Technical Description

SUNNY WEBBOX Modbus® Interface

WEBBOX_MODBUS-TB-EN-18 | Version 1.8

ENGLISH

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1 Information on this Document

Validity

This document is valid for the SMA devices listed in chapter 8.1 “Supported SMA Devices”, p. 68. It describes the variation of the communication protocol “Modbus®[1] Application Protocol” implemented by SMA and the associated data exchange formats for SMA devices.
This document does not include any information on the software communicating with the Modbus interface. Information on such software can be obtained from the respective software manufacturer.

Target Group

This document is for qualified employees. Only persons with corresponding qualifications are allowed to perform the tasks set forth in this document (see section 2.2 "Target Group Qualifications", p. 9).

Secondary Information

SMA documents

Additional information is available www.SMA-Solar.com:

Title of Document	Type of Document
SUNNY WEBBOX	User Manual

Other documents

Source initials	Source
[IANA]	Internet Assigned Numbers Authority (IANA), Service Name and Transport Protocol Port Number Registry: http://www.iana.org/assignments/service-names-port-numbers/service-names-port-numbers.xml
[MBAP]	Modbus Application Protocol Specification V1.1b, Modbus Organization, Inc. PO Box 628 Hopkinton, MA 01748, December 2006

[1] Modbus® is a registered trademark of Schneider Electric and is licensed by the Modbus Organization, Inc.

Symbols

Symbol	Explanation
ℹ	Indicates information that is important for a specific topic or objective, but is not safety-relevant
☐	Prerequisite that has to be met for a specific target
☑	Desired result

Typographies

Typography	Usage	Example
Bold	• File names • Elements that you have to select • Elements at a user interface • Elements that you have to enter • Parameters	• Select **Settings**. • Read the set port in field **Port** • Enter the value **502** in field **Port**
>	• Connects several elements that you have to select	• Select **Settings > Port**
[Button]	• Button that you have to select or click on	• Select **[Next]**
[Source]	• Reference to a literature source • Data channel name	• See source [MBAP]. • Requesting the plant time (UTC) [SerTm]

Nomenclature

Complete designation	Designation in this document
The communication device Sunny WebBox	Data logger
Photovoltaic plant	PV plant
Sunny WebBox	WebBox

Abbreviations and Terms

Abbreviation / Term	Designation	Explanation
CT	Current measuring unit	Hardware for string monitoring
Device-ID	-	Numerical value, which identifies a certain SMA device type, e.g. 155 = Sunny Central 250U
DWORD	Double word	Data with a width of 32 bit, according to IEC 61131-3
GFDI	Ground-Fault Detection and Interruption	Detection of grounding faults and following disruption of the circuit
Hex	-	Hexadecimal number
IP	Internet Protocol	Network protocol for connections over the Internet
MPP	Maximum Power Point	The point on the current-voltage (I-V) curve of a solar module under illumination, where the product of current and voltage is maximum (PMAX, measured in watts).
NaN	Not a number	No valid value is available
PMAX	Active power, maximum value	A device can generated active power up to this limit
RO	Read Only	Value can only be read
RW	Read/Write	Value can be read and written
SCADA	Supervisory Control and Data Acquisition	Concept for monitoring and controlling technical processes; this handbook uses SCADA as an example for a Modbus master system

SMA fieldbus	-	Interface for communication between SMA devices (e.g. RS485 or Ethernet). You can find information on supported communication interfaces in the data sheets of your SMA devices
SMID	Supervised Multiple Input Device	Technical system in the SMA product “Optiprotect“
SMU	String Monitoring Unit	A String Monitoring Unit recognizes, in cooperation with a Sunny Central String-Monitor Controller, a reduced power or a breakdown of solar panels (Strings).
UTC	Coordinated Universal Time	-
VPN	Virtual Private Network	VPN is used to establish a connection from one private computer network to another. The point of connection is established on both sides by what is referred to as a 'VPN gateway'. In each case the VPN gateway may be a computer or a router. The connection itself is described as a VPN tunnel. A secured data stream runs via the tunnel from one network to the other, providing VPN nodes from one network with access to services and devices of the other network.
WORD	-	Data with a width of 16 bit, according to IEC 61131-3

2 Safety

2.1 Intended Use

The Modbus Application Protocol [MBAP] is designed for industrial use.

- Read and follow this documentation to ensure proper and optimum use of Modbus implementation in SMA devices.
- Keep this document in a convenient place for future reference.

2.2 Target Group Qualifications

The activities and settings described in this document must only be performed by qualified employees. Qualified employees must have the following skills:

- Knowledge of IP based network protocols
- Training for installation and configuration of IT systems
- Knowledge and observance of this document

2.3 Safety Notes

Data Security in Ethernet networks

You can connect the data loggers to the Internet. Note that connecting to the Internet carries the risk that unauthorized users can gain access to and manipulate the data or devices in your plant.

Take preventive safety measures, e.g.:

- Set up a firewall
- Close unnecessary network ports
- Allow remote access only through a VPN tunnel
- Do not install a port forwarding for the used Modbus port

3 Product Description

3.1 Modbus Protocol

The Modbus Application Protocol (MBAP) is an industrial communication protocol that is currently mainly used in the solar sector for plant communication in PV power stations.
The Modbus protocol has been developed for reading data from or writing data to clearly defined data areas. The Modbus specification [MBAP] does not specify what data is within which data area; this information must be defined specifically for a device. The fixed definition for a device will be called Modbus profile in this document. With knowledge of the Modbus profile, a Modbus master (e.g. a SCADA system) can access the data of a Modbus slave (Sunny WebBox).
The SMA Modbus profile is the special Modbus profile for SMA devices.

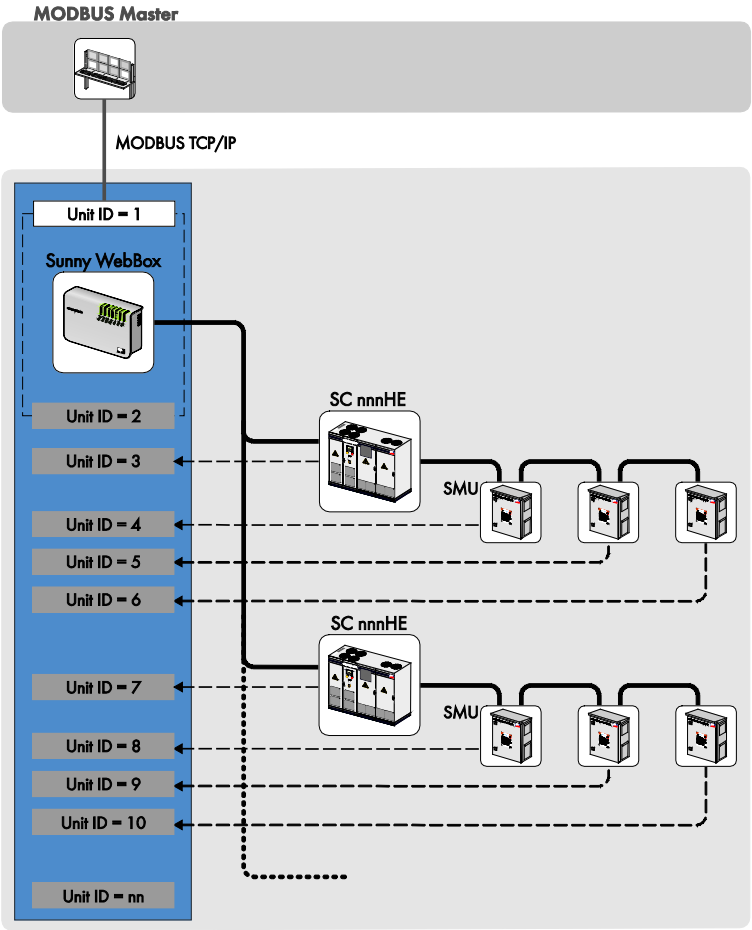
3.2 SMA Modbus Profile

The SMA Modbus profile contains definitions for selected SMA devices. For the definition there was a reduction of the available data, such as overall and daily energy, current output, voltages and currents, and this data was assigned to the respective Modbus registers. This reduction and assignment between SMA device data and Modbus addresses is illustrated in assignment tables (see chapter 6 "SMA Modbus Profile – Assignment Tables", page 23). There, an SMU (String Monitoring Unit), for example, provides the information on the string currents, whereas an inverter, for example, provides the opportunity to call up power and voltage.
In order to enable access to data of an SMA device, a special gateway is required that is provided by the data logger (Sunny WebBox).

3.3 Possible Network Topologies

The SMA Modbus profile has been designed for a hierarchical plant structure. This structure contains a data logger (Sunny WebBox) as communication device that is equipped with a Modbus TCP/IP interface. All other SMA devices that are connected to the data logger via the SMA fieldbus are subordinate to the data logger.
From the perspective of the Modbus protocol, the SC-COM is a Modbus slave that provides a gateway to subordinate SMA devices. The subordinate SMA devices can only be addressed using this gateway per Unit ID.

Network topology from the perspective of the SMA devices:



IP network connection between SCADA system and data logger (PV plant router)

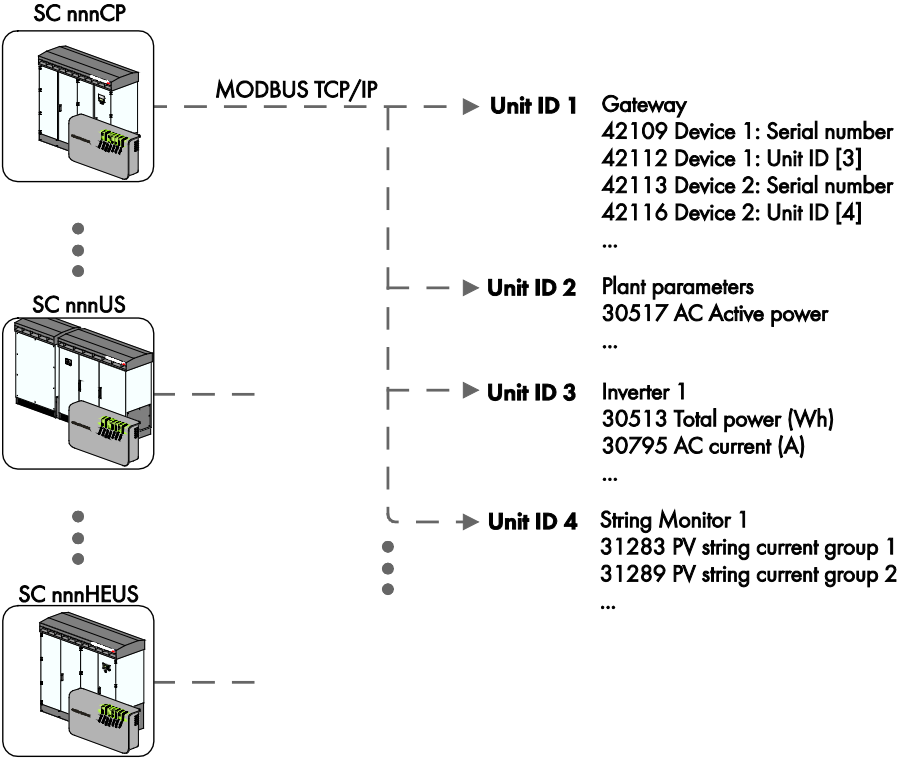
SMA fieldbus

Logical assignment of SMA device to Unit ID

Unit ID Device identifier in the Modbus protocol (see Section 5.1 "Addressing and Data Transfer in Modbus Protocol", page 17)

Network topology from the perspective of the Modbus:

In the graphic below, an inverter and its String Monitoring Unit are assigned a Unit ID. With it, their data become available on the Modbus protocol. Unit ID 1 and Unit ID 2 represent the gateway to the Modbus interface as well as the plant parameters.



4 Commissioning & Configuration

Requirement:

☐ The devices in your plant have to be connected to the data logger and the plant has to be set into operation (see operating instructions or user guide of the respective data logger).

Procedure:

1. Check the firmware version and if necessary carry out a firmware update, see source [Sunny WebBox]. A firmware update to a newer version is recommended to enable the data logger to support the SMA devices contained in the included SMA Modbus profile. You can find the required firmware version in chapter 8.1 “Supported SMA Devices”, page 68.

Background information to firmware update

When updating the firmware of Sunny WebBox to a Modbus-capable version (see section 8.1 “Supported SMA Devices", page 68), the SMA devices that are Modbus-capable and already detected in the data logger are automatically assigned Modbus Unit IDs. Once the firmware is updated, only the Modbus server must be activated.

2. Activate the Modbus server and if necessary, configure the communication port (see section 4.1 “Activating Modbus and Configuring the Port”, page 14).
3. If necessary, detect new, additional or replaced devices
   (see section 4.2 “Plant Detection - Automatic Distribution of the Unit IDs”, page 14).
4. If necessary, change the Unit IDs
   (see section 4.3 “Changing Unit IDs via the Gateway”, page 15)

4.1 Activating Modbus and Configuring the Port

If your Sunny WebBox is equipped with the required firmware or you have installed the correct firmware version, you must activate the Modbus to use it. The Modbus interface of the Sunny WebBox is deactivated by default. If necessary, you can also adjust the communication port for the Modbus protocol to your needs by following the steps. We recommend leaving the communication port in its default setting of 502.

Changing the port

If you change the "Modbus port" of the Sunny WebBox, you must also change the Modbus port of a connected Modbus master system. Otherwise, the Sunny WebBox can no longer be accessed via the Modbus protocol.

Procedure:

1. Log into the user interface of the Sunny WebBox as an installer.
2. Select **Settings > Network.**
3. On the page **Network Settings**:
   Select the **Yes** option in the **Use Modbus** field.
4. If required, select another port in the **Modbus port** field.
5. Select [**Save**].

