

# EZ-ZONE™ RUI/Gateway

## User's Manual



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ISO 9001



Registered Company  
Winona, Minnesota USA

0600-0060-0000 Rev. A

Made in the U.S.A.



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\$15.00


## 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.



**CAUTION or WARNING**



**Electrical Shock Hazard  
CAUTION or WARNING**

## Warranty

The EZ-ZONE™ RUI/Gateway is manufactured by ISO 9001-registered processes and is backed by a three-year warranty to the first purchaser for use, providing that the units have not been misapplied. Since Watlow has no control over their use, and sometimes misuse, we cannot guarantee against failure. Watlow’s obligations hereunder, at Watlow’s option, are limited to replacement, repair or refund of purchase price, and parts which upon examination prove to be defective within the warranty period specified. This warranty does not apply to damage resulting from transportation, alteration, misuse or abuse. The purchaser must use Watlow parts to maintain all listed ratings.

## Technical Assistance

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

- Complete model number
- All configuration information
- User’s Manual
- Factory Page

## Return Material Authorization (RMA)

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

- Ship-to address
- Bill-to address
- Contact name
- Phone number
- Method of return shipment
- Your P.O. number
- Detailed description of the problem
- Any special instructions
- Name and phone number of person returning the product.

2. Prior approval and an RMA number from the Customer Service Department is required when returning any product for credit, repair or evaluation. Make sure the RMA number is on the outside of the carton and on all paperwork returned. Ship on a Freight Prepaid basis.

3. After we receive your return, we will examine it and try to verify the reason for returning it.

4. In cases of manufacturing defect, we will enter a repair order, replacement order or issue credit for material returned. In cases of customer mis-use, we will provide repair costs and request a purchase order to proceed with the repair work.

5. To return products that are not defective, goods must be in new condition, in the original boxes and they must be returned within 120 days of receipt. A 20 percent restocking charge is applied for all returned stock controls and accessories.

6. If the unit is unrepairable, you will receive a letter of explanation. and be given the option to have the unit returned to you at your expense or to have us scrap the unit.

7. Watlow reserves the right to charge for no trouble found (NTF) returns.

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# 1

## Chapter 1: Overview

### Features and Benefits

#### Remote user interface (RUI)

- Uses one RUI for multiple zones
- Shallow panel depth allows it to fit in small spaces
- Eliminates the costs and complexity of having to bring all controller related wires to the front panel
- Enables the use of multiple RUIs to improve the system's usability and flexibility

#### Agency approvals: UL Listed, cULus, CSA, CE, RoHS,

- Assures prompt product acceptance
- Reduces end product documentation costs
- CSA C22.2 #14 Approved File 158031 (Short Case Only)
- cULus UL 508 Listed approval File E102269

#### P3T Armor Sealing System

- NEMA 4X and IP66, indoor use only

#### Three-year warranty

- Demonstrates Watlow's reliability and product support

#### EZ-Key

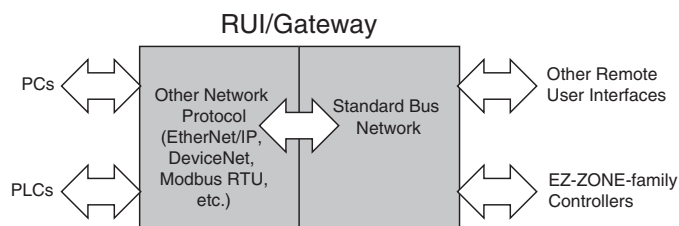
- Programmable EZ-Key enables simple one-touch operation of repetitive user activities

### Using the RUI as a Gateway

The addition of a gateway card allows information to be passed from the Standard Bus side of the gateway (EZ-ZONE-family controllers) to one or more of the following popular field bus networks:

- EtherNet/IP™
- DeviceNet™
- Modbus TCP
- Modbus RTU

The networks see the gateway and RUI as separate devices. Both sides of the gateway will require unique addresses based on the protocol specifications.



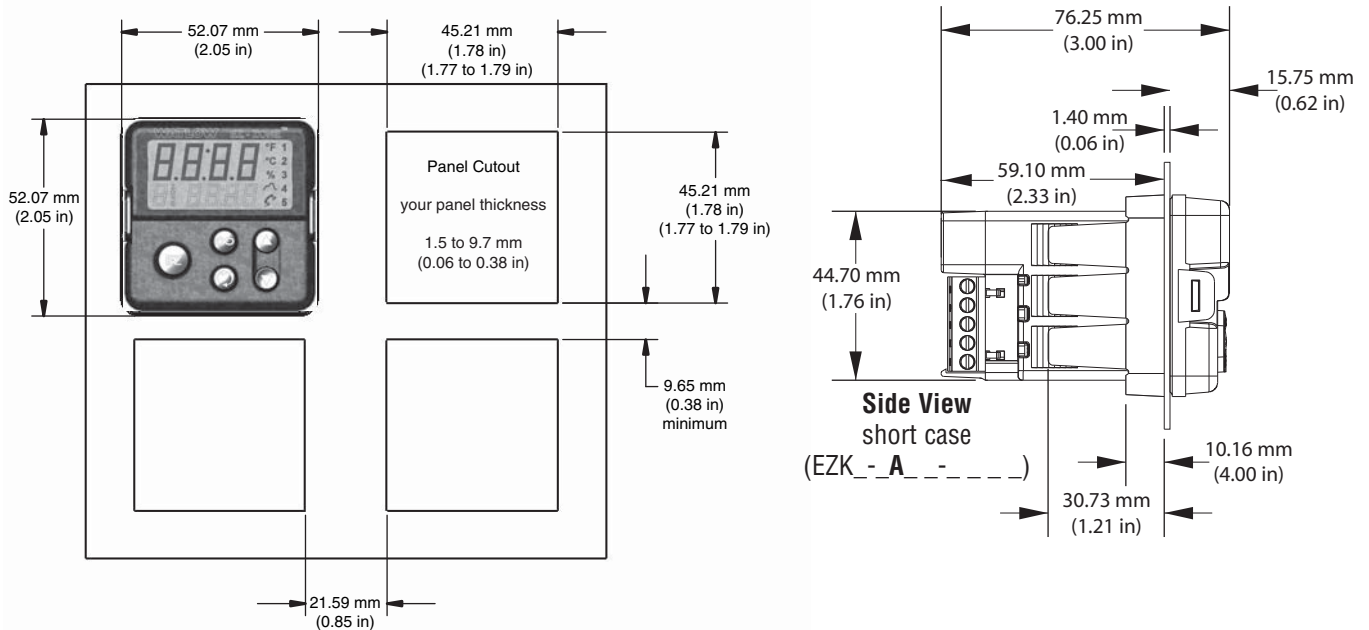
**Note:** Excessive writes through the gateway to other EZ-ZONE family controllers may cause premature EEPROM failure. For more detail see the section entitled "Saving Settings to Non-volatile Memory."

**Note:** A Standard Bus network can communicate with a maximum of four gateways or a maximum of eight RUIs. If the network includes both gateways and RUIs, each gateway address displaces an RUI address. Therefore, if the network includes four gateways, it can accommodate no more than four RUIs.

