5 Chapter 5: Using an RUI/Gateway

Conceptual View of the RUI/GTW

As shown in the following network screen shots the gateway allows for connectivity between dissimilar networks. Within the Watlow controllers there are many parameters (members), of which, some can be read and some read and or written to. As an example, the Process Value can be read only, where the Closed Loop Set Point can be read and or written to. In order for these parameters to be available on the field bus side of the gateway some basic setup is required in the RUI/GTW. Communications instance 1 will always represent the Standard Bus side of the network where communications instance 2 represents the field bus side. On each side of the RUI/GTW there are addresses (unique to each network) that need to be set up; there are also some network specific settings as well. As an example, when using DeviceNet™ as the field bus of choice, the network baud rate and node address must 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 total number of EZ-ZONE® controllers (slaves) to scan (starting and end zones). Once the RUI/GTW is configured, all accessible parameters for each of the EZ-ZONE controllers on the Standard Bus network will be available on the field bus side of the Gateway.

Note:

Excessive writes through the gateway to other EZ-ZONE family controllers may cause premature EEPROM failure. For more detail, open the associated controller User Guide to find the Non-Volatile Save prompt [nUS]. Turn to the Setup Page and then under the Com Menu and set this prompt to Yes (enable writes) or No (disable writes). To learn more turn to the section entitled "Saving Settings to Non-volatile Memory".

Using RUI Lockout and Password Security

If unintentional changes to parameter settings might raise safety concerns or lead to downtime, you can use the lockout feature to make them more secure. There are two methods of lockout that can be deployed through the RUI, both of which are accessible from the RUI Page. Method 1 is discussed below.

Method 1- Change the value of the Read Lock [rLoC] (1 to 5) and Set Lock [SLoC] (0 to 5) prompts where the higher the value or setting for each translates to a higher security clearance (greater access).

Note:

When using Method 1 Lockout all settings can be modified by anyone who knows how to find their way to the [SLoC] and [rLoC] parameters.

Note:

These lockout settings apply to the RUI only. When utilizing Method 1 described above, the RUI settings may serve as an override to the local PM settings when it too is using Method 1. As an example, if a PM control has Read Lock set to 1 and the RUI has the same prompt set to 5, the RUI will have full visibility to all PM menus when connected to it.

An example of Method 1 lockout usage could be that it is determined that an operator should have read access to all menus while allowing write access to the Home Page only.

1. Press and hold the Advance and Infinity keys for approximately 6 seconds to enter the RUI Page
2. Navigate to the [LoC] Menu using the Up or Down arrow keys
3. Using the green Advance key navigate to the Read Lockout Security [rLoC] and change it to 5
4. Push the green Advance key and navigate to the and Set Lockout Security [SLoC] changing it to 1

Using Lockout Method 1 (Read and Set Lock)

There are two Pages within an RUI (Home and RUI Page) that are always visible regardless of Read and Set Lock settings. However, the menus that are visible and which ones can be written to are dependent on these settings. Looking at the table below, "Y" equates to yes (can write/read) where "N" equates to no (cannot write/read). The colored cells simply differentiate one level from the next. As stated previously, the Set Lockout has 6 levels (0 to 5) of security where the Read Lockout has 5 (1 to 5). Therefore, level "0" applies to Set Lockout only.

RUI Page Menus [rLoC] and [SLoC]

Menus	Security Level					
	0	1	2	3	4	5
Communications Menu	N	N	N	N	N	Y
Global Menu	N	N	N	N	N	Y
Gateway Menu	N	N	N	N	N	Y
Lock Menu	N*	Y*	Y*	Y*	Y*	Y
Diagnostic Menu**	N	Y	Y	Y	Y	Y

* Visible, with limited write capabilities. Read and Set Lock can always be written to.

** Always visible and never writable

Note:

Using Method 1 Lockout all settings can be modified by anyone who knows how to find their way to the [SLoC] and [rLoC] parameters

Method 2- Enable Password Security [PAS.E] and then modify the Lock Level [LoC.L] value which ranges from 1 to 5. See the section entitled Using Lockout Method 2 for more detail.

Using Lockout Method 2 (Password Enable)

It is sometimes desirable to apply a higher level of security to the RUI where a password would be required to access the menus. If Password Enabled [PAS.E] in the RUI Page under the [LoC] Menu is set to on, an overriding Password Security will be in effect for the RUI. Without the appropriate password (User or Administrator), specified menus within the RUI will remain inaccessible based on the Locked Access Level [LoC.L] prompt. On the other hand, a User with a password would have visibility restricted by the Read Lockout [rLoC] and the Set Lockout [SLoC] settings. As an example, with the following settings:

- Password [PAS.E] Enabled
- Locked Access Level [LoC.L] set to 1
- Read [rLoC] and Set [SLoC] Lock set to 5

a User (having entered a User password) would have access to all menus with the exception of the Lock menu. Therefore, Read and Set Lock cannot be changed. If an Administrator enters the appropriate password all menus would then become available again.

How to Enable Password Security

Follow the steps below:

1. Go to the RUI Page by holding down the Advance key and the Down key for approximately six seconds

2. Push the Down or Up key to get to the [LoC] menu. Again push the Advance key until the Password Enabled [PAS.E] prompt is visible

3. Push either the Down or Up key to turn it on. Once on, 4 new prompts will appear:

   a. [LoC.L], Locked Access Level (1 to 5) corresponding to the lockout table above.

   b. [roLL], Rolling Password will change the Customer Code every time power is cycled.

   c. [PAS.u], User Password which is needed for a User to acquire access to the control.

   d. [PAS.A], Administrator Password which is needed to acquire administrative access to the control.

The Administrator can either change the User and or the Administrator password or leave them in the default state. Once Password Security is enabled they will no longer be visible to anyone other than the Administrator. In other words the Lock Menu [LoC] is not available to a User. As can be seen in the formula that follows either the User or Administrator will need to know what those passwords are to acquire a higher level of access to the control. Back out of this menu by pushing the Infinity key. Once out of the menu, the Password Security will be enabled.

How to Acquire Access to the Control

To acquire access to any inaccessible Menus, go to the RUI Page and enter the [ULoC] menu. Once there follow the steps below:

Note:

If Password Security (Password Enabled [PAS.E] is on) is enabled the two prompts mentioned below in the first step will not be visible. If the password is unknown, call the individual or company that originally setup the control.

