Using the DustIQ Soiling Sensor with the NRG SymphoniePRO Data Logger

INTRODUCTION

The following document describes how to connect the Kipp & Zonen DustIQ soiling sensor to the NRG Systems SymphoniePRO data logger.

PARTS

The following parts and equipment are required to use the DustIQ with the SymphoniePRO data logger:

NRG Part Number	Part Description	Part Specification	Quantity
8206	SymphoniePRO Data Logger		1
8150	26 Channel Wiring Panel		1
	DustIQ Sensor + Hardware		1
	External Power Supply with appropriate voltage and supply Recommended: **Mean Well RS-15-12**	**12 VDC** = 60 mA LEDs off – 130 mA LEDs on, std duty cycle 5% **24 VDC** = 40 mA LEDs off – 70 mA LEDs on, std duty cycle 5%	1

TOOLING

The following tools are required to successfully install the DustIQ sensor:

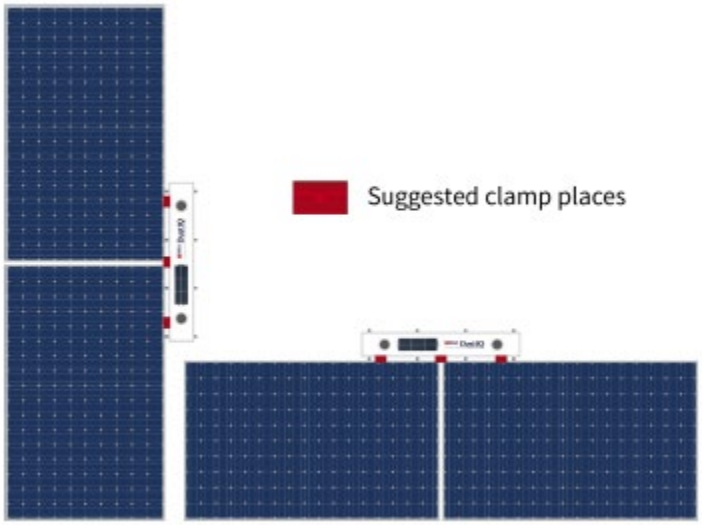
Item	Use
Small flathead screwdriver	Wiring the sensor to the logger
6 mm Hex Key	
13 mm Wrench	
USB to RS485 Adapter	Used for connecting 3+ DustIQ Sensors to 1 SymphoniePRO logger

PROCEDURE

1 Gather the parts and tools listed above. Open the DustIQ box and remove all of the hardware and the **DustIQ instruction sheet.**

2 Install the DustIQ sensor on the PV Panels in the desired configuration as described in the **DustIQ – instruction sheet.**

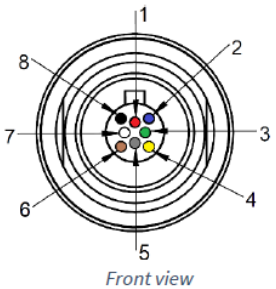
Be sure to verify that the sensor cable (10 m) is long enough to reach from the sensor to the data logger.



Note: for other configurations a custom bracket will be required, and is not included.

3 Wire the sensor cable to the SymphoniePRO Date Logger's 26 Channel COM A or COM B terminals as shown below. Cut or tape the red (1), green (3), and brown (6) wires, as they are not used.

Wire		Function	Connect to Logger
1	Red	None	Not used
3	Green	None	Not used
6	Brown	None	Not used
4	Yellow	Modbus® RS-485 B+	Half Duplex: TX+ terminal
5	Grey	Modbus® RS-485 A–	Half Duplex: TX– terminal
2	Blue	Modbus® common / Ground	SHD terminal*
7	White	Power +12 to 30 VDC	External power supply +
8	Black	Power ground	External power supply –
Shield		Housing	SHD terminal*

