MODBUS SLAVE MANUAL



Automatic Sustainable Controller, ASC

DEIF A/S · Frisenborgvej 33 · DK-7800 Skive
Tel.: +45 9614 9614 · Fax: +45 9614 9615
info@deif.com · www.deif.com

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1. General information

Warnings and notes

Throughout this document, a number of warnings and notes with helpful user information will be presented. To ensure that these are noticed, they will be highlighted as follows in order to separate them from the gener- al text.

Warnings

Warnings indicate a potentially dangerous situation, which could result in death, personal in- jury or damaged equipment, if certain guidelines are not followed.

Notes

Notes provide general information, which will be helpful for the reader to bear in mind.

Legal information and disclaimer

DEIF takes no responsibility for installation or operation of the generator set. If there is any doubt about how to install or operate the engine/generator controlled by the Multi-line 2 unit, the company responsible for the installation or the operation of the set must be contacted.

The Multi-line 2 unit is not to be opened by unauthorised personnel. If opened anyway, the war- ranty will be lost.

Disclaimer

DEIF A/S reserves the right to change any of the contents of this document without prior notice.

The English version of this document always contains the most recent and up-to-date information about the product. DEIF does not take responsibility for the accuracy of translations, and translations might not be updated at the same time as the English document. If there is any discrepancy, the English version prevails.

Safety issues

Installing and operating the Multi-line 2 unit may imply work with dangerous currents and voltages. Therefore, the installation should only be carried out by authorised personnel who understand the risks involved in work- ing with live electrical equipment.

Be aware of the hazardous live currents and voltages. Do not touch any AC measurement in- puts as this could lead to injury or death.

Electrostatic discharge awareness

Sufficient care must be taken to protect the terminal against static discharges during the installation. Once the unit is installed and connected, these precautions are no longer necessary.

Factory settings

The Multi-line 2 unit is delivered from factory with certain factory settings. These are based on average values and are not necessarily the correct settings for matching the engine/generator set in question. Precautions must be taken to check the settings before running the engine/generator set.

Contents and overall structure

This document is divided into chapters, and in order to make the structure simple and easy to use, each chapter will begin from the top of a new page.

2. Introduction

The ASC Modbus slave functionality offers a substantial proprietary protocol. Via the proprietary protocol, various life data can be read as well as parameter setting values can be both read and written to. Besides the proprietary protocol, the ASC Modbus slave offers a SunSpec interface as well.

The content of the proprietary protocol as well as the SunSpec protocol are accounted for in the following chapters.

3. Proprietary protocol

The ASC Modbus slave functionality offers a substantial proprietary protocol. Via the proprietary protocol both various life data can be read as well as parameter setting values can be both read and written to.

The ASC is able to run on two different voltage scalings.
The voltage scaling selected has an impact on the resolution of some of the data contained in the tables presented. These data are clearly marked.
With default scaling [100V;25000V] selected, the resolution is as indicated in the tables.
When scaling [10V-2500V] is selected, the resolution is a factor 10 higher than indicated in the tables.
The scaling is adjusted in menu 9030.

4. Live data

In this paragraph, the life data are accounted for.

Measurement table

All data from the measurement table are to be read using function code 0x04.
All 32 bit values are represented as with HI16 on highest address and LO16 on lowest address (big endian format).

Address	Label	Length (words)	Type
500	SW version	1	sint16
501	UL1L2 [V]	1	sint16
502	UL2L3 [V]	1	sint16
503	UL3L1 [V]	1	sint16
504	UL1N [V]	1	sint16
505	UL2N [V]	1	sint16
506	UL3N [V]	1	sint16
507	fL1 [0.01Hz]	1	sint16
508	fL2 [0.01Hz]	1	sint16
509	fL3 [0.01Hz]	1	sint16
510	PhiL1L2 [deg]	1	sint16
511	PhiL2L3 [deg]	1	sint16
512	PhiL3L1 [deg]	1	sint16
513	IL1 [A]	1	sint16
514	IL2 [A]	1	sint16
515	IL3 [A]	1	sint16
516	PL1 [kW]	1	sint16
517	PL2 [kW]	1	sint16
518	PL3 [kW]	1	sint16
519	P total [kW]	1	sint16
520	QL1 [kVAr]	1	sint16
521	QL2 [kVAr]	1	sint16
522	QL3 [kVAr]	1	sint16
523	Q total [kVAr]	1	sint16
524	SL1 [kVA]	1	sint16
525	SL2 [kVA]	1	sint16
526	SL3 [kVA]	1	sint16
527	S total [kVA]	1	sint16
528/529	Q energy total [kVArh]	2	sint32
530/531	P energy day [kWh]	2	sint32
532/533	P energy week [kWh]	2	sint32
534/535	P energy month [kWh]	2	sint32
536/537	P energy total [kWh]	2	sint32
538	Power factor	1	sint16
539	BB UL1L2 [V]	1	sint16
540	BB UL2L3 [V]	1	sint16
541	BB UL3L1 [V]	1	sint16
542	BB UL1N [V]	1	sint16
543	BB UL2N [V]	1	sint16
544	BB UL3N [V]	1	sint16
545	BB fL1 [0.01Hz]	1	sint16
546	BB fL2 [0.01Hz]	1	sint16
547	BB fL3 [0.01Hz]	1	sint16
548	BB PhiL1L2 [deg]	1	sint16
549	BB PhiL2L3 [deg]	1	sint16
550	BB PhiL3L1 [deg]	1	sint16
551	PhiL1BBL1 [deg]	1	sint16
552	PhiL2BBL2 [deg]	1	sint16
553	PhiL3BBL3 [deg]	1	sint16
554/555	Running hours [h]	2	sint32
556/557	Not used	-	-
558	Alarms	1	sint16
559	Un-ack. Alarms	1	sint16
560	Ack. Alarms	1	sint16
561/562	Not used	-	-

