TrackSO

Solar PV Monitoring & Analytics

Datasheet & Installation Guide
Solar Irradiation Sensor [SOZ 03]

Internet of Things

Solar Energy

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MODEL

SOZ 03

DATASHEET

Introduction

The SOZ-03 pyranometer consists of a mono-crystalline silicon cell (50 x 50 mm²) with under special solar glass laminated therefore high UV resistance and long-term stability.

Features:

- Plain integration into the top cover of the box
- Advanced weather proof junction box made of UV resistant material with cable gland and screw-less terminal for the connection of the measuring cable
- Improved, junction box made of polycarbonate
- High precision shunt resistor directly soldered to the terminals of the cell
- Individual calibration of each sensors in the natural sunlight close to AM 1,5 spectrum by means of a compatible calibrated reference cell
- Accuracy of monthly sums compared to a W.M.O. class 1 Pyranometer (e.g. CMP 11) according to ISO 9060: better ±5 %
- Low long-term drift of <1% / year (experience based on the market launch of the type soz-01 in 1989)
- Optionally also available with integrated temperature sensor Pt100

Specifications

Mono crystalline Silicon Solar Cell Size	50x 50 mm²
Housing Material	UV-resistant PVC plastic
Storage Temperature	-45° to +70°C
Range	0 - 1800 W/m2 (Actual might vary, as per tag/sticker on sensor)
Output A, B, C are 3 different models	A. 4 – 20 mA B. 0 – 5 VDC C. MODBUS RTU
Power supply	7-24 V_{DC}, 2 to 5 mA
Recommended calibration interval	1 Year

General Accuracy: NES Radiation Sensor Type SOZ-03 is better than 3% (from measuring value) in the range of 150-1200 W/m2 when the solar rays are perpendicular to the surface of the sensor and the spectrum corresponds to AM 1.5

For all other central European conditions and installations with an inclination of 45° (±20°) directed to the south (±45°) the accuracy of the monthly sums of the solar radiation is better than +-5% compared to an world class 1 pyrometer (W.M.O. first class , ISO 9060) (e.g. Kipp & Zonen CMP11)

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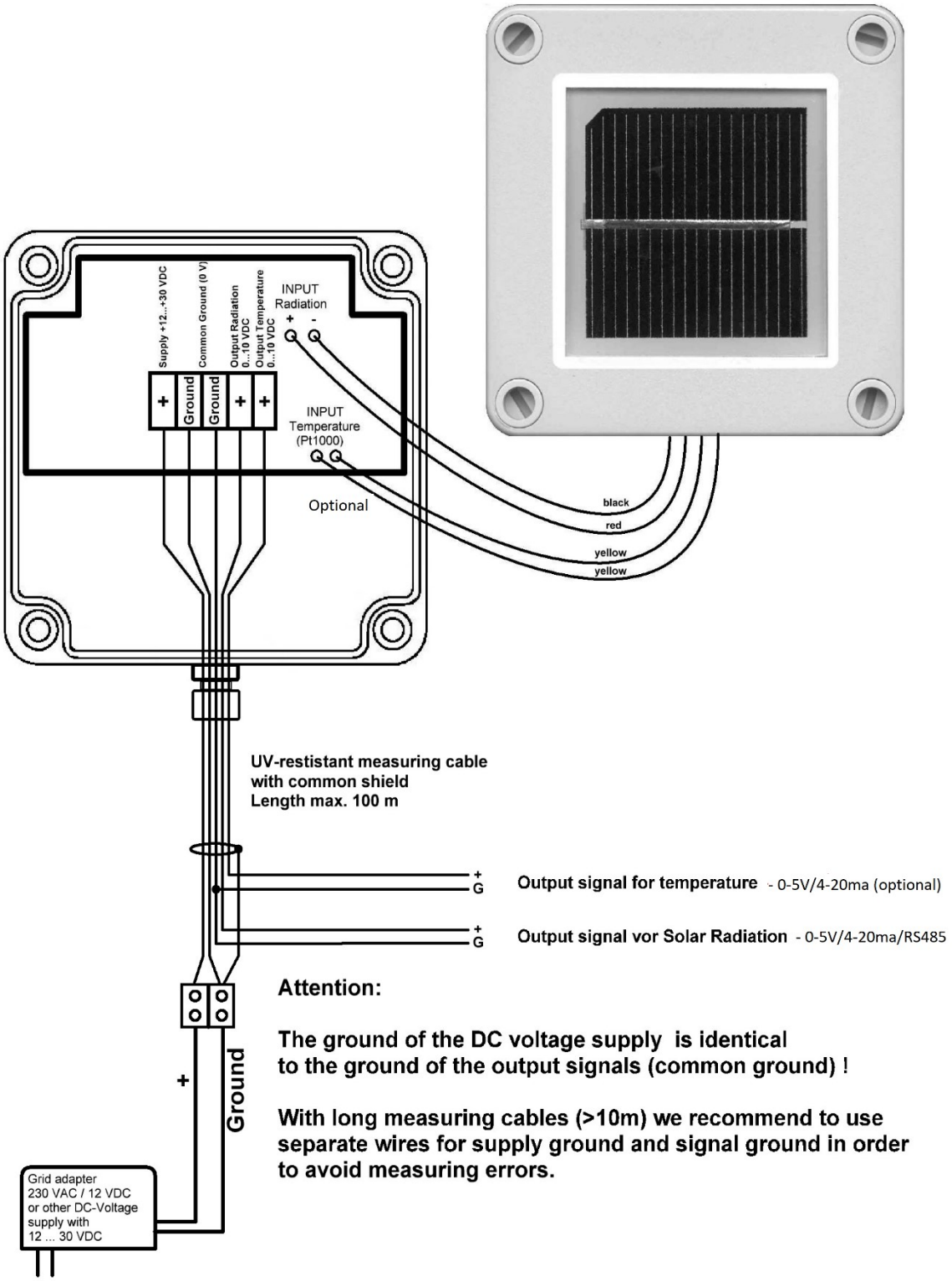
Internal Wiring Diagram