4.2 Plant Detection - Automatic Distribution of the Unit IDs

For a new PV plant or if other SMA devices are added or replaced, they must be added to the data logger. During that process Unit IDs are allocated to the SMA devices (see section 5.2 “Available and reserved Unit IDs”, page 18):

Unit ID after plant detection

When first detecting a plant and when adding further or modified SMA devices, they must be designated with the Modbus Unit ID = 255 (NaN) . These devices can then no longer be addressed and their measured values and parameters cannot be accessed via the Modbus gateway. You must change such assignments manually (see 4.3 "Changing Unit IDs via the Gateway", page 15).

Repeating the plant detection

If the plant is detected once again without any changes being made, existing Unit IDs that have been assigned will remain valid.

Procedure (plant detection):

1. Log into the user interface of the Sunny WebBox as an installer.
2. Select **Plant > Detect.**

   ☑ The page **Plant detection** opens.
3. In the **Total number of devices to be detected** field, enter the number of devices connected to the Sunny WebBox.
4. Select **[Start detection]**.

   ☑ The Sunny WebBox starts detecting all devices and displays its progress. Once all devices have been detected, the Sunny WebBox displays "### Device detection finished ###".
5. Select [**OK**].

   ☑ The **Plant > Devices** page is displayed. The devices have been detected.

4.3 Changing Unit IDs via the Gateway

Procedure:

- Read out the gateway assignment table
- Change the Unit ID in the gateway assignment table

Do not assign duplicate Unit IDs

You must not assign duplicate Unit IDs. If there is a duplicate assignment of a Unit ID, the device data that is entered in the assignment table of the gateway under the lowest Modbus address is always read out in the event of a Modbus request of this Unit ID.

4.3.1 Reading out the Gateway Assignment Table

You can read out the individual Unit IDs of the SMA devices from the assignment table via the Modbus interface. You can access the assignment table using the gateway of the data logger under the Unit ID = 1.

Accessing the gateway

You access the gateway via the IP address of the data logger under the Unit ID = 1.

The assignment of the Unit IDs 3 to 247 is saved in the Modbus registers from address 42109. Each assignment has an address range of 4 Modbus registers (see the following example), whereby in each case only the register with the Unit ID can be written. You can find the assignment table of the gateway in chapter 6.2.1 "Gateway", page 24.

Exemplary assignment table:

After a device is detected, the assignment table in your Modbus master system looks as follows (example):

Modbus address	Content	Description	Device #
...	...	...	
42109	*158*	*Device-ID*	A
42110	*2145600972*	*Serial number*	A
42112	*3*	*Unit ID*	A
42113	*160*	*Device-ID*	B
42114	*2145600320*	*Serial number*	B
42116	*4*	*Unit ID*	B
42117	*215*	*Device-ID*	C
42118	*2145600934*	*Serial number*	C
42120	*255*	*Unit ID*	C
...	...	...	...

4.3.2 Changing the Unit ID in the gateway assignment table:

You change a Unit ID by writing it to the corresponding Modbus address. For the following example, this means that the new Unit ID has to be written to Modbus address 42116. You can do this using your Modbus master system, e.g. a SCADA system.

Example for changing the Unit ID in the assignment table:

The following table shows an example assignment. An SMA device with device-ID = 160 and serial number 2145600320 has been detected subsequently as the second device in the plant. The Unit ID of this device was manually set to 4:

Modbus address	Description	After detection	Modified
42113	Device-ID	160	160
42114	Serial number	2145600320	2145600320
42116	Unit ID	255 (NaN)	4

5 Interface Definition

5.1 Addressing and Data Transfer in Modbus Protocol

Unit ID and Assignment Tables

The Unit ID is a super-ordinate addressing method in Modbus protocol. In SMA Modbus Profile, registers of individual SMA devices can be addressed under a Unit ID. Under the Unit IDs the assignment of registers of SMA devices to Modbus register addresses is realised in so-called assignment tables. The combination of the SMA devices with Unit IDs is stored in an assignment table in the data logger under the Unit ID = 1 (gateway). The general plant parameters are stored there under the Unit ID = 2. Each subordinate SMA device (e.g. an inverter) is therefore assigned a Unit ID > 2 = (3 to 247) under which the assignments for this SMA device are can be addressed.

Address Range for Modbus Registers

The address range 0 to 0xFFFF with 65536 addresses is available for addressing Modbus registers.

Modbus Register Address and Register width

The smallest unit for Modbus registers is 16 bits wide. For broader data types, connected registers are used and considered as small data blocks. In the assignment tables therefore each Modbus register address can be the start address of a data block. The number of connected Modbus registers is given in the assignment tables.

Data Transfer

The Modbus registers are stored at the data logger in Motorola format (big-endian), meaning for a data transmission that the high byte is transmitted first and then the low byte.
According to the Modbus specification, only a certain amount of user data can be transmitted during a data transfer. The user data also contains function-dependent parameters, like function-code, start address or number of Modbus registers to be transmitted. The amount of user data is dependent on the used Modbus command and must be taken into consideration for data transfer (You can find the possible number of Modbus registers by command in chapter 5.3 “Reading and Writing Data in Modbus Protocol”, page 18).

5.2 Available and reserved Unit IDs

In the Modbus protocol up to 247 devices can be addressed via the Unit ID. The following table shows a summary of the reserved and free Unit IDs:

Unit ID	Reserved for
1	Gateway
2	Plant parameters
3 to 247	Disposable
255	NaN

5.3 Reading and Writing Data in Modbus Protocol

The following Modbus commands are supported by the implemented Modbus interface:

Modbus Command	Hexadecimal Value	User Data (Number of Registers)[2]
Read Holding Registers	0x03	1 to 125
Read Input Registers	0x04	1 to 125
Write Single Register	0x06	1
Write Multiple Registers	0x10	1 to 123
Read Write Multiple Registers	0x17	Read: 1 to 125, Write: 1 to 121

Reading or writing a single Modbus register

A Modbus exception will be generated if a Modbus register that is not contained in Modbus profile is accessed or if a Modbus command is erroneous. Just as, Modbus exceptions will be generated if a read only register is written or a write only register is read.

Data Blocks

In order to avoid inconsistencies, data blocks of registers belonging together must be read or written in one step. For example, the 4 bytes of a 64 bit Modbus register have to be read with one operation into a 64 bit SMA data type.

[2] Number of Modbus registers (16 bit) transferable per command as data block

Writing several Modbus registers as a data block

If several registers are written in a data block (Modbus commands 0x10 and 0x17) and an error occurs during writing, the next register in the data block will be processed. If data is mutually dependent or excludes each other a data block will only be processed if it is valid completely. Otherwise, the complete data block will be rejected. In the event of an error a Modbus exception will be generated.

Reading several Modbus registers as a data block

An answer will be returned if a data block is read and at least one register that is defined in the Modbus profile can be determined in the data blocks data range. If this block moreover contains Modbus registers that are not defined in Modbus profile, NaN will be generated in each case for their request values. A request is not valid and a Modbus exception will be generated if none of the Modbus registers in the data range of a data block is defined in Modbus profile.

Modbus exceptions and NaN values

You will find information on Modbus exceptions in source [MBAP] in section “Other documents”, page 5.
You can find possible NaN values in section 5.4.4 “Data Types and NaN Values”, page 20.

5.4 SMA Data Types

The SMA data types are used in the assignment tables, in the **Type** column. They describe the data widths of the assigned values.

5.4.1 16 Bit Integer Values

16 bit integers are stored in a Modbus register in big-endian sorting.

Modbus register	**1**	
Byte	0	1
Bits	8 ... 15	0 ... 7

U16: 0 ... 65,535 NaN: 0xFFFF

S16: -32,767 ... 32,767 NaN: 0x8000

5.4.2 32 Bit Integer Values

32 bit integers are stored in two Modbus registers in big-endian sorting.

Modbus register	**1**		**2**	
Byte	0	1	2	3
Bits	24 ... 31	16 ... 23	8 ... 15	0 ... 7

U32: 0 ... 4,294,967,294 NaN: 0xFFFF FFFF

U32 (Status / 24 Bit): 0 ... 1,677,212 NaN: 0xFFFF FD

S32: -2,147,483,647 ... 2,147,483,647 NaN: 0x8000 0000

5.4.3 64 Bit Integer Values

64 bit integers are stored in four Modbus registers in big-endian sorting.

Modbus register	**1**		**2**	
Byte	0	1	2	3
Bits	56 ... 63	48 ... 55	40 ... 47	32 ... 39
Modbus register	**3**		**4**	
Byte	4	5	6	7
Bits	24 ... 31	16 ... 23	8 ... 15	0 ... 7

U64: 0 ... 18,446,744,073,709,551,614 NaN: 0xFFFF FFFF FFFF FFFF

5.4.4 Data Types and NaN Values

The following table sets of the data types of the SMA Modbus profile against possible NaN values:

Type	**Description**	**NaN value**
U16	A word (16 bit/WORD) in the local processor format	0xFFFF
S16	Signed word (16 bit/WORD) in the local processor format	0x8000
U32	A double word (32 bit/DWORD) in the local processor format	0xFFFF FFFF
S32	A signed double word (32 bit/DWORD) in the local processor format	0x8000 0000
U64	A quad word (64 bit/2 x DWORD) in the local processor format	0xFFFF FFFF FFFF FFFF

5.5 SMA Data Formats

The following SMA data formats describe how SMA data have to be interpreted. Data formats are e. g. important for data display or for further processing. The SMA data formats are used in the assignment tables, in the **Format** column.

Format	Explanation
Duration	**Time period** Output in seconds
DT	**Date/Time** Output of date/time, in accordance with country setting. Transmission as UTC (without Summertime) in seconds since 01/01/1970.
FIX0	**Factor 1** Output as decimal number, commercially rounded, no decimal places.
FIX1	**Factor 0.1** Output as decimal number, commercially rounded, one decimal place.
FIX2	**Factor 0.01** Output as decimal number, commercially rounded, two decimal places.
FIX3	**Factor 0.001** Output as decimal number, commercially rounded, three decimal places.
FW	Firmware version (e.g. 1.12.0.R), see excursus below.
RAW	Output as text or number, depending on data format of the value. Numbers without decimal places and without thousand or other separation indicators.
ENUM	Output as coded status values. You will find the breakdown of the code in each case directly under the description of the Modbus register in the assignment tables of the SMA Modbus profile.
TEMP	**Temperature** The values are given in special Modbus registers in degrees Celsius, in degrees Fahrenheit or in Kelvin. The output is given commercially rounded with one decimal place.

Firmware version excursus (FW): Four values are extracted from the delivered DWORD. The values **Major** and **Minor** are contained BCD coded in bytes 1 and 2. Byte 3 contains the **Build** value (not BCD coded). The **Release type** in accordance with the following table is contained in the 4th byte:

Value	Version	Explanation
0	N	NOREV
1	E	EXPERIMENTAL
2	A	ALPHA
3	B	BETA
4	R	RELEASE
5	S	SPECIAL
> 5	As number	No special interpretation

Example:

Values from DWORD: Major: 1, Minor: 5, Build: 10, Release type: 3
(Hex: 0x1 0x5 0xA 0x4)

6 SMA Modbus Profile – Assignment Tables

6.1 Information on the Assignment Tables

The following sections are sorted by Unit ID. Each section contains a table of the Modbus addresses which can be accessed under the corresponding Unit ID. The tables present the following information:

Information	Explanation
ADR	Decimal Modbus address (see also chapter 5.1 and following)
Description/Return code	Brief description of the function of this register and the possible return codes. The name of the SMA data channel is additionally specified in square brackets if available.
CNT	Number of utilized Modbus registers (see also chapter 5.1 and following)
Type	Type of the register values, e.g. U32 = 32 bit without algebraic sign (see also chapter 5.1)
Format	Processing information for the stored value, e.g. DT = date, FIX n = with n decimal places, TEMP = temperature (see also chapter 5.4.4)
Access	Access type for Modbus TCP (see chapter 5.3 "Reading and Writing Data in Modbus Protocol", page 18): RO: read-only access RW: read-write access

6.2 Data Logger

6.2.1 Gateway

You can access the gateway of the data logger under the Unit ID = 1. The following table contains the values provided by the gateway as well as the assignment of the subordinate SMA devices to the Unit IDs:

Unit ID = 255

For Unit ID = 255, please observe chapter 5.2 “Available and reserved Unit IDs”, page 18.

ADR (DEC)	Description/Return code	CNT (WORD)	Type	Format	Access
30001	Version number of the SMA Modbus profile	2	U32	RAW	RO
30007	Modbus data change: Counter value will increase if data in the profile has changed.	2	U32	RAW	RO
30057	Serial number of the data logger	2	U32	RAW	RO
Assignment Unit ID – SMA devices (see also section 5.2, page 18):					
42109	Device 1: Device-ID	1	U16	RAW	RO
42110	Device 1: Serial number	2	U32	RAW	RO
42112	Device 1: Unit ID, e.g. 3	1	U16	RAW	RW
42113	Device 2: Device-ID	1	U16	RAW	RO
42114	Device 2: Serial number	2	U32	RAW	RO
42116	Device 2: Unit ID, e.g. 4	1	U16	RAW	RW
...	...	...	...	...	...
43085	Device 245: Device-ID	1	U16	RAW	RO
43086	Device 245: Serial number	2	U32	RAW	RO
43088	Device 245: Unit ID, e.g. 247	1	U16	RAW	RW

6.2.2 Plant Parameters

You can access the plant parameters under the Unit ID = 2. The following table contains the plant parameter provided by the data logger:

ADR (DEC)	Description/Return code	CNT (WORD)	Type	Format	Access
30001	Version number of the SMA Modbus profile	2	U32	RAW	RO
30007	Modbus data change: Counter value will increase if data in the profile has changed.	2	U32	RAW	RO
30057	Serial number of the data logger [Serial Number]	2	U32	RAW	RO
30193	Reading the plant time (UTC) [SerTm]	2	U32	DT	RO
30195	Reading the time zone (UTC). For possible values, see section 8.6 "Return Codes for Time Zones", page 73.	2	U32	ENUM	RO
30513	Total yield (Wh) [E-Total]	4	U64	FIX0	RO
30517	Day yield (Wh) [E-heute]	4	U64	FIX0	RO
30529	Total yield (Wh) [E-Total]	2	U32	FIX0	RO
30531	Total yield (kWh) [E-Total]	2	U32	FIX0	RO
30533	Total yield (MWh) [E-Total]	2	U32	FIX0	RO
30535	Day yield (Wh) [E-heute]	2	U32	FIX0	RO
30537	Day yield (kWh) [E-heute]	2	U32	FIX0	RO
30539	Day yield (MWh) [E-heute]	2	U32	FIX0	RO
30775	AC active power across all phases (W) [Pac]	2	S32	FIX0	RO
40001	Setting of the plant time (UTC) [SerTm]	2	U32	DT	RW
40003	Selected time zone for the display [TmZn]. For possible values, see section 8.6 "Return Codes for Time Zones", page 73.	2	U32	ENUM	RW

6.3 SMA Devices

Availability of the Modbus registers

For each inverter type, only certain Modbus registers are available. If a Modbus register is not available for an inverter type, a Modbus exception will be generated upon accessing this register.
You will find information on Modbus exceptions in section "Other documents" in source [MBAP].

