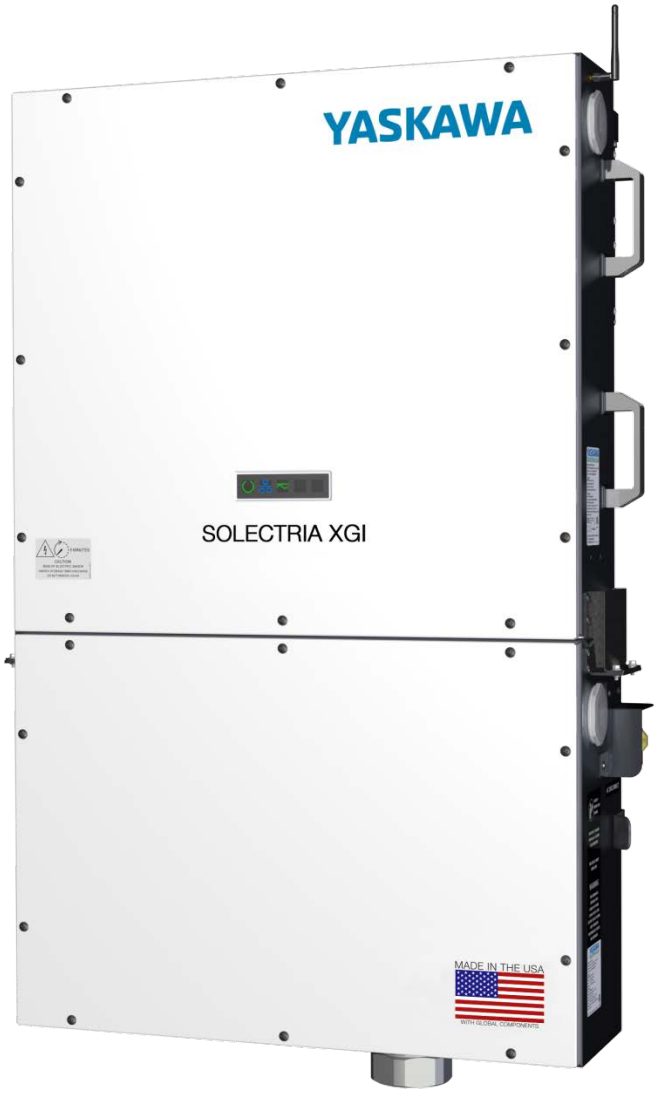
YASKAWA
SOLECTRIA SOLAR

Commercial 1000VDC String Inverter

SOLECTRIA XGI™ 1000

Modbus Manual

Models: XGI 1000-50/60 XGI 1000-60/65
XGI 1000-60/60 XGI 1000-65/65



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1 Introduction

This manual explains the SunSpec protocol using Modbus for SOLECTRIA XGI 1000 inverters. This does not include the history of either SunSpec or Modbus or the details regarding the creation of the protocols. It is expected that the person(s) reading this manual have a clear understanding of both SunSpec and Modbus.

1.1 SunSpec Overview

SunSpec organizes all registers into defined groups called models. Each model begins with a header to identify it and its length. Only the models listed in this document are supported by SOLECTRIA XGI 1000 inverters. See Section 3.1 for the list of supported models.

Within each model, not all registers are supported. Unsupported registered are marked as “Reserved”. Only use supported registers.

1.2 Data Types

Several data types are used in this document.

- **acc32:** An accumulated value that fills two registers. This is used for a value that increases over time.
- **bitfield16:** Group of 16 individual bits that fills one register. This is used to select non-mutually exclusive options, such as alarms.
- **bitfield32:** Group of 32 individual bits that fills two registers. This is used to select non-mutually exclusive options, such as alarms.
- **enum16:** Enumerated type that fills one register. This is used to select mutually exclusive options, such as the state of the inverter.
- **float32:** Floating point number that fills two registers.
- **int16:** Signed integer that fills one register.
- **string:** Group of registers that are used to hold an alphanumeric value. Size depends on the string and must be read for each string.
- **sunssf:** SunSpec scale factor.
- **uint16:** Unsigned integer that fills one register.
- **uint32:** Unsigned integer that fills two registers.
- **uint64:** Unsigned integer that fills four registers.

2 Modbus Overview

Registers can be read using Modbus function code three (3) and certain registers can be written with Modbus function code six (6). When reading or writing to a group of registers, such as reading a string, make sure that the read command starts at the lowest address of the group and is of the appropriate length size for the group.

2.1 Value, Scale Factor, and Units

Many registers use a scale factor to communicate the value as an integer. The scale factor and units explain how the value is read. See Equation 2.1 as an example of how to interpret the result of reading Address 40075, as shown in Table 2.1.

Table 2.1 - Example of Value, Scale Factor, and Units

Address	Size	Name	Value	Type	Units	Scale factor	R/W	Description
40075	1	AphC	-	uint16	A	A_SF	R	Phase C AC current
40076	1	A_SF	-1	uint16	-	-	R	Scale factor - AC current

Equation 2.1 - Example of Applying Value, Scale Factor, and Units

$$Phase\ C\ AC\ Current = Value\ (Address\ 40075) * 10^{-1}\ A$$

2.2 Read/Write

The R/W column determines whether a value is read-only (R), write-only (W), or read-write (RW). Only write to W or RW registers.

