

Silver Series EM Operator Interface Terminals (OIT)

What are the differences between the Silver Series EM models?

Generally the OITs are more alike than they are different. All of them are programmed with the same software, EZwarePlus, have the same processor, same on-board memory, conform to the same standards and carry the same agency approvals. Of course they differ in size and there are other differences. The specification sheet available on the Watlow website is the best resource for the details of the differences between the models but for an overview see the table below.

Feature	TS00-0043-EM00	TS00-0070- EM00	TS00-0100-EM00
Diagonal Screen Size	4.3 in.	7 in.	10 in.
Resolution (Pixels)	480 x 272	800 x 480	
Serial Ports	2 each		
Ethernet	Yes		
USB Host Ports	1 each		
Real Time Clock	Yes		

Will the Silver Series EM OIT communicate with all Watlow EZ-ZONE® Devices?

The Silver Series EM OIT communicates with Watlow EZ-ZONE products via Modbus® RTU and Modbus® TCP. It can communicate directly with EZ-ZONE ST, PM and RM products equipped with a Modbus® communications option, or the OIT can communicate with any EZ-ZONE product connected to an RUI Gateway or RM Access module equipped to act as a Modbus® RTU or Modbus® TCP gateway.

Can my EZ-ZONE controllers communicate with EZ-ZONE Configurator on a PC and the Silver Series EM OIT at the same time?

Yes, as long as the OIT and the PC are connected to separate communications ports on the EZ-ZONE controllers or an RUI gateway or RM Access module is used. Depending on the type of device and the ordering options, a particular device may or may not have more than one serial communications port. For example, an EZ-ZONE ST never has more than one port, but if its port is configured for Standard Bus and connected to an RUI Gateway equipped with Modbus®, the OIT can be connected to the RUI Gateway and the PC connected to the Standard Bus network allowing both to communicate with the ST.

Can my Silver Series EM OIT communicate with Watlow products other than EZ-ZONE controllers?

Yes, as long as the product has Modbus® communications or another protocol that is supported by a driver in the OIT. For Watlow control products such as the SERIES 96 and SERIES SD, Modbus® communications is available as an option. For others such as the SERIES F4, Modbus® is standard. These products can also be used with the Silver Series EM OIT.

Can the OIT communicate with a set of devices that don't all use Modbus®?

Yes, the Silver Series EM supports over one hundred communications drivers allowing communications with different types of devices. Devices that communicate via different protocols have to be connected to different ports. This limits the number of serial protocols that can be in an application to the number of serial ports on the OIT which varies depending on the model. Devices that communicate with the OIT via Ethernet can be compatible even if they don't use the same protocol.

Do the communications ports on Silver Series EM OITs correlate directly, one-to-one with the DB9 connectors?

The TS00-0043-EM00 has two communications ports both on its 9-pin Dsub (DB9) connector. The TS00-0070-EM00 and TS-0100-EM00 models have two serial ports and two DB9 connectors. Some of the pins

on one of these connectors are used for the 485 options for both COM1 and COM3. The other connector is used for the 232 option for COM1. See the manual for the details of the connections for each port. Note that while some ports have both 232 and 485 hardware, you can use only one of these at a time. For example, COM1 on the OIT has 232 and 485 connections, but you must choose to use either 232 or 485 when setting up the port in a project.

How do I hide or disable the system setting button that appears at the bottom right of the screen?

The system setting menu bar is opened by touching the arrow (or depending on the model, the less-than symbol) at the bottom right of the screen. On the TS00-0043-EM00 especially, this takes up space you might like to use for objects in your windows. You can hide this button by checking the **Hide system setting bar** option on the **System Setting** tab of the **System Parameter Settings** dialog. From the **Edit** menu choose **System Parameters...** then click the **System Setting** tab. If you still want users to have access to the System Settings dialog in the OIT, you can put a Set Bit button on a window that sets LB-9062 on.

How do I disable the Fast Selection button that appears on the OIT in my project?

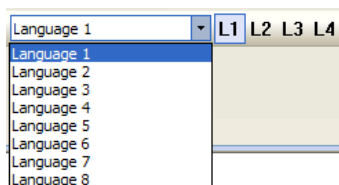
The Fast Selection button is a feature that is present by default in projects based on the templates. It opens a small pop-up window (Window 3) which you can edit like any other window in the project. The most common use of this window is to hold function buttons that open other windows you expect users will want to access frequently and from anywhere in the project. You can customize or disable the Fast Selection button in the **System Parameter Settings** dialog on the **General** tab. From the **Edit** menu choose **System Parameters...** then click the **General** tab.

Does the Silver Series EM OIT support multiple languages?