6.3.1 Common Addresses of all SMA Devices

In the following table, you will find the measured values and parameters, which you can access under the Unit IDs = 3-247. The table does not apply to the Unit IDs 1 and 2:

ADR (DEC)	Description/Return code	CNT (WORD)	Type	Format	Access
30057	Serial number [Serial Number]	2	U32	RAW	RO
30193	Reading the plant time (UTC) [SerTm]	2	U32	DT	RO
30197	Event ID of the current event (number of digits is limited by the device) [ErrNo]; see also chapter 7 "Troubleshooting", page 67.	2	U32	FIX0	RO
30231	Maximum possible continuous active power, fixed configuration. Can be greater than the nominal power (W) [Plimit]	2	U32	FIX0	RO
30233	Permanent active power limitation (W) [Pmax]	2	U32	FIX0	RO
30513	Total yield (Wh) [E-total]	4	U64	FIX0	RO
30517	Day yield (Wh) [E-heute]	4	U64	FIX0	RO
30521	Operating time (s) [h-On]	4	U64	Duration	RO
30525	Feed-in time (s) [h-total]	4	U64	Duration	RO
30529	Total yield (Wh) [E-Total]	2	U32	FIX0	RO
30531	Total yield (kWh) [E-Total]	2	U32	FIX0	RO
30533	Total yield (MWh) [E-Total]	2	U32	FIX0	RO
30541	Operating time (s) [h-on]	2	U32	Duration	RO
30543	Feed-in time (s) [h-Total]	2	U32	Duration	RO

30769	DC current input (A) [Ipv]	2	S32	FIX3	RO
30771	DC voltage input (V) [Vpv]	2	S32	FIX2	RO
30773	DC power input (W) [Ppv]	2	S32	FIX0	RO
30775	AC active power across all phases (W) [Pac]	2	S32	FIX0	RO
30789	Grid voltage phase AB (V) [VacL12]	2	U32	FIX2	RO
30791	Grid voltage phase BC (V) [VacL23]	2	U32	FIX2	RO
30793	Grid voltage phase CA (V) [VacL31]	2	U32	FIX2	RO
30795	Grid current (A) [Iac]	2	U32	FIX3	RO
30803	Power frequency (Hz) [Fac]	2	U32	FIX2	RO
30805	Reactive power (var) [Qac]	2	S32	FIX2	RO
30813	Apparent power[3] (VA) [Sac]	2	S32	FIX0	RO
30837	Active power target value (W) [P-W]	2	U32	FIX0	RO
34109	Heat sink temperature 1 (°C) [TmpHs]	2	S32	TEMP	RO
34113	Interior temperature 1 (°C) [TmpCab1]	2	S32	TEMP	RO
34125	External temperature 1 (air supply) (°C) [TmpExl1]	2	S32	TEMP	RO
40001	Setting of the plant time (UTC) [SerTm]	2	U32	DT	RW

[3] Due to internal calculation of the apparent power [Sac] for SC nnnCP it cannot be guaranteed that this value is available synchronous to the measured values reactive power [Qac] and active power [Pac].

6.3.2 Device Family SB n000US

In the following table, you will find the measured values and parameters supported by the SB n000US device family, which you can access under the Unit IDs = 3-247 (see section 5.2 “Available and reserved Unit IDs”, page 18):

Address compatibility

The assignments in section 6.3.1 “Common Addresses of all SMA Devices”, page 26, do **not** apply to this device type.

ADR (DEC)	Description/Return code	CNT (WORD)	Type	Format	Access
30051	Device class [MainModel]: 260 = Solar inverter	2	U32	ENUM	RO
30057	Serial number [SMA-SN]	2	U32	RAW	RO
30213	Message [Error]: 71 = Interference of device 84 = Over current grid (HW) 87 = Grid frequency disturbance 89 = Grid disconnection point 90 = Deviation grid voltage measurement 125 = Overvoltage input A (SW) 132 = System data defective 133 = System data access not possible 134 = System data restored 141 = Derating occurred 145 = Relay defect 148 = Internal communication 156 = Execution (Operation) 168 = Code memory defective 189 = Execution (State machine) 208 = Execution (Watchdog) 520 = Over temperature transformer area 540 = Ground fuse missing 542 = Internal measurement comparison fault 543 = Internal measurement comparison fault 546 = Measurement recording fault	2	U32	ENUM	RO

	547 = Grid fault reported 1004 = Grid type detection failed 1007 = Over current Ground fuse 1255 = Grid voltage fault 1598 = Transformer incorrectly connected				
30231	Maximum permanent active power, set unchangeable. Can be higher than the rated power (W) [Plimit]	2	U32	FIX0	RO
30233	Permanent active power limitation (W) [Pmax]	2	U32	FIX0	RO
30235	Status of the backup mode [Backup State]: 1440 = Grid mode 1441 = Separate grid mode	2	U32	ENUM	RO
30237	Grid type [Grid Type]: 1433 = 277 Volt 1434 = 208 Volt 1435 = 240 Volt 1436 = 208 Volt without neutral conductor 1437 = 240 Volt without neutral conductor	2	U32	ENUM	RO
30239	Operating mode of the PowerBalancer [Balancer]: 303 = Off 1442 = PhaseGuard 1443 = PowerGuard 1444 = FaultGuard	2	U32	ENUM	RO
30241	Operation mode [Mode]: 295 = MPP 381 = Stop 443 = Constant voltage 557 = Temperature derating is active 565 = Power specification via characteristic curve 1392 = Fault 1466 = Waiting 1467 = Starting 1468 = Searching for MPP 1470 = Disturbance 2100 = Power limitation to avoid unbalanced load (Power Balancing)	2	U32	ENUM	RO
30513	Total yield (Wh) [E-Total]	4	U64	FIX0	RO
30521	Operating time (s) [h-On]	4	U64	Duration	RO

30525	Feed-in time (s) [h-Total]	4	U64	Duration	RO
30529	Total yield (Wh) [E-Total]	2	U32	FIX0	RO
30531	Total yield (kWh) [E-Total]	2	U32	FIX0	RO
30533	Total yield (MWh) [E-Total]	2	U32	FIX0	RO
30561	Number of events for installer [Event-Cnt]	2	U32	FIX0	RO
30769	DC current input (A) [Ipv]	2	S32	FIX3	RO
30771	DC voltage input (V) [Vpv]	2	S32	FIX2	RO
30775	AC active power across all phases (W) [Pac]	2	S32	FIX0	RO
30783	Grid voltage L1 against N (V) [VacL1]	2	U32	FIX2	RO
30785	Grid voltage L2 against N (V) [VacL2]	2	U32	FIX2	RO
30797	Grid current L1 (A) [Iac]	2	U32	FIX3	RO
30803	Power frequency (Hz) [Fac]	2	U32	FIX2	RO
40007	Type of inverter control [Operating mode]: 295 = MPP 381 = Stop 443 = Constant voltage 565 = Power specification via characteristic curve	2	U32	ENUM	RW

6.3.3 Device Family SB nn000TL-US-12

In the following table, you will find the measured values and parameters supported by the SB nn000TL-US-12 device family, which you can access under the Unit IDs = 3-247 (see section 5.2 "Available and reserved Unit IDs", page 18):

Address compatibility

The assignments in section 6.3.1 "Common Addresses of all SMA Devices", page 26, do **not** apply to this device type.

ADR (DEC)	Description/Return code	CNT (WORD)	Type	Format	Access
30051	Device class [MainModel]: 260 = Solar inverter	2	U32	ENUM	RO
30057	Serial number [SMA-SN]	2	U32	RAW	RO
30213	Message [Error]: 71 = Interference of device 84 = Over current grid (HW) 85 = Over current grid (HW) (SW) 87 = Grid frequency disturbance 90 = Deviation grid voltage measurement 99 = High discharge current 110 = DI converter fault 112 = Residual current 119 = DC grid feed-in 123 = Overvoltage intermediate circuit (SW) 125 = Overvoltage input A (SW) 132 = System data defective 133 = System data access not possible 134 = System data restored 139 = Execution (Test HW) 141 = Derating occurred 145 = Relay defect 148 = Internal communication 149 = Insulation failure 150 = Sensor system insulation resistance 156 = Execution (Operation)	2	U32	ENUM	RO

	163 = L / N swapped 166 = Memory defective 168 = Code memory defective 189 = Execution (State machine) 207 = Bridge short-circuit 208 = Execution (Watchdog) 542 = Internal measurement comparison fault 543 = Internal measurement comparison fault 546 = Measurement recording fault 547 = Grid fault reported 1003 = Intermediate circuit voltages not permitted 1004 = Grid type detection failed 1255 = Grid voltage fault. 1655 = Electric arc detected 1657 = AFCI self-test failed				
30231	Maximum permanent active power, set unchangeable. Can be higher than the rated power (W) [Plimit]	2	U32	FIX0	RO
30233	Permanent active power limitation (W) [Pmax]	2	U32	FIX0	RO
30235	Status of the backup mode [Backup State]: 1440 = Grid mode 1441 = Separate grid mode	2	U32	ENUM	RO
30237	Grid type [Grid Type]: 1435 = 240 Volt 1436 = 208 Volt without neutral conductor 1437 = 240 Volt without neutral conductor 1530 = 208V WYE	2	U32	ENUM	RO
30239	Operating mode of the PowerBalancer [Balancer]: 303 = Off 1442 = PhaseGuard 1443 = PowerGuard 1444 = FaultGuard	2	U32	ENUM	RO
30241	Operation mode [Mode]: 295 = MPP 381 = Stop 443 = Constant voltage 557 = Temperature derating is active 1392 = Fault 1466 = Waiting	2	U32	ENUM	RO

	1467 = Starting 1468 = Searching for MPP 1470 = Disturbance 2100 = Power limitation to avoid unbalanced load (Power Balancing) 2101 = Insulation measurement				
30513	Total yield (Wh) [E-Total]	4	U64	FIX0	RO
30521	Operating time (s) [h-On]	4	U64	Duration	RO
30525	Feed-in time (s) [h-Total]	4	U64	Duration	RO
30529	Total yield (Wh) [E-Total]	2	U32	FIX0	RO
30531	Total yield (kWh) [E-Total]	2	U32	FIX0	RO
30533	Total yield (MWh) [E-Total]	2	U32	FIX0	RO
30561	Number of events for installer [Event-Cnt]	2	U32	FIX0	RO
30769	DC current input (A) [Ipv]	2	S32	FIX3	RO
30771	DC voltage input (V) [Vpv]	2	S32	FIX2	RO
30775	AC active power across all phases (W) [Pac]	2	S32	FIX0	RO
30783	Grid voltage L1 against N (V) [VacL1]	2	U32	FIX2	RO
30785	Grid voltage L2 against N (V) [VacL2]	2	U32	FIX2	RO
30797	Grid current L1 (A) [Iac]	2	U32	FIX3	RO
30803	Power frequency (Hz) [Fac]	2	U32	FIX2	RO
40007	Type of inverter control [Operating mode]: 295 = MPP 381 = Stop 443 = Constant voltage	2	U32	ENUM	RW

6.3.4 Device Family SC nnnCP and SC nnnHE-20

In the following table, you will find the measured values and parameters supported by the SC nnnCP and SC nnnHE-20 device family, which you can access under the Unit IDs = 3-247 (see section 5.2 “Available and reserved Unit IDs”, page 18). The assignments in section 6.3.1 “Common Addresses of all SMA Devices”, page 26 also apply to this table:

ADR (DEC)	Description/Return code	CNT (WORD)	Type	Format	Access
30195	Reading the time zone (UTC) [TmZn]: For possible values, see section 8.6 "Return Codes for Time Zones", page 73.	2	U32	ENUM	RO
30199	Time until grid connection attempt (s) [TmsRmg]	2	U32	Duration	RO
30211	Recommended action [Prio]: 336 = Contact manufacturer 337 = Contact installer 338 = Invalid	2	U32	ENUM	RO
30217	Grid contactor [GriSwStt]: 51 = Contactor closed 311 = Contactor open	2	U32	ENUM	RO
30225	Insulation resistance (ohms) [Riso]	2	U32	FIX0	RO
30227	Status of the key switch [DInKeySwStrStp]: 381 = Stop 569 = Activated	2	U32	ENUM	RO
30241	Operating state [Mode]: 309 = Operation 381 = Stop 455 = Warning 1392 = Error 1393 = Wait for PV voltage 1394 = Wait for AC grid 1480 = "Wait for electricity supplier" operating state (for regulation 0 %) 1560 = Remote control disconnection active 2383 = Manual restart	2	U32	ENUM	RO

