Application Note – Installing Environmental Sensors

This document is intended to assist in planning environmental sensor installations in commercial projects and should be used in conjunction with the following documents:

- SolarEdge Control and Communication Gateway Installation Guide
  http://www.solaredge.com/files/pdfs/solaredge-gateway-installation-guide.pdf

- SolarEdge Control and Communication Gateway Datasheet
  http://www.solaredge.com/files/pdfs/products/inverters/se_control_and_communication_gateway.pdf

- SolarEdge Environmental Sensors Datasheet
  http://www.solaredge.com/files/pdfs/products/inverters/se_sensor_datasheet.pdf

- SolarEdge Application Note – Monitoring Platform Performance Ratio Calculation
  http://www.solaredge.com/files/pdfs/monitoring_performance_ratio_calculation.pdf

Background

Environmental sensors are used to monitor a site's irradiance, temperature and wind conditions and calculate performance ratio (PR). Sensors connect to the SolarEdge Control and Communication Gateway (CCG) and the measurements are displayed in the SolarEdge monitoring server.

Up to three sensors can be connected to a single CCG.

NOTE
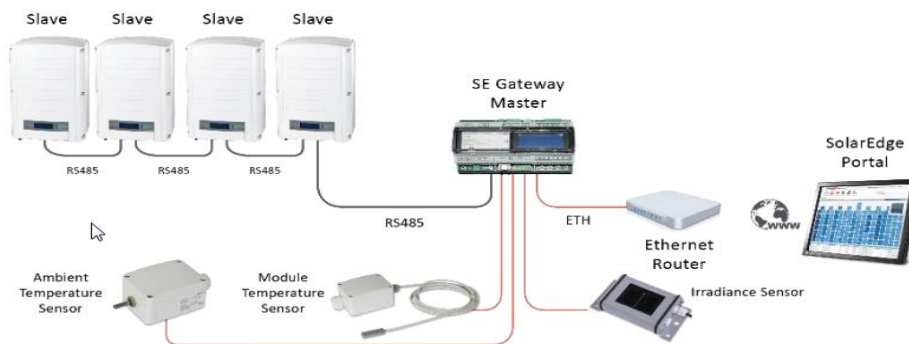When connecting more sensors than supported by a single gateway, use an additional CCG.

Figure 1: CCG Connected to 3 Sensors

Sensor Support

The CCG supports any environmental sensor meeting the specifications found in the CCG datasheet. SolarEdge offers irradiance, ambient temperature, module temperature and wind velocity sensors.

Additional SolarEdge approved sensors are available from Ingenieurbüro Mencke & Tegtmeyer GmbH. Please refer to http://www.solaredge.com/se-supported-devices for further details and specifications of approved environmental sensors.

To allow flexible connection of sensors, 3 analog inputs are available with different configurable input ranges:

- V1: 0-2V or 0-30mV, user configurable
- V2: 0-10V or 0-2V, user configurable
- I: 0-20mA

The table below includes a list of approved sensors and the input connectors to which they can be connected. Part numbers of sensors available from SolarEdge begin with the prefix "SE1000".

Sensor Input	SI Irradiance	Module Temperature	Ambient Temperature	Pyranometer	Wind Velocity	Wind Direction
V1 (0-2V)	**SE1000-SEN-IRR-S1** / Si-01Tcext (***)			SMP11-V (**)	4.3519.00.167	4.3129.00.167
V2 (0-10V)	Si-13TC-K (*)	Tmodul10 (*)	**SE1000-SEN-TAMB-S2** / Tamb10			
I (0-20mA)	Si-420TC-K (*)	**SE1000-SEN-TMOD-S2** / Tmodul420	Tamb420 (*)	SMP11-A	**SE1000-SEN-WIND-S1** / 4.3519.00.141	4.3129.00.141

Notes:

(*) An external 24 VDC/1A power supply is required

(**) 0-1 VDC

(***) 0-1.4 VDC

Follow the instructions in the section, "Configuring Environmental Sensors" in the *Solar Edge Control and Communication Gateway Installation Guide,* http://www.solaredge.com/files/pdfs/solaredge-gateway-installation-guide.pdf, to configure the sensors.

Sensor Connections

The following table details the CCG's 7 pin sensor terminal block inputs/outputs and their designation:

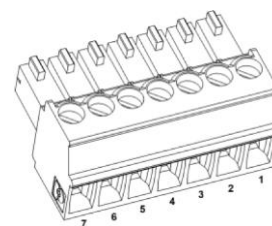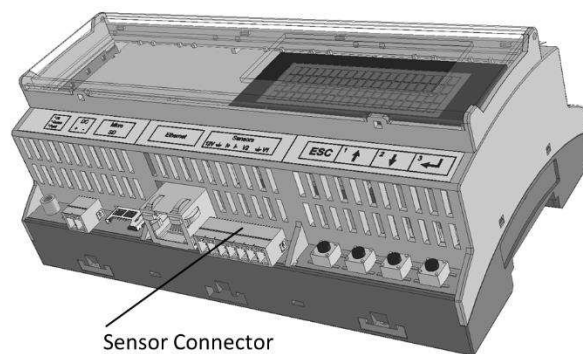| Pin #	Pin Name	Description
1	V1	Voltage sensor input number 1
2	GND	Ground - common for V1 & V2
3	V2	Voltage sensor input number 2
4	I-	Negative current sensor input
5	I+	Positive current sensor input
6	GND	Ground - common for V1 & V2
7	12V	12 VDC output voltage supply for sensors

Figure 2: Sensor 7-Pin Terminal Block

Figure 3: Position of Sensor Connector on the CCG

All sensors can be powered by the CCG. The CCG can power up to 3 sensors simultaneously.

