Using Watlow® Products with the Silver Series EM

Addendum to EZwarePlus Programming Manual

Operator Interface Terminals

Powered by Possibility

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1 Chapter 1: Introduction

Silver Series EM Operator Interface Terminals (OITs) are powerful human machine interfaces for equipment and processes. EZwarePlus is easy-to-use and flexible software for creating the windows, buttons, displays, gauges and other screen items with which operators interact on the OIT. The purpose of this addendum is to quickly get you up and running with the OIT and software when used with Watlow controllers.

Chapter 2: Communication Wiring provides the information needed to physically connect communication between a Silver Series EM OIT and Watlow products.

Chapter 3: Communication Basics provides the necessary information for using an OIT with Watlow controllers. Familiarity with these concepts is assumed in the tutorials that follow.

Chapter 4: Programming Tutorials walks you through establishing communication, creating user interfaces and using powerful features such as trending, data logging and recipes.

Additional Resources

In addition to this addendum the following resources are available for learning about Silver Series EM OITs and EZwarePlus programming software.

At www.watlow.com search for "EZware Software" to find the EZwarePlus product page for:

EZwarePlus Software Download for Silver Series EM—look for the "DOWNLOAD NOW" button.

EZwarePlus Programming Manual—under *Related Documents* expand *Software and Demos*.

Silver Series Sample Projects—under *Related Documents* expand *Software and Demos*.

Silver Series Secrets video tutorial series—under *Related Documents* expand *Training and Education*. Many of these were created for to the older EZware-5000, but they are still applicable.

Silver Series Frequently Asked Questions—under *Related Documents* expand *Training and Education*.

Also available at www.watlow.com:

EZ-ZONE ALL Modbus® register list in Excel—search for "EZ-ZONE ALL"

Watlow Silver Series EM Installation Guide—search for the part number: 0600-0101-0000.

2 Chapter 2: Communication Wiring

Consult the *Watlow Silver Series EM Installation Guide* for detailed information on installing and wiring the OITs. This chapter provides important additional information regarding connecting to and communicating with Watlow controllers.

Connecting via Modbus® RTU (232/485)

The tables below indicate to which pins on the Silver Series EM OIT's DB9 connectors the Watlow EZ-ZONE® screw terminals should connect.

Connecting via 485 2-wire

	Silver Series EM OIT				Watlow Cable[1]	Watlow EZ-ZONE	
	TS00-0043-EM00 TS00-0043-EM0B		TS00-0070-EM00 TS00-0070-EM0B TS00-0100-EM00				
Function	COM1	COM3	COM1	COM3	Wire Color	Terminals	Function
T-/R-	1	7	1	7	White/Brown	CA	T-/R-
T+/R+	2	8	2	8	Brown	CB	T+/R+
Common	5	5	5	9	Blue	CC	Common

[1] Supports COM1 only. Cable part number: 0219-0374-0000 for TS00-0070-EM00, TS00-0070-EM0B and TS00-0100-EM00 or part number 0219-0388-0000 for TS00-0043-EM000 and TS00-0043-EM00B

Connecting via 232

	Silver Series EM OIT		Watlow EZ-ZONE	
	TS00-0043-EM00 TS00-0043-EM0B	TS00-0070-EM00 TS00-0070-EM0B TS00-0100-EM00		
Function	COM1	COM1	Terminals	Function
TXD	6	3	C2	RD
RXD	9	2	C3	TX
Common	5	5	C5	Common

Connecting via Modbus® TCP (Ethernet)

Using standard Ethernet cables connect the controller(s) and the Silver Series EM OIT to an Ethernet switch or connect the controller directly to the OIT.

Determining or Setting the OIT's IP Address

If you connect the OIT to an Ethernet network in order to download programs or communicate with controllers via Ethernet, you must ensure the OIT has a unique IP address and you will need to know that address in order to communicate from your PC with the OIT.

To read or set the OIT's IP address:

- Connect a USB mouse to the OIT, if desired.

- Apply power to the OIT.

- Once the OIT is powered up, point with the mouse or tap with your finger at the lower right corner of the OIT screen.

- On the menu bar click the setting button (the one with the gear icon).

- Enter the password. (By default this is 111111.)

- The IP address is listed in the **System settings** window on the **Network** tab. If **Obtain an IP Address Automatically** is selected, the IP Address is not editable. If you want to configure the OIT for a fixed address, select **IP address get from below**, and enter the IP address.

- Click **OK** to close the **System settings** window on the OIT.

Hints for using the Virtual Keyboard to enter the OIT password and IP addresses:

- It can take a few seconds for the Systems settings dialog with the password field to appear.

- If you do not see the **Virtual Keyboard** it may be minimized; click the keyboard icon on the menu bar.

- Make sure the cursor is in the **Password** or **IP address** field on the **System Settings** dialog.

- You can tell the password key strokes are being entered if you hear the key chirp from the OIT and see stars (******) appearing in the password field.

- If you cannot see the **Password** field, arrange the **Virtual Keyboard** and **System Settings** dialog then make sure the cursor is in the **Password** field.

3 | Chapter 3: Communication Basics

The Silver Series EM OIT can communicate with Watlow controllers via Modbus® TCP or Modbus® RTU. This section defines terms you will encounter and provides information about Modbus® communication that will help you create a user interface with the Silver Series EM OIT for equipment and machines that include Watlow controllers.

Gateways, Controllers and PLCs

The Silver Series EM OIT can communicate with a variety of devices. Because many of these devices are Programmable Logic Controllers (PLCs), EZwarePlus refers to devices with which it communicates generically as "PLCs". Don't let this confuse you. When you are setting up the OIT to communicate with a Watlow product, from the OIT's point of view the controller is a PLC.

This addendum refers to configuring the Silver Series EM OIT to communicate with "controllers", but the instructions also apply to Watlow safety limits and gateways such as the EZ-ZONE® RUI Gateway.

Parameter Register Addresses

The Modbus® RTU and Modbus® TCP communication protocols assume that each device's memory is organized in blocks of like-data. Each data block contains either read-only data or read/write data and either bit-size data or word-size (16-bit) data. For example, the *Coils* data block contains read/write bits and the *Input Registers* data block contains read-only words.

Within each of these data blocks there is a range of memory locations. The data blocks are often referred to by the first digit of their address range. For example, the *Holding Registers* are often referred to as, "the 4x registers". The Modbus® standard defines both a numbering scheme and an addressing scheme for the memory locations in the data blocks. The table below illustrates this for the four most commonly discussed data blocks.

Name	Number	Access	Data Size	Memory Location Numbers (Absolute)	Memory Location Addresses (Relative)
Coils	0x	Read/Write	1 bit	1 to 65,536	0 to 65,535
Discrete Inputs	1x	Read-Only	1 bit	100,001 to 165,536	0 to 65,535
Input Registers	3x	Read-Only	Word	300,001 to 365,536	0 to 65,535
Holding Registers	4x	Read/Write	Word	400,001 to 465,536	0 to 65,535

Because the location numbering scheme includes the data block number, it is helpful to think of it as an *absolute* address. The absolute address specifies the address completely or absolutely in that it says which data block and which address contains a piece of data. Because the location addresses do not include the data block number, it is helpful to think of them as *relative* addresses. They specify where to look relative to the starting point of the data block.

Some software and device manufacturers document the use of their products in terms of the numbering scheme while others use the addresses. In either case the manufacturer typically calls the numbers they

supply "the addresses." So to use any two products together you need to know whether or not you have to convert the specified "address" in order to get the result you want.

EZwarePlus's Modbus® drivers call the data block, "Device type" and for "Address" expect the memory location's *absolute* address without the data block number. For example, to access a value in a holding register with absolute address 401,905, for **Device type** you select the data block "4x" and enter "1905" in the **Address** field. The following illustrates setting this address in EZwarePlus.


```
PLC :        Modbus RTU Master              ▼
Device type : 4x                            ▼
Address :    1905
```

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Watlow controllers use only the 4x registers. Therefore, you will set the **Device type** to 4x when accessing *any* parameter in a Watlow controller. Watlow manuals specify *relative* addresses. Therefore, you must add one (1) to an address found in a Watlow manual (other than this manual) before you enter it in EZwarePlus.

For example, the *EZ-ZONE PM Integrated Controller Models User's Manual* lists the relative address for Heat Power as 1904. To monitor the heat power with the Silver Series EM OIT, you will add one (1) to the relative address and enter "1905" in the **Address** field in EZwarePlus.

Dis-play	Parameter name Description	Range	Default	Modbus Relative Address	CIP Class Instance Attribute hex (dec)	Profibus Index	Param-eter ID	Data Type & Read/Write
ᴹ°ⁿ ₒₚₑᵣ **Monitor Menu**								
h.Pr [h.Pr]	*Monitor (1 to 2)* **Heat Power** View the current heat output level.	0.0 to 100.0%	0.0	*Instance 1* Map 1 Map 2 1904 2384 *Instance 2* Map 1 Map 2 1974 2454	0x97 (151) 1 to 2 0xD (13)	- - - -	8011	float R

(073)

In summary, when setting an address for a screen object to read or write from a Watlow controller:

- For the **Device type** select **4x**.

- Set the **Address** to a value that is one greater than the relative Modbus® address listed in the Watlow controller manual.

Address Maps

Some EZ-ZONE products have user-selectable address *maps.* Select the desired map in the controller's Setup page, Communication menu with the Data Map parameter. The Data Map affects the parameter addresses at which values are read and written. The Data Map setting applies to all the parameters in the controller. Generally Map 2 provides access to more parameters.

For example, the *EZ-ZONE PM Integrated Controller Models User's Manual* lists Map1 and Map 2 addresses for Process Value for Analog Inputs 1 and 2. If the Data Map parameter is set to Map 1 then the Process Value for Analog Input 2 is read at address 441 (the listed address plus one), but if Data Map is set to Map 2 then the Process Value for Analog Input 2 is read at address 451. The address for the Process Value for Analog Input 1 is the same for Map 1 and Map 2.

Display	Parameter name Description	Range	Default	Modbus Relative Address
Ain [Ain]	*Analog Input (1 to 2)* **Process Value** View the process value.	-1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C		*Instance 1* Map 1 Map 2 360 360 *Instance 2* Map 1 Map 2 440 450

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Choosing a Communication Driver

When you create a project using EZwarePlus you select the drivers necessary to communicate with the Watlow controllers and any other devices with which the Silver Series EM OIT must communicate. For Watlow controllers, you select one of these drivers:

- *Modbus RTU Master*—used with Watlow controllers that support Modbus® RTU and communicate via RS-232 or RS-485.

- *Modbus TCP/IP Master*—used with Watlow controllers that support Modbus® TCP and communicate via Ethernet.

Using the Modbus® RTU Master Driver to Communicate via 485

When you set up the Silver Series EM OIT to communicate via 485, you add a *Modbus RTU Master* device to the device list in the System Parameter Settings. Only one driver is required for each COM port on the OIT to which controllers are connected. This is true regardless of the number of controllers that are connected to that 485 COM port. Think of the Modbus RTU Master device as a driver for the COM port not as a driver for the controllers themselves. That is why you choose the Modbus RTU *Master* driver rather than the Modbus RTU *Slave* driver. The controllers are slaves; the OIT's COM port is the master.

Using the Modbus RTU Master Driver to Communicate via 232

When you set up the OIT to communicate via a 232 COM port, you add a *Modbus RTU Master* device to the device list in the System Parameter Settings. When using 232 on a COM port, only one controller can be connected to that port.

Using the Modbus TCP/IP Master Driver to Communicate via Ethernet

When you set up the OIT to communicate with controllers via Ethernet, you add one *Modbus TCP/IP Master* device to the device list in the System Parameter Settings dialog for *each* controller that has an IP address with which you will communicate. For example, for the OIT to communicate with three EZ-ZONE controllers via Ethernet, add three *Modbus TCP/IP Master* devices to the device list in the System Parameter Settings dialog, and configure each to communicate with one controller.

Addressing Parameters in Multiple Controllers

Normally the Silver Series EM OIT assumes that any register address you enter when communicating via Modbus® RTU is associated with the controller at the network address you set in the **PLC default station no** field in the **Device Properties** under the **System Parameter Settings**.

To read or write data from a register in another controller on a 485 network, enter the network address and register address separated by the number sign or hash mark (#). For example "3#2501" accesses register 2501 in the controller with the Modbus® network address 3.

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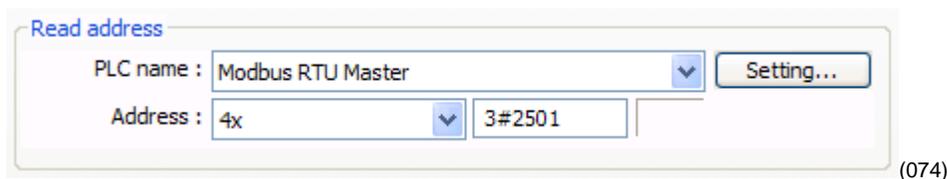
Address Offsets in Multi-Loop Controllers

In controllers with more than one loop of control, more than one limit etc., there is more than one instance of each parameter for these duplicated functions. The manuals for controllers such as the EZ-ZONE RM, list the Modbus® address and an *offset* for these parameters. Add the offset to the address *once* to get the address of the *second* instance of the parameter, add it *twice* to get the *third* instance and so on.

For example, the address of the Heat Power for Loop 1 is listed in the EZ-ZONE RM manual as 2244 with an offset of 70. The following table lists the addresses of the Heat Power parameter for each of the four possible loops in the controller. The table also reminds you to add one (1) to the relative addresses from the controller manuals before entering the parameter address in EZwarePlus.

Loop	Address + Offset(s)	Convert Relative Address	Enter in EZwarePlus
1	2224	2224 + 1	2225
2	2224 + 70	2294 + 1	2295
3	2224 + 70 + 70	2364 + 1	2365
4	2224 + 70 + 70 + 70	2434 + 1	2435

Using EZ-ZONE RUI Gateways and RM Access Modules

Multiple EZ-ZONE devices can communicate with the Silver Series EM OIT via one or more EZ-ZONE RUI Gateways or EZ-ZONE RM Access modules. When ordered with either the Modbus® TCP or Modbus® RTU communication option, each RUI Gateway or RM Access module allows a Silver Series EM OIT to communicate with up to 16 EZ-ZONE controllers without purchasing communication options for each controller.

In such a system the Silver Series EM OIT is connected to and configured to communicate with the gateway. The gateway presents itself as a single device on the Modbus® network; the OIT does not communicate with the controllers, only with the gateway. The gateway is configured by the user with an address offset for each controller connected to it. That address offset must be added to the parameter addresses for the controller.

For example, consider three EZ-ZONE PM controllers connected to an RUI Gateway configured with an offset of 0 for the first controller, 5000 for the second controller and 10,000 for the third controller. The table below indicates the addresses that must be entered in EZwarePlus to access the set point value in the three PM controllers.

PM	Set Point	Plus Gateway Offset	Convert Relative Address	Enter in EZwarePlus
1	2172	2172 + 0	2172 + 1	2173
2	2172	2172 + 5000	7172 + 1	7173
3	2172	2172 + 10000	12172 + 1	12173

Data Types

The Silver Series EM OIT's Modbus® drivers support a variety of data types. The Watlow manuals specify the data type of each parameter. However the terminology is not precisely the same. The table below correlates the data types indicated in the Watlow documentation with the data types you should select when configuring a screen object in EZwarePlus.

EZ-ZONE User's Manuals	EZ-ZONE ALL Modbus® List	EZwarePlus
uint	Enumeration, Event, unsigned 8-bit, unsigned 16-bit, Wide Enumeration	16-bit Unsigned
dint	signed 32-bit	32-bit Signed
float	IEEE Float	32-bit Float

Important Things to Know

Note: Make sure the Modbus Word Order is set to *Word Low High* in the controller. That is the setting that works with the Silver Series EM OIT.

Note: Examples in this manual use the map 1 addresses. If the controller's Data Map is set to 2, the examples may not work.

Caution: When using a multi-state switch object to set an enumerated parameter in a controller, each time the user clicks the switch, the setting selected by the switch is sent to the controller. When it is desirable to go directly from one setting to another without intermediate settings, use a set word object or an option list to set the parameter instead.

4 Chapter 4: Programming Tutorials

The following sections guide you through creating a first project using EZwarePlus and a Silver Series EM OIT that communicates with a Watlow controller.

Create a First Project

The following procedure guides you through the process of configuring a Silver Series EM OIT to communicate with a Watlow Controller.

1) To launch EZwarePlus: on the Windows task bar click **Start**, click **All Programs**, click **Watlow**, click **EZwarePlus** and click **EZwarePlus**.

2) With **New** selected, click **OK**.

3) In the **Welcome to EZwarePlus** dialog, for **Model**, choose the OIT model you have.

4) For **Display Mode** choose *Landscape*.

5) Make sure **Use template** is selected.

6) Click **OK**.