3 Models

3.1 Model Overview

Table 2.1 - SunSpec Model Overview

Address	Size	Name	Value	Type	R/W	Description
40000	2	SunSpecID	SunS	string	R	SunSpec ID
40002	68	1	-	-	-	Model 1 - Common
40070	52	103	-	-	-	Model 103 - Inverter (3 phase)
40122	72	113	-	-	-	Model 113 - Inverter (3 phase) FLOAT
40184	28	120	-	-	-	Model 120 - Nameplate
40212	32	121	-	-	-	Model 123 - Basic settings
40244	46	122	-	-	-	Model 123 - Measurement Status
40290	26	123	-	-	-	Model 123 - Immediate Controls
40316	62	129	-	-	-	Model 129 - LVRTD
40378	62	130	-	-	-	Model 130 - HVRTD
40440	62	135	-	-	-	Model 135 - LFRT
40502	62	136	-	-	-	Model 136 - HFRT
40564	90	160	-	-	-	Model 160 - Multiple MPPT inverter extension ,odel
40654	54	16	-	-	-	Model 16 - Simple IP network 0 (eth1)
40708	54	16001	-	-	-	Model 16001 - Simple IP network 1 (eth2)
40762	54	16002	-	-	-	Model 16002 - Simple IP network 2 (Bridge)
40816	54	16003	-	-	-	Model 16003 - Simple IP network 3 (WiFi API)
40870	51	64190	-	-	-	Model 64190 - Solectria variables
40921	1	SunSpecEnd	0xFFFF	-	R	SunSpec end

3.2 Model 1 – Common

Table 2.2 - Model 1

Address	Size	Name	Value	Type	Units	Scale factor	R/W	Description
40002	1	ID	1	uint16	-	-	R	Model number
40003	1	L	68	uint16	-	-	R	Model length
40004	16	Manufacturer	Yaskawa Solectria Solar	uint16	-	-	R	Manufacturer name
40020	16	Model	-	uint16	-	-	R	Inverter model
40036	8	Options	-	string	-	-	R	Inverter option
40044	8	Version	-	string	-	-	R	Inverter version
40052	16	Serial Number	-	string	-	-	R	Inverter serial number
40068	1	Device Address	-	uint16	-	-	R	Modbus device address
40069	1	Reserved	-	-	-	-	R	Reserved

3.3 Model 103 – Inverter (Three Phase)

Table 2.3 - Model 103

Address	Size	Name	Value	Type	Units	Scale factor	R/W	Description
40070	1	ID	103	uint16	-	-	R	Model number
40071	1	L	50	uint16	-	-	R	Model length
40072	1	A	-	uint16	A	A_SF	R	AC current – sum of phases (rms)
40073	1	AphA	-	uint16	A	A_SF	R	Phase A AC current (rms)
40074	1	AphB	-	uint16	A	A_SF	R	Phase B AC current (rms)
40075	1	AphC	-	uint16	A	A_SF	R	Phase C AC current (rms)
40076	1	A_SF	-1	uint16	-	-	R	Scale factor - AC current
40077	1	PPVphAB	-	uint16	V	V_SF	R	Phase voltage AB (rms)
40078	1	PPVphBC	-	uint16	V	V_SF	R	Phase voltage BC (rms)
40079	1	PPVphCA	-	uint16	V	V_SF	R	Phase voltage CA (rms)
40080	1	PPVphA	-	uint16	V	V_SF	R	Phase voltage AN (rms)
40081	1	PPVphB	-	uint16	V	V_SF	R	Phase voltage BN (rms)
40082	1	PPVphC	-	uint16	V	V_SF	R	Phase voltage CN (rms)
40083	1	V_SF	-1	uint16	-	-	R	Scale factor - phase voltage
40084	1	W	-	uint16	W	W_SF	R	AC Power
40085	1	W_SF	-1	uint16	-	-	R	Scale factor - AC Power
40086	1	Hz	-	uint16	Hz	Hz_SF	R	Line frequency
40087	1	Hz_SF	-1	uint16	-	-	R	Scale factor – line frequency
40088	1	VA	-	uint16	VA	VA_SF	R	Apparent Power
40089	1	VA_SF	-1	uint16	-	-	R	Scale factor - apparent power
40090	1	VAr	-	uint16	VAr	VAr_SF	R	Reactive Power
40091	1	VAr_SF	-1	uint16	-	-	R	Scale factor - reactive power
40092	1	PF	-	uint16	PF	PF_SF	R	Power Factor
40093	1	PF_SF	-1	uint16	-	-	R	Scale factor - power factor
40094	2	Wh	-	uint16	Wh	WH_SF	R	AC energy
40096	1	Wh_SF	-1	uint16	-	-	R	Scale factor - AC energy
40097	1	DCA	-	uint16	DCA	DCA_SF	R	DC current
40098	1	DCA_SF	-1	uint16	-	-	R	Scale factor - DC current
40099	1	DCV	-	uint16	DCV	DCV_SF	R	DC voltage
40100	1	DCV_SF	-1	uint16	-	-	R	Scale factor - DC voltage
40101	1	DCW	-	uint16	DCW	DCW_SF	R	DC power
40102	1	DCW_SF	-1	uint16	-	-	R	Scale factor - DC power
40103	3	Reserved	-	-	-	-	R	Reserved
40106	1	TmpOt	-	uint16	C	Tmp_SF	R	IMI temperature
40107	1	Tmp_SF	-1	uint16	-	-	R	Scale factor - temperature
40108	1	St	-	enum16	-	-	R	Operating state, see St Enumerated
40109	1	StVnd	-	enum16		-	R	Vender state, see StVnd Enumerated
40110	2	Evt1	-	bitfield32	-	-	R	Event, see Evt1 Bitfield
40112	2	Reserved	-	-	-	-	R	Reserved
40114	2	EvtVnd1	-	bitfield32	-	-	R	Vendor Event 1, see EvtVnd1 Bitfield

40116	2	EvtVnd2	-	bitfield32	-	-	R	Vendor Event 2, see EvtVnd2 Bitfield
40118	2	EvtVnd3	-	bitfield32	-	-	R	Vendor Event 3, see EvtVnd3 Bitfield
40120	2	Reserved	-	-	-	-	R	Reserved

3.3.1 St Enumerated

Table 2.3.1 - St Enumerated

Value	Description
3	Starting
4	MPPT mode
5	Throttled
6	Shutting down
7	Fault
8	Standby