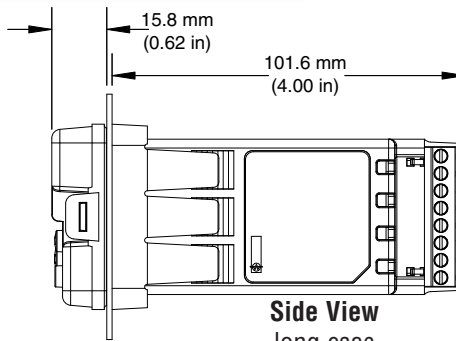
# 2

## Chapter 2: Install, Wire and Set Address

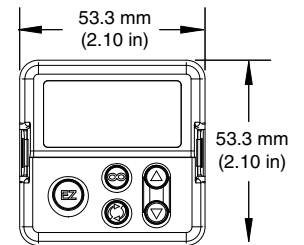
### RUI Panel Cutout Dimensions



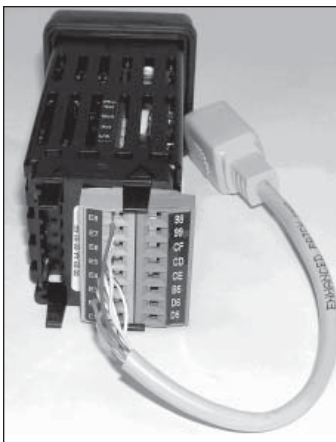
**Back View**  
short case



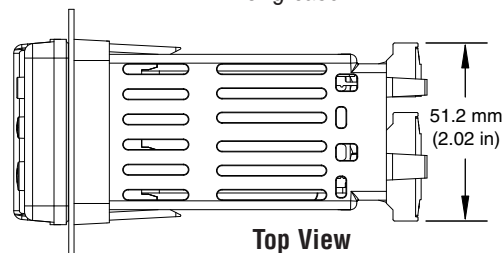
**Side View**  
long case



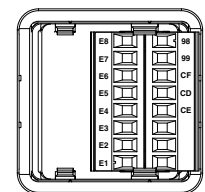
**Front View**



An Ethernet/IP™ and Modbus TCP gateway in slot B can be wired to an ethernet connector.



**Top View**  
long case  
(EZK - (2, 3 or 5) - - -)



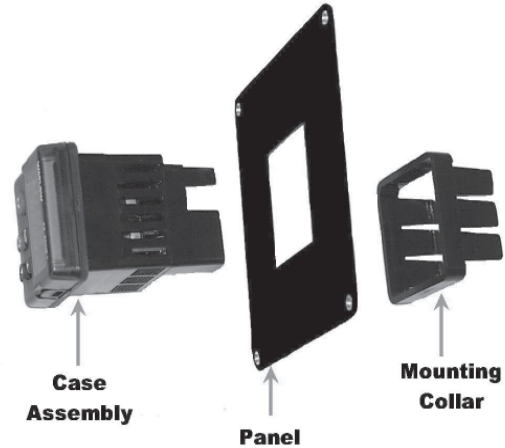
**Back View**  
long case



## Mounting the Remote User Interface (RUI)

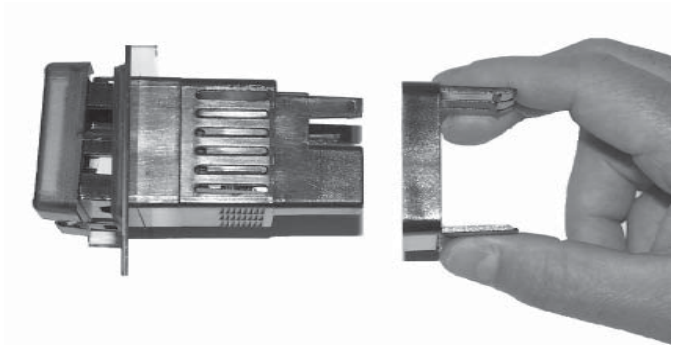
1. Make the panel cutout using the mounting template dimensions in this chapter.

Insert the case assembly into the panel cutout.



2. While pressing the case assembly firmly against the panel, slide the mounting collar over the back of the RUI.

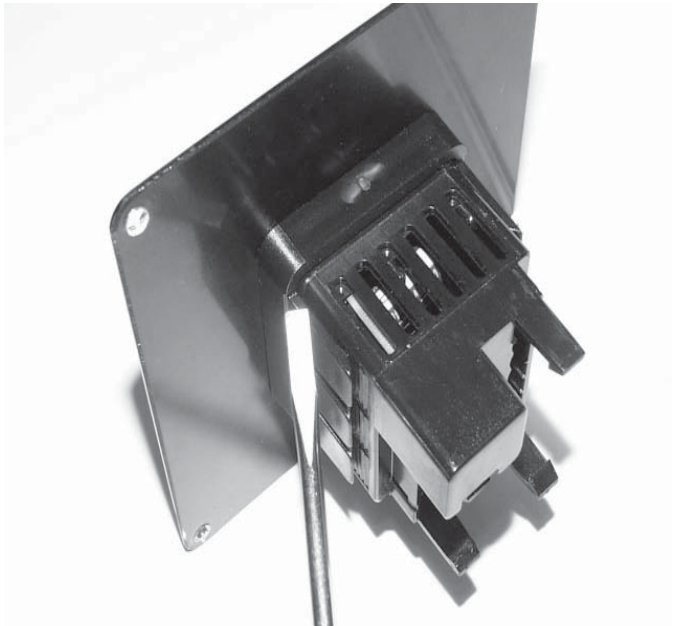
If the installation does not require an IP66/NEMA 4X seal, slide the mounting collar up to the back of the panel tight enough to eliminate the spacing between the gas ket and the panel.



3. For an IP66/NEMA 4X seal, place the blade of a screw driver in the notch of the mounting collar assembly and push to ward the panel while applying pressure to the face of the RUI. Don't be afraid to apply enough pressure to properly install the RUI. If you can move the case assembly back and forth in the cutout, you do not have a proper seal.

The tabs on each side of the bracket have teeth that latch into the ridges. Each tooth is staggered at a different depth from the front so that only one of the tabs one each side is locked onto the ridges at a time.

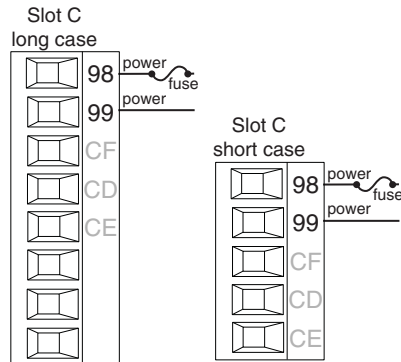
The seal is good if the distance from the panel and the top half of the assembly is 16 mm (0.630 in.) or less, and the distance bottom half and the panel is 13.3 mm (0.525 in.) or less



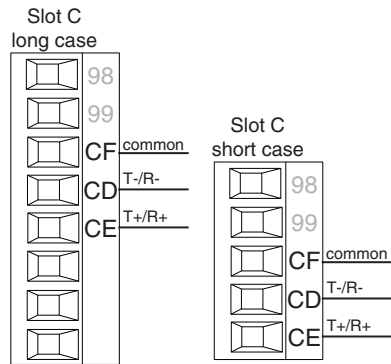


**Warning:**  
 Use National Electric (NEC) or other country-specific standard wiring and safety practices when wiring and connecting this controller to a power source and to electrical sensors or peripheral devices. Failure to do so may result in damage to equipment and property, and/or injury or loss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

## Power

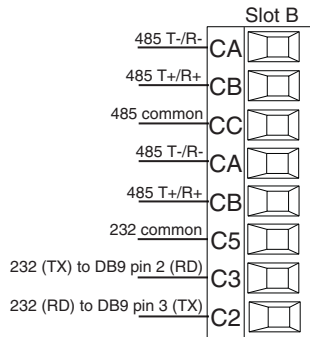


## Standard Bus EIA-485 Communications



- Wire T-/R- to the A terminal of the EIA-485 port.
- Wire T+/R+ to the B terminal of the EIA-485 port.
- Wire common to the common terminal of the EIA-485 port.
- Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network.
- Do not connect more than 16 controllers on a network.
- maximum network length: 1,200 meters (4,000 feet)
- 1/8th unit load on EIA-485 bus

## EIA-232/485 Modbus RTU Communications



- Wire T-/R- to the A terminal of the EIA-485 port.
- Wire T+/R+ to the B terminal of the EIA-485 port.
- Wire common to the common terminal of the EIA-485 port.
- Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network.
- A termination resistor may be required. Place a 120  $\Omega$  resistor across T+/R+ and T-/R- of last controller on 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.
- Do not connect more than one EZ-ZONE PM controller on an EIA-232 network.
- maximum number of EZ-ZONE PM controllers on a Modbus RTU EIA-485 network: 247
- maximum EIA-232 network length: 15 meters (50 feet)
- maximum EIA-485 network length: 1,200 meters (4,000 feet)
- 1/8th unit load on EIA-485 bus.