(001)
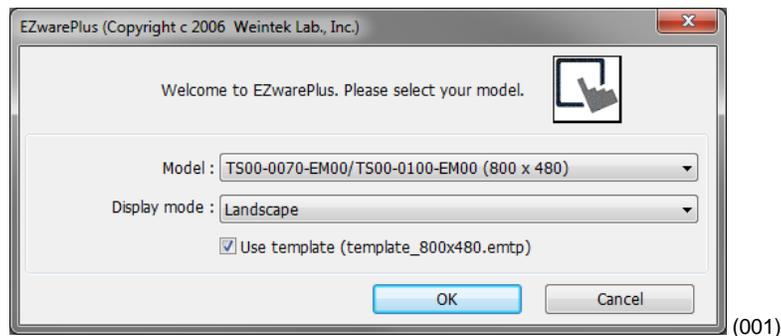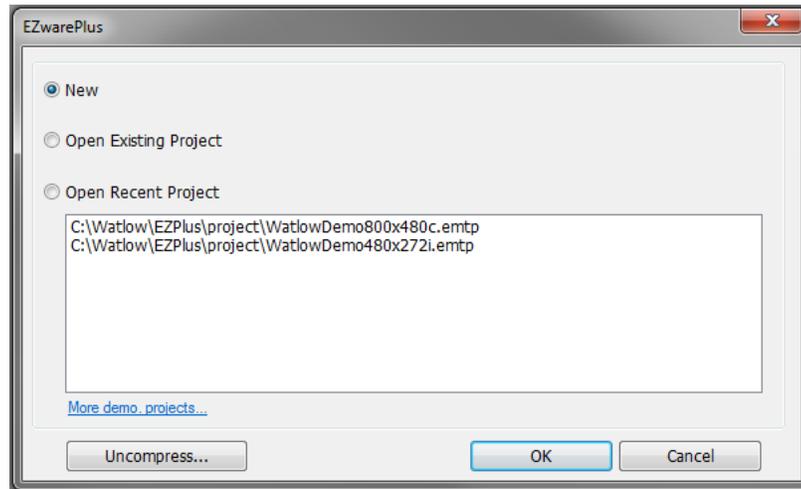
Note: If you have previously created a project, that project will open. In that case from the **File** menu, choose **New** to create a blank project for this tutorial and to see the Welcome dialog.

Note: The TS00-0070-EM00, TS00-0070-EM0B and TS00-0100-EM00 are supported by the same driver.

7) In the **System Parameter Settings** dialog, under the **Device List**, click **New…**
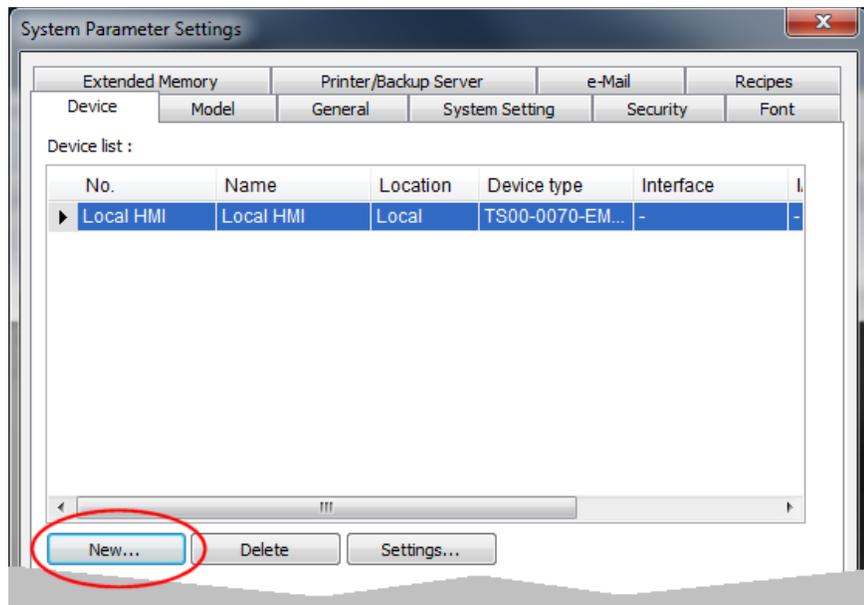
(002)

8) For **PLC type**, choose the appropriate driver. See the table below.

9) For **PLC I/F**, choose the appropriate hardware interface. See the table below.

10) For **PLC default station no.** type the controller's address. Typically this is 1 for the first controller.

11) Click **Settings…**
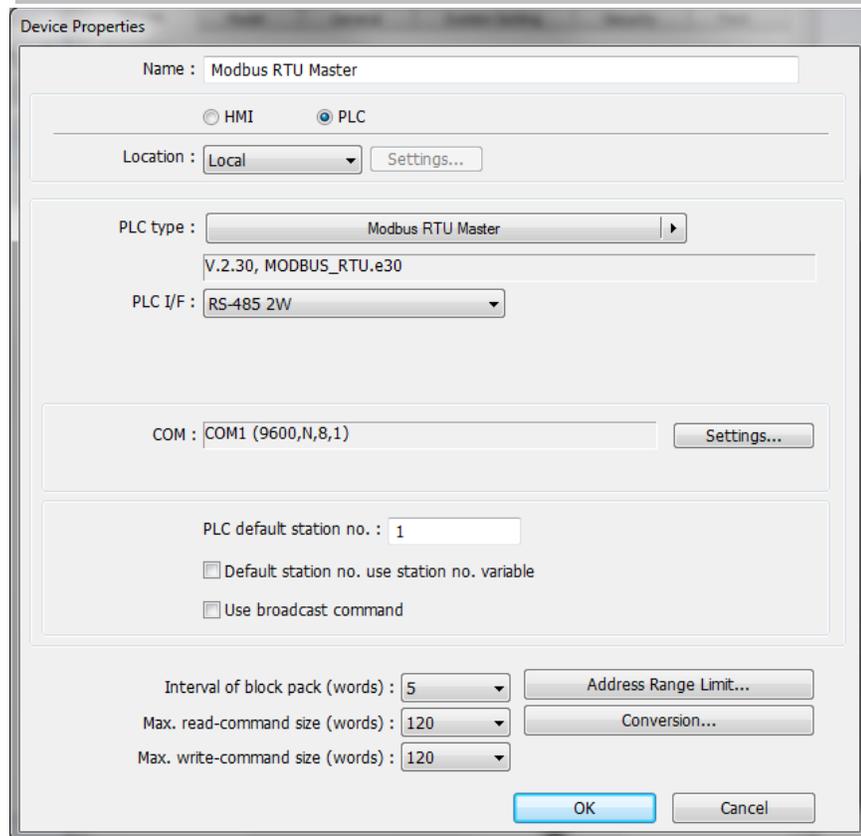
(003)

For part numbers like…	with…	For PLC type choose…	For PLC I/F choose…
STxx-xxx-xxxx PMxxxxx-1xxxxxx RMCxxxx-xxxx1xx RMHx-xxxx-x1xx RMLx-xxxx-x1xx RMSx-xxxx-x1xx	Modbus® RTU	Modbus RTU Master	RS-485 2W

For part numbers like…	with…	For PLC type choose…	For PLC I/F choose…
PMxxxxx-2xxxxxx EZKx-2xxx-xxxx RMAx-x2xx-xxxx	Modbus® RTU	Modbus RTU Master	RS-232 or RS-485 2W*
PMxxxxx-3xxxxxx EZKx-3xxx-xxxx RMAx-x3xx-xxxx	Modbus® TCP	Modbus TCP/IP Master	Ethernet
Other Watlow Controllers	Modbus® RTU	Modbus RTU Master	RS-232 or RS-485 2W*

*Both 232 and 485 are available; choose the one to which you have connected the OIT.

12) For the Modbus RTU Master…

- For **COM**, choose the communication port to which you have connected the controller. Typically this is COM 1.

- For **Baud rate**, choose the rate that is set in the controller.

(004)

- For Data bits, choose *8 Bits*.

- For **Parity**, choose *None*.

- For **Stop bits**, choose *1 Bit*.

- For multiple controllers on the same port, for **Turn around delay (ms)**, enter 15.

- Click **OK**.
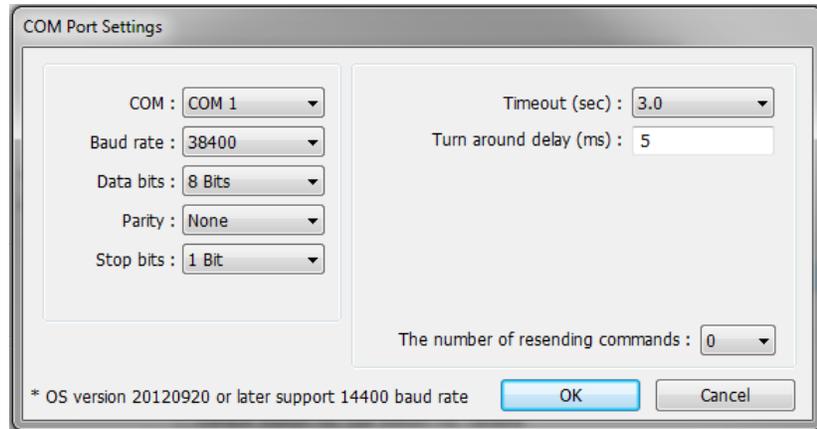
13) For the Modbus TCP/IP Master…

- For **IP address**, enter the IP address of the controller.

- Click **OK**.
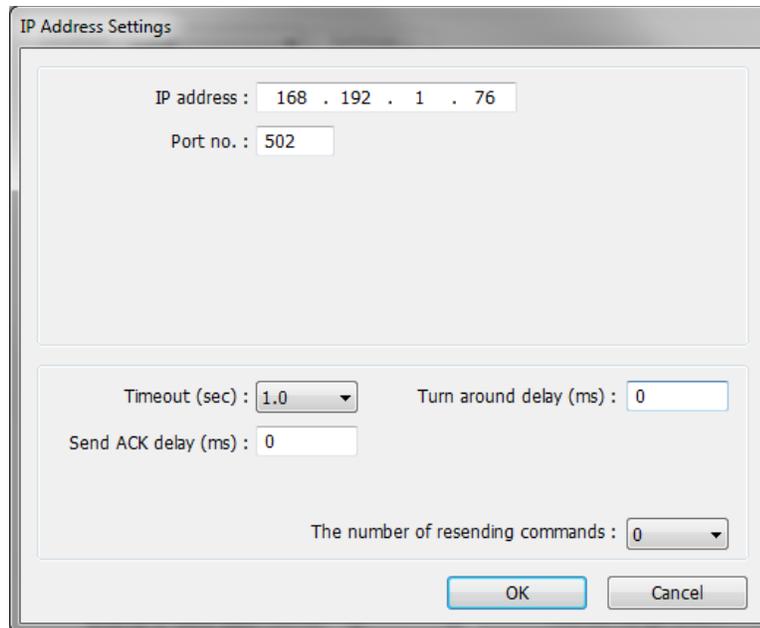
14) Click **OK** to close the Device Properties dialog.

(005)

15) To set up communication with controllers connected to other COM ports or to configure additional controllers communicating via Ethernet:

- Click New...

- Repeat from step 8 above.

16) Click **OK** to close the **System Parameter Settings** dialog.

17) Save the project:

- From the File menu, choose Save.

- In **File name** type *First Project.emtp*.

- Click **Save**.

Create a Popup Window

This example assumes you have created a project that is configured to communicate with a Watlow controller and that project is open in EZwarePlus.

1) From the **Window** menu, choose **Open Window**…

2) Click **New…**

(006)

3) Click **Base Window**.

(007)
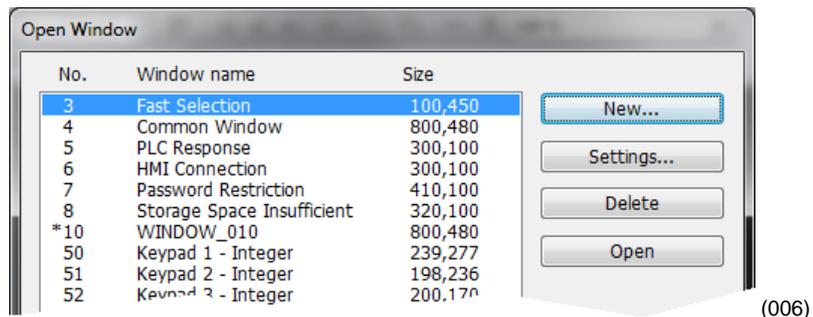
4) Ensure the **Name** is
Window_011 and the
Window no. is *11*.

5) Set **Width** to 420.

6) Set **Height** to 300 (272
for the 4.3 in. OIT).

7) To set the background
color to white:

- In the **Background**
group, next to **Color**
click ▼.

- Select the white color
swatch.

Window Settings

Name : Window_011

Window no. : 11

Size

Width : 420   Height : 300

Frame

Width : 4   Color : [   ]

Background

Color : [   ]   Pattern : [   ] [...]

☑ Filled   Pattern color : [   ]

Underlay window

Bottom : None

Middle : None

Top : None

Popup window

Start pos.   X : 120   Y : 120   ☐ Monopoly

OK   Cancel
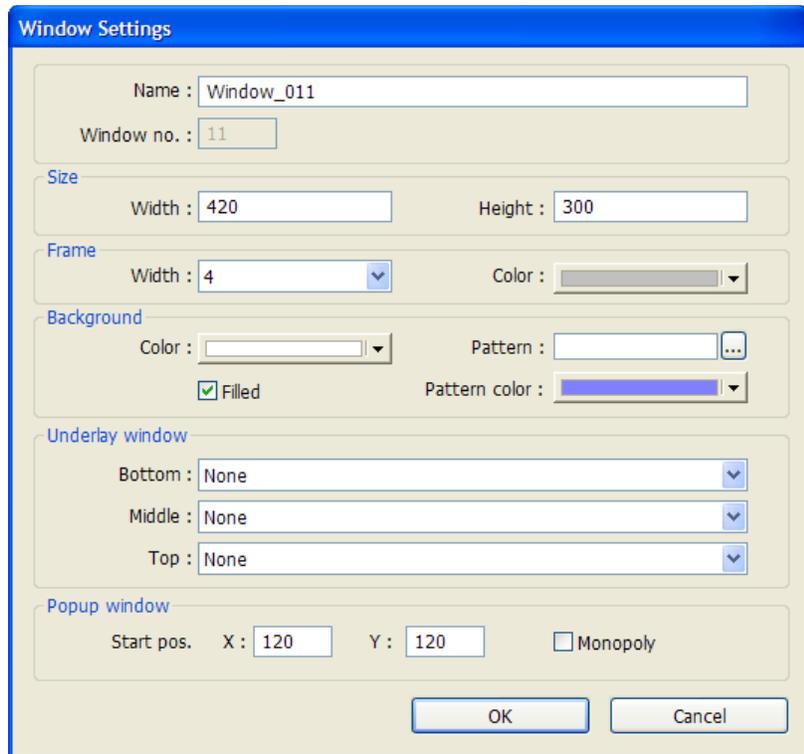
(008)

8) In the **Popup window** group, set **Start pos. X** to *120* (0 for the 4.3 in. OIT).

9) In the **Popup window** group, set **Start pos. Y** to *120* (0 for the 4.3 in. OIT).

10) Click **OK**.

11) In the **Open Window** dialog, select Window_11.

12) Click **Open**.

13) From the **File** menu choose **Save**.

Create a Meter in a Popup Window

This example assumes you have created a popup window in a project that is configured to communicate with a Watlow Controller and that window is open in EZwarePlus.

1) From the **Objects**
menu, choose **Meter**
Display.

2) Click the **General** tab.

3) In **Comment** type
Heat Power.

4) Click **Setting…**

New Meter Display Object

General | Outline | Limits | Security | Shape

Comment : Heat Power

Read address

PLC : Modbus RTU Master   Settings...

Address : 4x   1905   32-bit Float
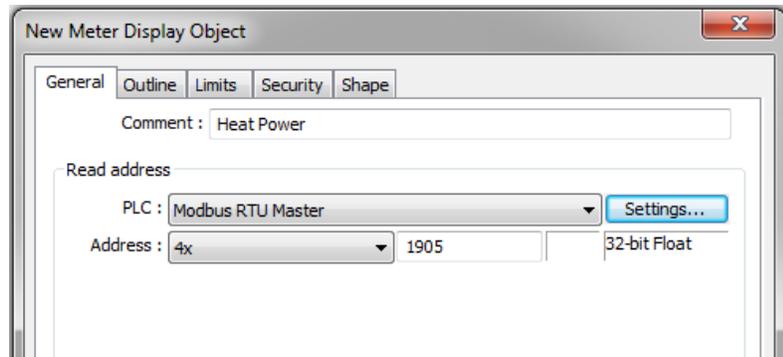
(009)

5) For **PLC** choose the *Modbus Master* or *Modbus TCP/IP Master*.

6) For **Device type** choose *4x*.
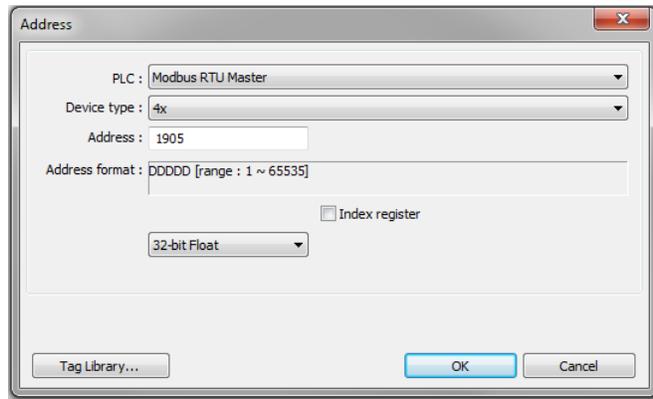
7) For **Address** enter the address of the heat power for your controller. See the table.

