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Configuration Guide

Pixii PowerShaper Modbus Mapping

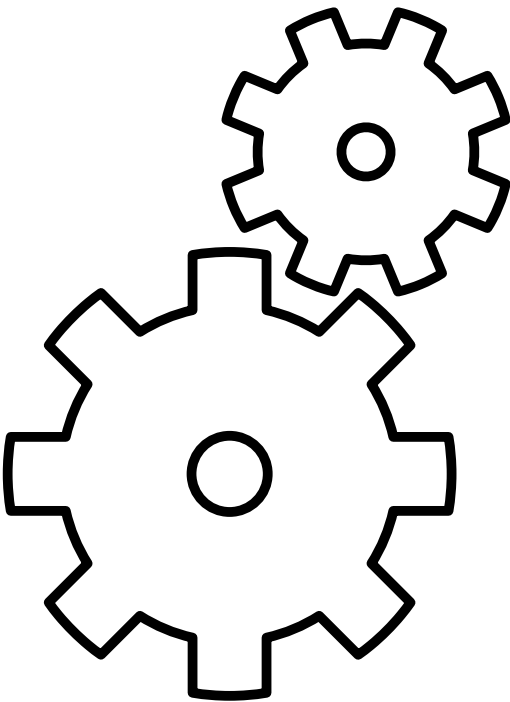


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Revision	Date	Comment
1.6	07.04.2022	Updated <i>"Table 20. 40194 Vendor specific event code"</i>
1.7	06.05.2022	New template
1.8	23.08.2022	Changed name of document. Merged information from "Pixii modbus mapping for control small systems". Updated chapters 1, 2, 4 and 6. Added chapter 5 Register addresses below 40000 (Pixii specific).
1.9	13.12.2022	Chapter 5 Register addresses below 40000 (Pixii specific): Added 39907 and 39908 for reactive power control. Added 39908 Start battery calibration Updated <i>"Table 20. 40194 Vendor specific event code"</i> , <i>"Table 21. Alarm bitfield"</i> , <i>"Table 22. Warning bitfield"</i>
2.0	14.02.2024	For cabinet and plant energy kWh counters: added 39958, 39960, 39962, 39964, and updated 40093. For the new control option not using the handshake counter: added 39930 and 39931. Added 39932 for available energy left to Max Reserved SoC, and 39933 for energy left to Min Reserved SoC. Added <i>"Table 23. Services types"</i> for register 40108 Updated chapter <i>"4.1 Recommended registers for energy/building management systems"</i>
2.1	13.11.2024	Added mapping for multiple services available from gateway revision 2.2., added chapter <i>"5.2 Multiple services"</i>
2.20	02.02.2025	Updated registers and descriptions. Added <i>"5.2.3 30200 range: Off-grid status registers"</i> on page 27 Fixed typo for function in registers 39905, 39906

1 Introduction

This document gives an overview of the SunSpec model that are supported by Pixii and their register addresses. The main purpose of the SunSpec models is for the communication with each cabinet/Gateway.

The document also includes the Pixii proprietary Modbus register definitions which is not covered by the SunSpec model. This was previously described in the “Pixii modbus mapping for control small systems” document.

NOTE:

Please refer to the document *13879_Pixii PowerShaper Modbus Control* for details about the control of single systems, and monitoring and control of multicabinet systems.

NOTE:

When utilizing the Modbus protocol, altering settings through the web interface, or making changes via an App, if the system is under the control of a third party, such as an aggregator, the user acknowledges and agrees that any such use or modification is performed at their own risk. Pixii expressly disclaims all liability for any direct, indirect, incidental, special, consequential, or exemplary damages, including but not limited to, damages for loss of profits, goodwill, use, data or other intangible losses, resulting from the use of the system in this manner. The user shall indemnify and hold harmless Pixii from any claim, demand, loss, liability, or expense arising out of or in connection with the use of the Modbus protocol, changes made via the web UI, or settings adjusted through the App under third-party control.

NOTE:

When using the Modbus protocol, Web UI, App or other means to alter and use the system, the user agrees to the terms and conditions outlined in *13947_Pixii PowerShaper End User License Agreement*.

1.1 Trademarks

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SunSpec® is a registered trademark of SunSpec Alliance, Inc.

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2 Modbus Details

The Pixii PowerShaper system bases its Modbus protocol from address 40000 and up on the SunSpec information model. The specification can be downloaded from https://sunspec.org/interoperability-specifications/?fw_spec_type=spec.

The addresses below 40000 are Pixii specific.

Please note that the values in the “Address” column are the addresses that are sent on the wire.

Both Modbus TCP and Modbus RTU over RS485 is supported.

Modbus TCP communicates over port 502 (not possible to change).

The default parameters for RS485 are:

- Address: 1
- Baud rate: 115200
- Data bits: 8
- Parity: none
- Stop bit: 1

The implemented SunSpec models are:

- Model 1 (Common)
- Model 103 (Inverter)
- Model 802 (Battery Base models)
- Model 2 (Basic Aggregator, for Client type system status)
- Model 501 (Solar Module)
- Model 201, 203 or 204 (AC meter) dependent on the actual meter the system receive values from

The function code supported is “Read Holding Registers 0x03” where not specified otherwise.

The values are stored in big-endian order to be compliant with the Modbus specification.

Please note that the registers 40000 – 40184 are for single cabinets only. The values of 40185 – 40199 depends on the multicabinet role of the system. Use the registers in 399xx instead for multicabinet systems.

NOTE:

Please note that the registers 40000 – 40184 are for single cabinets only. The values of 40185 – 40199 depends on the multicabinet role of the system. Use the registers in 399xx instead for multicabinet systems.

3 SunSpec Main Features

The SunSpec protocol provides a flexible and expandable way of providing values and information via Modbus.

The values are normally in integer format with a signed scale factor applied. A negative scale factor explicitly shifts the decimal point to the left, and a positive scale factor shifts the decimal point to the right by the number of places specified in the scale factor value.

The scale factor naming is normally the “Name” + “_SF” appended

NOTE:

Please note that the scale factors need to be read simultaneously with the actual value, since the scaling is dynamic to get the optimal resolution.

4 Register Addresses

NOTE:

Note that if the “In use” cell states “N”, the value is not implemented. Please also note that in some cases, registers are mandatory due to SunSpec and are stated as “Y”, however will only respond with a fixed value.

NOTE:

Also please note that the values in the “Address” column are the addresses that are sent on the wire.

Address	No of words	Name	In use	Type	Comment
40000	2		Y	uint32	SunSpec identifier ('SunS', 0x53756E53)
		Common model			
40002	1	Id	Y	uint16	Common object identifier (1)
40003	1	Len	Y	uint16	Common object length (65)
40004	16	Mn	Y	string	Manufacturer
40020	16	Md	Y	string	Model
40036	8	Opt	Y	string	Options
40044	8	Vr	Y	string	Version
40052	16	SN	Y	string	Serial number
40068	1	DA	Y	uint16	Modbus device address
		Inverter model			Inverter values
40069	1	Id	Y	uint16	Inverter object identifier (103)
40070	1	Len	Y	uint16	Inverter object length (50)
40071	1	A	Y	int16	AC current
40072	1	AphA	Y	int16	AC phase A current. Read scale factor in reg 40075.
40073	1	AphB	Y	int16	AC phase B current. Read scale factor in reg 40075.
40074	1	AphC	Y	int16	AC phase C current. Read scale factor in reg 40075.
40075	1	A_SF	Y	int16	Scale factor for AC currents.
40076	1	PPVphAB	N	uint16	AC phase voltage AB
40077	1	PPVphBC	N	uint16	AC phase voltage BC
40078	1	PPVphCA	N	uint16	AC phase voltage CA
40079	1	PhVphA	Y	uint16	AC phase voltage AN. Read scale factor in reg 40082.
40080	1	PhVphB	Y	uint16	AC phase voltage BN. Read scale factor in reg 40082.
40081	1	PhVphC	Y	uint16	AC phase voltage CN. Read scale factor in reg 40082.
40082	1	V_SF	Y	int16	Scale factor for AC voltages.
40083	1	W	Y	int16	AC power in W. Load reference frame (positive is charging the battery). Read scale factor in reg 40084.
40084	1	W_SF	Y	int16	Scale factor for AC power.
40085	1	Hz	Y	uint16	AC line frequency. Read scale factor in reg 40086.
40086	1	Hz_SF	Y	int16	Scale factor for AC frequency
40087	1	VA	Y	int16	AC apparent power. Read scale factor in reg 40088.