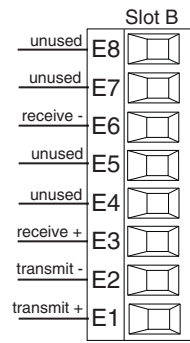
EZK \_ \_ 2 \_ \_A \_ A A

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



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

## EtherNet/IP™ and Modbus TCP Communications

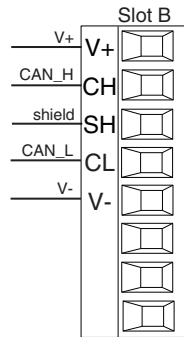


RJ-45 pin	T568B wire color	Signal	Slot B
8	brown	unused	E8
7	brown & white	unused	E7
6	green	receive -	E6
5	white & blue	unused	E5
4	blue	unused	E4
3	white & green	receive +	E3
2	orange	transmit -	E2
1	white & orange	transmit +	E1

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

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

## DeviceNet™ Communications



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





**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:**  
Excessive writes through the gateway to other EZ-ZONE family controllers may cause premature EEPROM failure. For more detail see the section entitled "Saving Settings to Nonvolatile Memory."

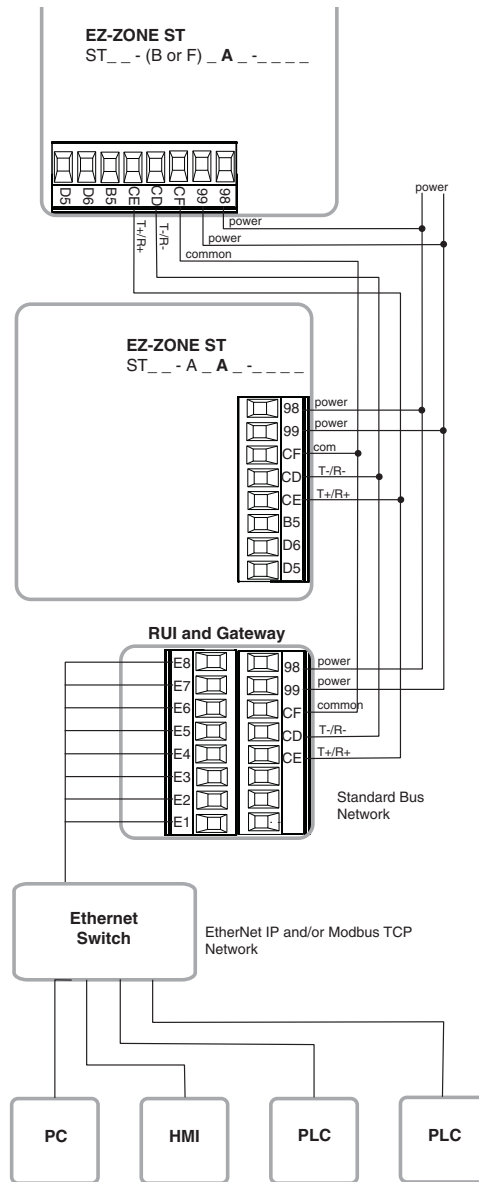
## Wiring a Serial EIA-485 Network

Do not route network wires with power wires. Connect network wires in daisy-chain fashion when connecting multiple devices in a network.

A termination resistor may be required. Place a 120 Ω resistor across T+/R+ and T-/R- of the last controller on a network.

**Note:** The RUI (remote user interface) without a gateway installed can communicate using Watlow's Standard Bus only.

**Note:** Do not route network wires with power wires.



**An RUI/Gateway allows for connectivity between dissimilar networks.**

# 3

## Chapter 3: Keys and Displays

### Upper Display:

In the Home Page, displays the process value, otherwise displays the value of the parameter in the lower display.

### Zone Display:

Indicates the controller zone that the remote user interface (RUI) is currently communicating with.

1 to 9 = zones 1 to 9

R = zone 10    E = zone 14  
b = zone 11    F = zone 15  
L = zone 12    H = zone 16  
d = zone 13

### Lower Display:

Indicates the set point or output power value during operation, or the parameter whose value appears in the upper display.

### EZ Key:

This key can be programmed to do various tasks, such as starting a profile.



### Temperature Units Indicator Lights:

Indicates whether the temperature is displayed in Fahrenheit or Celsius.

### Output Activity:

Number lights indicate output activity.

### Percent Units Indicator

Lights when the controller is displaying values as a percentage.

### Profile Activity;

Lights when a profile is running. Flashes when a profile is paused.

### Communications Activity

Flashes when the RUI is communicating with a controller.

### Up and Down Keys ▲ ▼

In the Home Page, adjusts the set point in the lower display. In other pages, changes the upper display to a higher or lower value, or changes a parameter selection.

### Infinity Key ∞

In the Home Page, press to scroll through the network zones.

In other prompts, press to back up one level, or press and hold for three seconds to return to the Home Page.

### Advance Key ⏩

Advances through parameter prompts.

### To Clear an Alarm

If the alarm condition has ended, from the Home Page, press the Advance Key ⏩. If there are any active messages, 1900 will appear in the upper display and the alarm instance will appear in the lower display.

Use the Down Arrow Key ▼ to scroll through the messages and the Up Arrow Key ▲ to clear the alarm.

### Error and Alarm Messages

REEn will appear in the lower display with the error message in the upper display.

Er.1 Error Input 1

Er.2 Error Input 2

AL 1 Alarm 1 (For alarm details, query

AL 2 Alarm 2 the alarm settings.)

AL 3 Alarm 3

AL 4 Alarm 4

L 177 Limit

tUnE Tuning

rP Ramping

dErr Device Error

C.Er Current Error

h.Er Heater Error

uRLh Value too large to be displayed ( $\geq 10000.0$ )

uRLl Value too small to be displayed ( $\leq -2000.0$ )

### No Device Connected

If no device is connected to the RUI or the controller on the selected zone is disconnected, no will appear in the upper display and dEu will appear in the lower display. Press the Infinity Key ∞ to move to the next zone.

If a zone disappears, check network wiring.