563	CB operations	1	sint16
564/566	Not used	-	-
567	Supply voltage [0.1V]	1	sint16
568	M4 supply voltage [0.1V]	1	sint16
569/572	Not used	-	-
573	Cosphi	1	sint16
574	Inductive/capacitive	1	sint16
575/578	Not used	-	-
579	DG Q total [kVAr]	1	sint16
580/582	Not used	-	-
583	Analogue in 102	1	sint16
584	Analogue in 105	1	sint16
585	Analogue in 108	1	sint16
586	Analogue in 91	1	sint16
587	Analogue in 93	1	sint16
588	Analogue in 95	1	sint16
589	Analogue in 97	1	sint16
590	Cabinet temp. [C]	1	sint16
591	DG P total [kW]	1	sint16
592	Mains P total [kW]	1	sint16
593/655	Not used	-	-
656	Analogue in 121	1	sint16
657	Analogue in 123	1	sint16
658	Analogue in 125	1	sint16
659	Analogue in 127	1	sint16
660/668	Not used	-	-
669	Mains Q total [kVAr]	1	sint16
670	Mains cosphi	1	sint16
671	Mains ind/cap	1	sint16
672-699	Not used	-	-
700	Instant P Max [kW]	1	sint16
701/789	Not used	-	-
790/791	Q energy month [kVArh*]	2	sint32
792/793	Q energy week [kVArh*]	2	sint32
794/795	Q energy day [kVArh*]	2	sint32
796/797	P energy total (c) [kWh*]	2	sint32
798/799	P energy month (c) [kWh*]	2	sint32
800/801	P energy week (c) [kWh*]	2	sint32
802/803	P energy day (c) [kWh*]	2	sint32
804/805	Q energy total (c) [kVArh*]	2	sint32
806/807	Q energy month (c) [kVArh*]	2	sint32
808/809	Q energy week (c) [kVArh*]	2	sint32
810/811	Q energy day (c) [kVArh*]	2	sint32
812/813	Pulse counter 1	2	sint32
814/815	Pulse counter 2	2	sint32
872/873	P genset energy year [kWh*]	2	sint32
874/875	P genset energy total [kWh*]	2	sint32
876/877	P genset energy month [kWh*]	2	sint32
878/879	P genset energy week [kWh*]	2	sint32
880/881	P genset energy day [kWh*]	2	sint32
882/883	P energy year [kWh*]	2	sint32
884/885	Q energy year [kVArh*]	2	sint32
886/887	P energy year (c) [kWh*]	2	sint32
888/889	P energy year (c) [kVArh*]	2	sint32
890/891	P curtailed energy year [kWh*]	2	sint32
892/893	P curtailed energy total [kWh*]	2	sint32
894/895	P curtailed energy month [kWh*]	2	sint32
896/897	P curtailed energy week [kWh*]	2	sint32
898/899	P curtailed energy day [kWh*]	2	sint32

The Modbus index in the above measurement table starts at 500.
The data on address index from 0-499 can be user-determined via dedicated configuration mapping area. This means that the data requested from the above measurement table can be packed together in order to optimise the data exchange needed between the master and the slave.
This can be done from within the USW.

PV monitoring

It is possible to select whether the ASC is to poll key data from the inverter(s) and place it in designated Modbus area for a monitoring system to read. PV monitoring can be used both together with unicast and broadcast topologies. The number of nodes determines the number of inverters the ASC should poll data from. A maximum of 42 nodes can be monitored. The ASC expects that the ModbusIDs of the inverters are consecutive in order starting from the selected ModbusID and forward.
70 registers are reserved for each inverter.
Below is the Modbus indexing for the first inverter presented. Registers for the following inverters will come consecutively.

Address	Name	Data type	Description
47000-47015	SN	String	Serial number (format maker-dependent)
47016-47031	MODEL	String	Inverter model (format maker-dependent)
47032	P_SIZE	U16	Rated power size [0.1kW]
47033	Q_SIZE	U16	Rated reactive power size [0.1 kvar]
47034	COUNTRY	U16	Country code (format maker-dependent)
47035	DCU_01	U16	DC voltage string 01 [0.1 V]
47036	DCP_01	S16	DC power string 01 [0.1 kW]
47037	DCU_02	U16	DC voltage string 02 [0. 1V]
47038	DCP_02	S16	DC power string 02 [0.1 kW]
47039	DCU_03	U16	DC voltage string 03 [0.1 V]
47040	DCP_03	S16	DC power string 03 [0.1 kW]
47041	DCU_04	U16	DC voltage string 04 [0.1 V]
47042	DCP_04	S16	DC power string 04 [0.1 kW]
47043	ACP	S16	AC active power [0.1 kW]
47044	ACQ	S16	AC reactive power [0.1 kvar]
47045	ACS	S16	AC apparent power [0.1k VA]
47046-47047	KWH	U32	Energy produced [kWh]
47048-47049	KWH_DAY	U32	Energy produced today [0.1 kWh]
47050-47051	HOURS	U32	Operating hours [h]
47052	MINUTES_DAY	U16	Operating minutes today [min]
47053	CAB_TEMP	S16	Cabinet temperature [0.1 C]
47054	L1N	U16	Phase1 to neutral voltage [0.1 V]
47055	L2N	U16	Phase2 to neutral voltage [0.1 V]
47056	L3N	U16	Phase3 to neutral voltage [0.1 V]
47057	L1L2	U16	Phase1 to phase2 voltage [0.1 V]
47058	L2L3	U16	Phase2 to phase3 voltage [0.1 V]
47059	L3L1	U16	Phase3 to phase1 voltage [0.1 V]
47060	GRIF_FREQ	U16	Grid frequency [0.1 Hz]
47061	PREF	S16	Active power reference (format maker-dependent).
47062	QREF	S16	Reactive power reference (format maker-dependent)
47063	STATE	U16	Inverter state (format maker-dependent)
47064	FAULT_CODE	U16	Fault code (format maker-dependent)
47065-47068	RESERVED		-
47069	ALIVE	U16	0: Inverter not alive on communication link. 1: Inverter alive on communication link.

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Depending on the inverter make and model and the interface provided, the data available can differ.
All 32 bit values are represented as with HI16 on lowest address and LO16 on highest address (big endian format).

In case signed 16 bit data is not supported, they are applied with the value 0x8000.
In case signed 32 bit data is not supported, they are applied with the value 0x80000000.
In case unsigned 16 bit data is not supported, they are applied with the value 0xFFFF.
In case unsigned 32 bit data is not supported, they are applied with the value 0xFFFFFFFF.
In case the data type is “String”, it is terminated by the NULL-character.
The data is accessible with function code 0x04.

On the registers following the data from the inverters, some additional data related to PV monitoring functionality can be read.

Address	Name	Data type	Description
49940	VERSION	U16	PV monitoring version
49941	PROTOCOL	U16	PV protocol selection: 0: Off 1: SMA FSC 2: SMA SunSpec 3: Fronius SunSpec 4: Reserved 5: DEIF Open 6: SunSpec Generic 7: ABB PVS800 8: Schneider Conext CL 9: Gamesa E-series 10: ABB TRIO 11: ABB PRO-33 12: Delta RPI 13: Sungrow SG10-60 14: Huawei SUN2000 8-28 15: Huawei SUN2000 33-40 16: Huawei Smart-logger
49942-49951	PROTOCOL_STRING	String	PV protocol selection (string access)
49952	ENABLED	U16	Monitoring enabled: 0: Disabled 1: Enabled
49953	NBR_NODES	U16	Number of inverters to monitor
49954	NBR_NODES_MISSING	U16	Number of inverters missing
49955	NODE_MISSING_MIN	U16	Lowest inverter ID missing
49956	NODE_MISSING_MAX	U16	Highest inverter ID missing
49957	P_REF_TYPE	U16	0: Percentage 1: kW
49958	Q_REF_TYPE	U16	0: Percentage 1: kvar 2: Cos phi
49959	P_REF_RESOLUTION	U16	0: zero decimals 1: one decimal 2: two decimals 3: three decimals
49960	Q_REF_RESOLUTION	U16	0: zero decimals 1: one decimal 2: two decimals 3: three decimals
49961	LOWEST_MODBUS_ID	U16	Lowest Modbus ID of the inverters

PV monitoring inverter maker specifics

In the below tables are listed which data are included in the PV monitoring scheme in the different protocols and in which SW version of the ASC. The entries relate to ASC-4 versions. The following relation can be used to determine support in ASC:

ASC version 5.06.0 supports the same as ASC-4 version 4.00.0.
ASC version 5.07.0 supports the same as ASC-4 version 4.01.0.

