

Technical Note – SunSpec Logging in SolarEdge Inverters

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Overview

SolarEdge inverters support reading inverter-level monitoring data directly from the inverter to a local non-SolarEdge device, by implementing the SunSpec open protocol for interoperability between devices in renewable energy systems. This option can be used alongside the connection to the SolarEdge monitoring server. This document describes the connection method and the protocol and configurations needed to implement this feature.

Direct connection to a monitoring device is useful when a network connection is unavailable, when extensive custom data processing is required, or when authorities require direct access to monitoring data.

In many cases, it is possible – and recommended – to employ the direct connection **alongside** a SolarEdge monitoring portal connection. Connection to the SolarEdge monitoring portal enables all the monitoring benefits, primarily:

- Proactive installer maintenance and real time troubleshooting by SolarEdge support, using with the physical mapping available only in the SolarEdge monitoring portal
- Module-level monitoring

SunSpec Supported Inverters

All inverters with CPU version 2.0496 and above are SunSpec-supported.

To check the inverter firmware versions, short press the LCD light button until reaching the following screen:

```

ID : #####
DSP 1 / 2 : . x x x x / x . x x x x
CPU : 0 0 0 2 . 0 4 9 6
C o u n t r y : x x x x x
    
```

If needed, contact SolarEdge support to upgrade inverters with earlier versions.

Physical Connection

The connection is done using an RS485 connector with a twisted pair cable.

The transmission mode in SolarEdge inverters is set to RTU (binary).

The COM port default properties are: 115200 bps, 8 data bits, no parity, 1 stop bit, no flow control. Baud rate can be changed between 9600bps to 115200bps (supported from CPU version 2.0549).

The RS485 bus can be configured to support connection either to a non-SolarEdge monitoring device or Master-Slave connection between SolarEdge inverters. Therefore, a slave inverter cannot communicate simultaneously with a master inverter and with a non-SolarEdge monitoring device on the same RS485 port.

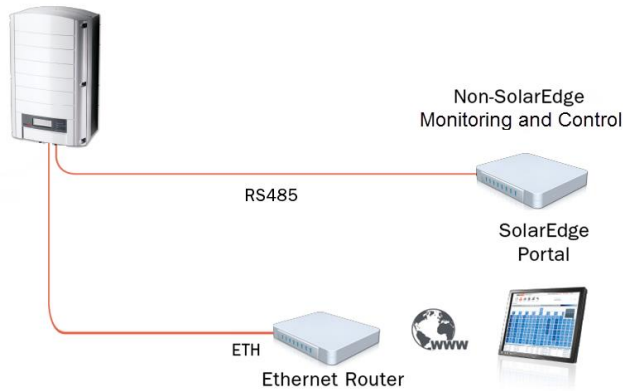
Use Cases

This section describes the options of connecting the inverter to a non-SolarEdge monitoring device and to SolarEdge monitoring portal.

Single Inverter Connection

Use the RS485 bus for connecting to a non-SolarEdge monitoring device.

Use an Ethernet cable or any of the optional wireless connection options for connecting to the SolarEdge monitoring portal.



Multiple Inverter Connection

Connection to a non-SolarEdge monitoring device only (without connection to the SolarEdge monitoring portal)

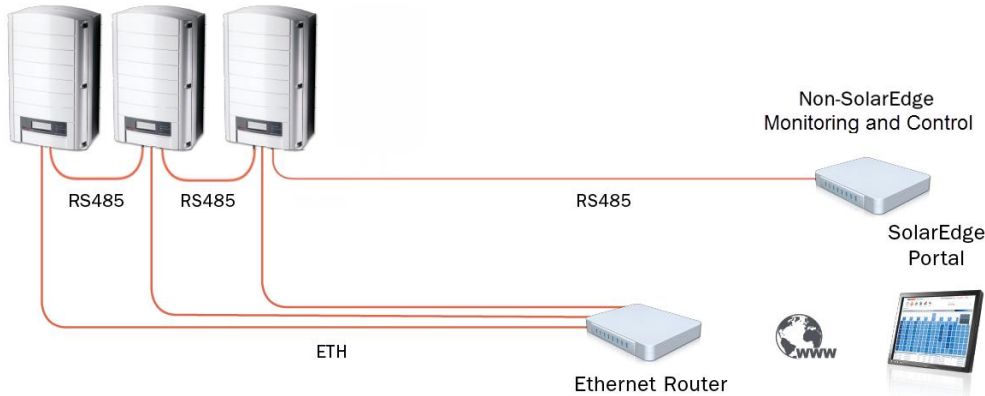
Use the RS485 bus for connection to a non-SolarEdge monitoring device. Every inverter in the RS485 bus should be configured to a different device ID (MODBUS ID).



