

EZIOxx Advanced Details

The EZIOxx devices offer many capabilities that require additional explanations to fully utilize. Because the various models of the EZIOxx line vary from inputs-only and outputs-only to combined input/output units, **PLEASE NOTE THAT YOUR SPECIFIC EZIOxx MAY NOT SUPPORT ALL FEATURES DISCUSSED IN THIS DOCUMENT.** It is assumed that the reader has a good understanding of the functionality of the particular EZIOxx. To enable or program some of these advanced features, a PC or Web application such as our Utility Suite needs to be used.

EZIOxx as an Input Controller (INSTEON Sender)

In this mode, the EZIOxx responds to changes in its inputs, and sends either **group commands** to devices it is linked with, or **broadcast messages** if not linked. Please note that only one mode may be active at a time. As a controller, EZIOxx has these additional features:

- A timer can be enabled that starts on the Off-to-On (leading edge) input transition and sends the On-to-Off command/message 1 second-255 minutes later. This is useful as a safeguard in case the input signal does not return to its initial state. The unit can also be programmed to ignore the physical change of the signal from On-to-Off while the timer is running.
- The commands that are sent on both input signal transitions are programmable. They default as INSTEON On and Off respectively.
- The input can be enabled to directly effect the corresponding relay (actuate local mode)
- An input can be linked as a responder to another INSTEON controller to cause a trigger as if a physical signal were present on the input.

The type of inputs can be:

- Digital:** responds to the presence or absence of a signal, such as in a switch closure. The signal is ON whenever the switch is closed.
- Analog:** responds to a change of value of the signal such as temperature being sensed through a thermistor or other analog sensor. When the analog conversion is enabled, the digital representation of this signal will be ON whenever the signal goes over the preset threshold (alarm point.)
- 1-Wire:** responds to the change in value of a sensor, such as the 18B20 temperature sensor currently supported. When the 1-Wire is enabled, the digital representation of this signal will be ON whenever the signal goes over the preset threshold (alarm point.)

The status of the inputs (both their digital representation and the value of the analog ones) can be read at any time with the appropriate INSTEON command (see reverse page.)

Configuration Register Effect on the Inputs: If checked, the various bits on this register affect the EZIOxx as follows:

- Enable Analog Inputs: Sets up the appropriate inputs to measure discrete values (0-5V or 0-3.3V depending on EZIOxx model)
- Continuous A/D Conversion: The analog to digital conversion will occur once per second as opposed to once when the input value is read
- Debounce the Inputs: a noise filter will be applied to signal transitions. Useful for suppression of "chatter" or noise from relays
- Enable 1-W Sensor:
- Set Timers in Seconds: The input timers unit will be seconds
- Broadcast on Status Change: when the input is not linked, a broadcast message is sent with the input status encoded.

Enable Analog Inputs
 Continuous A/D Conversion
 Debounce the Inputs
 Enable 1-W Sensor
 Set Timers in Seconds
 Broadcast on Status Change

Fig. 1: Configuration Register

Input All-Link Settings: All inputs can be set to send commands/messages on their transitions and their behavior can be programmed with the Utility Suite as shown on figure 2. Note that the Analog and 1-Wire inputs refer to their digital representations, that is, transitions on their alarm points. When linked, these parameters are used in conjunction with a link record.

A broadcast on an input change can only happen if the input is not linked. The **Group** number does not need to be the same number as the input, but must match a valid record in the links database. It is possible that several inputs could have the same group number if one wants to use various inputs to control the same device or device grouping with different characteristics. The input can have an immediate effect on a corresponding output if the **Actuate Output** box is checked. A **Timer** value greater than zero (seconds or minutes depending on the control register setting) will determine if an automatic On-to-Off transition is generated automatically. Finally, if the **Ignore On-to-Off** box is checked, the On-to-Off command will be sent when the timer expires, not when the input physically changes state from On to Off.

Insteon All_Link Group Commands Settings
 Input:
 Group: Actuate Output:
 Timer: Ignore On to Off:

Transition	CMD1	CMD2
Off to On	<input type="text"/>	<input type="text"/>
On to Off	<input type="text"/>	<input type="text"/>

Fig. 2: Input Settings

The analog and 1-Wire sensor can be "digitized" to provide the Off to On and On to Off transitions at preset points or alarms. These numbers represent a digital count scaled (0-1023) to the input analog values. By having 2 independent values, hysteresis can be built-in.