3.3.2 StVnd Enumerated

Table 2.3.2 - StVnd Enumerated

Value	Description
1	Initializing
2	Recovery
3	Normal operation with factory configuration
4	Normal operation with manufacturing configuration
5	Setup of custom configuration
6	Normal operation with custom configuration
7	Normal operation with communication fault
8	Administrator configuration
9	Software update
10	Normal shutdown

3.3.3 Evt1 Bitfield

Table 2.3.3 - Evt1 Bitfield

Bit	Description
0	Ground fault
1	DC over voltage
2	AC disconnected
4	Grid shutdown
6	Manual shutdown
7	Over temperature
8	Over frequency
9	Under frequency
10	AC over voltage
11	AC under voltage
14	Memory loss or internal communication error
15	Hardware test failure

3.3.4 EvtVnd1 Bitfield

Table 2.3.4 - Evt1Vnd Bitfield

Bit	Description
1	Software parameter load failure
2	Internal communication 1 failure
3	Internal communication 2 failure
4	Arc fault detected
5	AC contactor failure
6	Over temperature
7	Excessive leakage current
8	Low isolation resistance
9	Internal hardware failure
10	Ground fault detection failure
11	Self-check failure
12	Self-check startup failure

3.3.5 EvtVnd2 Bitfield

Table 2.3.5 - Evt2Vnd Bitfield

Bit	Description
1	Over voltage current
2	Phase lock loop failure
3	Island detected
4	Open phase detected
5	Low frequency 1 (LF1)
6	Low frequency 2 (LF2)
7	High frequency 1 (HF1)
8	High frequency 2 (HF2)
9	Low voltage 1 (LV1)
10	Low voltage 2 (LV2)
11	Low voltage 3 (LV3)
12	High voltage 1 (HV1)
13	High voltage 2 (HV2)
24	Communications system fault
25	Communications 1 fault
26	Communications 2 fault
27	Communications 3 fault
28	Network fault
29	Software Update fault
30	Unauthorized network access fault
31	Invalid configuration request

3.3.6 EvtVnd3 Bitfield

Table 2.3.6 - Evt3Vnd Bitfield

Bit	Description
1	Power derating – temperature
2	Power derating – customer command

3.4 Model 113 – Inverter (Three-Phase) FLOAT

Table 2.4 - Model 113

Address	Size	Name	Value	Type	Units	Scale factor	R/W	Description
40122	1	ID	113	uint16	-	-	R	Model number
40123	1	L	62	uint16	-	-	R	Model length
40124	2	A	-	float32	A	-	R	AC Current
40126	2	AphA	-	float32	A	-	R	Phase A current
40128	2	AphB	-	float32	A	-	R	Phase B current
40130	2	AphC	-	float32	A	-	R	Phase C current
40132	2	PPVphAB	-	float32	V	-	R	Phase voltage AB
40134	2	PPVphBC	-	float32	V	-	R	Phase voltage BC
40136	2	PPVphCA	-	float32	V	-	R	Phase voltage CA
40138	2	PhVphA	-	float32	V	-	R	Phase voltage AN
40140	2	PhVphB	-	float32	V	-	R	Phase voltage BN
40142	2	PhVphC	-	float32	V	-	R	Phase voltage CN
40144	2	W	-	float32	W	-	R	AC Power
40146	2	Hz	-	float32	Hz	-	R	Line Frequency
40148	2	VA	-	float32	VA	-	R	AC Apparent Power
40150	2	VAr	-	float32	var	-	R	AC Reactive Power
40152	2	PF	-	float32	Pct	-	R	AC Power Factor
40154	2	WH	-	float32	Wh	-	R	AC Energy
40156	2	DCA	-	float32	A	-	R	DC current
40158	2	DCV	-	float32	V	-	R	DC voltage
40160	2	DCW	-	float32	W	-	R	DC power
40162	6	Reserved	-	-	-	-	R	Reserved
40168	2	TmpOt	-	float32	C	-	R	IMI temperature
40170	1	St	-	enum16	-	-	R	Operating state, see St Enumerated
40171	1	StVnd	-	enum16	-	-	R	Vender state, see StVnd Enumerated
40172	2	Evt1	-	bitfield32	-	-	R	Event, see Evt1 Bitfield
40174	2	Reserved	-	-	-	-	R	Reserved
40176	2	EvtVnd1	-	bitfield32	-	-	R	Vendor Event 1, see EvtVnd1 Bitfield
40178	2	EvtVnd2	-	bitfield32	-	-	R	Vendor Event 2, see EvtVnd2 Bitfield
40180	2	EvtVnd3	-	bitfield32	-	-	R	Vendor Event 3, see EvtVnd3 Bitfield
40182	2	Reserved	-	-	-	-	R	Reserved

3.4.1 St Enumerated

Table 2.4.1 - St Enumerated

Value	Description
3	Starting
4	MPPT mode
5	Throttled
6	Shutting down
7	Fault
8	Standby

3.4.2 StVnd Enumerated

Table 2.4.2 - StVnd Enumerated

Value	Description
1	Initializing
2	Recovery
3	Normal operation with factory configuration
4	Normal operation with manufacturing configuration
5	Setup of custom configuration
6	Normal operation with custom configuration
7	Normal operation with communication fault
8	Administrator configuration
9	Software update
10	Normal shutdown

3.4.3 Evt1 Bitfield

Table 2.4.3 - Evt1 Bitfield

Bit	Description
0	Ground fault
1	DC over voltage
2	AC disconnected
4	Grid shutdown
6	Manual shutdown
7	Over temperature
8	Over frequency
9	Under frequency
10	AC over voltage
11	AC under voltage
14	Memory loss or internal communication error
15	Hardware test failure

3.4.4 EvtVnd1 Bitfield

Table 2.4.4 - Evt1Vnd Bitfield

Bit	Description
1	Software parameter load failure
2	Internal communication 1 failure
3	Internal communication 2 failure
4	Arc fault detected
5	AC contactor failure
6	Over temperature
7	Excessive leakage current
8	Low isolation resistance
9	Internal hardware failure
10	Ground fault detection failure
11	Self-check failure
12	Self-check startup failure