1. Acquire either the User Password [PAS.u] or the Administrator Password [PAS.A].

2. Push the Advance key until the Code [CodE] prompt appears.

Note:

   a. If the the Rolling Password is off push the Advance key until the Password [PASS] prompt is 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 RUI 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 RUI Page by pushing and holding the Infinity key for two seconds.

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

Passwords equal:

7. **User**

   a. If Rolling Password [roLL] is Off, Password [PASS] equals User Password [PAS.u].

   b. If Rolling Password [roLL] is On, Password [PASS] equals: ([PAS.u] x code) Mod 929 + 70

8. **Administrator**

   a. If Rolling Password [roLL] is Off, Password [PASS] equals User Password [PAS.A].

   b. If Rolling Password [roLL] is On, Password [PASS] equals: ([PAS.A] x code) Mod 997 + 1000

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

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

An example using Method 2 lockout may be a case where once the RUI gateway is setup downtime due to inadvertent and unwanted changes to the RUI would be unacceptable. By enabling Password Security all menus (with the exception of Unlock [UloC]) would be inaccessible until a valid password is entered.

1. Press and hold the Advance and Down arrow keys for approximately 6 seconds to enter the RUI Page
2. Navigate to the [LoC] Menu using the Up or Down arrow keys.
3. Using the green Advance key navigate to the Password Enable [PAS.E] prompt and change it to on.
4. Push the green Advance key and navigate to the Lock Level [LoC.L] prompt changing it to 1.
5. Push the green Advance key and select whether or not rolling password [roLL] should be on or off.
6. Push the green Advance key and select a User Password [PAS.u] by using the Up or Down arrow keys.
7. Push the green Advance key and select an Administrator Password [PAS.A] by using the Up or Down arrow keys.
8. Push and hold the Infinity key for 3 seconds to return to the Home Page.

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 parameter is read or written to as well as which controller.

As an example, lets assume the offsets are as shown in the graphic on the following page and the Master wants to read instance one Closed Loop Set Point from both Standard Bus address 1 and 4. Open up the associated PM Users Guide and determine whether or not the controller is configured to use Map 1 or Map 2 Modbus addresses. This can be found in the Setup Page under the Com Menu. Once this is determined, turn to the Operations Page and look in the Loop Menu for Closed Loop Set Point. If using Map 1 you'll notice that the Modbus register that holds the Closed Loop Set Point value is 2160; if using Map2 then the address would be 2640. To read instance one Closed Loop Set Point from Standard Bus address 1 the appropriate absolute Modbus address would be:

2160 + 400001 + Modbus offset (0) = 402161.

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

2160 + 400001 + Modbus offset (15000) = 417161.

When considering what the offsets will be for each control, first determine the highest Modbus address that you will need to access from any given control while keeping in mind that the last available Modbus address is 465535. Ensure the offsets for each control do not overlap one another. As a point of reference, the table below shows the maximum number of Modbus registers in each of the EZ-ZONE controls.

With Profiles

PM	ST	RMC
8,500	8,000	43,400

Without Profiles

PM Express	PM	ST	RMC	RMH	RMS	RML	RME	RMA
2,200	4,000	2,200	5,300	17,000	18,000	9,500	7,000	5,500

Note:

The Modbus Offset [MoF] as modified through the RUI cannot exceed 9999. Therefore, if it is desired to utilize a Modbus offset as shown in the following graphic (above 9999) it must be entered using EZ-ZONE Configurator software. This software can be downloaded free of charge from the Watlow web site:

Modbus - Using Programmable Memory Blocks

All EZ-ZONE controllers equipped with the Modbus protocol feature a block of addresses that can be configured by the user to provide direct access to a list of 40 user configured parameters. This allows the user easy access to this customized list by reading from or writing to a contiguous block of registers.

Note:

To use the User Programmable Memory Blocks feature, Map 2 must be selected in the controller and the RUI. The RUI and the control must be set the same. For the control change the mapping [MAP] via the Setup Page under the [CoM] Menu. For the RUI navigate to the RUI Page and then the [CoM] Menu

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

Assembly Definition Addresses

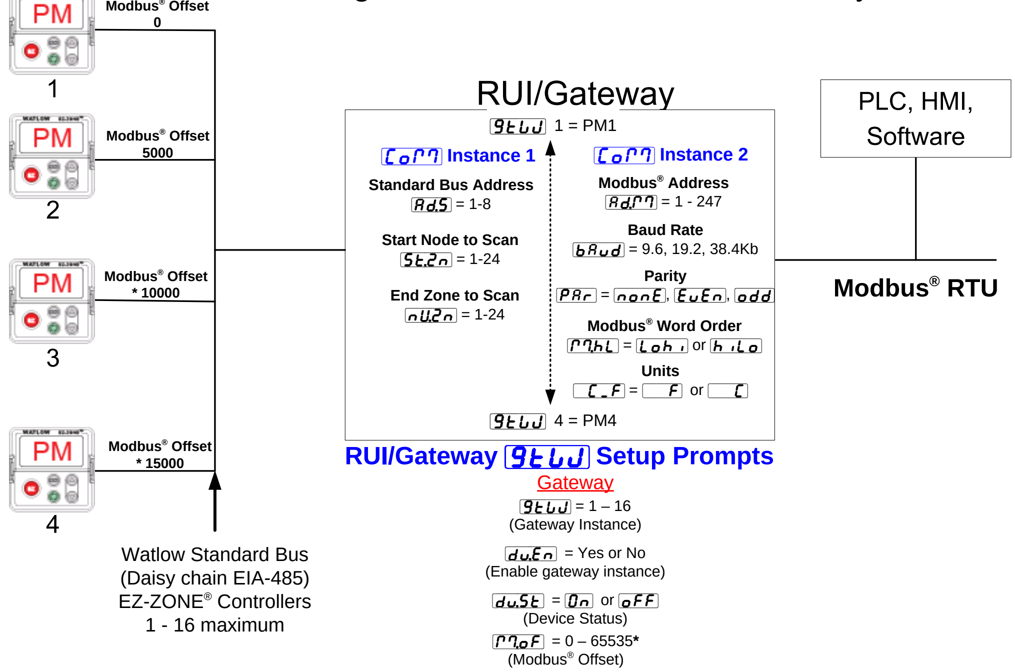
- Fixed addresses used to define the parameter that will be stored in the "Working Addresses", which may also be referred to as a pointer. The value stored in these addresses will reflect (point to) the Modbus address of a parameter within the controller.

