

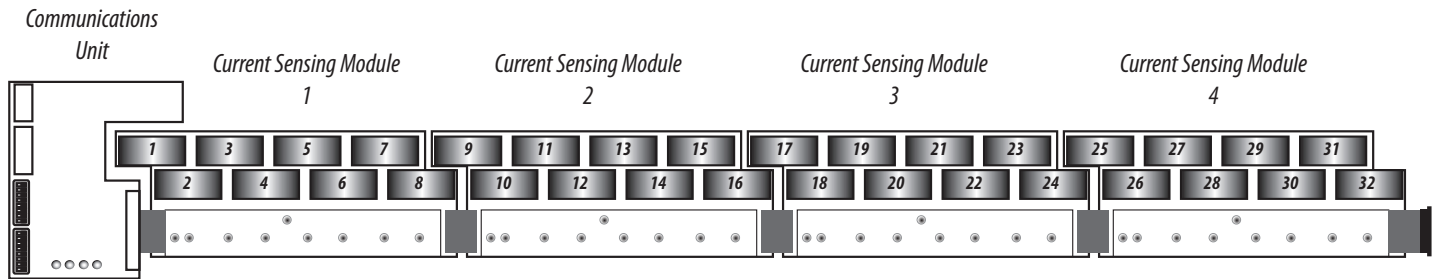
EA10 MODBUS POINT MAP

The EA10 supports the SunSpec Common Model and Basic String Combiner maps. See www.sunspec.org for more information. A proprietary Veris point map (encoded in the SunSpec style) follows with configuration and status information not provided in SunSpec. The layout of these register blocks is as follows:

Register Block	Start	End
SunSpec Common Model	40001	40069
SunSpec Basic String Monitor – up to 32 channels	40070	40343
Veris Proprietary Status & Configuration	40344	40416
SunSpec Null Block	40417	40418

Current Sensing Module Mapping

When using multiple current sensing modules (up to 4 per communications unit), map the location of each individual current sensor. The table and diagram below show how each sensor is numbered. The current sensing module closest to the communications unit is module 1 and utilizes strings (channels) 1 through 8 (see the illustration below).



Common Modbus Model Point Map

Modbus maps are defined using this common table format. Register addresses are absolute using base 1 notation. This table has been modified from the original SunSpec relative addressing format to absolute addressing.

Start	End	#	R/W	SunSpec Name	Type	Units	Scale Factor	Contents	Description
40001	40002	2	R	C_SunSpec_ID	uint32	N/A	N/A	0x53756e53 (SunS)	Well-known value. Uniquely identifies this as a SunSpec Modbus map
40003	40003	1	R	C_SunSpec_DID	uint16	N/A	N/A	0x0001	Well-known value. Uniquely identifies this as a SunSpec Common Model block
40004	40004	1	R	C_SunSpec_Length	uint16	registers	N/A	65	Length of common model block
40005	40020	16	R	C_Manufacturer	String(32)	N/A	N/A	N/A	"Veris Industries"
40021	40036	16	R	C_Model	String(32)	N/A	N/A	N/A	"EA10HC1AB"
40037	40044	8	R	C_Options	String(16)	N/A	N/A	N/A	"Basic"
40045	40052	8	R	C_Version	String(16)	N/A	N/A	N/A	Product version
40053	40068	16	R	C_SerialNumber	String(32)	N/A	N/A	N/A	Product serial number
40069	40069	1	R/W	C_DeviceAddress	uint16	N/A	N/A	N/A	Modbus ID
40070	40070	1	R	C_SunSpec_DID	uint16	N/A	N/A	Device ID	Start of next device
40071	40071	1	R	C_SunSpec_Length	uint16	N/A	N/A	Device Length	Device model block size

Basic String Combiner Modbus Register Map

The Basic String Combiner Modbus mapping allows a variable number of strings (8, 16, 24, or 32). **The Veris implementation is fixed at 32 strings for ease of integration with existing Modbus master devices.** As current sensing modules are added, the data from each CT appears, starting in the first block. **The CT closest to the communications unit is identified as String 1, and so on.** Any int16 values that are not supported return 0x8000. This table has been modified from the original SunSpec relative addressing format to absolute addressing. Combiner level readings provide combined values for current, amp-hours, voltage, status, and events. Individual string readings are provided for the current and events.