3.4.5 EvtVnd2 Bitfield

Table 2.4.5 - Evt2Vnd Bitfield

Bit	Description
1	Over voltage current
2	Phase lock loop failure
3	Island detected
4	Open phase detected
5	Low frequency 1 (LF1)
6	Low frequency 2 (LF2)
7	High frequency 1 (HF1)
8	High frequency 2 (HF2)
9	Low voltage 1 (LV1)
10	Low voltage 2 (LV2)
11	Low voltage 3 (LV3)
12	High voltage 1 (HV1)
13	High voltage 2 (HV2)
24	Communications system fault
25	Communications 1 fault
26	Communications 2 fault
27	Communications 3 fault
28	Network fault
29	Software Update fault
30	Unauthorized network access fault
31	Invalid configuration request

3.4.6 EvtVnd3 Bitfield

Table 2.4.6 - Evt3Vnd Bitfield

Bit	Description
1	Power derating – temperature
2	Power derating – customer command

3.5 Model 120 – Nameplate

Table 2.5 - Model 120

Address	Size	Name	Value	Type	Units	Scale factor	R/W	Description
40186	1	ID	120	uint16	-	-	R	Model number
40185	1	L	26	uint16	-	-	R	Model length
40186	1	DERTyp	4	enum16	-	-	R	Type of DER device, see DERTyp Enumerated
40187	1	WRtg	-	uint16	W	WRtg_SF	R	Continuous output power capability of the inverter
40188	1	WRtg_SF	3	sunssf	-	-	R	Scale factor – output power rating
40189	1	VARtg	-	uint16	VA	VARtg_SF	R	Continuous output Volt-Ampere capability of the inverter
40190	1	VARtg_SF	3	sunssf	-	-	R	Scale factor – output Volt-Ampere rating
40191	5	Reserved	-	-	-	-	R	Reserved
40196	1	ARtg	-	uint16	A	ARtg_SF	R	Continuous output current capability of the inverter
40197	1	ARtg_SF	-1	sunssf	-	-	R	Scale factor – output current rating
40198	14	Reserved	-	-	-	-	R	Reserved

3.5.1 DERTyp Enumerated

Table 2.5.1 - DERTyp Enumerated

Value	Description
4	Photovoltaic
82	Photovoltaic storage

3.6 Model 121 – Basic Settings

Table 2.6 - Model 121

Address	Size	Name	Value	Type	Units	Scale factor	R/W	Description
40212	1	ID	121	uint16	-	-	R	Model number
40213	1	L	30	uint16	-	-	R	Model length
40214	1	WMax	-	uint16	W	WMax_SF	R	Setting for maximum power output
40215	1	VRef	-	uint16	V	VRef_SF	R	Voltage from PCC to inverter
40216	1	VRefOfs	0	uint16	V	VRefOfs_SF	RW	Address from PCC to inverter
40217	2	Reserved	-	-	-	-	R	Reserved
40219	1	VAMax	-	uint16	VA	VAMax_SF	R	Setpoint for maximum apparent power
40220	5	Reserved	-	-	-	-	R	Reserved
40225	1	PFMinQ1	90	int16		PFMin_SF	R	Setpoint for minimum power factor in quadrant 1
40226	2	Reserved	-	-	-	-	R	Reserved
40228	1	PFMinQ4	90	int16		PFMin_SF	R	Setpoint for minimum power factor in quadrant 4
40229	1	Reserved	-	-	-	-	R	Reserved
40230	1	ClcTotVA	1	enum16	-	-	R	Calculation method for apparent power, see ClcTotVA Enumerated
40231	1	Reserved	-	-	-	-	R	Reserved
40232	1	ECPNomHz	-	uint16	Hz	ECPNomHz_SF	R	Setpoint for nominal frequency at the PCC
40233	1	Reserved	-	-	-	-	R	Reserved
40234	1	WMax_SF	3	sunssf	-	-	R	Scale factor – real power
40235	1	VRef_SF	0	sunssf	-	-	R	Scale factor – voltage at the PCC
40236	1	VRefOfs_SF	-	sunssf	-	-	R	Scale factor – Address voltage
40237	1	Reserved	-	-	-	-	R	Reserved
40238	1	VAMax_SF	3	sunssf	-	-	R	Scale factor – apparent power
40239	1	VArMax_SF	3	sunssf	-	-	R	Scale factor – reactive power
40240	1	Reserved	-	-	-	-	R	Reserved
40241	1	PFMin_SF	-2	sunssf	-	-	R	Scale factor – maximum power factor
40242	1	Reserved	-	-	-	-	R	Reserved
40243	1	ECPNomHz_SF	-2	sunssf	-	-	R	Scale factor – nominal frequency

3.6.1 ClcTotVA Enumerated

Table 2.5.1 - ClcTotVA Enumerated

Value	Description
1	Vector
2	Arithmetic

3.7 Model 122 – Measurement Status

Table 2.7 - Model 122

Address	Size	Name	Value	Type	Units	Scale Factor	R/W	Description
40244	1	ID	122	uint16	-	-	R	Model number
40245	1	L	44	uint16	-	-	R	Model length
40246	1	PVConn	-	bitfield32	-	-	R	PV inverter present/ available status, see PVConn Bitfield
40247	43	Reserved	-	-	-	-	R	Reserved