Connection to the SolarEdge monitoring portal and to a non-SolarEdge monitoring device

Use the RS485 bus for connection to a non-SolarEdge monitoring device. Every inverter in the RS485 bus should be configured to a different device ID (MODBUS ID).

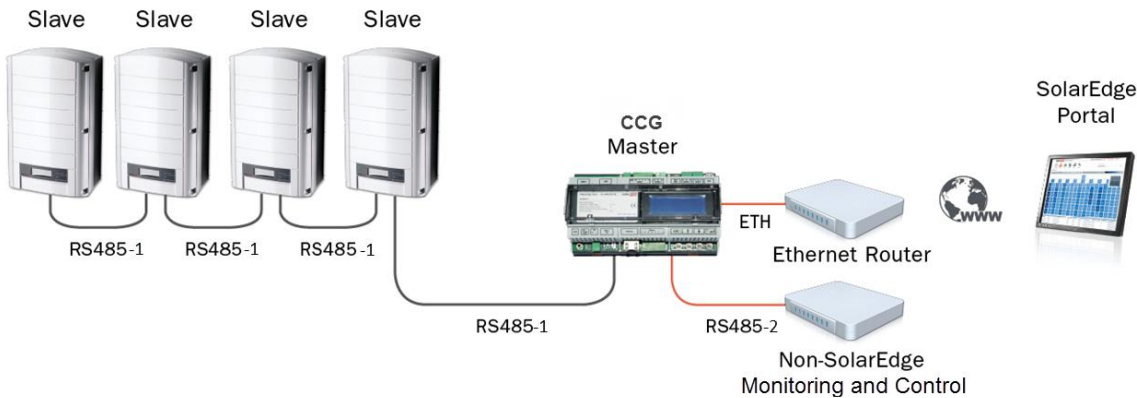
Connect each inverter to the SolarEdge monitoring portal via Ethernet cables.



Connection to SolarEdge monitoring portal and to a non-SolarEdge monitoring device using SolarEdge Control and Communication Gateway

Use the RS485-2 bus for connection to a non-SolarEdge monitoring device. Every inverter connected to the RS485 bus should be configured to a different device ID (MODBUS ID).

Use Ethernet cables to connect each inverter to the SolarEdge monitoring portal .



Register Mapping – Monitoring Data

This section describes the registers mapping for the inverter monitoring data (read-only MODBUS protocol data).

The SolarEdge inverter mapping for monitoring data is based on the open protocol managed by SunSpec: SunSpec Alliance Interoperability Specification – Inverter Models v1.0. Refer to the *SunSpec Alliance Interoperability Specification – Common Models (Elements)* document for a detailed description of the protocol.

The register mapping can be downloaded from the SunSpec Alliance web page: <http://www.sunspec.org/>.

SolarEdge inverters support device ID (DID) 101, 102¹ and 103 register mappings.

Common Model MODBUS Register Mappings

The base Register Common Block is set to 40001 (Modbus PLC address [base 1]), or 40000 (Modbus Protocol Address [base 0]).

All parameters are defined as in the SunSpec Common block definition, except for the **C_Options** register, which is set to NOT_IMPLEMENTED.

C_Manufacturer is set to SolarEdge.

¹ Supported only in split-phase configurations (Japanese grid and 240V grid in North America)

C_Model is set to the appropriate inverter model, e.g. SE5000.

C_Version contains the CPU software version with leading zeroes, e.g. 0002.0611.

C_SerialNumber contains the inverter serial number.

C_DeviceAddress is the device Modbus ID (default: 1), and may be changed using the inverter menu (refer to *SolarEdge Device Configuration* on page 5).