SolarEdge Ambient Temperature Sensor (SE1000-SEN-AMB-S2)

► **To connect the SolarEdge Ambient Temperature Sensor to the CCG:**

Connect the sensor to the CCG as shown in Figure 4 below:

- Vin to 12V of the CCG
- OUT to V2 of the CCG
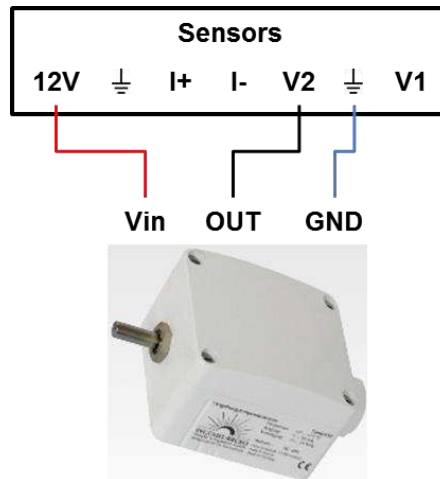- GND to GND of the CCG

Figure 4: Connecting the Ambient Temperature Sensor

SolarEdge Module Temperature Sensor (SE1000-SEN-TMOD-S2)

► **To connect the SolarEdge Module Temperature Sensor to the CCG:**

Connect the sensor to the CCG as shown in Figure 5 below:

- Vin to 12V on the CCG
- GND/OUT to I+ on the CCG
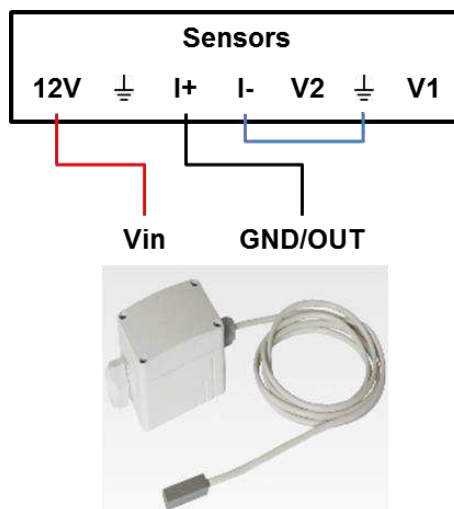- Short the CCG's **I-** and **GND** pins (see the blue line)

Figure 5: Connecting the Module Temperature Sensor

SolarEdge Solar Irradiance Sensor (SE1000-SEN-IRR-S1)

► **To connect the Solar Irradiance Sensor to the CCG:**

1 Connect the colored sensor wires to CCG as shown in Figure 6 below:

- Orange to the V1 pin on the CCG
- Black to the Ground pin on the CCG
- Red to the 12V pin on the CCG
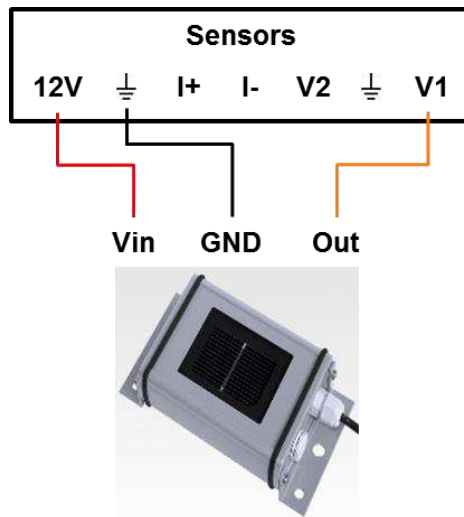
2 Do not connect the black cable shield.

Figure 6: Connecting the Solar Irradiance Sensor

NOTE
When configuring this sensor in the CCG, the type should be "Irradiance Direct".

SolarEdge Wind Velocity Sensor (SE1000-SEN-WIND-S1)

► **To connect the Wind Velocity Sensor to the CCG:**

Connect the wind velocity sensor to the CCG using a LiYCY 6 x 0.25mm² cable.

The sensor is supplied with a heating system that prevents the ball bearing and external rotation parts from freezing. When operated, the heating system consumes 20W and requires an external 24V power supply.

To connect the sensor *without* enabling use of the heating system:

Connect the sensor to the CCG as specified in the following table:

Table 1: Wind Velocity Sensor Connectivity

CCG Pin	Sensor Wire	CCG-to-CCG Connections	Sensor Wire Connections
2		Short CCG pins 2 and 4	
4		Short CCG pins 2 and 4	
5: I+	3 (green)		
6: GND	2 (brown)		
7: 12V	1 (white)		

To connect the sensor – enabling use of the heating system:

When deploying the heating system, connect the powering wires of both the sensor **and** the heating system to the external 24V power supply.

