for the area of focus by not displaying unwanted menus and parameters. Once the focus is brought to an individual parameter (single click of mouse) as is the case for Local Remote Gateway 1 in the left column, all that can be setup related to that parameter will appear in the center column. The grayed out field in the center column simply means that those parameters do not apply. In this particular case, Modbus TCP Enable has been set to No under the Communications Menu, therefore, it is not possible to define the Modbus Address Offset. To speed up the process of configuration notice that at the bottom of the center column there is an option to copy settings. If Gateway 1, 2 and 3 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 RMA 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:

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

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

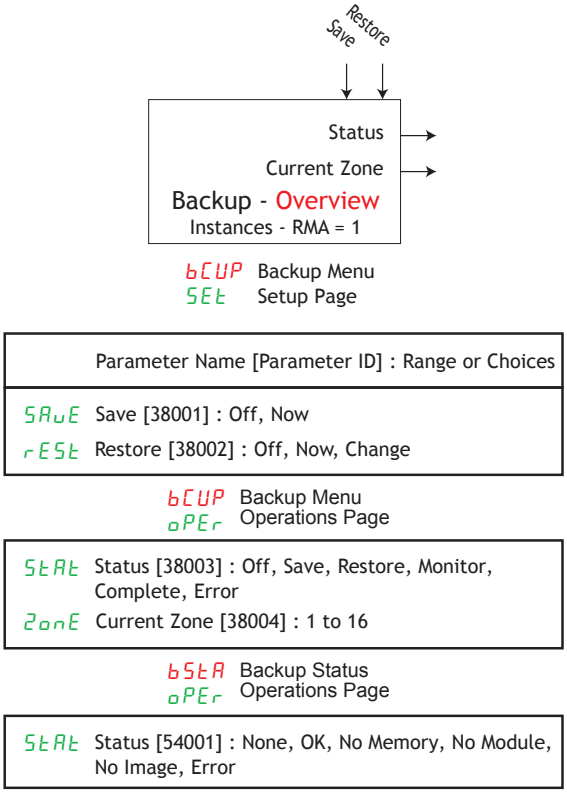
Function Block Descriptions

Each of the next several pages graphically shows each of the RMA 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 Ethernet IP Address Mode is set to DHCP (where a DHCP host supplies the IP address) all fields for the IP address will appear gray.

Backup / Restore Function

Restores configuration settings into changed modules based on serial number change. Will not restore modules having different hardware configurations. Ensure Standard Bus address is set to match replaced module before restoring settings.

There is one Backup Status instance in the Operations Page for each module on the standard bus network.



Communications

Ethernet

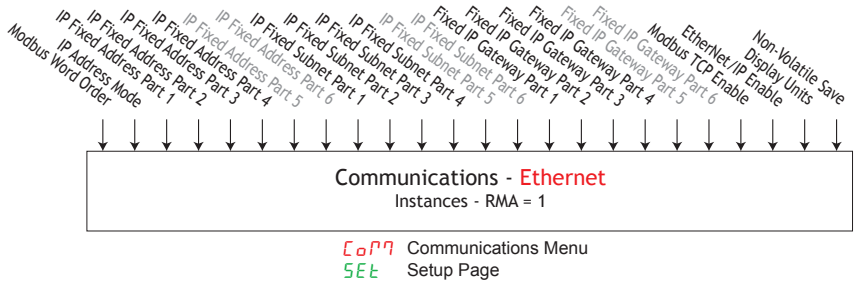
Configure the Ethernet communication protocol and settings using these parameters.

- When selecting fixed IP, power must be cycled to the controller before the chosen IP address is in effect.
- Use IP Address Mode to select how this device gets its IP address:
  - DHCP, assigned automatically when a DHCP server is available on the network
  - Fixed Address, assigned by a user entering the IP Fixed Address, IP Fixed Subnet and Fixed IP Gateway settings.

Note:

The first four parts of the IP addresses are used by IP version 4.

- Use Modbus TCP Enable to turn Modbus TCP on or off.
- Use Ethernet/IP Enable to turn EtherNet/IP on or off.
- To view the Actual IP Address after startup, navigate to Factory Page and then to the Diagnostic menu. Once there push the down button to view iP.A1, iP.A2, iP.A3 and iP.A4.



CoMM Communications Menu
SEt Setup Page

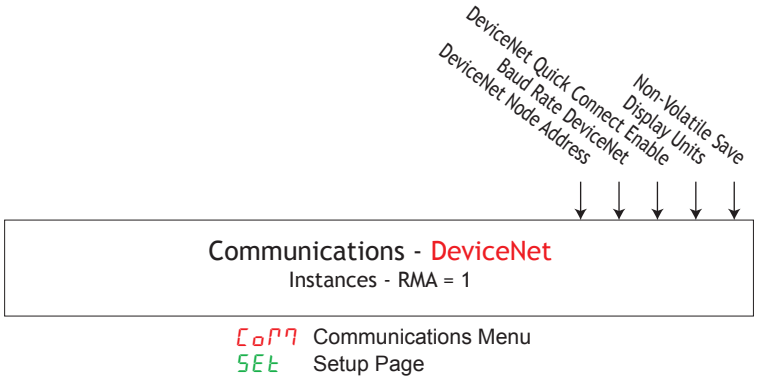
Parameter Name [Parameter ID] : Range or Choices	
MMbL	Modbus Word Order [17043] : Word Low High, Word High Low
iP.MM	IP Address Mode [17012] : DHCP, Fixed IP Address
iP.F1	IP Fixed Address Part 1 [17014] : 0 to 255
iP.F2	IP Fixed Address Part 2 [17015] : 0 to 255
iP.F3	IP Fixed Address Part 3 [17016] : 0 to 255
iP.F4	IP Fixed Address Part 4 [17017] : 0 to 255
iP.F5	IP Fixed Address Part 5 [17018] : 0 to 255
iP.F6	IP Fixed Address Part 6 [17019] : 0 to 255
iP.S1	IP Fixed Address Part 1 [17020] : 0 to 255
iP.S2	IP Fixed Address Part 2 [17021] : 0 to 255
iP.S3	IP Fixed Address Part 3 [17022] : 0 to 255
iP.S4	IP Fixed Address Part 4 [17023] : 0 to 255
iP.S5	IP Fixed Address Part 5 [17024] : 0 to 255
iP.S6	IP Fixed Address Part 6 [17025] : 0 to 255
iP.g1	Fixed IP Gateway Part 1 [17026] : 0 to 255
iP.g2	Fixed IP Gateway Part 2 [17027] : 0 to 255
iP.g3	Fixed IP Gateway Part 3 [17028] : 0 to 255
iP.g4	Fixed IP Gateway Part 4 [17029] : 0 to 255
iP.g5	Fixed IP Gateway Part 5 [17030] : 0 to 255
iP.g6	Fixed IP Gateway Part 6 [17031] : 0 to 255
MMbE	Modbus TCP Enable [17041] : No, Yes
E iPE	EtherNet/IP Enable [17042] : No, Yes
C_F	Display Units [17050] : F, C
nuS	Non-Volatile Save [17051] : No, Yes

Communications (cont.)

DeviceNet

Configure the DeviceNet communication settings using these parameters.

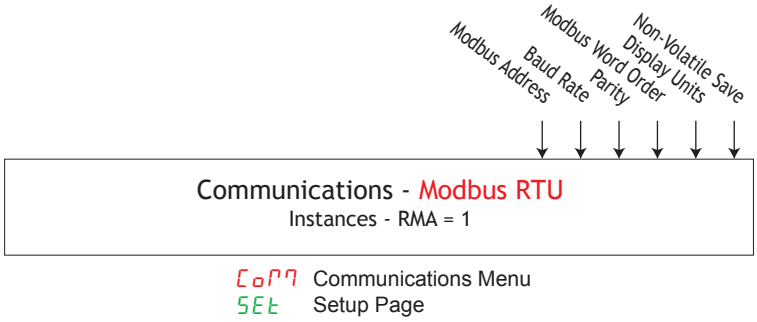
- Use Device Net Node Address to set a unique address for this device
- Use DeviceNet Baud Rate to select the communications speed of the network
- Use DeviceNet Quick Connect Enable to allow this device to immediately communicate with the scanner upon power up



	Parameter Name [Parameter ID] : Range or Choices
Add	DeviceNet Node Address [17052] : 0 to 63
bAUd	DeviceNet Baud Rate [17053] : 125K, 250K, 500K
FCE	DeviceNet Quick Connect Enable [17054] : No, Yes
C_F	Display Units [17050] : F, C
nVS	Non-Volatile Save [17051] : No, Yes

Modbus® RTU

- Configure the Modbus RTU serial communication settings using these parameters.



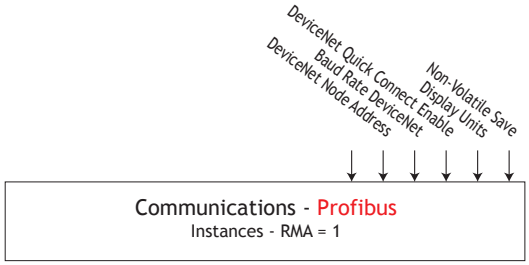
	Parameter Name [Parameter ID] : Range or Choices
AdrM	Modbus Address [17007] : 1 to 247
bAUd	Baud Rate [17002] : 19600, 19200, 38400
PAr	Parity [17003] : None, Even, Odd
MWhL	Modbus Word Order [17043] : Word Low High, Word High Low
C_F	Display Units [17050] : F, C
nVS	Non-Volatile Save [17051] : No, Yes

Communications (cont.)

Profibus

Configure the DeviceNet communication settings using these parameters.

- Use Address to set and read the address to be used on a Profibus network. Address changes are not accepted when the Status is Running.
- Set Address Lock to Off to allow changes to the Profibus Address to be made via Profibus communications. Set it to On to prevent the address from being changed via Profibus communications.
- Status indicates Ready when it is possible to establish communications and Running when communications has been established on a Profibus network.



CoMM Communications Menu
SEt Setup Page

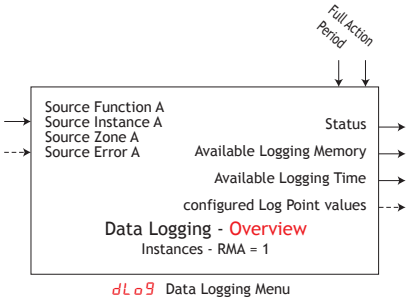
	Parameter Name [Parameter ID] : Range or Choices
PAdd	Profibus Address [17060] : 0 to 126
ALoc	Address Lock [17061] : No, Yes
StAt	Status [17062] : Ready, Not Ready
C_F	Display Units [17050] : F, C
nVS	Non-Volatile Save [17051] : No, Yes

Data Logging

Use Data Logging to record values from various RM modules. Modules that are on a split rail must have terminals CX, CW and CY connected for data logging to function. Source Function A activates logging.

The Data Logging Menu of the Operations Page provides detail on available storage and current status. See Log Points Menu for establishing the parameters to log.

- Specify the frequency of data logging using the Period parameter.
- Specify what the module should do when the card is full using the Full Action parameter.
- Data logs are stored on the SD micro memory card. Retrieve files using a USB cable or by removing and reading the card on a PC. Data is stored in a CSV (comma separated values) format. Do not leave a USB cable connected to a PC as that prevents data from being written to the card.



dLog Data Logging Menu
SEt Setup Page

	Parameter Name [Parameter ID] : Range or Choices
PErd	Period [37001] : 1 to 3,600 seconds
FAct	Full Action [37003] : Stop, Overwrite
SFnA	Source Function A [37006] : None, Alarm, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Logic, Timer, Variable
S iA	Source Instance A [37007] : 1 to 24
S2A	Source Zone A [37008] : 0 to 16

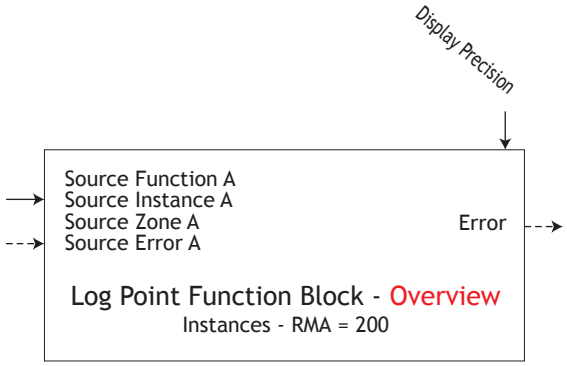
dLog Data Logging Menu
oPEr Operations Page

StAt	Status [37002] : OK, No Memory, Paused
AMnE	Available Logging Memory [37004] : 0 to 9,999 Megabytes
At i	Available Logging Time [37005] : 0 to 9,999 hours

Data Logging (cont.)

Assign data points to log using Log Point Function Block. Use Data Logging Function Block to start and stop data logging to memory.

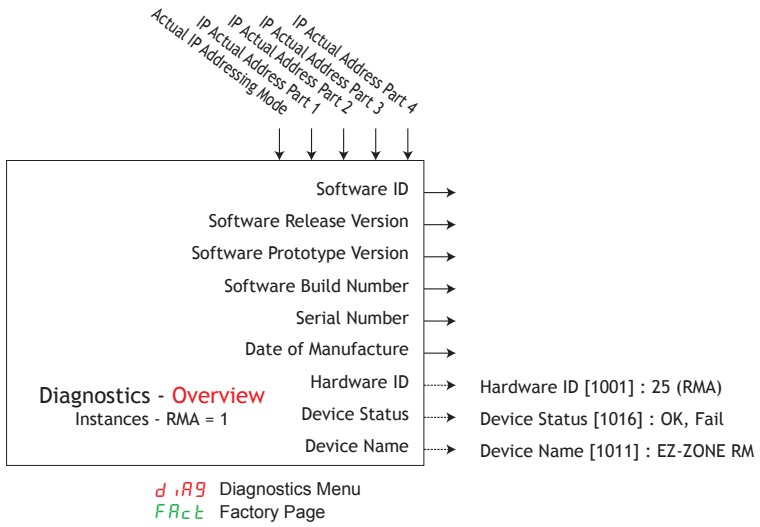
- File stored on SD card is comma separated values format. If data point is not accessible, data point is recorded as 'stale'.
- Error [39008] : None, Open, Shorted, Measurement Error, Bad Cal Data, Ambient Error, RTD Fail, Math Error, Not Sourced, Stale



dLog Data Logging Menu
SEt Setup Page

	Parameter Name [Parameter ID] : Range or Choices
SFnA	Source Function A [39001] : None, Analog Input, Current, Cool Power, Heat Power, Power, Linearization, Math, Process Value, Set Point Closed, Set Point Open, Variable, Alarm, Compare, Counter, Digital I/O, Profile Event Out A to H, Function Key, Limit, Logic, Special Function Output 1 to 4, Timer
S iA	Source Instance A [39002] : 1 to 24
S2A	Source Zone A [39003] : 0 to 16
PErd	Display Precision [39007] : Source, Whole, Tenths, Hundredths, Thousandths

Diagnostics Function



	Parameter Name [Parameter ID] : Range or Choices
S.id	Software ID [1002] : 0, 1, 2, ...
S.rL	Software Release Version [1003] : 1.0, 2.0, 3.0, ...
S.Pr	Software Prototype Version [1004] :
S.bLd	Software Build Number [1005] :
Sn	Serial Number [1007] : xxxxxx
dAtE	Date of Manufacture [1008] : YWW format
iP.AC	Actual IP Addressing Mode [17013] : None, Fixed IP Address, DHCP, Fail
iP.A1	IP Actual Address Part 1 [17044] : xxx
iP.A2	IP Actual Address Part 2 [17045] : xxx
iP.A3	IP Actual Address Part 3 [17046] : xxx
iP.A4	IP Actual Address Part 4 [17047] : xxx

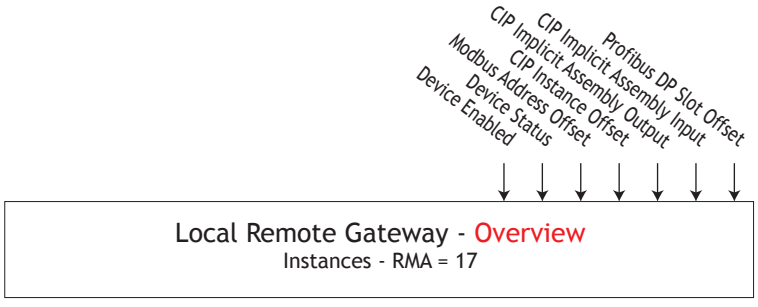
Gateway Function

There is one menu instance for each zone (each standard bus address, 1 to 17). Use these settings to configure each gateway to provide data from the devices on the Standard Bus network to the fieldbus network (Modbus RTU, Modbus TCP, DeviceNet, EtherNet/IP or Profibus DP).