8) Select the data type in the field below the **Address** field. See the table.

9) Click **OK**.

(075)

For this controller…	This parameter…	Enter this Address*…	Choose this Data Type…
RMCxxxx-xxxxxxx	Heat Power	2245	32-bit Float
RMHx-xxxx-x1xx	Heat Power	4125	32-bit Float
PMxxxxx-xxxxxxx	Heat Power	1905	32-bit Float
STxx-xxMx-xxxx	Heat Power	237	32-bit Float
ST via RUI Gateway	Heat Power	1901	32-bit Float
Other Controllers	Consult the controller manual.		

*These addresses have already been changed to the absolute form required for EZwarePlus by adding 1 to the value listed in the Watlow manual. Enter them as listed.

10) Click the **Outline** tab.

11) In **Degree** set **Start degree** to *270*.

12) In **Degree** set **End degree** to *90*.

13) In **Background** uncheck **Full circle**.

14) In **Tick marks** check **Enable**.

15) For **Tick marks Color**, select black.

16) In **Tick marks** set **Main scale** to *6*.

17) In **Tick marks** set **Sub scale** to *1*.

18) In **Tick marks** set **Length** to *6*.
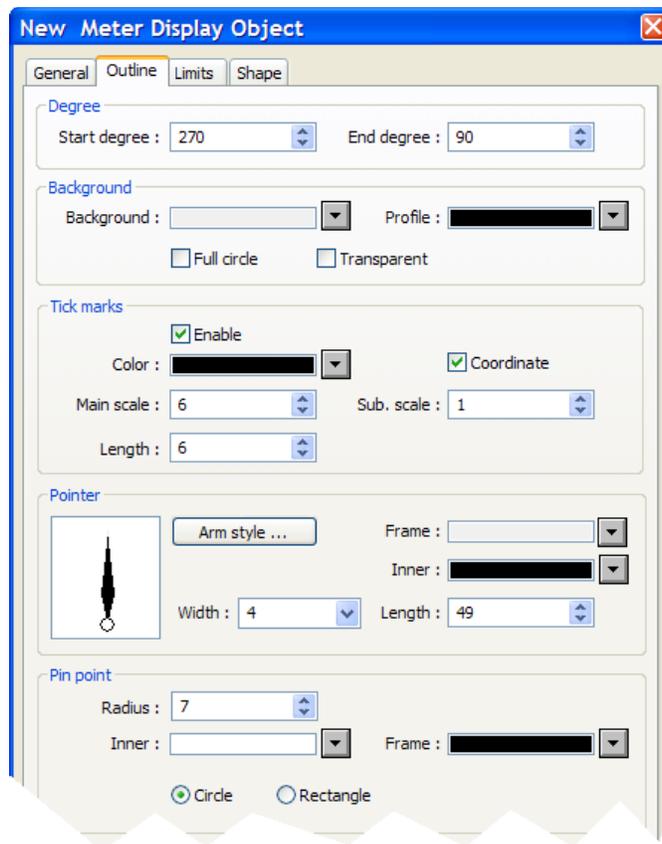
(010)

19) Click the **Limits** tab.

20) Set **Min.** to *0*.

21) Set **Max.** to *100*.

22) In **Range limits** select **Enable**.

23) Set **Width** to *3*.

24) Click **OK**.
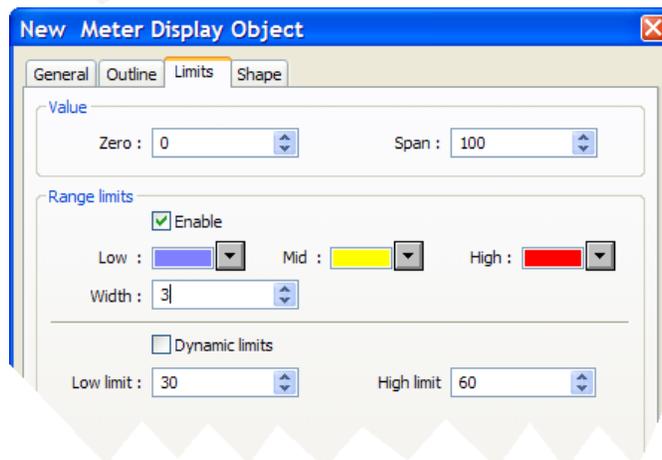
(011)

25) Move the cursor with the outline of the meter to position it and click to place the meter in Window_11.

26) Resize the meter with the corner handles to make it smaller, if necessary
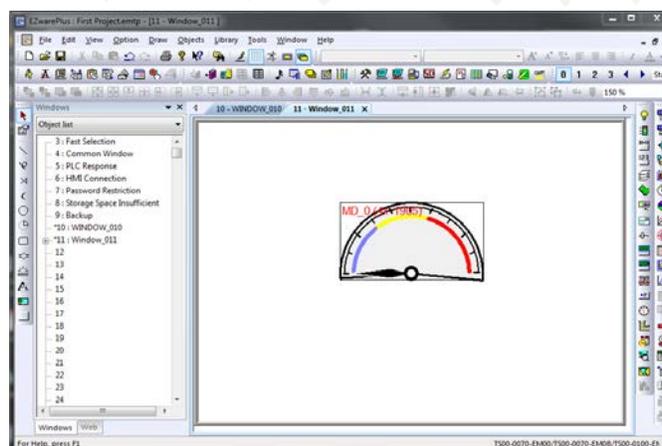
(080)

27) Double-click the meter to open the **Meter Display Object's Properties** dialog.

28) Click the **Profile** tab.

29) Set **X** to *140*.

30) Set **Y** to *60*.

31) Set **Width** to *140*.

32) Set **Width (%)** to *100*.

33) Click **OK**.

34) From the **File** menu choose **Save**.
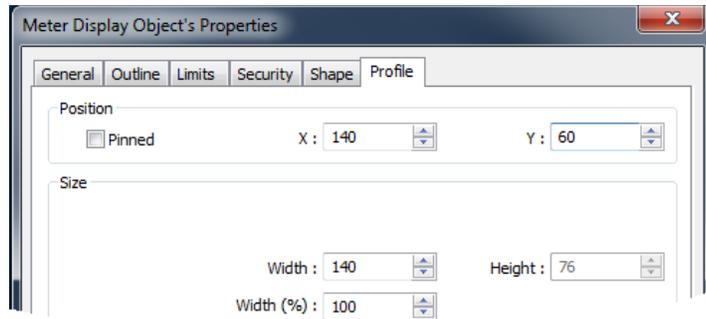
(012)

Add a Numeric Display

This example assumes you have created a window in a project that is configured to communicate with a Watlow Controller and that window is open in EZwarePlus.

1) On the **Objects** menu, choose **Numeric**.

2) Click the **General** tab.

3) In **Description** type *Actual Closed Loop Set Point*.

4) For **PLC** choose *Modbus RTU Master* or *Modbus TCP/IP Master*.

(013)

5) For **Address** choose *4x* and enter the address of the Closed Loop Working/Active Set Point for your controller. See the table.

For this controller…	This parameter…	Enter this Address*…	Choose this Data Type…
RMCxxxx-xxxxxxx	Closed Loop Working/Active Set Point (Read Only)	2513	32-bit Float
RMHx-xxxx-x1xx		5233	32-bit Float
PMxxxxx-xxxxxxx		2173	32-bit Float
STxx-xxMx-xxxx		204	32-bit Float
ST via RUI Gateway		2173	32-bit Float
Other Controllers	Consult the controller manual.		

*These addresses have already been changed to the absolute form required for EZwarePlus by adding 1 to the value listed in the Watlow manual. Enter them as listed.

6) Click the **Format** tab.

7) In **Data format** set the data type. See the table.

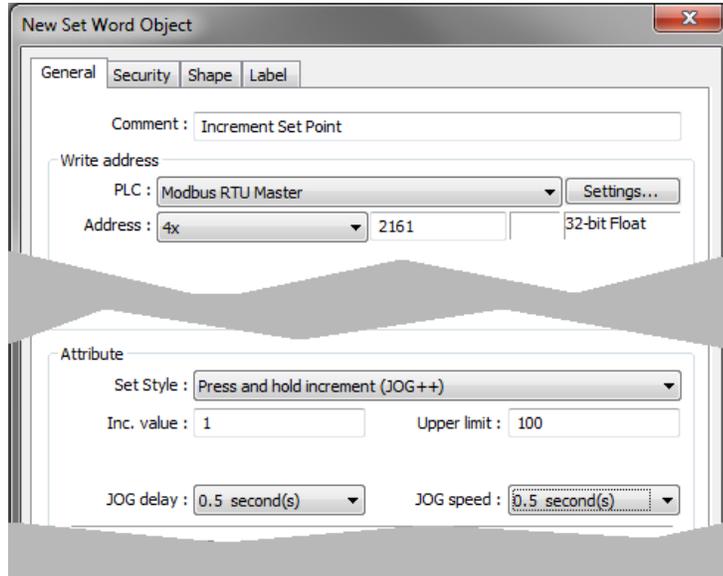8) On the **Font** tab set **Align** to **Right**.

9) Click **OK**.

For this controller…	This parameter…	Enter this Address*…	Choose this Data Type…
RMCxxxx-xxxxxxx	Closed Loop Working/Active Set Point (Read Only)	2513	32-bit Float
RMHx-xxxx-x1xx		5233	32-bit Float
PMxxxxx-xxxxxxx		2173	32-bit Float
STxx-xxMx-xxxx		204	32-bit Float
ST via RUI Gateway		2173	32-bit Float
Other Controllers	Consult the controller manual.		

*These addresses have already been changed to the absolute form required for EZwarePlus by adding 1 to the value listed in the Watlow manual. Enter them as listed.

10) Move the cursor with the outline to position the display field and click to place it.

11) Adjust the size of the field as needed.

12) From the **File** menu choose **Save**.

(013b)
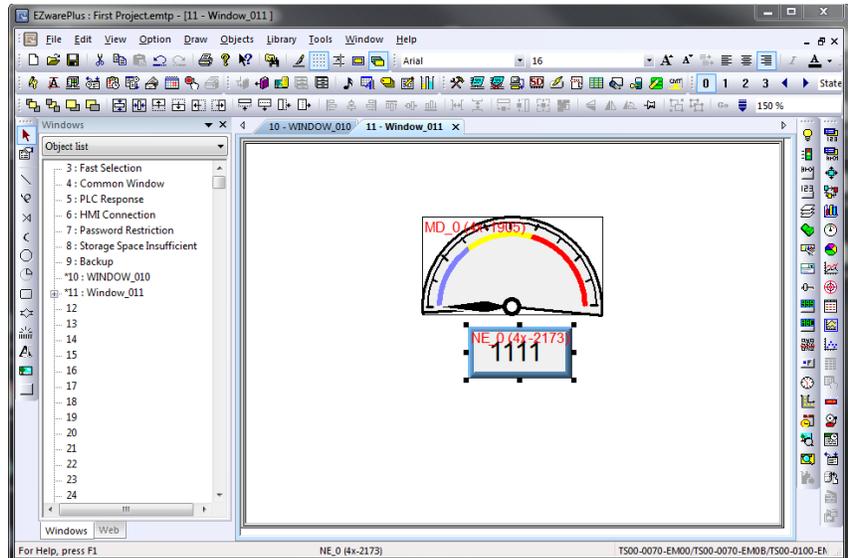
(014)

Add Increment and Decrement Buttons

This example assumes you have created a window in a project that is configured to communicate with a Watlow Controller and that window is open in EZwarePlus.

To add a button that increments the set point:

1) On the **Objects** menu, click **Button** then choose **Set Word**.

2) Click the **General** tab.

3) In **Comment** type *Increment Set Point*.

4) For **PLC** choose *Modbus RTU Master* or *Modbus TCP/IP Master*.

5) Click **Settings…**

6) For **Device type** choose *4x*.

7) For **Address** enter the address of the User Set Point for your controller.

8) Select the data type for the parameter in the field below the **Address** field.

9) Click **OK.**

10) In **Attribute** for **Set Style** choose *Press and hold increment (JOG++)*.

11) Set **Inc. value** to *1*.

12) Set **Upper Limit** to *100* or a value that is safe for your controller's set point.

13) Set **JOG delay** to *0.5 seconds*.

14) Click the **Shape** tab.

15) Check **Use shape**.

(015)

For this controller…	This parameter…	Enter this Address*…	Choose this Data Type…
RMCxxxx-xxxxxxx		2501	32-bit Float
RMHx-xxxx-x1xx	Closed Loop Set Point (Read/Write)	5221	32-bit Float
PMxxxxx-xxxxxxx		2161	32-bit Float
STxx-xxMx-xxxx		22	32-bit Float
ST via RUI Gateway		2161	32-bit Float
Other Controllers	Consult the controller manual.		

*These addresses have already been changed to the absolute form required for EZwarePlus by adding 1 to the value listed in the Watlow manual. Enter them as listed.

16) Click **Shape Library…**

17) Click the new library icon **Select Lib…**

18) In the EZwarePlus program's library directory (typically: C:\Watlow\EZPlus\library) select **Arrows 1.plb**.

19) Click **Open**.

20) Locate the button with the triangular arrow pointing up and click it.

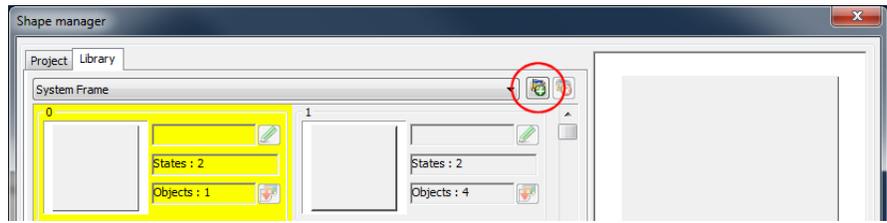21) Click **OK** to close the **Shape Library**.

22) Click **OK** to close the **New Set Word Object** dialog.
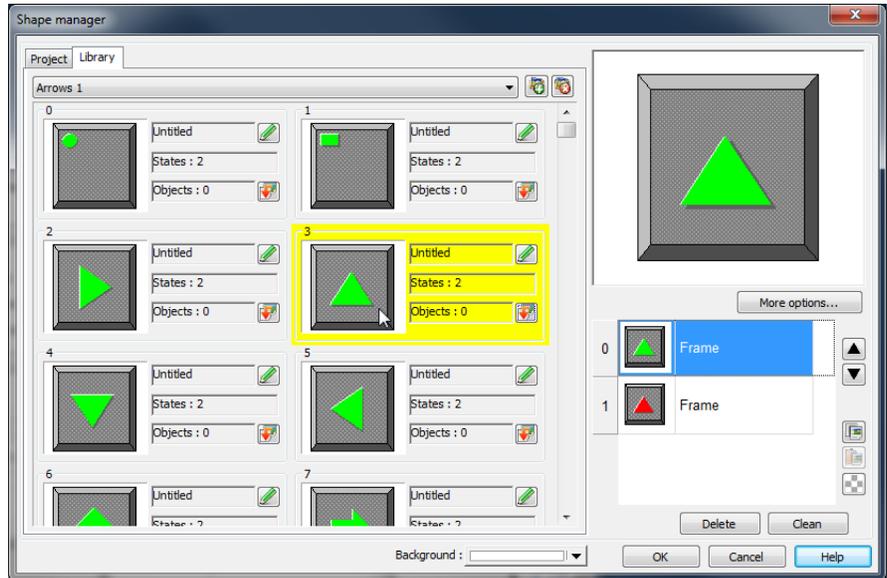
23) Click to place the button.

24) Use the handles to adjust the size of the button.

25) Drag the button to place it as desired on the screen.

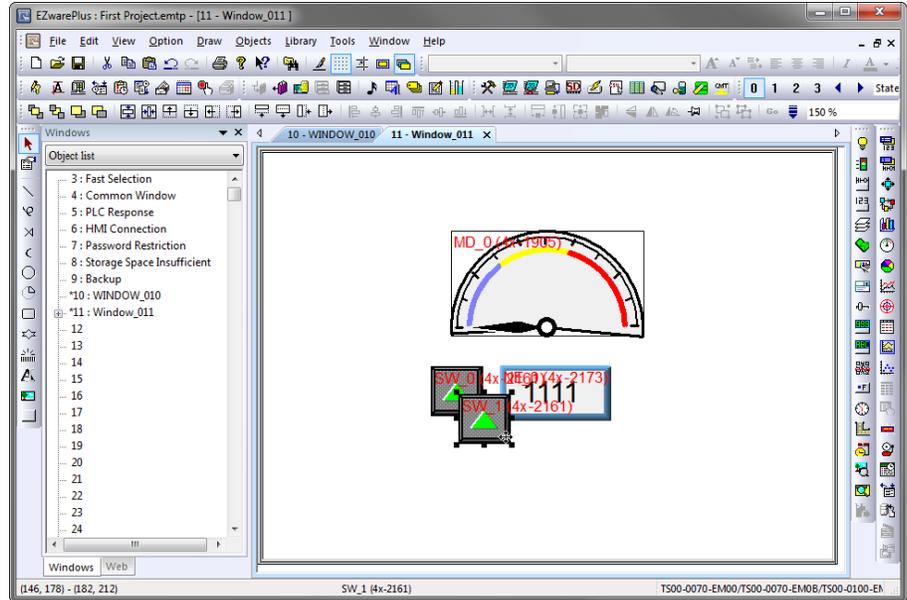26) From the **File** menu choose **Save**.