Yes, using the Label Library you can manage up to 24 language versions of all the text that appears in the objects you put in the windows in your project. Instead of entering text directly for an object, you choose the **Use label library** option on the **Text** or **Label** tab in the object's **Properties** dialog, and the object displays the correct string based on the user's language selection.

You set up one or more objects that allow the operator to set the language option stored in the system tag, LW-9134 (16bit) : *language mode* in the OIT. For example you can create up to 24 Set Word buttons where the first sets the value of LW-9134 to zero selecting language one, the second sets LW-9134 to one selecting language two and so on for up to 24 languages. When the user touches one of these language selection buttons, the OIT displays the text from the corresponding language in the label library.

The Label Library supports text for different states for each language so objects such as the Multi-State Switch can have different text for up to 256 different states total in each of up to 24 languages. The label library can be exported and imported so you can develop it in Excel or another program and import the results for use in your project if that is more convenient. You can preview the languages in EZwarePlus by selecting the language with the language tools:



How do I use my OIT in portrait mode?

The Silver Series EM OITs can be used in portrait or landscape mode. In portrait mode the OIT is mounted with the long screen dimension oriented vertically rather than horizontally as with landscape mode. Both the OIT and the project created with EZwarePlus must be configured for the same mode. To change the setting in the OIT, open the system setting menu bar by touching the arrow at the bottom right of the screen, click the settings button (the gear icon) and enter the password (111111 by default). Select the **Firmware Setting** tab and set the **Portrait Mode** for mounting the OIT rotated **90** or **270** degrees clockwise from the normal horizontal orientation. To create a portrait mode project, create a new project in

EZwarePlus and at the Welcome dialog where you can set the OIT Model, for **Display mode** choose *Portrait*.

Can I protect some windows or objects with passwords so only some users can access them?

Objects with which users can interact including function buttons that open and close windows and buttons that allow you to edit or set a value in a controller can be password protected. You can enable up to 127 users and give them access to any of up to twelve classes of objects. Configure security on the **System Parameter Settings** dialog's **Security** tab. You can assign an object to one of the twelve classes using the **Security** tab in the object's **Properties** dialog. If you use password protection, you will need to create a window that allows users to log in by selecting or entering which user they are and entering the password. See help in EZwarePlus for detailed information on how to set up password protection and use system tags to log in, log out, enter and update passwords and add, modify and delete user accounts.

What is the difference between off-line simulation and on-line simulation?

Both methods allow you to check the function of a compiled project on the PC without downloading it to an OIT. Off-line simulation allows you to check the functionality of your project, see how it will look, click on buttons etc., but it does not communicate with the controllers or other devices with which you have configured the OIT to communicate in the project. If the PC running EZwarePlus is connected directly to the controllers via 485, 232 or Ethernet, you can use the on-line simulation feature to run your project on the PC without the extra step of downloading the project. This makes it quicker to verify how the project will interact with controllers. Typically, off-line simulation is useful early in the development of a project when you are creating the windows and laying out the objects. On-line simulation becomes useful later in the project when you are testing and refining your windows.

How can I communicate with my controller via 485 during on-line simulation?

One of the first things you do when you create a project is to configure the driver and communications port that will be used by the OIT to communicate with the controller(s). If you want to simulate the OIT project on the PC and have the simulation communicate with the controllers, you must tell EZwarePlus to which COM port you have connected the controllers.

To change the COM port setting for on-line simulation, in EZwarePlus:

1. From the **Edit** menu choose **System Parameters** to open the **System Parameter Settings** dialog.
2. In the **Device List** select the **Modbus RTU Master** and click **Settings**.
3. Click **Settings...** and choose the appropriate COM port. (Ports 1 to 9 are available. If your converter has a higher COM port number you will need to change it to be within range to use on-line simulation. Typically the COM port number can be changed in the Windows Device Manager.)
4. Click **OK** to close each dialog.
5. Save and compile the project

You should be able to run the on-line simulation and communicate with the controllers. Be sure to restore any communications settings before you compile and download the project to the OIT.

I want to run a simulation from the EZwarePlus Utility Manager, where are the .EXOB files?

When you click **Simulation...** on the EZwarePlus Utility Manager window, you are prompted to locate the compiled project to simulate. The .EXOB file is created by compiling a project; so you must compile your project first to use this feature. By default these files are located along with the project files in the project folder under the program directory: C:\Watlow\EZPlus\project. But if you save your project in another directory, the .EXOB file will be there.

How can I make screen captures of my project to use in procedures or other documentation?