- Ensure that only those gateways that have a corresponding module are enabled. If data is not required from a particular module, field bus addressing space may be conserved by leaving that gateway disabled.
- Each module must have a unique Standard Bus address. Use the button on the front of each module to set a unique address. We suggest that the RMA remain at address '17' or 17. If changed, ensure it is the highest address in the system.

Note:

If it is desired to communicate to the internal registers of the RMA, enable Local Remote Gateway with same Standard Bus address as the RMA module.



gtwy Local Remote Gateway Menu
SEt Setup Page

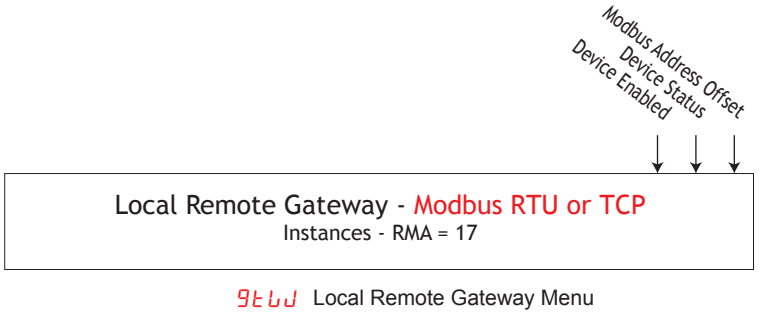
	Parameter Name [Parameter ID] : Range or Choices
duEn	Device Enabled [24002] : No, Yes
duSt	Device Status [24006] : Off, On
mAoF	Modbus Address Offset [24003] : 0 to 65,535
oSt	CIP Instance Offset [24004] : 0 to 255
Aonb	CIP Implicit Assembly Output Member Quantity [24009] : 0 to 40
A inb	CIP Implicit Assembly Input Member Quantity [24010] : 0 to 40
SoF	Profibus DP Slot Offset [24011] : 0 to 254

Gateway (cont.)

Modbus® RTU or TCP

There is one menu instance for each zone (each Standard Bus address, 1 to 17). Use these settings to configure the gateway to provide data from the devices on the Standard Bus network to the Modbus RTU network.

- Use Device Enabled to enable the gateway function for the device.
- Device Status indicates if the device is currently active on the Standard Bus network.
- Use Modbus Address Offset to stagger the Modbus registers of the EZ-ZONE controller's parameters that are to be accessed through the gateway via Modbus communications. The purpose of the offset is to divide the linear address space for Modbus which ranges from 0 to 65,535 into groups allocated to each module. The range for each module must be large enough to reach the highest register required. As an example, Gateway 1 has an offset of 0 and Gateway 2 has an offset of 10,000. Registers 0 to 9,999 can be accessed in module 1. Reading register 10,000 will retrieve register 0 of module 2. The Modbus Address Offset is added to the Modbus address of each parameter in the EZ-ZONE controller at this Standard Bus address. Use a large enough value to shift this controller's parameters above the ones you need to access in devices with lower zone numbers on the Standard Bus network.



9tWJ Local Remote Gateway Menu
SEt Setup Page

Parameter Name [Parameter ID] : Range or Choices	
duEn	Device Enabled [24002] : No, Yes
duSt	Device Status [24006] : Off, On
rMoF	Modbus Address Offset [24003] : 0 to 65,535

Gateway (cont.)

CIP (EtherNet/IP and DeviceNet)

There is one menu instance for each zone (each Standard Bus address, 1 to 17). Use these settings to configure the gateway to provide data from the devices on the Standard Bus network to the fieldbus network (DeviceNet or EtherNet/IP).

- Use Device Enabled to enable the gateway function for the device.
- Device Status indicates if the device is currently active on the Standard Bus network.
- CIP Instance Offset is used for explicit messages only. Use CIP Instance Offset to stagger the CIP instances of the EZ-ZONE controller's parameters that are to be accessed through the gateway via DeviceNet or EtherNet/IP. The CIP Instance Offset is added to the CIP Instance of each parameter in the EZ-ZONE controller at this Standard Bus address. Use a large enough value to shift this controller's parameters above the ones you need to access in devices with lower zone numbers on the Standard Bus network.
- CIP Implicit Assembly Input/Output Member Quantity defines the size for sending/receiving data implicitly to/from a PLC. The RMs output is the PLC's input. The RM's input is the PLC's output. There will be one additional member sent called Device Status in addition to the quantity specified by the RM Output Member Quantity. There is only one 32-bit Device Status word sent per system (not one for each Local Remote Gateway).

gtwy Local Remote Gateway Menu
SEt Setup Page

Parameter Name [Parameter ID] : Range or Choices	
duEn	Device Enabled [24002] : No, Yes
duSt	Device Status [24006] : Off, On
oSt	CIP Instance Offset [24004] : 0 to 255
Aonb	CIP Implicit Assembly Output Member Quantity [24009] : 0 to 40
Ainb	CIP Implicit Assembly Input Member Quantity [24010] : 0 to 40

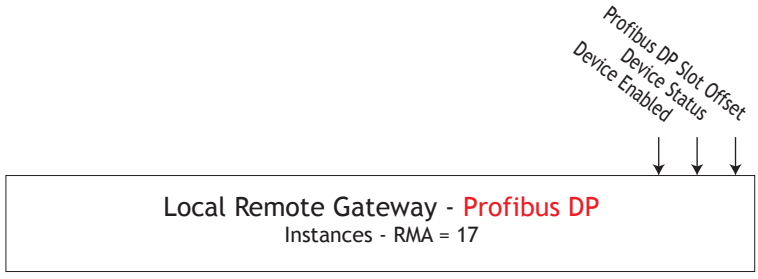
Gateway (cont.)

Profibus

There is one menu instance for each zone (each Standard Bus address, 1 to 17). Use these settings to configure the gateway to provide data from the devices on the Standard Bus network to the Profibus DP network.

- Use Device Enabled to enable the gateway function for the device.
- Device Status indicates if the device is currently active on the Standard Bus network.
- Use Slot Offset to stagger the addresses of parameters in EZ-ZONE controllers accessed through the gateway via acyclic (DP-V1) Profibus communications. A Profibus master accesses parameters in an EZ-ZONE controller using an address consisting of two parts: Slot and Index. The Index for each accessible parameter is listed in the EZ-ZONE controller's User's Manual. The Slot is determined by the Slot Offset and the Instance of the parameter to be read or written.

For example, The Index for Alarm 1 High Set Point found in the user's guide is 19. To access this parameter in a controller with its Slot Offset set to 10, the address is Slot 10 and Index 19. To address the next alarm's high set point, Alarm 2 High Set Point in the same controller, use the next Slot, 11 and the same Index, 19. The Slot Offset for the first controller is typically set to zero (0). The Slot Offset set for each subsequent controller determines the number of parameter instances that can be accessed in the previous controllers configured in the gateway. Use a large enough offset to allow unique slot numbers for all the instances of the parameters you want to access in the controllers with lower zone numbers on the Standard Bus network.

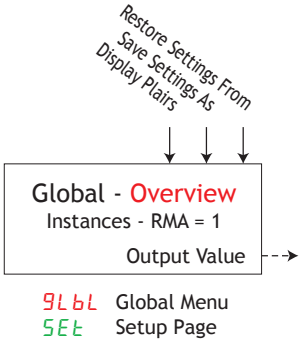


gtwy Local Remote Gateway Menu
SEt Setup Page

Parameter Name [Parameter ID] : Range or Choices	
duEn	Device Enabled [24002] : No, Yes
duSt	Device Status [24006] : Off, On
SoF	Profibus DP Slot Offset [24011] : 0 to 254

Global Function

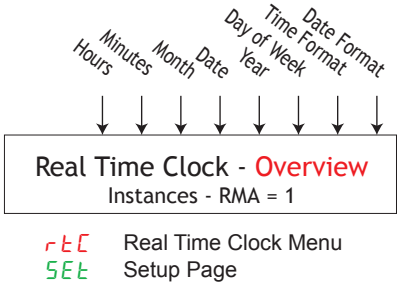
Use the global menu to specify display pairs when using an RUI as well as saving user settings or restoring a saved set. These settings only affect the RMA module.



	Parameter Name [Parameter ID] : Range or Choices
dPrS	Display Pairs [3028] : 1 to 10
USr.S	Save Settings As [1014] : None, User Set 1, User Set 2
USr.r	Restore Settings From [1013] : None, User Set 1, User Set 1, Factory

Real Time Clock Function

This option allows profiles to be started based on a time or date. Profiles will resume upon power loss. It also allows data logging to include time and date stamps.



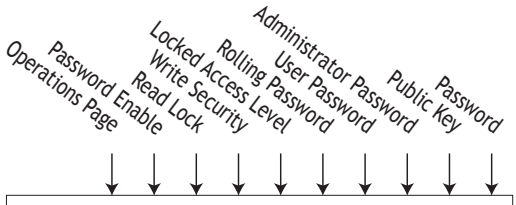
	Parameter Name [Parameter ID] : Range or Choices
hoUr	Hour [36003] : 0 to 23
MI in	Minutes [36004] : 0 to 59
MOn	Month [36006] : 1 to 12
dAtE	Date [36010] : 1 to 31
YEAr	Year [36008] : 2008 to 2100
dOWd	Day of Week [36007] : Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday
t.For	Time Format [36011] : HH:MM, HH:MM:SS
d.For	Date Format [36012] : MM/DD/YYYY, DD/MM/YYYY

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.

Note:

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



LoC Lock Menu
FAct Factory Page

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

ULoC Unlock Menu
FAct Factory Page

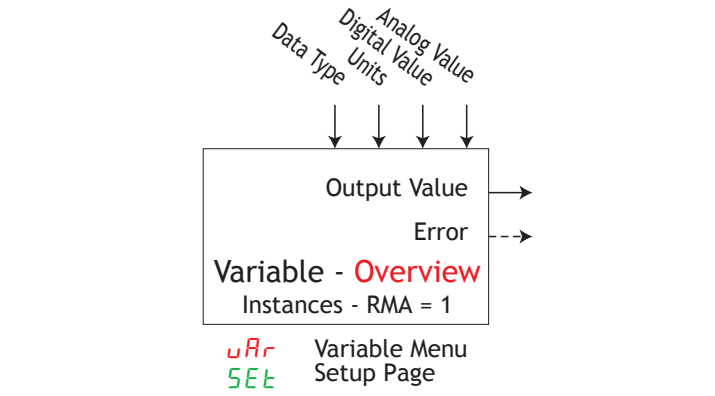
CodE	Public Key [3020] : 0 to 9999
PASS	Password [3022] : 10 to 999

Variable Function

This function simply passes the stored value to its output.

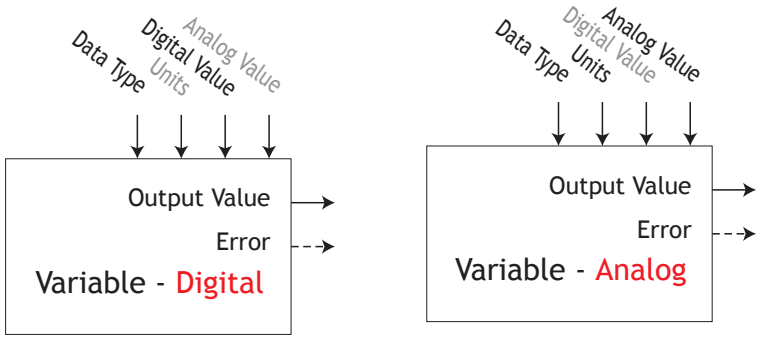
A variable function block is used to store a user supplied value and provide a source input to another function block with that value. As an example, you could use a variable function value as one input to a compare function. The other input to the compare function would determine the output value based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

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



uAr SEt Variable Menu Setup Page

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



7 Chapter 7: RMA Communications

EZ-ZONE RMA & Communications

With the introduction of the first Programmable Logic Controllers (PLC's) in the early to mid 1970's it quickly became apparent that there was a need to communicate between one PLC and another, and then on a wider scale, between PLC's and other computers within the company infrastructure. Some of those needs involved applications with interlinking processes, such as batch processes or assembly lines utilizing multiple controls that required better synchronization and control.

Over time, the scope of the requirements for industrial communications broadened and became better defined, with specific needs being addressed. Those requirements and specifications centered on collecting data, configuring controls, and controlling a process.

Protocols

The Protocol describes how to exchange data. Due to the volume of traffic (limited bandwidth) and sensitivity to disturbances on the network the protocol will define the number of bits in a packet of information, the speed of the data transfer, whether or not error checking is done, etc... There are a number of different data communications protocols in use today. The EZ-ZONE RMA module can be optionally equipped with the following protocols:

- Modbus® RTU & TCP
- Profibus® DP
- EtherNet/IP™
- DeviceNet™

Each of these protocols are heavily in use today within a wide array of industrial applications.

Modbus

Introduction to the Modbus Protocol

Gould Modicon, now called AEG Schneider, first created the protocol referred to as "Modbus RTU" used in process control systems. Modbus provides the advantage of being extremely reliable in exchanging information, a highly desirable feature for industrial data communications. This protocol works on the principle of packet exchanges. The packet contains the address of the controller to receive the information, a command field that says what is to be done with the information, and several fields of data. Each RM module User's Guide has a comprehensive listing of these registers found in the Operations, Setup, Profiling, and Factory Pages.

Many parameter values within the various RM modules are four bytes in length and require two Modbus registers. By default, the low order word contains the two lower bytes of the 32 bit parameter and the high register number contains the two higher bytes. If it makes your programming easier you may reverse this Modbus default when using RM modules where the low register number contains the two higher bytes and the high register number contains the two lower bytes. This setting can be modified in the RM Access Setup pages under the Communications [oM] Menu.

If it is desired to acquire more information on Modbus RTU or Modbus TCP direct your browser to: http://www.modbus.org.

User Programmable Memory Blocks

All RM modules equipped with the Modbus protocol features a block of 80 contiguous Modbus registers that can be configured by the user to reflect up to 40 members (parameters) of their choice. This assembly allows for direct read/write (depending on actual parameter) access in one contiguous block.

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

Assembly Definition Addresses

Fixed addresses used to define the parameter that will be stored in the "Assembly Working Addresses"; 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 an RM module.

Assembly Working Addresses

Fixed addresses directly related to their associated "Assembly Definition Addresses" (e.g., Working Addresses 200 & 201 will assume the parameter pointed to by definition addresses 40 & 41). Take a look at the section entitled "Modbus Default Assembly Structure 40-119" found in the Appendix. The RMC assembly can be seen where the first member is identified as "Control Loop Set Point 1". This is a writable parameter, therefore, within the user program when writing a new value to Modbus registers 200 and 201 the RMC loop 1 Closed Loop Set Point will change accordingly. So, 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, as in the case described above, writing to its working registers will change the parameters actual value.

Using Modbus RTU

Default RMA Communication Parameters (Modbus RTU)

If your model number has a two in the identified placeholder (RMA x - x [**2**] x x - x x x x) then these defaults apply.
Address (Ad.rr) = 1
Baud Rate (bAUd) = 9600
Parity (PAr) = nonE
Word Order rr.hL) = Loh ı
Modbus Units (C_F) = F
Non-volatile Save (nU.S) = YES

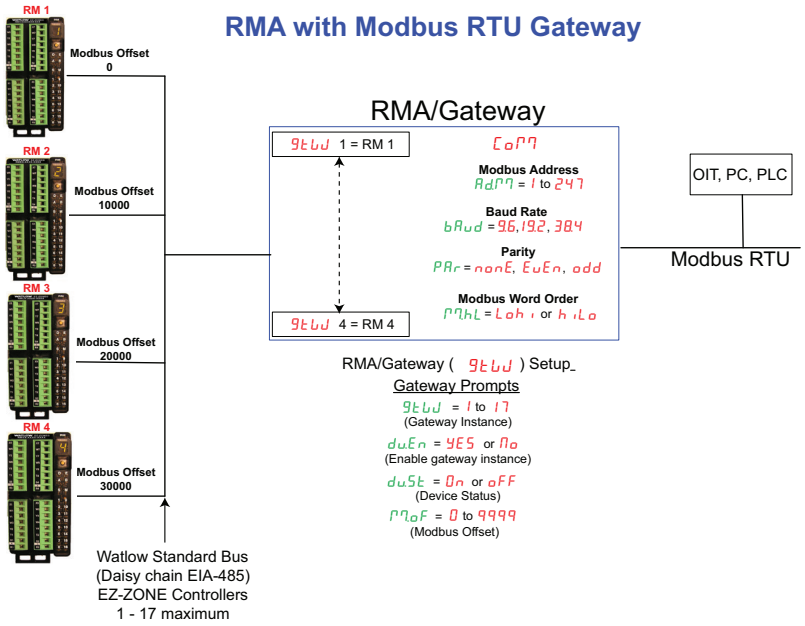
To Change Communications Default Settings Using an RUI

If using and RUI, reference the graphic below as an example, and follow the steps provided to configure the Modbus communication port as well as each gateway instance (RM Module).