Attention:

The ground of the DC voltage supply is identical to the ground of the output signals (common ground) !

With long measuring cables (>10m) we recommend to use separate wires for supply ground and signal ground in order to avoid measuring errors.

INSTALLATION

Guidelines

The following guidelines are recommended while installation of a pyranometer:

- Pyranometer is to be mounted in an easy-to-reach location in order to clean the dome regularly and carry out maintenance. At the same time, make sure that no buildings, constructions, trees or obstructions exceed the horizontal plane where the pyranometer lies. If this is not possible, select a site where obstructions in the path of the sun from sunrise to sunset do not exceed 5 degrees of elevation. N.B The presence of obstructions on the horizon line affects significantly the measurement of direct irradiance
- Pyranometer is to be located far from any kind of obstruction, which might reflect sunlight (or sun shadow) onto the pyranometer itself.
- The sunlight sensor must be installed at the same azimuth and tilt angle than the PV array.

Tools and Materials Needed

Please make sure you have all the necessary material as mentioned below:

- Wrench or pliers
- Wire cutters and stripper
- Multi meter
- Drill with 3/16 in drill bit (4.7 mm) to drill pilot holes
- Adjustable wrench or 11/32 in. wrench and 7/16 in
- Electrical Tapes to cover the wire

Location Recommendation

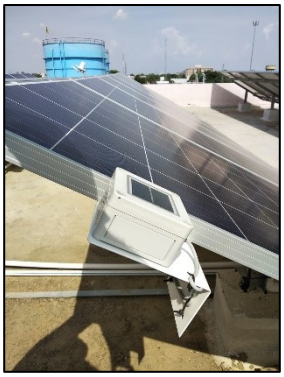
Use the following guidelines to determine the best location for mounting the Solar Radiation Sensor:

- The sunlight sensor must be installed at the same azimuth and tilt angle than the PV array (Drill it on the top of the panel).
- Pyranometer is to be located far from any kind of obstruction, which might reflect sunlight (or sun shadow) onto the pyranometer itself.