40088	1	VA_SF	Y	int16	Scale factor for AC apparent power
40089	1	VAr	N	int16	AC reactive power
40090	1	VAr_SF	N	int16	Scale factor for AC reactive power
40091	1	PF	N	int16	AC power factor
40092	1	PF_SF	N	int16	Scale factor for AC power factor
40093	2	WH	Y	uint32	AC energy. Read scale factor in reg 40095. Energy import - export. Number goes down if net output, up if net input.
40095	1	WH_SF	Y	int16	Scale factor for AC energy
40096	1	DCA	Y	int16	DC current. Read scale factor in reg 40097.
40097	1	DCA_SF	Y	int16	Scale factor for DC current
40098	1	DCV	Y	uint16	DC voltage. Read scale factor in reg 40099.
40099	1	DCV_SF	Y	int16	Scale factor for DC voltage
40100	1	DCW	Y	int16	DC power. Read scale factor in reg 40101.
40101	1	DCW_SF	Y	int16	Scale factor for DC power
40102	1	TmpCab	Y	int16	Converter input air temperature. Read scale factor in reg 40106.
40103	1	TmpSnk	N	int16	Heat sink temperature
40104	1	TmpTrns	Y	int16	Converter output air temperature. Read scale factor in reg 40106.
40105	1	TmpOt	N	int16	Other temperature
40106	1	Tmp_SF	Y	int16	Scale factor for temperatures
40107	1	St	Y	enum16	Operating state. See “Table 15. 40107 St. Operating state”
40108	1	StVnd	N	enum16	Vendor defined operating state. See “Table 23. Services types”
40109	2	Evt1	Y	bitfield32	Event fields – See SunSpec Model 103, bitfield Evt1. Will be expanded.
40111	2	Evt2	Y	bitfield32	Event fields. Reserved for future use and will be expanded.
40113	2	EvtVnd1	N	bitfield32	Vendor defined events
40115	2	EvtVnd2	N	bitfield32	Vendor defined events
40117	2	EvtVnd3	N	bitfield32	Vendor defined events
40119	2	EvtVnd4	N	bitfield32	Vendor defined events
		Battery model			Values from battery BMS
40121	1	Id	Y	uint16	Battery object identifier (802)
40122	1	Len	Y	uint16	Battery object length (62)
40123	1	AHRtg	Y	uint16	Charge capacity, DC AH. Read scale factor in reg 40173.
40124	1	WHRtg	Y	uint16	Energy capacity, DC WH. Read scale factor in reg 40174.
40125	1	WChaRteMax	Y	uint16	Maximum charge rate, DC W. Read scale factor in reg 40175.
40126	1	WDisChaRteMax	Y	uint16	Maximum discharge rate, DC W. Read scale factor in reg 40175.
40127	1	DisChaRte	N	uint16	Self-discharge rate, % of WHRtg per day
40128	1	SoCMax	Y	uint16	Maximum state of charge. Read scale factor in reg 40177.

40129	1	SoCMin	Y	uint16	Minimum state of charge. Read scale factor in reg 40177.
40130	1	SoCRsvMax	Y	uint16	Maximum reserved state of charge. Read scale factor in reg 40177.
40131	1	SoCRsvMin	Y	uint16	Minimum reserved state of charge. Read scale factor in reg 40177.
40132	1	SoC	Y	uint16	State of charge in %. Read scale factor in reg 40177.
40133	1	DoD	N	uint16	Depth of discharge in %
40134	1	SoH	Y	uint16	State of health in %. Read scale factor in reg 40179.
40135	2	NCyc	N	uint32	Number of cycles
40137	1	ChaSt	N	enum16	Charge status
40138	1	LocRemCtl	Y	enum16	Battery control mode. Has no effect, always 0.
40139	1	Hb	Y	uint16	Heartbeat
40140	1	CtrlHb	Y	uint16	Heartbeat
40141	1	AlmRst	Y	uint16	Reset of alarms. Always responds 0.
40142	1	Typ	Y	enum16	Type of battery
40143	1	State	Y	enum16	State. See “Table 16. 40143 Battery state”
40144	1	StateVnd	N	enum16	Vendor specific state
40145	2	WarrDt	N	uint32	Date of warranty expiration
40147	2	Evt1	Y	bitfield32	Alarms and warnings. See “Table 17. 40147 Evt1. Battery alarms and warnings”
40149	2	Evt2	Y	bitfield32	Alarms and warnings.
40151	2	EvtVnd1	Y	bitfield32	Vendor defined events. Reserved for future use and will be expanded.
40153	2	EvtVnd2	Y	bitfield32	Vendor defined events. Reserved for future use and will be expanded.
40155	1	V	Y	uint16	DC bus voltage. Read scale factor in reg 40180.
40156	1	VMax	N	uint16	Instantaneous maximum DC voltage
40157	1	VMin	N	uint16	Instantaneous minimum DC voltage
40158	1	CellVMax	N	uint16	Maximum DC cell voltage
40159	1	CellVMaxStr	N	uint16	Battery string with maximum DC cell voltage
40160	1	CellVMaxMod	N	uint16	Battery module with maximum DC cell voltage
40161	1	CellVMin	N	uint16	Minimum DC cell voltage
40162	1	CellVMinStr	N	uint16	Battery string with minimum DC cell voltage
40163	1	CellVMinMod	N	uint16	Battery module with minimum DC cell voltage
40164	1	CellVAvg	N	uint16	Average DC cell voltage
40165	1	A	Y	int16	Total DC current. Read scale factor in reg 40182.
40166	1	AChaMax	Y	uint16	Instantaneous maximum DC charge current. Read scale factor in reg 40183.
40167	1	ADisChaMax	Y	uint16	Instantaneous maximum DC discharge current. Read scale factor in reg 40183.

40168	1	W	Y	int16	Total battery DC power. Read scale factor in reg 40184.
40169	1	ReqInvState	N	enum16	Request from battery to start / stop inverter
40170	1	ReqW	N	int16	AC power requested by battery
40171	1	SetOp	Y	enum16	Set operation. Has no effect, always 0.
40172	1	SetInvState	Y	enum16	Set inverter state
40173	1	AHRtg_SF	Y	int16	Scale factor for charge capacity
40174	1	WHRtg_SF	Y	int16	Scale factor for energy capacity
40175	1	WChaDisChaMax_SF	Y	int16	Scale factor for maximum charge / discharge rate
40176	1	DisChaRte_SF	Y	int16	Scale factor for self-discharge rate
40177	1	SoC_SF	Y	int16	Scale factor for state of charge
40178	1	DoD_SF	N	int16	Scale factor for depth of discharge
40179	1	SoH_SF	Y	int16	Scale factor for state of health
40180	1	V_SF	Y	int16	Scale factor for DC bus voltage
40181	1	CellV_SF	Y	int16	Scale factor for DC cell voltage
40182	1	A_SF	Y	int16	Scale factor for DC current
40183	1	AMax_SF	Y	int16	Scale factor for instantaneous DC charge/discharge current
40184	1	W_SF	Y	int16	Scale factor for power request
Basic aggregator					
40185	1	Id	Y	uint16	Basic Aggregator object identifier (2).
40186	1	Len	Y	uint16	Basic Aggregator object length (14).
40187	1	AID	Y	uint16	Aggregated model identity.
40188	1	N	Y	uint16	Number of aggregated models.
40189	1	UN	Y	uint16	Update number. Incremented each time mapping is changed.
40190	1	St	Y	enum16	Enumerated status code. See “Table 18. 40190 Basic Aggregator State”
40191	1	StVnd	Y	enum16	Vendor specific status code. See “Table 19. 40191 Vendor specific status code”
40192	2	Evt	Y	bitfield32	Bitmask event code.
40194	2	EvtVnd	Y	bitfield32	Vendor specific event code. See “Table 20. 40194 Vendor specific event code”
40196	1	Ctl	N	enum16	Control register for all aggregated devices.
40197	2	CtlVnd	N	enum32	Vendor control register for all aggregated devices.
40199	2	CtlVI	N	enum32	Numerical value used as a parameter to the control.
Solar Module					
40201	1	ID	Y	uint16	Model identifier (501)
40202	1	L	Y	uint16	Model length
40203	1	Stat	Y	enum16	Enumerated value. Module Status Code
40204	1	StatVend		enum16	Module Vendor Status Code
40205	2	Evt	Y	bitfield32	Bitmask value. Module Event Flags
40207	2	EvtVend		bitfield32	Vendor specific flags
40209	1	Ctl		enum16	Module Control
40210	2	CtlVend		enum16	Vendor Module Control