Setting up a Communications Port:
Starting from the RUI Home Page.

1. Push and hold the up and down arrow keys on the front panel for six seconds to go the the Setup Menu.
2. Push the up or down arrow key until Corr (Communications Menu) appears in the upper display and SEt in the lower display.
3. Push the green Advance Key ◉ to enter the Communications Menu. The upper display shows the current Modbus address (1, factory default) and the lower display shows the address prompt Ad.rr.

4. Push the up arrow key until the chosen address appears in the upper display.
5. Push the green Advance Key to change the baud rate. The upper display shows 9600, and the lower display shows bAUd. Use the up and or down arrow key to change the baud rate.
6. Push the Advance Key to view the current parity setting. The upper display shows nonE and lower display shows PAr. If desired, use the up and or down arrow key to change the parity.
7. Push the Advance Key to view the Modbus TCP Word Order, which allows the user to swap the high and low order 16-bit values of a 32 bit member.. The factory default is Loh, low/high as shown in the upper display and the lower display shows the byte order prompt rr.hL.
8. Push the Advance Key to view the current units as passed between gateway devices and the master on the network. The upper display shows F and lower display shows C_F. If desired, use the up and or down arrow key to change the units.
9. Lastly, push the Advance Key to view whether or not parameters written from the master device (typically a PLC) will be saved in the slave (RM module). The upper display shows YES or no and lower display shows the non-volatile save prompt nvS. If desired, use the up and or down arrow key to change the from yes to no.
10. Push the Infinity Key three times or push and hold for approximately 3 seconds to navigate back to the Home Page.



Setting up the Gateway:

Starting from the RUI Home Page.

1. Push and hold the up and down arrow keys on the front panel for six seconds to go the the Setup Menu.
2. Push the up or down arrow key until gtwy (Gateway Menu) appears in the upper display and SEt in the lower display.
3. Push the green Advance Key to begin configuration of the first gateway instance (RM module zone 1). The upper display shows instance one 1 and the lower display shows the gateway prompt gtwy.
4. Push the green Advance Key once where the upper display indicates no as the default and the lower display shows the enable/disable prompt duEn.

6. Push the Advance Key to view the current status of this instance. The upper display will show either oFF or on depending on whether or not a successful link has been established between gateway and slave device. This is a read only prompt and will take a minute or so after enabled to reflect that it is on.
7. Push the Advance Key to view the current Modbus offset where the upper display will show zero 0 as a default and the lower display show the Modbus Offset prompt rM.oF. If desired, use the up arrow key to change the offset.
8. Push the Infinity Key three times or push it and hold for approximately 3 seconds to navigate back to the Home Page.

Communications To/From a Master:

After configuring the gateway, in order to read or write the expected parameter from the expected module the Modbus Offset prompt rM.oF is most significant. This parameter provides an offset for the purpose of module selection while at the same time providing the ability to read and or write to any given Modbus register.

As an example, lets assume the offsets are as shown in the graphic on the previous page (RMA with Modbus RTU Gateway) and the Master wants to read instance one Set Point from both RMC modules at address 1 and 4. Open up the RMC User's Guide, turn to the Operations Page and look in the Loop Menu for Set Point. To read instance one Set Point from RMC module address 1, the appropriate Map 1 address would be: 2500 + Modbus offset (0) = 2500. Notice that there is no offset applied in this example. To read the Set Point from the RMC module address 4 the address would now be: 2500 + Modbus offset (30000) = 32500.

As can be seen in this example, the Modbus Offset defines the module (in this case, RM 4) where the specific Modbus address for the parameter in question does not change. The values given for the Modbus Offset rM.oF prompt also determine the available Modbus addresses for each module. Looking at the graphic on the previous page, the following Modbus addresses would be available for each module:

RM 1, 1 - 10,000
RM 2, 10,001 - 20,000
RM 3, 20,001 - 30,000
RM 4, 30,001 - 65,535

Note:

The Modbus Offset rM.oF as modified through the RUI cannot exceed 9999. Therefore, if it is desired to utilize a Modbus offset as shown in the previous graphic (above 9999) it must be entered using EZ-ZONE Configurator software. Simply click on the link below and type Configurator into the Keyword field and then click Search to download the software free of charge. http://www.watlow.com/literature/software.cfm

Examples Using Modbus RTU Test Diagnostic Software

This program is free of charge and serves the user well as a diagnostic tool for Modbus RTU communications and it is offered by Watlow. It can be found and downloaded two ways:

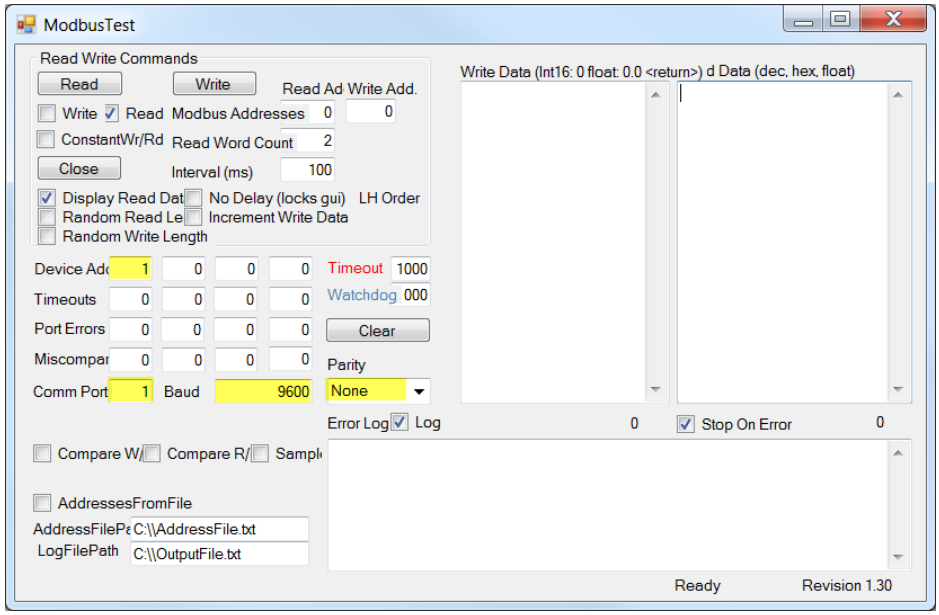
1. Navigate to the Watlow website at: http://www.watlow.com/literature/software.cfm.
   - Type "Modbus" in the Keyword field and click **Search**
   - Click on the file named **Modbus RTU Diagnostic Program for EZ-ZONE PM, RM and ST** to download to a local storage device

Or

2. Find and insert the Watlow Support Tools DVD into a DVD drive.
   - Once opened, right-click on **Utility Tools**
   - Click on **Modbus RTU Diagnostic Program for EZ-ZONE PM, RM and ST** to open up and run the program

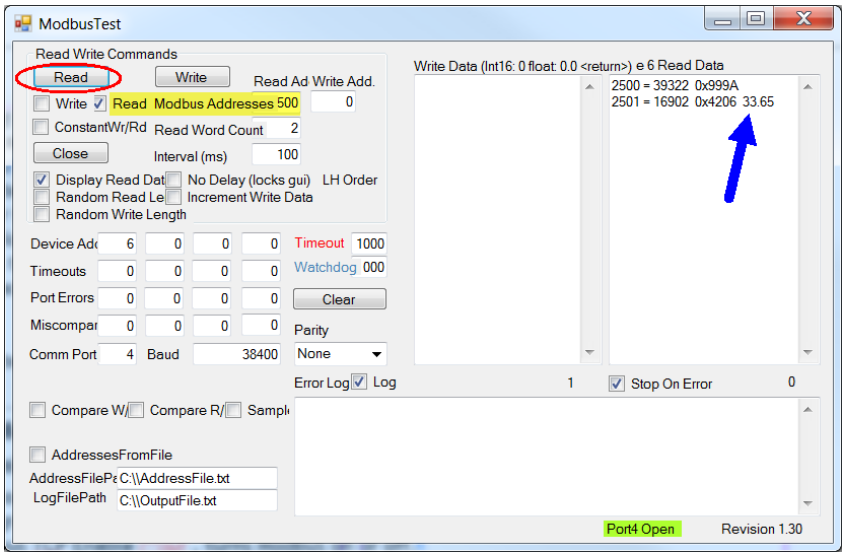
Running the Program

1. Set the desired Modbus communications parameters in the RM module (follow steps above) and ensure the module is set for Modbus communications.
2. Locate and double-click the file named **ModbusTest.exe**.
3. Set the communications parameters to match the settings in the RM module (highlighted fields below).



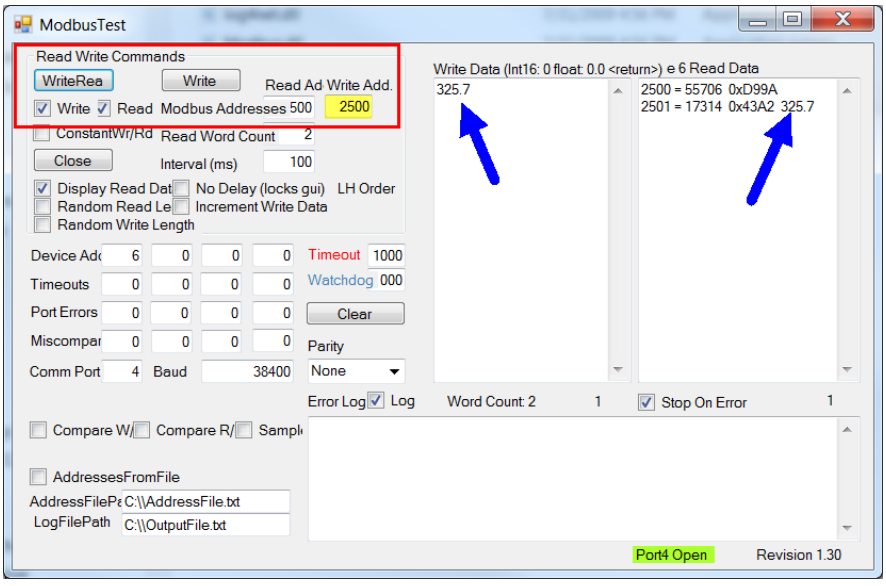
Reading the Set Point From an RMC Module

1. Find and open up the RMC User's Guide turning to the Operations page and then the Loop menu.
2. Locate and make note of the Set Point parameter and the Map 1 Modbus address.
3. Enter the Modbus address (2500) in the "Read Modbus Address" field as shown in the graphic below (yellow highlight). Note that the entire address is not shown.
4. Click the **Read** button (red circle).
5. The actual loop Set Point is displayed in decimal (blue arrow).



Writing the Set Point To an RMC Module

1. Find and open up the RMC User's Guide turning to the Operations page and then the Loop menu.
2. Locate and make note of the Set Point parameter and the Map 1 Modbus address.
3. Enter the Modbus address (2500) in the "Write Add" field as shown in the graphic below (yellow highlight). Note that in the example below the MB address was also entered in the read field.
4. Enter the desired Set Point, in this case 325.7 and follow that with the <return> key.
5. Click the **WriteRead** button (red box) where the value entered above is written and then read back.



Using Modbus TCP

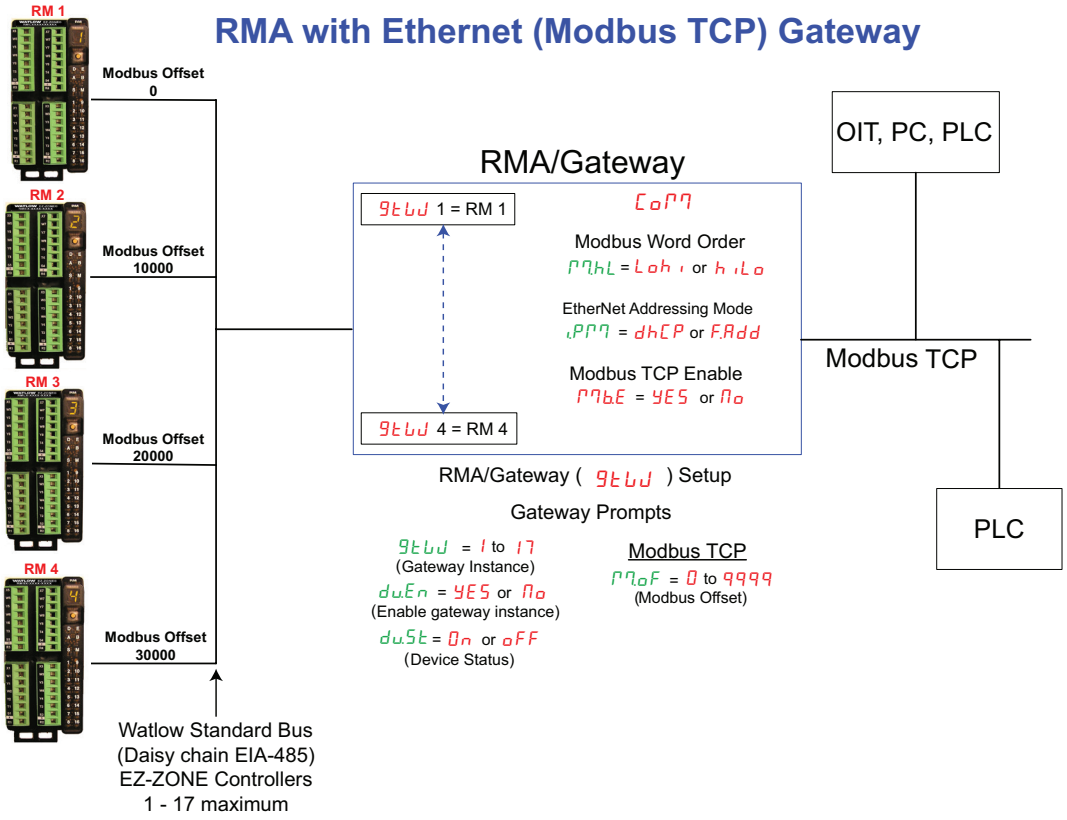
Communications To/From a Master:

When Modbus TCP is enabled there are Modbus related prompts (as shown below in the graphic) that need to be addressed. They are:

1. Modbus TCP Word Order mn.hL, which allows the user to swap the high and low order 16 bit values of a 32 bit member.
2. IP Address Mode iPMn, Fixed (FAdd) or DHCP (dhCP).
3. IP Fixed Address Part 1 to Part 4 (iPF1 to iPF4).
4. IP Fixed Subnet Part 1 to Part 4 (iPS1 to iPS4).
5. Fixed IP Gateway Part 1 to Part 4 (iPG1 to iPG4).
6. Modbus TCP Enable mnbE, turns Modbus TCP on (YES) or off (no).
7. Display Units C_F, Fahrenheit (F) or Celsius (C).
8. Non-volatile Save nvS, determines whether or not parameters written from the master device (typically a PLC) will be saved in the slave (RM module). Yes (YES) or no (no).

Note:

There are other Ethernet settings not shown in the graphic below that also must be set.



Examples Using Modbus TCP Test Diagnostic Software

This program is free of charge and serves the user well as a diagnostic tool for Modbus TCP communications and it is offered by Watlow. It can be found and downloaded two ways:

1. Navigate to the Watlow website at: http://www.watlow.com/literature/software.cfm
   - Type "Modbus" in the Keyword field and click **Search**
   - Click on the file named **Modbus TCP Diagnostic Program for EZ-ZONE PM, RM and ST** to download to a local storage device

Or

2. Find and insert the Watlow Support Tools DVD into a DVD drive
   - Once opened, right-click on **Utility Tools**
   - Click on **Modbus TCP Diagnostic Program for EZ-ZONE PM, RM and ST** to open up and run the program

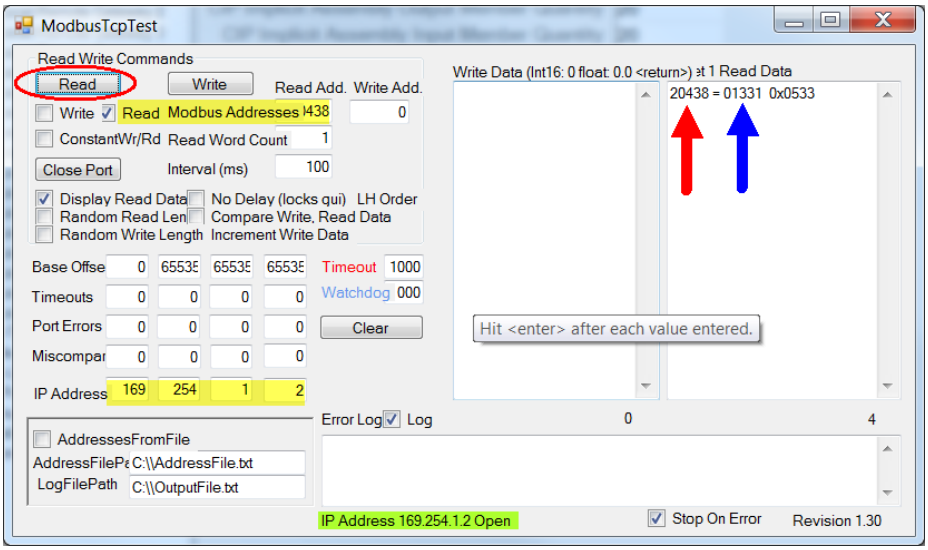
Running the Program

1. Set the desired Modbus TCP communications parameters in the RM module (follow steps above).
2. Locate and double-click the file named **ModbusTcpTest.exe**.
3. Set the IP address to match the RMA module (highlighted fields below).