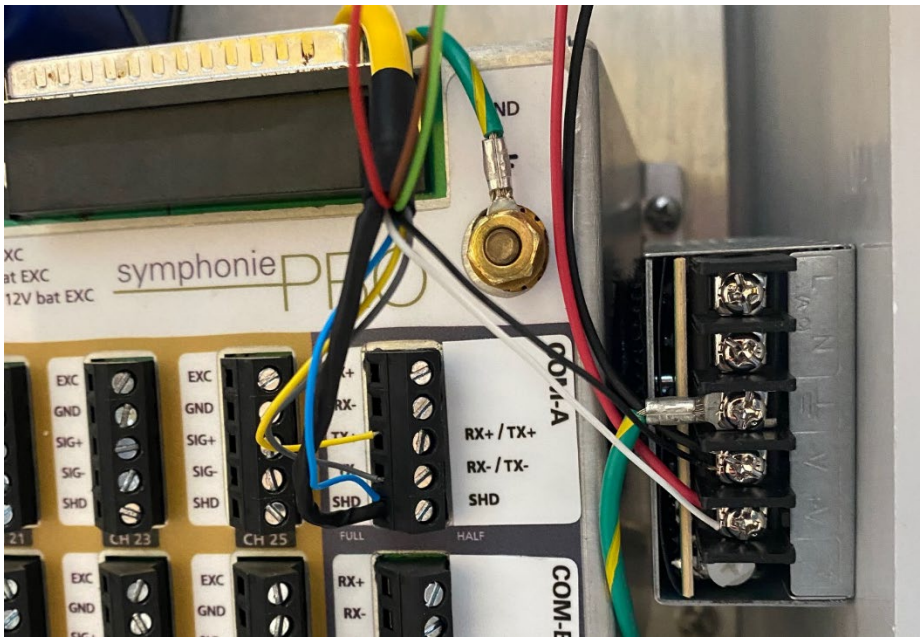


Front view

* Modbus common/Ground and Shield wire and both connected to the same SHD terminal

Note: Connect all wires to the data logger or SCADA system ***before*** plugging into the DustIQ.

If wired into a SymphoniePRO data logger with a AC/DC MeanWell converter attached, the power wires for the sensor can be wired into the DC + and DC – terminals of the MeanWell converter:



4 Install the DustIQ's back of module temperature sensor (if using it).

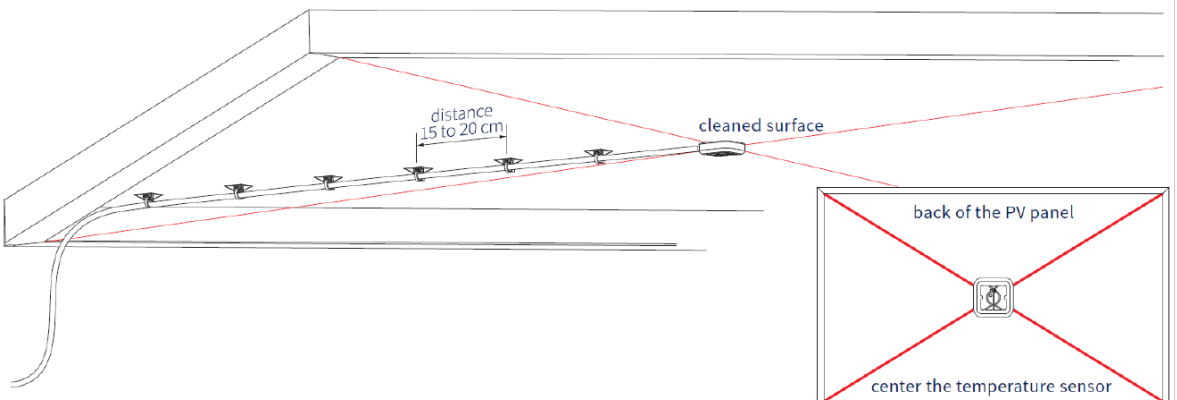
a) From the DustIQ, remove the black dust cap of the daisy-chain connector.

b) Insert the plug in the connector of the DustIQ.

c) Clean the surfaces of the locations for the cable supports and for the PV panel temperature sensor at the back of the PV panel.

d) The best location for the temperature sensor is the center of the PV panel.

e) Stick the temperature sensor to the cleaned surface at back of the PV panel.
Place with care, as the temperature sensor is extremely difficult or impossible to remove.



Mounting the PV panel temperature sensor

f) Stick the cable tie mounts to the cleaned surfaces at the back of the PV panel.

g) Secure the cable to the cable supports by using zip ties.

See section 6.12 of the DustIQ user manual for more details:
https://www.kippzonen.com/Download/994/DustIQ-Manual-April-2019-all-models

5 With the DustIQ and temperature sensor installed and the sensor wire attached to the logger wiring panel and power supply, connect the cable to the DustIQ.

NOTE: it can take up to a minute for the sensor to start up and begin providing accurate readings.

6 Follow the DustIQ calibration procedure that comes with the sensor to finish the installation.

7 Program the SymphoniePRO Data logger as follows:

a) Choose COM A or COM B depending on which terminal the sensor is wired into.

b) Enter the Slave Address for the sensor - all DustIQ sensors come with pre-programed with Slave Address 1 as the default.

NOTE: *if using two DustIQ sensors, place one sensor on COM A and one on COM B.*

If using 3+ sensors, the Slave Address will need to be changed for the COM terminal(s) that have more than one DustIQ sensor attached to it.