40212	2	CtlVal		int32	Module Control Value
40214	2	Tms		uint32	Timestamp. Time in seconds since 2000 epoch
40216	2	OutA		float32	Output Current – A
40218	2	OutV		float32	Output Voltage – V
40220	2	OutWh		float32	Output Energy – Wh
40222	2	OutW		float32	Output Power – W
40224	2	Tmp		float32	Module Temperature – C
40226	2	InA		float32	Input Current – A
40228	2	InV		float32	Input Voltage – V
40230	2	InWh		float32	Input Energy – Wh
40232	2	InW		float32	Input Power - W
		AC Meter			
40234	1	ID		uint16	Model ID (201, 202, 203) depending on the meter the values are coming from.
40235	1	L		uint16	Model Length
40236	1	A		int16	Amps. Read scale factor in reg 40240.
40237	1	AphA		int16	Amps PhaseA. Read scale factor in reg 40240.
40238	1	AphB		int16	Amps PhaseB. Read scale factor in reg 40240.
40239	1	AphC		int16	Amps PhaseC. Read scale factor in reg 40240.
40240	1	A_SF		sunssf	Current scale factor
40241	1	PhV		int16	Voltage LN. Read scale factor in reg 40249.
40242	1	PhVphA		int16	Phase Voltage AN. Read scale factor in reg 40249.
40243	1	PhVphB		int16	Phase Voltage BN. Read scale factor in reg 40249.
40244	1	PhVphC		int16	Phase Voltage CN. Read scale factor in reg 40249.
40245	1	PPV		int16	Voltage LL. Read scale factor in reg 40249.
40246	1	PPVphAB		int16	Phase Voltage AB. Read scale factor in reg 40249.
40247	1	PPVphBC		int16	Phase Voltage BC. Read scale factor in reg 40249.
40248	1	PPVphCA		int16	Phase Voltage CA. Read scale factor in reg 40249.
40249	1	V_SF		sunssf	Voltage scale factor
40250	1	Hz		int16	Hz. Read scale factor in reg 40251.
40251	1	Hz_SF		sunssf	Frequency scale factor
40252	1	W		int16	Watts. Read scale factor in reg 40256.
40253	1	WphA		int16	Watts phase A. Read scale factor in reg 40256.
40254	1	WphB		int16	Watts phase B. Read scale factor in reg 40256.
40255	1	WphC		int16	Watts phase C. Read scale factor in reg 40256.
40256	1	W_SF		sunssf	Real Power scale factor
40257	1	VA		int16	VA. Read scale factor in reg 40261.

40258	1	VAphA		int16	VA phase A. Read scale factor in reg 40261.
40259	1	VAphB		int16	VA phase B. Read scale factor in reg 40261.
40260	1	VAphC		int16	VA phase C. Read scale factor in reg 40261.
40261	1	VA_SF		sunssf	Apparent Power scale factor
40262	1	VAR		int16	VAR. Read scale factor in reg 40266.
40263	1	VARphA		int16	VAR phase A. Read scale factor in reg 40266.
40264	1	VARphB		int16	VAR phase B. Read scale factor in reg 40266.
40265	1	VARphC		int16	VAR phase C. Read scale factor in reg 40266.
40266	1	VAR_SF		sunssf	Reactive Power scale factor
40267	1	PF		int16	PF. Read scale factor in reg 40271.
40268	1	PFphA		int16	PF phase A. Read scale factor in reg 40271.
40269	1	PFphB		int16	PF phase B. Read scale factor in reg 40271.
40270	1	PFphC		int16	PF phase C. Read scale factor in reg 40271.
40271	1	PF_SF		sunssf	Power Factor scale factor
40272	2	TotWhExp		acc32	Total Watt-hours Exported. Read scale factor in reg 40288.
40274	2	TotWhExpPhA		acc32	Total Watt-hours Exported phase A. Read scale factor in reg 40288.
40276	2	TotWhExpPhB		acc32	Total Watt-hours Exported phase B. Read scale factor in reg 40288.
40278	2	TotWhExpPhC		acc32	Total Watt-hours Exported phase C. Read scale factor in reg 40288.
40280	2	TotWhImp		acc32	Total Watt-hours Imported. Read scale factor in reg 40288.
40282	2	TotWhImpPhA		acc32	Total Watt-hours Imported phase A. Read scale factor in reg 40288.
40284	2	TotWhImpPhB		acc32	Total Watt-hours Imported phase B. Read scale factor in reg 40288.
40286	2	TotWhImpPhC		acc32	Total Watt-hours Imported phase C. Read scale factor in reg 40288.
40288	1	TotWh_SF		sunssf	Real Energy scale factor
40289	2	TotVAhExp		acc32	Total VA-hours Exported. Read scale factor in reg 40305.
40291	2	TotVAhExp		acc32	Total VA-hours Exported phase A. Read scale factor in reg 40305.
40293	2	TotVAhExpPhB		acc32	Total VA-hours Exported phase B. Read scale factor in reg 40305.
40295	2	TotVAhExpPhC		acc32	Total VA-hours Exported phase C. Read scale factor in reg 40305.
40297	2	TotVAhImp		acc32	Total VA-hours Imported. Read scale factor in reg 40305.
40299	2	TotVAhImpPhA		acc32	Total VA-hours Imported phase A. Read scale factor in reg 40305.
40301	2	TotVAhImpPhB		acc32	Total VA-hours Imported phase B. Read scale factor in reg 40305.

40303	2	TotVAhImpPhC		acc32	Total VA-hours Imported phase C. Read scale factor in reg 40305.
40305	1	TotVAh_SF		sunssf	Apparent Energy scale factor
40306	2	TotVArhImpQ1		acc32	Total VAR-hours Imported Q1. Read scale factor in reg 40338.
40308	2	TotVArhImpQ1PhA		acc32	Total VAr-hours Imported Q1 phase A. Read scale factor in reg 40338.
40310	2	TotVArhImpQ1PhB		acc32	Total VAr-hours Imported Q1 phase B. Read scale factor in reg 40338.
40312	2	TotVArhImpQ1PhC		acc32	Total VAr-hours Imported Q1 phase C. Read scale factor in reg 40338.
40314	2	TotVArhImpQ2		acc32	Total VAr-hours Imported Q2. Read scale factor in reg 40338.
40316	2	TotVArhImpQ2PhA		acc32	Total VAr-hours Imported Q2 phase A. Read scale factor in reg 40338.
40318	2	TotVArhImpQ2PhB		acc32	Total VAr-hours Imported Q2 phase B. Read scale factor in reg 40338.
40320	2	TotVArhImpQ2PhC		acc32	Total VAr-hours Imported Q2 phase C. Read scale factor in reg 40338.
40322	2	TotVArhExpQ3		acc32	Total VAr-hours Exported Q3. Read scale factor in reg 40338.
40324	2	TotVArhExpQ3PhA		acc32	Total VAr-hours Exported Q3 phase A. Read scale factor in reg 40338.
40326	2	TotVArhExpQ3PhB		acc32	Total VAr-hours Exported Q3 phase B. Read scale factor in reg 40338.
40328	2	TotVArhExpQ3PhC		acc32	Total VAr-hours Exported Q3 phase C. Read scale factor in reg 40338.
40330	2	TotVArhExpQ4		acc32	Total VAr-hours Exported Q4. Read scale factor in reg 40338.
40332	2	TotVArhExpQ4PhA		acc32	Total VAr-hours Exported Q4 Imported phase A. Read scale factor in reg 40338.
40334	2	TotVArhExpQ4PhB		acc32	Total VAr-hours Exported Q4 Imported phase B. Read scale factor in reg 40338.
40336	2	TotVArhExpQ4PhC		acc32	Total VAr-hours Exported Q4 Imported phase C. Read scale factor in reg 40338.
40338	1	TotVArh_SF		sunssf	Reactive Energy scale factor
40339	2	Evt		bitfield32	Events

Table 1. Register addresses

4.1 Recommended registers for energy/building management systems

The following registers are recommended for use in energy and building management systems (per cabinet).

Address	No of words	Name	In use	Type	Comment
40083	1	W	Y	int16	AC power in W. Load reference frame (positive is charging the battery). Read scale factor in reg 40084.
40084	1	W_SF	Y	int16	Scale factor for AC power
40109	2	Evt1	Y	bitfield32	Event fields – See SunSpec Model 103, bitfield Evt1. Will be expanded.
40132	1	SoC	Y	uint16	State of charge in %. Read scale factor in reg 40177.
40147	2	Evt1	Y	bitfield32	Alarms and warnings. See “Table 17. 40147 Evt1. Battery alarms and warnings”
40177	1	SoC_SF	Y	int16	Scale factor for state of charge
40191	1	StVnd	Y	enum16	Vendor specific status code. See “Table 19. 40191 Vendor specific status code”
40194	2	EvtVnd	Y	bitfield32	Vendor specific event code. See “Table 20. 40194 Vendor specific event code”
39905	2	Power regulation set-point (MSB)	Y	int32	Reference in W. Generator reference frame
39906		Power regulation set-point (LSB)	Y		
39903	1	Handshake counter	Y	uint16	Value needs to be changed at least once per 60 seconds; else the system will go into idle mode.

Table 2. Registers for use in energy and building management systems (per cabinet).

The following registers are recommended for energy and building management systems (for a plant/multicabinet system via a master Gateway).

