Technical Information

SMA and SunSpec Modbus® Interface

SUNNY BOY / SUNNY BOY STORAGE / SUNNY TRIPOWER

ENGLISH

SMA-Modbus-general-TI-en-10 | Version 1.0

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Status: 5/24/2018

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1 Information on this Document

1.1 Validity

This document is valid for:

- SMA inverter with integrated Modbus interface and device-specific register HTML file ("Modbus® parameters and measured values")

1.2 Target Group

The tasks described in this document must only be performed by qualified persons. Qualified persons must have the following skills:

- Detailed knowledge of the grid management services
- Knowledge of IP-based network protocols
- Knowledge of the Modbus specifications
- Knowledge of the SunSpec Modbus specifications
- Training in the installation and configuration of IT systems
- Knowledge of and compliance with this document and all safety information

1.3 Content and Structure of this Document

This document does not contain any information on the Modbus registers provided by SMA products. Furthermore, no information on the firmware version to be installed on the respective SMA product is included. Information on firmware versions and device-specific Modbus registers of SMA products can be found on our product pages or Modbus page at www.SMA-Solar.com.

This document does not contain any information on software which can communicate with the Modbus interface (see the software manufacturer's manual).

This document contains a general description of the Modbus interface integrated in SMA products.

1.4 Levels of warning messages

The following levels of warning messages may occur when handling the product.

⚠ DANGER
Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING
Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION
Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE
Indicates a situation which, if not avoided, can result in property damage.

1.5 Symbols in the Document

Symbol	Explanation
	Information that is important for a specific topic or goal, but is not safety-relevant
☐	Indicates a requirement for meeting a specific goal
☑	Desired result
✖	A problem that might occur

1.6 Typographies in the document

Typography	Use	Example
bold	• Messages • Terminals • Elements on a user interface • Elements to be selected • Elements to be entered	• Connect the insulated conductors to the terminals **X703:1** to **X703:6**. • Enter **10** in the field **Minutes**.
>	• Connects several elements to be selected	• Select **Settings > Date**.
[**Button**] [**Key**]	• Button or key to be selected or pressed	• Select [**Enter**].

1.7 Additional Information

Title and information content	Type of information
"Application for SMA Grid Guard Code"	Form
"Modbus® parameters and measured values" Device-specific register HTML file	Technical Information

2 Safety

2.1 Intended Use

The Modbus interface of the supported SMA products is designed for industrial use and has the following tasks:

- Remote control of the grid management services of a PV system
- Remote-controlled querying of the measured values of a PV system
- Remote-controlled changing of the parameters of a PV system

The Modbus interface can be used via the protocol Modbus TCP and by the protocol Modbus UDP. With Modbus UDP, no answers are generated.

All components must remain within their permitted operating ranges and their installation requirements at all times.

Use this product only in accordance with the information provided in the enclosed documentation and with the locally applicable standards and directives. Any other application may cause personal injury or property damage.

Alterations to the product, e.g. changes or modifications, are only permitted with the express written permission of SMA Solar Technology AG. Unauthorized alterations will void guarantee and warranty claims and in most cases terminate the operating license. SMA Solar Technology AG shall not be held liable for any damage caused by such changes.

Any use of the product other than that described in the Intended Use section does not qualify as the intended use.

The enclosed documentation is an integral part of this product. Keep the documentation in a convenient place for future reference and observe all instructions contained therein.

2.2 Safety Information

This section contains safety information that must be observed at all times when working on or with the product.

To prevent personal injury and property damage and to ensure long-term operation of the product, read this section carefully and observe all safety information at all times.

NOTICE

Damage of SMA products due to cyclical changing of parameters

The parameters of SMA products that can be changed with writable Modbus registers (RW) are intended for long-term storage of device settings. Cyclical changing of these parameters leads to destruction of the flash memory of the SMA products. These parameters are marked with ⚠ in the device-specific register HTML file.

Parameters for grid management services to control and limit the nominal PV system power are an exception. Such parameters can be changed cyclically. These parameters are marked with in the device-specific register HTML file.

- Do not change device parameters cyclically.
- Use the parameters for grid management services for the automated remote control of the PV system.
- Observe the explanations of symbols in the legend within the device-specific register HTML file.

NOTICE

Manipulation of PV system data in Ethernet networks

You can connect the supported SMA products to the Internet. When connected to the Internet, there is a risk that unauthorized users can access and manipulate the data of your PV system.