Memory Blocks" found in the appendix of this Users Guide reflects the assemblies and their associated addresses.

To learn more about the Modbus RTU protocol point your browser address below:

http://www.modbus.org

RUI Being Used as Modbus® RTU Gateway



* The RUI allows for a maximum entry of 9999 due to the limitations of the 7 segment display. To enter an offset > 9999 EZ-ZONE® configurator software must be used.

Assembly Working Addresses

- Fixed addresses directly related to their associated Assembly Definition Addresses" (i.e., Assembly Working Addresses 200 & 201 will assume the the parameter pointed to by Assembly Definition Addresses 40 & 41).

When the Modbus address of a target parameter is stored in an "Assembly Definition Address" its corresponding working address will return that parameter's actual value. If it's a writable parameter, writing to its working register will change the parameter's actual value.

As an example (using the EZ-ZONE ST Users Guide), Modbus register 360 and 361 (Map 2) contains the Analog Input 1 Process Value (See Operations Page, Analog Input Menu). If the value 360 and 361 is loaded into Assembly Definition Addresses 90 and 91, the Process Value sensed by Analog Input 1 will also be stored in Modbus registers 250 and 251. Note that by default this parameter is also stored in working registers 240 and 241 as well.

Note:

When changing the assembly as in the example above a multi-write function must be used, i.e., writing 360 to register 90 and 361 to register 91. All members in the assembly are 32 bits.

The table identified as " Modbus Programmable

Note:

To minimize traffic and enable better throughput on Standard Bus, set the Number of Zones prompt [nU.Zn] in the RUI to the maximum number of EZ-ZONE controllers on the network to be scanned.

Note:

The logic used when determining the Modbus offset is based on the number of Modbus addresses needed for any given controller. In the above example, each PM controller would have access to the first 5000 Modbus registers (400001 - 405001).

Note:

If using a legacy EZ-ZONE ST controller with a firmware version less the 3.0, consider using the Modbus addresses listed in the ST Users Guide in the column entitled "RUI/GTW Modbus". If the firmware in the ST is 3.0 or higher new features were added and made accessible through the Map 2 registers. If interested in using the new features today or perhaps in the future configure the ST for Map2 Modbus registers.

CIP - Communications Capabilities

Communications using CIP (EtherNet/IP and DeviceNet) can be accomplished with any EZ-ZONE controller using an RUI/GTW. Reading or writing when using CIP can be accomplished via explicit and or implicit communications. Explicit communications usually requires the use of a message instruction within the Programmable Logic Controller (PLC) but there are other ways to do this as well. 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 controller and are different for each. 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. The O to T assembly is made up of 20 (32 bit) members that are user configurable where the T to O assembly consists of 21 (32 bit) members. The first member of the T to O assembly is called the Device Status, it is unique to the RUI/GTW and cannot be changed. Bits 16 - 31 of this 32 bit word represents the communications status of the EZ-ZONE controllers on the Standard Bus side of the RUI/GTW when enabled. Once a Zone is enabled, valid communications will be represented with the bit set to a "1", if set to "0", the RUI/GTW is not communicating with the zone. Bit 16 represents Zone 1 where bit 31 represents Zone 16. The 20 members that follow Device

Limit Menu) write the value of 0x70, 0x01 and 0x01 (Class, Instance and Attribute respectively) to 0x77, 0x01 and 0x0E. Once executed, writing a value of zero to this member will reset a limit assuming the condition that caused it is no longer present.

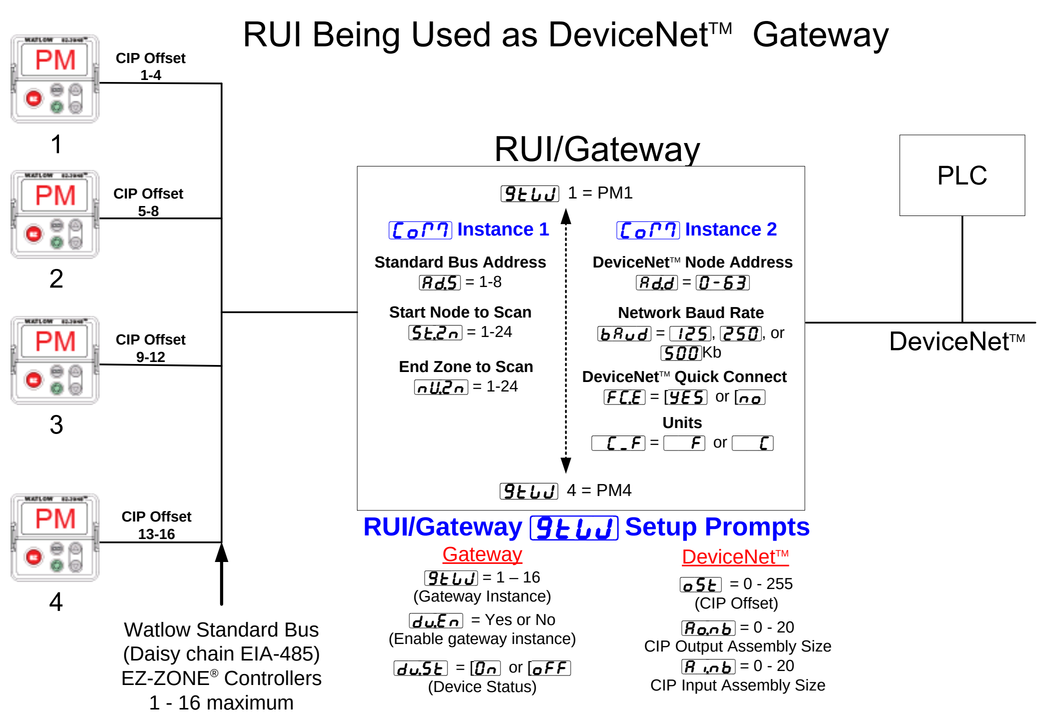
Note:

When changing the implicit assembly of any given controller through the RUI/GTW ensure that the CIP Instance Offset is added to the documented instance for any given parameter as well as the assembly instance. As an example, if it were desired to do the above operation on PM3 the value to write would now be 0x70, 0x09 and 0x01 (Class, Instance and Attribute respectively) to 0x77, 0x09 and 0x0E. Notice that the CIP Offset was added to each.