Address	No of words	Name	Type	Comment
39800	1	Plant system status	uint16	Only available for multi-cabinet systems. See “Table 19. 40191 Vendor specific status code” for information.
39920	2	Alarms	uint32	One or more parts of the system needs attention. See “Table 21. Alarm bitfield” for contents. Only available for master in multi-cabinet systems, shows plant status/warnings/alarms
39922	2	Warnings	uint32	The system operates, but with limitations imposed by, e.g., grid or battery BMS. See “Table 22. Warning bitfield” for contents. Only available for master in multi-cabinet systems, shows plant status/warnings/alarms
39904	1	Power regulation set-point	int16	Power reference in kW. Generator reference frame.
39912	1	Actual power regulation	int16	kW. Generator reference frame.
39954	2	System available power (MSB)	uint32	The available power of the system (W). This is a higher resolution version of 39913 (kW)
39955		System available power (LSB)		
39903	1	Handshake counter	uint16	Value needs to be changed at least once per 60 seconds; else the system will go into idle mode.
39915	1	Average battery SoC	uint16	The average SoC (gross) across all battery cabinets.
39916	1	Battery minimum SoC safety limit	uint16	The minimum SoC (gross), regulation will stop (based on battery manufacturer specification and guaranty requirements).
39917	1	Battery maximum SoC safety limit	uint16	The maximum SoC (gross), regulation will stop (based on battery manufacturer specification and guaranty requirements).
39914	1	System available energy	uint16	The total gross battery energy (kWh)

Table 3. Registers for energy and building management systems (for a plant/multicabinet system via a master Gateway).

5 Register Addresses below 40000 (Pixii specific)

The register addresses below 40000 are used for controlling the PowerShaper system, and provide access to multicabinet features (i.e., aggregated data in a system consisting of several PowerShaper cabinets) via the master or master/client.

NOTE:

Please note that these addresses do not follow the SunSpec model.

NOTE:

Also please note that the values in the “Address” column are the addresses sent on the wire.

The write values for the handshake counter and power regulation setpoints are stored in volatile memory, so they can and should safely be written to often even if there are no changes in the reference.

5.1 Demand Response / Power Control Service Mapping

This chapter contains the mapping supporting the Demand Response / Power Control services. The registers 39800 – 39896 is valid for all types of regulations and may be used for other regulation than Demand Response/ Power Control.

Address	No of words	Name	Type	Min	Max	Unit	Modbus command	Comment
39800	1	Plant system status	uint16	—	—	—	0x01, 0x03	Only available for multi-cabinet systems. See “Table 19. 40191 Vendor specific status code” for information.
39801	1	System status for cabinet 1	uint16	—	—	—	0x01, 0x03	Available for all systems. See “Table 19. 40191 Vendor specific status code” for information.
39802 - 39832	1	System status for cabinet 2 - 32	uint16	—	—	—	0x01, 0x03	Only available for multi-cabinet systems for present cabinets. See “Table 19. 40191 Vendor specific status code” for information.
39833	1	Extended status for cabinet 1	uint16	—	—	—	0x01, 0x03	Available for all systems. Please refer to Pixii PowerShaper Alarms and Diagnostics, 2.1.2 Extended status. Only shows 16 bits, value below 10000.
39834 - 39864	1	Extended status for cabinet 2 - 32	uint16	—	—	—	0x01, 0x03	Only available for multi-cabinet systems for present cabinets. Please refer to Pixii PowerShaper Alarms and Diagnostics, 2.1.2 Extended status. Only shows 16 bits, value below 10000.

39865	1	System events for cabinet 1	uint16	—	—	—	0x01, 0x03	Available for all systems. See “Table 24. System events” for contents. Note! Only the first 16 bits are used to conserve space. They will contain the most important events.
39866 - 39896	1	System events for cabinet 2 - 32	uint16	—	—	—	0x01, 0x03	Only available for multi-cabinet systems for present cabinets. See “Table 24. System events” for contents. Note! Only the first 16 bits are used to conserve space. They will contain the most important events.
39897 - 39899	1	Not used						
39900	1	Ready for regulation	bool	—	—	—	0x01, 0x03	Not applicable in standard systems
39901	1	Start regulation	bool	0	1	—	0x05, 0x06	Not applicable in standard systems
39902	1	Reset alarm	bool	0	1	—	0x05, 0x06	Not applicable in standard systems, do not use.
39903	1	Handshake counter	uint16	0	100	counts	0x03, 0x06	Value needs to be changed at least once pr 60 seconds, else the system will go into idle mode.
39904	1	Power regulation set-point	int16	-1000	1000	kW	0x06	Generator reference frame.
39905	2	Power regulation set-point (MSB)	int32	-1000000	1000000	W	0x03, 0x10	Generator reference frame.
39906		Power regulation set-point (LSB)						
39907	1	Enable reactive power	bool	0	1	—	0x05, 0x06	“Power control” service needs to be enabled
39908	1	Set reactive power	int16	-100	100	%	0x06	% of Smax or Qmax depending on reactive power mode
39909	1	Start battery calibration	bool	0	1	-	0x01, 0x03,	Start battery calibration
39910	1	Ready for regulation	bool	0	1	—	0x01, 0x03	Not applicable in standard systems
39911	1	Regulation started	bool	0	1	—	0x01, 0x03	Not applicable in standard systems

39912	1	Actual power regulation	int16	-1000	1000	kW	0x03	Generator reference frame.
39913	1	System available power	uint16	0	1000	kW	0x03	The absolute value of the available converter power.
39914	1	System available energy	uint16	0	1000	kWh	0x03	The total gross battery energy.
39915	1	Average battery SoC	uint16	0	1000	‰ (% , 1 decimal)	0x03	The average SoC (gross) across all battery cabinets.
39916	1	Battery minimum SoC safety limit	uint16	0	1000	‰ (% , 1 decimal)	0x03	The minimum SoC (gross), regulation will stop (based on battery manufacturer specification and guaranty requirements).
39917	1	Battery maximum SoC safety limit	uint16	0	1000	‰ (% , 1 decimal)	0x03	The maximum SoC (gross), regulation will stop (based on battery manufacturer specification and guaranty requirements).
39918	1	Average battery SoH	uint16	0	1000	‰ (% , 1 decimal)	0x03	The average SoH (gross) across all battery cabinets.
39919	1	not used						
39920	2	Alarms	uint32	—	—	—	0x03	One or more parts of the system needs attention. See “<i>Table 21. Alarm bitfield</i>” for contents. For a master cabinet it complies with the full table. For a client cabinet it will have these bits: - bit 0: battery alarm, - bit 1: converter alarm. No other bits are set for client cabinets.

39922	2	Warnings	uint32	—	—	—	0x03	The system is operating, but with limitations imposed by e.g. grid or battery BMS. See “Table 22. Warning bitfield” for contents. For a master cabinet it complies with all the bitfields in the table. For a client cabinet it will have these bits: - bit 0: SoC min. warning, - bit 1: SoC max. warning. - bit 2: current lim. battery max. warning - bit 3: power lim. warning. - bit 4: Converter derated or act_inj warning. - bit 5: Converters Unavailable warning. - bit 6: grid code trip warning. - bit 7: not set.
...								
39930	1	Control power activate	uint16	0	1	—	0x01, 0x03, 0x05, 0x06	0 = OK — normal operation of regulation. 1 = not OK — regulation will stop, and idle handling will start.
39931	1	Communication status	uint16	0	1	—	0x01, 0x03, 0x05, 0x06	0 = Remote communication is not working; regulation will stop and use idle handling. Fallback solution will be initiated. 1 = Remote communication is OK, normal operation of regulation.
39932	1	Remaining charging energy	uint16	0	1000	kWh	0x03	SoH x (Max Reserved SoC - SoC) x nominal battery energy

39933	1	Remaining discharging energy	uint16	0	1000	kWh	0x03	SoH x (SoC - Min Reserved SoC) x nominal battery energy
...								
39952	2	Actual power regulation (MSB)	int32	-1000000	1000000	W	0x03	The actual power output (W). This is a higher resolution version of 39912 (kW)
39953		Actual power regulation (LSB)						
39954	2	System available power (MSB)	uint32	0	1000000	W	0x03	The system available power (W). This is a higher resolution version of 39913 (kW)
39955		System available power (LSB)						
39956	2	System available energy (MSB)	uint32	0	1000	kWh	0x03	The total estimated gross battery energy (kWh). This is the 32-bit version of 39914
39957		System available energy (LSB)						
39958	2	Cabinet energy imported (MSB)	int32			kWh	0x03	The cabinet imported energy (charge). Positive value, always increasing
39959		Cabinet energy imported (LSB)						
39960	2	Cabinet energy exported (MSB)	int32			kWh	0x03	The cabinet exported energy (discharge). Negative value, always decreasing
39961		Cabinet energy exported (LSB)						
39962	2	Plant energy imported (MSB)	int32			kWh	0x03	The plant imported energy (charge). Positive value, always increasing. Only for master cabinets.
39963		Plant energy imported (LSB)						

39964	2	Plant energy exported (MSB)	int32			kWh	0x03	The plant exported energy (discharge). Negative value, always decreasing. Only for master cabinets.
39965		Plant energy exported (LSB)						

Table 4. Pixii specific register addresses

NOTE:

Note regarding use of 39904 and 39905+06:

If the Modbus control option is set to 'use start regulation' or 'simple' (using the handshake counter 39903), the following actions are performed:

The algorithm will use the last received value if the handshake counter is updated at least once per minute. If the handshake counter resumes after the system entered idle mode, it will revert to the most recent value. Consequently, before initiating the handshake counter and when ending power regulation with these registers, it is crucial to set the power reference register to 0.