3.7.1 PVConn Bitfield

Table 2.4.3 - PVConn Bitfield

Bit	Description
0	Connected
1	Available
2	Operating
3	Test

3.8 Model 123 – Immediate Controls

Table 2.8 - Model 123

Address	Size	Name	Value	Type	Units	Scale Factor	R/W	Description
40290	1	ID	123	uint16	-	-	R	Model number
40291	1	L	24	uint16	-	-	R	Model length
40292	2	Reserved	-	-	-	-	R	Reserved
40294	1	Conn	-	enum16	-	-	RW	Connection control, see Conn Enumerated
40295	1	WMaxLimPct	-	uint16	%W Max	WMaxLimPCT_SF	RW	Set power output to specified value
40296	3	Reserved	-	-	-	-	R	Reserved
40299	1	WMaxLim_Ena	-	enum16	-	-	RW	Throttle enable/disable control, see WMaxLimPCt_Ena Enumerated
40300	1	OutPFSet	-	int16		OutPFSet_SF	RW	Set power factor to specified value – cosine of angle
40301	3	Reserved	-	-	-	-	R	Reserved
40304	1	OutPFSet_Ena	-	enum16	-	-	RW	Fixed power factor control enable/disable, see OutPFSet_Ena Enumerated
40305	8	Reserved	-	-	-	-	R	Reserved
40313	1	WMaxLimPct_SF	-1	sunssf	-	-	R	Scale factor – power output percent
40314	1	OutPFSet_SF	-2	sunssf	-	-	R	Scale factor – power factor
40315	1	Reserved	-	-	-	-	R	Reserved

3.8.1 Conn Enumerated

Table 2.8.1 - Conn Enumerated

Value	Description
0	Disconnect
1	Connect

3.8.2 WMaxLimPCt_Ena Enumerated

Table 2.8.2 - WMaxLimPCt_Ena Enumerated

Value	Description
0	Disconnect
1	Connect

3.8.3 OutPFSet_Ena Enumerated

Table 2.5.1 - OutPFSet_Ena Enumerated

Value	Description
0	Disconnect
1	Connect

3.9 Model 129 – LVRTD

Table 2.9 - Model 129

Address	Size	Name	Value	Type	Units	Scale Factor	R/W	Description
40316	1	ID	129	uint16	-	-	R	Model number
40317	1	L	60	uint16	-	-	R	Model length
40318	1	Reserved	-	-	-	-	R	Reserved
40319	1	ModEna	1	bitfield16	-	-	RW	LVRT control mode, enables active curve, see ModEna Bitfield
40320	3	Reserved	-	-	-	-	R	Reserved
40323	1	NCrv	1	uint16	-	-	R	Number of curves supported
40324	1	NPt	3	uint16	-	-	R	Number of points supported
40325	1	Tms_SF	-2	sunssf	-	-	R	Scale factor – duration
40326	1	V_SF	-1	sunssf	-	-	R	Scale factor – %VRef
40327	1	Reserved	-	-	-	-	R	Reserved
40328	1	ActPt	6	uint16	-	-	RW	Number of active points
40329	2	Reserved	-	-	-	-	R	Reserved
40331	1	Tms2	-	uint16	S	Tms_SF	RW	Point 2 must disconnect - duration
40332	1	V2	-	uint16	% Vref	V_SF	RW	Point 2 must disconnect - voltage
40333	2	Reserved	-	-	-	-	R	Reserved
40335	1	Tms4	-	uint16	S	Tms_SF	RW	Point 4 must disconnect - duration
40336	1	V4	-	uint16	% Vref	V_SF	RW	Point 4 must disconnect - voltage
40337	2	Reserved	-	-	-	-	R	Reserved
40339	1	Tms6	-	uint16	S	Tms_SF	RW	Point 6 must disconnect - duration
40340	1	V6	-	uint16	% Vref	V_SF	RW	Point 6 must disconnect - voltage
40341	37	Reserved	-	-	-	-	R	Reserved

3.9.1 ModEna Bitfield

Table 2.9.1 - ModEna Bitfield

Bit	Description
0	Enabled

3.10 Model 130 – HVRTD

Table 2.10 - Model 130

Address	Size	Name	Value	Type	Units	Scale factor	R/W	Description
40378	1	ID	130	uint16	-	-	R	Model number
40379	1	L	60	uint16	-	-	R	Model length
40380	1	Reserved	-	-	-	-	R	Reserved
40381	1	ModEna	1	bitfield16	-	-	RW	HVRT control mode, enables active curve, see ModEna Bitfield
40382	3	Reserved	-	-	-	-	R	Reserved
40385	1	NCrv	1	uint16	-	-	R	Number of curves supported
40386	1	NPt	3	uint16	-	-	R	Number of points supported
40387	1	Tms_SF	-2	sunssf	-	-	R	Scale factor – duration
40388	1	V_SF	-1	sunssf	-	-	R	Scale factor – %VRef
40389	1	Reserved	-	-	-	-	R	Reserved
40390	1	ActPt	6	uint16	-	-	RW	Number of active points
40391	2	Reserved	-	-	-	-	R	Reserved
40393	1	Tms2	-	uint16	S	Tms_SF	RW	Point 2 must disconnect - duration
40394	1	V2	-	uint16	% Vref	V_SF	RW	Point 2 must disconnect - voltage
40395	2	Reserved	-	-	-	-	R	Reserved
40397	1	Tms4	-	uint16	S	Tms_SF	RW	Point 4 must disconnect - duration
40398	1	V4	-	uint16	% Vref	V_SF	RW	Point 4 must disconnect - voltage
40399	2	Reserved	-	-	-	-	R	Reserved
40401	1	Tms6	-	uint16	S	Tms_SF	RW	Point 6 must disconnect - duration
40402	1	V6	-	uint16	% Vref	V_SF	RW	Point 6 must disconnect - voltage
40403	37	Reserved	-	-	-	-	R	Reserved