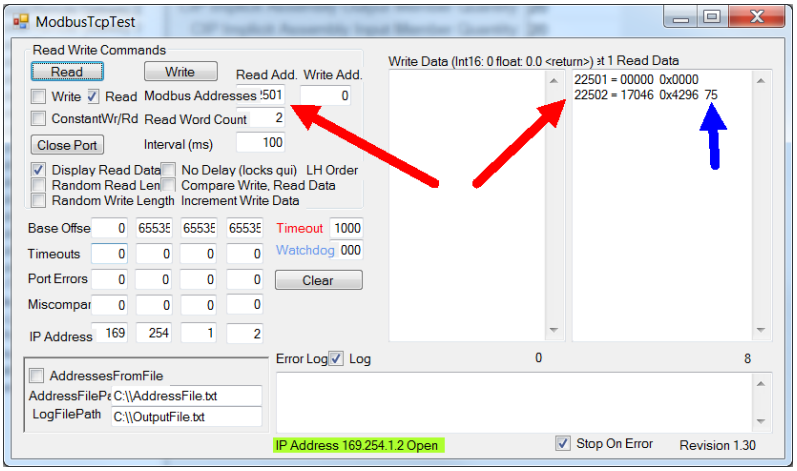
In the example below, the Modbus Word Order parameter is being read from the RMA module. Notice that the RMA has an offset of 20,000 applied to it. Therefore, the address to be read is 20438 (red arrow) while the enumerated value returned is displayed as decimal 1331 (blue arrow).

Note:

If it is desired to access Modbus addresses for the RMA module ensure that the RMA gateway (Standard Bus address) is enabled. An offset may be required if MB registers need to be accessed in other modulesother modules and has an offset associated with it. In the example that follows the RMA was given a Modbus Offset of 20,000.



As another example, on this same network resides an RMC module with an offset of 20,001. As the graphic below shows the Set Point at address 25001 is being read from the RMC module ans is displayed in decimal as 75.

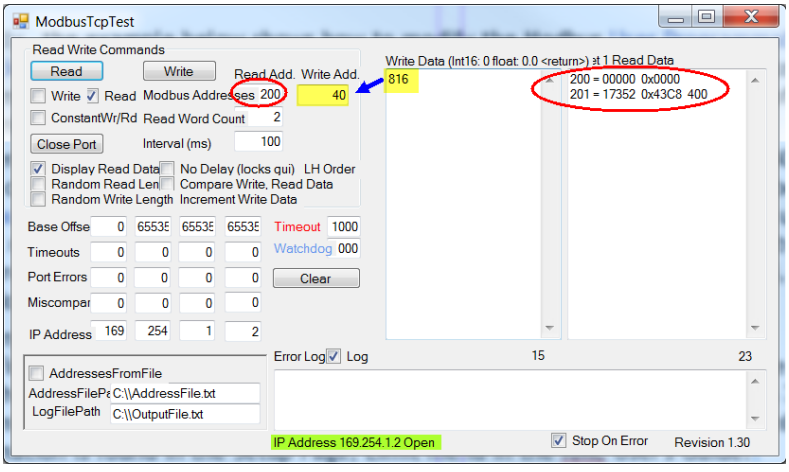


Lastly, the example below shows how to modify the Modbus User Programmable Memory Blocks. As noted earlier, these blocks of memory are also referred to as an assembly. In this example, the assembly to be modified will be within a RMC module with an offset of 0. Remember, if an offset is used simply add it to the Modbus address.

When a controller is delivered from the factory the first 20 members of the 40 available are pre-configured for the RMC module, referred to as the default state. As can be seen in the default Modbus assembly configuration graphic found in the Appendix of this user's guide the first member is configured as the Loop 1 Set Point. In this example, the first two Definition Addresses (40 and 41), or pointers will be overwritten to point to the Limit 4, High Set Point. To do this follow the steps below.

Changing and Verifying the MB Assembly:

1. Find the desired parameter and MB register in the appropriate user's guide. In this case, the MB register that is listed for the first instance of the Limit is shown as 726. Keep in mind that it is Limit 4 not 1 that will be written to the first assembly member. This information is found in the Setup Page, Limit menu in the RMC User's Guide.
2. Add the Map 1 offset (30) to the MB register listed for the appropriate instance. In this case, the actual address for Limit 4 High Set Point would be: 726 + 90 = 816.
3. In the graphic to the right notice the value written (yellow highlight) to register 40 (pointer) is 816. Also notice that when register 200 and 201 are read back we see a value 400 representing the Limit 4 High Set Point. Similar steps could be used to modify all assembly members.



Note:

If the RM module is ever brought back to the factory defaults, the assemblies will be overwritten.

Common Industrial Protocol (CIP)

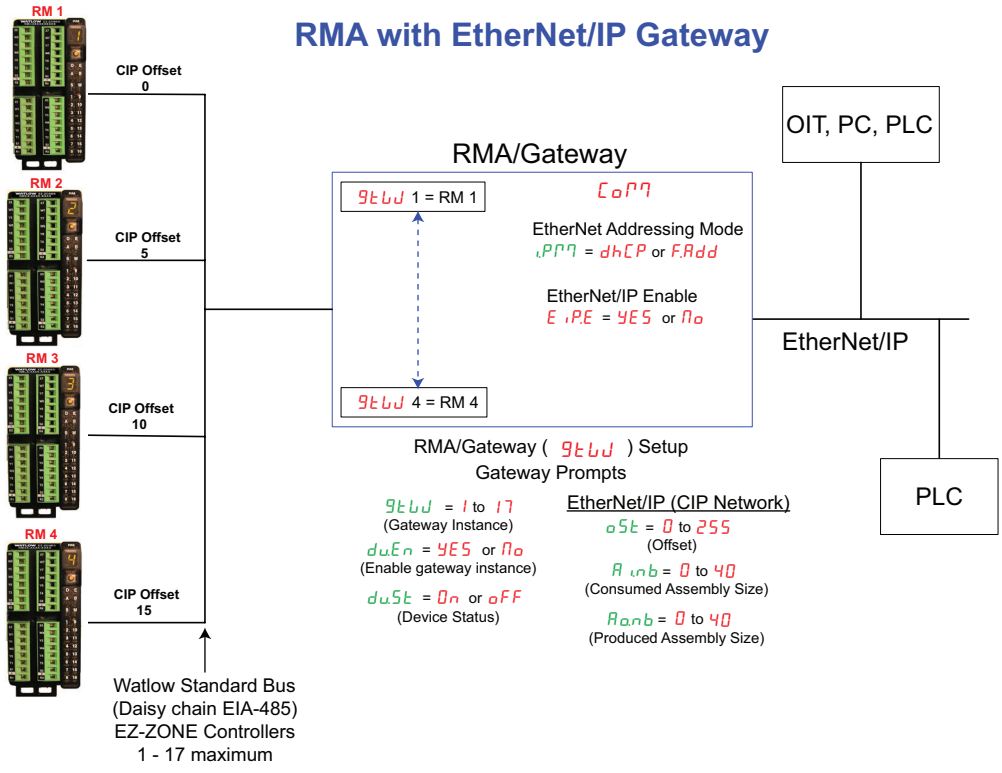
Introduction to CIP

With the introduction of CIP a user can now collect data, configure a device and control industrial devices. CIP is an open protocol at the application layer fully managed by the Open DeviceNet Vendors Association (ODVA, http://www.odva.org). Being that this is an open protocol there are many independent vendors offering a wide array of devices to the end user. CIP provides the ability to communicate utilizing both implicit messaging (real-time I/O messaging), and explicit messaging (information/configuration messaging). For implicit communications using a PLC simply configure the module (RMA) assembly size into the I/O structure of the PLC (See: CIP Implicit Assemblies). The assembly structure can also be changed by the user.

Explicit communications requires the use of specific addressing information. DeviceNet requires that the node address be specified where EtherNet/IP requires just the Class, Instance and Attribute.

- Node address or MAC ID (0 - 63, DeviceNet only)
- Class ID (1 to 255)
- Instance ID (0 to 255)
- Attribute ID (1 to 255)

EtherNet/IP and DeviceNet are both based on CIP. EtherNet/IP (Industrial Protocol) is a network communication standard capable of handling large amounts of data at speeds of 10 Mbps or 100 Mbps, and at up to 1,500 bytes per packet. It makes use of standard off-the-shelf Ethernet chip sets and the currently installed physical media (hardware connections). DeviceNet was the first field bus offering of the ODVA group and has been around for many years. DeviceNet can communicate at 125, 250 and 500 kilobytes per second with a maximum limitation of 64 nodes (0 to 63) on the network. The RMA module equipped with Ethernet and DeviceNet hardware supports implicit and unconnected explicit messages. To enable Ethernet communications with legacy Allen-Bradley PLCs the Ethernet card also supports the PCCC protocol.



CIP Implicit Assemblies

Communications using CIP (EtherNet/IP and DeviceNet) can be accomplished with any RM module using the RMA. As was already mentioned, reading or writing when using CIP can be accomplished via explicit and or implicit communications. Explicit communications is usually executed via a message instruction within the PLC but there are other ways to do this as well outside of the focus of this document.

Implicit communications is also commonly referred to as polled communications. When using implicit communications there is an I/O assembly that would be read or written to. The default assemblies are embedded into the firmware of the specific module in use and they can be different from module to module. Watlow refers to these assemblies as the T to O (Target to Originator) and the O to T (Originator to Target) assemblies where the Target is always the EZ-ZONE controller and the Originator is the PLC or master on the network. For each RM module, the O to T assembly is made up of 40 (32-bit) members where the T to O consists of 41 (32-bit) members. All assembly members are user configurable with the exception of the first T to O member. The first member of the T to O assembly is called the Device Status, it is unique to the RMA and cannot be changed. Bits 16 - 31 of this 32-bit word represents the communications status of the RM modules (zones) on the Standard Bus side of the RMA when enabled. Once a zone is enabled, valid communications will be represented with the bit set to a "1", if set to "0", the RMA is not communicating with the zone. Bit 16 represents Zone 1 where bit 31 represents Zone 16. The 40 members that follow Device Status are user configurable. The Appendix of this User's Guide contains the assemblies for each of the RM modules (See Appendix: CIP Implicit Assembly Structure by product).

Note:

EtherNet/IP allows for a maximum assembly size of 100 I/O members where DeviceNet allows for a maximum of 200 I/O members.

Compact Implicit Assembly Class

Along with the standard implicit assembly where each module parameter (member) occupies one 32-bit assembly member there is also a Compact Class of the assembly. The need for the Compact Class of assembly members became apparent as the high density RM modules (up to 16 control loops) were being developed. The Compact Class allows for better utilization of each bit within an assembly member by compacting parameters within one 32-bit assembly member. As an example, if a standard assembly member were configured as a Variable just 7 bits out of the 32 will be used to write an off (62) or on (63) status to the module. With the Variable Compact Class in use, 16 Variables can be placed in one 32-bit assembly member using just 2 bits for each (00 = off, 01 = on). There is a variety of predefined Compact Class members that can be used (See Appendix: CIP Compact Class Assemblies) to modify the default implicit assemblies.

Modifying Implicit Assembly Members

There are a couple of ways to modify the assemblies; the easiest way would be to download a utility program offered by Watlow free of charge and the other way would be to write explicit messages from the Master to the RM modules. For examples using explicit messages click the following link http://www.watlow.com/literature/whitepapers.cfm. Once there type "gateway" into the Keyword field and click **Search**.

The program mentioned above is free of charge and serves the user well to get up and running quickly. It can be found and downloaded two ways:

Locate and Download the Implicit Assembly Program:

1. Click on the following link: **http://www.watlow.com/literature/software.cfm**.
   - Type "implicit message" in the Keyword field and click **Search**
   - Click on the file identified as " **EZ-ZONE Implicit Message Assembly Programming Application**" and save the file to your local storage device.
   - Extract all of the files.

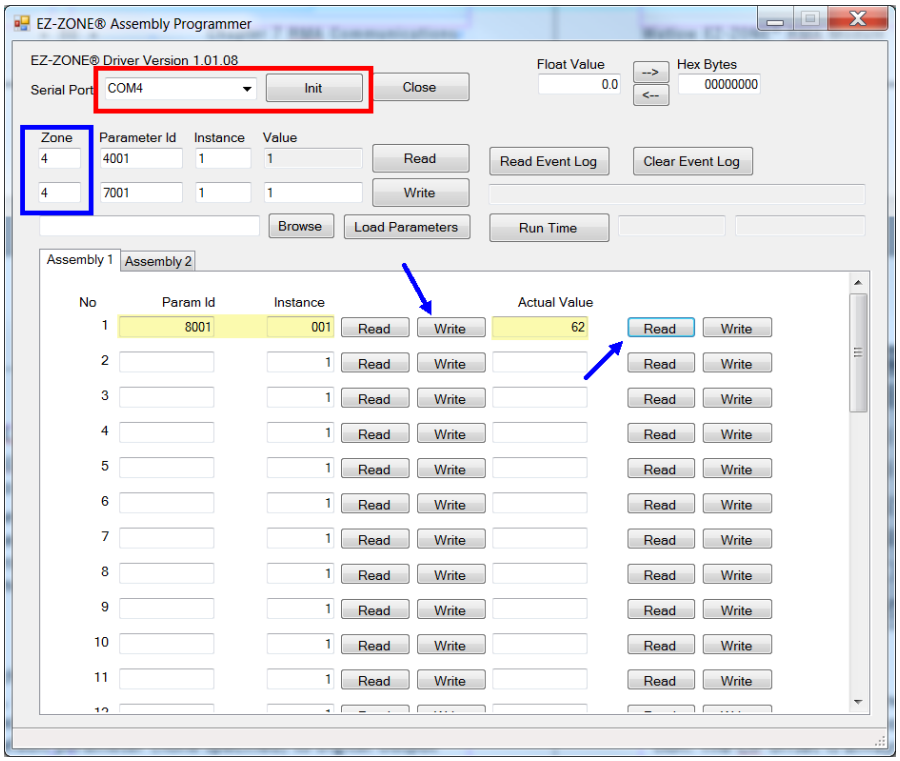
Or

2. Find and insert the Watlow Support Tools DVD into a DVD drive.
   - Once opened, right-click on **Utility Tools**
   - Mouse over "EZ-ZONE" and click on **EZ-ZONE_Assembly_Programmer** to open up and run the program

In the example below a RMC module will be used and the first implicit assembly member will be modified from the loop 1 Set Point to loop 1 Control Mode.

Writing a New Implicit Assembly Member:

1. Open the RMC user's guide and locate the parameter identified as Control loop 1 - Control Mode. This can be found on the Operations Page under the Loop menu.
2. Identify the column labeled as Parameter ID and note the ID for the desired parameter. In this case the parameter ID 8001.
3. Ensure that a PC communications port is connected to Standard Bus while making note of the comm port in use.
4. Locate the unzipped files from step 4 above and double-click the file named **EZ-ZONE_Assembly_Programmer.exe**.
5. Select the comm port identified in step 3 above and click the **Init** button (red box).
6. Enter the RM zone address that will be modified (blue box).
7. For Assembly 1 (O to T) enter 8001 in the Parameter Id column and 1 (Loop 1) in the Instance column.



8. Click on the **Write** button to send to the controller.
9. To the right of the column identified as "Actual Value" click the **Read** button to validate that the operation was completed successfully. According to the user's guide 62 indicates that the controller is off.

If need be, these steps can be duplicated to modify and read all 40 members of both the input and output assemblies for any RM module.

Note:
Any changes made to the assemblies will be overwritten if the RM module is ever brought back to factory defaults.