# 4

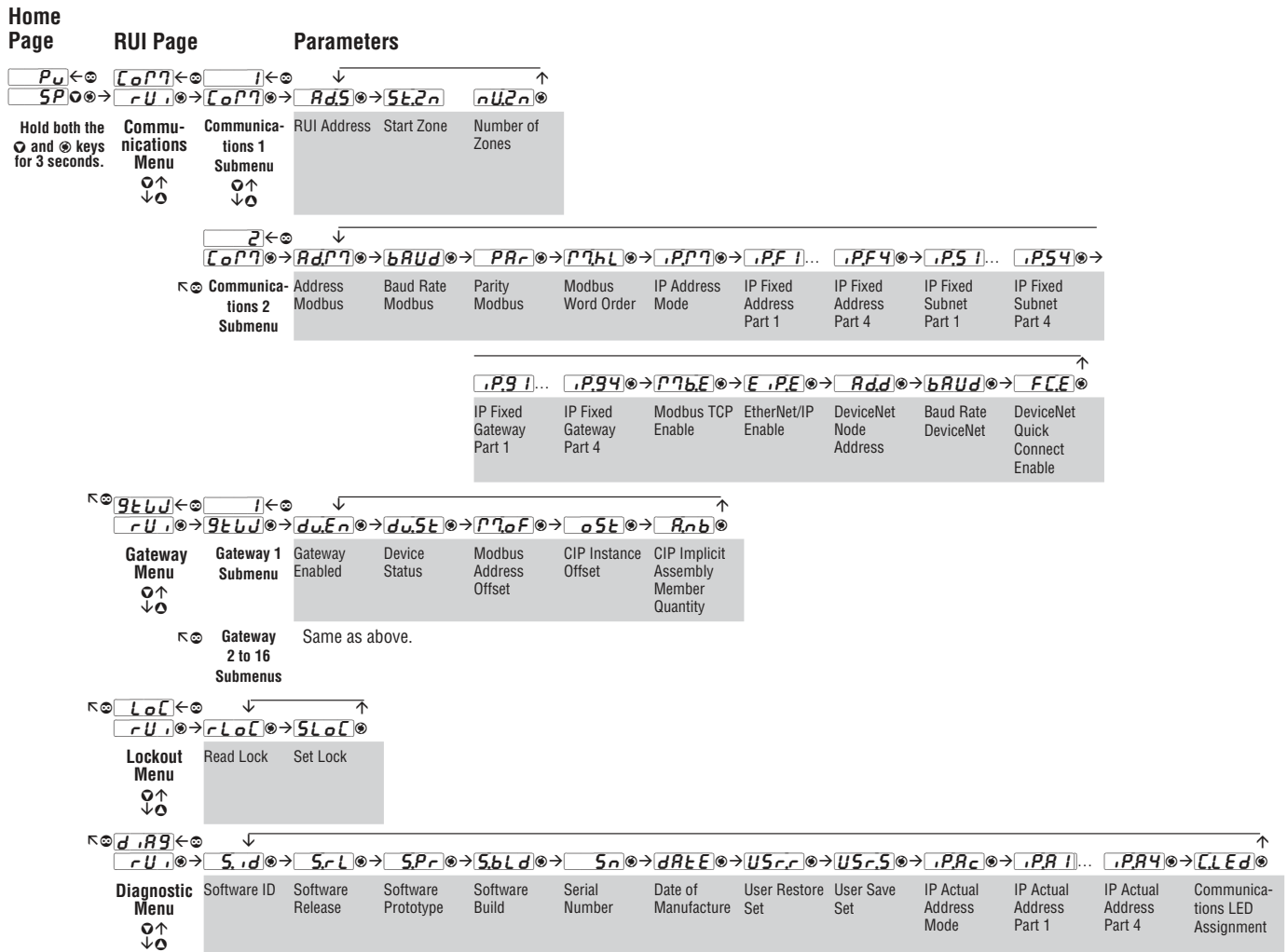
## Chapter 4: RUI Page

### The RUI Page

To go to the RUI Page from the Home Page, press both the Down  $\blacktriangledown$  and Advance  $\text{Ⓢ}$  keys for three seconds.  $\text{[L]}$  (local) will appear in the Zone Display,  $\text{[CoPn]}$  will appear in the upper display and  $\text{[rui]}$  will appear in the lower display.

- Press the Up  $\blacktriangle$  or Down  $\blacktriangledown$  key to move through the menus.
- Press the Advance Key  $\text{Ⓢ}$  to select a menu.

- Press the Advance Key  $\text{Ⓢ}$  to move through the parameters of the menu.
- Press the Up  $\blacktriangle$  or Down  $\blacktriangledown$  key to move through the parameter values.
- Press the Infinity Key  $\text{Ⓢ}$  to move backwards through the levels: parameter to menu; menu to Home Page.
- Press and hold the Infinity Key  $\text{Ⓢ}$  for two seconds to return to the Home Page.



Display	Parameter name Description	Settings	Range	Default	Appears If
<b>[AdS]</b> <b>[St.Zn]</b> <b>[nU.Zn]</b>	<b>Communications Menu</b> <b>Communications 1</b> <b>Communications 1</b>	<b>[1]</b> <b>[AdS]</b> <b>[St.Zn]</b> <b>[nU.Zn]</b>	<b>[2]</b> <b>[AdS]</b> <b>[AdS]</b>		<b>Communications 2</b> (menu 2 appears if EZK _- (2, 3 or 5) _-A _AA)
<b>[AdS]</b> [ Ad.S]	<b>Communications 1</b> <b>RUI Address</b> Set the Standard Bus address of this RUI. Each RUI on the network must have a unique address.		1 to 8	1	always
<b>[St.Zn]</b> [St.Zn]	<b>Communications 1</b> <b>Start Zone</b> Set the lowest Standard Bus address that this RUI will communicate with. Narrowing the range of addresses will speed up some operations.		1 to 16	1	always
<b>[nU.Zn]</b> [nU.Zn]	<b>Communications 1</b> <b>Number of Zones</b> Set the number of contiguous Standard Bus addresses that this RUI will communicate with. Narrowing the range of addresses will speed up some operations.		1 to 16	8	always
<b>[Ad.M]</b> [Ad.M]	<b>Communications 2</b> <b>Address Modbus</b> Set the network address of this gateway. Each device on the network must have a unique address.		1 to 247	1	the RUI includes a gateway (EZK _- 2 _- A _AA).
<b>[bAUd]</b> [bAUd]	<b>Communications 2</b> <b>Baud Rate Modbus</b> Set the speed of this controller's gateway to match the speed of the serial network.		9,600 19,200 38,400	9,600	the RUI includes a gateway (EZK _- 2 _- A _AA).
<b>[PAr]</b> [ PAr]	<b>Communications 2</b> <b>Parity Modbus</b> Set the parity of this gateway to match the parity of the serial network.		<b>[nonE]</b> None <b>[EVEN]</b> Even <b>[odd]</b> Odd	None	the RUI includes a gateway (EZK _- 2 _- A _AA).
<b>[M.hL]</b> [M.hL]	<b>Communications 2</b> <b>Modbus Word Order</b> Select the word order of the two 16-bit words in the floating-point values.		<b>[LoHi]</b> Low-High <b>[hiLo]</b> High-Low	Low-High	the RUI includes a gateway (EZK _- (2 or 3) _- A _AA).
<b>[iP.M]</b> [iP.M]	<b>Communications 2</b> <b>IP Address Mode</b> Select DHCP to let a DHCP server assign an address to this gateway.		<b>[dHCP]</b> DHCP <b>[FAdd]</b> Fixed Address	DHCP	the RUI includes a gateway (EZK _- 3 _- A _AA).
<b>[ip.F1]</b> [ip.F1]	<b>Communications 2</b> <b>IP Fixed Address Part 1</b> Set the IP address of this gateway. Each device on the network must have a unique address.		0 to 255	169	the RUI includes a gateway (EZK _- 3 _- A _AA).
<b>[ip.F2]</b> [ip.F2]	<b>Communications 2</b> <b>IP Fixed Address Part 2</b> Set the IP address of this gateway. Each device on the network must have a unique address.		0 to 255	254	the RUI includes a gateway (EZK _- 3 _- A _AA).
<b>[ip.F3]</b> [ip.F3]	<b>Communications 2</b> <b>IP Fixed Address Part 3</b> Set the IP address of this gateway. Each device on the network must have a unique address.		0 to 255	1	the RUI includes a gateway (EZK _- 3 _- A _AA).
<b>[ip.F4]</b> [ip.F4]	<b>Communications 2</b> <b>IP Fixed Address Part 4</b> Set the IP address of this gateway. Each device on the network must have a unique address.		0 to 255	1	the RUI includes a gateway (EZK _- 3 _- A _AA).
<b>[ip.S1]</b> [ip.S1]	<b>Communications 2</b> <b>IP Fixed Subnet Part 1</b> Set the IP subnet mask for this gateway.		0 to 255	255	the RUI includes a gateway (EZK _- 3 _- A _AA).
<b>[ip.S2]</b> [ip.S2]	<b>Communications 2</b> <b>IP Fixed Subnet Part 2</b> Set the IP subnet mask for this gateway.		0 to 255	255	the RUI includes a gateway (EZK _- 3 _- A _AA).