Using DeviceNet™ Communications To/From Third Party Device:

When using the DeviceNet protocol, there are two methods used in communicating, implicitly and explicitly. Once the gateway instance is enabled there are two prompts that relate directly to these forms of communication.

Use the graphic below in reference to the descriptions that follow.



Status are user configurable. The Appendix of this user manual contains the assemblies for each of the EZ-ZONE controllers. (See Appendix: CIP Implicit Assemblies by product).

To change any given member of either assembly simply write the new class, instance and attribute to the member location of choice. As an example, if it were desired to change the 14th member of the O to T assembly of an EZ-ZONE PM Integrated controller (PM1) from the default parameter (Heat Proportional Band) to Limit Clear Request (see Operations Page,

oSt CIP Offset, used exclusively with explicit messaging where it defines a specific gateway instance (EZ_ZONE PM or RM controller) to receive a message originating from the network Master. The CIP offset is unique to each gateway instance and is added to the published instance of any given parameter.

As an example, when programming the explicit message ensure that the class, instance and attribute are defined. To read the first instance of the Process Variable in PM2 (see graphic on next page) use the following information in the message instruction:

Class = 104 or (0x68)
Instance = 1
Attribute = 1

Note that the instance is identified as instance 1 because there is no offset to add. RUI prompt entry for gateway instance 1 follows:

oSt = 0

RUI prompt entry for gateway instance 2 (PM2) follows:

oSt = 4

RUI prompt entry for gateway instance 3 follows:

oSt = 8

RUI prompt entry for gateway instance 4 follows:

oSt = 12

To read the process value instance 2 of PM4 add the offset to the instance. The following information would need to be entered in the message instruction:

Class = 104 or (0x68)
Instance = **14** or (0x0E)
Attribute = 1

Ao.nb From the gateway perspective, this assembly represents data that comes from Standard Bus controllers (EZ-ZONE PM or RM) and is sent out on the network. As seen from the network, this is the CIP Implicit Output Assembly representing inputs to the Master and is used exclusively when communicating implicitly. For any given RUI gateway instance (EZ-ZONE controller), the output assembly size will never be greater than 20, 32-bit members. The user entry ranges from 0 to 20.

A i.nb From the gateway perspective, this assembly represents data that comes from the network Master and is sent to one or more gateway instance (EZ-ZONE PM or RM) on Standard Bus. As seen from the network, this is the CIP Implicit Input Assembly representing outputs from the Master and is used exclusively when communicating implicitly. For any given RUI gateway instance (EZ-ZONE controller), the input assembly size will never be greater than 20, 32-bit members. The user entry ranges from 0 to 20.

Note:

The maximum number of implicit input/output members using DeviceNet cannot exceed 200. A network could have up to 10 EZ-ZONE controllers with 20 members each maximum or the 200 members can be divided any way the user would like as long as 20 I/O members per controller are not exceeded.

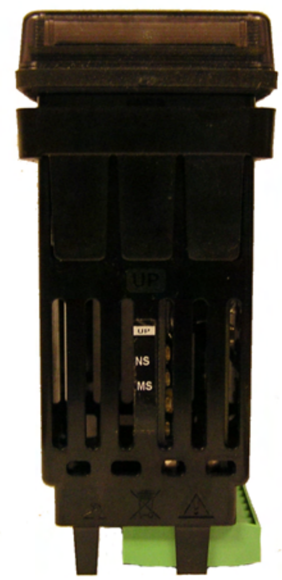
Using the graphic below as an example, if gtw instance 1 - 4 has Ao.nb and A i.nb set to 5, each of the four EZ-ZONE family controllers will contain the first 5 members of the assembly and this information would then be passed implicitly to the Master on the DeviceNet™ network. The EDS (Electronic Data Sheet) can be found on the CD shipped with the product "Controller Support Tools".

Note:

To minimize traffic and enable better throughput on Standard Bus, set the End Zone prompt nU.2n in the RUI to the maximum number of EZ-ZONE controllers on the network to be scanned.

DeviceNet RUI/GTW LED Indicators

Viewing the unit from the front and then looking on top of the RUI/GTW two LEDs can be seen aligned vertically front to back. The LED closest to the front is identified as the network (Net) LED where the one next to it would be identified as the module (Mod) LED.



Network Status (NS)

Indicator LED	Description
Off	The device is not online and 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 (allcated 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.

Module Status (MS)

Indicator LED	Description
Off	No power is applied to the device.
Flashing Green-Red	The device is performing a self-test.

Module Status (MS) cont.	
Indicator LED	**Description**
Flashing Red	Major Recoverable Fault.
Red	Major Unrecoverable Fault.
Green	The device is operating normally.

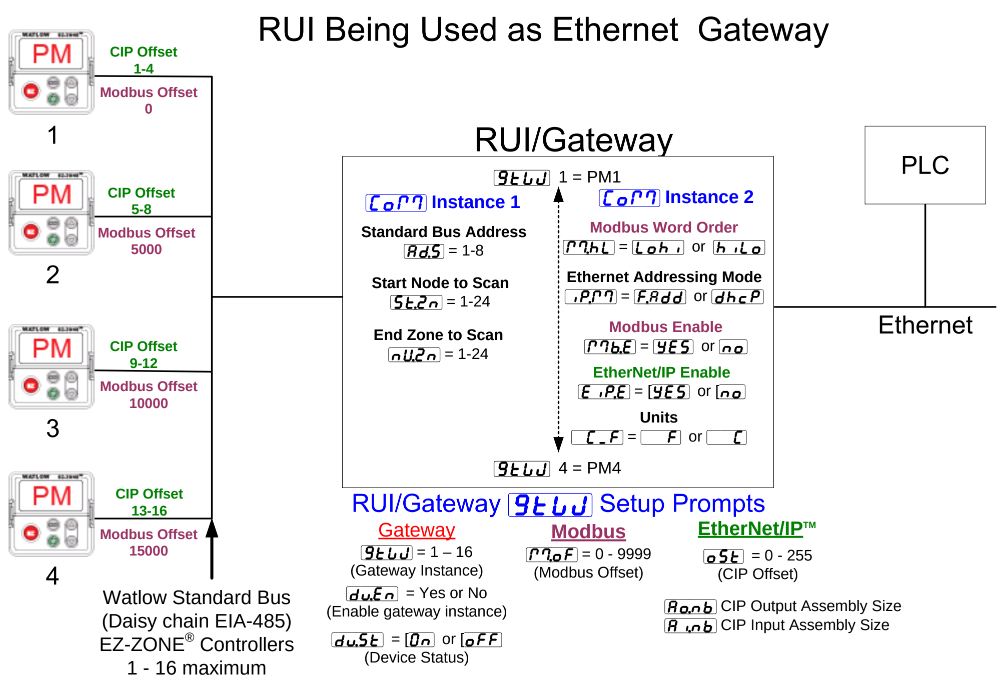
To learn more about CIP and DeviceNet point your browser to: http://www.odva.org

