Technical Information

SUNSPEC MODBUS

SUNNY BOY / SUNNY TRIPOWER / SUNNY HIGHPOWER

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1 Validity

This document is valid for:

Products		from firmware version
PV inverter	SB3.0-1AV-41 / SB3.6-1AV-41 / SB4.0-1AV-41 / SB5.0-1AV-41 / SB6.0-1AV-41 (Sunny Boy 3.0 / 3.6 / 4.0 / 5.0 / 6.0)	4.00.23.R
	STP3.0-3AV-40 / STP4.0-3AV-40 / STP5.0-3AV-40 / STP6.0-3AV-40 (Sunny Tripower 3.0 / 4.0 / 5.0 / 6.0)	4.00.02.R
	STP8.0-3AV-40 / STP10.0-3AV-40 (Sunny Tripower 8.0 / 10.0)	4.00.02.R
	STP 50-41 / STP 33-US-41 / STP 50-US-41 / STP 62-US-41 (Sunny Tripower CORE1)	3.14.##.R
	SHP 100-21 / SHP 150-21 / SHP 172-21/ SHP 125-US-21 / SHP 150-US-21 / SHP 165-US-21 / SHP 172-US-21 / SHP FLEX-US-21 / SHP 100-JP-21 / SHP 143-JP-21 (Sunny Highpower PEAK3)	4.##.##.R

2 Safety

2.1 Intended Use

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

- Remote control of grid management services
- Remote-controlled querying of measured values
- Remote-controlled changing of parameters
- Interface for direct marketing

The Modbus interface can only be used via the Modbus TCP protocol.

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

Use SMA products only in accordance with the information provided in the enclosed documentation and with the locally applicable laws, regulations, standards and directives. Any other application may cause personal injury or property damage.

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

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

This document does not replace any regional, state, provincial, federal or national laws, regulations or standards that apply to the installation, electrical safety and use of the product. SMA Solar Technology AG assumes no responsibility for the compliance or non-compliance with such laws or codes in connection with the installation of the product.

2.2 IMPORTANT SAFETY INSTRUCTIONS

Keep the manual for future reference.

This section contains safety information that must be observed at all times when working.

The product has been designed and tested in accordance with international safety requirements. As with all electrical or electronical devices, there are residual risks despite careful construction. 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 writable Modbus registers (RW) of the SMA products 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.

The following parameters are excluded. The parameters may be changed cyclically.

- Information model 123:
  - Conn
  - WMaxLimPct
  - OutPFSet
  - VArWMaxPct
  - VArMaxPct
- Information model 704:
  - WMaxLimPct
  - WSet
  - WSetPct
  - VarSetPct
  - PF + Ext (WInj, Power factor & excitation setpoint when injecting active power)
  - PF + Ext (WAbs, Power factor & excitation setpoint when absorbing active power)

Access to data points after activating the Modbus interface

After activating the Modbus interface, the read and write access to all data points is possible without further input of a password via Modbus.

Deactivating the Modbus interface by resetting the SMA product

When the SMA product is reset to the default settings, the Modbus interface is deactivated.

- If the Modbus interface is to be used after the reset, activate the Modbus interface (see Section 3, page 6).

3 Activating the SunSpec Modbus

The Modbus interface of SMA products is deactivated by default. To use the Modbus interface and to communicate with the products via SunSpec Modbus, you must activate Modbus as the type of communication and set the TCP port.

If you have a system in which the inverters are addressed via the Modbus Unit ID instead of via the IP address, the Unit ID must be set in addition to the TCP port. 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.

You can activate the Modbus interface of SMA inverters by means of the installation assistant.