(016a)

(016)
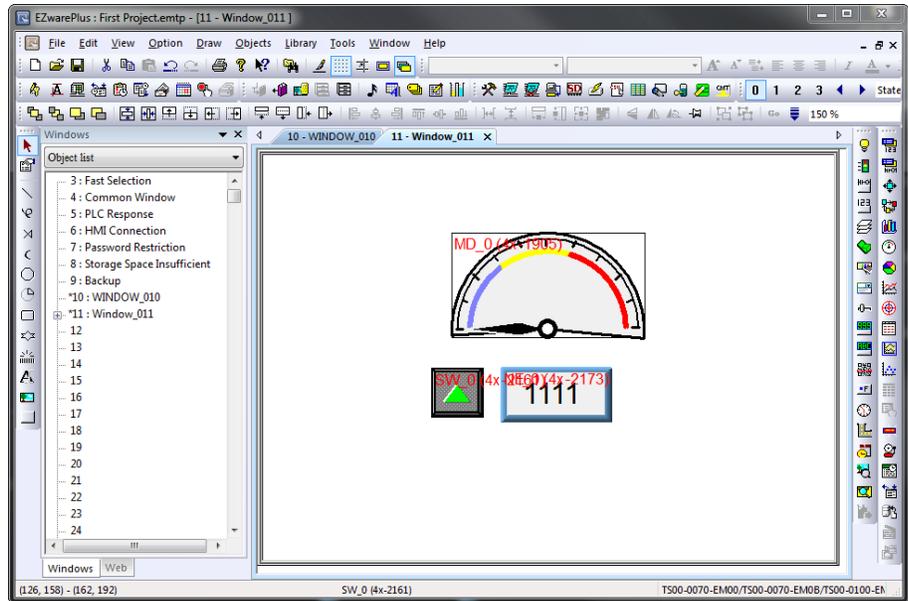
(017)

To add a button that decrements the set point:

1) Click the **increment** button to select it.

2) From the **Edit** menu, choose **Copy**.

3) From the **Edit** menu, choose **Paste**.

4) Drag the new button to an appropriate position.

5) Double click the new button to edit its properties.

(018)

6) On the **General** tab change:

- **Comment** to Decrement Set Point

- **Set Style** to Press and hold decrement (JOG--).

7) Set **Bottom Limit** to *0*.

8) On the **Shape** tab click **Shape Library…**

9) Locate the button with the triangular arrow pointing down and click it.

10) Click **OK** to close the **Shape Library**.

11) Click **OK** to close the **Set Word Object Properties** dialog.

12) From the **File** menu choose **Save**.

Add an Option List for Control Mode

This example assumes you have created a window in a project that communicates with a Watlow Controller and that window is open in EZwarePlus.

1) On the **Objects** menu, click **Button** then choose **Option List**.

2) Click the **Option list** tab.

3) In **Comment** type *Control Mode*.

4) Set **Mode** to *Drop-down list*.

5) Set **Item No.** to *3*.

6) In the **Monitor address** group:

   - For **PLC name** choose *Modbus RTU Master* or *Modbus TCP/IP Master*.

   - Click **Settings…**

   - For **Device type** choose *4x*.

   - In **Address** enter the address of the Control Mode. See the table.

   - Select the data type in the field below the **Address** field.

   - Click **OK** to close the **Address** dialog
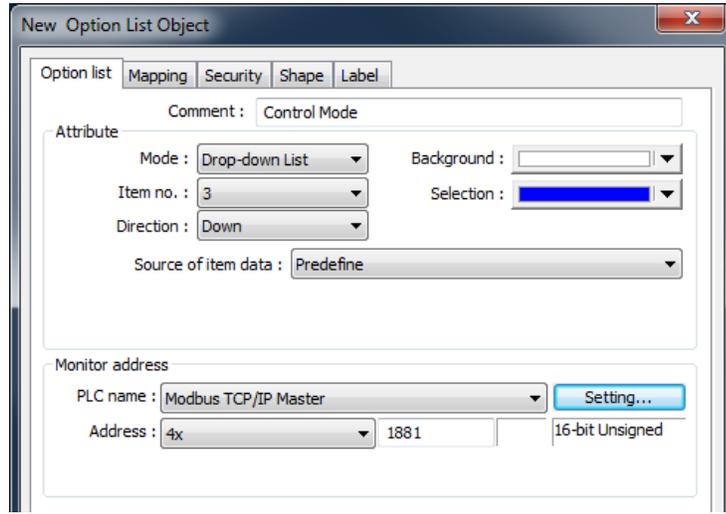
(019)

| For this controller…	This parameter…	Enter this Address*…	Choose this Data Type…
RMCxxxx-xxxxxxx		2221	16-bit Unsigned
RMHx-xxxx-x1xx		4101	16-bit Unsigned
PMxxxxx-xxxxxxx	Control Mode	1881	16-bit Unsigned
STxx-xxMx-xxxx		222	16-bit Unsigned
ST via RUI Gateway		1881	16-bit Unsigned
Other Controllers	Consult the controller manual.		

*These addresses have already been changed to the absolute form required for EZwarePlus by adding 1 to the value listed in the Watlow manual. Enter them as listed.

7) Click the **Mapping** tab.

8) In the **Values** column type the numeric values and in the **Item data** the text that corresponds to each option you want to include. See the table.

9) Click **OK** to close the **New Option List Object** dialog.

(020)
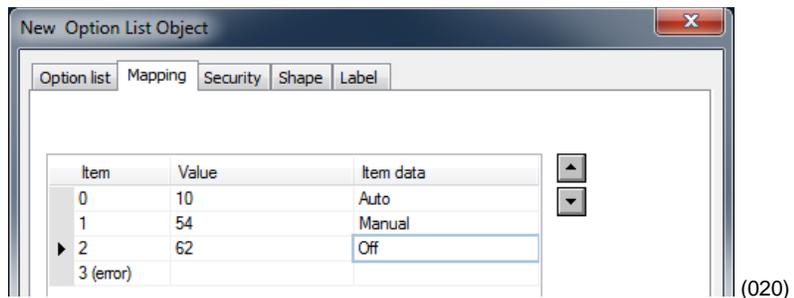
Item	Value	Item Data
0	10	Auto
1	54	Manual
2	62	Off
3 (error)		

10) Position the cursor near the bottom center of the window layout and click to place the multi-state switch. (You may have to move the other objects around to fit everything.)

11) From the **File** menu choose **Save**.
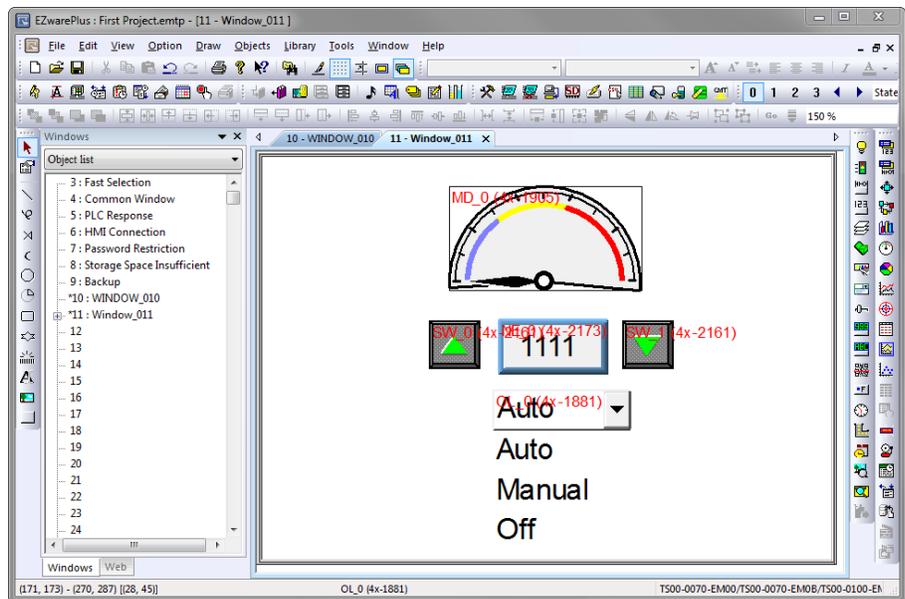
(022)

Add a Button to Close the Popup Window

This example assumes you have created a window in a project that communicates with a Watlow Controller and that window is open in EZwarePlus.

1) On the **Objects** menu, click **Button** then choose **Function Key**.

2) On the **General** tab, in **Comment** type *Close Window*.

3) Select **Close window**.

4) On the **Shape** tab, uncheck **Use shape**.

(023)

5) Check **Use picture**.

6) Click **Picture Library…**

7) Click the **Library** tab.

8) Click the new library icon

9) Select **Computer.flb**.

10) Click **Open**.

11) Locate the round grey button with the white x and click to select it.
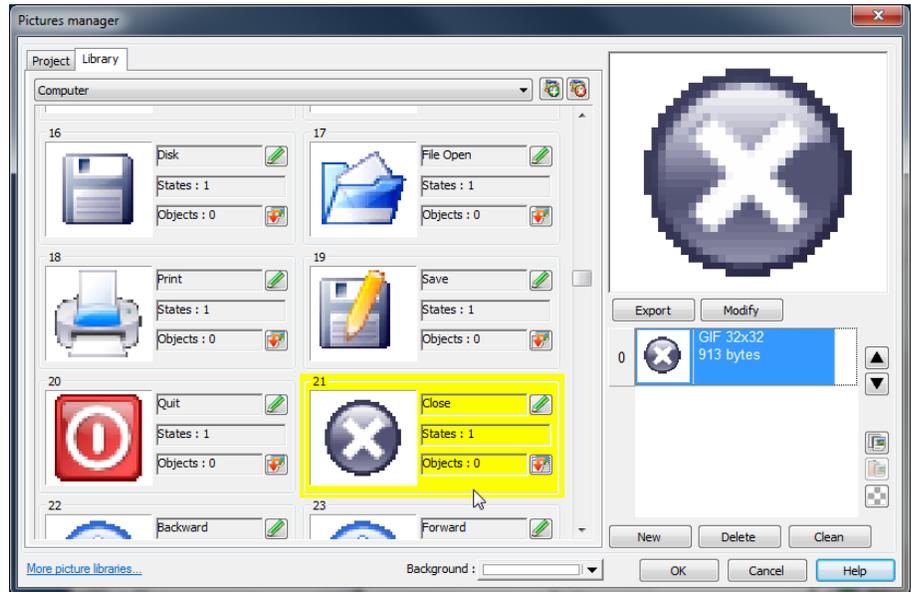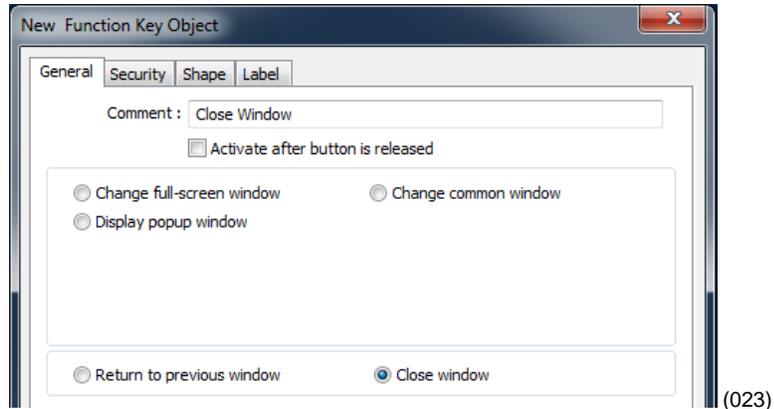
12) Click **OK** to close the **Picture Library**.

(024)

13) On the **Label** tab, make sure **Use label** is not checked.

14) Click **OK** to close the **New Function Key Object** dialog.

15) Click to place the function key in the upper right.

16) Double-click the function key to open the **Function Key Object's Properties** dialog.

17) Click the **Profile** tab

18) Set **Position X** to *375*.

19) Set **Position Y** to *5*.

20) Set **Size Width** to *32*.

21) Set **Size Height** to *32*.

22) Click **OK**.

23) From the **File** menu choose **Save**.
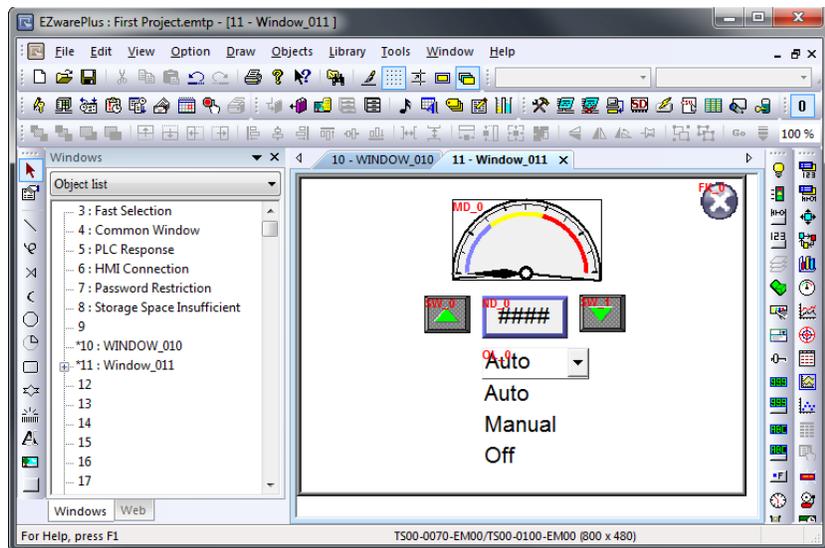
(025)

Edit the Startup Window

This example assumes you have created a popup window open in EZwarePlus in a project that is configured to communicate with a Watlow Controller.

To add text to the start up window:

1) From the **Window** menu, choose **1 10 – WINDOW_010**.

2) From the **Draw** menu choose **Text**.

3) Set these text **Attributes**:

   - Choose a **Font**.
   - Set **Color** to white.
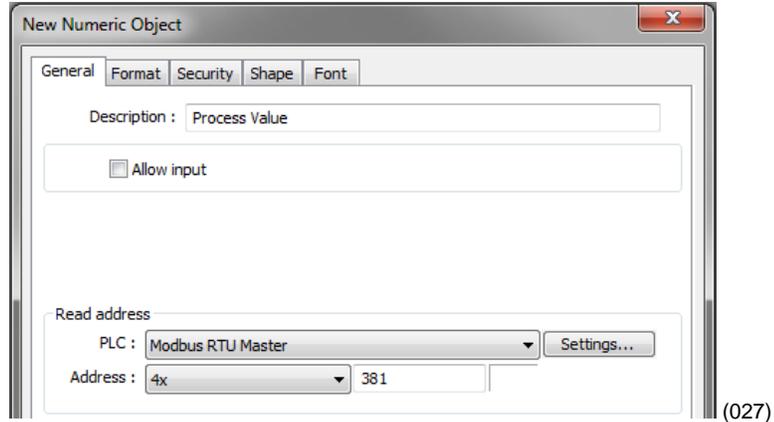   - Set **Size** to **14**.
   - Set **Align** to **Left**.
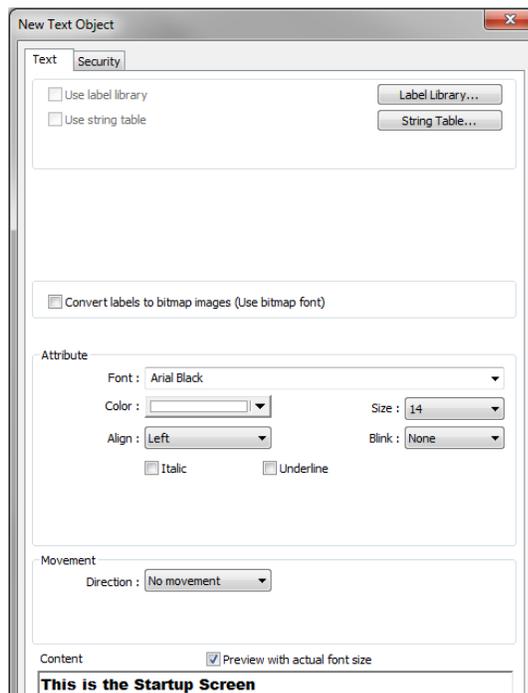
4) Edit **Content** to read, *This is the Startup Screen*.

5) Click **OK**.

(026)

6) Position the cursor centered in the top third of the window layout and click to place the text.

7) From the **File** menu choose **Save**.

Add a Numeric Display to the main window:

1) From the **Objects** menu, choose **Numeric**.

2) Click the **General** tab.

3) In **Description** type *Process Value*.

4) Deselect **Allow input**.

5) For **PLC** choose *Modbus RTU Master* or *Modbus TCP/IP Master*.

6) For **Address** choose *4x*.and enter the address of the Analog Input 1 Process Value. See the table.

(027)

For this controller…	This parameter…	Enter this Address*…	Choose this Data Type…
RMCxxxx-xxxxxxx		361	32-bit Float
RMHx-xxxx-x1xxx		381	32-bit Float
PMxxxxx-xxxxxxx	Analog Input 1 Process Value	361	32-bit Float
STxx-xxMx-xxxx		20	32-bit Float
ST via RUI Gateway		361	32-bit Float
Other Controllers	Consult the controller manual.		