30243	Error [Error]: 267 = Inverter 1395 = DC section 1396 = AC grid	2	U32	ENUM	RO
30247	Current event number for manufacturer [ErrNoSma]	2	U32	FIX0	RO
30249	GFDI relay status [DInGfdi]: 51 = closed 311 = open	2	U32	ENUM	RO
30251	Restart block status [ManResStt]: 1690 = Fast shut-down 2386 = Overvoltage 2387 = Undervoltage 2388 = Overfrequency 2389 = Underfrequency 2390 = Passive island detection	2	U32	ENUM	RO
30257	DC switch in cabinet [DcSwStt]: 51 = Closed 311 = Open	2	U32	ENUM	RO
30261	AC switch 1 in cabinet [AcSwStt]: 51 = Closed 311 = Open	2	U32	ENUM	RO
30265	AC switch-disconnector in cabinet [AcDiscon]: 51 = Closed 311 = Open	2	U32	ENUM	RO
30535	Day yield (Wh) [E-heute]	2	U32	FIX0	RO
30537	Day yield (kWh) [E-heute]	2	U32	FIX0	RO
30539	Day yield (MWh) [E-heute]	2	U32	FIX0	RO
30545	Operating time interior fan 1 (s) [CntFanCab1]	2	U32	Duration	RO
30547	Operating time interior fan 2 (s) [CntFanCab2]	2	U32	Duration	RO
30549	Operating time heat sink fan (s) [CntFanHs]	2	U32	Duration	RO
30557	Operating time cabinet heating 2 (s) [CntHtCab2]	2	U32	Duration	RO
30797	Grid current L1 (A) [IacL1]	2	U32	FIX3	RO
30799	Grid current L2 (A) [IacL2]	2	U32	FIX3	RO
30801	Grid current L3 (A) [IacL3]	2	U32	FIX3	RO
30821	Displacement power factor, across all phases [PF]	2	U32	FIX2	RO

30823	Excitation type of cos(φ) [PFExt]: 1041 = Overexcited 1042 = Underexcited	2	U32	ENUM	RO
30825	Operating mode of reactive power regulation [Q-VArMod]: 303 = Off 1069 = Reactive power/Voltage characteristic curve Q(U) 1070 = Reactive power Q, direct default setting 1071 = Reactive power const. Q (kvar) 1072 = Reactive power Q, default setting via plant control 1074 = cos(φ), direct default setting 1075 = cos(φ), default setting via plant control 1076 = cos φ(P) – characteristic curve 1387 = Reactive power Q, default setting via analog input 1388 = cos(φ), default setting via analog input 1389 = Reactive power/Voltage characteristic curve Q(U) with hysteresis and deadband	2	U32	ENUM	RO
30827	Reactive power target value (var) [SpntPwrRt]	2	S32	FIX0	RO
30829	Reactive power target value (%) [Q-VArNom]	2	S32	FIX1	RO
30831	Target value cos(φ) [PF-PFSpt]	2	S32	FIX2	RO
30833	Target value excitation type of cos(φ) [PF-PFExtSpt]: 1041 = Overexcited 1042 = Underexcited	2	U32	ENUM	RO
30835	Operating mode of active power limitation [P-WMod]: 303 = Off 1077 = Active power limitation P (W) 1078 = Active power limitation P in (%) of PMAX 1079 = Active power limitation P through plant control 1390 = Active power limitation P via analog inputs 1391 = Active power limitation P via digital inputs	2	U32	ENUM	RO
30839	Active power target value (%) [P-WNom]	2	U32	FIX0	RO
30841	AC voltages (average of all string voltages) (V) [Vac]	2	U32	FIX2	RO

30919	Operating mode of static voltage-stability for “Q at Night” [QoDQ-VArMod]: 303 = Off 1069 = Reactive power/voltage characteristic curve Q(U) 1070 = Reactive power Q, direct specification 1071 = React. power const. Q in kvar 1072 = Q specified by plant control 1387 = Reactive power Q, specified via analogue input 1389 = Reactive power/volt. char. Q(U) parameterised	2	U32	ENUM	RO
30921	Reactive power setpoint for “Q at Night” (var) [QoDQ-VAr]	2	S32	FIX0	RO
30923	Reactive power setpoint for “Q at Night” (%) [QoDQ-VArNom]	2	S32	FIX1	RO
34097	Operating time interior fan 1 (s) [CntFanCab1]	4	U64	Duration	RO
34101	Operating time interior fan 2 (s) [CntFanCab2]	4	U64	Duration	RO
34105	Operating time heat sink fan (s) [CntFanHs]	4	U64	Duration	RO
34117	Interior temperature 3 (°C) [TmpCab3]	2	S32	TEMP	RO
34141	Operating time interior heater 2 (s) [CntHtCab2]	4	U64	Duration	RO
34145	Temperature of the sine-wave filter chokes (°C) [TmpCol]	2	S32	TEMP	RO
34613	Total irradiation on sensor surface (W/m²) [ExtSolIrr]	2	U32	FIX0	RO
34637	Analogue current input 1 (mA) [ExtSolIrr]	2	S32	FIX2	RO
34639	Analogue current input 2 (mA) [ExLAnaInCur]	2	S32	FIX2	RO
34645	Analogue voltage input 1 (V) [ExLAnaInV1]	2	S32	FIX2	RO
40003	Selected time zone for the display [TmZn]. For possible values, see section "Return Codes for Time Zones", page 73.	2	U32	ENUM	RW
40009	Operating state [SpntRemEna]: 381 = Stop 569 = Switched on	2	U32	ENUM	RW
40020	External measurement of the insulation resistance: 303 = Off 308 = On	2	U32	ENUM	RW

6.3.5 Device Family SC nnnHE-US

In the following table, you will find the measured values and parameters supported by the SC nnnHE-US device family, which you can access under the Unit IDs = 3-247 (see section 5.2 "Available and reserved Unit IDs", page 18). The assignments in section 6.3.1 "Common Addresses of all SMA Devices", page 26 also apply to this table:

ADR (DEC)	Description/Return code	CNT (WORD)	Type	Format	Access
30199	Time until grid connection attempt (s) [TmsRmg]	2	U32	Duration	RO
30211	Recommended action [Prio]: 336 = Contact manufacturer 337 = Contact installer 338 = Invalid	2	U32	ENUM	RO
30217	Grid contactor [GdCtcStt]: 51 = Contactor closed 311 = Contactor open	2	U32	ENUM	RO
30241	Operating state [Mode]: 309 = Operation 455 = Warning 1392 = Error 1470 = Fault	2	U32	ENUM	RO
30243	Error [Error]: 267 = Inverter 1395 = DC section 1396 = AC grid	2	U32	ENUM	RO
30247	Current event number for manufacturer [ErrNoSma]	2	U32	FIX0	RO
30257	DC switch in cabinet [DcSwStt]: 51 = Closed 311 = Open	2	U32	ENUM	RO
30261	AC switch 1 in cabinet [AcSwStt]: 51 = Closed 311 = Open	2	U32	ENUM	RO
30265	AC switch-disconnector in cabinet [DlnErrAcScir]: 51 = Closed 311 = Open	2	U32	ENUM	RO

30535	Day yield (Wh) [E-heute]	2	U32	FIX0	RO
30537	Day yield (kWh) [E-heute]	2	U32	FIX0	RO
30539	Day yield (MWh) [E-heute]	2	U32	FIX0	RO
30547	Operating time interior fan 2 (s) [CntFanCab2]	2	U32	Duration	RO
30549	Operating time heat sink fan (s) [CntFanHs]	2	U32	Duration	RO
30797	Grid current L1 (A) [IacL1]	2	U32	FIX3	RO
30799	Grid current L2 (A) [IacL2]	2	U32	FIX3	RO
30801	Grid current L3 (A) [IacL3]	2	U32	FIX3	RO
30821	Displacement power factor, across all phases [PF]	2	U32	FIX2	RO
30823	Excitation type of cos(φ) [PFExt]: 1041 = Overexcited 1042 = Underexcited	2	U32	ENUM	RO
30825	Operating mode of reactive power regulation [Q-VArMod]: 303 = Off 1069 = Reactive power/Voltage characteristic curve Q(U) 1070 = Reactive power Q, direct default setting 1071 = Reactive power const. Q (kvar) 1072 = Reactive power Q, default setting via plant control 1074 = cos(φ), direct default setting 1075 = cos(φ), default setting via plant control 1076 = cos φ(P) – characteristic curve 1387 = Reactive power Q, default setting via analog input 1388 = cos(φ), default setting via analog input 1389 = Reactive power/Voltage characteristic curve Q(U) with hysteresis and deadband	2	U32	ENUM	RO
30827	Reactive power target value (var) [SpntPwrRt]	2	S32	FIX0	RO
30829	Reactive power target value (%) [Q-VArNom]	2	S32	FIX1	RO
30831	Target value cos(φ) [PF-PFSpt]	2	S32	FIX2	RO
30833	Target value excitation type of cos(φ) [PF-PFExtSpt]: 1041 = Overexcited 1042 = Underexcited	2	U32	ENUM	RO

30835	Operating mode of active power limitation [P-WMod]: 303 = Off 1077 = Active power limitation P (W) 1078 = Active power limitation P in (%) of PMAX 1079 = Active power limitation P via plant control 1390 = Active power limitation P via analog input	2	U32	ENUM	RO
30839	Active power target value (%) [P-WNom]	2	U32	FIX0	RO
30841	AC voltages (average of all string voltages) (V) [Vac]	2	U32	FIX2	RO
34101	Operating time interior fan 2 (s) [CntFanCab2]	4	U64	Duration	RO
34105	Operating time heat sink fan (s) [CntFanHs]	4	U64	Duration	RO
34115	Interior temperature 2 (°C) [TmpCab2]	2	S32	TEMP	RO
34121	Transformer temperature 1 (°C) [TmpTrf]	2	S32	TEMP	RO

6.3.6 Device Family SC nnnHE, SC nnnHE-10 and SC nnnHE-11

In the following table, you will find the measured values and parameters supported by the SC nnnHE, SC nnnHE-10 and SC nnnHE-11 device family, which you can access under the Unit IDs = 3-247 (see section 5.2 "Available and reserved Unit IDs", page 18). The assignments in section 6.3.1 "Common Addresses of all SMA Devices", page 26 also apply to this table:

ADR (DEC)	Description/Return code	CNT (WORD)	Type	Format	Access
30225	Insulation resistance (ohms) [R-Insul]	2	U32	FIX0	RO
30241	Operating state [Mode]: 295 = MPP 381 = Stop 1455 = Emergency stop 1466 = Waiting 1467 = Start 1468 = MPP search 1469 = Shut-down 1470 = Fault 1471 = Warning/Error mail OK 1472 = Warning/Error mail not OK 1473 = Plant information mail OK 1474 = Plant information mail not OK 1475 = Error mail OK 1476 = Error mail not OK 1477 = Warning mail OK 1478 = Warning mail not OK 1479 = Wait after grid interruption	2	U32	ENUM	RO
30535	Day yield (Wh) [E-heute]	2	U32	FIX0	RO
30537	Day yield (kWh) [E-heute]	2	U32	FIX0	RO
30539	Day yield (MWh) [E-heute]	2	U32	FIX0	RO
30821	Displacement power factor, across all phases [PF]	2	U32	FIX2	RO
30825	Operating mode of reactive power regulation [Q-VArMod]: 303 = Off 1069 = Reactive power/Voltage characteristic curve Q(U) 1070 = Reactive power Q, direct default setting	2	U32	ENUM	RO

	1071 = Reactive power const. Q (kvar) 1072 = Reactive power Q, default setting via plant control 1074 = cos(φ), direct default setting 1075 = cos(φ), default setting via plant control 1076 = cos φ(P) – characteristic curve 1387 = Reactive power Q, default setting via analog input 1388 = cos(φ), default setting via analog input				
30827	Reactive power target value (var) [Q-VArSpt]	2	S32	FIX0	RO
30831	Target value cos(φ) [PF-PFSpt]	2	S32	FIX2	RO
30833	Target value excitation type of cos(φ) [PF-PFExtSpt]: 1041 = Overexcited 1042 = Underexcited	2	U32	ENUM	RO
30835	Operating mode of active power limitation [P-WMod]: 303 = Off 1077 = Active power limitation P (W) 1078 = Active power limitation P in (%) of PMAX 1079 = Active power limitation P via plant control 1390 = Active power limitation P via analog input	2	U32	ENUM	RO
31283	PV string current group 1 [Mittelwert Grp1]	2	S32	FIX3	RO
31289	PV string current group 2 [Mittelwert Grp2]	2	S32	FIX3	RO
31295	PV string current group 3 [Mittelwert Grp3]	2	S32	FIX3	RO
32049	SSM ID for the communication fault has occurred [Komm.Fehler SMU]	2	U32	FIX0	RO
32051	SMU warning code for string fault [SMU Warncode]	2	U32	FIX0	RO
40009	Operating state [BF_Anlage Abf.]: 381 = Stop 569 = Switched on	2	U32	ENUM	RW

6.3.7 Device Family SC nnnU

In the following table, you will find the measured values and parameters supported by the SC nnnU device family, which you can access under the Unit IDs = 3-247 (see section 5.2 "Available and reserved Unit IDs", page 18). The assignments in section 6.3.1 "Common Addresses of all SMA Devices", page 26 also apply to this table:

ADR (DEC)	Description/Return code	CNT (WORD)	Type	Format	Access
30199	Time until grid connection attempt (s) [TmsRmg]	2	U32	Duration	RO
30211	Recommended action [Prio]: 336 = Contact manufacturer 337 = Contact installer 338 = Invalid	2	U32	ENUM	RO
30217	Grid contactor [GdCtcStt]: 51 = Contactor closed 311 = Contactor open	2	U32	ENUM	RO
30241	Operating state [mode]: 309 = Operation 455 = Warning 1392 = Error 1470 = Fault	2	U32	ENUM	RO
30243	Error [Error]: 267 = Inverter 1395 = DC section 1396 = AC grid	2	U32	ENUM	RO
30247	Current event number for manufacturer [ErrNoSma]	2	U32	FIX0	RO
30257	DC switch in cabinet [DcSwStt]: 51 = Closed 311 = Open	2	U32	ENUM	RO
30261	AC switch 1 in cabinet [AcSwStt]: 51 = Closed 311 = Open	2	U32	ENUM	RO
30265	AC switch-disconnector in cabinet [DlnErrAcScir]: 51 = Closed 311 = Open	2	U32	ENUM	RO