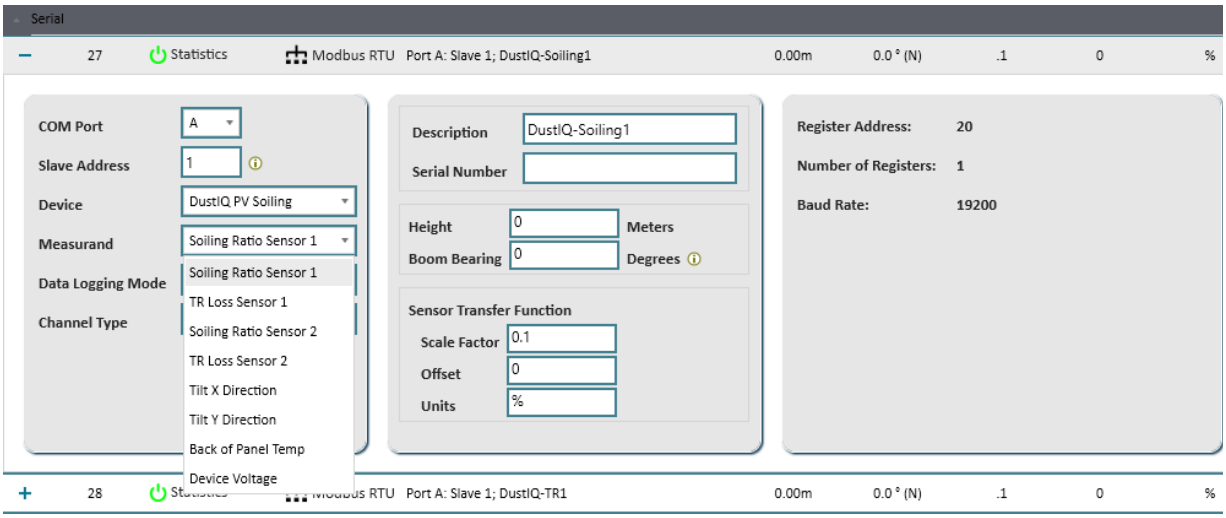
Modify the Slave Address by connecting the DustIIQ sensor to a PC with a USB to RS485 converter and use the Kipp & Zonen Smart Explorer application to give the sensor a different slave address (like 2). Mark the sensor or the sensor wire with the new Slave Address for future reference.

c) Choose "DustIQ PV Soiling" from the Device drop down list.

d) Choose the Measurand for the channel. See the table below.

Measurand	Slope	Offset	Units	Sensor Output Range
Soiling Ratio Sensor 1	0.1	0	% Soiled	50 – 101%
TR Loss Sensor 1	0.1	0	% Loss	-1 – 50%
Soiling Ratio Sensor 2	0.1	0	% Soiled	50 – 101%
TR Loss Sensor 2	0.1	0	% Loss	-1 – 50%
Tilt X	0.1	0	Degrees (°)	-179.9° - 180° (long axis)
Tilt Y	0.1	0	Degrees (°)	-179.9° - 180° (short axis)
Back of Panel Temp	0.1	-273.15	°C	-20 – 60 °C
Device Voltage	0.001	0	VDC	0 – 30 VDC

The programming should look like this:



8 The final settings in the logger should look like this:

Serial

+	27	Statistics	Modbus RTU	Port A: Slave 1; DustIQ-Soiling1	0.00m	0.0 ° (N)	.1	0	%	99.8 %
+	28	Statistics	Modbus RTU	Port A: Slave 1; DustIQ-TR1	0.00m	0.0 ° (N)	.1	0	%	0.2 %
+	29	Statistics	Modbus RTU	Port A: Slave 1; DustIQ-Soiling2	0.00m	0.0 ° (N)	.1	0	%	100 %
+	30	Statistics	Modbus RTU	Port A: Slave 1; DustIQ-TR2	0.00m	0.0 ° (N)	.1	0	%	0 %
+	31	Statistics	Modbus RTU	Port A: Slave 1; DustIQ-TiltX	0.00m	0.0 ° (N)	.1	0	Deg	2.5 Deg
+	32	Statistics	Modbus RTU	Port A: Slave 1; DustIQ-TiltY	0.00m	0.0 ° (N)	.1	0	Deg	0.8 Deg
+	33	Statistics	Modbus RTU	Port A: Slave 1; DustIQ-BOP Temp	0.00m	0.0 ° (N)	.1	-273.15	C	22.05 C
+	34	Statistics	Modbus RTU	Port A: Slave 1; DustIQ-Voltage	0.00m	0.0 ° (N)	.001	0	VDC	14.64 VDC