Display	Parameter name Description	Settings	Range	Default	Appears If
<b>LoC</b> Lockout Menu		* The positions of the Operations Page and Profiling Page in the ranges below can be changed in the Lock Menu (Factory Page). See the examples at the end of this chapter.			
<b>rLoC</b> [rLoC]	<b>Read Lock</b> Set the read-only security clearance level. The user can access the selected level and all lower levels. If the Set Lock level is higher than the Read Lock, the Read Lock level takes priority.		1 Home Page 2 Operations Page* 3 Profiling Page* 4 Setup Page & Diagnostics Menu 5 Lock, Calibration & Custom menus	5	always
<b>SLoC</b> [SLoC]	<b>Set Lock</b> Set the read-write security clearance level. The user can access the selected level and all lower levels. If the Set Lock level is higher than the Read Lock, the Read Lock level takes priority.		0 No changes allowed 1 Home Page 2 Operations Page* 3 Profiling Page* 4 Setup Page & Diagnostics Menu 5 Lock, Calibration & Custom menus	5	always
<b>dAG</b> Diagnostics Menu					
<b>S.id</b> [S.id]	<b>Software ID</b> View the software ID.		0 to 2, 147,483,647		always
<b>S.rL</b> [S.rL]	<b>Software Release</b> View the software release number.		0 to 2, 147,483,647		always
<b>S.Pr</b> [S.Pr]	<b>Software Prototype</b> View the software minor version number.		0 to 2, 147,483,647		always
<b>S.bLd</b> [S.bLd]	<b>Software Build</b> View the software build number.		0 to 2, 147,483,647		always
<b>Sn</b> [Sn]	<b>Serial Number</b> View the controller serial number.		0 to 2, 147,483,647		always
<b>dAtE</b> [dAtE]	<b>Date of Manufacture</b> View the controller manufacture date.		0 to 2, 147,483,647		always
<b>USr.r</b> [USr.r]	<b>User Restore Set</b> Restore the factory default RUI Page settings or load a saved configuration.		<b>nonE</b> Don't change settings <b>FCEY</b> Factory settings <b>SEt 1</b> User Set 1 <b>SEt 2</b> User Set 2	Don't change	always
<b>USr.S</b> [USr.S]	<b>User Save Set</b> Save the RUI Page settings.		<b>nonE</b> Don't change settings <b>SEt 1</b> User Set 1 <b>SEt 2</b> User Set 2	Don't change	always
<b>iPAC</b> [iPAC]	<i>Diagnostics Menu</i> <b>IP Actual Address Mode</b> View the addressing mode of the gateway in slot B of this RUI.		<b>dhCP</b> DHCP <b>FAdd</b> Fixed Address	DHCP	always
<b>iPA1</b> [iPA1]	<i>Diagnostics Menu</i> <b>IP Actual Address Part 1</b> View or change the first part of the IP address of the gateway in slot B of this RUI..		0 to 255	None	always
<b>iPA2</b> [iPA2]	<i>Diagnostics Menu</i> <b>IP Actual Address Part 2</b> View or change the second part of the IP address of the gateway in slot B of this RUI..		0 to 255	None	always
<b>iPA3</b> [iPA3]	<i>Diagnostics Menu</i> <b>IP Actual Address Part 3</b> View or change the third part of this controller's IP address.		0 to 255	None	always

Display	Parameter name Description	Settings	Range	Default	Appears If
<input type="checkbox"/> <b>PA4</b> [i.P.A4]	<i>Diagnostics Menu</i> <b>IP Actual Address Part 4</b> View or change the fourth part of this controller's IP address.		0 to 255	None	always
<input type="checkbox"/> <b>CLEd</b> [C.LEd]	<b>Communications LED Assignment</b> Set the activity that the communications indicator light will monitor.		<input type="checkbox"/> <b>Con1</b> Comms Port 1 <input type="checkbox"/> <b>Con2</b> Comms Port 2 <input type="checkbox"/> <b>both</b> Comms Ports 1 & 2 <input type="checkbox"/> <b>off</b> no monitoring	Comms Port 1	always

# 5

## Chapter 5: Using an RUI/Gateway

### Conceptual View of the RUI Used as a Gateway:

As shown in the following network screen shots the gateway allows for connectivity between dissimilar networks. Within the Watlow controls (slaves) there are many members, of which, some can be read and some read and or written to such as, the process variable, power output, set points, etc... In order for these members to be available on the field bus side of the gateway some basic setup is required in the RUI/Gateway. Com instance 1 will always represent the Standard Bus side where Com instance 2 represents the field bus side. On each side of the RUI/Gateway there are addresses (unique to each network) that need to be set up as well as some network specific settings. As an example, when using DeviceNet™ as the field bus of choice the network baud rate and node address needs to be specified. When using Ethernet the user can enable EtherNet/IP™, and or Modbus TCP. On the Standard Bus side the user will determine the number of EZ-ZONE controllers to scan (starting and end zones). Once the RUI/Gateway is configured, all accessible members for each of the EZ-ZONE controls on the Standard Bus network will be available on the field bus side of the Gateway.

### Using Modbus RTU

#### (Communications To/From a Master):

Once the gateway instance is enabled for Modbus RTU there is one other prompt (**MOF**) (Modbus Offset) that will have an impact on which member is read or written to as well as which control.

As an example:

Lets assume the offsets are as shown in the graphic on the following page and the master wants to read the closed loop set point from both Standard Bus address 1 and 4. Open up the PM Communications manual then search for closed loop set point. When found, you'll notice that the Modbus register that holds the closed loop set point value is 2160. To read the set point from Standard Bus address 1 the appropriate absolute Modbus address would be:

$$2160 + 400001 + \text{Modbus offset } (0) = 402161.$$

To read the closed loop set point from Standard Bus address 4 the absolute address would be:

$$2160 + 400001 + \text{Modbus offset } (15000) = 417161.$$

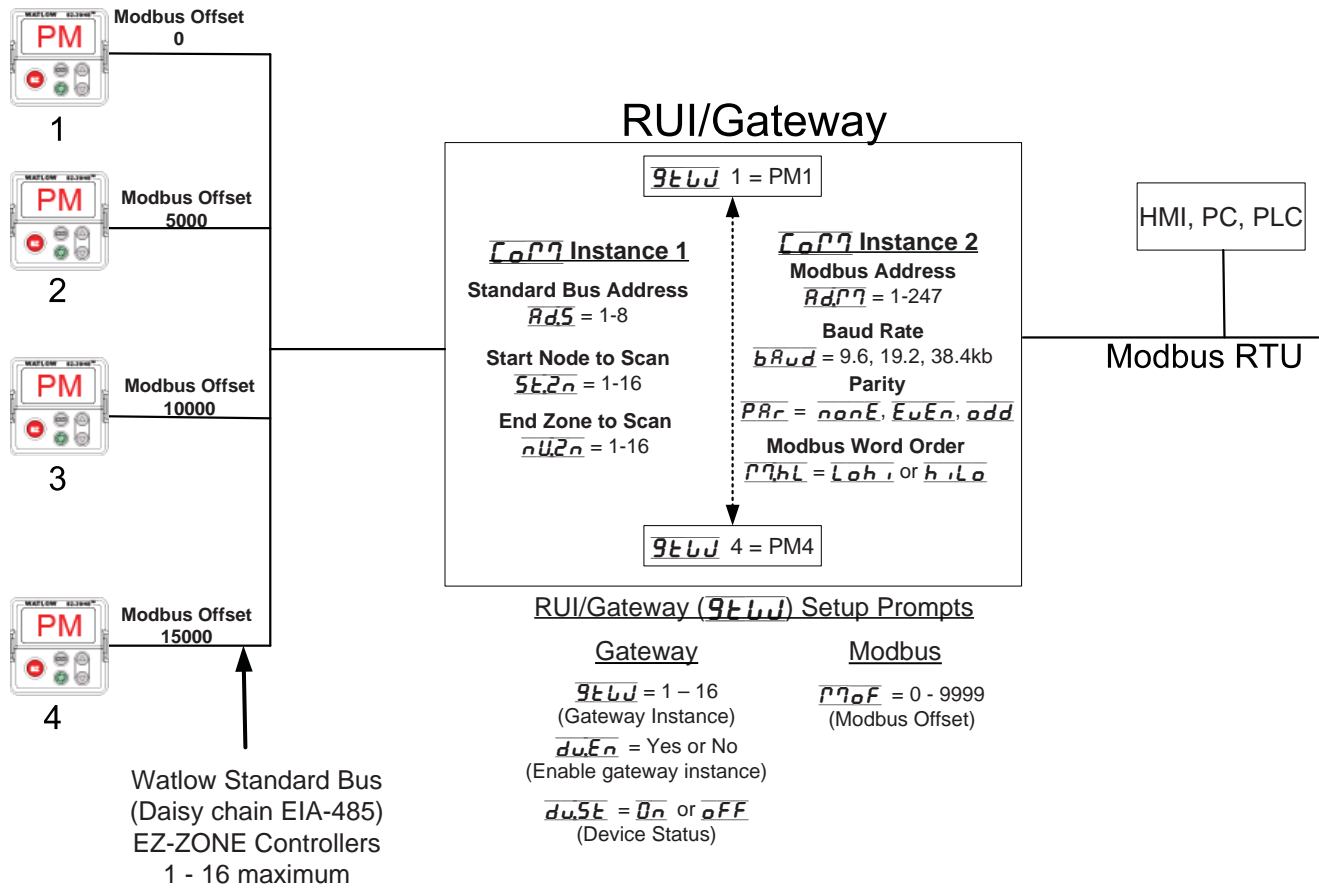
To learn more about the Modbus RTU protocol as used with EZ-ZONE controllers go to the Watlow web site and download the EZ-ZONE PM Communications User Manual: [http://www.watlow.com/literature/pti\\_search.cfm](http://www.watlow.com/literature/pti_search.cfm)