*These addresses have already been changed to the absolute form required for EZwarePlus by adding 1 to the value listed in the Watlow manual. Enter them as listed.

7) Click the **Format** tab.

8) In **Data format** set the data type.

9) Set **Right of decimal Pt.** to **1**.

(028)

10) On the **Font** tab set **Align** to **Right**.

11) Click **OK**.

12) Move the cursor with the outline to position the display field in the center of the screen and click to place it.

13) From the **File** menu choose **Save**.

(030)
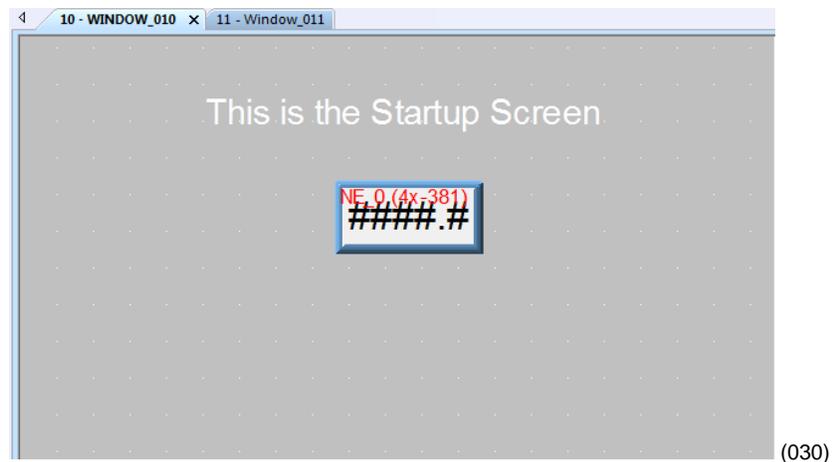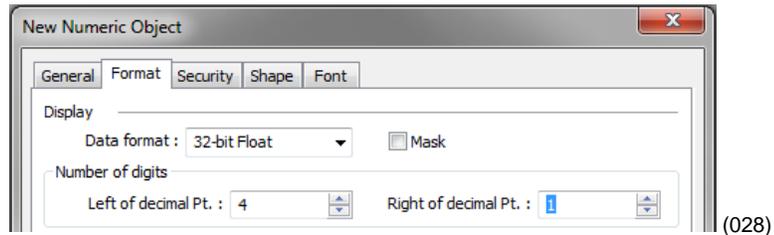
To create a function key on Window10:

1) On the **Objects** menu, click **Button** then choose **Function Key**.

2) On the **General** tab, in **Comment** type *Loop 1 Settings*.

3) Select **Display popup window**.

4) For **Style** choose **No title bar**.
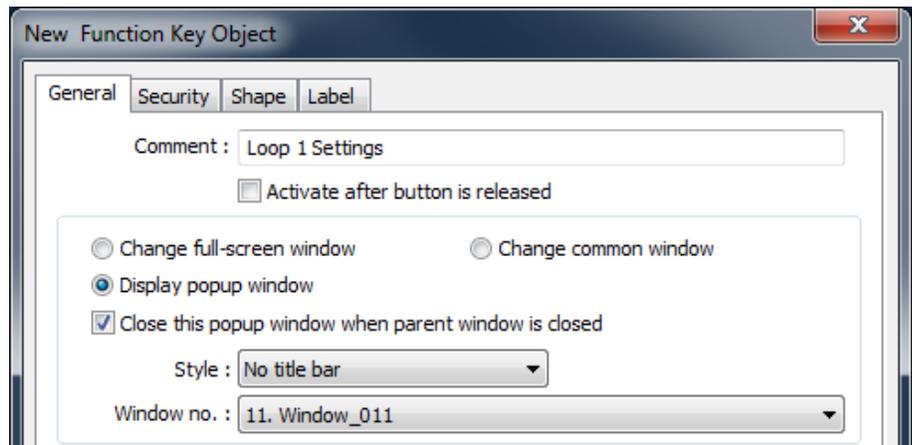
(031)

5) For **Window no.** select **11. Window_011**.

6) Click the **Shape** tab.

7) Deselect **Use picture**.

8) Select **Use shape**.

9) Click **Shape Library…**

10) In the **Library** list select **button1**.

11) Click one of the buttons to select it.

12) Click **OK** to close the **Shape Library**.

13) Click the **Label** tab.

14) Select **Use label**.

15) Set **Color** to black.

16) Set **Size** to **16**.

17) Set **Align** to **Left**.

18) In **Content** type *Loop 1*.

19) Click **OK**.

20) Position the cursor and click to place the function key.
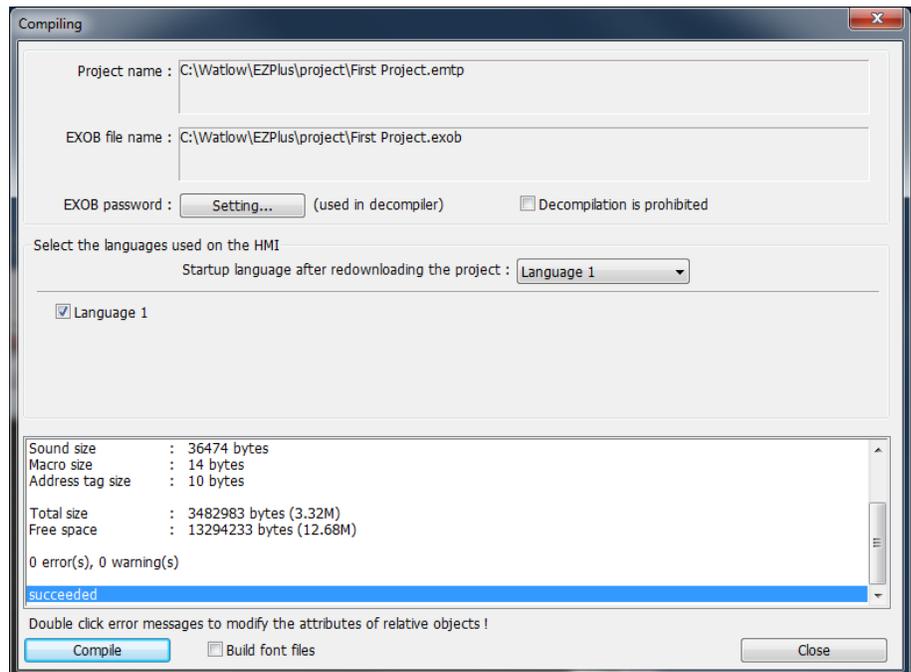
21) From the **File** menu choose **Save**.
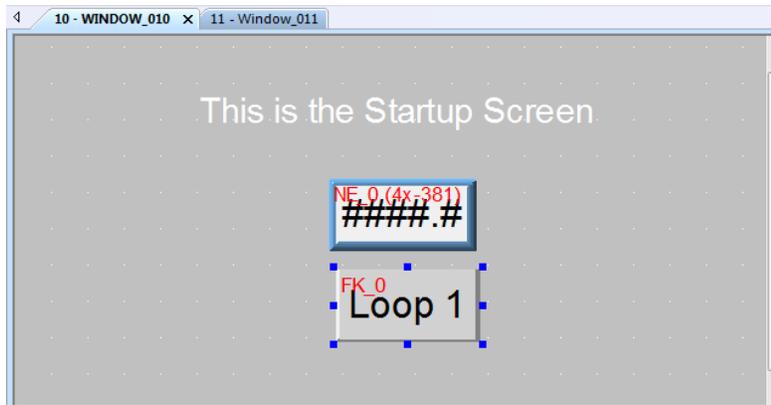
(032)

Compile and Download the Project

This example assumes you have a project that is ready to compile and load into an OIT.

To compile the project:

1) From the **Tools** menu, choose **Compile**.

2) Click **Compile**.

3) After the project is compiled, click **Close**.

(034)

To download via Ethernet:

1) Determine the OIT's IP address:

   - If you don't already know the OIT's IP address, follow the instructions in *Determining or Setting the OIT's IP Address* on page 4, note the IP address for use below.

2) In EZwarePlus from the **Tools** menu, choose **Download**.

3) In the **IP** field select or enter the OITs IP address.

4) Check **Runtime**, if not already checked.

5) Check **Reboot HMI after download**, if not already checked.

6) Click **Download**.

7) Once the download is complete, click **Exit**.
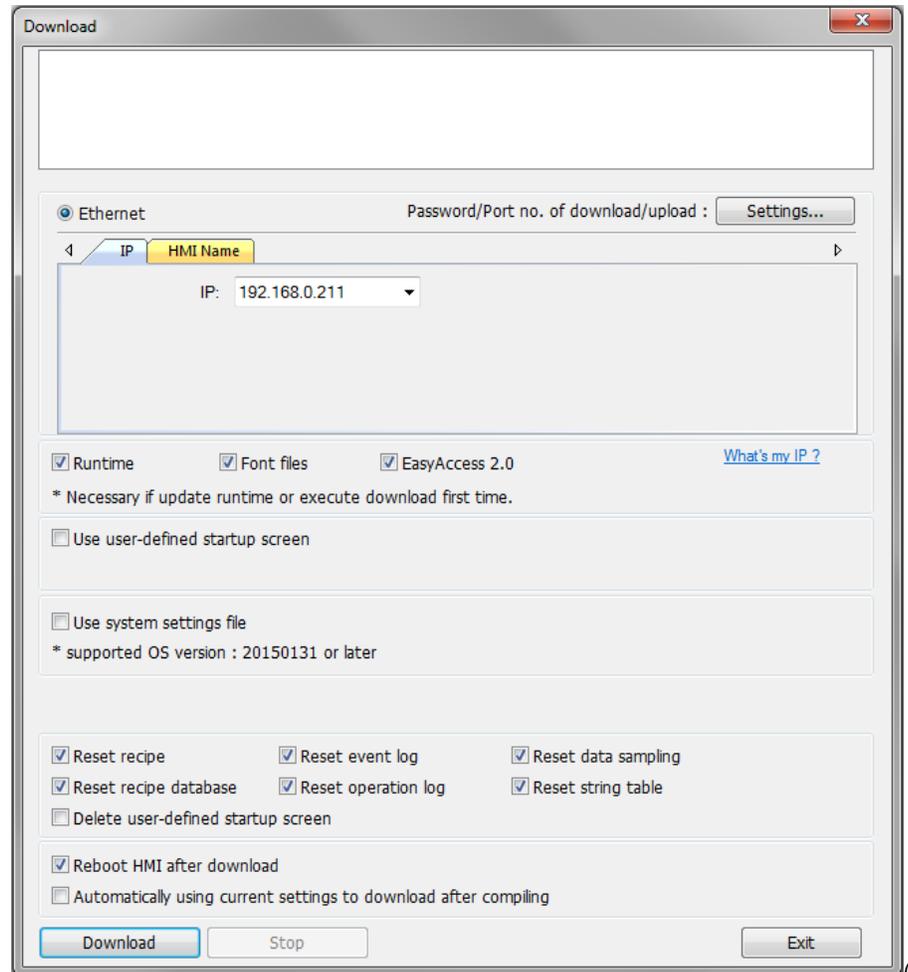
(035)

To download the project via a USB drive to an OIT:

1) Connect a USB drive to the PC

2) From the **Tools** menu choose **Build Data for USB Disk or SD Card Download…**

3) Click **Browse…**

(038)
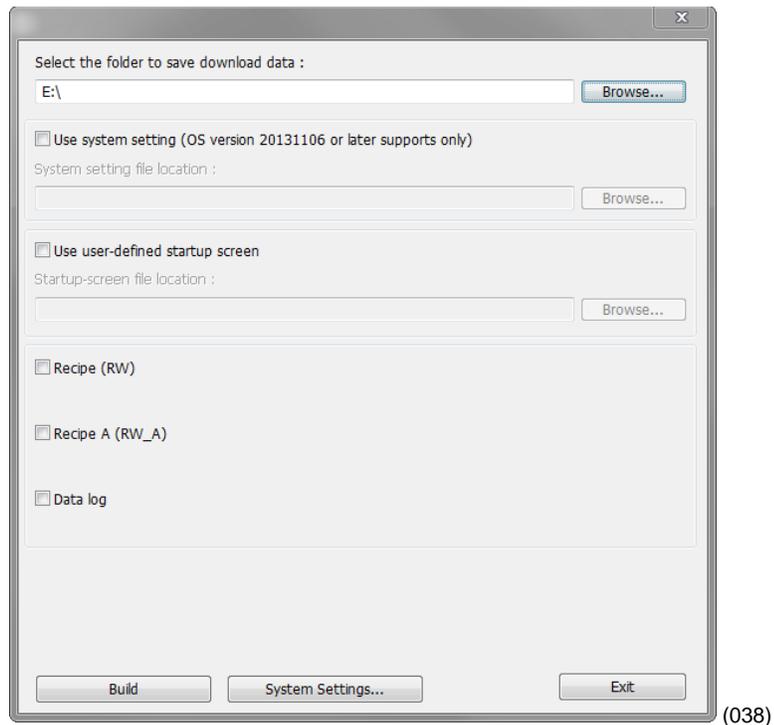
4) Locate and select the USB drive.

Note: Do not select a sub-directory of the USB drive. Select the root.

5) Click **OK** to close the **Browse For Folder** dialog.

(039)
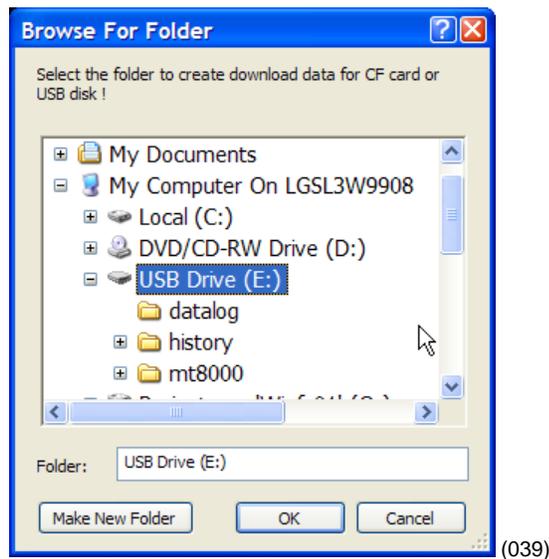
6) Click **Build**.

7) When the files are transferred successfully, click **OK**.

8) Click **Exit** to close the **USB Disk/CF Card/SD Card Data** dialog.

9) Remove the USB drive from the PC.

To download the from the USB drive to the OIT:

1) Connect the USB drive to the OIT.

2) When the Download/Upload screen appears on the OIT click **Download**.

Note: You only have a few seconds to do this before the screen times out. If you miss it, disconnect the USB drive and connect it again.

3) With the **Virtual Keyboard** enter the **Password**. (By default this is 111111.)

4) On the **Download Settings** dialog make sure **Download Project Files** is checked.

5) Click **OK**.

6) In the **Pick a Directory** dialog expand the **usbdisk** folder by clicking the plus (+) next to it.

7) Select the **disk_a_1** folder.

Note: The OIT represents the USB drive with a folder icon and a name it assigns such as **disk_a_1.** You can inspect the contents to be sure you pick the right one. The compiled project is in a directory called **mt8000ie**, but be sure to select the USB drive not a sub folder before proceeding.

8) Click **OK.**

9) Once the project downloads and runs, you can remove the USB drive from the OIT.

Log Data

This example assumes you have a project with at least one controller.

There are two steps to log data with the OIT:

- Copy data from the controller to contiguous local OIT memory with the Data Transfer (Time-based) object—this is necessary only if you want to log more than one parameter in the same file or show multiple parameters together in a Trend Display (graph) or a History Data Display (table).

- Create a data log with the Data Sampling object.

**Note:** This example uses specific addresses internal to the OIT. If you have used one or more of these for other purposes you will have to choose appropriate addresses for your project.

To copy data to the OIT's local memory:
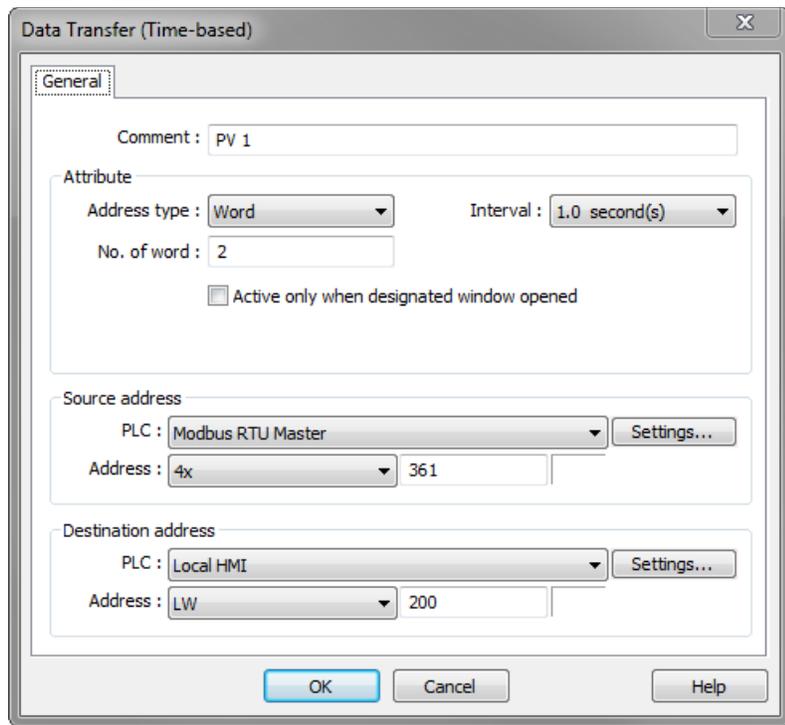
1) From the **Objects** menu choose **Data Transfer**.