3.10.1 ModEna Bitfield

Table 2.10.1 - ModEna Bitfield

Bit	Description
0	Enabled

3.11 Model 135 – LFRT

Table 2.11 - Model 135

Address	Size	Name	Value	Type	Units	Scale Factor	R/W	Description
40440	1	ID	135	uint16	-	-	R	Model number
40441	1	L	60	uint16	-	-	R	Model length
40442	1	Reserved	-	-	-	-	R	Reserved
40443	1	ModEna	1	bitfield16	-	-	RW	LFRT control mode, enables active curve, see ModEna Bitfield
40444	3	Reserved	-	-	-	-	R	Reserved
40447	1	NCrv	1	uint16	-	-	R	Number of curves supported
40448	1	NPt	3	uint16	-	-	R	Number of points supported
40449	1	Tms_SF	-2	sunssf	-	-	R	Scale factor – duration
40450	1	V_SF	-1	sunssf	-	-	R	Scale factor – %VRef
40451	1	Reserved	-	-	-	-	R	Reserved
40452	1	ActPt	6	uint16	-	-	RW	Number of active points
40453	2	Reserved	-	-	-	-	R	Reserved
40455	1	Tms2	-	uint16	S	Tms_SF	RW	Point 2 must disconnect - duration
40456	1	V2	-	uint16	% Vref	V_SF	RW	Point 2 must disconnect - voltage
40457	2	Reserved	-	-	-	-	R	Reserved
40459	1	Tms4	-	uint16	S	Tms_SF	RW	Point 4 must disconnect - duration
40460	1	V4	-	uint16	% Vref	V_SF	RW	Point 4 must disconnect - voltage
40461	41	Reserved	-	-	-	-	R	Reserved

3.11.1 ModEna Bitfield

Table 2.11.1 - ModEna Bitfield

Bit	Description
0	Enabled

3.12 Model 136 – HFRT

Table 2.12 - Model 136

Address	Size	Name	Value	Type	Units	Scale Factor	R/W	Description
40502	1	ID	136	uint16	-	-	R	Model number
40503	1	L	60	uint16	-	-	R	Model length
40504	1	Reserved	-	-	-	-	R	Reserved
40505	1	ModEna	1	bitfield16	-	-	RW	HFRT control mode, enables active curve, see ModEna Bitfield
40506	3	Reserved	-	-	-	-	R	Reserved
40509	1	NCrv	1	uint16	-	-	R	Number of curves supported
40510	1	NPt	3	uint16	-	-	R	Number of points supported
40511	1	Tms_SF	-2	sunssf	-	-	R	Scale factor – duration
40512	1	V_SF	-1	sunssf	-	-	R	Scale factor – %VRef
40513	1	Reserved	-	-	-	-	R	Reserved
40514	1	ActPt	6	uint16	-	-	RW	Number of active points
40515	2	Reserved	-	-	-	-	R	Reserved
40517	1	Tms2	-	uint16	S	Tms_SF	RW	Point 2 must disconnect - duration
40518	1	V2	-	uint16	% Vref	V_SF	RW	Point 2 must disconnect - voltage
40519	2	Reserved	-	-	-	-	R	Reserved
40521	1	Tms4	-	uint16	S	Tms_SF	RW	Point 4 must disconnect - duration
40522	1	V4	-	uint16	% Vref	V_SF	RW	Point 4 must disconnect - voltage
40523	41	Reserved	-	-	-	-	R	Reserved

3.12.1 ModEna Bitfield

Table 2.12.1 - ModEna Bitfield

Bit	Description
0	Enabled

3.13 Model 160 – Multiple MPPT Inverter Extension Mode

Table 2.13 - Model 160

Address	Size	Name	Value	Type	Units	Scale Factor	R/W	Description
40564	1	ID	160	uint16	-	-	R	Model number
40565	1	L	88	uint16	-	-	R	Model length
40566	1	DCA_SF	-1	sunssf	-	-	R	Scale factor – current
40567	1	DCV_SF	-1	sunssf	-	-	R	Scale factor – voltage
40568	1	DCW_SF	1	sunssf	-	-	R	Scale factor – power
40569	1	DCWH_SF	1	sunssf	-	-	R	Scale factor – energy
40570	4	Reserved	-	-	-	-	R	Reserved
40574	8	ID	1	uint16	-	-	R	Input ID – zone 1
40582	1	Reserved	-	-	-	-	R	Reserved
40583	1	DCA	-	uint16	A	DCA_SF	R	DC current – zone 1
40584	1	DCV	-	uint16	V	DCV_SF	R	DC voltage – zone 1
40585	1	DCW	-	uint16	W	DCW_SF	R	DC power – zone 1
40586	2	DCWH	0	acc32	Wh	DCWH_SF	R	Lifetime energy – zone 1
40588	2	Tms	0xFFFF FFFF	uint32	S	-	R	Timestamp
40590	1	Tmp	0x8000	int16	C	-	R	Temperature
40591	1	DCSt	0xFFFF	enum16	-	-	R	Operating state
40592	2	DCEvt	-	bitfield32	-	-	R	Module events
40594	8	ID	2	uint16	-	-	R	Input ID – zone 2
40602	1	Reserved	-	-	-	-	R	Reserved
40603	1	DCA	-	uint16	A	DCA_SF	R	DC current – zone 2
40604	1	DCV	-	uint16	V	DCV_SF	R	DC voltage – zone 2
40605	1	DCW	-	uint16	W	DCW_SF	R	DC power – zone 2
40606	2	DCWH	0	acc32	Wh	DCWH_SF	R	Lifetime energy – zone 2
40608	4	Reserved	-	-	-	-	R	Reserved
40612	2	DCEvt	-	bitfield32	-	-	R	Module events
40614	8	ID	3	uint16	-	-	R	Input ID – zone 3
40622	1	Reserved	-	-	-	-	R	Reserved
40623	1	DCA	-	uint16	A	DCA_SF	R	DC current – zone 3
40624	1	DCV	-	uint16	V	DCV_SF	R	DC voltage – zone 3
40625	1	DCW	-	uint16	W	DCW_SF	R	DC power – zone 3
40626	2	DCWH	0	acc32	Wh	DCWH_SF	R	Lifetime energy – zone 3
40628	4	Reserved	-	-	-	-	R	Reserved
40632	2	DCEvt	-	bitfield32	-	-	R	Module events
40634	8	ID	4	uint16	-	-	R	Input ID – zone 4
40642	1	Reserved	-	-	-	-	R	Reserved
40643	1	DCA	-	uint16	A	DCA_SF	R	DC current – zone 4
40644	1	DCV	-	uint16	V	DCV_SF	R	DC voltage – zone 4
40645	1	DCW	-	uint16	W	DCW_SF	R	DC power – zone 4
40646	2	DCWH	0	acc32	Wh	DCWH_SF	R	Lifetime energy – zone 4
40648	4	Reserved	-	-	-	-	R	Reserved
40652	2	DCEvt	-	bitfield32	-	-	R	Module events