30535	Day yield (Wh) [E-heute]	2	U32	FIX0	RO
30537	Day yield (kWh) [E-heute]	2	U32	FIX0	RO
30539	Day yield (MWh) [E-heute]	2	U32	FIX0	RO
30547	Operating time interior fan 2 (s) [CntFanCab2]	2	U32	Duration	RO
30549	Operating time heat sink fan (s) [CntFanHs]	2	U32	Duration	RO
30797	Grid current L1 (A) [IacL1]	2	U32	FIX3	RO
30799	Grid current L2 (A) [IacL2]	2	U32	FIX3	RO
30801	Grid current L3 (A) [IacL3]	2	U32	FIX3	RO
30835	Operating mode of active power limitation [P-WMod]: 303 = Off 1077 = Active power limitation P (W) 1078 = Active power limitation P in (%) of PMAX 1079 = Active power limitation P via plant control 1390 = Active power limitation P via analog input	2	U32	ENUM	RO
30839	Active power target value (%) [PWNom]	2	U32	FIX0	RO
30841	AC voltages (average of all string voltages) (V) [Vac]	2	U32	FIX2	RO
34101	Operating time interior fan 2 (s) [CntFanCab2]	4	U64	Duration	RO
34105	Operating time heat sink fan (s) [CntFanHs]	4	U64	Duration	RO
34115	Interior temperature 2 (°C) [TmpCab2]	2	S32	TEMP	RO
34121	Transformer temperature 1 (°C) [TmpTrf]	2	S32	TEMP	RO

6.3.8 Device Family SI and SBU

In the following table, you will find the measured values and parameters supported by the SI and SBU device families, which you can access under the Unit IDs = 3-247 (see section 5.2 “Available and reserved Unit IDs”, page 18):

Address compatibility

The assignments in section 6.3.1 “Common Addresses of all SMA Devices”, page 26, do **not** apply to this device type.

ADR (DEC)	Description/Return code	CNT (WORD)	Type	Format	Access
30051	Device class: 460 = Solar inverter	2	U32	ENUM	RO
30057	Serial number [Serial Number]	2	U32	RAW	RO
30061	Firmware [FwVer]	2	U32	FW	RO
30063	Firmware [FwVer2]	2	U32	FW	RO
30199	Time until grid connection attempt (s) [GdRmgTm]	2	U32	Duration	RO
30201	Condition [Mode]: 35 = Fault 303 = Off 307 = OK 455 = Warning	2	U32	ENUM	RO
30211	Recommended action [Prio]: 336 = Contact manufacturer 337 = Contact installer 338 = Invalid	2	U32	ENUM	RO
30213	Message [Msg]: 886 = none nnnnn = breakdown see respective device documentation	2	U32	ENUM	RO
30229	Local time (s) [Tm]	2	U32	DT	RO
30531	Total yield (kWh) [E-Total]	2	U32	FIX0	RO
30541	Operating time (s) [OnTmh]	2	U32	Duration	RO

30543	Feed-in time (s) [TotTmh]	2	U32	Duration	RO
30565	Number of generator starts [GnStrCnt]	2	U32	FIX0	RO
30567	Amp hours counter for battery charge (Ah) [AhCntIn]	2	U32	FIX0	RO
30569	Amp hours counter for battery discharge (Ah) [AhCntOut]	2	U32	FIX0	RO
30571	Meter reading consumption meter (Wh) [TotLodEgyCnt]	2	U32	FIX0	RO
30573	Generator operating time (s) [GnOpTmh]	2	U32	Duration	RO
30575	Released generator power (Wh) [GnEgyCnt]	2	U32	FIX0	RO
30577	Grid energy consumption today (Wh) [GdCsmpEgyTdy]	2	U32	FIX0	RO
30579	Grid energy feed-in today (Wh) [GdFeedEgyTdy]	2	U32	FIX0	RO
30581	Grid reference counter reading (Wh) [GdCsmpEgyMtr]	2	U32	FIX0	RO
30583	Grid feed-in counter reading (Wh) [GdFeedEgyMtr]	2	U32	FIX0	RO
30585	Power outage (s) [GdFailTms]	2	U32	Duration	RO
30587	PV generation counter reading (Wh) [PvEgyMtr]	2	U32	FIX0	RO
30589	Rise in self-consumption in total (Wh) [SlfCsmpIncEgy]	2	U32	FIX0	RO
30591	Rise in self-consumption today (Wh) [SlfCsmpIncTdy]	2	U32	FIX0	RO
30593	Energy consumed internally in total (Wh) [SlfCsmpEgy]	2	U32	FIX0	RO
30595	Absorbed energy (Wh) [EgyCntIn]	2	U32	FIX0	RO
30597	Released energy (Wh) [EgyCntOut]	2	U32	FIX0	RO
30599	Number of grid connections [GdCtcCnt]	2	U32	FIX0	RO
30775	Power (W) [TotInvPwrAt]	2	S32	FIX0	RO
30777	Power L1 (W) [InvPwrAt]	2	S32	FIX0	RO
30779	Power L2 (W) [InvPwrAtSlv1]	2	S32	FIX0	RO
30781	Power L3 (W) [InvPwrAtSlv2]	2	S32	FIX0	RO
30783	Grid voltage phase L1 (V) [InvVtg]	2	U32	FIX2	RO
30785	Grid voltage phase L2 (V) [InvVtgSlv1]	2	U32	FIX2	RO
30787	Grid voltage phase L3 (V) [InvVtgSlv2]	2	U32	FIX2	RO
30795	Grid current (A) [TotInvCur]	2	U32	FIX3	RO

30797	Grid current phase L1 (A) [InvCur]	2	U32	FIX3	RO
30799	Grid current phase L2 (A) [InvCurSlv1]	2	U32	FIX3	RO
30801	Grid current phase L3 (A) [InvCurSlv2]	2	U32	FIX3	RO
30803	Grid frequency (Hz) [InvFrq]	2	U32	FIX2	RO
30805	Reactive power (var) [TotInvPwrRt]	2	S32	FIX2	RO
30807	Reactive power L1 (var) [InvPwrRt]	2	S32	FIX0	RO
30809	Reactive power L2 (var) [InvPwrRtSlv1]	2	S32	FIX0	RO
30811	Reactive power L3 (var) [InvPwrRtSlv2]	2	S32	FIX0	RO
30843	Battery current (A) [TotBatCur]	2	S32	FIX3	RO
30845	Current battery charge status (%) [BatSoc]	2	U32	FIX0	RO
30847	Current battery capacity (%) [Soh]	2	U32	FIX0	RO
30849	Battery temperature (°C) [BatTmp]	2	S32	TEMP	RO
30851	Battery voltage (V) [BatVtg]	2	U32	FIX2	RO
30853	Active battery charging mode [BatChrgOp]: 1767 = Quick charge 1768 = Full charge 1769 = Compensation charge 1770 = Maintenance charge 2184 = Save energy while on mains	2	U32	ENUM	RO
30855	Current battery charging set voltage (V) [BatChrgVtg]	2	U32	FIX2	RO
30857	Number of battery charge throughputs [BatCpyThrpCnt]	2	S32	FIX0	RO
30859	Battery maintenance charge status [BatMntStt]: 803 = Inactive 1771 = Charge with solar power 1772 = Charge with solar and mains power	2	U32	ENUM	RO
30861	Consumer power (W) [TotLodPwrAt]	2	S32	FIX0	RO
30863	Current generator power (W) [TotGnPwrAt]	2	U32	FIX0	RO
30865	Power grid reference (W) [GdCsmpPwrAt]	2	S32	FIX0	RO
30867	Power grid feed-in (W) [GdFeedPwrAt]	2	S32	FIX0	RO
30869	PV power generated (W) [TotPvPwr]	2	S32	FIX0	RO
30871	Current self-consumption (W) [SlfCsmpPwrAt]	2	U32	FIX0	RO
30873	Current rise in self-consumption (W) [SlfCsmpIncPwr]	2	S32	FIX0	RO

30875	Multifunction relay status [Rly1Stt]: 51 = Closed 311 = Open	2	U32	ENUM	RO
30877	Power supply status [LodGdConStt]: 303 = Off 1461 = Mains connected 1462 = Backup not available 1463 = Backup	2	U32	ENUM	RO
30879	Reason for generator request [GnDmdSrc]: 46 = Battery 1773 = No request 1774 = Load 1775 = Time control 1776 = Manual one hour 1777 = Manual start 1778 = External source	2	U32	ENUM	RO
30881	PV mains connection [PvGdConStt]: 1779 = Separated 1780 = Public electricity mains 1781 = Island mains	2	U32	ENUM	RO
30883	Status public electricity mains [GdStt]: 303 = Off 1392 = Fault 1394 = Waiting for valid AC grid 1461 = Mains connected 1466 = Wait 1787 = Initialisation 2183 = Mains operation without consumption 2184 = Save energy while on mains 2185 = Stop save energy while on mains 2186 = Start save energy while on mains	2	U32	ENUM	RO
30885	Power external mains connection (W) [TotExtPwrAt]	2	U32	FIX0	RO
30887	Power external mains connection phase A (W) [ExtPwrAt]	2	U32	FIX0	RO
30889	Power external mains connection phase B (W) [ExtPwrAtSlv1]	2	U32	FIX0	RO
30891	Power external mains connection phase C (W) [ExtPwrAtSlv2]	2	U32	FIX0	RO

30893	Reactive power external mains connection (var) [TotExtPwrRt]	2	U32	FIX0	RO
30895	Reactive power external mains connection phase A (var) [ExtPwrRt]	2	U32	FIX0	RO
30897	Reactive power external mains connection phase B (var) [ExtPwrRtSlv1]	2	U32	FIX0	RO
30899	Reactive power external mains connection phase C (var) [ExtPwrRtSlv2]	2	U32	FIX0	RO
30901	Grid frequency external mains connection (Hz) [ExtFrq]	2	U32	FIX2	RO
30903	Voltage external mains connection phase A (V) [ExtVtg]	2	U32	FIX2	RO
30905	Voltage external mains connection phase B (V) [ExtVtgSlv1]	2	U32	FIX2	RO
30907	Voltage external mains connection phase C (V) [ExtVtgSlv2]	2	U32	FIX2	RO
30909	Current external mains connection phase A (A) [ExtCur]	2	S32	FIX3	RO
30911	Current external mains connection phase B (A) [ExtCurSlv1]	2	S32	FIX3	RO
30913	Current external mains connection phase C (A) [ExtCurSlv2]	2	S32	FIX3	RO
30917	Generator status [GnStt]: 303 = Off 1392 = Fault 1787 = Initialisation 1788 = Ready 1789 = Warming 1790 = Synchronisation 1791 = Activated 1792 = Resynchronisation 1793 = Generator separation 1794 = Slow down 1795 = Bolted 1796 = Blocked after error	2	U32	ENUM	RO

40009	Operating condition [ManStr]: 381 = Stop 569 = Activated	2	U32	ENUM	RW
40011	Acknowledge fault [ErrAckn]: 26 = Acknowledge fault	2	U32	ENUM	RW
40031	Rated battery capacity (Ah) [BatCpyNom]	2	U32	FIX0	RO
40033	Max. battery temperature (°C) [BatTmpMax]	2	U32	TEMP	RW
40035	Battery type [BatTyp]: 1782 = Sealed lead battery (VRLA) 1783 = Flooded lead acid batt. (FLA) 1784 = Nickel/Cadmium (NiCd) 1785 = Lithium-Ion (Li-Ion)	2	U32	ENUM	RO
40037	Rated battery voltage (V) [BatVtgNom]	2	U32	FIX0	RO
40039	Battery quick charge time (min) [AptTmBoost]	2	U32	Duration	RW
40041	Battery compensation charge time (h) [AptTmEqu]	2	U32	Duration	RW
40043	Battery full charge time (h) [AptTmFul]	2	U32	Duration	RW
40045	Max. battery charging current (A) [BatChrgCurMax]	2	U32	FIX3	RW
40047	Rated generator current (A) [GnCurNom]	2	U32	FIX3	RW
40049	Automatic generator start [GnAutoEna]: 1129 = Yes 1130 = No	2	U32	ENUM	RW
40051	Generator shutdown battery charge limit (%) [GnSocTm1Stp]	2	U32	FIX0	RW
40053	Generator startup battery charge limit (%) [GnSocTm1Str]	2	U32	FIX0	RW
40055	Manual generator control [GnManStr]: 381 = Stop 1438 = Automatic 1467 = Start 1776 = Manual one hour	2	U32	ENUM	RW
40057	Generator request via power on [GnPwrEna]: 1129 = Yes 1130 = No	2	U32	ENUM	RW
40059	Generator shutdown load limit (W) [GnPwrStp]	2	U32	FIX0	RW
40061	Generator startup load limit (W) [GnPwrStr]	2	U32	FIX0	RW