Some data stated as supported may not be available in a specific model of the inverter series or missing due to maker not providing them despite being stated in documentation. In such cases, they will be presented as “Not available” in the ASC.

Name	SMA FSC	SMA SunSpec	Fronius SunSpec	DEIF Open	SunSpec Generic	ABB PVS800	Schneider ConextCL	Gamesa E-series	ABB Trio
SN	-	4.00.0	4.00.0	-	4.00.0	-	4.00.0	-	4.00.0
MODEL	-	4.00.0	4.00.0	-	4.00.0	-	4.00.0	-	4.00.0
P_SIZE	-	-	-	-	-	-	-	-	-
Q_SIZE	-	-	-	-	-	-	-	-	-
COUNTRY	-	-	-	-	-	-	-	-	4.00.0
DCU_01	-	4.00.0	4.00.0	-	4.00.0	4.00.0	4.00.0	-	4.00.0
DCP_01	-	4.00.0	4.00.0	-	4.00.0	4.00.0	4.00.0	-	4.00.0
DCU_02	-	4.01.0	-	-	-	-	4.00.0	-	4.00.0
DCP_02	-	4.01.0	-	-	-	-	4.00.0	-	4.00.0
DCU_03	-	-	-	-	-	-	-	-	-
DCP_03	-	-	-	-	-	-	-	-	-
DCU_04	-	-	-	-	-	-	-	-	-
DCP_04	-	-	-	-	-	-	-	-	-
ACP	-	4.00.0	4.00.0	-	4.00.0	4.00.0	4.00.0	-	4.00.0
ACQ	-	4.00.0	4.00.0	-	4.00.0	4.00.0	4.00.0	-	4.00.0
ACS	-	4.00.0	4.00.0	-	4.00.0	4.00.0	4.00.0	-	4.00.0
KWH	-	4.00.0	4.00.0	-	4.00.0	4.00.0	4.00.0	-	4.00.0
KWH_DAY	-	-	-	-	-	-	4.00.0	-	4.00.0
HOURS	-	-	-	-	-	4.00.0	4.00.0	-	-
MINUTES_DAY	-	-	-	-	-	-	-	-	-
CAB_TEMP	-	4.00.0	4.00.0	-	4.00.0	4.00.0	4.00.0	-	4.00.0
L1N	-	4.00.0	4.00.0	-	4.00.0	4.00.0	4.00.0	-	4.00.0
L2N	-	4.00.0	4.00.0	-	4.00.0	4.00.0	4.00.0	-	-
L3N	-	4.00.0	4.00.0	-	4.00.0	4.00.0	4.00.0	-	-
L1L2	-	4.00.0	4.00.0	-	4.00.0	-	4.00.0	-	-
L2L3	-	4.00.0	4.00.0	-	4.00.0	-	4.00.0	-	-
L3L1	-	4.00.0	4.00.0	-	4.00.0	-	4.00.0	-	-
GRIF_FREQ	-	4.00.0	4.00.0	-	4.00.0	4.00.0	4.00.0	-	4.00.0
PREF	-	4.00.0	4.00.0	-	4.00.0	4.00.0	4.00.0	-	4.00.0
QREF	-	4.00.0	4.00.0	-	4.00.0	4.00.0	4.00.0	-	4.00.0
STATE	-	4.00.0	4.00.0	-	4.00.0	4.00.0	4.00.0	-	4.00.0
FAULT_CODE	-	-	-	-	-	4.00.0	4.00.0	-	4.00.0
ALIVE	-	4.00.0	4.00.0	-	4.00.0	4.00.0	4.00.0	-	4.00.0

Name	ABB PRO33	Delta RPI	Sungrow SG10-60	Huawei SUN2000 8-28KTL	Huawei SUN2000 33-40KTL	Huawei SmartLogger	Goodwe DT-series
SN	4.00.0	4.00.0	4.00.0	-	-	-	4.01.0
MODEL	4.00.0	-	-	-	-	-	4.01.0
P_SIZE	-	-	4.00.0	-	-	-	-
Q_SIZE	-	-	4.00.0	-	-	-	-
COUNTRY	4.00.0	-	4.00.0	-	-	-	-
DCU_01	4.00.0	4.00.0	4.00.0	4.00.0	4.00.0	-	4.01.0
DCP_01	4.00.0	4.00.0	4.00.0	4.00.0	4.00.0	-	4.01.0
DCU_02	-	4.00.0	4.00.0	4.00.0	4.00.0	-	4.01.0
DCP_02	-	4.00.0	4.00.0	4.00.0	4.00.0	-	4.01.0
DCU_03	-	-	4.00.0	4.00.0	4.00.0	-	-
DCP_03	-	-	4.00.0	4.00.0	4.00.0	-	-
DCU_04	-	-	4.00.0	4.00.0	4.00.0	-	-
DCP_04	-	-	4.00.0	4.00.0	4.00.0	-	-
ACP	4.00.0	4.00.0	4.00.0	4.00.0	4.00.0	-	4.01.0
ACQ	4.00.0	4.00.0	4.00.0	4.00.0	4.00.0	-	-
ACS	4.00.0	4.00.0	4.00.0	4.00.0	4.00.0	-	-
KWH	4.00.0	4.00.0	4.00.0	4.00.0	4.00.0	-	4.01.0
KWH_DAY	4.00.0	4.00.0	4.00.0	4.00.0	4.00.0	-	4.01.0
HOURS	4.00.0	4.00.0	4.00.0	-	-	-	4.01.0
MINUTES_DAY	-	4.00.0	4.00.0	-	-	-	-
CAB_TEMP	4.00.0	4.00.0	4.00.0	4.00.0	4.00.0	-	4.01.0
L1N	4.00.0	-	4.00.0	-	4.00.0	-	4.01.0
L2N	4.00.0	-	4.00.0	-	4.00.0	-	4.01.0
L3N	4.00.0	-	4.00.0	-	4.00.0	-	4.01.0
L1L2	4.00.0	4.00.0	4.00.0	4.00.0	4.00.0	-	-
L2L3	4.00.0	-	4.00.0	4.00.0	4.00.0	-	-
L3L1	4.00.0	-	4.00.0	4.00.0	4.00.0	-	-
GRIF_FREQ	4.00.0	4.00.0	4.00.0	4.00.0	4.00.0	-	4.01.0
PREF	4.00.0	4.00.0	4.00.0	4.00.0	4.00.0	-	4.01.0
QREF	4.00.0	4.00.0	4.00.0	4.00.0	4.00.0	-	4.01.0
STATE	4.00.0	4.00.0	4.00.0	4.00.0	4.00.0	-	4.01.0
FAULT_CODE	4.00.0	-	4.00.0	-	-	-	4.01.0
ALIVE	4.00.0	4.00.0	4.00.0	4.00.0	4.00.0	-	4.01.0