3.13.1 Module Events Zone 1

Table 2.13.1 - Module Events Zone 1

Bit	Description
15	Arc detection

3.13.2 Module Events Zone 2

Table 2.13.1 - Module Events Zone 2

Bit	Description
15	Arc detection

3.13.3 Module Events Zone 3

Table 2.13.1 - Module Events Zone 3

Bit	Description
15	Arc detection

3.13.4 Module Events Zone 4

Table 2.13.1 - Module Events Zone 4

Bit	Description
15	Arc detection

3.14 Model 16 – Simple IP Network (eth1)

Table 2.14 - Model 16

Address	Size	Name	Value	Type	Units	Scale Factor	R/W	Description
40654	1	ID	16	uint16	-	-	R	Model number
40655	1	L	52	uint16	-	-	R	Model length
40656	4	Nam	eth1	string	-	-	R	Interface name
40660	1	Cfg	-	enum16	-	-	R	Force IPv4 configuration method, see Cfg Enumerated
40661	1	Ctl	3	enum16	-	-	R	Bitmask value configuration, see Ctl Enumerated
40662	8	Addr	-	string	-	-	R	IP address
40670	8	Msk	-	string	-	-	R	Netmask
40678	8	Gw	-	string	-	-	R	Gateway IP address
40686	16	Reserved	-	-	-	-	R	Reserved
40702	4	MAC	-	uint64	-	-	R	IEEE MAC address
40706	1	LnkCtl	3	bitfield16	-	-	RW	Link control flags, see LnkCtl Bitfield
40707	1	Reserved	-	-	-	-	R	Reserved

3.14.1 Cfg Enumerated

Table 2.14.1 Cfg - Enumerated

Value	Description
0	Static IP address is assigned
1	DHCP Used to acquire IP address

3.14.2 Ctl Enumerated

Table 2.14.2 - Ctl Enumerated

Value	Description
0	Enable DNS
1	Enable NTP

3.14.3 LnkCtl Bitfield

Table 2.14.3 - ModEna Bitfield

Bit	Description
0	Auto-negotiate
1	Full duplex

3.15 Model 16001 – Simple IP Network (eth2)

Table 2.15 - Model 16001

Address	Size	Name	Value	Type	Units	Scale Factor	R/W	Description
40708	1	ID	16	uint16	-	-	R	Model number
40709	1	L	52	uint16	-	-	R	Model length
40710	4	Nam	eth2	string	-	-	R	Interface name
40714	1	Cfg	-	enum16	-	-	R	Force IPv4 configuration method, see Cfg Enumerated
40715	1	Ctl	3	enum16	-	-	R	Bitmask value configuration, see Ctl Enumerated
40716	8	Addr	-	string	-	-	R	IP address
40724	8	Msk	-	string	-	-	R	Netmask
40732	8	Gw	-	string	-	-	R	Gateway IP address
40740	16	Reserved	-	-	-	-	R	Reserved
40756	4	MAC	-	uint64	-	-	R	IEEE MAC address
40760	1	LnkCtl	3	bitfield16	-	-	RW	Link control flags, see LnkCtl Bitfield
40761	1	Reserved	-	-	-	-	R	Reserved

3.15.1 Cfg Enumerated

Table 2.15.1 - Cfg Enumerated

Value	Description
0	Static IP address is assigned
1	DHCP Used to acquire IP address

3.15.2 Ctl Enumerated

Table 2.15.2 - Ctl Enumerated

Value	Description
0	Enable DNS
1	Enable NTP

3.15.3 LnkCtl Bitfield

Table 2.15.3 - ModEna Bitfield

Bit	Description
0	Auto-negotiate
1	Full duplex

3.16 Model 16002 – Simple IP Network (Bridge)

Table 2.16 - Model 16002

Address	Size	Name	Value	Type	Units	Scale Factor	R/W	Description
40762	1	ID	16002	uint16	-	-	R	Model number
40763	1	L	52	uint16	-	-	R	Model length
40764	4	Nam	Bridge	string	-	-	R	Interface name
40768	1	Cfg	-	enum16	-	-	R	Force IPv4 configuration method, see Cfg Enumerated
40769	1	Ctl	3	enum16	-	-	R	Bitmask value configuration, see Ctl Enumerated
40770	8	Addr	-	string	-	-	R	IP address
40778	8	Msk	-	string	-	-	R	Netmask
40786	8	Gw	-	string	-	-	R	Gateway IP address
40794	16	Reserved	-	-	-	-	R	Reserved
40810	4	MAC	-	uint64	-	-	R	IEEE MAC address
40814	1	LnkCtl	3	bitfield16	-	-	RW	Link control flags, see LnkCtl Bitfield
40815	1	Reserved	-	-	-	-	R	Reserved

3.16.1 Cfg Enumerated

Table 2.16.1 - Cfg Enumerated

Value	Description
0	Static IP address is assigned
1	DHCP Used to acquire IP address