Sensors (1-Wire and Analog Inputs) Alarm Settings
 Input:

Transition	Trip Point
Off to On	<input type="text"/>
On to Off	<input type="text"/>

Fig. 3: Analog and 1-Wire Alarm Settings

EZIOxx as an INSTEON Responder

In addition to responding to direct commands as shown in the command set table, EZIOxx can respond to an All-Link (Group) ON command in different ways as follows:

1. An individual (discrete) relay (output) is turned on
2. A pattern (memorized at the time of linking) is placed on the relays. This is the so-called "snapshot" mode
3. The EZIOxx responds as if one of its inputs goes from off to on. Think of it as a virtual input, triggerable remotely by an Insteon controller. If the input has been linked to other Insteon units, a group command would be sent upon this trigger.

Upon receiving the Group command, the EZIOxx uses the middle and lower data bytes from its links record to determine which of the above actions to take according to the table below.

Middle Byte	Lower Byte	Action
0x00	0x00-0x07	Discrete relay (1-8) is activated
0x80	0b00000000-0b11111111	Relays are activated per the bit pattern.
0x01	0x00-0x06	Discrete input (1-7) is triggered.

Use the SHN Utility suite or an equivalent program to set the data bytes in the link record per this table, based on the desired behavior.

Relay Timers: If the Enable Output Timers box is checked, the relay will turn off after the timer elapses, even if no additional off command is received. This feature is useful to create momentary action on the relays as short as 1 second.

X10 Enabling/Disabling:

- Select the desired House code (A-P) on an X10 controller, then press and hold the Set Button on the side of EZIO for at least 4 seconds. The LED will start blinking once the button is released. Press and hold the button again to stop linking.
- If **enabling** X10 control, send 3 **ON** commands (any Unit code) in succession until the LED stops blinking. If **disabling**, send 3 **OFF** commands (any Unit code) in succession until the LED stops blinking.

EZIOxx INSTEON and X10 Messages/Commands

The following information is intended to aid in programming a PC application to support EZIO. The comprehensive INSTEON command set was established with and certified by SmartLabs to ensure interoperability and future expansion. Manufacturers of INSTEON applications follow this command set to ensure maximum customer satisfaction with INSTEON products. In the tables that follow, the column heading **SE DAB** denotes whether the command is Standard-length (**S**) or Extended-length (**E**), and whether it is a Direct (**D**), ALL-Link (**A**), or Broadcast (**B**) command. EZIO assigned codes by SmartLabs are: DevCat: 0x07, SubDevCat: 0x02. **PLEASE NOTE YOUR SPECIFIC EZIOxx MAY NOT SUPPORT ALL COMMANDS.**

INSTEON Standard-Length Direct Messages/Commands					
Command Name	SE DAB	Cmd 1	Cmd 2	Description	
Assign to ALL-Link Group	SD	0x01	0x00 - 0xFF Group Number	Used during INSTEON device linking session. Assigns a status snapshot to an ALL-Link group.	
Delete from ALL-Link Group	SD	0x02	0x00 - 0xFF Group Number	Used during unlinking session. Deletes a status snapshot from an ALL-Link group.	
Product Data Request	SD	0x03	0x00	EZIO responds with an Extended-length Product Data Response message.	
Enter Link Mode	SD	0x09	0x00 - 0xFF Group Number	Enters linking mode. Use to add links.	
Enter Unlink Mode	SD	0x0A	0x00 - 0xFF Group Number	Enters unlinking mode. Use to delete links.	
ID Request	SD	0x10	0x00	EZIO first returns an ACK message, then it sends a <i>SET Button Pressed</i> Broadcast message, but it does not enter Linking Mode.	
Set Address MSB	SD	0x28	0x00—0xFF High byte of 16-bit address	Set Most-significant byte of EEPROM address for peek or poke. Set to 0x00 for access to EZIOxx.	
Poke (see note 2)	SD	0x29	0x00 - 0xFF value of parameter to store	Puts the byte in Cmd 2 into the parameter RAM location pointed to by PARPTR.	
Peek (see note 1)	SD	0x2B	0x00 - 0xFF PARPTR value	Sets Cmd 2 value into PARPTR. Cmd 2 of the ACK message returns the byte pointed to PARPTR.	
Output ON	SD	45	0x00—0x07 Output number	Turn ON output specified in Cmd2	
Output OFF	SD	46	0x00—0x07 Output number	Turn OFF output specified in Cmd2	
Write Output Port	SD	0x48	0x00-0xFF Value to store on data register (only output bits are affected)	ACK Cmd2 byte contains the data byte as written to the output port	
Read Input Port	SD	0x49	0x00	ACK Cmd2 byte contains the data byte as read from the input port	
Get Sensor Value	SD	0x4A	0x00 - 0x03 Sensor Number	ACK contains sensor value in Command 2.	
Set Sensor 1 OFF -> ON Alarm	SD	0x4B	0x00—0xFF Alarm value	Set value for Sensor 1 to trigger an alarm when its state goes from OFF to ON.	
Set Sensor 1 ON -> OFF Alarm	SD	0x4C	0x00—0xFF Alarm value	Set value for Sensor 1 to trigger an alarm when its state goes from ON to OFF.	
Write Configuration Port	SD	0x4D	Bits 0:7 See Note 1	Configure EZIO options. ACK Cmd2 byte contains the new Configuration byte (see Note 1.)	
Read Configuration Port	SD	0x4E	0x00	ACK Cmd2 byte contains the new Configuration byte.	
EZIO Control	SD	0x4F	Subcommand		
			0x00	Load Initialization Values	Resets EZIO to its factory default settings
			0x01	Update EEPROM	Load EEPROM from RAM Parameters
			0x02	Status Request	Return the Status of the Outputs in Cmd2 of ACK message
			0x09	Enable status change message	Enables Output Port status change broadcast messages
			0x0A	Disable status change message	Disables Output Port status change broadcast messages
			0x0E	Diagnostics ON	Put unit in Diagnostics mode (cycle outputs 1 sec each)
			0x0F	Diagnostics OFF	Take unit out of Diagnostics mode