Name	SMA Cluster Controller	Schneider Conext CL60	**INVT BG Series**
SN	4.01.0	4.01.0	4.02.0
MODEL	-	-	4.02.0
P_SIZE	-	4.01.0	-
Q_SIZE	-	4.01.0	-
COUNTRY	-	4.01.0	-
DCU_01	4.01.0	4.01.0	4.02.0
DCP_01	4.01.0	4.01.0	4.02.0
DCU_02	-	4.01.0	4.02.0
DCP_02	-	4.01.0	4.02.0
DCU_03	-	4.01.0	-
DCP_03	-	4.01.0	-
DCU_04	-	4.01.0	-
DCP_04	-	4.01.0	-
ACP	4.01.0	4.01.0	4.02.0
ACQ	4.01.0	4.01.0	4.02.0
ACS	4.01.0	4.01.0	4.02.0
KWH	4.01.0	4.01.0	4.02.0
KWH_DAY	4.01.0	4.01.0	4.02.0
HOURS	4.01.0	4.01.0	4.02.0
MINUTES_DAY	-	4.01.0	-
CAB_TEMP	4.01.0	4.01.0	4.02.0
L1N	4.01.0	4.01.0	4.02.0
L2N	4.01.0	4.01.0	4.02.0
L3N	4.01.0	4.01.0	4.02.0
L1L2	4.01.0	4.01.0	-
L2L3	4.01.0	4.01.0	-
L3L1	4.01.0	4.01.0	-
GRIF_FREQ	4.01.0	4.01.0	4.02.0
PREF	4.01.0	4.01.0	4.02.0
QREF	4.01.0	4.01.0	4.02.0
STATE	-	4.01.0	4.02.0
FAULT_CODE	-	4.01.0	4.02.0
ALIVE	4.01.0	4.01.0	4.02.0

DEIF open protocol

The ASC offers the possibility of interfacing to multiple inverter makes/models and conducting control as a Modbus master device. This is not dealt with in this document.

However the ASC also offers the possibility of performing control via slave interface.
This is done via proprietary “DEIF open” protocol which is accounted for in this chapter.

Some data (references for PV plant) are calculated on the ASC side and will be made available for the PV controller.
Other data (statuses of the PV plant) are measured/calculated in the PV controller and received/read and placed here.

One designated PV Modbus address area (40000-40999) is reserved in the ASC for the purpose.
This address area is read/write accessible by function code 0x03.
The address area is split in three:

- 40000-40099 Read area (ASC puts data here for PV controller to read).
- 40100-40199 Write area (PV controller write data here for ASC to use).
- 40200-40299 Read area 2 (ASC puts data here for PV controller to read).
- 40300-40999 Free for future expansion.

It is intended that this area is being kept as general as possible in order to be used despite the selection of PV brand.

All 32 bit values are represented as with HI16 on lowest address and LO16 on highest address (big endian format).

Example:
From DEIF open protocol:
Address: 40000/40001, Data: PV_P_ref

Means that:
Address: 40000, Data: HI16(PV_P_ref)
Address: 40001, Data: LO16(PV_P_ref)

The below chapters contain the DEIF open protocol.

Read area

Address	Name	Description
40000/40001	PV_P_ref	PV active power reference [kW]. NOTE: Resolution follows ASC scaling selected in menu 9030!
40002/40003	PV_Q_ref	PV reactive power reference [kVAr]. NOTE: Resolution follows ASC scaling selected in menu 9030!
40004/40005	PV_Emg_Stop	Emergency stop request to PV 100: Activate emergency stop 200: Deactivate emergency stop
40006/40007	Reserved	-
40008/40009	Deif_watch_dog	Watch dog will increment continuously. To be used for PV/DEIF communication supervision on PV side.
40010/40011	DG_P_tot	Active power delivered by the gensets [kW].
40012/40013	DG_P_nom	Online nominal genset power [kW].
40014/40015	DG_Q_tot	Reactive power delivered by the gensets [kVAr].
40016/40017	DG_P_min	Minimum genset load required [kW].
40018/40019	Mains_P_tot	Mains active power [kW].
40020/40021	Mains_Q_tot	Mains reactive power [kVAr].
40022/40023	Fuel_trip_count	Amount of diesel used since last reset [l].
40024/40025	Fuel_flow	Diesel consumption [0.1l/h].
40026	PV_P_curtailment	PV active power reference [%].
40027	PV_P_curtailment_act	PV curtailment active 0: Inactive 1: Active
40028/40029	PV_P_curtailed_tot_kwh	Curtailed energy counter total [kWh] NOTE: Resolution follows ASC scaling selected in menu 9030!
40030/40031	PV_P_ curtailed _mth_kwh	Curtailed energy counter month [kWh] NOTE: Resolution follows ASC scaling selected in menu 9030!
40032/40033	PV_P_ curtailed _wk_kwh	Curtailed energy counter week [kWh] NOTE: Resolution follows ASC scaling selected in menu 9030!
40034/40035	PV_P_ curtailed _day_kwh	Curtailed energy counter day [kWh] NOTE: Resolution follows ASC scaling selected in menu 9030!
40036	POA_Irradiation_01	Plane of array irradiation sensor 1 [W/m2]
40037	POA_Irradiation_02	Plane of array irradiation sensor 2 [W/m2]
40038	POA_Irradiation_03	Plane of array irradiation sensor 3 [W/m2]
40039	POA_Irradiation	Plane of array irradiation weighted [W/m2]
40040	BOM_Temperature_01	Back of module temperature sensor 1 [0.1C]
40041	BOM_Temperature_02	Back of module temperature sensor 2 [0.1C]
40042	BOM_Temperature_03	Back of module temperature sensor 3 [0.1C]
40043	BOM_Temperature	Back of module temperature weighted [0.1C]
40044/40045	Panel_Pmax_instant_kW	Instant maximum active power that can be generated by PV panels [kW] NOTE: Resolution follows ASC scaling selected in menu 9030!
40046/40047	Panel_Smax_instant_kVA	Instant maximum apparent power that can be generated by inverter(s) [kVA] NOTE: Resolution follows ASC scaling selected in menu 9030!
40048/40049	Panel_Q1max_instant_kVA	Instant maximum reactive power that can be generated by inverter(s) in first quadrant [kVAr] NOTE: Resolution follows ASC scaling selected in menu 9030!
40050/40051	Panel_Q4max_instant_kVA	Instant maximum reactive power that can be generated by inverter(s) in fourth quadrant [kVAr] NOTE: Resolution follows ASC scaling selected in menu 9030!
40052/40053	PV_P	Active PV power production [kW]. NOTE: Resolution follows ASC scaling selected in menu 9030!
40054/40055	PV_S	Active PV apparent power production [kVA]. NOTE: Resolution follows ASC scaling selected in menu 9030!
40056/40057	PV_Q	Active PV reactive power production [kVAr]. NOTE: Resolution follows ASC scaling selected in menu 9030!
40058/40059	My_spinning_reserve_kW	Spinning reserve generated by this PV [kW]. NOTE: Resolution follows ASC scaling selected in menu 9030!
40060/40061	PV_spinning_reserve_tot_kW	Spinning reserve generated by all the PV's [kW].
40062	GH_Irradiation	Global horizontal irradiation [W/m2]
40063	Ambient_Temperature	Ambient temperature [0.1C]
40064	Relative_Humidity	Relative humidity [%]
40065	Barometric_Pressure	Barometric pressure [hPa]
40066	Wind_Speed	Wind speed [m/s]
40067	Wind_Direction	Wind direction [deg]