**Note: Excessive writes through the gateway to other EZ-ZONE family controllers may cause premature EEPROM failure. For more detail see the section entitled "Saving Settings to Nonvolatile Memory."**

**Note: **MOF** as modified through the RUI cannot exceed 9999. Therefore if it is desired to utilize a Modbus offset as shown in the graphic below (above 9999) it must be done using EZ-ZONE Configurator software. This software can be downloaded free of charge from the Watlow web site, [http://www.watlow.com/products/software/zone\\_config.cfm](http://www.watlow.com/products/software/zone_config.cfm)**



# RUI Being Used as Modbus RTU Gateway



**Note:** To minimize traffic and enable better throughput on Standard Bus, set the End Zone prompt in the RUI to the maximum number of EZ-ZONE controllers on the network to be scanned.

# Using DeviceNet™

## (Communications To/From a PLC):

There are two methods to communicate to/from a PLC, i.e., implicitly and explicitly. Once the gateway instance is enabled for DeviceNet™ there are two prompts that relate directly to these forms of communication.

Use the graphic on the following page (RUI being used as a DeviceNet™ Gateway) in reference to the description below.

**o5t** (CIP Offset) Used with explicit messages where this prompt defines the instance offset. The CIP offset is unique to each gateway instance and should not overlap from one gateway instance to another.

As an Example:

When programming the message instruction in the PLC the class, instance, and attribute need to be defined. To read the first instance of the process variable in PM2 enter the following information in the message instruction:

Class = 104  
Instance = 5  
Attribute = 1

Note that the instance is identified as instance 5 and not 1. RUI prompt entry for gateway instance 1 follows:

**o5t** = 0

RUI prompt entry for gateway instance 2 follows:

**o5t** = 4

Likewise, to read the process value instance 2 of PM4 the following information would need to be entered in the PLC message instruction:

Class = 104  
Instance = 14  
Attribute = 1

RUI prompt entry for gateway instance 3 follows:

**o5t** = 8

RUI prompt entry for gateway instance 4 follows:

**o5t** = 12

**Rnb** (CIP Assembly Size) Used with implicit messages where this prompt defines the implicit Assembly size. For any given RUI gateway the input and output assembly size will never be greater than 20 members. The user entry ranges from 0 to 20 where all members can be dedicated to one gateway instance or they can be distributed any way the user sees fit across the EZ-ZONE family controllers on the network. As indicated in the graphic on the following page the second instance of the RUI **CoPn** menu will require that a DeviceNet™ node address be defined along with the network baud rate.

Using the graphic below as an example, if:

**9tLJ** instance 1 has **Rnb** set to 5

**9tLJ** instance 2 has **Rnb** set to 5

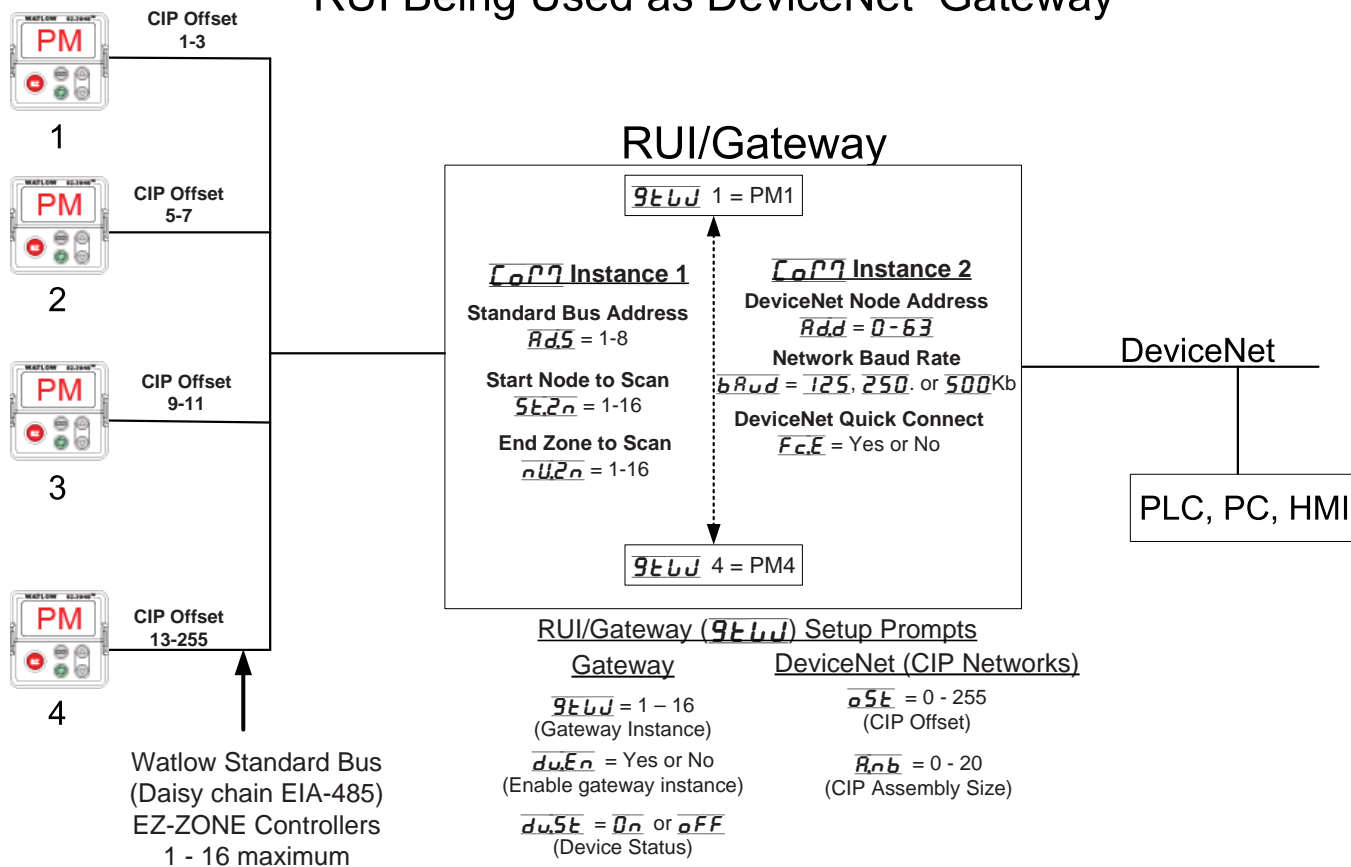
**9tLJ** instance 3 has **Rnb** set to 5

**9tLJ** instance 4 has **Rnb** set to 5

Note that the maximum assembly size of 20 has not been exceeded.