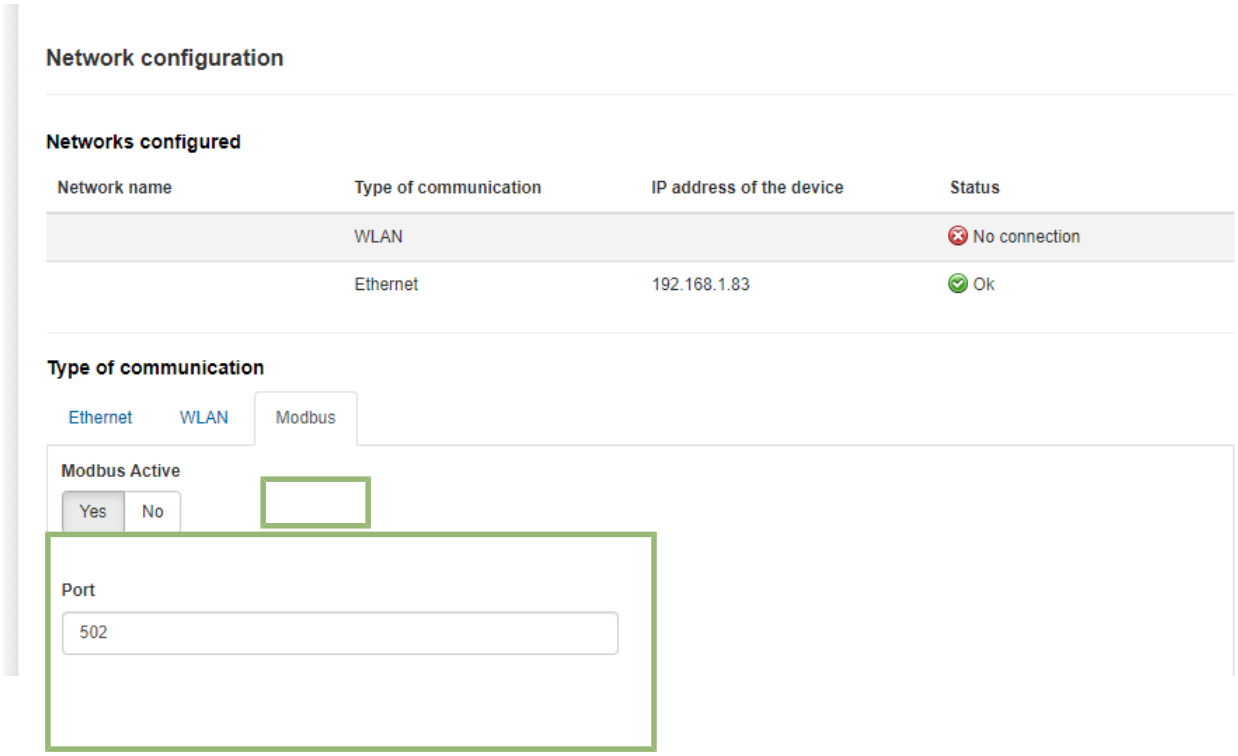

Figure 1: Activation via the installation assistant on the inverter's user interface

4 SunSpec Profile

There are 3 SunSpec Modbus profiles:

- SunSpec profile 2.0
- SunSpec profile 1.1
- SunSpec profile 1.0

The SunSpec profile is automatically selected by setting a country data set when commissioning the product.

SunSpec profile 2.0

The SunSpec profile 2.0 is automatically selected when a country data set is selected that is based on the SMA Grid Guard 10. This can be identified either by a year specification ≥ 2018 or by a reference below the drop-down menu for country data sets.

The SunSpec profile 2.0 is shown in the installation assistant in the step **Network configuration > Modbus** as profile version **Standard (recommended)**.

The SunSpec profile 2.0 contains information models of the 100 series including the improvement (see Section 7, page 11) and will be extended by information models of the 700 series in the future to meet the IEE1547:2018 requirements.

The profile only contains the information models that are supported by the product. All information models not supported by the product are excluded dynamically. This ensures that battery inverters, for example, do not contain information models for PV inverters and vice versa.

Within an information model, blocks are used that are repeated in order to accommodate data areas with different lengths (e.g. for a different number of DC inputs).

Determine Modbus addresses

All information models start with an ID register and a length register. This information is used to cycle through or scan the information models even if the ID and the contents of an information are not understood during the scan. In this way, information models can be found and used, or ignored if the definition is unknown.

