

# Sunmeter PRO COUNTER



The SUNMETER PRO SUNSPEC is based on Sunmeter PRO, a digital photovoltaic pyranometer for calculating photovoltaic performance with a high degree of precision and reliability. This sensor has a digital output (RS485 Modbus interface). Manufacturing and Calibrations are done following the IEC 61215, IEC 60904-2; 60904-4; 60904-10 regulations.

## Measurement features

In addition to common **irradiance** sensor functionality, Sunmeter Pro Counter has totalizer functions of the irradiance measured through 3 counters; these values are equivalent to **irradiation**. These counters allow for a simpler, more accurate and complete measurement of PV system performance. Additionally, a special counter indicates time since sensor restart: a handy way of checking if power outages may have affected the measurement. Here the list of counters:

A – IRRADIATION COUNTER

B – COUNTER CONDITIONED BY A THRESHOLD

C - COUNTER CONDITIONED BY CONTACT

D – RESTART COUNTER

Definition:

IRRADIANCE = **Power** of sunlight in a given instant [W / m<sup>2</sup>]

IRRADIATION = **Energy** of sunlight for a period of time [Wh / m<sup>2</sup>]

**Spectrum of interest**  
The spectral radiation range where Sunmeter Pro and PV modules produce energy is the radiation values (yellow area) between 0.3 ÷ 1.1 μm

**Physical features**  
Silicon sensor laminated in glass, anodized aluminum housing, high durability, practical mounting bracket with screw clamp, UV-resistant cable

**Most common uses**  
It's used in solar energy conversion to calculate P.R (Performance Ratio) Of medium-large PV systems.

SUNMETER SENSOR		
Product	Sunmeter PRO C.	
Reference Standard	IEC 60904-2 IEC 60904-4 IEC 60904-10 IEC 61724-1	
Output	Digital Modbus	
Input Range	Irradiance	0 ÷ 1500 W / m <sup>2</sup>
	Spectral range	0,3 μm ÷ 1,1 μm
	Temperature	-30 ÷ +90 °C (with external PT100)
Output	Irradiance	0 ÷ 1500 [W/m <sup>2</sup> ]
	Temperature	-30 ÷ +90 [°C]
	Energy counter 1	Integral of W/m <sup>2</sup> received
	Energy counter 2	Integral of W/m <sup>2</sup> above a threshold
	Count reset command (total and partial)	
	Status bit on accidental shutdown	
Output precision	Irradiance	<± 2 % <sup>(2)</sup>
	Temperature	≤ ± 0.5 °C
	Response Time	< 100 ms
Type of sensor	Photovoltaic Pyranometer	
Supply	Ext. Current loop	9 ÷ 30 Vdc protected against reverse polarity, short circ.
Electronics non-linearity	± 0,03% of range	
Temperature drift. -30 + 90°C	< ± 0,2% at 1000 W/m <sup>2</sup>	
Overall measurement uncertainty	± 2,1% @ 1000 W/m <sup>2</sup>	
Uncertainty reference cell	± 1,2% ( ISFH , accredited by Dakks)	
PV cell	monocrystalline silicon	
Encapsulant	Glass + E.V.A. + Polyester	
Cable	50cm UV resistant cable with Male connector	
Connectors	Male M12 8 pin, IP67 (main)	
	Female M8 3pin, IP67 (temp. probe)	
Dimensions	114x70x22 mm without fixing bracket	
Weight	357 g	
IP code	IP 65	
<p>(1) Note: this irradiance sensor is suitable for companies that develop monitoring systems and system integrators, as it provides interesting data for the calculation of PR even in terms of kWh, statistics, events. (2) Note: first recalibration included in the price. Recommended after the first 18 months.</p>		