The best way to make screen captures is by running the project in EZwarePlus's simulation mode. In simulation mode the OIT screen is simulated on the computer screen. Use the Windows Print Screen feature to copy the screen to the Windows clipboard by pressing the Print Screen button on your keyboard. Then paste the image in to a graphics program or a word processor such as Microsoft Word using that programs Edit/Paste command or by pressing Ctrl-V on the keyboard. You can also use a third-party screen capture utility program that works with your PC.

Can I remotely monitor my process from a computer through the OIT?

The OIT models that include Ethernet communications also include a VNC Server. You can download the VNC Client and use it to remotely monitor the OIT. Detailed instructions are available on the website.

Can I use the OIT to idle my machine for the off hours and warm it up in the morning?

Yes, you can use the Scheduler object to set a bit that transfers a recipe of settings that puts the machine or system in an idle state and schedule another event to transfer a “warm-up” recipe to prepare the system for working hours. The schedule can be programmed and updated with the EZwarePlus programming software or by creating scheduler events that are programmed with memory address settings in the project at runtime. It is also possible to suspend scheduled events at the OIT when it is necessary for the equipment to work outside the normal operating hours. Always consider the safety ramifications of programming the OIT to perform a task that automatically changes equipment or process settings.

Can I use a printer with the Silver Series EM OIT?

A serial printer compatible with the one of the Epson drivers selected with the printer **Type** option on the **Model** tab of the **System Parameter Settings** dialog may be used when connected to an 232 COM port. A USB printer compatible with the *HP PCL Series (USB)* driver can be used when connected to the USB port. If the Silver Series EM OIT is connected to an Ethernet network, the EasyPrinter software running on a PC on the network allows the OIT to print to a networked printer. The printer options are found in the **System Parameter Settings** dialog on the **Model** and **Printer/Backup Server** tabs in EZwarePlus.

What information do I need to program the OIT to display a particular controller parameter and where do I get it?

Presuming that you already know the name of the parameter you are interested in, you always need at least two additional pieces of information: the Modbus[®] address and the data type. For enumerated parameters you will also need the list of values. The information you need about the parameters is in the controller's manual. If you know what page and menu to find a parameter on in the controller or RUI, you can find it in the manual. Watlow control application engineers can assist you in locating and understanding the parameters in Watlow controllers. Lists of parameters and Modbus[®] addresses for EZ-ZONE and other Watlow controllers are available on our website and upon request from Watlow Technical Support.

What objects should I use to indicate and set values of Watlow EZ-ZONE controller parameters?

There are many different objects available to put in windows, and which you use can depend on the application and the types of users who will interact with the OIT, but in general a few of the objects will occur over and over in your windows, and the choice of an object is greatly influenced by the data type of the parameter you want to display or set. See the table below.

Data Type	Such As...	Display Value with...	Set Value with...
Float	Process Variable Set Point Proportional Band	Numeric Display Gauge Bar Graph	Numeric Input
Integer	Timer Preset Count Step Number	Numeric Display Slider Gauge Bar Graph	Numeric Input Slider Set Word Button
Enumerated	Control Mode Alarm State Step Type	Option List Multi-State Switch	Option List Multi-State Switch Set Word Button

What is an enumerated parameter?

An enumerated parameter is a parameter whose value appears as text but whose setting is actually stored as an integer. For example, Control Mode has the options “Manual”, “Auto” and “Off” but the controller stores and communicates the values as 54 for Manual, 10 for Auto and 62 for Off. The controller doesn't actually contain the text, just the integer, so you must program these text values in the OIT in order for them to be displayed to users.

Which OIT object is best to use with Enumerated Parameters?

If you just want to display an enumerated parameter and the user doesn't need to set it, the Multi-State Switch is an excellent choice. It can display the enumerated value and need not be configured to accept user input. This makes sense especially for read-only parameters such as Alarm State.

To allow the user to set an enumerated parameter, you can use any of the listed objects. The Option List and Multi-State switch take less space than having a Set Word button for each option. For example, the Multi-State Switch and Option List (configured as a Drop-Down List) need only take up as much space as the largest enumerated option, but to use a Set Word button you need to provide a button for each option.

If there are more than two settings, the Option List is a good choice because the Multi-State Switch advances one setting for each user touch whereas the Option List lets the user choose a new setting directly without setting each intermediate value in the controller. For example if you set up a Multi-State Switch to set the Control Mode and the settings are in the order Off, Manual, Auto, then if the state is Auto, the user will have to touch the Multi-State Switch twice to set the loop to Manual; the first touch sets the Control Mode to Off and the second touch sets the Control Loop to Manual.

How do I use a Multi-State Switch or Option List with an Enumerated Parameter?

Many of the objects in EZwarePlus can appear different depending on the value read from the controller.