Mounting

- Final leveling of the sensor(s) should be done with the ISS mounted in its operating location. Small errors in alignment can produce significant errors. Be certain that the sensor is mounted level.
- Mount the sensor where it will not be in a shadow. Any obstruction should be below the plane of the sensor head. If that is not possible, try to limit obstructions to below 5 degrees, where the effect will be minimal.
- If possible, avoid locating the sensors in dusty locations. Dust, pollen, and salt residue that collect on the top of the sensor can significantly degrade accuracy.
- Ensure that the cables are free of crimps. Secure them to the support tubes with the provided cable ties so that they will not fray in the wind.
- Shade the sensor and make sure the reading changes
- While mounting the enclosure ensure the Gland is at the bottom and tightened fully to avoid precipitation
- If necessary, adjust the position of the sensor by tightening or loosening the leveling screws. When pointed directly at the sun, the shadows from the alignment fins should appear as shown in the illustration below:

Example Installations



Calibration

- If using Modbus sensor then the Pyranometer is factory calibrated.
- If using analog output senor then use the following info to calibrate.

  Output: 0 - 5 V_{DC} (0- 1800 W/m^2)
  Model: SOZ3 V
  Irradiance in W/m^2 = 360*Sensor Output voltage (in Volt)

  Output: 4-20mA (0-1800 W/m^2)
  Model: SOZ3 C
  Irradiance in W/m^2 = 112.5 (Output in mA - 4)

It is highly recommended that the calibration be checked annually

Note: Only valid for sensor model with Modbus RTU RS485 Output

Modbus Mapping

Note: Modbus register mapping of the sensor with RS485 output is always mentioned at the back of the ip65 box cover and can be immediately referred.

Default Id: 1 (if only sensor is purchased) or 15 (if purchased along with data logger)
Default Baud Rate, Parity Stop bits: 9600, None, 1

Function Code: Holding Register (03)

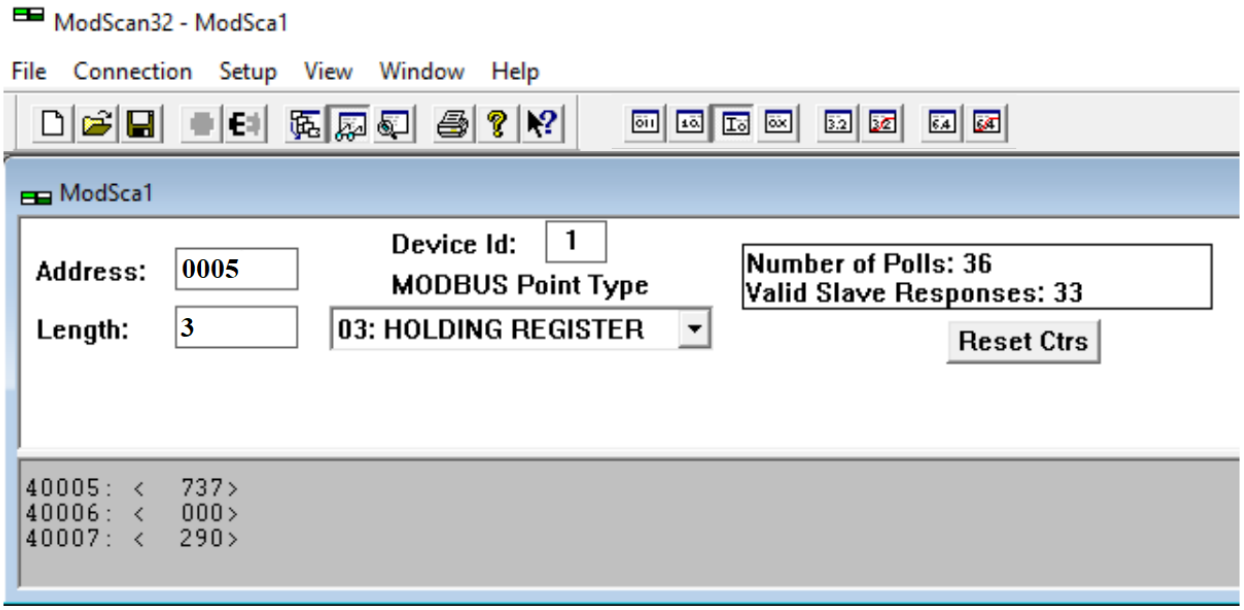
Modbus Register	Parameter	Type	Raw value Ex	Scale Factor	Actual Value Ex
5	Solar Irradiation W/m2	U16	737	1	737 W/m2
7	Cell Temperature deg C (Optional)	U16	290	0.1	29.0 deg C