SunSpec Modbus profile 1.1

The SunSpec profile 1.1 is automatically selected when an old country data set is selected that is not based on the SMA Grid Guard 10. You can identify this by the fact that the year specification is missing or is older than 2018.

The profile only contains information models of the 100 series.

The SunSpec profile 1.1 is shown in the installation assistant in the step **Network configuration > Modbus** as profile version **Standard (recommended)**.

Compatibility mode / SunSpec Modbus profile 1.0

If you have an existing system with inverters for which a country data set is selected that is not based on the SMA Grid Guard 10, problems in the control may occur due to the improvements in the SunSpec profile 1.1 (see Section 7, page 11).

In this case, you can switch to the SunSpec profile 1.0 by selecting the SunSpec Modbus profile version **Compatibility mode** in the installation assistant in the step **Network configuration > Modbus**.

For systems with inverters for which a country data set is selected that is based on the SMA Grid Guard 10, this option does not exist.

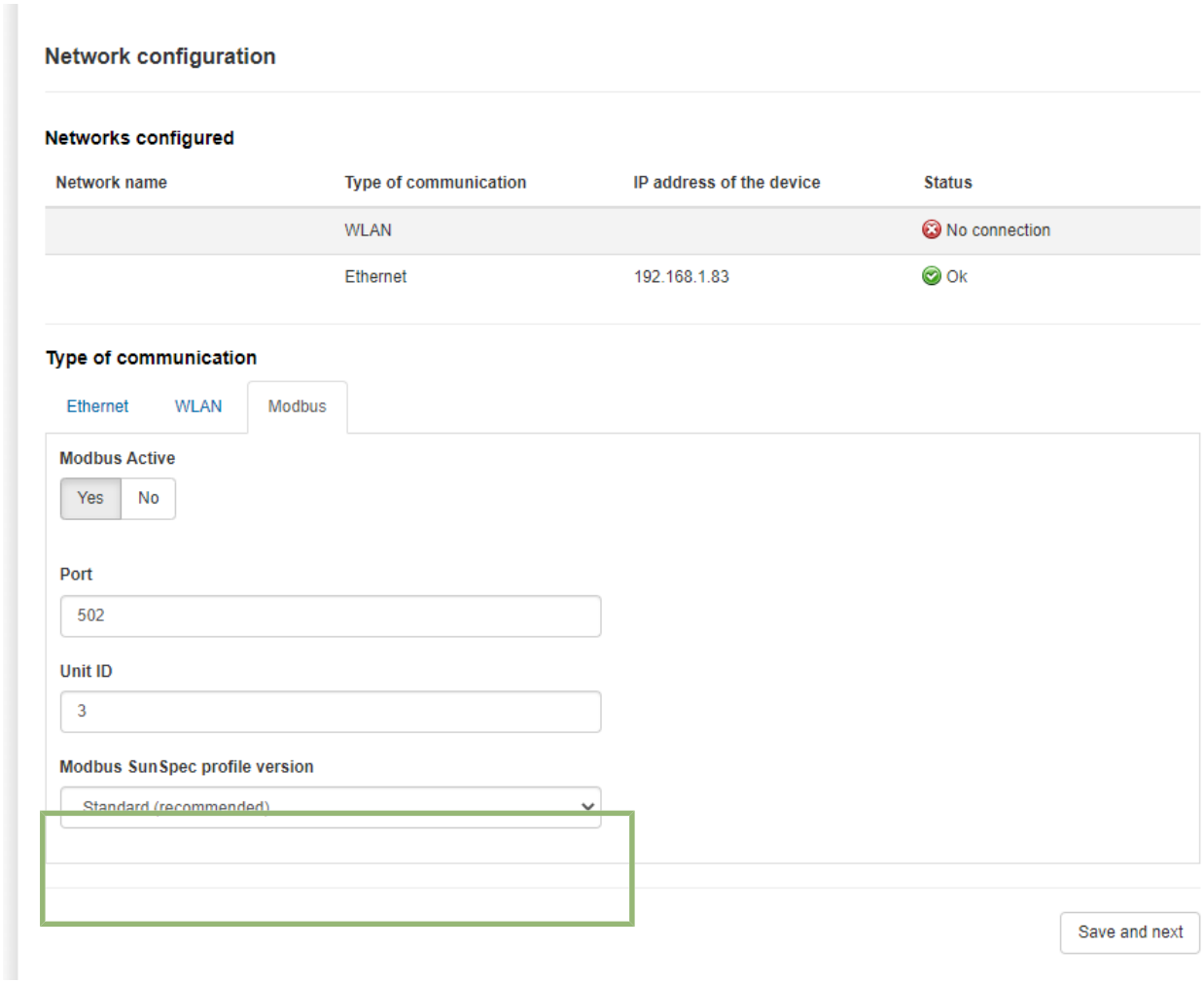

Figure 2: Activating the compatibility mode

5 Supported Information Models

The following information models are supported:

- 001 - Common
- 011 - Ethernet Link Layer
- 012 - IP v4
- 101 - single phase AC Monitoring (701 is recommended)
- 102 - split phase AC Monitoring (701 is recommended)
- 103 - three phase AC Monitoring (701 is recommended)
- 120 - Inverter Nameplate ratings (702 is recommended)
- 121 - Inverter Nameplate settings (702 is recommended)
- 122 - Extended Measurement
- 123 - Inverter Immediate Controls (704 is recommended)
- 160 - DC Monitoring (714 is recommended)

In a future firmware version, the SunSpec profile 2.0 is extended to meet the IEEE1547:2018 requirements. For this, the so-called 700 series of SunSpec information models is intended as the substitute for the 100 series. The 100 series can still be used; it is however designated as outdated in the SunSpec.

The 700 series includes the following information models:

- 701 - DER AC Measurement
- 702 - DER Capacity
- 703 - Enter Service
- 704 - AC Controls
- 705 - DER Volt-Var Q(U)
- 706 - DER Volt-Watt P(U)
- 707 - DER Trip LV
- 708 - DER Trip HV
- 709 - DER Trip LF
- 710 - DER Trip HF
- 711 - DER Frequency Droop P(f)
- 712 - DER Watt-Var Q(P)
- 713 - DER Storage Capacity (only with battery inverters)
- 714 - DC Monitoring

6 Not Supported Information Models

The following information models are no longer supported in the SunSpec profile 2.0:

- 124 – Storage
- 126 – Volt-Var Q(U) (replaced by 705 in profile 2.0)
- 127 – Frequency-Watt P(f) (replaced by 711 in profile 2.0)
- 128 – Dynamic Reactive Current
- 131 – Watt-PF cosPhi(P)
- 132 – Volt-Watt P(U) (replaced by 706 in profile 2.0)
- 129 – Trip LV (replaced by 707 in profile 2.0)
- 130 – Trip HV (replaced by 708 in profile 2.0)

7 Improvements in SunSpec Profile 1.1 and 2.0

With the SunSpec profile 1.1 and 2.0, most of the known problems with SunSpec Modbus with SMA products are rectified.

Basic corrections:

- Repair of the SunSpec mappings for country data sets that are based on the SMA Grid Guard 10.
- SMA Grid Guard code is no longer needed for write operations via SunSpec Modbus.

Information model	Improvement
001	"Model" contains the SMA type designation in plain text, e.g. "STP 62-US-41" instead of "Solar Inverter" "Options" not applicable
101/102/103	"Amps PhaseA , B , C": data type was corrected from int16 to uint16 "Other Temperature" not applicable "Operating State" mapping extended by 2 battery states "Event1": updating of the event mapping Voltage and current register: first measured value is always set to line conductor A, regardless of the setting of the inverter.OutPhs
120	"DERTyp" mapping adjusted "ARtg" scaling introduced for better accuracy (one decimal)
121	"MaxRmpRte" mapping adjusted. Designation in % of WGra instead of WMax
122	"PVConn", "StorConn", "ECPConn": status mapping adjusted
123	W, VAr und PF setpoints: readback capability implemented
129/130	"V1, V2, V3": unit corrected. Designation in % of VRef instead of V