Ethernet Communications

Using EtherNet/IP™ Communications To/From Third Party Device:

When using the EtherNet/IP protocol, there are two methods used in communicating, implicitly and explicitly. Once the gateway instance is enabled there are two prompts that relate directly to these forms of communication.

Use the graphic below in reference to the descriptions that follow below.



[oSt] CIP Offset, used exclusively with explicit messaging where it defines a specific gateway instance (EZ_ZONE PM or RM controller) to receive a message originating from the network Master. The CIP offset is unique to each gateway instance and is added to the published instance of any given parameter.

As an example, when programming an explicit message ensure that the class, instance and attribute is defined. To read the first instance of the Process Variable in PM2 use the following information in the message instruction:

Class = 104 or (0x68)
Instance = 1
Attribute = 1

Note that the instance is identified as instance 1 because there is no offset to add. RUI prompt entry for gateway instance 1 follows:

[oSt] = 0

RUI prompt entry for gateway instance 2 (PM2) follows:

[oSt] = 4

RUI prompt entry for gateway instance 3 follows:

[oSt] = 8

RUI prompt entry for gateway instance 4 follows:

[oSt] = 12

To read the process value instance 2 of PM4 add the offset to the instance. The following information would need to be entered in the message instruction:

Class = 104 or (0x68)
Instance = **14** or (0x0E)
Attribute = 1

[Ao.nb] From the gateway perspective, this assembly represents data that comes from Standard Bus controllers (EZ-ZONE PM or RM) and is sent out on the network. As seen from the network, this is the CIP Implicit Output Assembly representing inputs to the Master and is used exclusively when communicating implicitly. For any given RUI gateway instance (EZ-ZONE controller), the output assembly size will never be greater than 20, 32-bit members. The user entry ranges from 0 to 20.

[A i.nb] From the gateway perspective, this assembly represents data that comes from the network Master and is sent to one or more gateway instance (EZ-ZONE PM or RM) on Standard Bus. As seen from the network, this is the CIP Implicit Input Assembly representing outputs from the Master and is used exclusively when communicating implicitly. For any given RUI gateway instance (EZ-ZONE controller), the input assembly size will never be greater than 20, 32-bit members. The user entry ranges from 0 to 20.

Note:

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 20 I/O members per controller are not exceeded.

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

[gtwy] instance 1 has [a.inb] and [a.onb] set to 5

[gtwy] instance 2 has [a.inb] and [a.onb] set to 5

[gtwy] instance 3 has [a.inb] and [a.onb] set to 5

[gtwy] instance 4 has [a.inb] and [a.onb] set to 5

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 EtherNet/IP network.

Using Modbus TCP Communications To/From a Master:

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

1. Modbus TCP Enable [mb.e], turns Modbus on or off.
2. Modbus TCP Word Order [m.hl], which allows the user to swap the high and low order 16 bit values of a 32-bit member.
3. Modbus TCP Offset [m.of], 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. For the purpose of this discussion assume the offsets are as shown in the graphic on the following page and the Master wants to read the first instance of Closed Loop Set Point from both Standard Bus address 1 and 4. Open up the appropriate PM users manual and go to the Operations Page, Loop Menu to find the Closed Loop Set Point.

Note:

If using a legacy EZ-ZONE ST controller with a firmware version less the 3.0, consider using the Modbus addresses listed in the ST user manual in the column entitled "RUI/GTW Modbus". If the firmware in the ST is 3.0 or higher new features were added and made accessible through the Map2 registers. If interested in using the new features today or perhaps in the future configure the ST for Map 2 Modbus registers.

When found, notice that the relative Modbus register is 2160 (Map 1) or 2640 (Map 2). To read the set point from address 1 the appropriate absolute Modbus address would be:

2160 + 400001 + Modbus offset (0) = 402161.

To read the Closed Loop Set Point from Standard Bus address 4 the absolute address would be:

2160 + 400001 + Modbus offset (15000) = 417161.

Note:

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

Note:

The RUI/GTW allows for a maximum entry of 9999 due to limitations of the 7 segment display. To enter a Modbus offset > 9999 EZ-ZONE Configurator must be used..

Note:

In the above graphic 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 prompt shown for "Ethernet Addressing Mode" related to specifying the actual IP [ip.f1] - [ip.f4], subnet [ip.s1] - [ip.s4] and the gateway [ip.g1] - [ip.g4] (external gateway) addresses. If set to receive an IP address from a host [dhcp]computer, the prompts shown above are accurate.

Note:

When changing the RUI/GTW IP address, power must be cycled for the new address to take effect.

Ethernet RUI/GTW LED Indicators

Viewing the unit from the front and then looking on top of the RUI/GTW four LEDs can be seen aligned vertically front to back. The LEDs are identified accordingly: closest to the front reflects the Network (Net) status, Module (Mod) status is next, Activity status follows and lastly, the LED closest to the rear of the RUI/GTW reflects the Link status.

Network Status

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.

Module Status

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.

Module Status (cont.)

Indicator State	Summary	Requirement
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.