- Set up a firewall.
- Close unnecessary network ports.
- If absolutely necessary, only enable remote access via a virtual private network (VPN).
- Do not set up port forwarding at the used Modbus ports.

Access to data points after activating the Modbus interface

The read-only access to data points is possible after activating the Modbus interface. The read-only access to all data points (which are not protected by the SMA Grid Guard code) are possible without further input of a password via Modbus after activating the Modbus interface.

- Ensure that the Modbus interface is still active after resetting the SMA product to default settings.

2.3 SMA Grid Guard code

Certain parameters are protected by the personal SMA Grid Guard code. If you would like to changes these parameters, you must first unlock the individual SMA inverters via a personal SMA Grid Guard code. When unlocked, the SMA inverter changes its configuration mode to the Grid Guard mode. Changes to the grid management service parameters in Grid Guard mode will be recorded by the SMA inverter. These parameters are marked with in the device-specific register HTML file.

With an SMA Grid Guard code, only one person, communication device or software tool can log into the SMA product. If you want to change parameters via your Modbus client, you are not allowed to use the same SMA Grid Guard code via Sunny Explorer, user interface of an SMA inverter or via SMA data logger at the same time.

You can obtain the SMA Grid Guard code via SMA Service or via the "Application for SMA Grid Guard Code" at www.SMA-Solar.com.

The SMA Grid Guard code as well as the code for logging out of the Grid Guard mode are described in the Modbus register 43090 under the Unit ID 3. If an SMA inverter is restarted during Grid Guard mode, the SMA Grid Guard code must be transmitted again. The Grid Guard mode is ended with the code **0**. Login with the Grid Guard code is only possible with the IP address used during login.

For more information on accessing an SMA product via Grid Guard code, see manual of the SMA product. For parameters that are Grid Guard-protected, see product pages or Modbus page at www.SMA-Solar.com.

3 Product Overview

3.1 Modbus Protocol

The Modbus Application Protocol is an industrial communication protocol that is currently used in the solar sector mainly for PV system communication. The Modbus protocol has been developed for reading data from or writing data to clearly defined data areas. The Modbus specification does not prescribe what data is within which data area. The data areas must be defined device-specifically in Modbus profiles. With knowledge of the device-specific Modbus profile, a Modbus client (e.g. a SCADA system) can access the data of a Modbus server (e.g. SMA product with Modbus interface).

The SMA Modbus profile and SunSpec Modbus profile are used for SMA products.

3.2 SunSpec Modbus Profile

The SunSpec Modbus profile from the SunSpec Alliance contains a comprehensive set of measured values and parameters for energy-generating devices in PV systems. SMA has performed a mapping of the special data points of the supported SMA products on the data points required by SunSpec. The supported SMA products therefore conform with the SunSpec Modbus profile of the underlying specification version. The SunSpec Modbus profile for the SMA products starts at the register number 40001.

3.3 SMA Modbus Profile

The SMA Modbus profile contains definitions for SMA products. All available data on SMA products was assigned to the corresponding Modbus registers for the definition. Not all SMA products support all Modbus registers of the SMA Modbus profile.

Therefore, Modbus registers that belong to an SMA product are available separately. Information on firmware versions and device-specific Modbus registers of SMA products can be found on our product pages or Modbus page at www.SMA-Solar.com.

3.4 System Topology

An SMA product with Modbus interface is connected with the SCADA system of the electric utility company or the grid operator via Ethernet. The Modbus interface also enables communication via the Modbus protocol. From the perspective of the Modbus protocol, an SMA product with Modbus interface constitutes a Modbus server that supports the SMA Modbus profile.

3.5 Addressing and Data Transmission

3.5.1 Unit IDs

The Unit ID is a superordinate addressing type in the Modbus protocol. The Unit ID in the SMA Modbus profile is freely configurable within the area 3 to 123. The default value is 3.

The Unit ID in the SunSpec Modbus profile for SMA products derives from the preset Unit ID in the SMA Modbus profile + 123. The preset value for the Unit ID in the SunSpec Modbus profile is therefore 126.