Note: Do not choose the Data Transfer (Trigger-based) option.

2) For each item to be logged in the file:

- Click **New…**
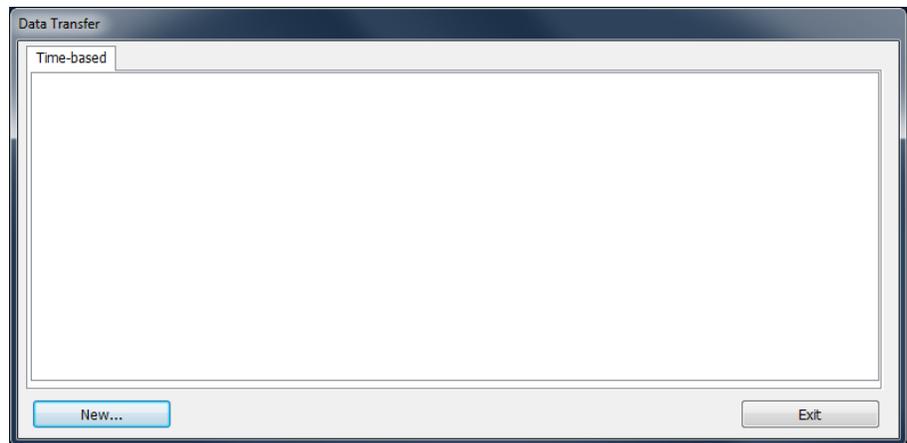
(041)

- In **Comment** type a description of the data to be copied such as "PV 1".

- For **Address type** choose *Word*.

- For **Interval** choose a value that is the same as or less than the amount of time you want between data samples.

- In **No. of word** type word size of the parameter's data type. See table.

- For **Source address PLC** choose *Modbus RTU Master* or *Modbus TCP/IP Master*.

- For **Source address** device type choose *4x*.

- In **Source address Address** type the address of the parameter to be logged.

Data Transfer (Time-based)

General

Comment : PV 1

Attribute
Address type : Word   Interval : 1.0 second(s)
No. of word : 2
☐ Active only when designated window opened

Source address
PLC : Modbus RTU Master   [Settings...]
Address : 4x   361

Destination address
PLC : Local HMI   [Settings...]
Address : LW   200

[OK] [Cancel]   [Help]
(042)

Data Type	No. of word
Float	2
16-bit integer	1
32-bit integer	2

| For this controller…	This parameter…	Enter this Address*…	Choose this Data Type…
RMCxxxx-xxxxxxx		361	32-bit Float
RMHx-xxxx-x1xxx		381	32-bit Float
PMxxxxx-xxxxxxx	Analog Input 1 Process Value	361	32-bit Float
STxx-xxMx-xxxx		20	32-bit Float
ST via RUI Gateway		361	32-bit Float
Other Controllers	Consult the controller manual.		

*These addresses have already been changed to the absolute form required for EZwarePlus by adding 1 to the value listed in the Watlow manual. Enter them as listed.

- For **Destination address PLC** choose the OIT ("Local HMI" by default).

- For **Destination address** device type choose *LW*.

- In **Destination address Address** type the local address at which to save the data to be logged.

Note: Pick a range of addresses with room to store all the data that must be displayed. For example, use 200 for the first parameter to be logged then for each additional parameter increment the address by the size in words of the previous data. For example, typically you log floats such as process variables and set points which each require two words to store. In that case if the first process variable is copied to 200, set the next parameter to copy to 202 so on. In this example, a process variable, a set point and the heat output power are logged.

- Click **OK**.

3) Click **Exit** to close the Data Transfer (Time-based) Object window.
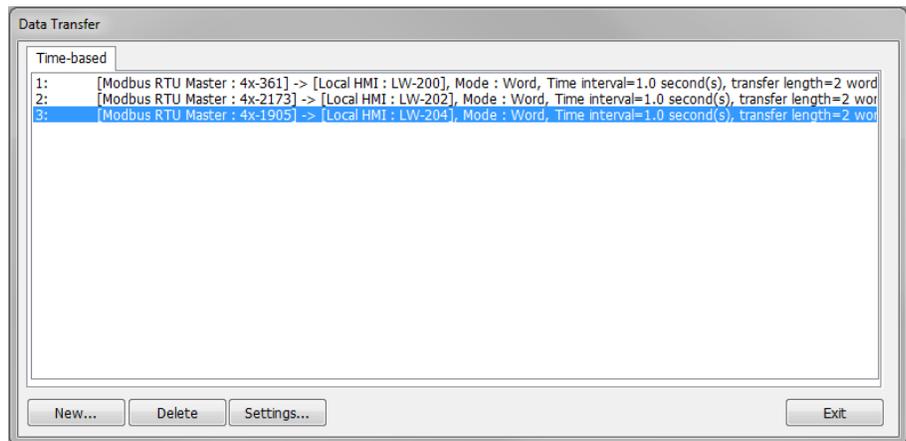
(043)

To set up data sampling to log the data:

1) On the **Objects** menu, click **Data Logging** then choose **Data Sampling**.

2) Click **New…**
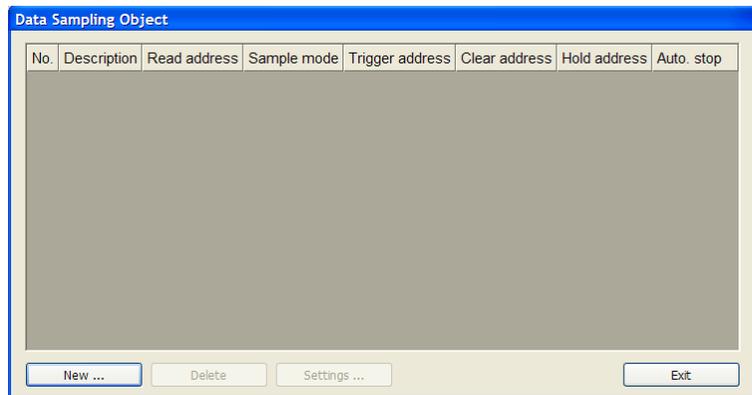
(044)

3) In **Comment** type a description for the set of data such as "Loop 1".

4) For **Sampling mode** choose **Time-based**.

5) For **Sampling time interval** choose the time between samples.

6) For **Read address PLC name** choose the OIT ("Local HMI" by default).

7) For **Read address** device type choose **LW**.
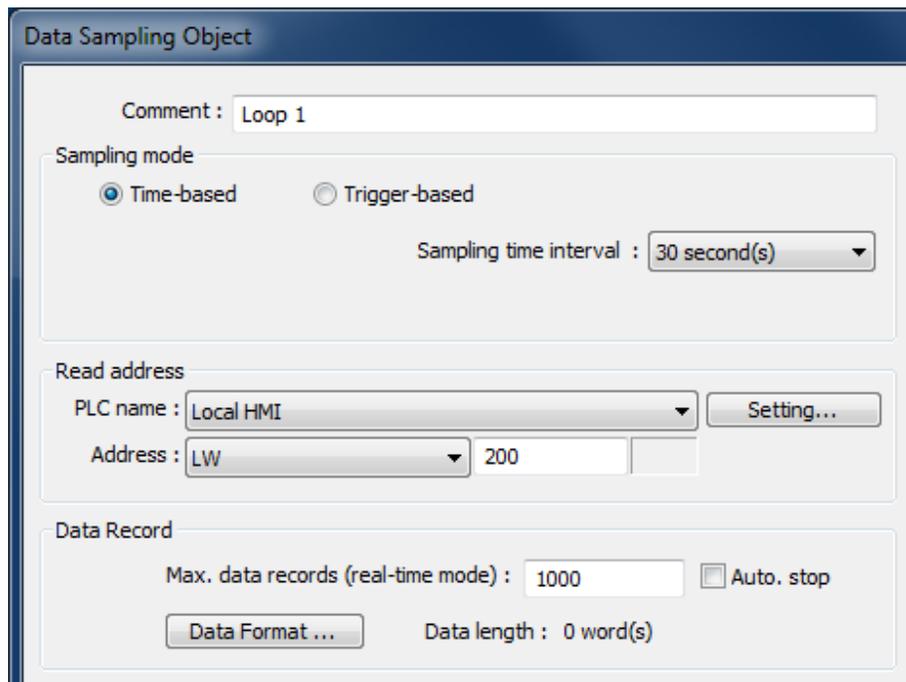
(045)

8) In **Address** type the first address to which data was copied. In the example, this is 200.

9) In **Max. data records** type the number of records to save in a file.

10) Click **Data Format…**

11) For each item to be logged in the file:

   - Click **New…**

(046)

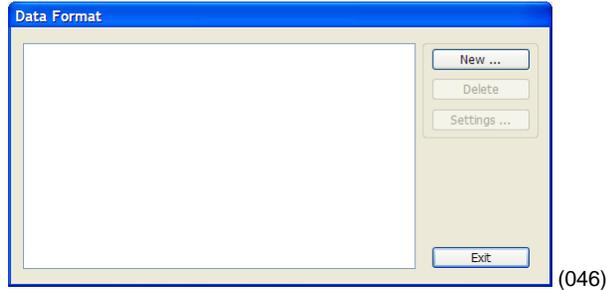   - For **Data type** choose the data type of the item being logged. Typically 32-bit Float).

   - In **Comment** Enter a description for the item to be logged, for example "PV 1".

   - Click **OK.**

(047)
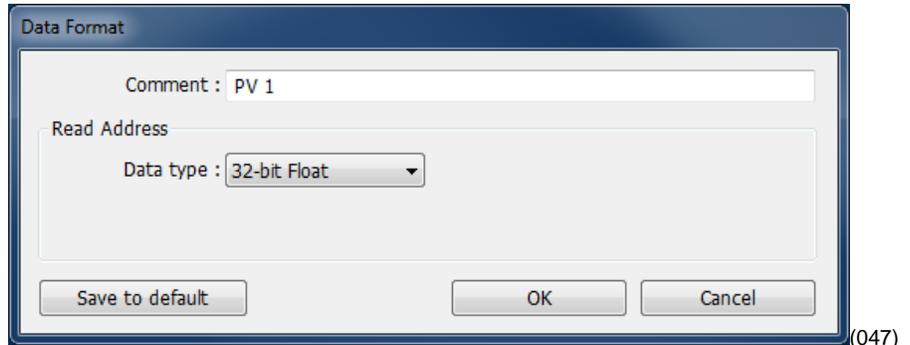
12) Click **Exit** to close the Data Format window.

(048)
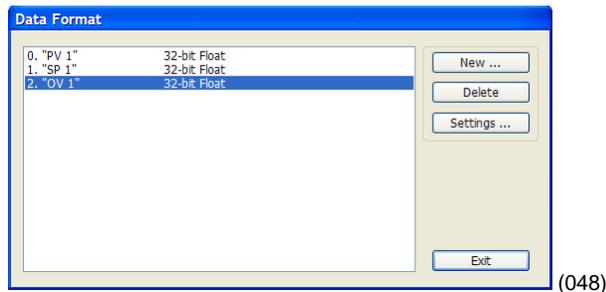
13) In the **History Files** group check one or more locations to which to save the data (**Save to USB disk** or **Save to HMI memory**).
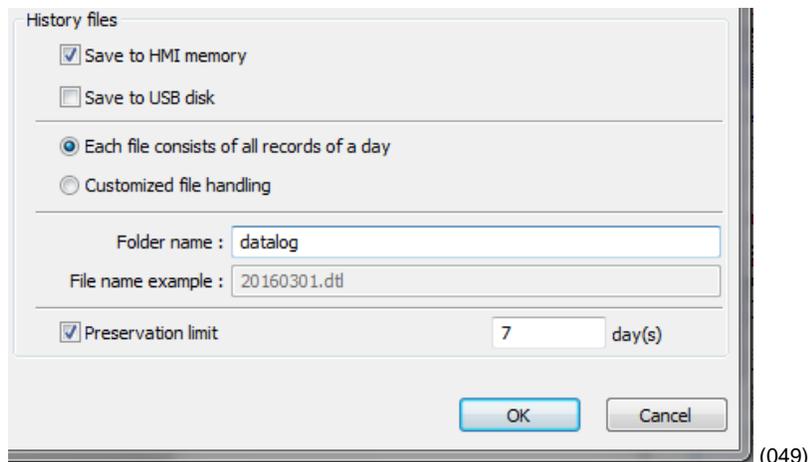
14) In **Folder name** type a name for the folder in which the data log file should be created such as "datalog".

(049)

15) Click **OK** to close the **Data Sampling Object** set up window.

16) Click **Exit** to close the **Data Sampling Object** window.

No.	Description	Read address	Sample mode	Trigger address	Clear address	Hold address	Auto. stop
1	Loop 1	LW200	Periodical	Disable	Disable	Disable	Disable

New ...   Delete   Settings ...   Exit
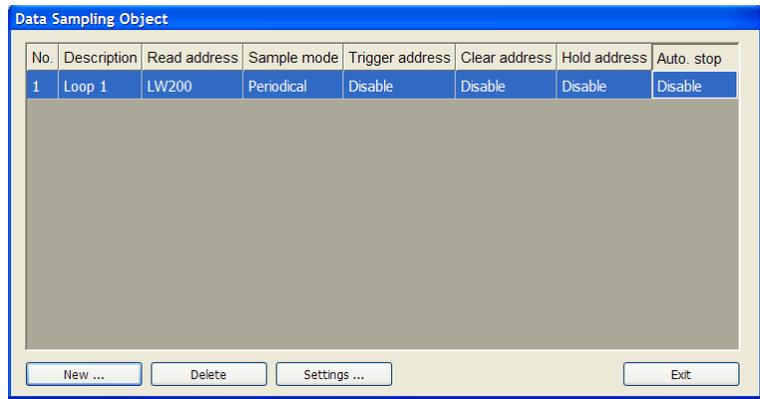
(050)

Create a Graph

This example assumes you have a project with at least one controller and that you have previously configured a time-based data sampling object.

To create and open a window to use for the trend.

1) From the **Window** menu, choose **Open Window**.

2) Click **New…**

3) Click **Base Window**.

4) In **Name** type *Trend*.

5) Click **OK**.

6) In the Window list select **Trend**.

7) Click **Open**.

(056)

(007)

(057)
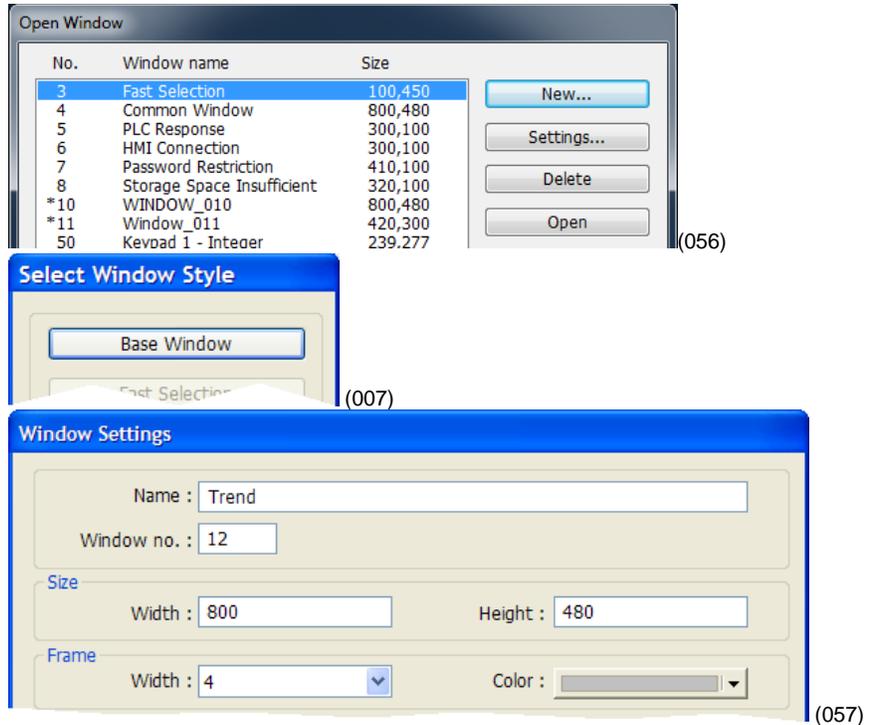
To create buttons to open the Trend window and return to the first window:

1) Select window 10.

(064)

2) Select the function key on that screen by clicking it once.