Link Status

Indicator State	Summary	Requirement
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

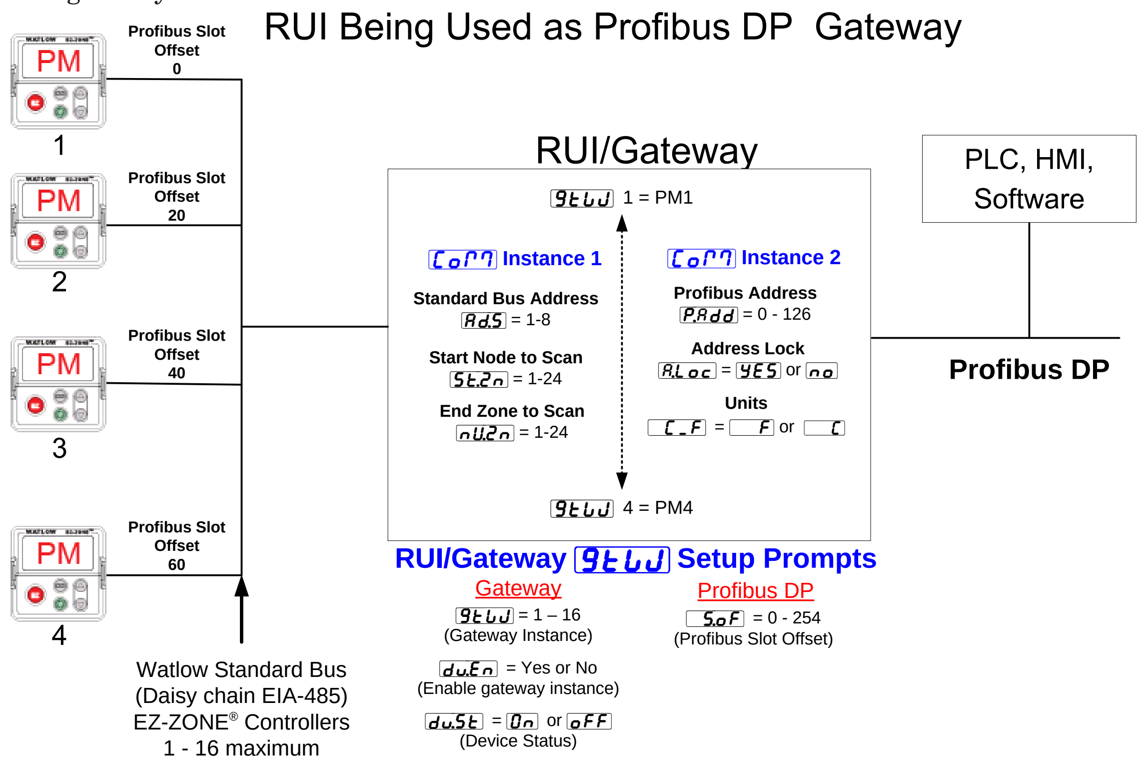
Indicator State	Summary	Requirement
Flashing Green	Detects activity	If the MAC detects activity, the LED will be flashing green.
Red	Link speed = 10Mbit	If the MAC detects a collision, the LED will be red.

Using Profibus DP Communications To/From Third Party Device:

The RUI/GTW 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 RUI/GTW) 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. 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 and the specific index for any given parameter. 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



dv.En. 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.

S.oF 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 manual in the various menus) are defined. To read the first instance of the Process Value in PM2 use the following information when programming the Master:

Slot Offset = 20
Index = 0 (See the EZ-ZONE PM Users Manual, Operations Page under the Analog Input Menu)

Note that PM2 and instance 1 is identified in the Slot Offset where the parameter, in this case, Process Value 1 is identified via the Profibus Index. If it were instance 2 same parameter that was needed the Slot Offset would change to 21.

Likewise, to read the Process Value instance 2 of PM4 the following information would need to be entered when programming the Master:

Slot Offset = 61
Index = 0

Profibus DP RUI/GTW LED Indicators

Viewing the unit from the front and then looking on top of the RUI/GTW two bi-color LEDs 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 DP point your browser to: http://www.profibus.org

Software Configuration

Using EZ-ZONE® Configurator Software

To enable a user to configure the RUI/GTW using a personal computer (PC), Watlow has provided free software for your use. If you have not yet obtained a copy of this software insert the DVD that came with the product (Controller Support Tools) into your CD/DVD drive and install the software. Alternatively, if you are viewing this document electronically and have a connection to the internet simply click on the link below and download the software from the Watlow web site free of charge.

http://www.watlow.com/products/software/zone_config.cfm

Once the software is installed, double click on the EZ-ZONE Configurator icon placed on your desktop during the installation process. If you cannot find the icon follow the steps below to run the software:

1. Move your mouse to the "Start" button
2. Place the mouse over "All Programs"
3. Navigate to the "Watlow" folder and then the sub-folder "EZ-ZONE Configurator"
4. Click on EZ-ZONE Configurator to run.

The first screen that will appear is shown below.

If the PC is already physically connected to the EZ-ZONE RUI/GTW click the next button to go on-line.

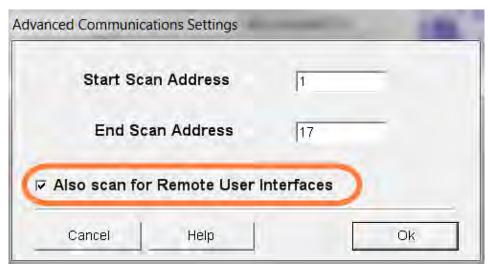
Note:

When establishing communications from PC to the EZ-ZONE RUI/GTW 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 (consider Watlow Part # 0847-0326-0000). However, some PCs may still be equipped with EIA-232 ports, therefore an EIA-232 to EIA-485 converter would be required.