Also note that if the value in the setpoint registers is not changed, the reference value remain unchanged.

If the Modbus control option is set to 'use start regulation', the last received value in 39904 is used. When the Modbus control option is set to 'simple', the last received value in either 39904 or 39905+06 is used.

Further, it is vital that the 39905 + 39906 are written to atomically.

Example: if setting 39904 to 1, the system will discharge 1000 W. If then setting 39905 and 39906 to 65535,65436, the system will charge with 100 W. If then 1 is written to 39904 and the handshake is running, the system will keep using the values in 39905 + 39906 and charge with 100 W. If setting a different value in 39904, e.g. 2, the system will start discharging with 2 kW.

If the Modbus control option is set to "use control power activate", the last received value in 39904 is used as long as both 39930 and 39931 are set to 1.

NOTE:

When all services except "Multiple services" (explained below) are used, writing to 30xxx registers does not work. Reading values work.

5.2 Multiple services

This chapter contains the Modbus mapping that supports starting, stopping and setting runtime parameters for more services than just Demand Response and Power Control. These include:

- Fixed and adaptive peak shaving
- Target SoC
- Battery SoC calibration
- Voltage Support
- Frequency services

To enable these features, the “Multicabinet regulation type” needs to be set to “Multiple services”. That is done in the web menu under Communication > Modbus.

Further, reading of values and statuses have been organized in the 30000 and 30100 ranges.

NOTE:

When multiple services are used, writing to 39xxx registers does not work. Reading values work.

5.2.1 30000 range: System type values

Address	No of words	Name	Type	Min	Max	Unit	Modbus command	Comment
30000	1	Ready for regulation	uint16	0	1	-	3 & 4	
30001	1	Currently running service	uint16	0		-	3 & 4	See “Table 11. Running service”
30002	1	Status for currently running service	uint16	0		-	3 & 4	See “Table 13. Running service status”
30003	2	Remaining duration of running service	int32	-1	--	s	3 & 4	Remaining seconds until service ends because duration exceeds. ‘-1’ means that remaining duration is not calculated and service must be stopped by command.
30005	1	Number of converters	uint16	0	-	-		The total number of converters. Available in 2.3.33 and later versions.
			uint16	0	-	-	3 & 4	The number of converters not in alarm or otherwise disabled. Available in 2.3.33 and later versions.
30009	1	Erroneous input value for setting service	uint16	0	31062	-	3 & 4	Address of the erroneous input value. 0 = no error.
30010	2	AC voltage, phase A	float	0		V	3 & 4	
30012	2	AC voltage, phase B	float	0		V	3 & 4	
30014	2	AC voltage, phase C	float	0		V	3 & 4	

30016	2	AC current, phase A	float			A	3 & 4	Generator reference.
30018	2	AC current, phase B	float			A	3 & 4	Generator reference.
30020	2	AC current, phase C	float			A	3 & 4	Generator reference.
30022	2	AC current, total	float			A	3 & 4	Generator reference.
30024	2	AC active power, phase A	float			kW	3 & 4	Generator reference.
30026	2	AC active power, phase B	float			kW	3 & 4	Generator reference.
30028	2	AC active power, phase C	float			kW	3 & 4	Generator reference.
30030	2	AC active power, total	float			kW	3 & 4	Generator reference.
30032	2	AC reactive power, phase A	float			kVAr	3 & 4	Only available when meter connected
30034	2	AC reactive power, phase B	float			kVAr	3 & 4	Only available when meter connected
30036	2	AC reactive power, phase C	float			kVAr	3 & 4	Only available when meter connected
30038	2	AC reactive power, total	float			kVAr	3 & 4	Only available when meter connected
30040	2	AC apparent power, phase A	float			kVA	3 & 4	
30042	2	AC apparent power, phase B	float			kVA	3 & 4	
30044	2	AC apparent power, phase C	float			kVA	3 & 4	
30046	2	AC apparent power, total	float			kVA	3 & 4	
30048	2	AC frequency	float	0	70	Hz	3 & 4	
30050	2	AC energy, imported	float	0		kWh	3 & 4	Accumulated imported AC energy
30052	2	AC energy, exported	float	0			3 & 4	Accumulated imported AC energy
30054	2	DC voltage	float	0		V	3 & 4	
30056	2	DC current	float			A	3 & 4	Generator reference.
30058	2	DC power	float			kW	3 & 4	Generator reference.
30060	2	Battery state of charge, minimum	float	0	100	%	3 & 4	Minimum SoC measured in a battery.
30062	2	Battery state of charge, maximum	float	0	100	%	3 & 4	Maximum SoC measured in a battery.
30064	2	Battery state of charge, average	float	0	100	%	3 & 4	Average SoC measured among all batteries.
30066	2	Battery state of health, minimum	float	0	100	%	3 & 4	Minimum SoH measured in a battery.

30068	2	Battery state of health, maximum	float	0	100	%	3 & 4	Maximum SoH measured in a battery.
30070	2	Battery state of health, average	float	0	100	%	3 & 4	Average SoH measured among all batteries.
30072	2	System power, total nominal	float	0		kW	3 & 4	
30074	2	System power, maximum available	float	0		kW	3 & 4	
30076	2	System power, available for charging	float	0		kW	3 & 4	
30078	2	System power, available for discharging	float	0		kW	3 & 4	
30080	2	System energy, total nominal	float	0		kWh	3 & 4	
30082	2	System energy, maximum available	float	0		kWh	3 & 4	
30084	2	System energy, available for charging	float	0		kWh	3 & 4	
30086	2	System energy, available for discharging	float	0		kWh	3 & 4	

Table 5. 30000 range: System type values

5.2.2 30100 range: Client cabinet type values

The following registers are only relevant for client type of cabinets.

Address	No of words	Name	Type	Min	Max	Unit	Modbus command	Comment
30100	1	Number of PV connected modules	uint16	0	-	-	3 & 4	
30101	1	Number of OK PV connected modules	uint16	0	-	-	3 & 4	
30102	2	DC input voltage, average	float	0	-	V	3 & 4	Average input voltage for all OK PV modules
30104	2	DC input current, total	float	0	-	A	3 & 4	Total input current for all OK PV modules
30106	2	DC input power, total	float	0	-	W	3 & 4	Total input power for all OK PV modules
30108	2	DC output voltage, average	float	0	-	V	3 & 4	Average output voltage for all OK PV modules
30110	2	DC output current, total	float	0	-	A	3 & 4	Total input current for all OK PV modules
30112	2	DC output power, total	float	0	-	W	3 & 4	Total input power for all OK PV modules

Table 6. Client cabinet values/readings

The following registers are dependent of how many PV connected modules that exist. Maximum modules showing is 6.

The registers are only showing when the module number is present.