40068	Rain_Fall	Rain fall [mm]
40069	Snow_Depth	Snow depth [mm]
40070/40071	PV_P_ curtailed _year_kwh	Curtailed energy counter year [kWh] NOTE: Resolution follows ASC scaling selected in menu 9030!
40072	PR_total	Performance ratio total [0.1%]
40073	PR_year	Performance ratio year [0.1%]
40074	PR_month	Performance ratio moth [0.1%]
40075	PR_week	Performance ratio week [0.1%]
40076	PR_day	Performance ratio day [0.1%]
40077/40078	DG_total_kWh	Total genset energy counter [kWh] NOTE: Resolution follows ASC scaling selected in menu 9030!
40079/40080	DG_year_kWh	Yearly genset energy counter [kWh] NOTE: Resolution follows ASC scaling selected in menu 9030!
40081/40082	DG_month_kWh	Monthly genset energy counter [kWh] NOTE: Resolution follows ASC scaling selected in menu 9030!
40083/40084	DG_week_kWh	Weekly genset energy counter [kWh] NOTE: Resolution follows ASC scaling selected in menu 9030!
40085/40086	DG_day_kWh	Daily genset energy counter [kWh] NOTE: Resolution follows ASC scaling selected in menu 9030!
40087	PV_pen_total	PV penetration total [0.1%]
40088	PV_pen_year	Yearly PV penetration [0.1%]
40089	PV_pen_month	Monthly PV penetration [0.1%]
40090	PV_pen_week	Weekly PV penetration [0.1%]
40091	PV_pen_day	Daily PV penetration [0.1%]
40092-40099	Free	These addresses are currently unused.

Even though “DEIF open” protocol is not being used, the “Read” area will still be updated by the ASC and will hence be available for SCADA/monitoring systems in any case.

Write area

Address	Name	Description
40100/40101	PV_P_available	Available PV power [kW*]. <0: Nominal power setting in the ASC will be used by logics. ≥0: PV_P_available will be used by logics.
40102/40103	PV_P_tot	Active PV power [kW*].
40104/40105	Reserved	-
40106/40107	Reserved	-
40108/40109	Reserved	-
40110/40111	Reserved	Available PV apparent power [kVA*]. <0: Nominal power setting in the ASC will be used by logics. ≥0: PV_S_available will be used by logics.
40112/40113	DG_P_reserve	Spinning reserve in diesel system [kW].
40114/40115	PV_mode	Current operation mode of the PV plant: 200: Ready for operation
40116/40117	PV_watch_dog	Watch dog will increment continuously. To be used for PV/DEIF communication supervision on DEIF side.
40118/40119	Reserved	-
40120/40121	PV_error	To raise warning and shutdown alarms on DEIF side 100: Warning. 200: Shutdown. 300: Warning & Shutdown.
40122/40123	PV_Q_tot	Reactive PV power [kVAr*].
40124/40125	PV_S_tot	Apparent PV power [kVA*].
40126/40127	Fuel_trip_reset	Reset gensets fuel trip counters from PV side: 100: reset fuel trip counters
40128/40129	PV_Q_available_Q1	Available PV reactive power [kVAr*] in Q1. <0: Nominal power setting in the ASC will be used by logics. ≥0: PV_Q_available_Q1 will be used by logics.
40130	POA_Irradiation_01	Plane of array irradiation sensor 1 [W/m2]
40131	POA_Irradiation_02	Plane of array irradiation sensor 2 [W/m2]
40132	POA_Irradiation_03	Plane of array irradiation sensor 3 [W/m2]
40133	BOM_Temperature_01	Back of module temperature sensor 1 [C]
40134	BOM_Temperature_02	Back of module temperature sensor 2 [C]
40135	BOM_Temperature_03	Back of module temperature sensor 3 [C]
40136	GH_Irradiation	Global horizontal irradiation [W/m2]
40137	Ambient_Temperature	Ambient temperature [C]
40138	Relative_Humidity	Relative humidity [%]
40139	Barometric_Pressure	Barometric pressure [hPa]
40140	Wind_Speed	Wind speed [m/s]
40141	Wind_Direction	Wind direction [deg]
40142	Rain_Fall	Rain fall [mm]
40143	Snow_Depth	Snow depth [mm]
40144/40145	PV_Q_available_Q2	Available PV reactive power [kVAr*] in Q2. <0: Nominal power setting in the ASC will be used by logics. ≥0: PV_Q_available_Q2 will be used by logics.
40146/40147	PV_Q_available_Q3	Available PV reactive power [kVAr*] in Q3. <0: Nominal power setting in the ASC will be used by logics. ≥0: PV_Q_available_Q3 will be used by logics.
40148/40149	PV_Q_available_Q4	Available PV reactive power [kVAr*] in Q4. <0: Nominal power setting in the ASC will be used by logics. ≥0: PV_Q_available_Q4 will be used by logics.

40150-40165	P genset 01..16	Active power of gensets 1 to 16. NOTE: Resolution follows ASC scaling selected in menu 9030!
40166-40181	Q genset 01..16	Reactive power of gensets 1 to 16. NOTE: Resolution follows ASC scaling selected in menu 9030!
40182	P Mains	Active mains power. NOTE: Resolution follows ASC scaling selected in menu 9030!
40183	Q Mains	Reactive mains power. NOTE: Resolution follows ASC scaling selected in menu 9030!
40184	GB close feedback	GB closed feedback bitwise from genset 01..16
40185	MB close feedback	MB closed feedback bitwise from Mains 01..01
40186	MB open feedback	MB open feedback bitwise from Mains 01..01
40187-40199	Free	These addresses are currently unused.

Read area 2

Address	Name	Description
40200/40201	Mains_total_kWh	Total mains imported energy counter [kWh] NOTE: Resolution follows ASC scaling selected in menu 9030!
40202/40203	Mains_year_kWh	Yearly mains imported energy counter [kWh] NOTE: Resolution follows ASC scaling selected in menu 9030!
40204/40205	Mains_month_kWh	Monthly mains imported energy counter [kWh] NOTE: Resolution follows ASC scaling selected in menu 9030!
40206/40207	Mains_week_kWh	Weekly mains imported energy counter [kWh] NOTE: Resolution follows ASC scaling selected in menu 9030!
40208/40209	Mains_day_kWh	Daily mains imported energy counter [kWh] NOTE: Resolution follows ASC scaling selected in menu 9030!
40210/40211	Mains_total_con_kWh	Total mains exported energy counter [kWh] NOTE: Resolution follows ASC scaling selected in menu 9030!
40212/40213	Mains_year_ con_kWh	Yearly mains exported energy counter [kWh] NOTE: Resolution follows ASC scaling selected in menu 9030!
40214/40215	Mains_month_ con_kWh	Monthly mains exported energy counter [kWh] NOTE: Resolution follows ASC scaling selected in menu 9030!
40216/40217	Mains_week_ con_kWh	Weekly mains exported energy counter [kWh] NOTE: Resolution follows ASC scaling selected in menu 9030!
40218/40219	Mains_day_ con_kWh	Daily mains exported energy counter [kWh] NOTE: Resolution follows ASC scaling selected in menu 9030!
40220-40299	Free	These addresses are currently unused.