Address	Size	Name	Type	Description
40001	2	C_SunSpec_ID	uint32	Value = "SunS" (0x53756e53). Uniquely identifies this as a SunSpec Modbus Map
40003	1	C_SunSpec_DID	uint16	Value = 0x0001. Uniquely identifies this as a SunSpec Common Model Block
40004	1	C_SunSpec_Length	uint16	65 = Length of block in 16-bit registers
40005	16	C_Manufacturer	String(32)	Value Registered with SunSpec = "SolarEdge "
40021	16	C_Model	String(32)	SolarEdge Specific Value
40045	8	C_Version	String(16)	SolarEdge Specific Value
40053	16	C_SerialNumber	String(32)	SolarEdge Unique Value
40069	1	C_DeviceAddress	uint16	Modbus Unit ID

Inverter Device Status Values

The following **I_Status_ xxxx** values are supported:

Parameter	Value	Description
I_STATUS_OFF	1	Off
I_STATUS_SLEEPING	2	Sleeping (auto-shutdown) – Night mode
I_STATUS_MPPT	4	Inverter is ON and producing power

Inverter Model MODBUS Register Mappings

The following table lists the supported MODBUS register values.

Unsupported values are indicated by the NOT_IMPLEMENTED value.

The base register of the Device Specific block is set to 40070 (Modbus PLC address [base 1]), or 40069 (Modbus Protocol Address [base 0]).

Address	Size	Name	Type	Units	Description
40070	1	C_SunSpec_DID	uint16		101 = single phase 102 = split phase ¹ 103 = three phase
40071	1	C_SunSpec_Length	uint16	Registers	50 = Length of model block
40072	1	I_AC_Current	uint16	Amps	AC Total Current value
40073	1	I_AC_CurrentA	uint16	Amps	AC Phase A Current value
40074	1	I_AC_CurrentB	uint16	Amps	AC Phase B Current value
40075	1	I_AC_CurrentC	uint16	Amps	AC Phase C Current value
40076	1	I_AC_Current_SF	int16		AC Current scale factor
40077	1	I_AC_VoltageAB	uint16	Volts	AC Voltage Phase AB value
40078	1	I_AC_VoltageBC	uint16	Volts	AC Voltage Phase BC value
40079	1	I_AC_VoltageCA	uint16	Volts	AC Voltage Phase CA value
40080	1	I_AC_VoltageAN ²	uint16	Volts	AC Voltage Phase A to N value
40081	1	I_AC_VoltageBN ¹	uint16	Volts	AC Voltage Phase B to N value
40082	1	I_AC_VoltageCN ¹	uint16	Volts	AC Voltage Phase C to N value
40083	1	I_AC_Voltage_SF	int16		AC Voltage scale factor
40084	1	I_AC_Power	int16	Watts	AC Power value
40085	1	I_AC_Power_SF	int16		AC Power scale factor
40086	1	I_AC_Frequency	uint16	Hertz	AC Frequency value

² Supported only in split-phase configurations (Japanese grid and 240V grid in North America)

Address	Size	Name	Type	Units	Description
40087	1	I_AC_Frequency_SF	int16		Scale factor
40088	1	I_AC_VA	int16	VA	Apparent Power
40089	1	I_AC_VA_SF	int16		Scale factor
40090	1	I_AC_VAR	int16	VAR	Reactive Power
40091	1	I_AC_VAR_SF	int16		Scale factor
40092	1	I_AC_PF	int16	%	Power Factor ³
40093	1	I_AC_PF_SF	int16		Scale factor
40094	2	I_AC_Energy_WH	acc32	WattHours	AC Lifetime Energy production
40096	1	I_AC_Energy_WH_SF	uint16		Scale factor
40097	1	I_DC_Current	uint16	Amps	DC Current value
40098	1	I_DC_Current_SF	int16		Scale factor
40099	1	I_DC_Voltage	uint16	Volts	DC Voltage value
40100	1	I_DC_Voltage_SF	int16		Scale factor
40101	1	I_DC_Power	int16	Watts	DC Power value
40102	1	I_DC_Power_SF	int16		Scale factor
40104	1	I_Temp_Sink	int16	Degrees C	Heat Sink Temperature
40107	1	I_Temp_SF	int16		Scale factor
40108	1	I_Status	uint16		Operating State
40109	1	I_Status_Vendor	uint16		Vendor-defined operating state and error codes. The errors displayed here are similar to the ones displayed on the inverter LCD screen. For error description, meaning and troubleshooting, refer to the <i>SolarEdge Installation Guide</i> .