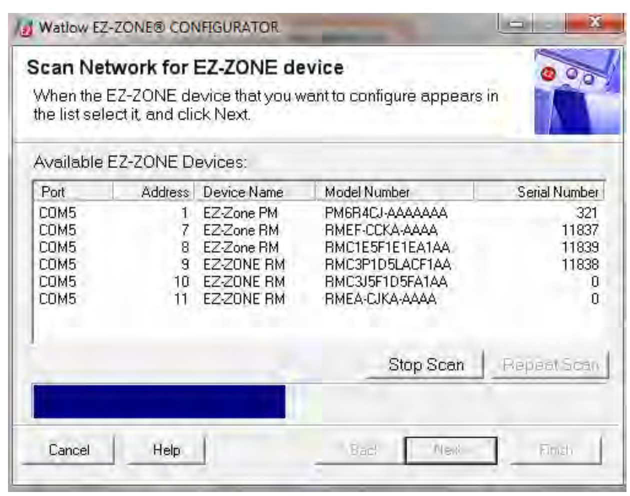
As can be seen in the above screen shot the software provides the user with the option of downloading a previously saved configuration as well as the ability to create a configuration off-line to download later. The screen shots that follow will take the user on-line.

After clicking the next button it is necessary to define which communications port the PC will use. Clicking on the drop down (orange circle below) will show all available communication ports.

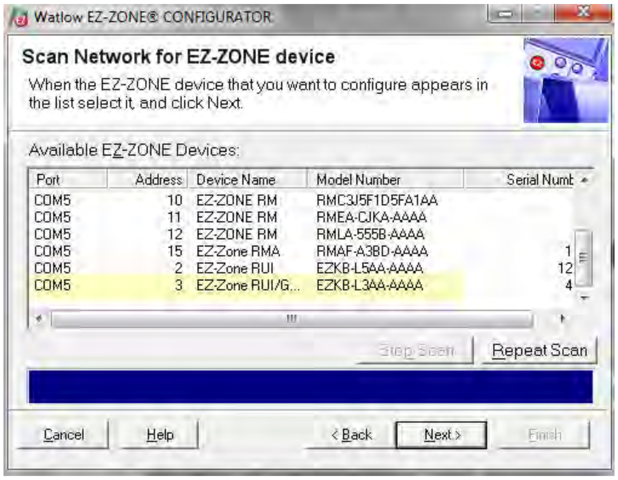
The "Advanced" button allows the user to specify how many controller zones (1 - 17) to look for when scanning as well as whether or not to scan for RUI/GTWs. If it is desired to connect and configure the RUI/GTW, ensure that "Also scan for Remote Users Interfaces" is checked as shown in the graphic below.



The following screen shot 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 in the graphic below.

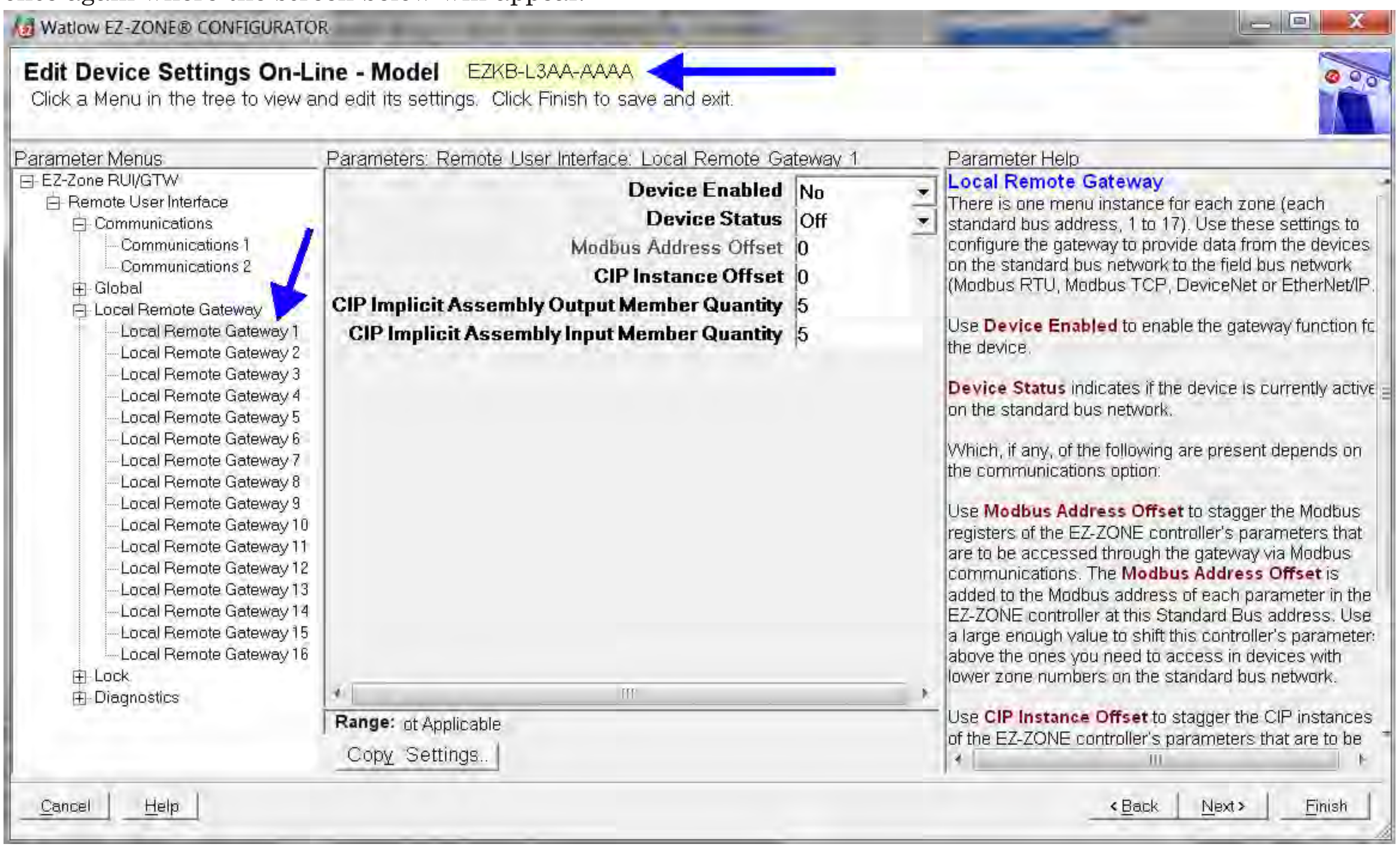


In the screen shot above the RUI/GTW is shown highlighted to bring greater clarity to the subject in focus. Any EZ-ZONE device on the network will appear in this window and would be available for the purpose of configuration and monitoring. After clicking on the RUI/GTW simply click the next button once again where the screen below will appear.