(065)

3) From the **Edit** menu, choose **Copy.**

4) From the **Edit** menu, choose **Paste.**

5) Place the copy next to the original**.**

6) Double-click the copy to open the **Function Key Object's Properties** window.
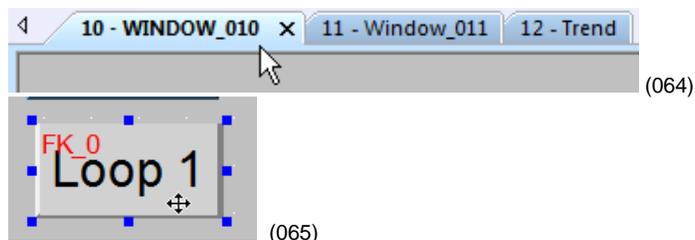
7) Edit the **Comment** to read *Trend Graph Window*.

8) Choose **Change full-screen window**.

9) For **Window no.** choose **12. Trend**.

(066)

10) Click the **Label** tab.

11) Edit the **Content** to read *Trend*.

12) Click **OK** to close the **Function Key Object's Properties** window.

13) If necessary, select the function key by clicking it.

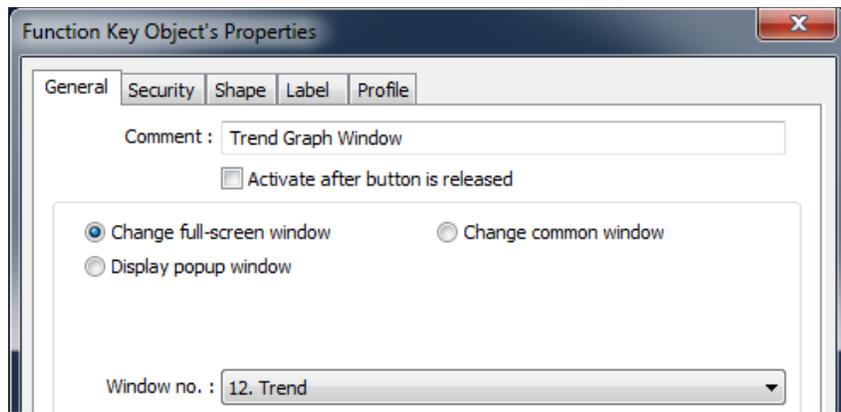14) From the **Edit** menu, choose **Copy.**

15) Select window 12 Trend.

16) From the **Edit** menu, choose **Paste.**

17) Position the button centered at the bottom of the screen**.**

18) Edit the new button's properties so that it changes to full-screen **WINDOW_010** and is labeled "**Back**".

To create a trend graph:

1) On the **Objects** menu point to **Data Logging** and choose **Trend Display**.

2) In **Comment** type a description of the trend such as "Loop 1 PV, SP and Heat vs. Time".

3) For **Data Sampling Object index** choose the data sampling object you previously configured.
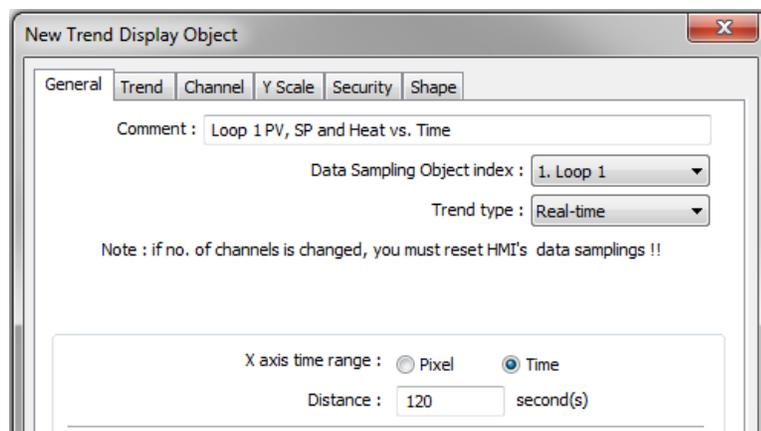
(051)

4) For **Trend type** choose **Real-time**.

5) For **Distance between data samples/X axis time range** choose **Time**.

6) In **Distance** type the number of seconds the width of the trend graph will represent. For example, if you want to see two minutes of data at once, type 120.

7) Click the **Trend** tab.

8) Choose a **Frame** color and a **Background** color.
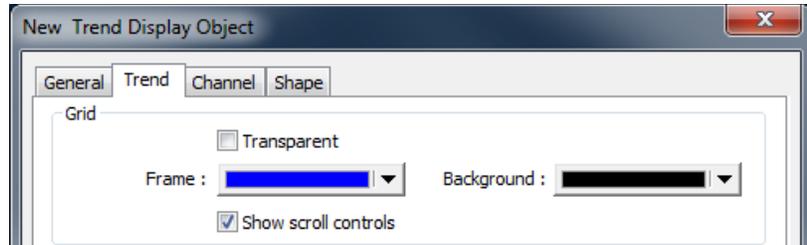
9) Click the **Channel** tab.

10) For each channel to be graphed:

- In the Data sampling object group check **Display**.

- For **Color** choose a color that contrasts with the background color.

- In **Min** type the value that should be graphed at the bottom of the y-axis.

- In **Max** type the value that should be graphed at the top of the y-axis.

11) Click **OK**.
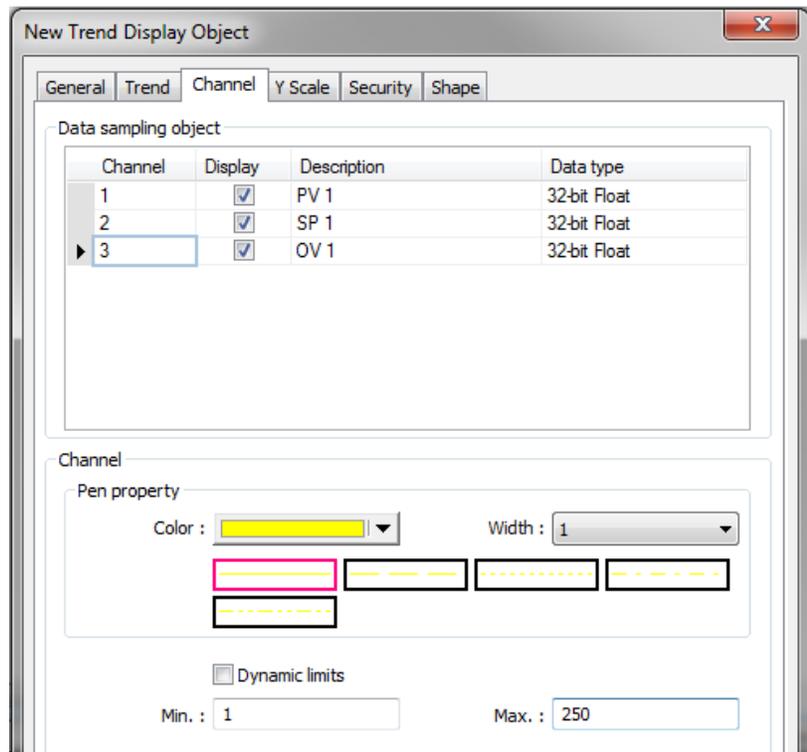
Note: Keep in mind that while you can choose a different min and max for each pen, you don't want to confuse users, so it may be best to graph all the channels against the same min and max values.

12) Place and size the trend object.
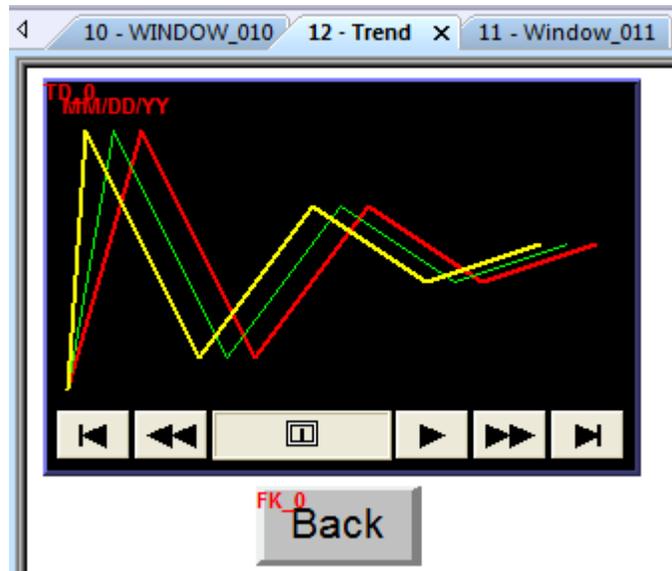
(053)

13) *Optional*: In the **Trend Display Object's Properties** dialog **Trend** tab enable the **Grid** and set it up to display the time.
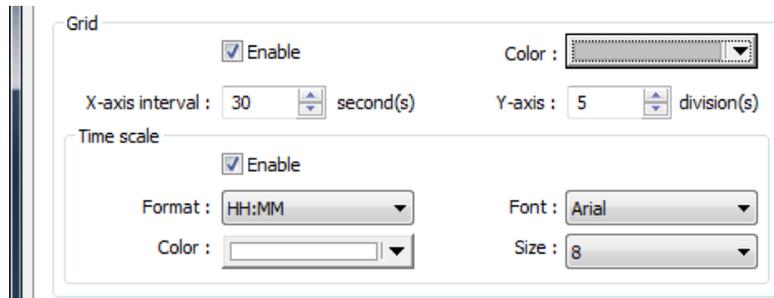
(054)

14) *Optional*: Use the Scale tool to add a scale and labels with the Text tool. Color coordinate these or add a legend if the trend channels don't all have the same zero and span.
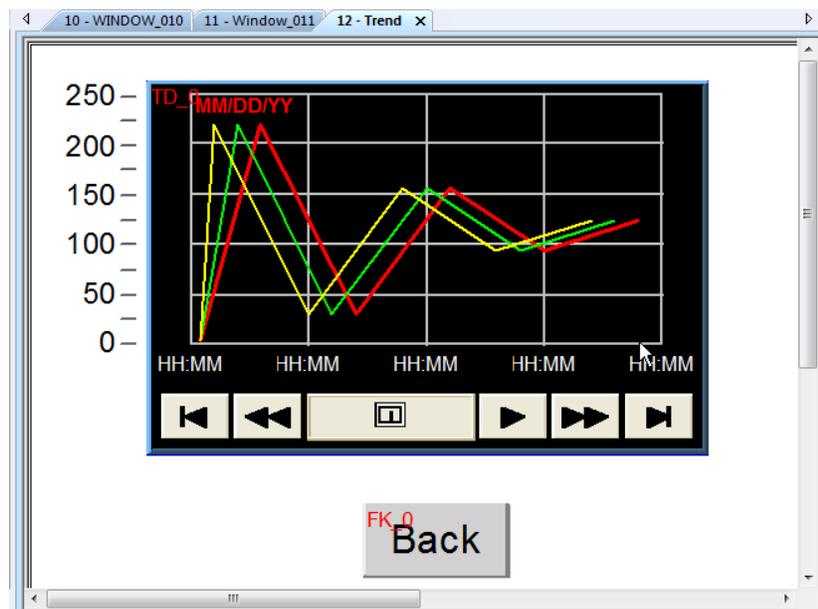
(055)

Use Recipes

This example assumes you have a project with at least one controller in which the recipe memory has not already been used for something else.

In this example we will create a recipe that has five parameters from one controller. For each parameter we will create a data transfer object that saves the parameter's value in the recipe in the OIT. For these objects the source addresses are the parameters' Modbus® addresses in the controller and the destination addresses are RW (recipe word) addresses in the OIT. See the table.

Note: This example uses specific addresses internal to the OIT. If you have used one or more of these for other purposes you will have to choose appropriate addresses for your project.

To create a recipe window and link it to the other screens:

1) Create and open a window to use for viewing, saving and loading recipes called "Recipe Manager".

2) Create a button on WINDOW_010 that opens the Recipe Manager window.

3) Create a button on the Recipe Manager window that opens window 10.

Note: Refer to the Trend example if necessary.

Repeat the following steps to add a data transfer object to the Recipe Manager screen for each parameter you want to save in a recipe. Refer to the table below for addresses etc.:

Parameter	"Source" Address in Controller					Size in Words	"Destination" Recipe Address
	RMC	RMH	PM	ST	ST GTW*		
Closed Loop Set Point	2501	5221	2161	22	2161	2	0
Alarm High Set Point	1741	2661	1481	98	1481	2	2
Heat Proportional Band	2231	4111	1891	233	1897	2	4
Integral	2235	4115	1895	227	1891	2	6
Derivative	2237	4117	1897	229	1893	2	8

*ST via RUI Gateway

1) From the **Objects** menu choose **Data Transfer (Trigger-based)**.

2) In **Comment** type "Recipe Save:" and the name of the name of the parameter (such as "Loop 1 Set Point".

3) In **Source address** for **PLC** choose *Modbus RTU Master* or *Modbus TCP/IP Master*.

4) In **Source address** choose *4x* and enter the address of the parameter.

5) In **Destination address** for **PLC** choose the OIT (*Local HMI* by default).

6) In **Destination address** click **Settings…**

7) For **Device type** choose *RW* to store recipes in the battery backed up recipe word memory.

8) In **Address** type 0 for the first item in the recipe (Increment this by the previous item's *No of words* for each subsequent recipe item. For example, if the first item was a 16-bit integer, the address of the second item is 1. If the second item is a float, the address of the third item is 3.)

9) If you want to store more than one recipe:

  • Check **Index register**.

  • For **Index** choose *INDEX 0 (16-bit).*

10) Click **OK** to close the **Address** dialog

11) In **No. of words** type word size of the parameter's data type. See Table

Data Type	No. of words
Float	2
16-bit integer	1
32-bit integer	2

12) For Mode choose **External Trigger**.

13) In **Trigger address** for **PLC** choose the OIT (*Local HMI* by default).

14) In **Trigger address** choose *LB* to use an internal bit to cause the OIT to store values in a recipe.

15) In **Trigger address** for **Address** type *500*.

16) Click the **Label** tab.

17) Select **Use label**.

18) Set **State** to *0*.

19) In **Content** type the name of the parameter.

20) Click **OK.**

21) Place the Data Transfer (Trigger-based) object on the screen.

Repeat the following steps to create the data transfer items that will load recipes in to the controller:

Note: For the data transfer objects that load the recipe from the OIT to the controller, the source addresses are RW (recipe words) addresses in the OIT and the destination addresses are the parameters' Modbus® addresses in the controller.

Parameter	"Source" Recipe Address	Size in Words	"Destination" Address in Controller				
			RMC	RMH	PM	ST	ST GTW*
Closed Loop Set Point	0	2	2501	5221	2161	22	2161
Alarm High Set Point	2	2	1741	2661	1481	98	1481
Heat Proportional Band	4	2	2231	4111	1891	233	1897
Integral	6	2	2235	4115	1895	227	1891
Derivative	8	2	2237	4117	1897	229	1893

*ST via RUI Gateway

1) From the **Objects** menu choose **Data Transfer (Trigger-based)**.

2) In **Comment** type "Recipe Load:" and the name of the parameter (such as "Loop 1 Set Point").

3) In **Source address** for **PLC** choose the OIT.

4) In **Source address** choose *RW and* type the recipe address for the item.

(062)

5) If you set up the recipe save to use and index register:

- Click **Source address Settings…**

- Check **Index register**

- For **Index** choose *INDEX 0 (16-bit).*

- Click **OK** to close the **Address** dialog.

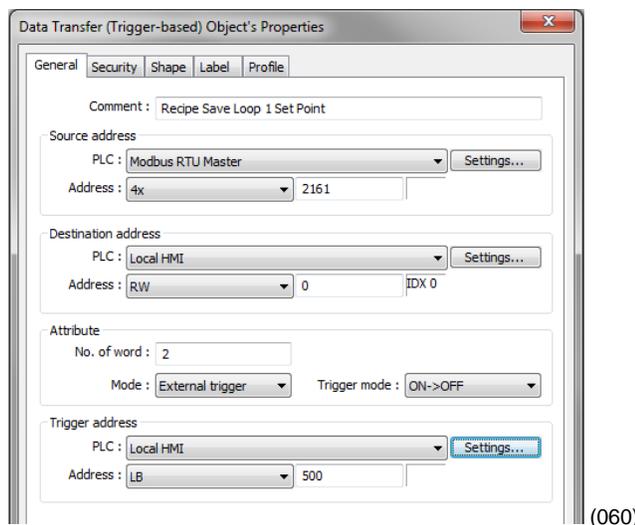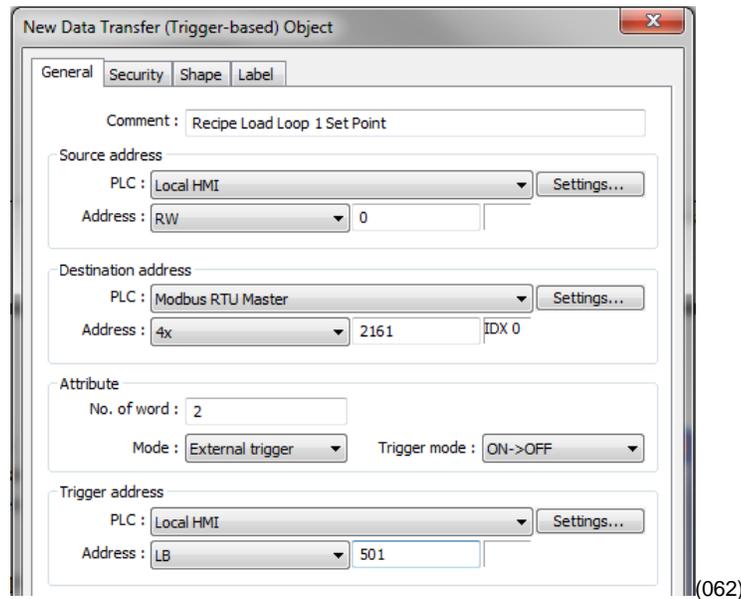6) In **No. of word** type word size of the parameter's data type.