3.5.2 Query of Unit ID

The Unit ID of the SMA inverter is requested via the Modbus command Read Holding Registers on the register address 42109 with the Unit ID 1. Such query provides following data:

- Physical serial number (2 registers)
- Physical SusyID (1 register)
- Unit ID (1 register)

3.5.3 Register Address, Register Width and Data Block

A Modbus register is 16 bits wide. For wider data items, connected Modbus registers are used and considered as data blocks. The address of the first Modbus register in a data block is the start address of the data block. The number of connected Modbus registers arises from the data type and the offset between the register addresses. Several Modbus registers with different start addresses, that can only be processed as a data block, are specially marked. In addition, larger data blocks can be formed.

i Offset of the SunSpec register addresses

For the reading and writing of Modbus registers, use the register addresses reduced by the offset 1 in each case.

Example: Modbus register address = register address in the SunSpec Modbus profile – offset = 40001 - 1 = 40000.

3.5.4 Data Transmission

In accordance with the Modbus specification, only a specific volume of data can be transported in a single data transmission in a simple protocol data unit (PDU). The data also contains function-dependent parameters such as the function code, start address or number of Modbus registers to be transmitted. The amount of data depends on the Modbus command used and has to be taken into account during data transmission (see Section 3.5.5, page 10).

With data storage in the Motorola format "Big Endian", data transmission begins with the high byte and then the low byte of the Modbus register.

3.5.5 Reading and Writing of Data

The Modbus interface can be used via the protocol Modbus TCP and by the protocol Modbus UDP. Using Modbus TCP enables read- and write access to the Modbus register. SMA products with Modbus interface use the Modbus TCP as standard. Using Modbus UDP only enables write access to the Modbus register. The Modbus UDP is a specific extension and is used to broadcast system control commands to all products within a system for example.

Access type	Explanation
RO (Read-Only)	Read only (not UDP)
RW (Read-Write)	Read and write (not UDP) With Modbus UDP, all RW registers are write-only (WO register).
WO (Write-Only)	Write only

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

Modbus command	Hexadecimal value	Data volume (number of registers)*
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

* Number of Modbus registers transferable as a data block per command (16 bit)

Error messages on reading or writing individual Modbus registers

If a Modbus register is accessed, which is not contained in a Modbus profile, or if a Modbus command is incorrect, a Modbus exception is generated. Modbus exceptions are also generated when write access occurs on a read-only Modbus register or read access occurs on a write-only Modbus register.

Reading or writing of data blocks

To prevent inconsistencies, data blocks of associated Modbus registers or Modbus register ranges must be read or written consecutively. The 4 bytes of a 64-bit Modbus register must, for example, be read with an operation in a 64-bit SMA data type.

Reading multiple Modbus registers as a data block

If a data block is read and if at least one register defined in the Modbus profile can be determined in its data range, an answer is returned. If this data block also contains Modbus registers that are not defined in the Modbus profile, NaN is used for the query values in each case. If none of the Modbus registers are defined in the data range of a data block in the Modbus profile, the query is invalid and a Modbus exception is generated.

Error message on writing multiple Modbus registers as a data block

If multiple registers are written in the data block (Modbus command 0x10 and 0x17) and an error occurs when writing, the process continues with the next register in the data block. If some data is dependent on other data, or if some data is mutually exclusive, the data is only processed if the entire data block is valid. Otherwise the entire data block is discarded. In the event of an error, a Modbus exception will be generated.

Modbus exceptions

For Modbus exceptions, see "Modbus Application Protocol Specification" at http://www.modbus.org/specs.php.

3.5.6 SunSpec Data Types and NaN Values

The following table shows the data types used in the SunSpec Modbus profile and compares these to possible NaN values. The SunSpec data types are listed in the assignment tables in the **Type** column. The SunSpec data types describe the data widths of the assigned values:

Type	Explanation	NaN value
acc32	Accumulated value (32 bit). Is used for all sequentially increasing values.	0x0000 0000
acc64	Accumulated value (64 bit). Is used for all sequentially increasing values. Only positive values are permitted. The overflow of the number range takes place at 0x7FFF FFFF FFFF FFFF.	0x0000 0000 0000 0000
bitfield16	Bit field (16 bit). A combination of individual bits. Is used for multi-value alarm messages or status. Value range 0 to 0x7FFF. If the MSB is set in a bit field, all other bits are ignored.	0xFFFF
bitfield32	Bit field (32 bit). A combination of individual bits. Is used for multi-value alarm messages or status. Value range 0 to 0x7FFF FFFF. If the MSB is set in a bit field, all other bits are ignored.	0xFFFF FFFF
enum16	Number code (16 bit). The breakdown of the possible codes can be found directly under the designation of the Modbus register in the assignment tables.	0xFFFF
int16	Signed integer (16 bit)	0x8000
int32	Signed integer (32 bit)	0x8000 0000
string	String (multiple of 2 bytes). A zero-terminating value or a value of fixed length.	-
sunssf	SunSpec scale factor as signed integer (16 bit). Scale factors are used as exponents of a power of ten. Negative scale factors push the decimal point to the left, positive scale factors to the right.	0x8000
uint16	Unsigned integer (16 bit)	0xFFFF
uint32	Unsigned integer (32 bit)	0xFFFF FFFF
uint64	Unsigned integer (64 bit)	0xFFFF FFFF FFFF FFFF