40071	Grid creating generator [ExtSrc]: 1799 = No 1801 = Mains 1802 = Mains and generator 1803 = Invalid configuration for the PV generation counter	2	U32	ENUM	RW
40073	Lower discharging limit for rise in self-consumption (%) [SlfCsmpSOCMin]	2	U32	FIX0	RW
40075	Rise in self-consumption switched on [SlfCsmpIncEna]: 1129 = Ja 1130 = Nein	2	U32	ENUM	RW
40077	Initiate device restart [InvRs]: 1146 = Execute	2	U32	ENUM	RW
40079	Charging stop voltage battery (V) [BatDiChgVtgMin]	2	U32	FIX2	RW
40081	Maximum charging current battery (A) [BatChrgCurMax]	2	U32	FIX3	RW
40083	Maximum discharging current battery (A) [BatDiChgCurMax]	2	U32	FIX3	RW
40085	Target voltage per cell for quick charge (V) [ChrgVtgBoost]	2	U32	FIX2	RW
40087	Target voltage per cell for full charge (V) [ChrgVtgFul]	2	U32	FIX2	RW
40089	Target voltage per cell for compensation charge (V) [ChrgVtgEqu]	2	U32	FIX2	RW
40091	Target voltage per cell for maintenance charge (V) [ChrgVtgFlo]	2	U32	FIX2	RW
40093	Voltage monitoring upper minimum threshold (V) [GdVtgMin]	2	U32	FIX2	RW
40095	Voltage monitoring upper maximum threshold (V) [GdVtgMax]	2	U32	FIX2	RW
40097	Voltage monitoring hysteresis minimum threshold (V) [GdVtgMinDel]	2	U32	FIX2	RW
40099	Voltage monitoring hysteresis maximum threshold (V) [GdVtgMaxDel]	2	U32	FIX2	RW
40101	Frequency monitoring lower minimum threshold (Hz) [GdFrqMin]	2	U32	FIX2	RW

40103	Voltage monitoring upper maximum threshold (Hz) [GdFrqMax]	2	U32	FIX2	RW
40105	Frequency monitoring hysteresis minimum threshold (Hz) [GdFrqMinDel]	2	32	FIX2	RW
40107	Frequency monitoring hysteresis maximum threshold (Hz) [GdFrqMaxDel]	2	32	FIX2	RW
40109	Country standard set [Country]: 42 = AS4777.3 438 = VDE0126-1-1 1013 = Other standard	2	U32	ENUM	RO
40111	Voltage monitoring generator lower minimum threshold (V) [GnVtgMin]	2	U32	FIX2	RW
40113	Voltage monitoring generator upper maximum threshold (V) [GnVtgMax]	2	U32	FIX2	RW
40115	Voltage monitoring generator hysteresis minimum threshold (V) [GnVtgMinDel]	2	U32	FIX2	RW
40117	Voltage monitoring generator hysteresis maximum threshold (V) [GnVtgMaxDel]	2	U32	FIX2	RW
40119	Frequency monitoring generator lower minimum threshold (Hz) [GnFrqMin]	2	U32	FIX2	RW
40121	Frequency monitoring generator upper maximum threshold (Hz) [GnFrqMax]	2	U32	FIX2	RW
40123	Frequency monitoring generator hysteresis minimum threshold (Hz) [GnFrqMinDel]	2	U32	FIX2	RW
40125	Frequency monitoring generator hysteresis maximum threshold (Hz) [GnFrqMaxDel]	2	U32	FIX2	RW
40127	Voltage monitoring generator maximum reverse power (W) [GnRvPwr]	2	U32	FIX2	RW
40129	Voltage monitoring generator maximum reverse power trigger time (s) [GnRvTm]	2	U32	Duration	RW
40131	Grid connection point rated current (A) [GdCurNom]	2	U32	FIX2	RW
40133	Grid nominal voltage (V) [GdVtgNom]	2	U32	FIX0	RW
40135	Nominal frequency (Hz) [GdFrqNom]	2	U32	FIX2	RW
40137	Acknowledge generator faults [GnAck]: 26 = Acknowledge fault	2	U32	ENUM	RW

40141	Max. start attempts after error [AutoStr]	2	U32	FIX0	RW
40143	Active current for operating mode “plant control” (A) [FedInCurAtCom]	2	S32	FIX2	RW
40145	Reactive current for the operating mode “plant control” (A) [FedInCurRtCom]	2	S32	FIX2	RW
40147	Generator active current limitation for the operating mode “plant control” (A) [GnCurNomCom]	2	U32	FIX2	RW
40149	Active power setpoint for the operating mode “plant control” (W) [FedInPwrAtComW]	2	S32	FIX0	RW
40151	Plant control (Effective and reactive power control via communication) [FedInSpntCom]: 802 = active 803 = inactive	2	U32	ENUM	RW
40153	Reactive power setpoint for the operating mode “plant control” (var) [FedInPwrRtComW]	2	S32	FIX0	RW

6.3.9 Device Family STP nn000TL-10

In the following table, you will find the measured values and parameters supported by the STP nn000TL-10 device family, which you can access under the Unit IDs = 3-247 (see section 5.2 “Available and reserved Unit IDs”, page 18).

Address compatibility

The assignments in section 6.3.1 “Common Addresses of all SMA Devices”, page 26, do **not** apply to this device family.

ADR (DEC)	Description/Return code	CNT (WORD)	Type	Format	Access
30051	Device class [MainModel]: 260 = Solar inverter	2	U32	ENUM	RO
30053	Device-ID [Model]: 9067 = Sunny Tripower 10000TL-10 9068 = Sunny Tripower 12000TL-10 9069 = Sunny Tripower 15000TL-10 9070 = Sunny Tripower 17000TL-10 9101 = Sunny Tripower 8000TL-10	2	U32	ENUM	RO
30057	Serial number [SerNumSet]	2	U32	RAW	RO
30197	Event ID of the current event (number of digits is limited by device) [Op.EvtNo]; see also chapter 7 “Troubleshooting”, page 67.	2	U32	FIX0	RO
30199	Time until grid connection attempt (s) [Op.TmsRmg]	2	U32	Duration	RO
30201	Condition [Op.Health]: 35 = Fault 307 = OK 455 = Warning	2	U32	ENUM	RO
30211	Recommended action [Op.Prio]: 336 = Contact manufacturer 337 = Contact installer 338 = Invalid 887 = None	2	U32	ENUM	RO

30217	Grid contactor [Op.GriSwStt]: 51 = Contactor closed 311 = Contactor open	2	U32	ENUM	RO
30219	Temperature derating [Inv.TmpLimStt]: 557 = Regulation due to temperature 884 = Not active	2	U32	ENUM	RO
30225	Insulation resistance (ohms) [Riso]	2	U32	FIX0	RO
30231	Maximum permanent active power, set unchangeable. Can be higher than the rated power (W) [Plimit]	2	U32	FIX0	RO
30233	Permanent active power limitation (W) [Pmax]	2	U32	FIX0	RO
30513	Total yield (Wh) [E-Total]	4	U64	FIX0	RO
30521	Operating time (s) [Mt.TotTmh]	4	U64	Duration	RO
30525	Feed-in time (s) [Mt.TotOpTmh]	4	U64	Duration	RO
30529	Total yield (Wh) [E-Total]	2	U32	FIX0	RO
30531	Total yield (kWh) [E-Total]	2	U32	FIX0	RO
30533	Total yield (MWh) [E-Total]	2	U32	FIX0	RO
30541	Operating time (s) [Mt.TotTmh]	2	U32	Duration	RO
30543	Feed-in time (s) [Mt.TotOpTmh]	2	U32	Duration	RO
30559	Number of events for user [Op.EvtCntUsr]	2	U32	FIX0	RO
30561	Number of events for installer [Op.EvtCntIstl]	2	U32	FIX0	RO
30563	Number of events for service [Op.EvtCntSvc]	2	U32	FIX0	RO
30769	DC current input (A) [A.Ms.Amp]	2	S32	FIX3	RO
30771	DC voltage input (V) [A.Ms.Vol]	2	S32	FIX2	RO
30773	DC power input (W) [A.Ms.Watt]	2	S32	FIX0	RO
30775	AC active power across all phases (W) [Pac]	2	S32	FIX0	RO
30777	Power L1 (W) [GridMs.W.phsA]	2	S32	FIX0	RO
30779	Power L2 (W) [GridMs.W.phsB]	2	S32	FIX0	RO
30781	Power L3 (W) [GridMs.W.phsC]	2	S32	FIX0	RO
30783	Grid voltage phase L1 to N (V) [GridMs.PhV.phsA]	2	U32	FIX2	RO
30785	Grid voltage phase L2 to N (V) [GridMs.PhV.phsB]	2	U32	FIX2	RO
30787	Grid voltage phase L3 to N (V) [GridMs.PhV.phsC]	2	U32	FIX2	RO

30797	Grid current phase L1 (A) [GridMs.A.phsA]	2	U32	FIX3	RO
30799	Grid current phase L2 (A) [GridMs.A.phsB]	2	U32	FIX3	RO
30801	Grid current phase L3 (A) [GridMs.A.phsC]	2	U32	FIX3	RO
30803	Power frequency (Hz) [GridMs.Hz]	2	U32	FIX2	RO
30805	Reactive power (var) [GridMs.TotVAr]	2	S32	FIX2	RO
30807	Reactive power L1 (var) [GridMs.VAr.phsA]	2	S32	FIX0	RO
30809	Reactive power L2 (var) [GridMs.VAr.phsB]	2	S32	FIX0	RO
30811	Reactive power L3 (var) [GridMs.VAr.phsC]	2	S32	FIX0	RO
30813	Total apparent power (VA) [GridMs.TotVA]	2	S32	FIX0	RO
30815	Apparent power L1 (VA) [GridMs.VA.phsA]	2	S32	FIX0	RO
30817	Apparent power L2 (VA) [GridMs.VA.phsB]	2	S32	FIX0	RO
30819	Apparent power L3 (VA) [GridMs.VA.phsC]	2	S32	FIX0	RO
30825	Operating mode of reactive power regulation [Q-VArMod]: 303 = Off 1069 = Reactive power/Voltage characteristic curve Q(U) 1070 = Reactive power Q, direct default setting 1072 = Reactive power Q, default setting via plant control 1074 = cos(φ), direct default setting 1075 = cos(φ), default setting via plant control 1076 = cos φ(P) – characteristic curve	2	U32	ENUM	RO
30829	Reactive power target value (%) [Q-VArNom]	2	S32	FIX1	RO
30831	Target value cos(φ) [PF-PF]	2	S32	FIX2	RO
30833	Target value excitation type of cos(φ) [PF-PFExt]: 1041 = Overexcited 1042 = Underexcited	2	U32	ENUM	RO
30835	Operating mode of active power limitation [P-WMod]: 303 = Off 1077 = Active power limitation P (W) 1078 = Active power limitation P in (%) of PMAX 1079 = Active power limitation P via plant control	2	U32	ENUM	RO
30837	Active power target value (W) [P-W]	2	U32	FIX0	RO

30839	Active power target value (%) [P-WNom]	2	U32	FIX0	RO
31793	String current, string 1 (A) [A1.Ms.Amp]	2	S32	FIX3	RO
31795	String current, string 2 (A) [A2.Ms.Amp]	2	S32	FIX3	RO
31797	String current, string 3 (A) [A3.Ms.Amp]	2	S32	FIX3	RO
31799	String current, string 4 (A) [A4.Ms.Amp]	2	S32	FIX3	RO
31801	String current, string 5 (A) [A5.Ms.Amp]	2	S32	FIX3	RO
31803	String current, string 6 (A) [B1.Ms.Amp]	2	S32	FIX3	RO
35377	Number of events for user [Op.EvtCntUsr]	4	U64	FIX0	RO
35381	Number of events for installer [Op.EvtCntIstl]	4	U64	FIX0	RO
35385	Number of events for service [Op.EvtCntSvc]	4	U64	FIX0	RO
40009	Operating state [Op.OpModSet]: 295 = MPP 381 = Stop 443 = Constant voltage	2	U32	ENUM	RW
40204	Reactive power setpoint Q in (%) of PMAX [Q-VArNom]	2	S32	FIX1	RW
40206	Cos(φ) setpoint, direct specification [PF-PF]	2	S32	FIX2	RW
40208	Cos(φ) excitation type, direct specification [PF-PFExt]: 1041 = Overexcited 1042 = Underexcited	2	U32	ENUM	RW
40212	Active power limitation P (W) [P-W]	2	U32	FIX0	RW
40214	Active power limitation P (%) [P-WNom]	2	U32	FIX0	RW

6.3.10 Optiprotect

In the following table, you will find the measured values and parameters supported by the Optiprotect, which you can access under the Unit IDs = 3-247 (see section 5.2 “Available and reserved Unit IDs”, page 18).

Address compatibility

The assignments in section 6.3.1 “Common Addresses of all SMA Devices”, page 26, do **not** apply to this device type.

