



## CALIBRATED CELL FOR SOLAR IRRADIANCE MEASUREMENTS

Si sensors use a high-quality monocrystalline solar cell connected to a high accuracy shunt. The low shunt resistance causes the cell to operate close to the short-circuit point. Si sensors can be provided with active temperature compensation to avoid any possible measurement shifts caused by the temperature.

The compensation is realized by using a specific temperature sensor laminated to the rear side of the solar cell. One of the key elements of the electronic compensation circuit design is very low power consumption. The current consumption of the Si-01TC sensor which is powered by an internal Lithium battery is only about 15  $\mu$ A.

Si sensors are manufactured in many different configurations to meet the monitoring requirements of almost any system. Sensors are available with an internal or external power supply, with both analog and digital (RS-485) output signals and with or without a sensor output for cell temperature.

Sensors can also be purchased with a pre-connected cable or with standard industry connectors for a range of applications.

All sensors are calibrated in simulated sunlight against a reference cell of the same type. The reference cell calibration is periodically verified using a reference cell calibrated by Fraunhofer ISE, Freiburg.

### Mechanical Construction

Si sensors are built using a powder-coated aluminum case sealed to IP 65. The solar cell is embedded in Ethylen-Vinyl-Acetate (EVA) between glass and Tedlar™.

The laminated cell is integrated into a powder-coated aluminum case. This configuration of the sensor is comparable to that of a standard PV module making the sensor an ideal choice for irradiance monitoring of commercial PV installations.

The electrical connection for the sensor is realized by an integrated cable or an IP67 rated connector. A cable length of 3 meters is standard for most of our sensors, however other cable lengths can be provided.



Temperature Compensated Solar Irradiance Sensor Model Si01TC-T-K. See additional models available on reverse.

### Cell Temperature Measurement

Si sensors with a “-T” extension to the part number provide an additional signal output representing cell temperature.



# SILICON IRRADIANCE SENSORS SPECIFICATIONS

## General Information

- Solar cell: Monocrystalline Silicon (50 mm x 33 mm)
- Current shunt: 0.1  $\Omega$  (TC = 20 ppm / K) for 1 V and 20 mA output sensors  
0.12  $\Omega$  (TC = 20 ppm / K) for 10 V output sensors, 0.1  $\Omega$  (TC = 30 ppm / K) for digital output sensors
- Operating temperature: -20 °C to 70 °C
- Electrical connection via shielded cable, length 3 m standard, or IP 67 rated connector
- Case, protection mode: Powder-coated aluminum, IP 65
- Dimension, Weight: 145mm x 86mm x 39mm, 340 g

## Accuracy

### Irradiance

- Error with temperature compensation compared to pyranometer within the operating range of -20 °C to 70 °C and vertically beam of irradiance:  $\pm 5\%$
- Non-linearity of the electronic circuit:  $\pm 0.3\%$  from reading for 50 to 1300 W/m<sup>2</sup>

### Temperature

- Accuracy at 25 °C:  $\pm 1.5\text{ °C}$
- Non-linearity:  $\pm 0.5\text{ °C}$
- Error (over operating temperature range of -20 to -70°C):  $\pm 2.0\text{ °C}$

### Options

- Silicon sensor with shielded cable, 0.14 mm<sup>2</sup>, UV- and temperature resistant
- Custom cable length
- Version with waterproof connector (Si-01TC always with connector)

## Available Sensor Types

Model	Temperature Output Format	Radiation Output Format
Si-01V	-	0-1Vcc (0-1000W/m <sup>2</sup> )
Si-01L	-	4-20 mA (0-1200W/m <sup>2</sup> )
Si-01TV	1-2 Vcc (-20° to +100°C)	0-1Vcc (0-1000W/m <sup>2</sup> )
Si-01TL	12-21 mA (20° to +100°C)	4-20 mA (0-1200W/m <sup>2</sup> )
Si-RS	-	RS-485