Address	No of words	Name	Type	Min	Max	Unit	Modbus command	Comment
30114	1	Module no. 1	uint16	1	1	-	3 & 4	ID of this PV connected module.
30115	1	Module status	uint16	0	9	-	3 & 4	Status of this PV connected module. See "Table 14. Converter status"
30116	2	DC input voltage	float	0	-	V	3 & 4	Input voltage for this PV module
30118	2	DC input current	float	0	-	A	3 & 4	Input current for this PV module
30120	2	DC input power	float	0	-	W	3 & 4	Input power for this PV module
30122	2	DC output voltage	float	0	-	V	3 & 4	Output voltage for this PV module
30124	2	DC output current	float	0	-	A	3 & 4	Output current for this PV module
30126	2	DC output power	float	0	-	W	3 & 4	Output power for this PV module

30128	1	Module no. 2	uint16	2	2	-	3 & 4	ID of this PV connected module.
30129	2	Module status	uint16	0	9	-	3 & 4	Status of this PV connected module. See "Table 14. Converter status"
30130	2	DC input voltage	float	0	-	V	3 & 4	Input voltage for this PV module
30132	2	DC input current	float	0	-	A	3 & 4	Input current for this PV module
30134	2	DC input power	float	0	-	W	3 & 4	Input power for this PV module
30136	2	DC output voltage	float	0	-	V	3 & 4	Output voltage for this PV module
30138	2	DC output current	float	0	-	A	3 & 4	Output current for this PV module
30140	2	DC output power	float	0	-	W	3 & 4	Output power for this PV module
30142	1	Module no. 3	uint16	3	3	-	3 & 4	ID of this PV connected module.
30143	2	Module status	uint16	0	9	-	3 & 4	Status of this PV connected module. See "Table 14. Converter status"
30144	2	DC input voltage	float	0	-	V	3 & 4	Input voltage for this PV module
30146	2	DC input current	float	0	-	A	3 & 4	Input current for this PV module
30148	2	DC input power	float	0	-	W	3 & 4	Input power for this PV module
30150	2	DC output voltage	float	0	-	V	3 & 4	Output voltage for this PV module
30152	2	DC output current	float	0	-	A	3 & 4	Output current for this PV module
30154	2	DC output power	float	0	-	W	3 & 4	Output power for this PV module
30156	1	Module no. 4	uint16	4	4	-	3 & 4	ID of this PV connected module.
30157	2	Module status	float	0	9	-	3 & 4	Status of this PV connected module. See "Table 14. Converter status"
30158	2	DC input voltage	float	0	-	V	3 & 4	Input voltage for this PV module
30160	2	DC input current	float	0	-	A	3 & 4	Input current for this PV module
30162	2	DC input power	float	0	-	W	3 & 4	Input power for this PV module
30164	2	DC output voltage	float	0	-	V	3 & 4	Output voltage for this PV module
30166	2	DC output current	float	0	-	A	3 & 4	Output current for this PV module
30168	2	DC output power	float	0	-	W	3 & 4	Output power for this PV module
30170	1	Module no. 5	uint16	5	5	-	3 & 4	ID of this PV connected module.

30171	1	Module status	uint16	0	9	-	3 & 4	Status of this PV connected module. See "Table 14. Converter status"
30172	2	DC input voltage	float	0	-	V	3 & 4	Input voltage for this PV module
30174	2	DC input current	float	0	-	A	3 & 4	Input current for this PV module
30176	2	DC input power	float	0	-	W	3 & 4	Input power for this PV module
30178	2	DC output voltage	float	0	-	V	3 & 4	Output voltage for this PV module
30180	2	DC output current	float	0	-	A	3 & 4	Output current for this PV module
30182	2	DC output power	float	0	-	W	3 & 4	Output power for this PV module
30184	1	Module no. 6	uint16	6	6	-	3 & 4	ID of this PV connected module.
30185	1	Module status	uint16	0	9	-	3 & 4	Status of this PV connected module. See "Table 14. Converter status"
30186	2	DC input voltage	float	0	-	V	3 & 4	Input voltage for this PV module
30188	2	DC input current	float	0	-	A	3 & 4	Input current for this PV module
30190	2	DC input power	float	0	-	W	3 & 4	Input power for this PV module
30192	2	DC output voltage	float	0	-	V	3 & 4	Output voltage for this PV module
30194	2	DC output current	float	0	-	A	3 & 4	Output current for this PV module
30196	2	DC output power	float	0	-	W	3 & 4	Output power for this PV module

Table 7. MPPT module values

5.2.3 30200 range: Off-grid status registers

The following registers contain the off-grid status, available from rev 2.3.18.

Address	No of words	Name	Type	Min	Max	Unit	Modbus command	Comment
30200	1	Off-grid mode activated	bool	0	1	-	3 & 4	Whether off-grid mode is activated or not.
30201	1	Current trigger transition method	uint16	0	5		3 & 4	See <i>Table 6</i> .
30202	1	Transition status	uint16	0	4		3 & 4	Status of off-grid mode transitions. See <i>Table 7</i> .
30203	1	Transition error code	uint16	0	7		3 & 4	Possible error code when doing off-grid transitions. See <i>Table 10</i> .
30204	1	Converter status	uint16	0	9		3 & 4	Status of operating converters. See <i>Table 5</i> .

Table 8. Off-grid status

The following registers are showing input used for transitions.

Address	No of words	Name	Type	Min	Max	Unit	Modbus command	Comment
30210	2	AC voltage from meter, phase A	float	0	300	V	3 & 4	Used for transition source: meter
30212	2	AC voltage from meter, phase B	float	0	300	V	3 & 4	Used for transition source: meter
30214	2	AC voltage from meter, phase C	float	0	300	V	3 & 4	Used for transition source: meter
30216	1	Status of digital input		0	1	-	3 & 4	Used for transition source digital input; 0 - on-grid, 1 - off-grid
30217	1			0	1	-	3 & 4	Command to the contactor; 0 - close, 1 - open.

Table 9. Off-grid transitions

5.2.4 31000 range: Services control and configuration

Services without own registers (parameters): Voltage support, Fast frequency reserve (FFR), Frequency regulation 1-8. These are available from GW rev 2.1.

The signals below are available from rev 2.2.8.

The column m/o means: Mandatory / Optional.

Address	No of words	Signal	Type	m/o	Min	Max	Default	Unit	Modbus command	Comment
31000	1	Handshake counter	uint16	m	0	-	0	counts	3, 6 & 16	Service will stop when not changed during a certain time. Default 60 seconds.
31001	1	Set running service	uint16	m	0	-	0	-	3, 6 & 16	See "Table 4. Pixii specific register addresses"
31002	1	Stop running service	uint16	o	0	1	0	-	3, 6 & 16	When set, stop service independent of duration.
31003	2	Service duration	int32	m	-1	-	0	s	3 & 16	-1 = run until stopped by command, (Note! -1 is not possible for Target SoC and Battery SoC calibration.) 0 = service will not run, > 0 = run until duration exceeds or stopped by command. Note! When value changes the new value is immediately used, and a new countdown is started if service is running.

31009	1	Keep service active	uint16	o	0	1	0	-	3 & 16	When set, it will prevent other services to run when current service is IDLE. Note! Only for Demand Response, Power Control and Target SoC.
Registers for services: Demand response, Power control										
31020	2	Active power, total or phase A	float	m	-	-	0	kW	3 & 16	Active power in kW. Generator reference.
31022	2	Reactive power, total or phase A	float	o	-100	100	0	%	3 & 16	Reactive power in percentage. Note! Only for Power control.
31024	2	Active power, phase B	float	o	-	-	0	kW	3 & 16	Active power in kW. Generator reference. Note! Only for 3-phase power control. Available from 2.2.13.
31026	2	Reactive power, phase B	float	o	-100	100	0	%	3 & 16	Reactive power in percentage. Note! Only for 3-phase power control. Available from 2.2.13.
31028	2	Active power, phase C	float	o	-	-	0	kW	3 & 16	Active power in kW. Generator reference. Note! Only for 3-phase power control. Available from 2.2.13.
31030	2	Reactive power, phase C	float	o	-100	100	0	%	3 & 16	Reactive power in percentage. Note! Only for 3-phase power control. Available from 2.2.13.

Registers for services: Fixed & Adaptive peak shaving										
31040	2	Discharge when below	float	m	-	-	0	kW	3 & 16	Discharge when below this limit. Generator reference. Note! Discharge limit must be below or equal to charge limit.
31042	2	Charge when above	float	m	-	-	0	kW	3 & 16	Charge when above this limit. Generator reference. Note! Charge limit must be above or equal to discharge limit.
31044	2	Maximum charge	float	m	0	-	0	kW	3 & 16	Maximum charge power.
31046	2	Maximum discharge	float	m	0	-	0	kW	3 & 16	Maximum discharge power.
31048	2	Maximum change in charge/discharge power	float	o	0	-	0	kW	3 & 16	Maximum change of limits calculated each midnight. When set to '0', there is no change in limits. Note! Only for Adaptive peak shaving.
Registers for services: Target state of charge										Note! Duration of '-1' is not possible for Target SoC.
31050	2	State of charge after calibration	float	m	1	100	90	%	3 & 16	Calibration will discharge to this level.
31062	1	Wait for flag	uint16	o	0	1	0	-	3 & 16	Wait for calibration flag from battery. Note! Only for some battery types.

Registers for mode: Off-grid										Note! 'Set running service/mode' & 'Duration' is not used for Off-grid mode.
31070	1	Switch off-grid / on-grid.	uint16	o	0	2	0	-	3, 6 & 16	0 - no operation, 1 - switch to off-grid, 2 - switch to on-grid. Available from rev 2.3.19.
31071	1	Switch off-grid / using gen-set.	uint16	o	0	2	0	-	3, 6 & 16	0 - no operation, 1 - switch to off-grid, 2 - switch to using gen-set (only when in off-grid). Available from rev 2.3.19.
31072	1	Waiting time before transition to off-grid.	uint16	o	0	-	0	s	3, 6 & 16	Waiting time before doing a transition to off-grid. Available from rev 2.3.19.
31073	1	Waiting time before transition to on-grid.	uint16	o	0	-	0	s	3, 6 & 16	Waiting time before doing a transition to on-grid. Available from rev 2.3.19.