Using EtherNet/IP™

Communications To/From Third Party Device:

When using the EtherNet/IP protocol, there are two methods used in communicating, implicitly (See: CIP Implicit Assemblies) and explicitly. Once the gateway instance is enabled there are two prompts that relate directly to these forms of communication.
Reference the graphic above (RMA with EtherNet/IP Gateway).

oSt CIP Offset, used exclusively with explicit messages where this prompt defines the parameter instance as well as the module on the network. The CIP offset is unique to each gateway instance (RM module) and should not overlap from one gateway instance to another.

Application Note:
Assume that in the graphic above that there are 4 RMC modules on the network with each having 4 instances of an Analog Input. If it is desired to access all of the Analog Inputs from each module the CIP offset must, at a minimum, have an offset of 4 between each module (gateway instance). If the offset for each module is set as shown on the following page, the 4th instance would not be available. As another example, looking at the RMC User's Guide in the Setup Page under the Variable Menu, it shows that there are 16 instances available. If all 16 for each module are to be made available to the Master (OIT, PC, PLC) then the offsets should at a minimum be set as shown below: RM1 = 0, RM2 = 17, RM3 = 33 and RM4 = 50.

Using the RMC User's Guide look at the Operations Page and then the Analog Input Menu. There you will find the class, instance and attribute of the first instance of the Analog Input Value for RM 2 to be the following:
Class = 104 or (0x68)
Instance = 6
Attribute = 1

This information would be needed to execute an explicit message to read this parameter. Notice that the instance above is identified as 6 and not 1 as listed in the RMC documentation. The CIP offset is always added to the documented instance. Using the graphic above the offset entries are listed below.
1. RUI prompt entry for gateway instance 1 (RM 1) follows: oSt = 0
2. RUI prompt entry for gateway instance 2 (RM 2) follows: oSt = 5
3. RUI prompt entry for gateway instance 3 (RM 3) follows: oSt = 10
4. RUI prompt entry for gateway instance 4 (RM 4) follows: oSt = 15

Likewise, to read the Analog Input Value *instance 2* of RM 4 the following information would need to be entered in the message instruction:
Class = 104 or (0x68)
Instance = 17 or (0x0E)
Attribute = 1

AonB CIP Implicit Output (Produced, input to Master) Assembly Size, used exclusively when communicating implicitly. For any given RMA gateway instance (1 - 17), the output assembly size will never be greater than 40, 32 bit members. The user entry ranges from 0 to 40.

A inb CIP Implicit Input (Consumed, output from Master) Assembly Size, used exclusively when communicating implicitly. For any given RMA gateway instance (1 - 17), the input assembly size will never be greater than 40, 32 bit members. The user entry ranges from 0 to 40.

Note:

When configuring the RMA assemblies for each gateway instance it is important to note that the maximum number of implicit input/output members using EtherNet/IP cannot exceed 100. A network could have up to 5 EZ-ZONE controllers with 20 members each maximum or the 100 members can be divided any way the user would like as long as 40 I/O members per module are not exceeded.

Using the graphic above as an example, if:
StUd instance 1 has A inb and Aonb set to 5
StUd instance 2 has A inb and Aonb set to 5
StUd instance 3 has A inb and Aonb set to 5
StUd instance 4 has A inb and Aonb set to 5

Each of the four RM modules will contain the first 5 members of the I/O assembly and this information would then be passed implicitly to/from the Master on the EtherNet/IP network.

Note:

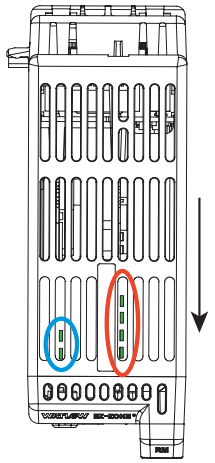
In the graphic above identified as "RMA with EtherNet/IP Gateway" there are several prompts omitted for the sake of saving some space. When the Ethernet addressing mode is set to Fixed the user will find several more prompts that will follow the prompts shown for "Ethernet Addressing Mode" related to specifying the actual IP iPF1 - iPF4, subnet iPS1 - iPS4 and the gateway iPG1 - iPG4 (external gateway) addresses. If set to receive an IP address from a host dhCP computer, the prompts shown are accurate.

Note:

When changing the RMA IP address, power must be cycled for the new address to take affect.

Ethernet Indicator LEDs

The RMA has four indicator LED's on the top of the module for Ethernet, two of which are not used for Modbus TCP. The Module Status and Network Status LED's apply only when EtherNet/IP is enabled. The characteristics of the Activity and Link indicator LED's are defined in the Ethernet specification.



This is a view of the RMA module looking down into the top where the arrow is pointing towards the front of the module.

Left Front (blue circle):
- Green accessing SD card.
- Red accessing internal memory

Left Rear (blue circle):
- Flashing green heartbeat
- Red boot loader activity

Right, from front to rear (red circle):
- Active Status - Ethernet
- Link Status - Ethernet
- MS (Module Status - CIP)
- NS (Network Status - CIP)

Link Status Indicator		
Steady Off	Not powered, unknown link speed	If the device cannot determine link speed or power is off, the network status indicator shall be steady off.
Red	Link speed = 10 Mbit	If the device is communicating at 10 Mbit, the link LED will be red.
Green	Link speed = 100 Mbit	If the device is communicating at 100 Mbit, the link LED will be green.

Activity Status Indicator		
Flashing Green	Detects activity	If the MAC detects activity, the LED will be flashing green.
Red	Link speed = 10Mbit	If the MAC detects a collision, the LED will be red.

EtherNet/IP Indicator LEDs

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

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

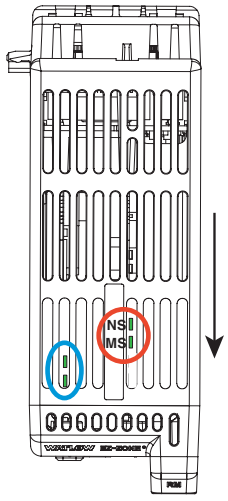
Using DeviceNet™

Communications To/From Third Party Device:

Like EtherNet/IP when using the DeviceNet™ protocol, there are two methods used in communicating, implicitly (See: CIP Implicit Assemblies) and explicitly. Because DeviceNet and Ethernet/IP both use CIP, the communications examples discussed above apply here as well. To acquire a better understanding of DeviceNet communications substitute DeviceNet for EtherNet/IP and review the section entitled "Using EtherNet/IP, Communications To/From a Third Party Device".

DeviceNet Indicator LED's

The RMA has four indicator LEDs on the top of the module, two of which (rear two) are used for DeviceNet (Module Status and Network Status). The characteristics of these two LEDs is established by the Open DeviceNet Vendors Association (ODVA, http://www.odva.org)



This is a view of the RMA module is looking down into the top where the arrow is pointing towards the front of the module.

Left Front (blue circle):
- Green accessing SD card.
- Red accessing internal memory

Left Rear (blue circle):
- Flashing green heartbeat
- Red boot loader activity

Right, from front to rear (red circle):
- MS (Module Status - CIP)
- NS (Network Status - CIP)

Module Status (MOD)	
Indicator LED	**Description**
Off	No power is applied to the device.
Flashing Green-Red	The device is performing a self-test.
Flashing Red	Major Recoverable Fault.
Red	Major Unrecoverable Fault.
Green	The device is operating normally.

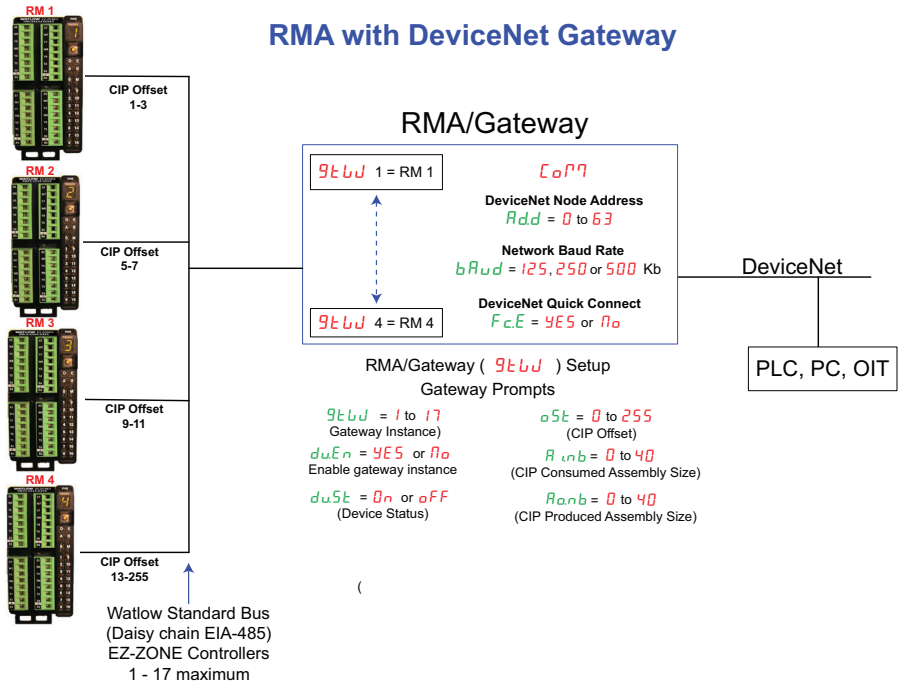
Network Status (NET)	
Indicator LED	**Description**
Off	The device is not online. The device has not completed the duplicate MAC ID test yet. The device may not be powered..
Green	The device is online and has connections in the established state. For a Group 2 Only device it means that the device is allocated to a Master.
Red	Failed communication device. The device has detected an error that has rendered it incapable of communicating on the network (duplicate MAC ID or Bus-off).
Flashing Green	The device is online, but no connection has been allocated or an explicit connection has timed out.
Flashing Red	A poll connection has timed out.

Setting DeviceNet Communication Parameters from the RUI Front Panel

Valid DeviceNet node addresses range from 0 - 63 and there are three available baud rates (network speed) for the user to choose from: 125Kb, 250Kb, or 500Kb. The EZ-ZONE RMA factory defaults are as follows: Node address = 63, Baud rate = 125Kb

To change the node address, go to the RMA "Setup Page" following the steps below:

1. Push and hold the up and down arrow keys on the front of the RUI for six seconds to go the Setup Menu.
2. If not already visible push the up or down arrow key until CoMM (Communications Menu) appears in upper display and SEt in the lower display.
3. Push the green Advance Key to enter the Communications Menu where the lower display shows Add and the top display shows the current DeviceNet node address.
4. Push the up or down arrow to change the DeviceNet node address.
5. Push the green Advance Key once to change the baud rate where the lower display shows bAud and the top display shows the current DeviceNet baud rate.
6. Push the up or down arrow to change to the desired baud rate (125Kb, 250Kb, or 500Kb)
7. Push the green Advance Key once to enable/disable the DeviceNet quick connect feature. The lower display shows FCE and the top display will show no or YES based on the current setting.
8. Push the up or down arrow key to enable or disable the quick connect feature.
9. Push the green Advance key once to change the temperature units passed over DeviceNet where the lower display shows C_F and the top display will show F or C based on the current setting.
10. Push the up or down arrow to change to the temperature units.
11. Push the Infinity Key three times or push and hold for approximately 3 seconds to navigate back to the Home Page.



There are three prompts delivered to the user from the RUI when attached to the RMA that are related to DeviceNet. Two of which are defined above, bAud (network baud rate or speed) and Add (network node address). There is one other which is identified and explained below: FCE (Quick Connect)

The Quick Connect feature is an option enabled on a node-by-node basis. When enabled, a device transitions to the on-line state concurrently with sending the first Duplicate MACID request message. The device is still required to execute the network State Tranisition Diagram (STD, used to describe object behavior), including going offline anytime a Duplicate MACID response message is received.

Note:

Although this feature allows a device to begin communicating on the network faster, it is at the expense of a delay in the duplicate node detection algorithm. It is left up to the user to guarantee that no nodes exist with the same MAC ID and that no more than one client device is configured to access the same device using the predefined Master/Slave connection set. Bus errors may occur if either of these conditions exists. This feature is enabled within a device through a non-volatile attribute in the DeviceNet object. A device shall have this feature disabled (attribute set to '0') as the factory default.

Once the above parameters have been changed cycle power on the DeviceNet network for the new parameters to take affect.

Profibus DP

Introduction to Profibus DP

Profibus was created by the German government in the late 80's due to industrial automation demand. Profibus DP (Decentralized Periphery) is a serial communications fieldbus using EIA-485 as the physical layer and is in accordance with the European Electrical Specification EN50170.

Profibus DP uses a master slave network configuration where RM modules equipped with this protocol serve as the slave. The RMA equipped with the Profibus DP protocol supports cyclic

(DP-V0) and acyclic (DP-V1) communications. For your reference, cyclic communications implies that a set of defined parameters (user configured as it relates to the RMA) are periodically read and or written. The frequency or period of the read/write operations is determined (setup) via the master on the network. You can configure the cyclic parameter set by installing the software (Profibus GSD Editor for EZ-ZONE Products) which can be found on the CD that came with the product (Controller Support Tools) or by clicking on the link below where it can be downloaded free of charge, point your browser to: http://www.watlow.com/literature/pti_search.cfm?dltype=4

Once the GSD (Generic Station Description) file is created, simply upload it to the master device.

Acyclic communications will read and or write data on demand and is based on the Slot Offset (as defined in the RMA configuration) and the specific parameter index (as can be found in the menus of the modules User's Guide). Most of the discussion that follows is related to acyclic communications.

As with all of the other available protocols, prior to establishing communications between master and the slave the gateway instance must first be enabled duEn. Once enabled, the user must define the Slot Offsets for each enabled EZ-ZONE controller.

Use the graphic below (RUI being used as a Profibus DP Gateway) in reference to the descriptions that follow below.

SoF Slot Offsets are used exclusively with acyclic (DP-V1) communications and define the individual EZ-ZONE controller on the network as well as the instance of the parameter to be read or written to. The offset defaults are as shown in the graphic in increments of 20, however, they can be changed based on user needs.

As an example, when programming the master device ensure that the Slot Offset and the Profibus Index (found in each product User's Guide in the various menus) are defined. To read the first instance of the Analog Input Value in RM 2 use the following information when programming the Master:

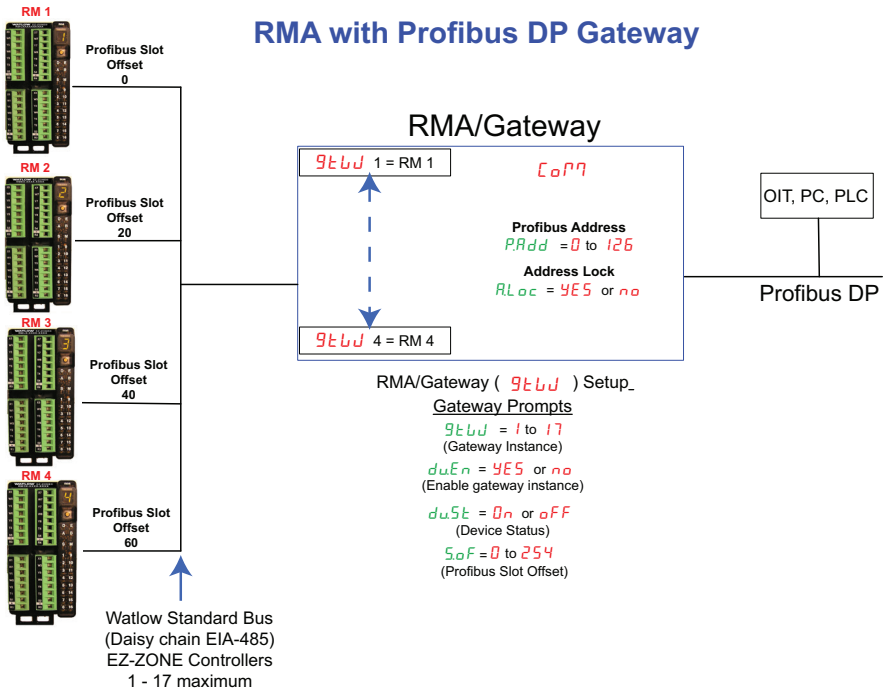
Slot Offset = 20

Index = 0 (See the EZ-ZONE RMC User's Guide, Operations Page under the Analog Input Menu)

Note that RM 2 and instance 1 is identified in the Slot Offset where the parameter, in this case, Analog Input Value 1 is identified via the Profibus Index. If it were instance 2 of the same parameter that was needed the Slot Offset would change to 21. Likewise, to read the Analog Input Value instance 2 of RM 4 the following information would need to be entered when programming the Master:

Slot Offset = 61

Index = 0



Profibus DP RMA LED Indicators

Viewing the unit from the front and then looking on top of the RMA two bicolor LED's can be seen where only the front one is used. Definition follows:

Closest to the Front

Indicator LED	Description
Red	Profibus network not detected
Red Flashing	Indicates that the Profibus card is waiting for data exchange.
Green	Data exchange mode

To learn more about Profibus point your browser to http://www.profibus.org.