SunSpec Combiner and Input String Event Flag Values

The string combiner specific flags are defined here. Any number of events may be active at the same time, and as a result the SC_Event value is implemented as a bit-map. The bit-map values specifically called out as SC_EVENT_COMBINER_ only apply to the combiner unit as a whole.

Event Name	Flag Value	Description
SC_EVENT_CURRENT	0x00000008	Current out of range. Set threshold in Sensor LED Blink Threshold register.
SC_EVENT_REVERSED_POLARITY	0x00002000	Reversed polarity detected
SC_EVENT_COMM_ERROR	0x00008000	Subsystem Communication Error

Vendor Event Flags

The vendor specific string combiner flags are defined here. These flags are specific to the EA10 and are not specified by SunSpec. They appear in the SC_Event_Vendor (summary) and SC_Input_Event_Vendor (per string) registers. Any number of events can be active at the same time, and as a result the SC_Event_Vendor event value is implemented as a bit-map. The SC_Event_Vendor field applies to the combiner as a whole, while the SC_Input_Event_Vendor field applies to the specific string combiner input. An event in one or more of the SC_Input_Event_Vendor registers associated with each string activate the same event in the summary SC_Event_Vendor register. Users trigger on the combiner level SC_EVENT and then drill down to the SC_Input_Event_Vendor level to determine which string(s) are at fault. The bit-map values specifically called out as SC_EVENT_COMBINER_ only apply to the combiner unit as a whole.

The SC_EVENT_LED_ bits indicate the state of the LED indicators on both the sensing module and communications units. These are bi-color LEDs that can be off, red or green. When the indicator is on, it can either be on constantly or blinking. See LED Indicators section.

Event Name	Flag Value	Description
SC_EVENT_LED_GREEN	0x00000001	Positive current flow detected. Green LED on. Set threshold in configuration register 40359.
SC_EVENT_LED_RED	0x00000002	Negative current flow detected. Red LED on. Set threshold in configuration register 40359.
SC_EVENT_LED_BLINK	0x00000004	Over-range current. LED blinking red or green, depending on current flow direction. Set threshold in configuration register 40358.
Unused	0xFFFFFFFF8	N/A

Start	End	N	R/W	Name	Type	Units	Scale Factor	Contents	Description
40070	40070	1	R	C_SunSpec_DID	uint16	N/A	N/A	403	Uniquely identifies this as a basic SunSpec String Combiner Modbus register map.
40071	40071	1	R	C_SunSpec_Length	uint16	Registers	N/A	272	Variable model length block. The value is calculated according to the SunSpec formula $16+N*8$, where 16=number of combiner registers, N=number of combiner inputs, and 8=length of combiner input block. For the EA10, N is fixed at 32.
40072	40072	1	R	SC_DC_Current_SF	int16	SF	N/A	Configured	Combined DC current scale factor
40073	40073	1	R	SC_DC_AH_SF	int16	SF	N/A	Configured	Combined DC amp-hour scale factor
40074	40074	1	R	SC_DC_Voltage_SF	int16	SF	N/A	Configured	DC voltage scale factor
40075	40075	1	R	SC_DC_Current_Max	uint16	Amps	SC_DC_Current_SF	Configured	Maximum DC Current Rating for the combiner
40076	40076	1	R	SC_Num_Inputs	uint16	N/A	N/A	Configured	(N) Number of string inputs to this combiner. This register must be supported but may have a zero value.