7) In **Destination address** for **PLC** choose *Modbus RTU Master* or *Modbus TCP/IP Master.*

8) In **Destination address** for **Address** choose *4x* and enter the controller address of the parameter.

9) For **Mode** choose **External Trigger**.

10) In **Trigger address** for **PLC** choose the OIT (**Local HMI** by default).

11) In **Trigger address** for **Address** choose **LB** to use an internal bit to cause the OIT to load recipe values in to a controller and type *501*.

12) Click the **Label** tab.

13) Select **Use label**.

14) Enter the name of the parameter to display.

15) Click **OK.**

16) Place the Data Transfer (Trigger-based) object on the screen.

To create a button to trigger the data transfer objects to copy the values currently in the controller to the corresponding recipe memory in the OIT:

1) On the **Objects** menu, point to **Button** and choose **Set Bit**.

2) In **Comment** type, "Save Recipe".

3) For **PLC** choose the OIT (**Local HMI** by default).
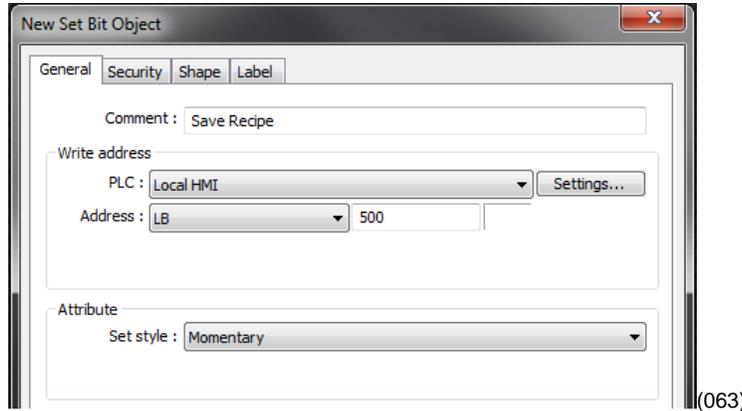
4) For **Address** choose **LB** and type *500.*

5) For **Set style** choose **Momentary**.

6) Click the **Label** tab.

7) Select **Use label**.

8) In **Content** for state 0 type "Save to OIT".

9) Click **OK**.

10) Place the button.

To create a button to trigger the data transfer objects to copy the values currently in the OIT's recipe memory to the controller:

1) On the **Objects** menu, point to **Button** and choose **Set Bit**.

2) In **Comment** type "Load Recipe".

3) For **PLC** choose the OIT (Local HMI by default).

4) For **Address** choose **LB** and type *501*.

5) For **Set style** choose **Momentary**.

6) Click the **Label** tab.

7) Select **Use label**.

8) In **Content** for state 0 type "Load from OIT".

9) Click **OK**.

10) Place the button.

Note: Using pictures for buttons may help operators.

Optional: To see what you are copying from the controller to the OIT's recipe memory, create an object displaying the current value in the controller next to each Data Transfer (Trigger-based) object. Create a label that indicates what the fields are such as "Current Controller Values".

Optional: To see or edit directly what is saved in recipe memory create a data entry object for each recipe item. These objects should display the values of the data in the RW memory at the recipe addresses. Create a label that indicates what the fields are such as "Recipe Values".
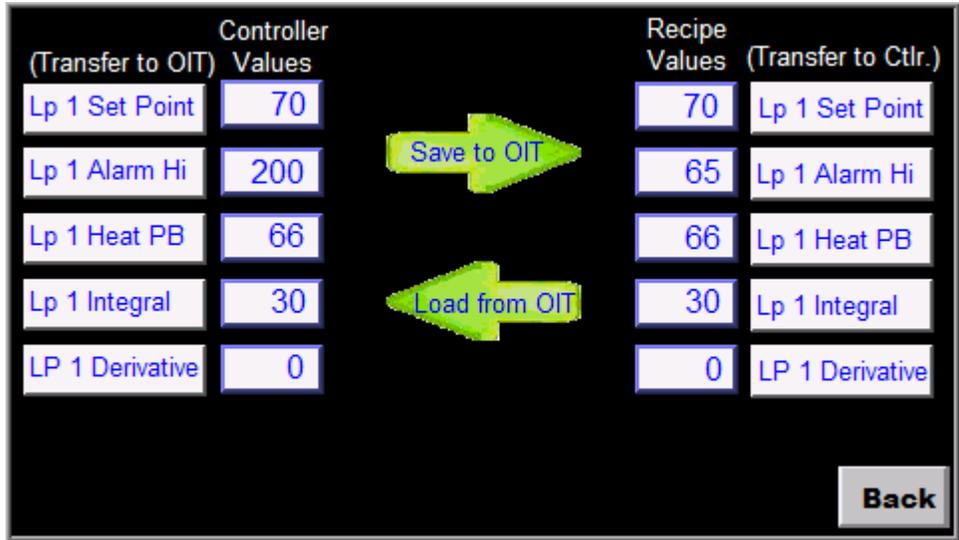
(068)

Optional: The values in the RW addresses are automatically saved in non-volatile memory every five minutes, but adding a button that momentarily sets LB-9029 forces the values to be saved and can avoid lost data in the event the power is shut off too soon after editing a recipe.

Optional: If you want to store more than one recipe in the OIT, set up the data transfer objects to use indexing for the RW addresses.

(071)

Address indexing allows a screen object to display and set the value of different memory locations depending on the value in the index. In this example we use LW-9200 as the address index. Whatever value the index is set to is added to the address in the data transfer (and recipe display) objects. When the index value is zero, the first recipe is used. When the index is 10 the second recipe is used. When the index is 20 the third recipe is used. A multi-state switch is used to set the value of the index when the user selects the recipe.

Recipe Selector

Multi-State Switch
Address = LW 9200
"Recipe 1" = State 0 = 0
"Recipe 2" = State 1 = 10
"Recipe 3" = State 2 = 20

LW Memory

LW 9200: address index

RW Memory
Recipe 1 (index = 0)

| RW 0: (Lp 1 Set Point) |
| RW 2: (Lp 1 Hi Alarm) |
| RW 4: (Lp 1 Heat PB) |
| RW 6: (Lp 1 Integral) |
| RW 8: (Lp 1 Derivative) |

Data Transfer Objects

Data Transfer Object 1
(Lp 1 Set Point)
Address = RW 0 + index

Data Transfer Object 2
(Lp 1 Hi Alarm)
Address = RW 2 + index

Data Transfer Object 3
(Lp 1 Heat PB)
Address = RW 4 + index

Data Transfer Object 4
(Lp 1 Integral)
Address = RW 6 + index

Data Transfer Object 5
(Lp 1 Derivative)
Address = RW 8 + index

Controller Memory

| 2161: (Lp 1 Set Point) |
| 1481: (Lp 1 Hi Alarm) |
| 1891: (Lp 1 Heat PB) |
| 1895: (Lp 1 Integral) |
| 1897: (Lp 1 Derivative) |

Recipe 2 (index = 10)

| RW 10: (Lp 1 Set Point) |
| RW 12: (Lp 1 Hi Alarm) |
| RW 14: (Lp 1 Heat PB) |
| RW 16: (Lp 1 Integral) |
| RW 18: (Lp 1 Derivative) |

Recipe 3 (index = 20)

| RW 20: (Lp 1 Set Point) |
| RW 22: (Lp 1 Hi Alarm) |
| RW 24: (Lp 1 Heat PB) |
| RW 26: (Lp 1 Integral) |
| RW 28: (Lp 1 Derivative) |

Note: You can also use the address index to create one screen that displays data for one loop at a time with a multi-state switch or option list that allow users to switch from one loop to another.

To select the recipe to save to or load from create a multi-state switch to select the recipe as follows:
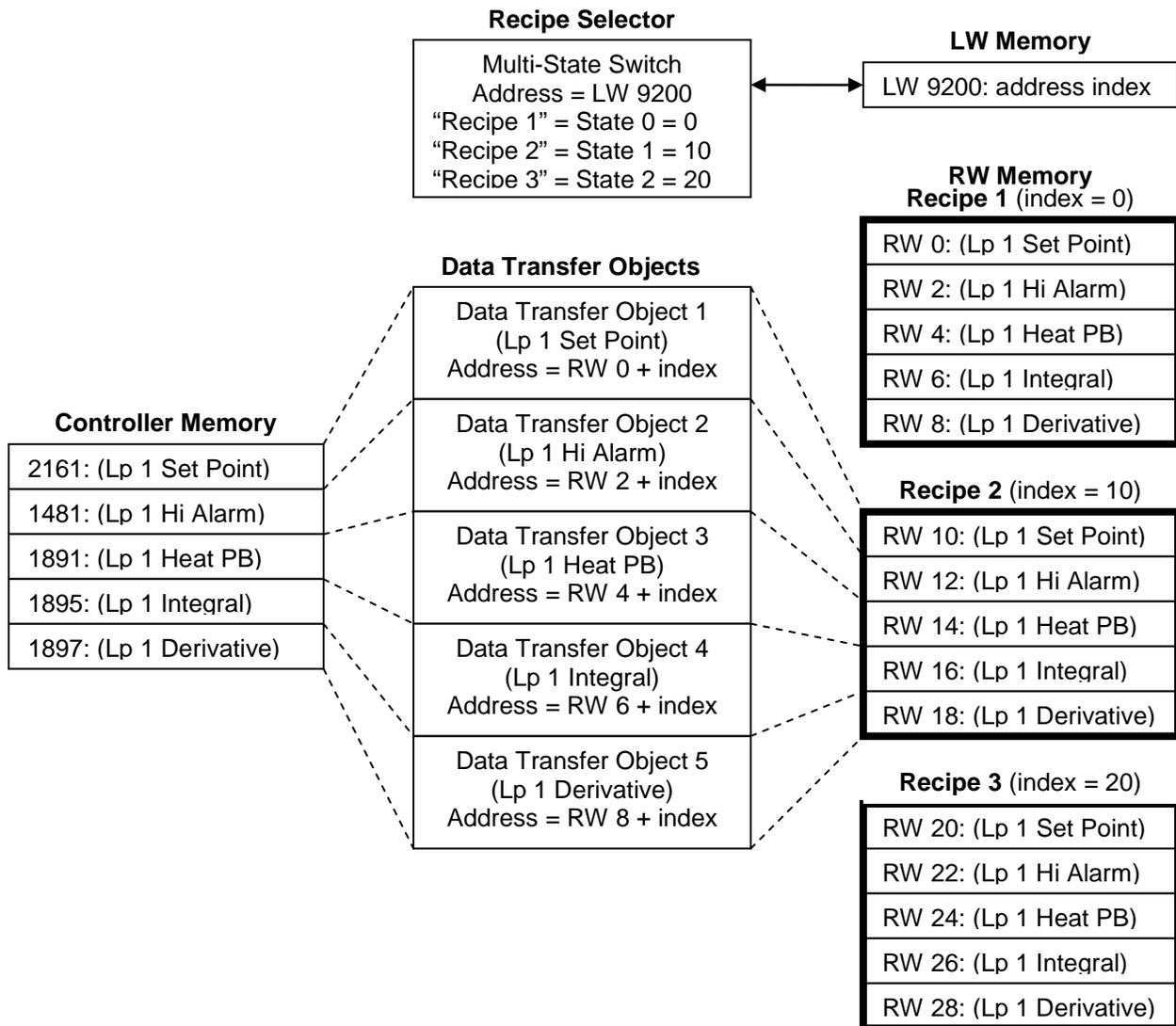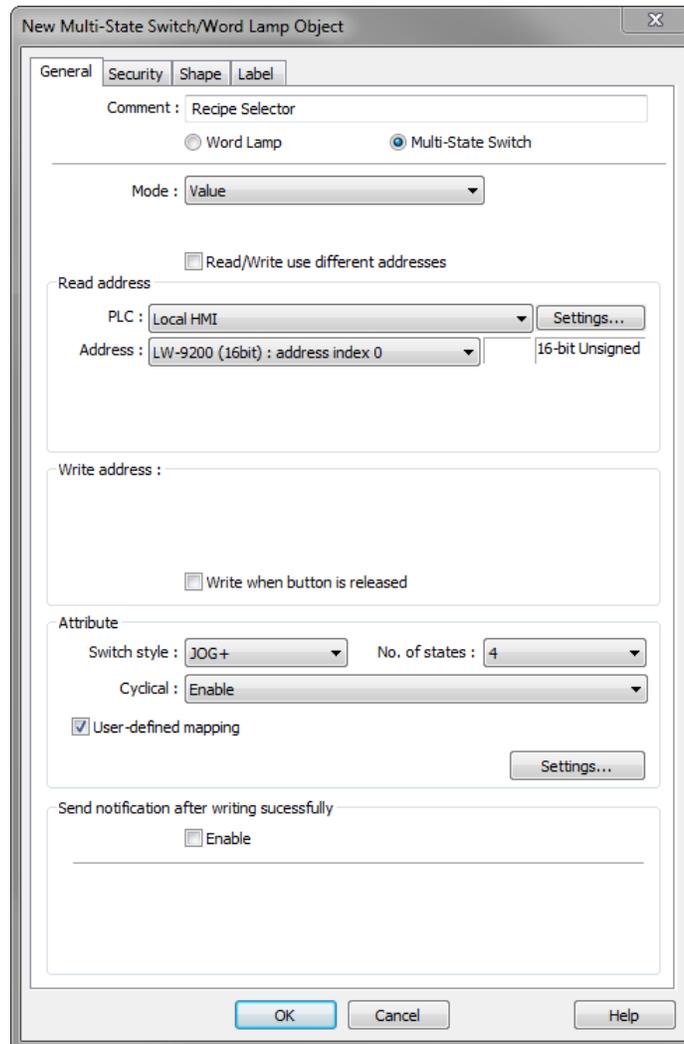
1) On the **Objects** menu point to **Buttons** and choose **Multi-State Switch**.

2) In **Comment** type "Recipe Selector".

3) In **Read address** click **Settings…**

4) For **PLC** choose the OIT (Local HMI by default).

5) Check **System tag**.

6) For **Device type** choose **LW-9200 (16bit) : address index 0**.

7) Click **OK** to close the **Address** dialog.

(069)

8) In **Attribute** for **Switch style** choose **JOG+**.

9) For **No. of states** choose the number of recipes you want to store.

10) For **Cyclical** choose **Enable**.

11) Select **User-defined mapping**.

12) In **Attribute** click **Settings…**

13) For each state enter the appropriate offset **Value**. For state 0 enter 0. For state 1 enter a value that will offset the beginning of the second recipe beyond the end of the first in the recipe memory.

14) Click **OK** to close the **Mapping** window.

State	Value
0	0
1	10
2	20
3	30
4 (error)	

(070)
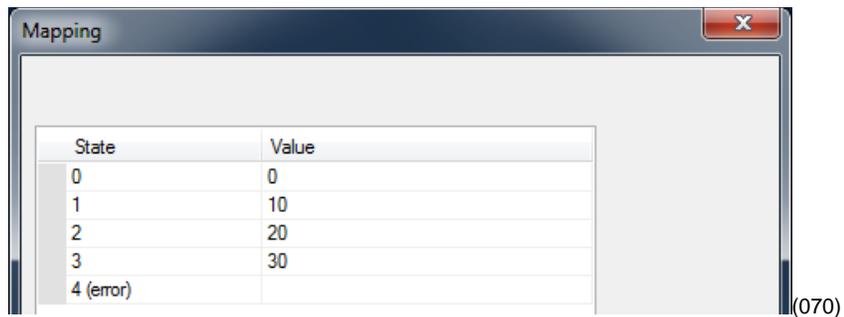
Note: The first recipe is selected with the multi-state switch in its state 0. This recipe stores its values in the memory locations you entered in the data transfer objects with no offset from address indexing, so for state 0 the Value is 0. Calculate the minimum offset for the second recipe by finding the sum of the number of words in memory used to store the items in one recipe. The second recipe (state 1 for the multi-state switch) should set the offset to this sum. The third recipe (state 2) should set the offset to twice the sum. The fourth recipe (state 3) should set the offset to three times the sum. And so on.

15) Click the **Label** tab.

16) Select **Use label**.

17) In **Content** enter a label indicating which recipe is selected. (For state 0 type "Recipe 1", for state 1 type "Recipe 2" etc.)

18) Click **OK** and place the Multi-State Switch object on the screen.

To create a button to save the recipes in non-volatile memory:

1) On the **Objects** menu point to **Buttons** and choose **Set Bit**.

2) In **Comment** type "Save Recipes".

3) In **Write address** click **Settings…**

4) For **PLC** choose the OIT (Local HMI by default).

5) Check **System tag**.

6) For **Device type** choose **LB-9029 : save all recipe data to machine (set ON)**.

7) Click **OK** to close the **Address** dialog.

8) For **Set style** choose **Momentary.**

9) Click the **Label** tab.

10) Select **Use label**.

11) In **Content** enter, "Save Recipes".

12) Click **OK** and place the Set Bit object on the screen.

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