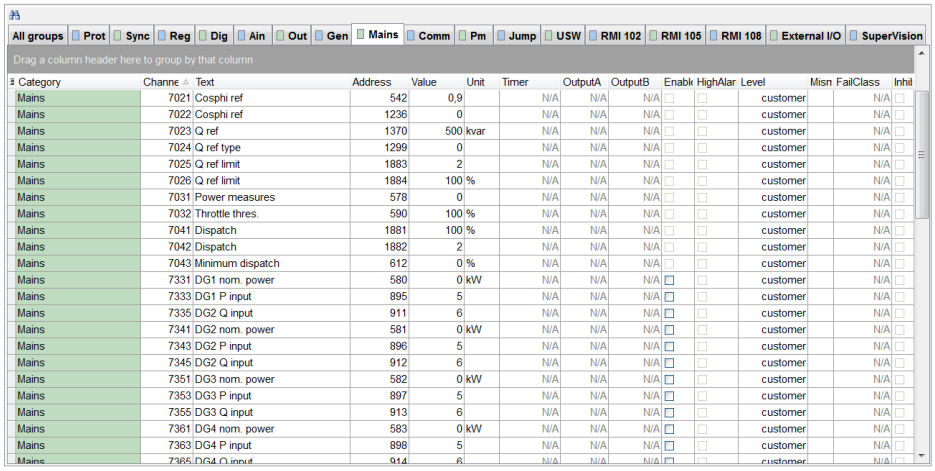
Even though “DEIF open” protocol is not being used, the “Read”-area2 will still be updated by the ASC and will hence be available for SCADA/monitoring systems in any case.

Parameters

All parameters in the ASC are reachable and adjustable via Modbus.
A parameter has various settings/functions attached to it.
It does however not necessarily make use of all its possible settings/functions.

A parameter holds an offset address and each specific setting/function holds a base address.
To determine the absolute address of a specific setting/function of a specific parameter, the base address and the offset address are merely to be added.

The offset address of a parameter can be found via the parameter page (list view) in the USW.
The offset address is shown in the “address” column.



Category	Channe	Text	Address	Value	Unit	Timer	OutputA	OutputB	Enabl	HighAlar	Level	Misn	FailClass	Inhil
Mains	7021	Cosphi ref	542	0,9		N/A	N/A	N/A			customer		N/A	
Mains	7022	Cosphi ref	1236	0		N/A	N/A	N/A			customer		N/A	
Mains	7023	Q ref	1370	500	kvar	N/A	N/A	N/A			customer		N/A	
Mains	7024	Q ref type	1299	0		N/A	N/A	N/A			customer		N/A	
Mains	7025	Q ref limit	1883	2		N/A	N/A	N/A			customer		N/A	
Mains	7026	Q ref limit	1884	100	%	N/A	N/A	N/A			customer		N/A	
Mains	7031	Power measures	578	0		N/A	N/A	N/A			customer		N/A	
Mains	7032	Throttle thres.	590	100	%	N/A	N/A	N/A			customer		N/A	
Mains	7041	Dispatch	1881	100	%	N/A	N/A	N/A			customer		N/A	
Mains	7042	Dispatch	1882	2		N/A	N/A	N/A			customer		N/A	
Mains	7043	Minimum dispatch	612	0	%	N/A	N/A	N/A			customer		N/A	
Mains	7331	DG1 nom. power	580	0	kW	N/A	N/A	N/A			customer		N/A	
Mains	7333	DG1 P input	895	5		N/A	N/A	N/A			customer		N/A	
Mains	7335	DG2 Q input	911	6		N/A	N/A	N/A			customer		N/A	
Mains	7341	DG2 nom. power	581	0	kW	N/A	N/A	N/A			customer		N/A	
Mains	7343	DG2 P input	896	5		N/A	N/A	N/A			customer		N/A	
Mains	7345	DG2 Q input	912	6		N/A	N/A	N/A			customer		N/A	
Mains	7351	DG3 nom. power	582	0	kW	N/A	N/A	N/A			customer		N/A	
Mains	7353	DG3 P input	897	5		N/A	N/A	N/A			customer		N/A	
Mains	7355	DG3 Q input	913	6		N/A	N/A	N/A			customer		N/A	
Mains	7361	DG4 nom. power	583	0	kW	N/A	N/A	N/A			customer		N/A	
Mains	7363	DG4 P input	898	5		N/A	N/A	N/A			customer		N/A	
Mains	7365	DG4 Q input	914	6		N/A	N/A	N/A			customer		N/A	

The base addresses of the different settings/functions are accounted for in the below paragraphs.

Read (function code 0x01)/write (function codes 0x05 and 0x0F) flag status

Base address	Setting
2000-3999	Enable
6000-7999	Acknowledge alarm

Read flag status (function code 0x02)

Base address	Setting
4000-5999	Alarm active
6000-7999	Alarm acknowledge
8000-9999	Timer output
10000-11999	Timer running

Read (function code 0x03)/write (function codes 0x06 and 0x10) register

Base address	Setting
2000-3999	Timer used
4000-5999	Value used
6000-7999	Value minimum
8000-9999	Value maximum
10000-11999	Output a
12000-13999	Output b
14000-15999	Fail class used
16000-17999	Enable
18000-19999	Inhibit

Read register (function code 0x04)

Base address	Setting
2000-3999	Timer minimum
4000-5999	Timer maximum
6000-7999	Output a minimum
8000-9999	Output a maximum
10000-11999	Output b minimum
12000-13999	Output b maximum
14000-15999	Fail class minimum
16000-17999	Fail class maximum
20000-21999	Timers elapsed time
22000-23999	Actual value

Commands
It is possible to apply various commands to the ASC.
These are accounted for below.

Write single coil (function code 0x05)

Address	Command
0	Semi start
1	PV breaker close
2	PV breaker open
3	Semi stop
9	Alarm acknowledge
16	Island mode
18	Peak shaving mode
19	Fixed power mode
20	Mains power export mode
26	Auto start
27	Auto stop

4. SunSpec slave

Besides the substantial proprietary protocol that the ASC Modbus slave offers, a SunSpec map has been added for providing a standardised Modbus slave interface to PV SCADA systems.
The following SunSpec models are included in the SunSpec slave support:

C001:	Common model
I103:	Inverter model
I120:	Name plate model
I121:	Inverter controls basic settings model
I122:	Inverter controls extended measurements and status model
I123:	Immediate control model
E302:	Irradiation model
E303:	Back of module temperature model
E307:	Base meteorological model
	End Model

The models are explained in details in the following paragraphs.
All addresses are provided with offset 0.

Common model
The Common model defines the start of a SunSpec map with unique ID and contains the following data.

Address	Label	Length (words)	Type	Access
50000	SunSpec ID 0x53756E53	2	uint32	RO
50002	Model ID 1	1	uint16	RO
50003	Data elements 66	1	uint16	RO
50004	Manufacturer	16	string	RO
50020	Model	16	string	RO
50036	Options	8	string	NA
50044	Version	8	string	RO
50052	Serial	16	string	NA
50068	Modbus ID	1	uint16	RO
50069	Pad	1	pad	RO

Inverter model

The Inverter model contains the following data.