ADR (DEC)	Description/Return code	CNT (WORD)	Type	Format	Access
30051	Device class [MainModel]: 8001 = Sensor system general	2	U32	ENUM	RO
30057	Serial number SMID-CONT [Serial Number]	2	U32	RAW	RO
30061	Firmware SMID-CONT [Firmware]	2	U32	FW	RO
30063	Boot loader SMID-CONT [Firmware-2]	2	U32	FW	RO
30065	Firmware SMID-CT1 [Firmware-3]	2	U32	FW	RO
30067	Boot loader SMID-CT1 [Firmware-4]	2	U32	FW	RO
30069	Firmware SMID-CT2 [Firmware-5]	2	U32	FW	RO
30071	Boot loader SMID-CT2 [Firmware-6]	2	U32	FW	RO
30073	Firmware SMID-CT3 [Firmware-7]	2	U32	FW	RO
30075	Boot loader SMID-CT3 [Firmware-8]	2	U32	FW	RO
30077	Firmware SMID-CT4 [Firmware-9]	2	U32	FW	RO
30079	Boot loader SMID-CT4 [Firmware-10]	2	U32	FW	RO
30097	Serial number SMID-CT1 [Serial Number-1]	2	U32	RAW	RO
30099	Serial number SMID-CT2 [Serial Number-2]	2	U32	RAW	RO
30101	Serial number SMID-CT3 [Serial Number-3]	2	U32	RAW	RO
30103	Serial number SMID-CT4 [Serial Number-4]	2	U32	RAW	RO
30193	Reading the plant time (UTC) [SerTm]	2	U32	DT	RO

30195	Reading the time zone (UTC) [TmZn]: For possible values, see section 8.6 "Return Codes for Time Zones", page 73.	2	U32	ENUM	RO
30197	Event ID of the current event (number of digits is limited by the device) [ErrNo]; chapter 7 “Troubleshooting”, page 67.	2	U32	FIX0	RO
30199	Time until grid connection attempt (s) [TmsRmg]	2	U32	Duration	RO
30211	Recommended action [Prio]: 336 = Contact manufacturer 337 = Contact installer 338 = Invalid	2	U32	ENUM	RO
30225	Insulation resistance (ohms) [Riso]	2	U32	FIX0	RO
30241	Operating state [Mode]: 309 = Operation 455 = Warning 1392 = Error	2	U32	ENUM	RO
30243	Error [Error]: 267 = Inverter 1395 = DC section 1396 = AC grid	2	U32	ENUM	RO
30267 to 30297	SMID DC switch 1 to 16 [DcSwStt1.1] to [DcSwStt4.4]: 51 = closed 311 = opened 1694 = has triggered	2	U32	ENUM	RO
30331 to 30361	Error message SMID DC switch 1 to 16 [DcSwErr1.1] to [DcSwErr4.4] 1508 = 90 % of the DC-switching cycles reached 1509 = 100 % of the DC switching times reached 1695 = DC switch waits for connection 1696 = DC switch blocked by spindle 1697 = DC switch manually blocked 1698 = DC switch triggered 3 times 1699 = DC switch defective	2	U32	ENUM	RO
30771	DC voltage (V) [Vpv]	2	S32	FIX2	RO
31791	Number of DC current measurement units [CTNoOf]	2	U32	FIX0	RO

31793 to 31855	String current 1 to 32 (A) [Ipv1.1.B] to [Ipv4.4.B]	2	S32	FIX3	RO
32057 to 32119	Status of the monitored strings 1 to 32 [DcInStt1.1.B] to [DcInStt4.4.B]: 307 = OK 467 = DC overvoltage 477 = Reverse current 1492 = String temporarily deselected due to earth fault 1493 = String permanently deselected due to earth fault 1649 = String x has low power 1650 = Partial string x has low power 1692 = String deactivated due to power reduction 1693 = No string connected	2	U32	ENUM	RO
40001	Setting of the plant time (UTC in s) [SerTm]	2	U32	DT	RW
40003	Setting of the time zone [TmZn]. For possible values, see section 8.6 "Return Codes for Time Zones", page 73.	2	U32	ENUM	RW
40011	Acknowledgement: 26 = Acknowledge fault	2	U32	ENUM	RW

6.3.11 Sunny String-Monitor

In the following table, you will find the measured values and parameters supported by the Sunny String-Monitor, which you can access under the Unit IDs = 3-247 (see section 5.2 "Available and reserved Unit IDs", page 18).

Address compatibility

The assignments in section 6.3.1 "Common Addresses of all SMA Devices", page 26, do **not** apply to this device type.

ADR (DEC)	Description/Return code	CNT (WORD)	Type	Format	Access
30057	Serial number [Seriennummer]	2	U32	RAW	RO
30245	SMU ID [SSM Identifier]	2	U32	FIX0	RO
31793	String current of the string 1 of an SMU/SMID (A) [IString 1]	2	S32	FIX3	RO
31795	String current of the string 2 of an SMU/SMID (A) [IString 2]	2	S32	FIX3	RO
31797	String current of the string 3 of an SMU/SMID (A) [IString 3]	2	S32	FIX3	RO
31799	String current of the string 4 of an SMU/SMID (A) [IString 4]	2	S32	FIX3	RO
31801	String current of the string 5 of an SMU/SMID (A) [IString 5]	2	S32	FIX3	RO
31803	String current of the string 6 of an SMU/SMID (A) [IString 6]	2	S32	FIX3	RO
31805	String current of the string 7 of an SMU/SMID (A) [IString 7]	2	S32	FIX3	RO
31807	String current of the string 8 of an SMU/SMID (A) [IString 8]	2	S32	FIX3	RO
32053	Status of signal contact 1 [Signal contact 1]: 303 = Off 308 = On	2	U32	ENUM	RO
32055	Status of signal contact 2 [Signal contact 2]: 303 = Off 308 = On	2	U32	ENUM	RO

6.3.12 Sunny Central String-Monitor Controller

In the following table, you will find the measured values and parameters supported by the Sunny String-Monitor Controller, which you can access under the Unit IDs = 3-247 (see section 5.2 “Available and reserved Unit IDs”, page 18).

Address compatibility

The assignments in section 6.3.1 “Common Addresses of all SMA Devices”, page 26, do **not** apply to this device type.

ADR (DEC)	Description/Return code	CNT (WORD)	Type	Format	Access
30057	Serial number [Serial Number]	2	U32	RAW	RO
30197	Event ID of the current event (number of digits is limited by the device); see also chapter 7 “Troubleshooting”, page 67”.	2	U32	FIX0	RO
30241	Operating state [mode]: 309 = Operation 455 = Warning 1392 = Error 1470 = Fault	2	U32	ENUM	RO
30243	Error [Error]: 1 = Warning 380 2 = Warning 381 3 = Warning 383 4 = Warning 380 5 = Warning 381 6 = Warning 383	2	U32	ENUM	RO
30521	Operating time (s) [h-On]	4	U64	Duration	RO
30541	Operating time (s) [h-on]	2	U32	Duration	RO
31283	PV string current group 1 (A) [MeanCurGr1]	2	S32	FIX3	RO
31289	PV string current group 2 (A) [MeanCurGr2]	2	S32	FIX3	RO
31295	PV string current group 3 (A) [MeanCurGr3]	2	S32	FIX3	RO
31301	PV string current group 4 (A) [MeanCurGr4]	2	S32	FIX3	RO
31307	PV string current group 5 (A) [MeanCurGr5]	2	S32	FIX3	RO
31313	PV string current group 6 (A) [MeanCurGr6]	2	S32	FIX3	RO
32051	SMU warning code for string error [SSMUWrnCode]	2	U32	FIX3	RO

6.3.13 Sunny Central String-Monitor-US

In the following table, you will find the measured values and parameters supported by the Sunny Central String-Monitor-US, which you can access under the Unit IDs = 3-247 (see section 5.2 "Available and reserved Unit IDs", page 18).

Address compatibility

The assignments in section 6.3.1 "Common Addresses of all SMA Devices", page 26, do **not** apply to this device type.

ADR (DEC)	Description/Return code	CNT (WORD)	Type	Format	Access
30057	Serial number [Serial Number]	2	U32	RAW	RO
30241	Operating state [Mode]: 309 = Operation 455 = Warning 1392 = Fault 1470 = Disruption	2	U32	ENUM	RO
30245	SMU ID [SSMId]	2	U32	FIX0	RO
31793	String current of the string 1 of an SMU/SMID (A) [CurCh1]	2	S32	FIX3	RO
31795	String current of the string 2 of an SMU/SMID (A) [CurCh2]	2	S32	FIX3	RO
31797	String current of the string 3 of an SMU/SMID (A) [CurCh3]	2	S32	FIX3	RO
31799	String current of the string 4 of an SMU/SMID (A) [CurCh4]	2	S32	FIX3	RO
31801	String current of the string 5 of an SMU/SMID (A) [CurCh5]	2	S32	FIX3	RO
31803	String current of the string 6 of an SMU/SMID (A) [CurCh6]	2	S32	FIX3	RO
31805	String current of the string 7 of an SMU/SMID (A) [CurCh7]	2	S32	FIX3	RO
31807	String current of the string 8 of an SMU/SMID (A) [CurCh8]	2	S32	FIX3	RO

6.3.14 SMA Meteo Station

In the following table, you will find the measured values and parameters supported by the SMA Meteo Station, which you can access under the Unit IDs = 3-247 (see section 5.2 "Available and reserved Unit IDs", page 18).

Address compatibility

The assignments in section 6.3.1 "Common Addresses of all SMA Devices", page 26, do **not** apply to this device type.

ADR (DEC)	Description/Return code	CNT (WORD)	Type	Format	Access
30051	Device class [MainModel]: 8001 = Sensor system general	2	U32	ENUM	RO
30241	Operating status [Stat]: 455 = Warning 1392 = Error 1787 = Initialisation	2	U32	ENUM	RO
30243	Error [Stat]: 503 = Fault sensor ambient temperature 1006 = Unknown error 1118 = Calibration failed 1835 = Fault sensor module temperature 1836 = Fan life-time reached 1837 = Error in pyranometer 1838 = Pyranometer calibration necessary	2	U32	ENUM	RO
30521	Operating time (s) [SMA h-On]	4	U64	Duration	RO
34609	Environment temperature (°C) [TmpAmb C]	2	S32	TEMP	RO
34613	Total irradiation on sensor surface (W/m²) [IntSollrr]	2	U32	FIX0	RO
34615	Wind speed (m/s) [WindVel m/s]	2	U32	FIX1	RO
34617	Relative humidity (%) [envhmdt]	2	U32	FIX2	RO
34619	Air pressure (Pa) [envpress]	2	U32	FIX2	RO
34621	PV module temperature (°C) [TmpMdul C]	2	S32	TEMP	RO
34625	Environment temperature (°F) [TmpAmb F]	2	S32	TEMP	RO
34627	Environment temperature (K) [TmpAmb K]	2	S32	TEMP	RO

34629	PV module temperature (°F) [TmpMdul F]	2	S32	TEMP	RO
34631	PV module temperature (K) [TmpMdul K]	2	S32	TEMP	RO
34633	Wind speed (km/h) [WindVel km/h]	2	U32	FIX1	RO
34635	Wind speed (mph) [WindVel mph]	2	U32	FIX1	RO

6.3.15 Sunny Sensorbox

In the following table, you will find the measured values and parameters supported by the Sunny Sensorbox, which you can access under the Unit IDs = 3-247 (see section 5.2 “Available and reserved Unit IDs”, page 18).

Address compatibility

The assignments in section 6.3.1 “Common Addresses of all SMA Devices”, page 26, do **not** apply to this device type.

ADR (DEC)	Description/Return code	CNT (WORD)	Type	Format	Access
30051	Device class [MainModel]: 8001 = Sensor system general	2	U32	ENUM	RO
30521	Operating time (s) [SMA h-On]	4	U64	Duration	RO
34609	Environment temperature (°C) [TmpAmb C]	2	S32	TEMP	RO
34613	Total irradiation on sensor surface (W/m²) [IntSollrr]	2	U32	FIX0	RO
34615	Wind speed (m/s) [WindVel m/s]	2	U32	FIX1	RO
34621	PV module temperature (°C) [TmpMdul C]	2	S32	TEMP	RO
34623	Total irradiation on external sensor / pyranometer (W/m²) [ExlSollrr]	2	U32	FIX0	RO
34625	Environment temperature (°F) [TmpAmb F]	2	S32	TEMP	RO
34627	Environment temperature (K) [TmpAmb K]	2	S32	TEMP	RO
34629	PV module temperature (°F) [TmpMdul F]	2	S32	TEMP	RO
34631	PV module temperature (K) [TmpMdul K]	2	S32	TEMP	RO
34633	Wind speed (km/h) [WindVel km/h]	2	U32	FIX1	RO
34635	Wind speed (mph) [WindVel mph]	2	U32	FIX1	RO

7 Troubleshooting

For troubleshooting please use the event numbers provided by the devices under the Modbus address 30197.

Event numbers cannot be decoded by return codes

The event numbers are device-specific. You cannot decode the event numbers using the general return codes (see section 8.7, page 74). For breakdown of the event numbers and of the message numbers please use the operating instructions of the device

You can find further information for error analysis of the SMA Modbus profile in chapter 5.3 “Reading and Writing Data in Modbus Protocol”, page 18.

8 Technical Data

8.1 Supported SMA Devices

SMA Modbus profile version

Starting with Sunny WebBox firmware version 1.53, the SMA Modbus profile can be updated at the data logger with a separate XML file. The separate XML file has a profile version. With profile version 1.30 the device-IDs assigned until now will change. Please take a look at the profile version and device-ID at all of the following SMA devices listed hereafter.