The menu structure as laid out within this software follows:

- Communications
- Global
- Local Remote Gateway
- Lock
- Diagnostics

Navigating through this software and acquiring a better understanding of the available options is easy. Simply slide the scroll bar up or down to display the menu and parameter of choice. As an alternative, menus can be collapsed for greater focus on the menu of choice and or expanded for a broader view of all menus by clicking on the plus or negative symbol next to menu name. Once the focus is brought to an individual parameter of choice (single click of mouse) as shown below for Local Remote Gateway 1, all that can be setup related to that parameter will appear in the center column along with context sensitive help in the right hand column. If a parameter is grayed out (not selectable) as shown in the center column below, that function is either not enabled or it does not apply.

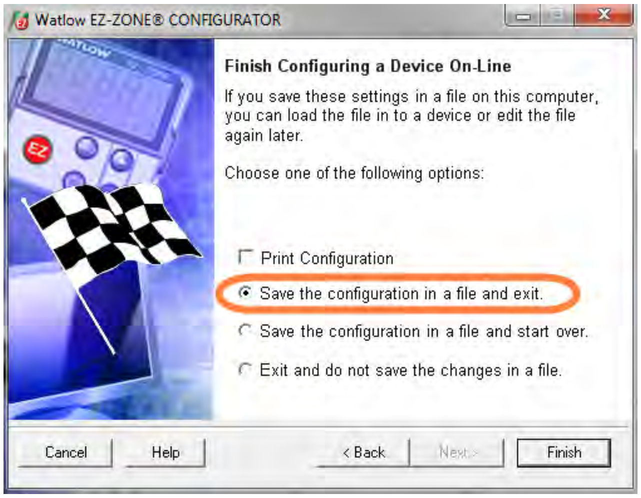


Notice in the screen shot above that the device part number is clearly displayed at the top of the page (yellow highlight added for emphasis). When multiple EZ-ZONE devices are on the network it is important that the part number be noted prior to configuring so as to avoid making unwanted configuration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

Looking closely at the left hand column (Parameter Menus) notice that it displays all of the available menus and associated parameters within the gateway

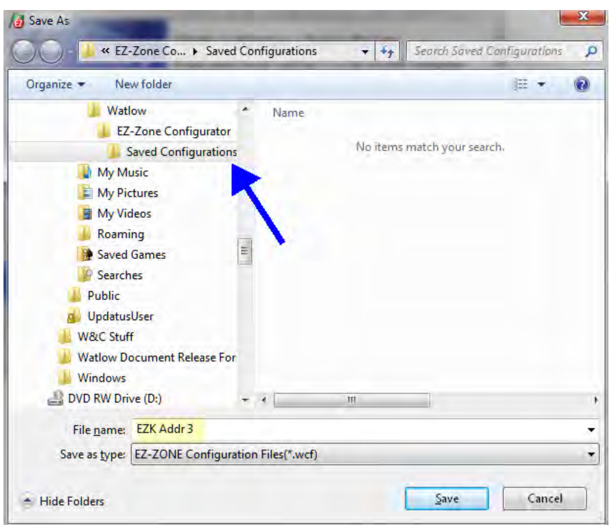
To speed up the process of configuration notice that at the bottom of the center column there is an option to copy settings. If gateway settings are the same for all instances click on "Copy Settings" where a copy from to copy to dialog box will appear allowing for quick duplication of all settings.

Once the configuration is complete click the "Finish" button at the bottom right of the screen above. The screen that follows this action can be seen below.



Although the RUI/GTW now contains the configuration (because this entire discussion focused on doing the configuration on-line) it is suggested that after the configuration process is completed that the user save this file to 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 RUI/GTW versus trying to figure out what was changed. There is also 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 then appear.



When saving the configuration note the location where the file will be placed (arrow) and enter the file name (File name, yellow highlight) as well. The default path for saved files follows:

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

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

Saving Settings to Non-volatile Memory

When save to EEPROM is enabled, values are saved once every five seconds if a value written has changed. if the EEPROM is disabled, any changes from the keypad that cause a change in the controller will initiate a save of all values.

If controller settings are entered from the front panel (PM) or via an RUI, changes are always saved to non-volatile memory (EEPROM) in the controller (RM, PM or ST). 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 data from a Master device on a network such as a PLC via the gateway, 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. Whenever new information is sent from these devices, e.g., new set point, new control mode, etc... a write to EEPROM will occur. No further writes to EEPROM will occur until the input data changes again. This would be true over a network (Com instance 2) as well. If the data is changing it will be written to the EEPROM. If it is desired to inhibit writes to the EEPROM over a network, write the value of 59 to the addresses in the controllers specified below.

Note:

This is an individual operation on each EZ-ZONE controller on the Standard Bus side of the network.

CIP (DeviceNet and EtherNet/IP) by Controller Type

For the following controllers:

RMC, RMS, RML, RMH, ST and PM-PID
Class = 150
Instance = 1
Attribute = 8

RMA

Class = 150
Instance = 2
Attribute = 8

PMI and PML

Class = 150	Class = 150
Instance = 1	Instance = 2
Attribute = 8	Attribute = 8

Modbus Registers by Controller Type

PMI and PML

Instance 1	Instance 2
Map 1 = 2494	Map 1 = 2514
Map 2 = 2974	Map 2 = 2994

PID
Instance 1

Map 1 = 2494

Map 2 = 2974

ST
Map 1 = 317
Map 2 = 2064

RMC	RMA	RMS	RML	RMH
2834	444	3474	3504	6514

Profibus by Controller Type

RMC, RML, RMH, PML, PMI and PID
198

RMS
112

RMA
82

Enumerated values for this member follows:

Yes = 106 (allow writes to EEPROM), No = 59 (Disable writes to EEPROM)

Note:

Some controllers have only 1 communications port where this discussion would apply if connected to an RUI/GTW or RMA module. Other controls like the PMI and the PML can have 2 communications ports therefore you will find 2 instances. This setting relates to the controller the RUI/GTW is connected to, not the RUI/GTW itself. Everything changed in the RUI/GTW, either via EZ-ZONE Configurator software or from the front panel will be saved to the EEPROM in the RUI/GTW.