Chapter 8: Appendix

Modbus - User Programmable Memory Blocks

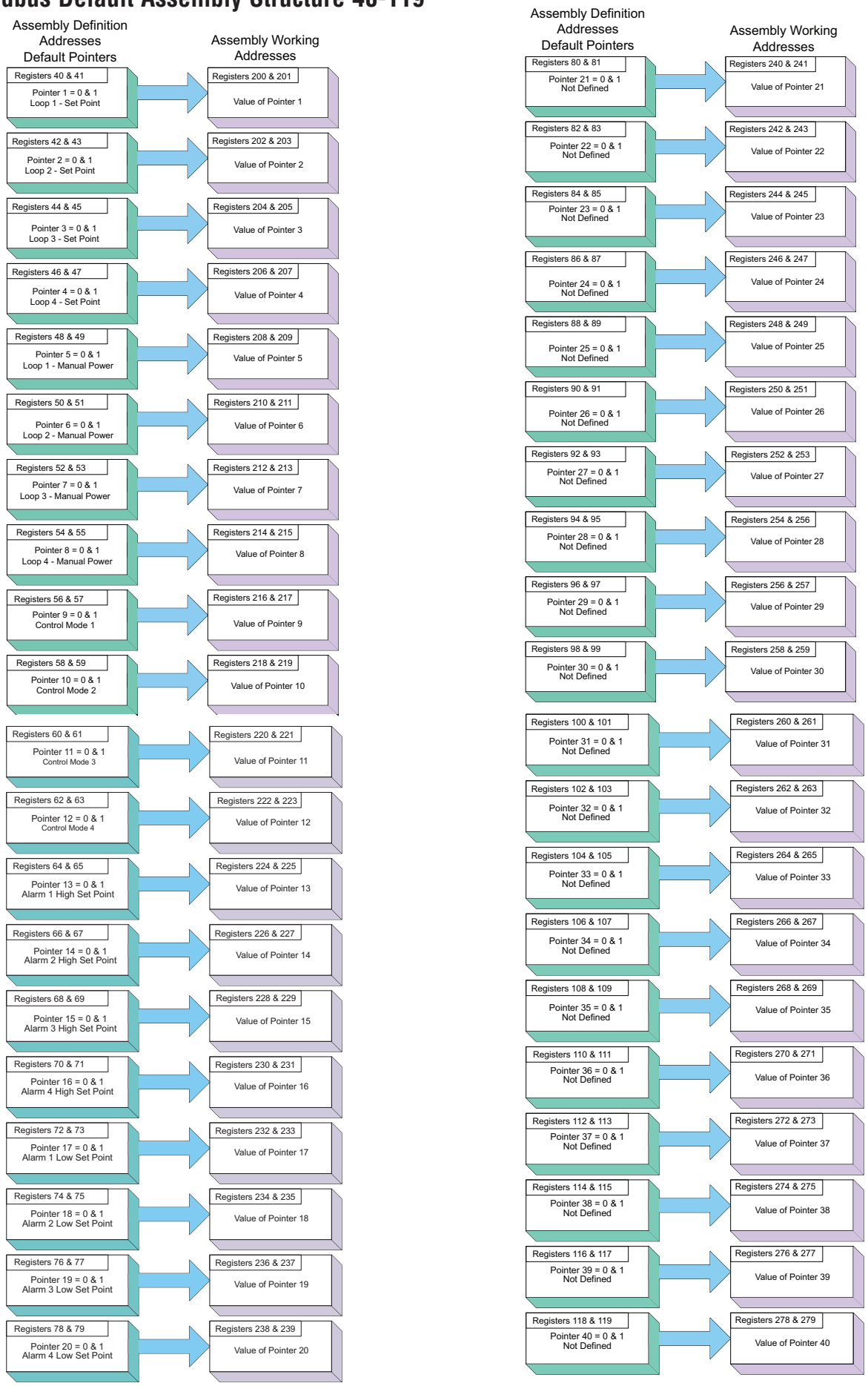
Assembly Definition Address and Assembly Working Addresses

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

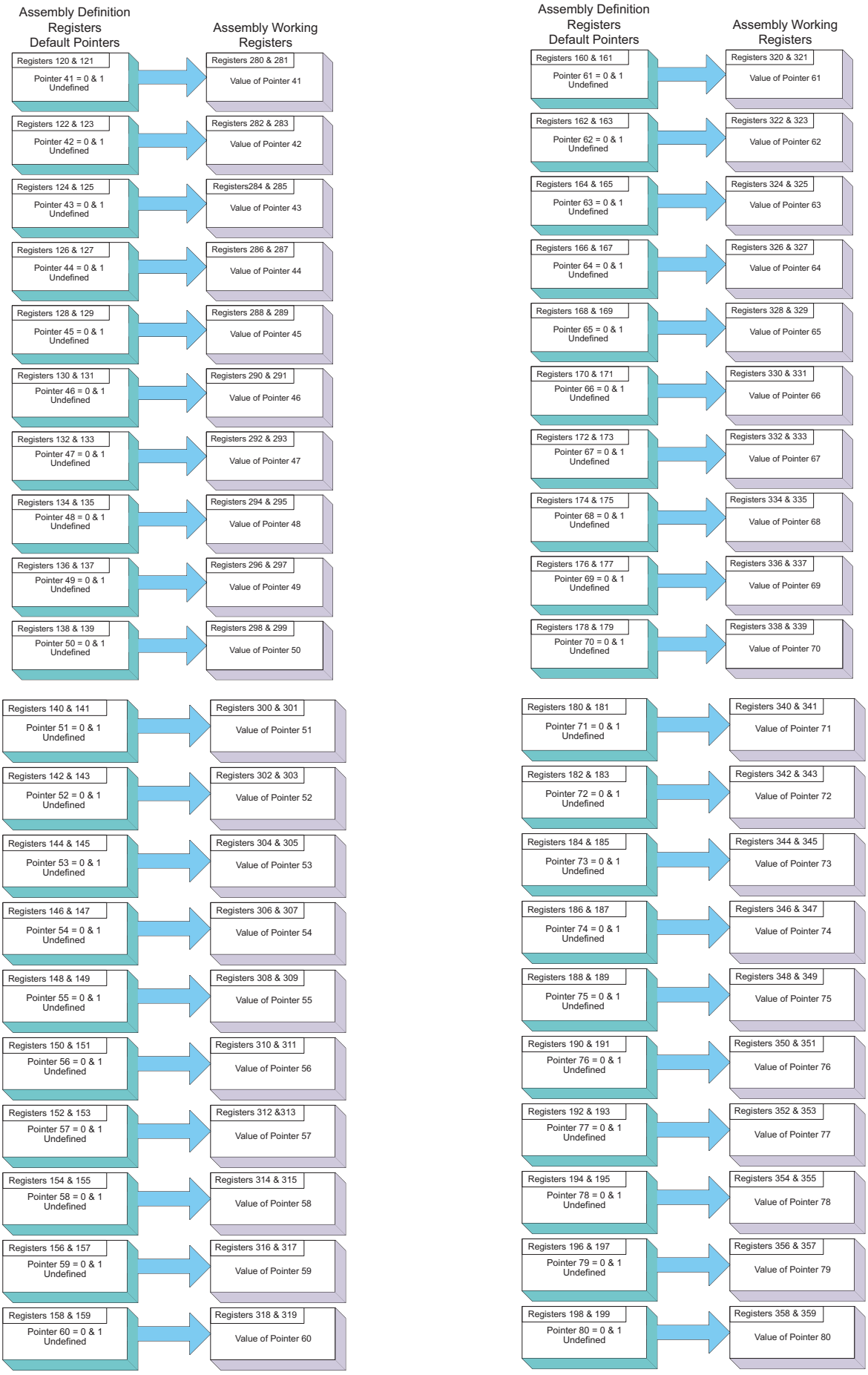
Note:

Notice that in the Modbus tables that follow the first 20 members have predefined definitions from the factory. These members reflect the assembly of the RMC module only. All other RM module assemblies are undefined as delivered from the factory; if the undefined members are to be used, they must be configured by the user.

Modbus Default Assembly Structure 40-119



Modbus Default Assembly Structure 120-199



CIP Implicit Assembly Structure

RMA / RME CIP Implicit Assembly Defaults

CIP Implicit Assembly Originator (Master) to Target (RMA / RME)					
Assembly Members	**Assembly Class, Instance, Attritbute**	**RM Module Data Type**	**Parameter**	**Parameter Class, Instance, Attritbute**	**PLC Data Type**
1	0x77, 0x01, 0x01	DINT	None specified	0x65, 0xFF, 0x01	undefined
2	0x77, 0x01, 0x02	DINT	None specified	0x65, 0xFF, 0x01	undefined
3	0x77, 0x01, 0x03	DINT	None specified	0x65, 0xFF, 0x01	undefined
4	0x77, 0x01, 0x04	DINT	None specified	0x65, 0xFF, 0x01	undefined
5	0x77, 0x01, 0x05	DINT	None specified	0x65, 0xFF, 0x01	undefined
6	0x77, 0x01, 0x06	DINT	None specified	0x65, 0xFF, 0x01	undefined
7	0x77, 0x01, 0x07	DINT	None specified	0x65, 0xFF, 0x01	undefined
8	0x77, 0x01, 0x08	DINT	None specified	0x65, 0xFF, 0x01	undefined
9	0x77, 0x01, 0x09	DINT	None specified	0x65, 0xFF, 0x01	undefined
10	0x77, 0x01, 0x0A	DINT	None specified	0x65, 0xFF, 0x01	undefined
11	0x77, 0x01, 0x0B	DINT	None specified	0x65, 0xFF, 0x01	undefined
12	0x77, 0x01, 0x0C	DINT	None specified	0x65, 0xFF, 0x01	undefined
13	0x77, 0x01, 0x0D	DINT	None specified	0x65, 0xFF, 0x01	undefined
14	0x77, 0x01, 0x0E	DINT	None specified	0x65, 0xFF, 0x01	undefined
15	0x77, 0x01, 0x0F	DINT	None specified	0x65, 0xFF, 0x01	undefined
16	0x77, 0x01, 0x10	DINT	None specified	0x65, 0xFF, 0x01	undefined
17	0x77, 0x01, 0x11	DINT	None specified	0x65, 0xFF, 0x01	undefined
18	0x77, 0x01, 0x12	DINT	None specified	0x65, 0xFF, 0x01	undefined
19	0x77, 0x01, 0x13	DINT	None specified	0x65, 0xFF, 0x01	undefined
20	0x77, 0x01, 0x14	DINT	None specified	0x65, 0xFF, 0x01	undefined

CIP Implicit Assembly Target (RMA / RME) to Originator (Master)					
Assembly Members	**Assembly Class, Instance, Attritbute**	**RM Module Data Type**	**Parameter**	**Parameter Class, Instance, Attritbute**	**PLC Data Type**
1	Cannot be changed	Binary	Device Status	none	DINT
2	0x77, 0x02, 0x01	DINT	None specified	0x65, 0xFF, 0x01	undefined
3	0x77, 0x02, 0x02	DINT	None specified	0x65, 0xFF, 0x01	undefined
4	0x77, 0x02, 0x03	DINT	None specified	0x65, 0xFF, 0x01	undefined
5	0x77, 0x02, 0x04	DINT	None specified	0x65, 0xFF, 0x01	undefined
6	0x77, 0x02, 0x05	DINT	None specified	0x65, 0xFF, 0x01	undefined
7	0x77, 0x02, 0x06	DINT	None specified	0x65, 0xFF, 0x01	undefined
8	0x77, 0x02, 0x07	DINT	None specified	0x65, 0xFF, 0x01	undefined
9	0x77, 0x02, 0x08	DINT	None specified	0x65, 0xFF, 0x01	undefined
10	0x77, 0x02, 0x09	DINT	None specified	0x65, 0xFF, 0x01	undefined
11	0x77, 0x02, 0x0A	DINT	None specified	0x65, 0xFF, 0x01	undefined
12	0x77, 0x02, 0x0B	DINT	None specified	0x65, 0xFF, 0x01	undefined
13	0x77, 0x02, 0x0C	DINT	None specified	0x65, 0xFF, 0x01	undefined
14	0x77, 0x02, 0x0D	DINT	None specified	0x65, 0xFF, 0x01	undefined
15	0x77, 0x02, 0x0E	DINT	None specified	0x65, 0xFF, 0x01	undefined
16	0x77, 0x02, 0x0F	DINT	None specified	0x65, 0xFF, 0x01	undefined
17	0x77, 0x02, 0x10	DINT	None specified	0x65, 0xFF, 0x01	undefined
18	0x77, 0x02, 0x11	DINT	None specified	0x65, 0xFF, 0x01	undefined
19	0x77, 0x02, 0x12	DINT	None specified	0x65, 0xFF, 0x01	undefined
20	0x77, 0x02, 0x13	DINT	None specified	0x65, 0xFF, 0x01	undefined
21	0x77, 0x02, 0x14	DINT	None specified	0x65, 0xFF, 0x01	undefined

RMH / RMS / RML CIP Implicit O to T Assembly Defaults

CIP Implicit Assembly Originator (Master) to Target (RMH / RMS / RML)					
Assembly Members	**Assembly Class, Instance, Attritbute**	**RM Module Data Type**	**Parameter**	**Parameter Class, Instance, Attritbute**	**PLC Data Type**
1	0x77, 0x01, 0x01	DINT	None specified	0x65, 0xFF, 0x01	undefined
2	0x77, 0x01, 0x02	DINT	None specified	0x65, 0xFF, 0x01	undefined
3	0x77, 0x01, 0x03	DINT	None specified	0x65, 0xFF, 0x01	undefined
4	0x77, 0x01, 0x04	DINT	None specified	0x65, 0xFF, 0x01	undefined
5	0x77, 0x01, 0x05	DINT	None specified	0x65, 0xFF, 0x01	undefined
6	0x77, 0x01, 0x06	DINT	None specified	0x65, 0xFF, 0x01	undefined
7	0x77, 0x01, 0x07	DINT	None specified	0x65, 0xFF, 0x01	undefined
8	0x77, 0x01, 0x08	DINT	None specified	0x65, 0xFF, 0x01	undefined
9	0x77, 0x01, 0x09	DINT	None specified	0x65, 0xFF, 0x01	undefined
10	0x77, 0x01, 0x0A	DINT	None specified	0x65, 0xFF, 0x01	undefined
11	0x77, 0x01, 0x0B	DINT	None specified	0x65, 0xFF, 0x01	undefined
12	0x77, 0x01, 0x0C	DINT	None specified	0x65, 0xFF, 0x01	undefined
13	0x77, 0x01, 0x0D	DINT	None specified	0x65, 0xFF, 0x01	undefined
14	0x77, 0x01, 0x0E	DINT	None specified	0x65, 0xFF, 0x01	undefined
15	0x77, 0x01, 0x0F	DINT	None specified	0x65, 0xFF, 0x01	undefined
16	0x77, 0x01, 0x10	DINT	None specified	0x65, 0xFF, 0x01	undefined
17	0x77, 0x01, 0x11	DINT	None specified	0x65, 0xFF, 0x01	undefined
18	0x77, 0x01, 0x12	DINT	None specified	0x65, 0xFF, 0x01	undefined
19	0x77, 0x01, 0x13	DINT	None specified	0x65, 0xFF, 0x01	undefined
20	0x77, 0x01, 0x14	DINT	None specified	0x65, 0xFF, 0x01	undefined
21	0x77, 0x01, 0x15	DINT	None specified	0x65, 0xFF, 0x01	undefined
22	0x77, 0x01, 0x16	DINT	None specified	0x65, 0xFF, 0x01	undefined
23	0x77, 0x01, 0x17	DINT	None specified	0x65, 0xFF, 0x01	undefined
24	0x77, 0x01, 0x18	DINT	None specified	0x65, 0xFF, 0x01	undefined
25	0x77, 0x01, 0x19	DINT	None specified	0x65, 0xFF, 0x01	undefined
26	0x77, 0x01, 0x1A	DINT	None specified	0x65, 0xFF, 0x01	undefined
27	0x77, 0x01, 0x1B	DINT	None specified	0x65, 0xFF, 0x01	undefined
28	0x77, 0x01, 0x1C	DINT	None specified	0x65, 0xFF, 0x01	undefined
29	0x77, 0x01, 0x1D	DINT	None specified	0x65, 0xFF, 0x01	undefined
30	0x77, 0x01, 0x1E	DINT	None specified	0x65, 0xFF, 0x01	undefined
31	0x77, 0x01, 0x1F	DINT	None specified	0x65, 0xFF, 0x01	undefined
32	0x77, 0x01, 0x20	DINT	None specified	0x65, 0xFF, 0x01	undefined
33	0x77, 0x01, 0x21	DINT	None specified	0x65, 0xFF, 0x01	undefined
34	0x77, 0x01, 0x22	DINT	None specified	0x65, 0xFF, 0x01	undefined
35	0x77, 0x01, 0x23	DINT	None specified	0x65, 0xFF, 0x01	undefined
36	0x77, 0x01, 0x24	DINT	None specified	0x65, 0xFF, 0x01	undefined
37	0x77, 0x01, 0x25	DINT	None specified	0x65, 0xFF, 0x01	undefined
38	0x77, 0x01, 0x26	DINT	None specified	0x65, 0xFF, 0x01	undefined
39	0x77, 0x01, 0x27	DINT	None specified	0x65, 0xFF, 0x01	undefined
40	0x77, 0x01, 0x28	DINT	None specified	0x65, 0xFF, 0x01	undefined