Start	End	N	R/W	Name	Type	Units	Scale Factor	Contents	Description															
40077	40078	2	R	SC_Event	uint32	Bitfield	N/A	SC_EVENT_	SunSpec Combiner event code. <table border="1" data-bbox="1128 325 1518 703"> <thead> <tr> <th>Event Name</th> <th>Flag Value</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>SC_EVENT_CURRENT</td> <td>0x00000008</td> <td>Current out of range. Set threshold in Sensor LED Blink Threshold register.</td> </tr> <tr> <td>SC_EVENT_REVERSED_POLARITY</td> <td>0x00002000</td> <td>Reversed polarity detected</td> </tr> <tr> <td>SC_EVENT_COMM_ERROR</td> <td>0x00008000</td> <td>Subsystem Communication Error</td> </tr> </tbody> </table>	Event Name	Flag Value	Description	SC_EVENT_CURRENT	0x00000008	Current out of range. Set threshold in Sensor LED Blink Threshold register.	SC_EVENT_REVERSED_POLARITY	0x00002000	Reversed polarity detected	SC_EVENT_COMM_ERROR	0x00008000	Subsystem Communication Error			
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40079	40080	2	R	SC_Event_Vendor	uint32	Bitfield	N/A	SC_EVENT_	EA10 specific event code. <table border="1" data-bbox="1128 756 1518 1249"> <thead> <tr> <th>Event Name</th> <th>Flag Value</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>SC_EVENT_LED_GREEN</td> <td>0x00000001</td> <td>Positive current. Green LED on. Set threshold in register 40359.</td> </tr> <tr> <td>SC_EVENT_LED_RED</td> <td>0x00000002</td> <td>Negative current. Red LED on. Set threshold in register 40359.</td> </tr> <tr> <td>SC_EVENT_LED_BLINK</td> <td>0x00000004</td> <td>Over-range current. LED blinking red or green. Set threshold in configuration register 40358.</td> </tr> <tr> <td>Unused</td> <td>0xFFFFFFFF8</td> <td>N/A</td> </tr> </tbody> </table>	Event Name	Flag Value	Description	SC_EVENT_LED_GREEN	0x00000001	Positive current. Green LED on. Set threshold in register 40359.	SC_EVENT_LED_RED	0x00000002	Negative current. Red LED on. Set threshold in register 40359.	SC_EVENT_LED_BLINK	0x00000004	Over-range current. LED blinking red or green. Set threshold in configuration register 40358.	Unused	0xFFFFFFFF8	N/A
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40081	40081	1	R	SC_DC_Current	int16	Amps	SC_DC_Current_SF	Measured	Combined current value (sum of string amps)															
40082	40083	2	R	SC_DC_AmpHour	uint32	AH	SC_DC_AH_SF	Metered	Accumulated amps supplied by combiner (sum of string amp-hours). Only positive (+) current flow is accumulated. Negative (-) current flow is not accumulated.															
40084	40084	1	R	SC_DC_Voltage	int16	Volts	SC_DC_Voltage_SF	Measured	Combined voltage value (not supported)															
40085	40085	1	R	SC_Internal_Temp	int16	°C	N/A	Measured	Internal temperature of the combiner (not supported)															
40086	40086	1	R	SC_Input_DC_Current_SF	int16	SF	N/A	Configured	DC input current scale factor															
40087	40087	1	R	SC_Input_DC_AH_SF	int16	SF	N/A	Configured	DC input amp-hour scale factor															

