

# Silver Series Operator Interface Terminals (OIT)



### *What are the differences between the Silver Series models?*

Generally the OITs are more alike than they are different. All of them are programmed with the same software, EZware-5000, 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	TS00-0043-0000	TS00-0043-E000	TS00-0070-0000	TS00-0100-0000
Diagonal Screen Size	4.3 in.		7 in.	10.2 in.
Screen Resolution (Pixels)	480 x 272		800 x 480	
Serial Ports	2 each		3 each	
Ethernet	No	Yes		
USB Host Ports	None		1 each	2 each
USB Programming	Yes	No	Yes	
SD Card Slot	No		Yes	
Real Time Clock	No		Yes	
Audio Line Out	No		Yes	

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

The Silver Series 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 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 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 OIT.



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

Yes, the Silver Series supports dozens of communications drivers allowing communications with hundreds of different 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.



### How do some Silver Series OITs have three communications ports with only two DB9 connectors?

On the TS00-0100-0000 and TS-0070-0000 models which have three serial ports but only two 9-pin Dsub connectors, only some of the pins in each connector are used for each serial port. See the manual for the details of the connections for each port. Also note that while some ports have both 232 and 485 connections, 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 TS00-0043-0000 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 in the **System Parameter Settings** dialog on the **System Setting** tab. 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.

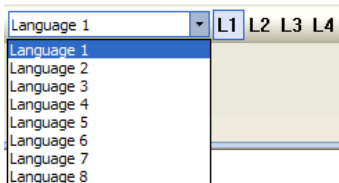


### Does the Silver Series OIT support multiple languages?

Yes, using the Label Library you can manage up to eight 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 will display the correct string based on the user's language selection.

You'll 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 eight 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 to the eight button that sets LW-9134's value to seven selecting language eight. The user touches one of these buttons to select the language and 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 eight different 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 EasyBuilder5000 by selecting the language with the language tools:



### How do I use my OIT in portrait mode?

The Silver Series 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 EZware-5000 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 or wrench 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 EasyBuilder5000 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 12 users and give them access to any of up to six classes of objects. Configure security on the **System Parameter Settings** dialog's **Security** tab. You can assign an object to one of the six 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 EasyBuilder5000's help for detailed information on how to set up password protection and use system tags to log in, log out, and enter and update passwords.

#### ***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 EasyBuilder5000 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 EasyBuilder5000 to which COM port you have connected the controllers.

To change the COM port setting for on-line simulation, in EasyBuilder5000:

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. Change the **PLC I/F** setting to **RS-232** (even if your PC has a 485 connection such as a USB to 485 converter).
4. 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.)
5. Click **OK** to close each dialog.
6. Save and compile the project

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

#### ***I want to run a simulation from the EasyBuilder5000 Project Manager, where are the .XOB files?***

When you click **On-line Simulation...** or **Off-line Simulation...** on the EZware-5000 Project Manger window, you are prompted to locate the compiled project to simulate. The .XOB 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\EZ5000\project. But if you save your project in another directory, the .XOB 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 EasyBuilder5000'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 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 at: <http://www.watlow.com/downloads/en/whitepapers/remote%20oit.pdf>.



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

Yes, with an OIT model that features a real time clock you can use the Scheduler object to set a bit that transfers a recipe of settings that put the machine or system in an idle state and schedule another event to transfer a “warm-up” recipe to prepare for working hours in advance enough to be ready to go when it is time. The schedule is programmed and updated with the EasyBuilder5000 programming software. 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 affects an equipment or process.

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

A serial printer compatible with the Epson ESC/P2 driver may be used when connected to one of the Silver Series’ RS-232 COM ports. A USB printer can be used when connected to the USB A (host) port. If the Silver Series 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 EasyBuilder5000.

**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 Technical Support 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.

Parameter Type	Such As...	OIT Object to Display a Value	OIT Object(s) to Set a Value
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.

When you want the user to be able to change the setting of the enumerated parameter, you can use any of the 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 may be a better choice than the Multi-State Switch because the Multi-State Switch advances one setting for each user touch whereas the Option List allows the user to choose a new setting with fewer touches and 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 EasyBuilder5000 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.** (in older software **No. of States**) 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	Label
0	10	Auto
1	54	Manual
2	62	Off

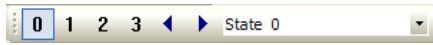
The Multi-State Switch can present a different shape, picture, color and label for each integer parameter value. In the **Multi-State Switch Object's Properties** dialog:

- 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 **Set...**
- 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 EasyBuilder5000 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 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 64 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? <sup>1</sup>	Addresses		Size <sup>3</sup>
			User Defined	System Tags <sup>2</sup>	
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 10,255	16 bits
RW	Recipe Words	Yes <sup>4</sup>	0 to 524,287	none	16 bits
EM0 to EM9 <sup>5</sup>	Extended Memory	Yes	0 to 4,294,901,760		

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

<sup>2</sup>These 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."

<sup>3</sup>The amount of data stored at each address.

<sup>4</sup>Recipe 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.

<sup>5</sup>The extended memory files are stored in a removable memory device (SD card or a 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 types of Secure Digital (SD) cards are compatible with the Silver Series OIT?***

Silver Series OIT models that support SD cards are compatible with the standard SD cards (2 GB or less) and High Capacity SDHC cards (4 GB to 32 GB).

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

Depending on the model, projects can be downloaded from EasyBuilder5000 via a USB cable connected to the PC and Silver Series OIT, transferred over Ethernet if the PC and OIT are on the same network, or EasyBuilder5000 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.