RMH / RMS / RML CIP Implicit T to O Assembly Defaults

CIP Implicit Assembly Target (RMH / RMS / RML) to Originator (Master)					
Assembly Members	**Assembly Class, Instance, Attritbute**	**RM Module Data Type**	**Parameter**	**Parameter Class, Instance, Attritbute**	**PLC Data Type**
1	Cannot be changed	Binary	Device Status	none	DINT
2	0x77, 0x02, 0x01	DINT	None specified	0x65, 0xFF, 0x01	undefined
3	0x77, 0x02, 0x02	DINT	None specified	0x65, 0xFF, 0x01	undefined
4	0x77, 0x02, 0x03	DINT	None specified	0x65, 0xFF, 0x01	undefined
5	0x77, 0x02, 0x04	DINT	None specified	0x65, 0xFF, 0x01	undefined
6	0x77, 0x02, 0x05	DINT	None specified	0x65, 0xFF, 0x01	undefined
7	0x77, 0x02, 0x06	DINT	None specified	0x65, 0xFF, 0x01	undefined
8	0x77, 0x02, 0x07	DINT	None specified	0x65, 0xFF, 0x01	undefined
9	0x77, 0x02, 0x08	DINT	None specified	0x65, 0xFF, 0x01	undefined
10	0x77, 0x02, 0x09	DINT	None specified	0x65, 0xFF, 0x01	undefined
11	0x77, 0x02, 0x0A	DINT	None specified	0x65, 0xFF, 0x01	undefined
12	0x77, 0x02, 0x0B	DINT	None specified	0x65, 0xFF, 0x01	undefined
13	0x77, 0x02, 0x0C	DINT	None specified	0x65, 0xFF, 0x01	undefined
14	0x77, 0x02, 0x0D	DINT	None specified	0x65, 0xFF, 0x01	undefined
15	0x77, 0x02, 0x0E	DINT	None specified	0x65, 0xFF, 0x01	undefined
16	0x77, 0x02, 0x0F	DINT	None specified	0x65, 0xFF, 0x01	undefined
17	0x77, 0x02, 0x10	DINT	None specified	0x65, 0xFF, 0x01	undefined
18	0x77, 0x02, 0x11	DINT	None specified	0x65, 0xFF, 0x01	undefined
19	0x77, 0x02, 0x12	DINT	None specified	0x65, 0xFF, 0x01	undefined
20	0x77, 0x02, 0x13	DINT	None specified	0x65, 0xFF, 0x01	undefined
21	0x77, 0x02, 0x14	DINT	None specified	0x65, 0xFF, 0x01	undefined
22	0x77, 0x02, 0x15	DINT	None specified	0x65, 0xFF, 0x01	undefined
23	0x77, 0x02, 0x16	DINT	None specified	0x65, 0xFF, 0x01	undefined
24	0x77, 0x02, 0x17	DINT	None specified	0x65, 0xFF, 0x01	undefined
25	0x77, 0x02, 0x18	DINT	None specified	0x65, 0xFF, 0x01	undefined
26	0x77, 0x02, 0x19	DINT	None specified	0x65, 0xFF, 0x01	undefined
27	0x77, 0x02, 0x1A	DINT	None specified	0x65, 0xFF, 0x01	undefined
28	0x77, 0x02, 0x1B	DINT	None specified	0x65, 0xFF, 0x01	undefined
29	0x77, 0x02, 0x1C	DINT	None specified	0x65, 0xFF, 0x01	undefined
30	0x77, 0x02, 0x1D	DINT	None specified	0x65, 0xFF, 0x01	undefined
31	0x77, 0x02, 0x1E	DINT	None specified	0x65, 0xFF, 0x01	undefined
32	0x77, 0x02, 0x1F	DINT	None specified	0x65, 0xFF, 0x01	undefined
33	0x77, 0x02, 0x20	DINT	None specified	0x65, 0xFF, 0x01	undefined
34	0x77, 0x02, 0x21	DINT	None specified	0x65, 0xFF, 0x01	undefined
35	0x77, 0x02, 0x22	DINT	None specified	0x65, 0xFF, 0x01	undefined
36	0x77, 0x02, 0x23	DINT	None specified	0x65, 0xFF, 0x01	undefined
37	0x77, 0x02, 0x24	DINT	None specified	0x65, 0xFF, 0x01	undefined
38	0x77, 0x02, 0x25	DINT	None specified	0x65, 0xFF, 0x01	undefined
39	0x77, 0x02, 0x26	DINT	None specified	0x65, 0xFF, 0x01	undefined
40	0x77, 0x02, 0x27	DINT	None specified	0x65, 0xFF, 0x01	undefined
41	0x77, 0x02, 0x28	DINT	None specified	0x65, 0xFF, 0x01	undefined

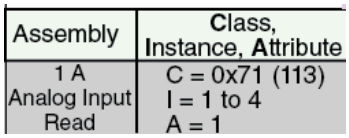
RMC CIP Implicit Assembly Defaults

CIP Implicit Assembly Originator (Master) to Target (RMC)					
Assembly Members	**Assembly Class, Instance, Attritbute**	**RM Module Data Type**	**Parameter**	**Parameter Class, Instance, Attritbute**	**PLC Data Type**
1	0x77, 0x01, 0x01	DINT	Control Loop 1, Closed Loop Set Point	0x6B, 0x01, 0x01	REAL
2	0x77, 0x01, 0x02	DINT	Control Loop 2, Closed Loop Set Point	0x6B, 0x02, 0x01	REAL
3	0x77, 0x01, 0x03	DINT	Control Loop 3, Closed Loop Set Point	0x6B, 0x03, 0x01	REAL
4	0x77, 0x01, 0x04	DINT	Control Loop 4, Closed Loop Set Point	0x6B, 0x04, 0x01	REAL
5	0x77, 0x01, 0x05	DINT	Control Loop 1, Open Loop Set Point	0x6B, 0x01, 0x02	REAL
6	0x77, 0x01, 0x06	DINT	Control Loop 2, Open Loop Set Point	0x6B, 0x02, 0x02	REAL
7	0x77, 0x01, 0x07	DINT	Control Loop 3, Open Loop Set Point	0x6B, 0x03, 0x02	REAL
8	0x77, 0x01, 0x08	DINT	Control Loop 4, Open Loop Set Point	0x6B, 0x04, 0x02	REAL
9	0x77, 0x01, 0x09	DINT	Control Loop 1, User Control Mode	0x97, 0x01, 0x01	DINT
10	0x77, 0x01, 0x0A	DINT	Control Loop 2, User Control Mode	0x97, 0x02, 0x01	DINT
11	0x77, 0x01, 0x0B	DINT	Control Loop 3, User Control Mode	0x97, 0x03, 0x01	DINT
12	0x77, 0x01, 0x0C	DINT	Control Loop 4, User Control Mode	0x97, 0x04, 0x01	DINT
13	0x77, 0x01, 0x0D	DINT	Alarm 1, Alarm High Set Point	0x6D, 0x01, 0x01	REAL
14	0x77, 0x01, 0x0E	DINT	Alarm 2, Alarm High Set Point	0x6D, 0x02, 0x01	REAL
15	0x77, 0x01, 0x0F	DINT	Alarm 3, Alarm High Set Point	0x6D, 0x03, 0x01	REAL
16	0x77, 0x01, 0x10	DINT	Alarm 4, Alarm High Set Point	0x6D, 0x04, 0x01	REAL
17	0x77, 0x01, 0x11	DINT	Alarm 1, Alarm Low Set Point	0x6D, 0x05, 0x01	REAL
18	0x77, 0x01, 0x12	DINT	Alarm 2, Alarm Low Set Point	0x6D, 0x06, 0x01	REAL
19	0x77, 0x01, 0x13	DINT	Alarm 3, Alarm Low Set Point	0x6D, 0x07, 0x01	REAL
20	0x77, 0x01, 0x14	DINT	Alarm 4, Alarm Low Set Point	0x6D, 0x08, 0x01	REAL

CIP Implicit Assembly Target (RMC) to Originator (Master)					
Assembly Members	**Assembly Class, Instance, Attritbute**	**RM Module Data Type**	**Parameter**	**Parameter Class, Instance, Attritbute**	**PLC Data Type**
1	Cannot be changed	Binary	Device Status	none	DINT
2	0x77, 0x02, 0x01	DINT	Analog Input 1, Analog Input Value (filtered)	0x68, 0x01, 0x01	REAL
3	0x77, 0x02, 0x02	DINT	Analog Input 1, Input Error	0x68, 0x01, 0x02	DINT
4	0x77, 0x02, 0x03	DINT	Analog Input 2, Analog Input Value (filtered)	0x68, 0x02, 0x01	REAL
5	0x77, 0x02, 0x04	DINT	Analog Input 2, Input Error	0x68, 0x02, 0x02	DINT
6	0x77, 0x02, 0x05	DINT	Analog Input 3, Analog Input Value (filtered)	0x68, 0x03, 0x01	REAL
7	0x77, 0x02, 0x06	DINT	Analog Input 3, Input Error	0x68, 0x03, 0x02	DINT
8	0x77, 0x02, 0x07	DINT	Analog Input 4, Analog Input Value (filtered)	0x68, 0x04, 0x01	REAL
9	0x77, 0x02, 0x08	DINT	Analog Input 4, Input Error	0x68, 0x04, 0x02	DINT
10	0x77, 0x02, 0x09	DINT	Alarm 1, Alarm State	0x6D, 0x01, 0x09	DINT
11	0x77, 0x02, 0x0A	DINT	Alarm 2, Alarm State	0x6D, 0x02, 0x09	DINT
12	0x77, 0x02, 0x0B	DINT	Alarm 3, Alarm State	0x6D, 0x03, 0x09	DINT
13	0x77, 0x02, 0x0C	DINT	Alarm 4, Alarm State	0x6D, 0x04, 0x09	DINT
14	0x77, 0x02, 0x0D	DINT	Alarm 5, Alarm State	0x6D, 0x05, 0x09	DINT
15	0x77, 0x02, 0x0E	DINT	Alarm 6, Alarm State	0x6D, 0x06, 0x09	DINT
16	0x77, 0x02, 0x0F	DINT	Alarm 7, Alarm State	0x6D, 0x07, 0x09	DINT
17	0x77, 0x02, 0x10	DINT	Alarm 8, Alarm State	0x6D, 0x08, 0x09	DINT
18	0x77, 0x02, 0x11	DINT	Control Loop 1, Output Power	0x97, 0x01, 0x0F	REAL
19	0x77, 0x02, 0x12	DINT	Control Loop 2, Output Power	0x97, 0x02, 0x0F	REAL
20	0x77, 0x02, 0x13	DINT	Control Loop 3, Output Power	0x97, 0x03, 0x0F	REAL
21	0x77, 0x02, 0x14	DINT	Control Loop 4, Output Power	0x97, 0x04, 0x0F	REAL

As can be seen on the previous page, the RMC module is the only RM module that defaults to a populated assembly structure. If it is desired to use the implicit assembly for any of the other RM modules the assembly structure must be built by the user. Their are many software tools available to modify the assembly structure, one of which is described in this user's guide. What can be found in this document is the *process* to build the assembly structure. If viewing this document electronically simply click on the link below to read the section entitled " Modifying Implicit Assembly Members". Otherwise, turn back to the table of contents to find the above named section.

Compact Class Assembly Structure



On the next six pages, the 17 available members of the Compact Class are displayed. As an orientation to the format as displayed in this document, notice that each member begins with header identified as "Assembly" and below the header you will see the member number along with parameter information contained within. While looking at these illustrations keep in mind that each member is actually 32-bits in length. To better illustrate this information in this document, the following 6 pages present these members divided in half where the letter "A" in the page header and assembly number represents the most significant 16-bits where the letter "B" in the title and assembly number represents the least significant 16-bits of each member. In the event that these pages are printed out and then mixed up, simply match up the page headers placing them side by side. As an example, Compact Class 1 A through 7 A should be paired with Class 1 B through 7 B, left to right.

For further explanation as to what the Compact Class assembly is, navigate to the RMA Communications Chapter and then to the section entitled "Compact Implicit Assembly Class"

Compact Class 1 A through 7 A

		Instance i															
Assembly	Class, Instance, Attribute	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
1 A Analog Input Read	C = 0x71 (113) I = 1 to 4 A = 1	Filtered Analog Input Value															

Bits 16 to 31, Signed 16 bits with implied tenths precision (-32768.8 to 3276.7)

		Instance i															
Assembly	Class, Instance, Attribute	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
2 A Control Read/Write	C = 0x71 (113) I = 1 to 4 A = 2	Closed Loop Set Point															

Bits 16 to 31, Signed 16 bits with implied tenths precision (-32768.8 to 3276.7)

		Instance i + 1															
Assembly	Class, Instance, Attribute	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
3 A Control Read/Write	C = 0x71 (113) I = 1 to 4 A = 3	Closed Loop Set Point															

Bits 16 to 31, Signed 16 bits with implied tenths precision (-32768.8 to 3276.7)

		Instance i															
Assembly	Class, Instance, Attribute	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
4 A Control Read/Write	C = 0x71 (113) I = 1 to 4 A = 4	Heat Proportional Band															

Bits 16 to 31, Unsigned 16 bits with implied tenths precision (0 to 6553.5)

		Instance i															
Assembly	Class, Instance, Attribute	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
5 A Control Read/Write	C = 0x71 (113) I = 1 to 4 A = 5	Cool Proportional Band (instance i)															

Bits 16 to 31, Unsigned 16 bits with implied tenths precision (0 to 6553.5)

		Instance i + 1															
Assembly	Class, Instance, Attribute	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
6 A Limit Read	C = 0x71 (113) I = 1 to 4 A = 6	Limit State		Input Error Status	Analog Input Value												

Bits 16 to 28, Signed 16 bits whole (-4096 to 4095)
Bit 29, Analog Input Error Status (0 = None, 1 = Error)
Bits 30 and 31, Limit State (00 =None, 01 = Low Limit, 10 = Limit High, 11 = Other)

		Instance i + 1															
Assembly	Class, Instance, Attribute	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
7 A Limit Read/Write	C = 0x71 (113) I = 1 to 4 A = 7	Spare	Limit Clear	Clear Latched Error	Analog Input Value												

Bits 16 to 28, Signed 13 bits whole (-4096 to 4095)
Bit 29, Clear Latched Input Error (0 = Ignore, 1 = Clear)
Bits 30, Limit Clear (0 = Ignore, 1 = Clear)

Compact Class 1 B through 7 B

	Instance i															
Assembly	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1 B	Input Error Status	Loop Error Status	Actual Control Mode		Tune Status	Control Loop Output Power										

Bits 0 to 10, Signed 10 bits with implied tenths precision (-100.0 to 100.0)
Bit 11, Loop Tuning Status (0 = Off, 1 = Anything Else)
Bits 12 and 13, Actual Control Mode (00 = Off, 01 = Manual, 10 = Auto)
Bit 14, Loop Error Status (0 = None, 1 = Error)
Bit 15, Analog Input Error (0 = None, 1 = Error)

	Instance i															
Assembly	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
2 B	Spare	Open Loop Clear	Control Mode		Initiate Tune	Open Loop Set Point										

Bits 0 to 10, Signed 10 bits with implied tenths precision (-100.0 to 100.0)
Bit 11, Initiate Tune (0 = No, 1 = Yes)
Bits 12 and 13, Actual Control Mode (00 = Off, 01 = Manual, 10 = Auto)
Bit 14, Open Loop Clear (0 = Ignore, 1 = Clear)

	Instance i															
Assembly	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
3 B	Closed Loop Set Point															

Bits 0 to 15, Signed 16 bits with implied tenths precision (-3276.8 to 3276.8)

	Instance i															
Assembly	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
4 B	Integral Time															

Bits 0 to 15, Unsigned 16 bits whole (0 to 65535)