Start	End	N	R/W	Name	Type	Units	Scale Factor	Contents	Description
Input string values repeated for each string as configured by SC_Num_Inputs.									
These values are repeated for every string in the EA10 system. See below for register numbers for individual strings.	1	R	SC_Input_ID	uint16	N/A	N/A	Configured	The ID of String.	
	2	R	SC_Input_Event	uint32	Bitfield	N/A	SC_EVENT_	String Sunspec input event flags. See SunSpec Event Flags registers 40077-40078.	
	2	R	SC_Input_Event_Vendor	uint32	Bitfield	N/A	SC_EVENT_	String vendor input event flags. EA10 specific. See Vendor Event Flags registers 40079-40080.	
	1	R	SC_Input_DC_Current	int16	Amps	SC_Input_DC_Current_SF	Measured	String DC current value. May be negative due to ground fault.	
	2	R	SC_Input_DC_AmpHout	uint32	AH	SC_Input_DC_AH_SF	Metered	Accumulated amps (amp-hours) for this string. Only positive (+) current flow is accumulated. Negative (-) current flow is not accumulated.	
Each set of eight registers below represents one string. The eight registers are specified above.									
40088	40095	8	R	String 1					String register blocks. Each set of eight registers represents the values described above for all strings in the system (up to 32 strings possible with one communications unit).
40096	40103	8	R	String 2					
40104	40111	8	R	String 3					
40112	40119	8	R	String 4					
40120	40127	8	R	String 5					
40128	40135	8	R	String 6					
40136	40143	8	R	String 7					
40144	40151	8	R	String 8					
40152	40159	8	R	String 9					
40160	40167	8	R	String 10					
40168	40175	8	R	String 11					
40176	40183	8	R	String 12					
40184	40191	8	R	String 13					
40192	40199	8	R	String 14					
40200	40207	8	R	String 15					
40208	40215	8	R	String 16					
40216	40223	8	R	String 17					
40224	40231	8	R	String 18					
40232	40239	8	R	String 19					
40240	40247	8	R	String 20					
40248	40255	8	R	String 21					
40256	40263	8	R	String 22					
40264	40271	8	R	String 23					
40272	40279	8	R	String 24					
40280	40287	8	R	String 25					
40288	40295	8	R	String 26					
40296	40303	8	R	String 27					
40304	40311	8	R	String 28					
40312	40319	8	R	String 29					
40320	40327	8	R	String 30					
40328	40335	8	R	String 31					
40336	40343	8	R	String 32					

Status and Configuration Register Block

This block is implemented as a proprietary SunSpec device block. Register addresses are absolute in base 1 notation. Length is the number of 16 bit Modbus registers.