3.16.2 Ctl Enumerated

Table 2.16.2 - Ctl Enumerated

Value	Description
0	Enable DNS
1	Enable NTP

3.16.3 LnkCtl Bitfield

Table 2.16.3 - ModEna Bitfield

Bit	Description
0	Auto-negotiate
1	Full duplex

3.17 Model 16003 – Simple IP Network (WiFi AP)

Table 2.17 - Model 16003

Address	Size	Name	Value	Type	Units	Scale Factor	R/W	Description
40816	1	ID	16003	uint16	-	-	R	Model number
40817	1	L	52	uint16	-	-	R	Model length
40818	4	Nam	WiFi AP	string	-	-	R	Interface name
40822	1	Cfg	-	enum16	-	-	R	Force IPv4 configuration method, see
40823	1	Ctl	3	enum16	-	-	R	Bitmask value configuration, see
40824	8	Addr	-	string	-	-	R	IP address
40832	8	Msk	-	string	-	-	R	Netmask
40840	8	Gw	-	string	-	-	R	Gateway IP address
40848	16	Reserved	-	-	-	-	R	Reserved
40864	4	MAC	-	uint64	-	-	R	IEEE MAC address
40868	1	LnkCtl	3	bitfield16	-	-	RW	Link control flags
40869	1	Reserved	-	-	-	-	R	Reserved

3.17.1 Cfg Enumerated

Table 2.17.1 - Cfg Enumerated

Value	Description
0	Static IP address is assigned
1	DHCP Used to acquire IP address

3.17.2 Ctl Enumerated

Table 2.17.2 - Ctl Enumerated

Value	Description
0	Enable DNS
1	Enable NTP

3.17.3 LnkCtl Bitfield

Table 2.17.3 - ModEna Bitfield

Bit	Description
0	Auto-negotiate
1	Full duplex

3.18 Model 64190 – Solectria Variables

Table 2.18 - Model 64190

Address	Size	Name	Value	Type	Units	Scale Factor	R/W	Description
40870	1	ID	64190	uint16	-	-	R	Model number
40871	1	L	49	uint16	-	-	R	Model length
40872	1	AFRT	-	uint16	S	AFRT_SF	RW	Abnormal recovery time
40873	1	AFRT_SF	0	sunssf	-	-	R	Scale factor – abnormal recovery time
40874	2	WH	-	float32	Wh	-	R	Today's energy production
40876	16	InvName	-	string	-	-	RW	Inverter name
40892	1	Password	-	string	-	-	W	Password
40893	2	ClrEvt1	-	bitfield32	-	-	W	Clears Evt1 (40110, 40176), see Evt1 Bitfield
40895	2	ClrEvtVnd1	-	bitfield32	-	-	W	Clears EvtVnd1 (40111, 40177), see EvtVnd1 Bitfield
40897	2	ClrEvtVnd2	-	bitfield32	-	-	W	Clears EvtVnd2 (40112, 40178), see EvtVnd2 Bitfield
40899	2	ClrEvtVnd3	-	bitfield32	-	-	W	Clears EvtVnd3 (40113, 40179), see EvtVnd3 Bitfield
40901	2	Reserved	-	-	-	-	R	Reserved
40903	1	LedStat	-	bitfield16	-	-	R	LED status
40904	1	InputZone	-	uint16	-	-	RW	Input zone number configuration
40905	11	Reserved	-	-	-	-	R	Reserved
40916	1	stStrtArcTst	-	enum16	-	-	RW	Arc test start
40917	1	stStrtIRTst	-	enum16	-	-	RW	Insulation resistance test start
40918	1	stStrtIMITst	-	enum16	-	-	RW	Isolation monitor interrupter test start
40919	1	AFRWT	-	uint16	S	AFRWT_SF	RW	Abnormal recovery wait time
40920	1	AFRWT_SF	0	sunssf	-	-	R	Scale factor – abnormal recovery wait time

3.18.1 Evt1 Bitfield

Table 2.18.1 - Evt1 Bitfield

Bit	Description
0	Ground fault
1	DC over voltage
2	AC disconnected
4	Grid shutdown
6	Manual shutdown
7	Over temperature
8	Over frequency
9	Under frequency
10	AC over voltage
11	AC under voltage
14	Memory loss or internal communication error
15	Hardware test failure

3.18.2 EvtVnd1 Bitfield

Table 2.28.2 - Evt1Vnd Bitfield

Bit	Description
1	Software parameter load failure
2	Internal communication 1 failure
3	Internal communication 2 failure
4	Arc fault detected
5	AC contactor failure
6	Over temperature
7	Excessive leakage current
8	Low isolation resistance
9	Internal hardware failure
10	Ground fault detection failure
11	Self-check failure
12	Self-check startup failure

3.18.3 EvtVnd2 Bitfield

Table 2.18.3 - Evt2Vnd Bitfield

Bit	Description
1	Over voltage current
2	Phase lock loop failure
3	Island detected
4	Open phase detected
5	Low frequency 1 (LF1)
6	Low frequency 2 (LF2)
7	High frequency 1 (HF1)
8	High frequency 2 (HF2)
9	Low voltage 1 (LV1)
10	Low voltage 2 (LV2)
11	Low voltage 3 (LV3)
12	High voltage 1 (HV1)
13	High voltage 2 (HV2)
25	Communications system fault
26	Communications 1 fault
27	Communications 2 fault
28	Communications 3 fault
29	Network fault
30	Software Update fault
31	Unauthorized network access fault

3.18.4 EvtVnd3 Bitfield

Table 2.18.4 - Evt3Vnd Bitfield

Bit	Description
1	Power derating – temperature
2	Power derating – customer command

3.18.5 LedStat Bitfield

Table 2.18.5 - LedStat Bitfield

Bit	Description
0	Inverter warning/fault
1	Inverter service
2	Inverter AC power generation
3	Inverter network status
4	System ready

3.18.6 stStrtArcTest Enumerated

Table 2.18.6 - stStrtArcTest Enumerated

Value	Description
0	Off
1	Start
2	Running

3.18.7 stStrtIRTest Enumerated

Table 2.18.6 - stStrtIRTest Enumerated

Value	Description
0	Off
1	Start
2	Running

3.18.8 stStrtIMITest Enumerated

Table 2.18.6 - stStrtIMITest Enumerated

Value	Description
0	Off
1	Start
2	Running