	Instance i															
Assembly	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
5 B	Derivative Time															

Bits 0 to 15, Unsigned 16 bits whole (0 to 65535)

	Instance i															
Assembly	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
6 B	Limit State		Input Error Status	Analog Input Value												

Bits 0 to 12, Signed 13 bits whole (-4096 to 4095)
Bits 13, Analog Input Error Status (0 = None, 1 = Error)
Bit 14 and 15, Limit State (00 = None, 01 = Limit low, 10 = Limit high, 11 = Other)

	Instance i															
Assembly	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
7 B	Spare	Limit Clear	Clear Latched Error	Limit Set Point High												

Bits 0 to 12, Signed 13 bits whole (-4096 to 4095)
Bit 13, Clear Latched Input Error (0 = Ignore, 1 = Clear)
Bit 14, Limit Clear (0 = Ignore, 1 = Clear)

Compact Class 8 A through 13 A

		Instance i + 15		Instance i + 14		Instance i + 13		Instance i + 12		Instance i + 11		Instance i + 10		Instance i + 9		Instance i + 8	
Assembly	**C**lass, **I**nstance, **A**ttribute	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
8 A Limit Read	C = 0x71 (113) I = 1 to 4 A = 8	Limit State		Limit State		Limit State		Limit State		Limit State		Limit State		Limit State		Limit State	

Bits 16 to 31, Paired bits representing the state of up to 16 limits (00 = None, 01 = Limit low,, 10 = Limit High)

		Instance i + 15		Instance i + 14		Instance i + 13		Instance i + 12		Instance i + 11		Instance i + 10		Instance i + 9		Instance i + 8	
Assembly	**C**lass, **I**nstance, **A**ttribute	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
9 A Limit Read/Write	C = 0x71 (113) I = 1 to 4 A = 9	Spare	Limit Clear	Spare	Limit Clear	Spare	Limit Clear	Spare	Limit Clear	Spare	Limit Clear	Spare	Limit Clear	Spare	Limit Clear	Spare	Limit Clear

Bits 16 to 31, Paired bits representing the state of up to 16 limits (00 = None, 01 = Limit low,, 10 = Limit High)

		Instance i															
Assembly	**C**lass, **I**nstance, **A**ttribute	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
10 A Limit Read/Write	C = 0x71 (113) I = 1 to 4 A = 0x0A (10)	Spare	Limit Clear	Clear Latched Error	Limit Set Point High												

Bits 16 to 28, Signed 13 bits whole (-4096 to 4095) - Bit 29, Clear Latched Input Error (0 = Ignore, 1 = Clear)
Bits 30, Limit Clear (0 = Ignore, 1 = Clear)

		Instance i + 1															
Assembly	**C**lass, **I**nstance, **A**ttribute	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
11 A CT Read	C = 0x71 (113) I = 1 to 4 A = 0x0B (11)	Spare	Heater Error		Current Error		Current RMS										

Bits 16 to 26, Unsigned 11 bits (0 to 2047)
Bits 27 and 28, Current Error (00 = None, 01 = Shorted, 10 = Open)
Bits 29 and 30, Heater Error (00 = None, 01 = Low, 10 = High)

		Instance i + 15		Instance i + 14		Instance i + 13		Instance i + 12		Instance i + 11		Instance i + 10		Instance i + 9		Instance i + 8	
Assembly	**C**lass, **I**nstance, **A**ttribute	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
12 A Alarm Read	C = 0x71 (113) I = 1 to 4 A = 0x0C (12)	Alarm State		Alarm State		Alarm State		Alarm State		Alarm State		Alarm State		Alarm State		Alarm State	

Bits 16 to 31, Paired bits reflecting the state of up to 16 alarms (00 = None, 01 = Alarm Low, 10 = Alarm High, 11 = Other)

		Instance i + 15		Instance i + 14		Instance i + 13		Instance i + 12		Instance i + 11		Instance i + 10		Instance i + 9		Instance i + 8	
Assembly	**C**lass, **I**nstance, **A**ttribute	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
13 A Alarm Read/Write	C = 0x71 (113) I = 1 to 4 A = 0x0D (13)	Alarm Clear		Alarm Silence		Alarm Clear		Alarm Silence		Alarm Clear		Alarm Silence		Alarm Clear		Alarm Silence	

Bits 16 to 31, Paired bits reflecting the state of up to 16 alarms (0 = Ignore, 1 = Clear)

Compact Class 8 B through 13 B

	Instance i + 7		Instance i + 6		Instance i + 5		Instance i + 4		Instance i + 3		Instance i + 2		Instance i + 1		Instance i	
Assembly	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
8 B	Limit State		Limit State		Limit State		Limit State		Limit State		Limit State		Limit State		Limit State	

Bits 0 to 15, Paired bits representing the state of up to 16 limits (00 = None, 01 = Limit low,, 10 = Limit High)

	Instance i + 7		Instance i + 6		Instance i + 5		Instance i + 4		Instance i + 3		Instance i + 2		Instance i + 1		Instance i	
Assembly	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
9 B	Spare	Limit Clear	Spare	Limit Clear	Spare	Limit Clear	Spare	Limit Clear	Spare	Limit Clear	Spare	Limit Clear	Spare	Limit Clear	Spare	Limit Clear

Bits 0, 2, 4, 6, 8, 10, 12 and 14, Limit Clear for instance i to instance i (0 = Ignore, 1 = Clear)

	Instance i															
Assembly	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
10 B	Spare			Limit Set Point Low												

Bits 0 to 12, Signed 13 bits whole (-4096 to 4095)

	Instance i															
Assembly	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
11 B	Spare	Heater Error		Current Error		Current RMS										

Bits 11 and 12, Current Error (00 = None, 01 = Shorted, 10 = Open)
Bits 13 and 14, Heater Error (00 = None, 01 = Low, 10 = High)

	Instance i + 7		Instance i + 6		Instance i + 5		Instance i + 4		Instance i + 3		Instance i + 2		Instance i + 1		Instance i	
Assembly	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
12 B	Alarm State		Alarm State		Alarm State		Alarm State		Alarm State		Alarm State		Alarm State		Alarm State	

Bits 0 to 15, Paired bits reflecting the state of up to 16 alarms (00 = None, 01 = Alarm Low, 10 = Alarm High, 11 = Other)

	Instance i + 7		Instance i + 6		Instance i + 5		Instance i + 4		Instance i + 3		Instance i + 2		Instance i + 1		Instance i	
Assembly	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
13 B	Alarm Clear		Alarm Silence		Alarm Clear		Alarm Silence		Alarm Clear		Alarm Silence		Alarm Clear		Alarm Silence	

Bits 0 to 15, Paired bits reflecting the state of up to 16 alarms (0 = Ignore, 1 = Clear)

Compact Class 14 A through 19 A

		Instance i															
Assembly	Class, Instance, Attribute	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
14 A Alarm Read/Write	C = 0x71 (113) I = 1 to 4 A = 0x0E (14)	Alarm Clear	Alarm Set Point High														

Bits 16 to 30, Signed 15 bits with implied tenths precision (-1638.4 to 1638.3)
Bit 31, Alarm Clear (0 = Ignore, 1 = Clear)

		Instance i + 1															
Assembly	Class, Instance, Attribute	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
15 A Analog Input Read	C = 0x71 (113) I = 1 to 4 A = 0x0F (15)	Input Error Status	Filtered Analog Input Value														

Bits 16 to 30, Signed 15 bits with implied tenths precision (-1638.4 to 1638.3)
Bit 31, Analog Input Error (0 = None, 1 = Error)

		Instance i + 1															
Assembly	Class, Instance, Attribute	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
16 A Analog Input Read	C = 0x71 (113) I = 1 to 4 A = 0x10 (16)	Filtered Analog Input Value															

Bits 16 to 31, Signed 16 bits with implied tenths precision (-3276.8 to 3276.8)

		Instance i + 15		Instance i + 14		Instance i + 13		Instance i + 12		Instance i + 11		Instance i + 10		Instance i + 9		Instance i + 8	
Assembly	Class, Instance, Attribute	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
17 A Analog Input Read	C = 0x71 (113) I = 1 to 4 A = 0x11 (17)	Spare	Input Error Status	Spare	Input Error Status	Spare	Input Error Status	Spare	Input Error Status	Spare	Input Error Status	Spare	Input Error Status	Spare	Input Error Status	Spare	Input Error Status

Bits 16, 18, 20, 22, 24, 26, 28, 30, Analog Input Error Status (0 = None, 1 = Error)

Compact Class 14 B through 17 B

	Instance i															
Assembly	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
14 B	Alarm Silence	Alarm Set Point Low														

Bits 0 to 14, Signed 15 bits with implied tenths precision (-1638.4 to 1638.3)
Bit 15, Alarm Silence (0 = Ignore, 1 = Silence)

	Instance i															
Assembly	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
15 B	Input Error Status	Filtered Analog Input Value														

Bits 0 to 14, Signed 15 bits with implied tenths precision (-1638.4 to 1638.3)
Bit 15, Analog Input Error (0 = None, 1 = Error)

	Instance i															
Assembly	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
16 B	Filtered Analog Input Value															

Bits 0 to 15, Signed 16 bits with implied tenths precision (-3276.8 to 3276.8)

	Instance i + 7		Instance i + 6		Instance i + 5		Instance i + 4		Instance i + 3		Instance i + 2		Instance i + 1		Instance i	
Assembly	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
17 B	Spare	Input Error Status	Spare	Input Error Status	Spare	Input Error Status	Spare	Input Error Status	Spare	Input Error Status	Spare	Input Error Status	Spare	Input Error Status	Spare	Input Error Status

Bits 0, 2, 4, 6, 8, 10, 12, 14, Analog Input Error Status(0 = None, 1 = Error)

RMA Specifications

Line Voltage/Power

- 20.4 to 30.8V≂ (ac/dc), 50/60Hz, ±5 percent
- Any external power supply used should comply with a class 2 or SELV rating. (See specific module specification listing for maximum VA power consumption)
- Data retention upon power failure via nonvolatile memory
- Compliant with Semi F47-0200, Figure R1-1 voltage sag requirements
- Power consumption: 4 W, 9VA

Environment

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

Agency Certifications

- UL®/EN 61010 listed; c-UL C22.2 #61010
- ANSI/ISA 12.12.01-2007 Class 1, Div. 2-Group A, B, C, D Temperature code T4 (optional)
- EN 60529 IP20; RM modules
- UL® 50, Type 4X indoor use RUI EZK Series
- NEMA 4X, EN 60529 IP66; RUI EZK Series
- RoHS by design, W.E.E.E.
- FM Class 3545 on limit control versions

Serial Communications

- All modules ship with isolated standard bus protocol for configuration and communication connection to all other EZ-ZONE products

Remote User Interface (RUI)

- Optional equipment
- 1/16 DIN
- Dual 4 digit, 7-segment displays
- Keys: Advance, infinity, up, down, plus a programmable EZ-Key
- Seven-segment address LED, programmed via push-button switch
- Communications activity, 2 LEDs

Maximum System Configuration

- One RMA module plus up to 16 additional RM modules (any combination), up to 152 loops

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

- 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

Power Supplies

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

EZ-ZONE RM Product Documentation

- User's Guide, printed hard copy, P/N 0600-0072-0000
- Watlow Support Tools CD, P/N 0601-0001-0000

Additional Communication Options:

- EIA 232/485, Modbus® RTU
- EtherNet/IP™, Modbus® TCP, 10 BASE-T/100 BASE-TX
- DeviceNet™
- Profibus DP
- USB, RM recognized as a mass storage device

USB

- USB 1.1 device
- Mini USB connector type B
- Recognized as a mass storage device/serial communications

Real Time Clock with Battery Back-up

- Accuracy (typical): +/- 30ppm at 25°C
- +30/-100ppm (-20 to 65°C)
- Battery type: Rayovac 3V (BR1225) lithium (recycle properly). Battery is available only on models with real-time clock
- Battery typical life: three cumulative years of life without power at 77°F (25°C)

Data Logging

- File storage on-removable micro SD card
- CSV (Common separated value) file type
- Export files via removable micro SD (Secure Digital) memory card or via USB communications port

Memory Card

- Removable micro SD physical size
- 2G SD memory card provided, accepts other storage space amounts
- -25 to +85°C ambient rating, non-volatile memory
- Information access to configuration files, ability to store module auto-configuration settings and data log files if options have been ordered

Auto-configuration File Back-up

- Integrated memory
  - Supports up to four modules and two profiles with micro SD memory card installed
  - Supports up to 16 modules

Note:

All module parameters are backed up in memory except for USER SET 1 and USER SET 2 parameter settings.

Note:

These specifications are subject to change without prior notice.

RMA Ordering Information

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

Code Number

①② EZ-ZONE Rail Mount	③ Access Module	④ Connector Style		⑤ Future Options	⑥ Comms. Options	⑦ Ramp/Soak Functions	⑧ Sys. Conf. & Data Logging Options		⑨⑩ Future Options	⑪⑫ Additional Options
RM	A		-	A				-	AA	

④ Connector Style

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

⑤ Future Options

A = Standard

⑥ Communications Options

A = None
2 = Modbus ® RTU 232/485
3 = EtherNet/IP™, Modbus ®/TCP
5 = DeviceNet™
6 = Profibus DP

⑦ Ramp/Soak Functions

A = None
B = Battery backup and real time clock for profile ramp and soak

⑧ System Configuration & Data Logging Options

Order Option	USB "Device" Comms.	Limited Configuration File Back-up, Maximum 4 Modules	Unlimited Auto-Configuration File Back-up, Maximum 16 Modules	On-Board Data Logging
A				
B				
Y				
D				

USB Device Configuration: USB access to configuration files (and data log files if data logging option is ordered) stored via on-board SD memory card. PC access to product via Standard Bus protocol.

Auto-Configuration Backup: Limited fixed on board memory can support backing up configuration files for a maximum of 4 modules. The unlimited option utilizes a SD memory card to enable configuration file backup for up to 16 modules. Feature can be used for cloning configuration files to multiple modules or for easy field replacement to limit downtime.

Data Logging: Data log files stored on 2G SD memory card. Data files can be exported via USB communication port transfer or removing SD card into external card reader. Watlow reserves the right to ship a larger memory amount at any point in time.

⑨⑩ Future Options

AA = Standard

⑪⑫ Additional Options

Firmware, Overlays, Parameter Settings

AA = Standard
AB = Replacement connectors hardware only, for the entered model number
12 = Class 1, Div. 2 (not available with integrated limit controller or mechanical relay options)
XX = Custom

Declaration of Conformity

EZ Zone Series RM

CE

WATLOW Electric Manufacturing Company ISO 9001 since 1996.
1241 Bundy Blvd.
Winona, MN 55987 USA

Declares that the following Series RM (Rail Mount) products:

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

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

2004/108/EC Electromagnetic Compatibility Directive

EN 61326-1	**2013**	**Electrical equipment for measurement, control and laboratory use – EMC requirements, Industrial Immunity, Class A Emissions (*Not for use in a Class B environment without additional filtering).***
EN 61000-4-2	2009	Electrostatic Discharge Immunity
EN 61000-4-3	2010	Radiated Field Immunity
EN 61000-4-4	2012	Electrical Fast-Transient / Burst Immunity
EN 61000-4-5	2006	Surge Immunity (Reviewed to IEC 61000-4-5 2014)
EN 61000-4-6	2014	Conducted Immunity
EN 61000-4-11	2004	Voltage Dips, Short Interruptions and Voltage Variations Immunity
EN 61000-3-2	2009	Harmonic Current Emissions (Reviewed to IEC 61000-3-2 2014)
EN 61000-3-3[1]	2013	Voltage Fluctuations and Flicker
SEMI F47	2000	Specification for Semiconductor Sag Immunity Figure R1-1

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

2006/95/EC Low-Voltage Directive

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

Compliant with 2011/65/EU RoHS Directive

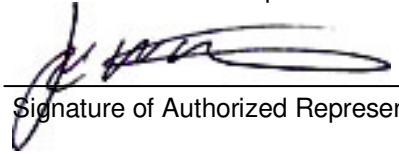
Per 2012/19/EU W.E.E.E Directive  *Please Recycle Properly*

Joe Millanes
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

How to Reach Us

Corporate Headquarters

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

Fax: +1 (314) 878-6814

Latin America

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

Europe

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

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

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

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

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

Asia and Pacific

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

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

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

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

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

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

Watlow Japan Ltd.
1-14-4 Uchikanda, Chiyoda-Ku
Tokyo 101-0047
Japan
Tel: +81-3-3518-6630 Fax: +81-3-3518-6632
Email: infoj@watlow.com Website: www.watlow.co.jp

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

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

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

電話: 07-2885168 傳真: 07-2885568

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

Your Authorized Watlow Distributor

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3 Year Warranty