Modbus Register	Parameter	Remarks
31 to 35	Configuration	
31	Password	79-update ,80 – confirm First enter 79, change the parameters of Register 32 to 35 as required and enter 80 to save the value
32	Time	Counter decrement to save and exit
33	ID	0 to 32
34	Baud	1=9600, 2=19200, 3=38400, 4=57600, 5= 115200
35	Parity	1=8N1,2=8O1,3=8E1

Video Link: How to set Modbus ID & Baud Rate on Generic Sensors with RS485 Output:
https://www.youtube.com/watch?v=Y5OLjMc8uX0

24 V		485			Pyra	
+	-	+	-		+	-

M T		
R	G	B



Logger Connections

- For ANALOG output connections (Voltage or Current) , please search for '*Installation Guide – Analog Sensors*' on: https://trackso.in/trackso-installation-manuals/

- For MODBUS output connections, please search for '*Installation Guide – MODBUS Sensors*' on: https://trackso.in/trackso-installation-manuals/

Sensor Maintenance

- For applications demanding higher accuracy, the sensors should be calibrated once every year. Read more about common calibration practices here- https://trackso.in/knowledge-base/common-practices-for-pyranometer-recalibration/
- Monthly maintenance
    - The frequency of cleaning is highly dependent upon the local weather and environmental conditions, such as dust, airborne pollutants or salt spray in marine environments. Ideally, the sensor should be cleaned every month.
      Note: Wipe the surfaces of the shield with a damp cloth to remove dirt and dust. You can wash it using water and standard papers for lens.
- Yearly maintenance
    - Check all the electrical connections. Check cables for damage caused by accident or by rodents.
    - Inspect cable quality, inspect cable glands, inspect mounting position, inspect cable, clean instrument, clean cable, inspect levelling, change instrument tilt in case this is out of specification, inspect mounting connection, inspect interior of dome for condensation and take necessary corrective actions.
- When operating multiple instruments in a network TrackSo recommends keeping procedures simple and having a few spare instruments to act as replacements during service and recalibrations.

Troubleshooting

Situation	Comments
The sensor signal / output is unrealistically high or low.	• Note that night-time signals may be negative (down to -5 W/m2 on clear windless nights), due to zero offset a. • Check if the pyranometer has clean domes. • Check the location of the pyranometer; are there any obstructions that could explain the measurement result. • Check the orientation / levelling of the pyranometer. • Check if the right calibration factor is entered into the algorithm. • Check the condition of the wiring at the logger. • Check the cable condition looking for cable breaks.
The sensor signal shows unexpected variations	• Check the presence of strong sources of electromagnetic radiation (radar, radio etc.) • Check the condition of the shielding. • Check the condition of the sensor cable. • Check if the cable is not moving during the measurement

Previous Version

Item	Link	Comments
Datasheet & Manual V1	Link	Updated Modbus Mapping section

Disclaimer

This sensor is a low-cost alternative to the Class 1/Class 2 sensors of the same type. Since this sensor fall under no class, there will be some variation in the real vs. expected values. If you wish to minimise the error/deviation in output values, we recommend that you purchase Class 1/Class 2 sensor.

Please note this product is not manufactured by TrackSo, but sold by TrackSo, warranties are only to the limits extended by the original manufacturer.

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Warranty

Applicable Warranty Term & Conditions is available on - https://trackso.in/warranty/

Repair - For all returns for repair or warranty claims, the customer must fill out a “Service Form”. The form is available from our website at https://trackso.in/service-form/. A completed form must be submitted online. TrackSo is unable to process any returns for repair or warranty until this form is received. If the form is not received within three days of product receipt or is incomplete, the product will be returned to the customer at the customer’s expense.

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