SolarEdge Device Configuration

This section describes how to configure the SolarEdge device (inverter or Control & Communication Gateway) as a non-SolarEdge monitoring device. To reach the main setup menu, follow the instructions in the *Installation Guide* of the specific SolarEdge device.

► To configure the inverters (when used without the Control and Communication Gateway):

- Under the Communication menu, set the following:
 - Communication → Server → Select any server connection, except for RS485 (if the inverter is *not* connected to the SolarEdge monitoring portal, select **None**).
 - Communication → RS485-1 Conf
 - RS485-1 Conf → Device Type → Non-SE Logger
 - RS485-1 Conf → Protocol → SunSpec
 - RS485-1 Conf → Device ID and enter the MODBUS address (a unique value 1...247). This will set the register C_DeviceAddress.
- If needed, set the baud rate to a preferred value: RS485-1 Conf → Baud rate and enter the rate.

► To configure the inverter (when used with the Control and Communication Gateway):

- Inverters configuration: For all inverters, set the following RS485 bus settings:
 - Communication → RS485-1 Conf → Device Type → SolarEdge
 - Communication → RS485-1 Conf → Protocol → Slave
 - Communication → RS485-1 Conf → Device ID → [a unique value 1...247]

³ Supported only for three phase inverters

- 2** Gateway configuration: Use RS485-1 to connect to the inverters. RS485-1 bus configuration is as follows:
 - Communication → RS485-1 Conf → Device Type → SolarEdge
 - Communication → RS485-1 Conf → Protocol → Master
 - Communication → RS485-1 Conf → Slave DetectThe Gateway should report the correct number of slaves. If it does not, verify the connections and terminations.
- 3** Use RS485-2 to connect to the non-SolarEdge monitoring device. RS485-2 bus configuration is as follows:
 - Communication → RS485-2 Conf → Device Type → Non-SE Logger
 - Communication → RS485-2 Conf → Protocol → SunSpecThe Control and Communication Gateway device ID is irrelevant for the communication but need to be set to one other than the ones set for the inverters
 - Communication → RS485-2 Conf → Device ID → [use one of the higher ID's (e.g. 247) to make sure it is out of scope]
 - The default baud rate is 115200bps. If a different baud rate is required, select: Communication → RS485-2 Conf → Baud Rate
- 4** Make sure the device ID of the non-SolarEdge monitoring device is different from all other device IDs configured in the inverters and gateways.
- 5** Connect the gateway to the Ethernet and configure:
 - Communication → Server → LAN
 - Communication → LAN Conf → Set DHCP → [Select Enable for DHCP or Disable for static IP configuration]
 - For Static DHCP setting, configure as follows:
 - Communication → LAN Conf → Set IP → [Set inverters' IP]
 - Communication → LAN Conf → Set Mask → [Set inverters' subnet mask]
 - Communication → LAN Conf → Set Gateway → [Set inverters' gateway]
 - Communication → LAN Conf → Set DNS → [Set inverters' DNS]
- 6** If Ethernet is connected to the server, verify that the LCD panel displays <S_OK>.
- 7** Verify that the LCD panel of all inverters is <S_OK>.

Appendix A – Examples of a Supported MODBUS Request

SolarEdge has implemented two methods of the MODBUS request procedure:

- Modbus request with explicit register addressing - supported by all communication board CPU versions. For example:
 - Tx: 01 03 9C 40 00 7A EB AD – Read 122 registers starting at address 40001.
 - Rx: 01 03 F4 53 75 ... [Registers data] ... FF FF 12 1B
- Modbus request without explicit addressing – supported by communication board CPU version 2.478 and above. For example:
 - Tx: 01 03 00 00 00 7A C4 29 – Read 122 registers starting at offset 0.
 - Rx: 01 03 F4 53 75 6E 53 ... [Registers data] ... FF FF AE DB