INSTEON Extended-Length Direct Messages/Commands				
Command Name	SE DAB	Cmd 1	Cmd 2	Description
Product Data Response	ED	0x03	0x00	Response to Standard-Length Product Data Request. See Note .
Set Sensor/Analog Alarms	ED	0x4B	0x00-0x03 Sensor / Analog Input Number	D1—D4 Alarm Values (2 bytes for S1-S4) or 4 bytes for AN1 - AN3
Set Output Timers	ED	0x4D	00	D1—D8 Timer values
INSTEON Standard-Length ALL-Link Messages/Commands				
ALL-Link Activate	SA	0x11	0x00 - 0x0F Group number	Recall and activate ALL-Link state for number in Cmd 2
INSTEON Standard-Length Broadcast Messages/Commands				
SET Button Pressed Slave	SB	0x01	None	Linking Mode as a Slave device
Status Changed	SB	0x27	EZIO Output Port if "To Address = xx.yy.00 EZIO Input Port if "To Address = xx.yy.01"	EZIO will send this message when there is change of data in its output or input port. Cmd2 has the Output or Input status. The lower byte of the "To Address" in the message indicates if an output (00) or input (01) changed.
Notes:				
1) EZIO Configuration Port: This port determines how EZIO responds to the various commands. The information in this port is encoded as shown on the right.		Bit 0—1:	00 = Analog Input is not used 01 = Analog Input used, convert on command 11 = Analog Input used, convert on fixed interval	
		Bit 2:	If set (1): Send Broadcast on Sensor Alarm	
		Bit 3:	If set (1): Debounce the inputs	
		Bit 4:	If set (1): Enable 1-Wire port	
		Bit 5:	If set (1): Output timers are in seconds	
		Bit 6:	If set (1): Enable broadcast of Output and Input port change	
		Bit 7:	If set (1): Enable output timers if greater than 0	
2) EZIO Memory Layout: The range of fixed (EEPROM) and volatile (RAM) locations accessible for Peek and Poke (if applicable) correspond to the map on the right. The "rw" notation indicates whether the location is read only ("r"), or both readable and writeable ("rw") when followed with the "RAM to EEPROM" command. Note that some locations are directly accessible with Standard Direct Commands. Also note that the MSB of the peek address must be first set to 0x00 for these locations to be accessible.		Address	Description (r: readable; w: writeable)	
		0x00—0x07	Output Timers (rw)	
		0x08	X10 House Code (rw)	
		0x09	Configuration Port (rw)	
		0x0A—0x11	Sensor 1-4 Alarms (4 X 2) (rw)	
		0x12—0x19	Analog Inputs 1-2 Alarms (2 X 4) (rw)	
		0x1A	Inputs to Outputs Crosslink bitmap (rw)	
		0x1B-0x1F	Reserved (rw)	
		0x20—3F	Group Command On/Off sequence for I1—I8 (rw)	
		0x40—0x47	Group numbers for I1-I8 (rw)	
		0x48	Firmware Version (r)	
		0x49	EEPROM Loaded flag (r)	
		0x4A	Output Port Status (r)	
		0x4B	Input Port Status (r)	
		0x4C	Analog Data (2 X 2) (r)	
		0x50	1-Wire raw data (r)	
		0x58—0x5F	Input timers (rw)	

EZIOxx X-10 Commands			
Command Name	UNIT	CMD	Description
Turn Output ON	1-8	ON	Turn Output in UNIT (1-8) ON
Turn Output OFF	1-8	OFF	Turn Output in UNIT (1-8) OFF
Enable Timers	16	ON	Enable Output Timers
Disable Timers	16	OFF	Disable Output Timers