Start	End	Size	R/W	Name	Type	Units	SF	Contents	Description												
40344	40344	1	R	C_SunSpec_DID	uint16	N/A	N/A	64001	Uniquely identifies this as a proprietary SunSpec format Modbus register map												
40345	40345	1	R	C_SunSpec_Length	uint16	Registers	N/A	71	Block Length												
40346	40346	1	R/W	Command Code	uint16	Code Word	N/A	0	Always returns 0x0000 on a read. Customer Command Codes: <table border="1" data-bbox="933 478 1404 558"> <thead> <tr> <th>Dec</th> <th>Hex</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>30078</td> <td>0x757E</td> <td>Clear all accumulators to 0.</td> </tr> </tbody> </table>	Dec	Hex	Description	30078	0x757E	Clear all accumulators to 0.						
Dec	Hex	Description																			
30078	0x757E	Clear all accumulators to 0.																			
40347	40347	1	R	Hardware Revision	uint16		N/A	0	4 bit hardware revision: <table border="1" data-bbox="933 611 1386 732"> <thead> <tr> <th>Bit</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0-3</td> <td>Hardware Revision</td> </tr> <tr> <td>4-15</td> <td>unused</td> </tr> </tbody> </table>	Bit	Description	0-3	Hardware Revision	4-15	unused						
Bit	Description																				
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40348	40348	1	R	RS FW Revision	uint16		N/A		Reset System Firmware Version												
40349	40349	1	R	OS FW Revision	uint16		N/A		Operating System Firmware Version												
40350	40351	2	R	Product Revision	ASCII		N/A		Product Revision												
40352	40352	1	R	Boot Count	uint16		N/A		Count of Boot Cycles												
40353	40353	1	R	DIP Switches	uint16		N/A		All 16 DIP switches: <table border="1" data-bbox="933 942 1502 1064"> <thead> <tr> <th>Switch</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>87654321</td> <td>Address</td> </tr> <tr> <td>87654321</td> <td>Reverse, Parity, Baud Rate (see DIP Switch Settings, page 5)</td> </tr> </tbody> </table>	Switch	Function	87654321	Address	87654321	Reverse, Parity, Baud Rate (see DIP Switch Settings, page 5)						
Switch	Function																				
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40354	40354	1	R	# Detected current sensing modules	uint16		N/A	0 - 4+	Number of current sensing modules detected on the bus by analog measurement.												
40355	40355	1	R	# Communicating current sensing modules	uint16		N/A	0 - 4	Number of current sensing modules that the communications unit is able to communicate with. If all modules are active and communicating, this number will match the previous register, and the user can assume all status LEDs are green. If one or more modules is not communicating, these values will not match, and the affected module status LED is red.												
40356	40356	1	R	System Status	uint16		N/A	Bit Map	Status bit map: <table border="1" data-bbox="933 1316 1495 1514"> <thead> <tr> <th>Bit</th> <th>Hex</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0x0001</td> <td>Actual state of amperage sign reversal and sensing module LED color state. Controlled by DIP switch if configuration register (next register) bit 1 is 0, or configuration register bit 0 if bit 1 is asserted.</td> </tr> <tr> <td>1-15</td> <td></td> <td>unused</td> </tr> </tbody> </table>	Bit	Hex	Description	0	0x0001	Actual state of amperage sign reversal and sensing module LED color state. Controlled by DIP switch if configuration register (next register) bit 1 is 0, or configuration register bit 0 if bit 1 is asserted.	1-15		unused			
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40357	40357	1	R/W	System Configuration	uint16		N/A		Configuration bit map: <table border="1" data-bbox="933 1566 1495 1871"> <thead> <tr> <th>Bit</th> <th>Hex</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0x0001</td> <td>Reverse amp sign and sensing module LED color. Has no effect if bit below is 0.</td> </tr> <tr> <td>1</td> <td>0x0002</td> <td>Override Reverse DIP Switch. If this bit is 0, the Reverse Current DIP switch on the communications unit controls the state of the reverse amp sign bit in the status register. If this bit is set to a 1, the state of the bit above controls sign reversal.</td> </tr> <tr> <td>2-15</td> <td></td> <td>unused</td> </tr> </tbody> </table>	Bit	Hex	Description	0	0x0001	Reverse amp sign and sensing module LED color. Has no effect if bit below is 0.	1	0x0002	Override Reverse DIP Switch. If this bit is 0, the Reverse Current DIP switch on the communications unit controls the state of the reverse amp sign bit in the status register. If this bit is set to a 1, the state of the bit above controls sign reversal.	2-15		unused
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2-15		unused																			
40358	40358	1	R/W	Sensor LED Blink Threshold	uint16	%		1 - 100	Current sensing module LED blink (over-range) threshold in percent of current sensing module CT current rating of 20 A. Currents at or above this threshold cause the current sensing module string LEDs to blink. Default is 100% (20 A).												