Each of the four EZ-ZONE family controllers will contain the first 5 members of the assembly and this information would then be passed implicitly to the master on the DeviceNet™ network. Go to the Watlow web site and download the EZ-ZONE PM Communications User Manual to find more information and examples on the DeviceNet™ CIP assembly structure. The EDS (Electronic Data Sheet) can be found on our website as well. Point your browser to: [http://www.watlow.com/literature/pti\\_search.cfm](http://www.watlow.com/literature/pti_search.cfm)

# RUI Being Used as DeviceNet Gateway



**Note:** To minimize traffic and enable better throughput on Standard Bus, set the End Zone prompt in the RUI to the maximum number of EZ-ZONE controllers on the network to be scanned.

## Using EtherNet/IP™

### (Communications To/From a PLC):

There are two methods used to communicate to/from a PLC, i.e., implicitly and explicitly. Once the gateway instance is enabled for EtherNet/IP™ there are two prompts that relate directly to these forms of communication shown below. In the explanation below note that it is the CIP offset that is being used not the Modbus offset as shown in the graphic below.

Use the graphic on the following page (RUI being used as an Ethernet Gateway) in reference to the description that follows.

**o5t** (CIP Offset) Used with explicit messages where this prompt defines the instance offset. The CIP offset is unique to each gateway instance and should not overlap from one gateway instance to another

As an Example:

When programming the message instruction in the PLC the class, instance, and attribute needs to be defined. To read the first instance of the process variable in PM2 enter the following information in the message instruction:

Class = 104  
Instance = 5  
Attribute = 1

Note that the instance is identified as instance 5 and not 1. RUI prompt entry for gateway instance 1 follows:

**o5t** = 0

RUI prompt entry for gateway instance 2 follows:

**o5t** = 4

Likewise, to read the process value instance 2 of PM4 the following information would need to be entered in the PLC message instruction:

Class = 104  
Instance = 14  
Attribute = 1

RUI prompt entry for gateway instance 3 follows:

**o5t** = 8

RUI prompt entry for gateway instance 4 follows:

**o5t** = 12

**Rnb** (CIP Assembly Size) Used with implicit messages where this prompt defines the implicit Assembly size. For any given RUI gateway the input and output assembly size will never be greater than 20 members. The user entry ranges from 0 to 20 where all members can be dedicated to one gateway instance or they can be distributed any way the user sees fit across the EZ-ZONE family controllers on the network.

Using the graphic on the following page as an example, if:

**gELJ** instance 1 has **Rnb** set to 5

**gELJ** instance 2 has **Rnb** set to 5

**gELJ** instance 3 has **Rnb** set to 5

**gELJ** instance 4 has **Rnb** set to 5

Note that the maximum assembly size of 20 has not been exceeded.

Each of the four EZ-ZONE family controllers will contain the first 5 members of the assembly. If it is desired to modify the default members found in the assembly or if you are simply looking for a better understanding of the CIP assembly structure go to the Watlow web site and download the EZ-ZONE PM Communications User Manual: [http://www.watlow.com/literature/pti\\_search.cfm](http://www.watlow.com/literature/pti_search.cfm)

## Using Modbus TCP

### (Communications To/From a Master):

When Modbus is enabled there are Modbus related prompts that need to be addressed. They are:

1. Modbus TCP Enable **r7bE**, turns Modbus on or off.
2. Modbus TCP Word Order **r7hL**, which allows the user to swap the high and low order 16 bit values of a 32 bit member.
3. Modbus TCP Offset **r7oF**, which defines each of the available Modbus registers for each gateway instance.

As an example:

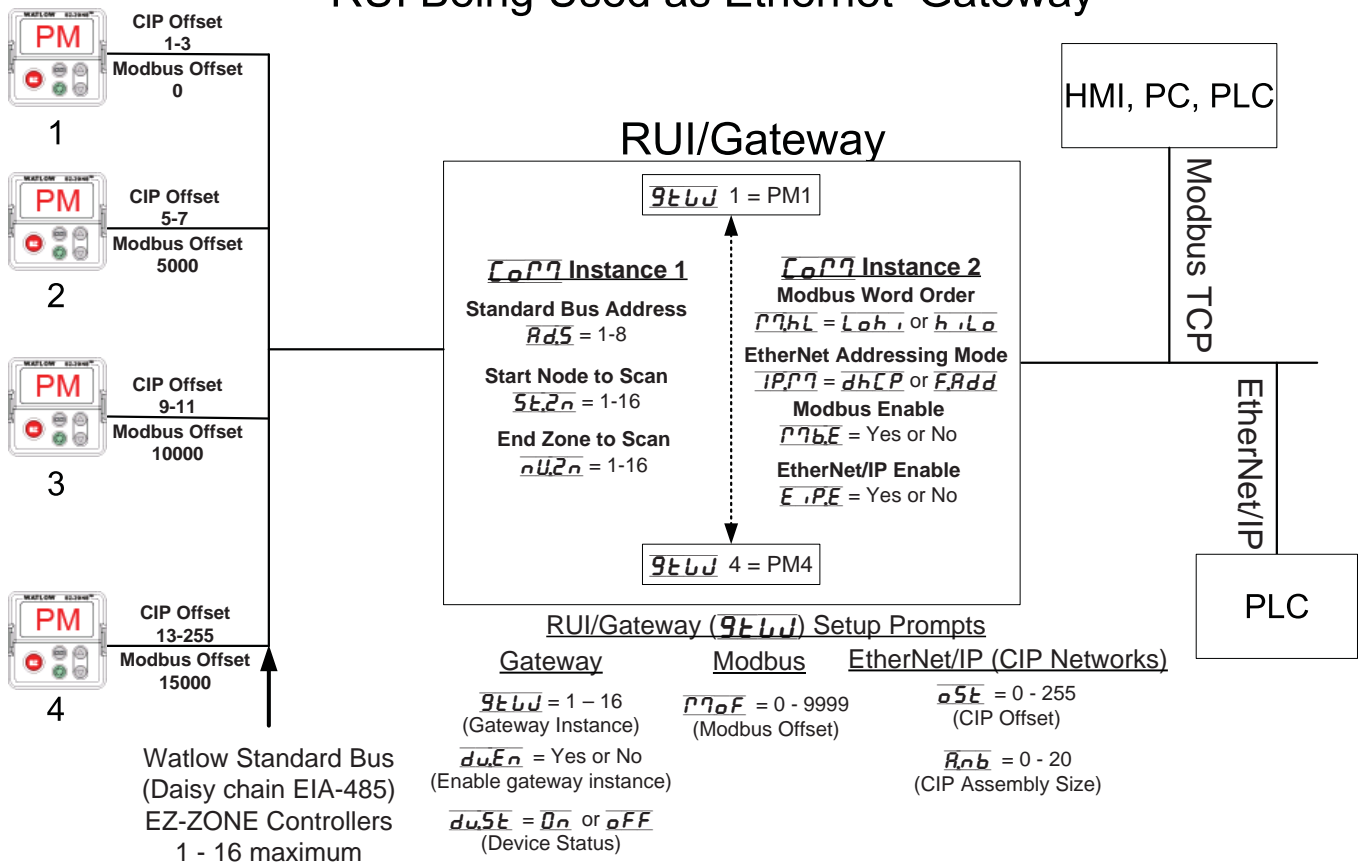
When using Modbus TCP notice that the Modbus offset now applies. Lets assume the offsets are as shown in the graphic on the following page and the master wants to read the closed loop set point from both Standard Bus address 1 and 4. Open up the PM Communications then search for closed loop set point. When found, you'll notice that the Modbus register that holds the closed loop set point value is 2160. To read the set point from address 1 the appropriate absolute Modbus address would be:

$2160 + 400001 + \text{Modbus offset (0)} = 402161.$

To read the closed loop set point from Standard Bus address 4 the absolute address would be:

$2160 + 400001 + \text{Modbus offset (15000)} = 417161.$

# RUI Being Used as Ethernet Gateway



**Note:** To minimize traffic and enable better throughput on Standard Bus, set the End Zone prompt in the RUI to the maximum number of EZ-ZONE controllers on the network to be scanned.