Connect the sensor and heating system to the CCG and external 24V power supply as specified in the following table:

Table 2: Wind Velocity Sensor and Heating System Connectivity

CCG Pin	External PS Terminal	Sensor Wire	CCG-to-CCG Connections	Sensor Wire Connections
2			Short CCG pins 2 and 4	
4			Short CCG pins 2 and 4	
5: I+		3 (green)		
	+	2 (brown), 6 (pink)		
	-	1 (white), 5 (gray)		

Using Sensor Information

Once the CCG and environmental sensors have been installed and configured, the sensor readings are accessible in the monitoring platform: *Charts -> Environmental -> On-site sensors*. See the example below, in which information from three sensors is displayed.
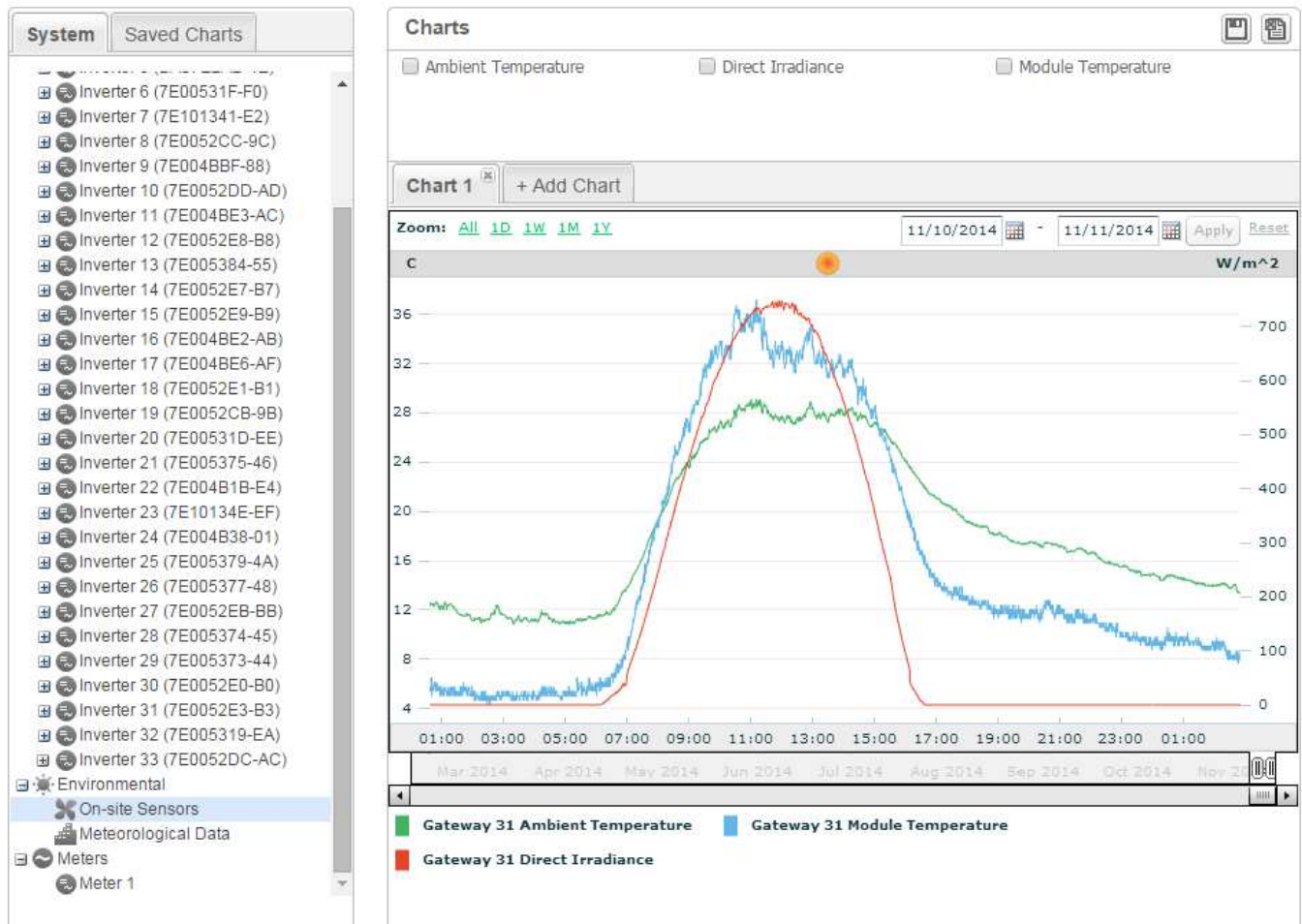

Figure 7: Viewing sensor readings on the monitoring platform

Performance Ratio Calculation

Following installation of the sensors, you can enable performance ratio calculations in the monitoring platform. To enable the performance ratio calculations, see the application note: *Monitoring Platform Performance Ratio Calculation*:

http://www.solaredge.com/sites/default/files/monitoring_performance_ratio_calculation.pdf