3.5.7 SMA Data Types and NaN Values

The following table shows the data types used in the SMA Modbus profile and compares these to possible NaN values. The SMA data types are listed in the assignment tables in the **Type** column. The SMA data types describe the data widths of the assigned values:

Type	Explanation	NaN value
S16	A signed word (16-bit).	0x8000
S32	A signed double word (32-bit).	0x8000 0000
STR32	32 byte data field, in UTF8 format.	ZERO
U16	A word (16-bit).	0xFFFF
U32	A double word (32-bit).	0xFFFF FFFF
U32	For status values, only the lower 24 bits of a double word (32-bit) are used.	0xFFFF FD
U64	A quadruple word (64-bit).	0xFFFF FFFF FFFF FFFF

3.5.8 SMA Data Formats

The following SMA data formats describe how SMA data is to be interpreted. The data formats are used, for example, for the display of data or for its further processing. The SMA data formats are listed in the **Format** column of the assignment tables.

Format	Explanation
Duration	Time in seconds, in minutes or in hours, depending on the Modbus register
ENUM or TAGLIST	Coded numerical values. The breakdown of the possible codes can be found directly under the designation of the Modbus register in the assignment tables.
FIX0	Decimal number, commercially rounded, without decimal place.
FIX1	Decimal number, commercially rounded, one decimal place.
FIX2	Decimal number, commercially rounded, two decimal places.
FIX3	Decimal number, commercially rounded, three decimal places.
FIX4	Decimal number, commercially rounded, four decimal places.
FUNCTION_SEC	The date saved in the Modbus register will be transmitted in the event of a change to a function and starts this. After execution of the function, no status value is set. A security question must be executed in the client software prior to execution of the function.
FW	Firmware version
HW	Hardware version (e.g. 24)

Format	Explanation
IP4	4-byte IP address (IPv4) of the form XXX.XXX.XXX.XXX.
RAW	Text or number. A RAW number has no decimal places and no thousand or other separation indicators.
Outline Purchase Agreement	Revision number of the form 2.3.4.5.
TEMP	Temperature values are stored in special Modbus registers in degrees Celsius (°C), in degrees Fahrenheit (°F), or in Kelvin K. The values are commercially rounded, with one decimal place.
TM	UTC time, in seconds
UTF8	Data in UTF8 format.
DT	Date/time, in accordance with country settings (Transmission in seconds since 1970-01-01)

3.5.9 SMA Firmware Data Formats

Four values are extracted from the delivered double word (DWORD) within the corresponding Modbus register. The values "Major" and "Minor" are contained BCD-coded in bytes 1 and 2. Byte 3 contains the "Build" value (not BCD-coded). Byte 4 contains the "Release Type" value according to the following table:

Release type	Release-type coding	Explanation
0	N	No revision number
1	E	Experimental release
2	A	Alpha release
3	B	Beta release
4	R	Release
5	S	Special release
> 5	As number	No special interpretation

Example:

Product firmware version:	1.05.10.R
Values from double word (DWORD):	Major: 1, Minor: 05, Build: 10, Release type: 4 (Hex: 0x1 0x5 0xA 0x4)

3.6 Modbus Ports

The following table shows the default setting of the supported network protocols:

Network protocol	Modbus port
TCP	502
UDP	502

Using free ports

Only use free ports when using another port than 502. The following range is generally available: 49152 to 65535.

You can find more information on occupied ports in the database "Service Name and Transport Protocol Port Number Registry" at http://www.iana.org/assignments/service-names-port-numbers/service-names-port-numbers.xml.