Table 10. Service control and configuration

Running service	Description
102	Demand response
103	Not in-use.
104	Fixed peak shaving
105	Adaptive peak shaving
106	Not in-use.
107	Target SoC
108	Not in-use.
109	Not in-use.
110	Voltage support
111	Fast frequency reserve (FFR)
112	Not in-use.
113	Not in-use.
114	Not in-use.
115	Off-grid
116	Battery SoC calibration
117	Ripple control
118	Demand response mode (DRM)
119	Power control
120	Import & export control
121	Frequency regulation 1
122	Frequency regulation 2
123	Frequency regulation 3
124	Frequency regulation 4
125	Frequency regulation 5
126	Frequency regulation 6
127	Frequency regulation 7
128	Frequency regulation 8
129	3-phase power control service

Table 11. Running service

Running service	Description	Comment
102	Demand response	Avail. in 2.2.8
104	Fixed peak shaving	Avail. in 2.2.8
105	Adaptive peak shaving	Avail. in 2.2.8
107	Target SoC	Avail. in 2.2.8
110	Voltage support	Avail. in 2.1
111	Fast frequency reserve (FFR)	Avail. in 2.1
116	Battery SoC calibration	Avail. in 2.2.8
119	Power control	Avail. in 2.2.8
120	Import & export control	Avail. in 2.1
121	Frequency regulation 1	Avail. in 2.1
122	Frequency regulation 2	Avail. in 2.1

123	Frequency regulation 3	Avail. in 2.1
124	Frequency regulation 4	Avail. in 2.1
125	Frequency regulation 5	Avail. in 2.1
126	Frequency regulation 6	Avail. in 2.1
127	Frequency regulation 7	Avail. in 2.1
128	Frequency regulation 8	Avail. in 2.1
129	3-phase power control	Avail. in 2.2.13

Table 12. Selectable service

Running service status	Description
0	Undefined status
1	Enabled
2	Idle
3	Idle, kept active
4	Idle, awaiting
5	Running
6	Running, possible limitations
7	Running, awaiting
8	Disabled

Table 13. Running service status

Converter status	Description
0	Unknown status
1	Normal
2	Information exist
3	Warning exist
4	Alarm exist
5	Disabled module
6	Disconnected, no connection
7	Active injection mode
8	Derated mode, limited power
9	Inactive

Table 14. Converter status

6 Status Enum & Bitfield Descriptions

The following lists the descriptions of the status, warning, and alarm enums and bitfields.

Enum value	Name	Description	Action/Comment
0	Off	Device is not operating	
1	Sleeping	Device is sleeping / auto-shutdown	
2	Starting	Device is starting up	
3	MPPT	Device is auto tracking maximum power point	N/A
4	Throttled	Device is operating at reduced power output	
5	Shutting down	Device is shutting down	
6	Fault	One or more faults exist	
7	Standby	Device is in standby/standard operating mode	

Table 15. 40107 St. Operating state

Enum value	Name	Description	Action/Comment
1	Disconnected	Battery bank is disconnected. All contactors are open.	
2	Initializing	Battery bank is initializing but not ready for operating. String balancing may occur.	
3	Connected	Battery bank is ready for operation. All enabled contactors are closed.	
4	Standby	Battery bank is connected and in standby/power saving mode.	
5	SoC Protection	Battery bank is connected but SoC is too low. Battery should be considered "offline".	
6	Suspending	Battery bank is suspending operation and will disconnect.	
99	Fault	The battery has experienced a critical failure and may not be operated.	

Table 16. 40143 Battery state

Name	Bit no	Description	Action/Comment
Communication error	0	The battery has a communication error	Set to 1 if there is a communication error, no batteries are present. Please refer to the battery documentation.
High temperature alarm	1	The battery signals a high temperature alarm.	Only valid for LG and Prime batteries. Please refer to the battery documentation.
High temperature warning	2	The battery signals a high temperature warning.	Only valid for LG and Prime batteries. Please refer to the battery documentation.
Low temperature alarm	3	The battery signals a low temperature alarm.	Only valid for LG and Prime batteries. Please refer to the battery documentation
Low temperature warning	4	The battery signals a low temperature warning.	Only valid for LG and Prime batteries. Please refer to the battery documentation
High current charge limit alarm	5	The battery signals a high current charge limit alarm.	Only valid for LG and Prime batteries. Please refer to the battery documentation
High current charge limit warning	6	The battery signals a high current charge limit warning.	Only valid for LG and Prime batteries. Please refer to the battery documentation
High current discharge limit alarm	7	The battery signals a high current discharge limit alarm.	Only valid for LG and Prime batteries. Please refer to the battery documentation
High current discharge limit warning	8	The battery signals a high current discharge limit warning.	Only valid for LG and Prime batteries. Please refer to the battery documentation
High voltage alarm	9	The battery signals a high voltage alarm.	Only valid for LG and Prime batteries. Please refer to the battery documentation
High voltage warning	10	The battery signals a high voltage warning.	Only valid for LG and Prime batteries. Please refer to the battery documentation
Low voltage alarm	11	The battery signals a low voltage alarm.	Only valid for LG and Prime batteries. Please refer to the battery documentation
Low voltage warning	12	The battery signals a low voltage warning.	Only valid for LG and Prime batteries. Please refer to the battery documentation
	13		
	14		
	15		

	16		
Voltage imbalance warning	17	The battery signals a voltage imbalance warning.	Only valid for LG and Prime batteries. Please refer to the battery documentation
	18		
	19		
	20		
	21		
	22		
	23		
	24		
Other alarm	25		Only valid for LG and Prime batteries. Please refer to the battery documentation

Table 17. 40147 Evt1. Battery alarms and warnings

Name	No	Description	Action/Comment
Off	1		
On	2	No alarms in the system (warnings or info events may be present)	
Full	3	Not used	
Fault	4	Set when one or more alarms are present in the system	Check the system

Table 18. 40190 Basic Aggregator State

Name	No	Description	Action/Comment
Undefined	0	Status not defined	
Normal	1	Unit operating normally	
Info	2	Unit operating normally, but has some information	
Warning	3	Unit still operating, but with restrictions (due to temperature or other parameters)	Check the system
Alarm	4	Unit is not operating	Check the system
Disabled	5	Disabled due to grid parameters	
Disconnected	6	Unit is disconnected (reserved for future use)	
Active_injection	7	Converter is in Active injection state (due to regulations)	
Derated	8	Unit is in derating state due to external control	

Table 19. 40191 Vendor specific status code

Name	Bit no	Description	Action/Comment
Battery alarm	0	At least one top-level battery alarm.	Check the batteries. One or more batteries may be disconnected or giving an alarm.
Converter alarm	1	At least one top-level converter alarm	Check the converters for faults.
Smoke alarm	2	Smoke detector alarm	If consistent over 3 minutes, check the converters and batteries as soon as possible.
Earth fault alarm	3	Earth fault (DC)	Check the earthing on the DC side.
Door alarm	4	Door open alarm (more than 8 hours)	Check that the door is closed
Fan speed alarm	5	Fan speed alarm (cabinet)	If the alarm does not clear by itself after 2 - 3 minutes, check that the fans are working.
Emergency switch	6	Emergency switch activation alarm. The switch has been manually activated.	Check the installation.
AC side fuse alarm	7	AC side fuse alarm (cabinet)	Check the AC fuse.
OVP alarm	8	Over-voltage protection alarm	Check and replace the SPD.
Heater fuse alarm	9	Heater fuse alarm (cabinet)	Check the heater fuse
Battery temperature alarm	10	Battery temperature alarm.	If the alarm is not cleared by itself after a while, check the system.
External shutdown alarm	11	External signal by Ripple control or MQTT/Modbus used to shut down the PixiiBoxes, then the batteries.	Might need to manually ACK that the conditions for external shutdown have cleared. This depends on the system setup and usage of the external shutdown.
Battery vapour alarm	12	The battery vapour sensor (e.g. Li-Ion Tamer) has triggered.	Check the system for the status of the battery vapour sensor.
Aircon alarm	13	The aircon unit is in alarm	Check the aircon unit.
...			
Do SoC calibration warning	16	Calibration indicator	When set, the batteries should be calibrated. When cleared after set, the calibration can stop. Only applicable for batteries that need calibration (e.g. LFP types)
Not used	17		
Power lim. derating warning	18	Has hit limitation derating due to battery voltage/SoC.	Action: none.
Converter derated or act_inj warning	19	Has hit limitation derating due to one or more converters in derating or active injection.	Action: none.
Converters Unavailable warning	20	The converters are not in an operational state. This may be because of being in alarm, disabled, or not communicating at all.	Check that the grid connection is ok if duration is longer than 5 minutes. If the units are not communicating, or in alarm, check the system.
Grid code trip warning	21	The converters have tripped because of measurements outside grid code limits. E.g. grid has high/low Vac, fac etc.	Action: none. The grid connected inverters will reconnect automatically when the limits are back within allowed values.