Address	Label	Length (words)	Type	Access
50070	Model ID 103	1	uint16	RO
50071	Data elements 50	1	uint16	RO
50072	A	1	uint16	NA
50073	AphA	1	uint16	RO
50074	AphB	1	uint16	RO
50075	AphC	1	sunssf	RO
50076	A_SF	1	uint16	RO
50077	PPVphAB	1	uint16	RO
50078	PPVphBC	1	uint16	RO
50079	PPVphCA	1	uint16	RO
50080	PVphA	1	uint16	RO
50081	PVphB	1	uint16	RO
50082	PVphC	1	uint16	RO
50083	V_SF	1	sunssf	RO
50084	W	1	int16	RO
50085	W_SF	1	sunssf	RO
50086	Hz	1	uint16	RO
50087	Hz_SF	1	sunssf	RO
50088	VA	1	int16	RO
50089	VA_SF	1	sunssf	RO
50090	VAr	1	int16	RO
50091	VAr_SF	1	sunssf	RO
50092	PF	1	int16	RO
50093	PF_SF	1	sunssf	RO
50094	WH	2	acc32	RO
50096	WH_SF	1	sunssf	RO
50097	DCA	1	uint16	NA
50098	DCA_SF	1	sunssf	RO
50099	DCV	1	uint16	NA
50100	DCV_SF	1	sunssf	RO
50101	DCW	1	int16	NA
50102	DCW_SF	1	sunssf	RO
50103	TmpCap	1	int16	NA
50104	TmpSnk	1	int16	NA
50105	TmpTrns	1	int16	NA
50106	TmpOt	1	int16	NA
50107	Tmp_SF	1	sunssf	RO
50108	St	1	enum16	RO
50109	StVnd	1	enum16	NA
50110	Evt1	2	bitfield32	NA
50112	Evt2	2	bitfield32	NA
50114	EvtVnd1	2	bitfield32	NA
50116	EvtVnd2	2	bitfield32	NA
50118	EvtVnd3	2	bitfield32	NA
50120	EvtVnd4	2	bitfield32	NA

“St” status is handled in the following way:

STANDBY (8)	In case none of the below applies
MMPT (4)	In case in operation and none of the below applies
STARTING (3)	In case put in operation but still in starting procedure. “Delay regulation” not expired.
THROTTLE (5)	In case in operation and power production is throttled.
SHUTTING DOWN (6)	In case in operation but in the procedure of stopping down.
FAULT (7)	In case a fault is active that prevents operation

Name plate model

The name plate model contains the following data.

Address	Label	Length (words)	Type	Access
50122	Model ID 120	1	uint16	RO
50123	Data elements 26	1	uint16	RO
50124	DERTyp 4	1	enum16	RO
50125	WRtg	1	uint16	RO
50126	WRtg_SF	1	sunssf	RO
50127	VARtg	1	uint16	RO
50128	VARtg_SF	1	sunssf	RO
50129	VA1RtgQ1	1	int16	RO
50130	VA1RtgQ2	1	int16	NA
50131	VA1RtgQ3	1	int16	NA
50132	VA1RtgQ4	1	int16	RO
50133	VArRtg_SF	1	sunssf	RO
50134	ARtg	1	uint16	NA
50135	ARtg_SF	1	sunssf	RO
50136	PFRtgQ1	1	int16	NA
50137	PFRtgQ2	1	int16	NA
50138	PFRtgQ3	1	int16	NA
50139	PFRtgQ4	1	int16	NA
50140	PFRtg_SF	1	sunssf	RO
50141	WHRtg	1	unit16	NA
50142	WHRtg_SF	1	sunssf	RO
50143	AhrRtg	1	unit16	NA
50144	AhrRtg_SF	1	sunssf	RO
50145	MaxChaRte	1	unit16	NA
50146	MaxChaRte_SF	1	sunssf	RO
50147	MaxDisChaRte	1	unit16	NA
50148	MaxDisChaRte_SF	1	sunssf	RO
50149	Pad	1	Pad	RO

Inverter controls basic settings model

The inverter controls basic settings model contains the following data.

Address	Label	Length (words)	Type	Access
50150	Model ID 121	1	uint16	RO
50151	Data elements 30	1	uint16	RO
50152	WMax	1	uint16	RW
50153	VRef	1	uint16	NA
50154	VRefOfs	1	int16	NA
50155	VMax	1	uint16	NA
50156	VMin	1	uint16	NA
50157	VAMax	1	uint16	RW
50158	VArMaxQ1	1	int16	RW
50159	VArMaxQ2	1	int16	NA
50160	VArMaxQ3	1	int16	NA
50161	VArMaxQ4	1	int16	RW
50162	WGra	1	uint16	NA
50163	PFMinQ1	1	int16	NA
50164	PFMinQ2	1	int16	NA
50165	PFMinQ3	1	int16	NA
50166	PFMinQ4	1	int16	NA
50167	VArAct	1	enum16	NA
50168	ClcTotVA	1	enum16	NA
50169	MaxRmpRte	1	uint16	NA
50170	ECPNomHz	1	uint16	NA
50171	ConnPh	1	enum16	NA
50172	WMax_SF	1	sunssf	RO
50173	VRef_SF	1	sunssf	RO
50174	VRefOfs_SF	1	sunssf	RO
50175	VMinMax_SF	1	sunssf	RO
50176	VA_SF	1	sunssf	RO
50177	VAr_SF	1	sunssf	RO
50178	WGra_SF	1	sunssf	RO
50179	PFMin_SF	1	sunssf	RO
50180	MaxRmpRte_SF	1	sunssf	RO
50181	ECPNomHz_SF	1	sunssf	RO

Inverter controls extended measurement and status model

The inverter controls extended measurements and status model contains the following data.

Address	Label	Length (words)	Type	Access
50182	Model ID 122	1	uint16	RO
50183	Data elements 44	1	uint16	RO
50184	PVConn	1	bitfield16	NA
50185	StorConn	1	bitfield16	NA
50186	ECPConn	1	bitfield16	NA
50187	ActWh	4	acc64	NA
50191	ActVAh	4	acc64	NA
50195	ActVArhQ1	4	acc64	NA
50199	ActVArhQ2	4	acc64	NA
50203	ActVArhQ3	4	acc64	NA
50207	ActVArhQ4	4	acc64	NA
50211	VArAval	1	int16	RO
50212	VArAval_SF	1	sunssf	RO
50213	WAval	1	uint16	RO
50214	WAval_SF	1	sunssf	RO
50215	StSetLimMsk	2	bitfield32	NA
50217	StActCtl	2	bitfield32	NA
50219	TmSrc	4	string	NA
50223	Tms	2	unit32	NA
50225	RtSt	1	bitfield16	NA
50226	Ris	1	unit16	NA
50227	Ris_SF	1	sunssf	RO

Immediate control model

The immediate control model contains the following data.