Start	End	Size	R/W	Name	Type	Units	SF	Contents	Description						
40359	40359	1	R/W	Sensor LED On Threshold	uint16	%		1 - 100	Current sensing module LED on (current flowing) threshold in percent of current sensing module CT current rating of 20 A. Currents at or above this threshold cause the current sensing module string LEDs illuminate. LED states are reported in the SunSpec Basic String Combiner block, Vendor Event Flag Register. Default is 3% (0.6 A).						
40360	40360	1	R	Reserved	uint16		N/A	0	Unused register location. Reserved for future use.						
40361	40376	16	R/W	Location Text String	uint16	ASCII	N/A	Text	User writable string for storing the unit's location or other information about the unit. Up to 32 characters. Must be null terminated (unused bytes are all 0x00). This string is returned as part of the response to the Modbus slave ID command. Information on each of the attached current sensing modules.						
Information for each of the current sensing modules.															
40377	40377	1	R	Sensor 1 Unit ID	uint16		N/A		Sensor Unit ID: <table border="1" data-bbox="922 611 1511 730"> <thead> <tr> <th>ID</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No unit detected or unit is not communicating. Module status LED is red.</td> </tr> <tr> <td>1</td> <td>8 channel, 20 A current sensor. Module status LED is green</td> </tr> </tbody> </table>	ID	Description	0	No unit detected or unit is not communicating. Module status LED is red.	1	8 channel, 20 A current sensor. Module status LED is green
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40378	40378	1	R	Address	uint16		N/A		Sensor address on the EA10's internal bus						
40379	40379	1	R	OS Version	uint16		N/A		Sensor firmware version						
40480	40481	2	R	Product Version	ASCII		N/A		Sensor product revision						
40382	40386	5	R	Serial Number	ASCII		N/A	10 digit	Sensor serial number						
40387	40387	1	R	Sensor 2 Unit ID	uint16		N/A		Sensor Unit ID: <table border="1" data-bbox="922 936 1511 1056"> <thead> <tr> <th>ID</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No unit detected or unit is not communicating. Module status LED is red.</td> </tr> <tr> <td>1</td> <td>8 channel, 20 A current sensor. Module status LED is green</td> </tr> </tbody> </table>	ID	Description	0	No unit detected or unit is not communicating. Module status LED is red.	1	8 channel, 20 A current sensor. Module status LED is green
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40388	40388	1	R	Address	uint16		N/A		Sensor address on the EA10's internal bus						
40389	40389	1	R	OS Version	uint16		N/A		Sensor firmware version						
40390	40391	2	R	Product Version	ASCII		N/A		Sensor product revision						
40392	40396	5	R	Serial Number	uint16		N/A	10 digit	Sensor serial number						
40397	40397	1	R	Sensor 3 Unit ID	uint16		N/A		Sensor Unit ID: <table border="1" data-bbox="922 1262 1511 1381"> <thead> <tr> <th>ID</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No unit detected or unit is not communicating. Module status LED is red.</td> </tr> <tr> <td>1</td> <td>8 channel, 20 A current sensor. Module status LED is green</td> </tr> </tbody> </table>	ID	Description	0	No unit detected or unit is not communicating. Module status LED is red.	1	8 channel, 20 A current sensor. Module status LED is green
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40398	40398	1	R	Address	uint16		N/A		Sensor address on the EA10's internal bus						
40399	40399	1	R	OS Version	uint16		N/A		Sensor firmware version						
40400	40401	2	R	Product Version	ASCII		N/A		Sensor product revision						
40402	40406	5	R	Serial Number	uint16		N/A	10 digit	Sensor serial number						
40407	40407	1	R	Sensor 4 Unit ID	uint16		N/A		Sensor Unit ID: <table border="1" data-bbox="922 1587 1511 1707"> <thead> <tr> <th>ID</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No unit detected or unit is not communicating. Module status LED is red.</td> </tr> <tr> <td>1</td> <td>8 channel, 20 A current sensor. Module status LED is green</td> </tr> </tbody> </table>	ID	Description	0	No unit detected or unit is not communicating. Module status LED is red.	1	8 channel, 20 A current sensor. Module status LED is green
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40408	40408	1	R	Address	uint16		N/A		Sensor address on the EA10's internal bus						
40409	40409	1	R	OS Version	uint16		N/A		Sensor firmware version						
40410	40411	2	R	Product Version	ASCII		N/A		Sensor product revision						
40412	40416	5	R	Serial Number	uint16		N/A	10 digit	Sensor serial number						
40417	40417	1	R	C_SunSpec_DID	uint16			Device ID	Start of next device (Null DID = 0xFFFF)						
40418	40418	1	R	C_SunSpec_Length	uint16			Device Length	Device model block size (null length = 0x0000)						