SoC min	22	Has hit the soc min limit	Action: none.
SoC max	23	Has hit the soc max limit.	Action: none.
Currlim batt max	24	Has hit limitation due to battery received limit	Action: none. The cabinet(s) in question cannot charge/discharge more due to battery limitations.
Door open	25	Cabinet door is open	Action: Depending on the location of the system. In publicly accessible areas, the system should be checked as soon as possible.
Battery low voltage	26	Battery voltage is below low voltage limit.	If the alarm is not cleared by itself after a while, check the system.
Battery modules missing	27	Communication with at least one battery module is missing.	Check that the number of battery modules is correct. Check the battery communication cables.
Tripped fuse on battery warning	28	At least one battery has a tripped fuse.	Check the battery fuse.
Converter missing warning	29	Communication with at least one converter is missing.	Check the converters.
DC contactor disconnected warning	30	In installed, input used for DC contactor indicates it disconnected	Check the DC contactor.

Table 20. 40194 Vendor specific event code

Name	Bit no	Description	Action/Comment
Battery alarm	0	At least one cabinet has a top-level battery alarm.	Check the batteries. One or more batteries may be disconnected or giving an alarm.
Converter alarm	1	At least one cabinet has a top-level converter alarm.	Check the converters for faults.
Smoke alarm	2	At least one cabinet has a smoke detector alarm.	If consistent over 3 minutes, check the converters and batteries as soon as possible.
Earth fault DC alarm	3	At least one cabinet has an earth fault (DC) alarm.	Check the earthing on the DC side.
Door alarm	4	At least one cabinet has a door open (more than 8 hours) alarm.	Check that the door is closed
Fan speed alarm	5	At least one cabinet has a cabinet environment fan speed alarm.	If the alarm does not clear by itself after 2 - 3 minutes, then check that the fans are working.
Emergency switch	6	Emergency switch activation alarm. The switch has been manually activated.	Check the installation.
AC side fuse alarm	7	AC side fuse alarm (cabinet)	Check the AC fuse.
OVP alarm	8	Over-voltage protection alarm	Check and replace the SPD.
Heater fuse alarm	9	Heater fuse alarm (cabinet)	Check the heater fuse
Battery temperature alarm	10	Battery temperature alarm.	If the alarm is not cleared by itself after a while, check the system.
External shutdown alarm	11	External signal by Ripple control or MQTT/Modbus used to shut down the PixiiBoxes, then the batteries.	Might need to manually ACK that the conditions for external shutdown have cleared. This depends on the system setup and usage of the external shutdown.
Battery vapour alarm	12	The battery vapour sensor (e.g. Li-Ion Tamer) has triggered.	Check the system for the status of the battery vapour sensor.
Aircon alarm	13	The aircon unit is in alarm	Check the aircon unit.

Table 21. Alarm bitfield

Name	Bit no	Description	Action/Comment
Do SoC calibration warning	0	Calibration indicator	When set, the batteries should be calibrated. When cleared after set, the calibration can stop. Only applicable for batteries that need calibration (e.g. LFP types)
Not used	1		
Power lim. derating warning	2	At least one cabinet has hit limitation derating due to battery voltage/SoC.	Action: none.
Converter derated or act_inj warning	3	At least one cabinet has hit limitation derating due to one or more converters in derating or active injection.	Action: none.
Converters Unavailable warning	4	The converters are not in an operational state in at least one cabinet. This may be because of being in alarm, disabled, or not communicating at all.	Check that the grid connection is ok if duration is longer than 5 minutes. If the units are not communicating, or in alarm, check the system.
Grid code trip warning	5	At least one cabinet has converters that have tripped because of measurements outside grid code limits. E.g. grid has high/low Vac, fac etc.	Action: none. The grid connected inverters will reconnect automatically when the limits are back within allowed values.
SoC min	6	At least one cabinet has hit the SoC min limit	Action: none. The cabinet(s) in question cannot discharge more.
SoC max	7	At least one cabinet has hit the SoC max limit.	Action: none. The cabinet(s) in question cannot charge more.
Currlim batt max	8	At least one cabinet has hit limitation due to battery received limit	Action: none. The cabinet(s) in question cannot charge/discharge more due to battery limitations.
Currlim batt max	8	At least one cabinet has hit limitation due to battery received limit	Action: none. The cabinet(s) in question cannot charge/discharge more due to battery limitations.
Door open	9	Cabinet door is open	Action: Depending on the location of the system. In publicly accessible areas, the system should be checked as soon as possible.
Battery low voltage	10	Battery voltage is below low voltage limit.	If the alarm is not cleared by itself after a while, check the system.
Battery modules missing	11	Communication with at least one battery module is missing.	Check that the number of battery modules is correct. Check the battery communication cables.
Tripped fuse on battery warning.	12	At least one battery has a tripped fuse.	Check the battery fuse.
Converter missing warning.	13	Communication with at least one converter is missing.	Check the converters.

DC contactor disconnected warning.	14	In installed, input used for DC contactor indicates it disconnected	Check the DC contactor.
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Table 22. Warning bitfield

Enum index	Name	Description
101	Scheduler	A scheduled service
102	Demand response	Demand power service
104	Fixed peak shaving	Fixed charge/discharge limits
105	Adaptive Peak Shaving	Peak shaving with adaptive limits
107	Target SoC	Charging/discharging to a specific energy level in the battery during a specific time range
110	Voltage support	Voltage support is autonomously running in the converter modules.
111	Frequency regulation FFR	Frequency regulation is autonomously running in the converter modules using the FFR settings table.
115	Off-grid mode	Off-grid mode is autonomously running in the converter modules.
116	Battery calibration	The system is doing battery calibration.
117	Ripple control	Ripple control input states running and overriding other services.
118	DRM mode	The system operation is overridden by the Australian / NZ DRM mode interface.
119	Power control	Power control service (supports reactive power control)
120	Export/Import limitation (Meter limitation)	Meter limitation overrides other services
121	Frequency regulation 1 service	Frequency regulation is autonomously running in the converter modules
122	Frequency regulation 2 service	Frequency regulation is autonomously running in the converter modules
123	Frequency regulation 3 service	Frequency regulation is autonomously running in the converter modules
124	Frequency regulation 4 service	Frequency regulation is autonomously running in the converter modules
125	Frequency regulation 5 service	Frequency regulation is autonomously running in the converter modules
126	Frequency regulation 6 service	Frequency regulation is autonomously running in the converter modules
127	Frequency regulation 7 service	Frequency regulation is autonomously running in the converter modules
128	Frequency regulation 8 service	Frequency regulation is autonomously running in the converter modules
129	3-phase power control service	Power control 3-phase

Table 23. Services types

Name	Bit no	Description	Action/Comment
Battery alarm	0	At least one top-level battery alarm.	Check the batteries. One or more batteries may be disconnected or giving an alarm.
Converter alarm	1	At least one top-level converter alarm.	Check the converters for faults.
Smoke alarm	2	Smoke detector alarm.	If consistent over 3 minutes, check the converters and batteries as soon as possible.
Earth fault alarm	3	Earth fault (DC).	Check the earthing on the DC side.
Door alarm	4	Door open alarm (more than 8 hours)	Check that the door is closed.
OVP alarm	5	Over-voltage protection alarm.	Check and replace the SPD.
Emergency switch	6	Emergency switch activation alarm. The switch has been manually activated.	Check the installation.
AC side fuse alarm	7	AC side fuse alarm (cabinet).	Check the AC fuse.
Do SoC calibration warning	8	Calibration indicator.	When set, the batteries should be calibrated. When cleared after set, the calibration can stop. Only applicable for batteries that need calibration (e.g. LFP types)
Not in use	9		
Battery modules missing	10	Communication with at least one battery module is missing.	Check that the number of battery modules is correct. Check the battery communication cables.
Power limitation warning	11	The system is in power limitation	None.
Converters Unavailable warning	12	The converters are not in an operational state. This may be because of being in alarm, disabled, or not communicating at all.	If the converters are in disabled, they will recover automatically. If the units are not communicating, or in alarm, check the system.
Grid code trip warning	13	The system has tripped due to grid settings.	None, will reconnect when conditions are within allowed constraints.
SoC min warning	14	The battery average SoC is below the Min value.	The battery will be charged according to the idle or force charge settings.
SoC max warning	15	The battery average SoC is above the Max value.	The battery will not allow more charge.

Table 24. System events

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