This document applies only for the following SMA devices:

Data logger:

- Sunny WebBox with firmware version 1.52 or higher, device-ID = 47

Backup Systems:

- Sunny Backup:
  - SBU2200, device-ID = 67, model = 9155
  - SBU5000, device-ID = 69, model = 9157

Inverters:

- Device family SB n000US, (firmware version 01.21.00.R, or higher):
  - Sunny Boy 5000US, device-ID = 268, model = 9044
  - Sunny Boy 6000US, device-ID = 268, model = 9047
  - Sunny Boy 7000US, device-ID = 268, model = 9053
  - Sunny Boy 8000US, device-ID = 268, model = 9083
- Device family SB nn000TL-US-12, (firmware version 01.90.00.R, or higher):
  - Sunny Boy 6000TL-US-12, device-ID = 269, model = 9153
  - Sunny Boy 7000TL-US-12, device-ID = 269, model = 9152
  - Sunny Boy 8000TL-US-12, device-ID = 269, model = 9148
  - Sunny Boy 9000TL-US-12, device-ID = 269, model = 9149
  - Sunny Boy 10000TL-US-12, device-ID = 269, model = 9150
  - Sunny Boy 11000TL-US-12, device-ID = 269, model = 9151

- Device family SC nnnCP and SC nnnHE-20:
  - Sunny Central 500CP (firmware version 01.13.07.R or higher), device-ID = 160, model = 9088. From profile version 1.30 on, device-ID = 122
  - Sunny Central 500CP-JP (firmware version 01.18.25.R, or higher), device-ID = 253, model = 9206. From profile version 1.30 on, device-ID = 122
  - Sunny Central 500CP-US (firmware version 01.16.16.R, or higher), device-ID = 262, model = 9215. From profile version 1.30 on, device-ID = 122
  - Sunny Central 500CP-US 600V (firmware version 01.16.16.R, or higher), device-ID = 271, model = 9221. From profile version 1.30 on, device-ID = 122
  - Sunny Central 500HE-20 (firmware version 01.15.41.R or higher), device-ID = 202, model = 9123. From profile version 1.30 on, device-ID = 122
  - Sunny Central 630CP (firmware version 01.13.07.R or higher), device-ID = 159, model = 9089. From profile version 1.30 on, device-ID = 122
  - Sunny Central 630CP-JP (firmware version 01.15.30.R, or higher), device-ID = 122, model = 9228
  - Sunny Central 630CP-US (firmware version 01.16.16.R, or higher), device-ID = 261, model = 9214. From profile version 1.30 on, device-ID = 122
  - Sunny Central 630HE-20 (firmware version 01.15.41.R or higher), device-ID = 201, model = 9122. From profile version 1.30 on, device-ID = 122
  - Sunny Central 720CP (firmware version 01.13.07.R or higher), device-ID = 165, model = 9095. From profile version 1.30 on, device-ID = 122
  - Sunny Central 720CP-US (firmware version 01.16.16.R, or higher), device-ID = 263, model = 9216. From profile version 1.30 on, device-ID = 122
  - Sunny Central 720HE-20 (firmware version 01.15.41.R or higher), device-ID = 203, model = 9124. From profile version 1.30 on, device-ID = 122
  - Sunny Central 750CP-US (firmware version 01.16.16.R, or higher), device-ID = 264, model = 9217. From profile version 1.30 on, device-ID = 122
  - Sunny Central 760CP (firmware version 01.13.07.R or higher), device-ID = 164, model = 9094. From profile version 1.30 on, device-ID = 122
  - Sunny Central 760HE-20 (firmware version 01.15.41.R or higher), device-ID = 204, model = 9125. From profile version 1.30 on, device-ID = 122
  - Sunny Central 800CP (firmware version 01.13.07.R or higher), device-ID = 158, model = 9090. From profile version 1.30 on, device-ID = 122
  - Sunny Central 800CP-JP (firmware version 01.15.30.R, or higher), device-ID = 122, model = 9227
  - Sunny Central 800CP-US (firmware version 01.16.16.R, or higher), device-ID = 260, model = 9213. From profile version 1.30 on, device-ID = 122

  - Sunny Central 800HE-20 (firmware version 01.15.41.R or higher), device-ID = 200, model = 9121. From profile version 1.30 on, device-ID = 122
  - Sunny Central 850CP (firmware version 01.13.07.R, or higher), device-ID = 254, model = 9207. From profile version 1.30 on, device-ID = 122
  - Sunny Central 850CP-US (firmware version 01.15.30.R, or higher), device-ID = 256, model = 9209. From profile version 1.30 on, device-ID = 122
  - Sunny Central 900CP (firmware version 01.13.07.R, or higher), device-ID = 255, model = 9208. From profile version 1.30 on, device-ID = 122
  - Sunny Central 900CP-US (firmware version 01.15.30.R, or higher), device-ID = 257, model = 9210. From profile version 1.30 on, device-ID = 122
- Device family SC nnnHE, SC nnnHE-10 and SC nnnHE-11, (firmware version 2.10 or higher):
  - Sunny Central 250HE, device-ID = 230, model = 9175. From profile version 1.30 on, device-ID = 107
  - Sunny Central 400HE-11, device-ID = 228, model = 9170. From profile version 1.30 on, device-ID = 107
  - Sunny Central 500HE-10, device-ID = 227, model = 9169. From profile version 1.30 on, device-ID = 107
  - Sunny Central 500HE-11, device-ID = 227, model = 9169. From profile version 1.30 on, device-ID = 107
  - Sunny Central 630HE-11, device-ID = 166, model = 9168. From profile version 1.30 on, device-ID = 107
- Device family SC nnnHE-US:
  - Sunny Central 500HE-US (firmware version 1.060 or higher), device-ID = 157, model = 9093. From profile version 1.30 on, device-ID = 87
- Device family SC nnnU, (firmware version 1.060 or higher):
  - Sunny Central 250-US, device-ID = 155, model = 9091. From profile version 1.30 on, device-ID = 87
  - Sunny Central 500-US, device-ID = 156, model = 9092. From profile version 1.30 on, device-ID = 87
- Device family STP nn000TL-10, (firmware version 2.22.10.R or higher):
  - Sunny Tripower 8000TL-10, device-ID = 128, model = 9101
  - Sunny Tripower 10000TL-10, device-ID = 128, model = 9067
  - Sunny Tripower 12000TL-10, device-ID = 128, model = 9068
  - Sunny Tripower 15000TL-10, device-ID = 128, model = 9069
  - Sunny Tripower 17000TL-10, device-ID = 128, model = 9070

Island inverters:

- Sunny Island:
  - SI 2012, device-ID = 67, model = 9155
  - SI 2224, device-ID = 67, model = 9158
  - SI 5048, device-ID = 69, model = 9159
  - SI4548-US-10, device-ID = 69, model = 9159
  - SI6048-US-10, device-ID = 69, model = 9159
  - SI6.0H-10, device-ID = 137, model = 9159
  - SI8.0H-10, device-ID = 137, model = 9159

String monitoring devices:

- Optiprotect (firmware version 1.00 or higher), device-ID = 198, model = 9120. From profile version 1.30 on, device-ID = 161
- Sunny Central String-Monitor Controller (firmware version 1.05 or higher), device-ID = 187, model = 9108. From profile version 1.30 on, device-ID = 129
- Sunny Central String-Monitor-US (firmware version 1.04 or higher), device-ID = 190, model = 9110. From profile version 1.30 on, device-ID = 97
- Sunny String-Monitor (firmware version 1.04 or higher), device-ID = 171

Weather stations:

- SMA Meteo Station (firmware version 1.00 or higher), device-ID = 232, model = 9176
- Sunny Sensorbox (firmware version 1.00 or higher), device-ID = 81, model = 9061

8.2 Modbus Communication Port

Communication port	Factory setting
TCP	502

Use another communication port

If you have to change the Modbus communication port, you should only use a free communication port. For this purpose, generally the following range of ports is available: 49152 to 65535. You can find further information about used ports under [IANA].

8.3 Modbus Reaction Time

This section contains typical reaction times for different inverter families. The reaction time is the interval within which changes in value are available in the SMA devices at the Modbus interface of the data logger. Consequently, changes in value can only be displayed in a corresponding or larger interval in your Modbus master system (e.g. in a SCADA system).

Device Family	Reaction Time (s)
SC nnnCP and SC nnnHE-20	8 to 10
SC nnnU	8 to 10
SC nnnHE-US	8 to 10
SC nnnHE-11	8 to 10 (with 1-2 inverters per Sunny WebBox)
String Monitoring Unit (provides 5-minute mean values)	300

8.4 Interval of Data Request and Number of Values

Limit of data processing capabilities

Due to reasons of system stability the period between data transfers via the Modbus protocol should be at least 10 seconds, whereby not more than 30 Modbus registers should be transmitted. This specification is the upper limit for SMA devices connected through the Modbus protocol, according to chapter “Number of SMA Devices”.

8.5 Number of SMA Devices

Recommended number of SMA devices

For performance reasons, we recommend operating approx. 25 SMA devices on the data logger and not to fully utilize the maximum possible number of 50 SMA devices that the data logger can handle.

8.6 Return Codes for Time Zones

In the following table, you will find an overview of the most important time zones and their numerical codes (referenced to UTC).

Time zone	Code	City
UTC+04:00	9503	Abu Dhabi, Muskat
UTC+09:30	9513	Adelaide
UTC-09:00	9501	Alaska
UTC+02:00	9542	Amman
UTC+01:00	9578	Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna
UTC-07:00	9574	Arizona
UTC+06:00	9515	Astana, Dhaka
UTC-04:00	9594	Asuncion
UTC+02:00	9537	Athens, Bucharest, Istanbul
UTC-04:00	9505	Atlantic (Canada)
UTC+12:00	9553	Auckland, Wellington
UTC-01:00	9509	Azores
UTC+03:00	9504	Baghdad
UTC+04:00	9508	Baku
UTC+07:00	9566	Bangkok, Hanoi, Jakarta
UTC+02:00	9546	Beirut
UTC+01:00	9517	Belgrade, Bratislava, Budapest, Ljubljana, Prague
UTC-05:00	9563	Bogotá, Lima, Quito
UTC-03:00	9527	Brasilia
UTC+10:00	9525	Brisbane
UTC+01:00	9560	Brussels, Copenhagen, Madrid, Paris
UTC-03:00	9562	Buenos Aires
UTC+02:00	9529	Cairo
UTC+10:00	9507	Canberra, Melbourne, Sydney
UTC-01:00	9511	Cape Verde Islands
UTC-04:30	9564	Caracas
UTC+00:00	9585	Casablanca
UTC+04:00	9582	Caucasian Standard Time
UTC-03:00	9593	Cayenne
UTC-06:00	9520	Central America
UTC-02:00	9545	Central Atlantic
UTC+05:30	9539	Chennai, Kolkata, Mumbai, New Delhi
UTC-06:00	9583	Chicago, Dallas, Kansas City, Winnipeg
UTC-07:00	9587	Chihuahua, La Paz, Mazatlan
UTC+09:30	9506	Darwin
UTC-07:00	9547	Denver, Salt Lake City, Calgary
UTC+00:00	9534	Dublin, Edinburgh, Lisbon, London
UTC+12:00	9531	Fidschi, Marshall Islands
UTC-04:00	9591	Georgetown, La Paz, San Juan
UTC-03:00	9535	Greenland
UTC-06:00	9584	Guadalajara, Mexico City, Monterrey
UTC+10:00	9580	Guam, Port Moresby
UTC+02:00	9567	Harare, Pretoria
UTC-10:00	9538	Hawaii
UTC+02:00	9532	Helsinki, Kiev, Riga, Sofia, Tallin, Wilna
UTC+10:00	9570	Hobart
UTC-05:00	9573	Indiana (East)
UTC-12:00	9523	International Date Line (Western)
UTC+08:00	9555	Irkutsk
UTC+05:00	9579	Islamabad, Karatschi
UTC+05:00	9530	Jekaterinburg
UTC+02:00	9541	Jerusalem
UTC+04:30	9500	Kabul
UTC+05:45	9552	Katmandu
UTC+07:00	9556	Krasnoyarsk
UTC+08:00	9544	Kuala Lumpur, Singapore
UTC+03:00	9502	Kuwait, Riyardh
UTC+11:00	9519	Magadan, Solomon Islands, New Caledonia
UTC-04:00	9516	Manaus
UTC-11:00	9565	Midway Islands, Samoa
UTC+02:00	9526	Minsk
UTC+00:00	9536	Monrovia, Reykjavík
UTC-03:00	9588	Montevideo
UTC+03:00	9561	Moskow, St. Petersburg, Volgograd
UTC+03:00	9524	Nairobi
UTC-05:00	9528	New York, Miami, Atlanta, Detroit, Toronto
UTC-03:30	9554	Newfoundland
UTC+06:00	9550	Novosibirsk
UTC+13:00	9572	Nuku'alofa
UTC+09:00	9571	Osaka, Sapporo, Tokyo
UTC-08:00	9558	Pacific (USA, Canada)

UTC+08:00	9522	Peking, Chongqing, Hongkong, Urumchi
UTC+08:00	9576	Perth
UTC+12:00	9595	Petropavlovsk-Kamtschatski
UTC+04:00	9586	Port Louis
UTC-04:00	9557	Santiago
UTC+01:00	9518	Sarajevo, Skopje, Warsaw, Zagreb
UTC-06:00	9510	Saskatchewan
UTC+09:00	9543	Seoul
UTC+05:30	9568	Sri Jayawardenepura
UTC+08:00	9569	Taipeh
UTC+05:00	9589	Taschkent
UTC+03:30	9540	Teheran
UTC+04:00	9533	Tiflis
UTC-08:00	9559	Tijuana, Baja California (Mexico)
UTC+08:00	9592	Ulan-Bator
UTC+10:00	9575	Vladisvostok
UTC+01:00	9577	West.Centr.Africa
UTC+02:00	9551	Windhoek
UTC+09:00	9581	Yakutsk
UTC+06:30	9549	Yangon (Rangoon)
UTC+04:00	9512	Yerevan

8.7 General Return Codes

The following table provides the most common register return codes of SMA devices. The enumeration(s) column contains the corresponding abbreviations. Due to the variety of devices, several abbreviations may be specified. In the tables of section 6 "SMA Modbus Profile – Assignment Tables", from page 23, the return codes are assigned to the individual Modbus addresses.

Event Numbers

The event numbers provided by the devices under the Modbus address 30197 are device-specific. For their breakdown, please use the documentation of the respective device. You cannot decode the event numbers using the return codes of this section.

Return code	Meaning	Enumeration(s)
51	Closed	Cls
276	Instantaneous value	LimFst
295	MPP	Mpp, MPP, Mpp-Betrieb, Mpp-Operation
303	Off	Off
308	On	On
309	Operation	Operation
311	Open	Opn

336	Contact manufacturer	PrioA
337	Contact installer	PrioC
338	Invalid	PrioIna
381	Stop	Stop
455	Warning	Wrn, Disturbance, Stoer, Stoerung, Störung, Warning
461	SMA (manufacturer specification)	
973	Not set, NaN	NaN, ---, ----, -----, ------, -------, ----------
1041	Overexcited	OvExt, Overexcited
1042	Underexcited	UnExt, Underexcited
1069	Reactive power/Voltage characteristic Q(U)	VArCtlVol
1070	Reactive power Q, direct default setting	VArCnstNom
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1478	Warning mail not OK	EvtWrnTxNok
1479	Wait after grid interruption	GriFltMon
1480	Wait for electricity supplier	WaitUtil

9 Contact

If you have technical problems concerning our products, contact the SMA Service Line. We need the following information in order to provide you with the necessary assistance:

- Used Modbus master software or hardware
- Software version of your data logger
- Type of communication interface between the data logger and the devices
- Type, serial numbers, and software version of the devices connected to the PV plant

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