The Option List displays a particular text label based on the parameter value. In the **Option List Object's Properties** dialog:

- On the **Option List** tab, set the **Item no.** to the number of enumerated options you want to allow users to select between
- Also on the **Option List** tab, choose the **Mode: List Box** if the object will be large enough to display all the options or **Drop-Down List** to use the least amount of space.
- On the **Mapping** tab, enter the integer values and corresponding text labels for each state. See the table below for an example of the Control Mode enumerations.

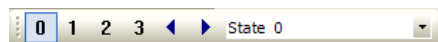
Item	Value	Item Data
0	10	Auto
1	54	Manual
2	62	Off

The Multi-State Switch can present a different shape, picture, color and label for each integer parameter value. In the **Multi-State Switch Object's Properties** dialog:

- On the **General** tab, set the number of states (**No. of States**) to the number of enumerated options you want to allow users to select between
- Also on the **General** tab, Check **User-defined mapping** and click **Setting...**
- Enter the value to correspond to each state
- On the **Label** tab enter the corresponding text labels for each state. See the table above for an example of the Control Mode enumerations.

What are States?

Many of the objects in EZwarePlus can appear different depending on their state. States are numbered starting at zero. Objects that represent binary data such as the Bit Lamp always have two and only two states numbered 0 and 1. Other objects such as the Multi-State Switch and Option List can have up to 256 states (numbered 0 to 255). When you are designing windows you can see what the objects will look like in the different states by setting the state with the controls on the State tool bar. Click 0, 1, 2 or 3 to set all the objects in the window to that state, use the Previous State or Next State arrow buttons to adjust the state setting throughout its range. The state drop down selector indicates the current state and gives quick access to any of the 256 states.



When editing a project, setting a state with the state toolbar sets all the objects on the window to the same state, but when your project is running the state of each object is independent of the others and is determined by the value at the (read) address programmed in the object.

The states of some objects such as the Multi-State Switch and the Option List, can be mapped to a different value than the state number. This is used with Watlow EZ-ZONE controllers to read and set parameters that have enumerated values. For example, to create an Option List that lets an operator program the step type in a ramp and soak program, you can map states to the values that represent the available step types: Unused Step (50), Time (143), Rate (81), Soak (87) and so on up to Wait For Time (1543) which without mapping would not be available since the state numbers only go up to 255.

What are the different types of memory in the OIT and how should I use them?

The Silver Series EM OITs available from Watlow have 128 megabytes of flash memory. This is memory that retains information even when the OIT's power is turned off. Half of the flash memory is reserved for the operating system software and the other half is available for user programs, data logs and recipes. The 128 megabytes of dynamic random access memory (DRAM) is used to run the program and store information when the OIT is powered up. The information in DRAM is not retained after the OIT's power is turned off.

When using the Local HMI memory (the OIT's memory) you choose a device type and an address. How you choose these depends on what you are doing. See the table for information about the various types of memory locations in the OIT.

Device Type	Description	Retained? ¹	Addresses		Size ³
			User Defined	System Tags ²	
LB	Local Bits	No	0 to 8,999	9,000 to 11,999	1 bit
LW	Local Words	No	0 to 8,999	9,000 to 10,899	16 bits
RW	Recipe Words	Yes ⁴	0 to 524,287	none	16 bits
EM0 to EM9 ⁵	Extended Memory	Yes	0 to 4,294,901,760	none	16 bits

¹Indicates if the data is retained in flash memory after cycling power or not.

²These addresses have special functions defined by the OIT's operating system and should only be accessed by user programs to utilize the corresponding function. See the help topic listed in the help index under "Reserved Local Memory."

³The amount of data stored at each address.

⁴Recipe words are stored in DRAM and copied to the flash memory every five minutes. Only data that has been copied to flash is retained after the OIT is turned off. Use LB-9029 to save recipe data in flash immediately.

⁵The extended memory files are stored in a removable USB drive. So this memory is available only when one of these devices is connected to an OIT that supports them. The actual amount of data that can be stored is limited to the size of the memory device.

What choices do I have for downloading projects to the Silver Series OIT?

Projects may be downloaded from EZwarePlus via Ethernet if the PC and OIT are on the same network, or EZwarePlus can compile the files and place them on a USB flash drive which you take to the OIT and plug in to transfer the project.

Why can't I download the project via Ethernet?

If the PC and the OIT are connected directly, check the cable. Either a crossover cable or a straight-through cable will work. If your PC and the OIT are both connected to a switch, but the PC is running software that creates a virtual private network (VPN) connection to another network, you may not be able to download via Ethernet until you close the VPN software allowing your PC to make connections on the local network.

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