Changing the Modbus port

If you change one of the communication ports, you must also change the corresponding Modbus port of a connected Modbus/client system. Otherwise the SMA product can no longer be accessed via the Modbus protocol.

3.7 Data Processing and Time Behavior

In this Section, you can find typical data-processing and reaction times of the Speedwire Modbus interface and time details for saving parameters in SMA products.

Signal runtime via the SMA product with Modbus interface

The signal runtime of the SMA product with Modbus is usually 100 ms. The signal runtime is the time required by the SMA product to process incoming Modbus commands.

Data Transfer Interval via the Modbus protocol

For system stability reasons, the time period between data transfers via the Modbus protocol must be at least ten seconds. No more than five parameters and measured values should be transmitted per SMA inverter.

Data Transfer Interval via the Modbus protocol

The physical reaction time of SMA products is normally approx. one second. The physical reaction time is the time between the changing of setpoints in a SMA product until their physical implementation. Such a change would be, for example, changing cos φ.

Reaction time of the Modbus interface

The reaction time of the Modbus interface is five to ten seconds. The reaction time of the Modbus interface is the time between the arrival of the parameter specifications in the SMA product until the corresponding measured values are provided to the Modbus interface. Due to this reaction time, parameter specifications can only be displayed via a Modbus/client system (e.g. a SCADA system) at a corresponding or larger interval.

3.8 Number codes of time zones

The following table contains the most important time zones and their number codes in the SMA Modbus profile. If the location is known, you can determine the numerical key (code) and the time zone. In addition, take account of local regulations for summer/winter time.

City/Country	Code	Time zone
UTC-AUTO	9499	AUTO
Abu Dhabi, Muscat	9503	UTC+04:00
Adelaide	9513	UTC+09:30
Alaska	9501	UTC-09:00
Amman	9542	UTC+02:00
Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna	9578	UTC+01:00
Arizona	9574	UTC-07:00
Astana, Dhaka	9515	UTC+06:00
Asuncion	9594	UTC-04:00
Athens, Bucharest, Istanbul	9537	UTC+02:00
Atlantic (Canada)	9505	UTC-04:00
Auckland, Wellington	9553	UTC+12:00
Azores	9509	UTC-01:00
Baghdad, Istanbul	9504	UTC+03:00
Baku	9508	UTC+04:00
Bangkok, Hanoi, Jakarta	9566	UTC+07:00
Beirut	9546	UTC+02:00
Belgrade, Bratislava, Budapest, Ljubljana, Prague	9517	UTC+01:00
Bogotá, Lima, Quito	9563	UTC-05:00
Brasilia	9527	UTC-03:00
Brisbane	9525	UTC+10:00
Brussels, Copenhagen, Madrid, Paris	9560	UTC+01:00

City/Country	Code	Time zone
Buenos Aires	9562	UTC-03:00
Canberra, Melbourne, Sydney	9507	UTC+10:00
Caracas	9564	UTC-04:30
Casablanca	9585	UTC+00:00
Cayenne	9593	UTC-03:00
Chennai, Kolkata, Mumbai, New Delhi	9539	UTC+05:30
Chicago, Dallas, Kansas City, Winnipeg	9583	UTC-06:00
Chihuahua, La Paz, Mazatlán	9587	UTC-07:00
Darwin	9506	UTC+09:30
Denver, Salt Lake City, Calgary	9547	UTC-07:00
Dublin, Edinburgh, Lisbon, London	9534	UTC+00:00
Yerevan	9512	UTC+04:00
Fiji, Marshall Islands	9531	UTC+12:00
Georgetown, La Paz, San Juan	9591	UTC-04:00
Greenland	9535	UTC-03:00
Guadalajara, Mexico City, Monterrey	9584	UTC-06:00
Guam, Port Moresby	9580	UTC+10:00
Harare, Pretoria	9567	UTC+02:00
Hawaii	9538	UTC-10:00
Helsinki, Kiev, Riga, Sofia, Tallinn, Vilnius	9532	UTC+02:00
Hobart	9570	UTC+10:00
Indiana (East)	9573	UTC-05:00
International Date Line (West)	9523	UTC-12:00
Irkutsk	9555	UTC+08:00
Islamabad, Karachi	9579	UTC+05:00
Yakutsk	9581	UTC+09:00
Yekaterinburg	9530	UTC+05:00
Jerusalem	9541	UTC+02:00
Kabul	9500	UTC+04:30