Address	Label	Length (words)	Type	Access
50228	Model ID 123	1	uint16	RO
50229	Data elements 24	1	uint16	RO
50230	Conn_WinTms	1	uint16	NA
50231	Conn_RvrtTms	1	uint16	NA
50232	Conn	1	enum16	RW
50233	WMaxLimPct	1	uint16	RW
50234	WMaxLimPct_WinTms	1	uint16	NA
50235	WMaxLimPct_RvrtTms	1	uint16	NA
50236	WMaxLimPct_RmpTms	1	uint16	NA
50237	WMaxLimPct_Ena	1	enum16	RW
50238	OutPFSet	1	int16	RW
50239	OutPFSet_WinTms	1	uint16	NA
50240	OutPFSet_RvrtTms	1	uint16	NA
50241	OutPFSet_RmpTms	1	uint16	NA
50242	OutPFSet_Ena	1	enum16	RW
50243	VArWMaxPct	1	uint16	RW
50244	VArMaxPct	1	uint16	RW
50245	VArAvalPct	1	uint16	RW
50246	VArPct_WinTms	1	uint16	NA
50247	VArPct_RvrtTms	1	uint16	NA
50248	VArPct_RmpTms	1	uint16	NA
50249	VArPct_Mod	1	enum16	RW
50250	VArPct_Ena	1	enum16	RW
50251	WMaxLimPct_SF	1	sunssf	RO
50252	OutPFSet_SF	1	sunssf	RO
50253	VArPct_SF	1	sunssf	RO

Enabling ”Conn” corresponds to applying AutoStart signal to the ASC.
Enabling ”WMaxLimPct_Ena” will only have any impact in case ASC is put in fixed power mode.
Enabling ”VArPct_Ena” will only have any impact in case ASC is in SinglePV application or not being in power management mode.
Enabling ”OutPFSet_Ena” will only have any impact in case ASC is in SinglePV application or not being in power management mode.
In case both ”VArPct_Ena” and ”OutPFSet_Ena” is being enabled, ASC will prioritise ”VArPct_Ena”.

Irradiation model

The irradiation control model contains the following data

Address	Label	Length (words)	Type	Access
50254	Model ID 302	1	uint16	RO
50255	Data elements 5	1	uint16	RO
50256	GHI	1	uint16	RO
50257	POAI	1	uint16	RO
50258	DFI	1	uint16	NA
50259	DNI	1	uint16	NA
50260	OTI	1	uint16	NA

Back of module temperature model

The back of module temperature model contains the following data

Address	Label	Length (words)	Type	Access
50261	Model ID 303	1	uint16	RO
50262	Data elements 3	1	uint16	RO
50263	BOM1	1	int16	RO
50264	BOM2	1	int16	RO
50265	BOM3	1	int16	RO

Base meteorological model

The base meteorological model contains the following data

Address	Label	Length (words)	Type	Access
50266	Model ID 307	1	uint16	RO
50267	Data elements 11	1	uint16	RO
50268	TmpAmb	1	int16	RO
50269	RH	1	int16	RO
50270	Pres	1	int16	RO
50271	WndSpd	1	int16	RO
50272	WndDir	1	int16	RO
50273	Rain	1	int16	RO
50274	Snw	1	int16	RO
50275	PPT	1	int16	RO
50276	ElecFld	1	int16	NA
50277	SurWet	1	int16	NA
50278	SoilWet	1	int16	NA

End model

The end model concludes the SunSpec map and contains the following data

Address	Label	Length (words)	Type	Access
50279	Model ID 0xFFFF	1	uint16	RO
50280	Data elements 0	1	uint16	RO

5. Genset data

Besides the data originating from the PV plant (inverters and weather sensors), data from the diesel plant are available in the ASC as well. However this being the case only, in case the complete PV/diesel installation is constituted by a DEIF Power Management system. This means that the gensets need to be equipped with AGC controllers from DEIF which are interlinked with the ASC on the DEIF internal Power Management communication line.

Furthermore, part of the data originates from the genset ECU. Therefore the gensets need to be equipped with an ECU from which the AGC can collect these data. Data only being available via ECU is marked in italics. In case ECU data is not supported, it is applied with the value 0x8000.

All genset data are read using function code 0x04.

The below table describes the Modbus indexing for retrieving genset data from genset number 1 to genset number 16.

Address	Label	Length (words)	Type	Access
1510-1525	Nominal Power	1	sint16	RO
1526-1541	Active Power	1	sint16	RO
1542-1557	Reactive Power	1	sint16	RO
1701	GB positions ON	1	Bit pattern	RO
1702	GB positions OFF	1	Bit pattern	RO
1703	DG Volt/Feq Ok	1	Bit pattern	RO
1705	DG Ready Auto start	1	Bit pattern	RO
1707	Any alarm present	1	Bit pattern	RO
1709	DG Running	1	Bit pattern	RO
1711	GB synchronizing	1	Bit pattern	RO
1732	BB volt freq. Ok	1	Bit pattern	RO
1735	BB volt present	1	Bit pattern	RO
1739	BA volt present	1	Bit pattern	RO
31240-31255	*FuelTripCounter_LO*	1	sint16	RO
31256-31271	*FuelTripCounter_HI*	1	sint16	RO
31272-31287	*FuelTotalCounter_LO*	1	sint16	RO
31288-31303	*FuelTotalCounter_HI*	1	sint16	RO
31304-31319	*Actual fuel rate*	1	sint16	RO
31320-31335	*Engine nominal power kWm*	1	sint16	RO
31336-31351	*Engine power kWm*	1	sint16	RO
31352-31367	*EngineLoadFactor*	1	sint16	RO
31368-31383	*Actual fuel Intensity l/kWhe*	1	sint16	RO
31384-31399	*Actual fuel efficiency kWhe/l*	1	sint16	RO
31400-31415	RunningHourCounter_LO	1	sint16	RO
31416-31431	RunningHourCounter_HI	1	sint16	RO
31432-31447	OilPressure	1	sint16	RO
31448-31463	CoolingWater	1	sint16	RO
31464-31479	FuelLevel	1	sint16	RO
31480-31495	EngineType*	1	sint16	RO
31536-31551	Conversion**	1	sint16	RO
31584-31599	*Expected fuel rate*	1	sint16	RO
31600-31615	*Expected fuel Intensity*	1	sint16	RO
31616-31631	*Expected fuel efficiency*	1	sint16	RO
31632-31647	Genset ID_LO	1	sint16	RO
31648-31663	Genset ID_HI	1	sint16	RO
31664-31679	Site ID_LO	1	sint16	RO
31680-31695	Site ID_HI	1	sint16	RO
31736-31751	Fuel volume litres	1	sint16	RO

* Engine type is to be interpreted according to the below table:

Index	Engine type
1	Detroit (DDEC).
2	Deutch (EMR).
3	JohnDeere (JDEC).
4	Iveco (Iveco).
5	Perkins (Perkins).
6	Caterpillar (Caterpillar)
7	Volvo (VPDEC).
8	Volvo (VPDEC2).
9	Scania (EMS).
10	Scania (EMS2).
11	MTU (MDEC 302).
12	MTU (MDEC 303).
13	MTU (ADEC).
14	Cummins (Cummins).
15	Generic J1939

** Conversion is to be interpreted according to below table:

Bitmask	Engine type
BIT0-1	Oilpressure 0: 0 decimal 1: 1 decimals 2: 2 decimals
BIT2-3	CoolWater 0: 0 decimal 1: 1 decimals 2: 2 decimals
BIT4-5	FuelLevel 0: 0 decimal 1: 1 decimals 2: 2 decimals