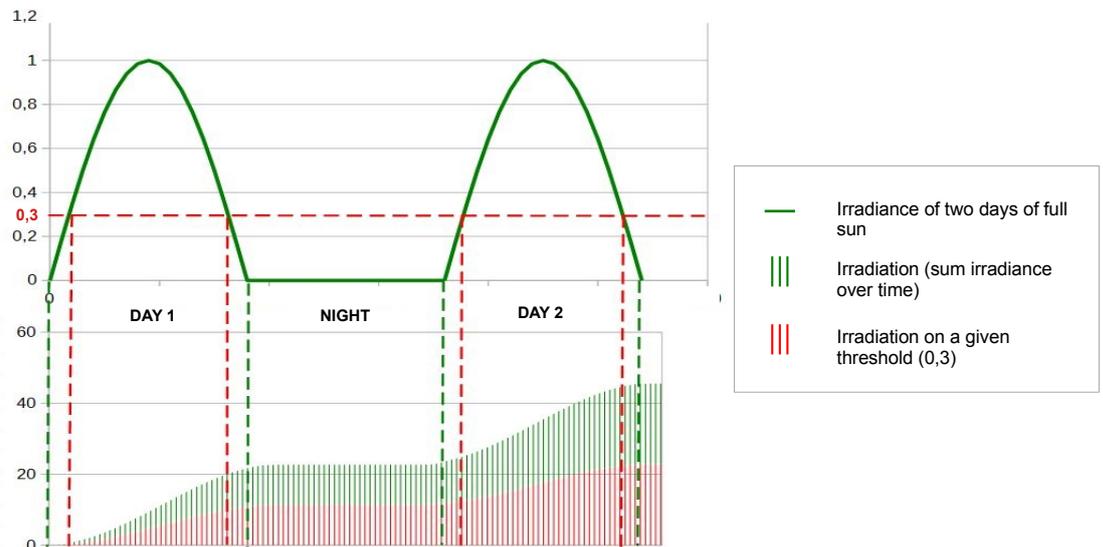
## SUNMETER PRO COUNTER

Data is stored in the non-volatile memory of the solar meter so even in the event of power failure the accumulated value is maintained. Should the photovoltaic pyranometer suffer power supply interruptions, the photovoltaic pyranometer would return the values corresponding only to the period of operation.

To understand if there was an anomalous interruption, there is the restarts counter which increases by 1 with each switched on, then its variation indicates to the data logger that the meters may not reflect the solar energy actually reaching the surface.

For effective use of this photovoltaic pyranometer, it is important the data logger stores readings at the end of each day, such as the daily energy production of the PV plant. This allows comparison of energy production from day to day.

The graphs illustrate the different "behaviors" of the various counters along two sunny days ideal (line green).  
The top graph shows ideal irradiance, at the bottom the irradiation counter A and the irradiation counter B conditioned by a minimum irradiance threshold 0.3.



**Table of the most significant Modbus registers**

Register	Description	Type	Access	NV save
0x0101	Current irradiance level [W/m2], range 0 ÷ 1250, decimal	Word	R	
0x0102	Current PT100 temperature [°C], range -30 ÷ +90, 2 - complement value, fixed point 14.2 format (14 bits integer, 2 bits fractional)	Word	R	
0x0103	Status, bit coded [see complete Modbus Sheet]		R	
0x0104	Counter number switching range 0 ÷ 65535, roll-over in overflow cases	Word	R	
0x0105 0x0106	Least significant and most significant bytes of Total energy Counter, in Wh/m2.	Double Word	R	
0x0107 0x0108	Least significant and more significant bytes of threshold energy Counter, in Wh/m2.	Double Word	R	
0x0109 0x010A	Least significant and most significant bytes of external enabling energy Counter, in Wh/m2.	Double Word	W	
0x8301	Commands for Statistics Registers; Accepted values are: - 0x1111 for to erase ALL counters (Counter of power-on, N# of power on, all Energy Counters). - 0x2222 for to erase ALL energy counter - 0x3333 for to erase the Threshold Energy Counter and 'external enabling counter' - 0x4444 for to erase the 'external enabling counter' - 0xABCD for to force the saving of statistics.	Integer bit	W	
0x800C	Threshold for energy counter, in W/m2, default 50, range 0-2000. Value can be modified during its job.	Word	R/W	