City/Country	Code	Time zone
Cairo	9529	UTC+02:00
Cape Verde Islands	9511	UTC+05:45
Caucasus Standard Time	9582	UTC+04:00
Krasnoyarsk	9556	UTC+07:00
Kuala Lumpur, Singapore	9544	UTC+08:00
Kuwait, Riyadh	9502	UTC+03:00
Magadan, Solomon Islands, New Caledonia	9519	UTC+11:00
Manaus	9516	UTC-04:00
Midway Islands, Samoa	9565	UTC-11:00
Minsk	9526	UTC+02:00
Mid-Atlantic	9545	UTC-02:00
Monrovia, Reykjavík	9536	UTC+00:00
Montevideo	9588	UTC-03:00
Moscow, St. Petersburg, Volgograd	9561	UTC+03:00
Nairobi	9524	UTC+03:00
Newfoundland	9554	UTC-03:30
New York, Miami, Atlanta, Detroit, Toronto	9528	UTC-05:00
Novosibirsk	9550	UTC+06:00
Nuku'alofa	9572	UTC+13:00
Osaka, Sapporo, Tokyo	9571	UTC+09:00
Pacific (U.S., Canada)	9558	UTC-08:00
Beijing, Chongqing, Hong Kong, Ürümqi	9522	UTC+08:00
Perth	9576	UTC+08:00
Petropavlovsk-Kamchatsky	9595	UTC+12:00
Port Louis	9586	UTC+04:00
Santiago	9557	UTC-04:00
Sarajevo, Skopje, Warsaw, Zagreb	9518	UTC+01:00
Saskatchewan	9510	UTC-06:00
Seoul	9543	UTC+09:00
Sri Jayawardenepura	9568	UTC+05:30

City/Country	Code	Time zone
Taipei	9569	UTC+08:00
Tashkent	9589	UTC+05:00
Teheran	9540	UTC+03:30
Tbilisi	9533	UTC+04:00
Tijuana, Lower California (Mexico)	9559	UTC-08:00
Ulan Bator	9592	UTC+08:00
West-Central Africa	9577	UTC+01:00
Windhoek	9551	UTC+02:00
Vladivostok	9575	UTC+10:00
Yangon (Rangoon)	9549	UTC+06:30
Central America	9520	UTC-06:00

4 Configuration

The two servers Modbus TCP and Modbus UDP are deactivated as default in the supported SMA products. You must activate the Modbus servers to use them. You can activate the Modbus ports of both Modbus protocols upon activation of the servers.

Access to data points after activating the Modbus interface

The read-only access to data points is possible after activating the Modbus interface. The read-only access to all data points (which are not protected by the SMA Grid Guard code) are possible without further input of a password via Modbus after activating the Modbus interface.

- Ensure that the Modbus interface is still active after resetting the SMA product to default settings.

4.1 Configuration with the user interface of an SMA inverter

1. Establish a connection to the user interface (see the inverter manual).
2. Log into the user interface as an **Installer**.
3. Select the **Device Parameters** tab.
4. Select [**Edit parameters**].
5. Select the parameter group **External Communication**.
6. To activate the TCP server, make the following settings in the group **Modbus > TCP Server**:
   - In the drop-down list **Activated**, select the entry **Yes**.
   - If necessary, change the port in the field **Port** (default setting: 502).
7. To activate the UDP server, make the following settings in the group **Modbus > UDP Server**:
   - In the drop-down list **Activated**, select the entry **Yes**.
   - If necessary, change the port in the field **Port** (default setting: 502).
8. Select [**Save all**].

4.2 Configuration with Sunny Explorer

1. Start Sunny Explorer on the computer and a create Speedwire plant (see Sunny Explorer user manual).
2. Log into the Speedwire system as **Installer**.
3. Select the SMA inverter to be configured in the system directory.
4. Select the tab **Settings**.
5. Select the parameter group **External Communication**.
6. Select [**Edit**].
7. To activate the TCP server, make the following settings in the group **Modbus > TCP Server**:
   - In the drop-down list **Activated**, select the entry **Yes**.
   - If necessary, change the port in the field **Port** (default setting: 502).
8. To activate the UDP server, make the following settings in the group **Modbus > UDP Server**:
   - In the drop-down list **Activated**, select the entry **Yes**.

- If necessary, change the port in the field **Port** (default setting: 502).

9. Select [**Save**].

5 Contact

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