## Saving Settings to Non-volatile Memory

When controller settings are entered from the controller front panel or a remote user interface (RUI) changes are always saved to non-volatile memory (EEPROM). If the controller loses power or is switched off its settings will be restored when power is reapplied.

The EEPROM will wear out after about 1,000,000 writes, which should not be a problem with changes made from the panel or RUI. However if the controller is receiving instructions from a PLC, via the gateway or a computer through a network connection, the EEPROM could, over time, wear out.

By default, settings made over Standard Bus (Com instance 1) via the gateway or front panel of the RUI are saved to EEPROM. Once changed, a write to EEPROM will occur. No further writes to EEPROM will occur until the data changes again. If it is desired to inhibit writes to the EEPROM using a CIP network set class 150, instance 1, and attribute 8 to 59. If using Modbus set register 2494 to 59.

Non-volatile Save  
Modbus Addr: 2494  
EtherNet/IP™ & DeviceNet™  
Class: 150  
Instance: 1  
Attribute: 8  
Enumeration: yes = 106, no = 59

**Note: Disabling EEPROM writes is available with EZ-ZONE PM and ST firmware revision 2 and above.**

# A

## Appendix

### Troubleshooting

Indication	Description	Possible Cause(s)	Corrective Action
No Display	No display indication or LED illumination	<ul style="list-style-type: none"> <li>• Power to RUI (Remote User Interface) is off</li> <li>• Fuse open</li> <li>• Breaker tripped</li> <li>• Safety interlock switch open</li> <li>• Separate system limit control activated</li> <li>• Wiring error</li> <li>• Incorrect voltage to controller</li> </ul>	<ul style="list-style-type: none"> <li>• Turn on power.</li> <li>• Replace fuse.</li> <li>• Reset breaker.</li> <li>• Close interlock switch.</li> <li>• Reset limit.</li> <li>• Correct wiring issue.</li> <li>• Apply correct voltage.</li> </ul>
EZ-Key doesn't work	EZ-Key does not activate required function	<ul style="list-style-type: none"> <li>• Keypad malfunction</li> </ul>	<ul style="list-style-type: none"> <li>• Replace or repair the RUI.</li> </ul>
<div style="border: 1px solid black; padding: 2px; display: inline-block;">no</div> upper display <div style="border: 1px solid black; padding: 2px; display: inline-block;">dEu</div> lower display	The RUI (Remote User Interface) will not communicate with the controller at the selected zone.	<ul style="list-style-type: none"> <li>• Communications wired incorrectly</li> <li>• Communications wires routed with power wires</li> <li>• Zone address set out of range</li> <li>• RUI or controller defective</li> </ul>	<ul style="list-style-type: none"> <li>• Check and correct wiring.</li> <li>• Check and correct wiring.</li> <li>• Check zone range and address.</li> <li>• Replace or repair RUI or controller.</li> </ul>
<div style="border: 1px solid black; padding: 2px; display: inline-block;">uRLh</div>	Value is too large to be displayed ( $\geq 1000.0$ ).	<ul style="list-style-type: none"> <li>• Scaling is out of range</li> </ul>	<ul style="list-style-type: none"> <li>• Check scaling.</li> <li>• Call technical support.</li> </ul>
<div style="border: 1px solid black; padding: 2px; display: inline-block;">uRLl</div>	Value is too small to be displayed ( $\leq -2000.0$ ).	<ul style="list-style-type: none"> <li>• Scaling is out of range</li> </ul>	<ul style="list-style-type: none"> <li>• Check scaling.</li> <li>• Call technical support.</li> </ul>

# Specifications

## Basic Remote User Interface (RUI)

### Operator Interface

- Dual 4-digit, 7-segment LED displays
- EZ Key programmable function key
- Typical display update rate 1Hz
- Agency approved to IP66/NEMA 4X (indoor use only)

### Line Voltage/Power

- 100 to 240V~ (ac), +10/-15 percent; (85 to 264V~ [ac]) 50/60 Hz, ±5 percent 6VA maximum
- 24V≈ (ac/dc), +10/-15 percent; 50/60 Hz, ±5 percent

### Environment

- -18 to 65°C ambient
- -40 to 80°C shipping and storage

## Dimensions

Size	Behind Panel (max.)	Width	Height	Display Height
Long Case	101.6 mm (4.00 in)	53.3 mm (2.10 in)	53.3 mm (2.10 in)	up: 10.80 mm (0.425 in) low: 6.98 mm (0.275 in)
Short Case	59.1 mm (2.33 in)	53.3 mm (2.10 in)	53.3 mm (2.10 in)	up: 10.80 mm (0.425 in) low: 6.98 mm (0.275 in)

## Weight

- Controller (short case): 99.8 g (0.22 lb)
- Controller (long case): 162.5 g (0.36 lb)

Modbus® is a trademark of AEG Schneider Automation Inc.

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

UL® is a registered trademark of Underwriters Laboratories Inc.

DeviceNet™ is a trademark of Open DeviceNet™ Vendors Association.

**Note:** These specifications are subject to change without prior notice.



# Ordering Information

**EZ-Zone Remote Users Interface** E Z K - - - - -

## Remote User Interface (RUI)

- A None
- B Basic 1/16 DIN

## Power Supply Voltage for Remote User Interface (RUI)

- A None, if no RUI is being ordered
- L Low voltage 24 to 28V $\approx$  (ac/dc)
- H Universal high voltage 100 to 240V $\approx$  (ac/dc)

## Communications Options (Standard Bus always included)

- A None (short case)
- 2 EIA 232/485 Modbus RTU™ (long case)
- 3 EtherNet/IP™ Modbus TCP (long case)
- 5 DeviceNet™ (long case)

## Custom Remote User Interface (RUI)

- AA None
- XX Custom options, consult factory

## For Future Use

- A None

## Central Communication Module

- A None

## PC Based Software

- AA None

## NOTE

Configurator PC software can be downloaded for free from the Watlow website ([www.watlow.com](http://www.watlow.com)).

# Declaration of Conformity

## Series EZ Zone RUI



Watlow Winona, Inc.  
1241 Bundy Blvd.  
Winona, MN 55987 USA

Declares that the following product:

Designation: **Series EZ Zone RUI**

Model Numbers: EZK, followed by A or B, followed by A, L or H, followed by any number or letter, followed by any two letters or numbers, followed by A, followed by A, followed by any two letters or number.

Classification: Temperature control, Installation Category II, Pollution degree 2  
IP66 Environmental seal on front panel.

Rated Voltage and Frequency: Control 100 to 240 V~ (ac 50/60 Hz) or 24 to 28 V~ (ac 50/60 Hz or dc)

Rated Power Consumption: 10 VA

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

### **89/336/EEC Electromagnetic Compatibility Directive**

<b>EN 61326</b>	<b>1997</b>	<b>A1:1998</b>	<b>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.</b>
		<b>A2:2002</b>	
EN 61000-4-2	1996	A1, 1998	Electrostatic Discharge Immunity
EN 61000-4-3	1997		Radiated Field Immunity
EN 61000-4-4	1995		Electrical Fast-Transient / Burst Immunity
EN 61000-4-5	1995	A1, 1996	Surge Immunity
EN 61000-4-6	1996		Conducted Immunity
EN 61000-4-8	1994	A1, 2001	Magnetic Field Immunity
EN 61000-4-11	1994		Voltage Dips, Short Interruptions and Voltage Variations Immunity
EN 61000-3-2	2000	ED.2.	Harmonic Current Emissions
EN 61000-3-3	1995	A1:1998	Voltage Fluctuations and Flicker

### **73/23/EEC Low-Voltage Directive**

**EN 61010-1**      **2001**      **Safety Requirements of electrical equipment for measurement, control and laboratory use. Part 1: General requirements**

### **Compliant with 2002/95/EC RoHS Directive**


**2002/96/EC WEEE Directive**  **Equipment Requires Recycling**

Raymond D. Feller III  
Name of Authorized Representative

Winona, Minnesota, USA  
Place of Issue

General Manager  
Title of Authorized Representative

January 2008  
Date of Issue

  
Signature of Authorized Representative

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