

# PYRANOMETER PYRA-485®



## USER MANUAL

hw rev. LM5-485

### GENERAL DESCRIPTION

PYR1-485 and PYR2-485 are ISO 9060:2018 CLASS B (First Class) and CLASS C (Second Class) pyranometers respectively, with RS485 bus interface with the well known industry standard protocol Modbus RTU.

### FEATURES

	PYR1-485	PYR2-485
<b>Measurements:</b>		
spectral range:	300 ÷ 2900nm	
input irradiance range:	0 ÷ 2000 W/m <sup>2</sup>	
<b>Response time:</b>	< 20 sec	<25 sec
<b>Temperature response:</b>	< ± 2 % (-10 to +40°C)	< ± 5 % (-10 to +40°C)
<b>Zero offset</b>		
Thermal radiation (at 200 W/m <sup>2</sup> )	<14 W/m <sup>2</sup>	<20 W/m <sup>2</sup>
Temperature change (5 k/h)	<± 3	<± 6 W/m <sup>2</sup>
<b>Resolution</b>		
Smallest detectable change		Irradiance: ± 1 W/m <sup>2</sup> Inclination: 0.1°
<b>Outputs</b>		
serial:	RS485, standard Modbus RTU protocol	
<b>Output resolution:</b>	1 W/m <sup>2</sup>	
<b>Output precision:</b>		
Tilt response (0 ÷ 90°):	< ± 2%	< ± 4%
Temp. Response ( Δt = 50K)	< 4%	< 8%
<b>Working temperature:</b>	-40 ÷ +80 °C	
<b>Supply:</b>	9 ÷ 30 Vdc protected against short circuit	
<b>Encapsulation:</b>	Quartz [k5]	
<b>Special glass transparent to:</b>	Double glass dome	Single glass dome
<b>Case:</b>	0,3 ÷ 3,0 μm	0,3 ÷ 3,0 μm
<b>Connectors:</b>	Anodized aluminum standard M8 4 pin female	
<b>Dimensions:</b>	Φ 162 x h 104 mm	

### PIECE'S LIST

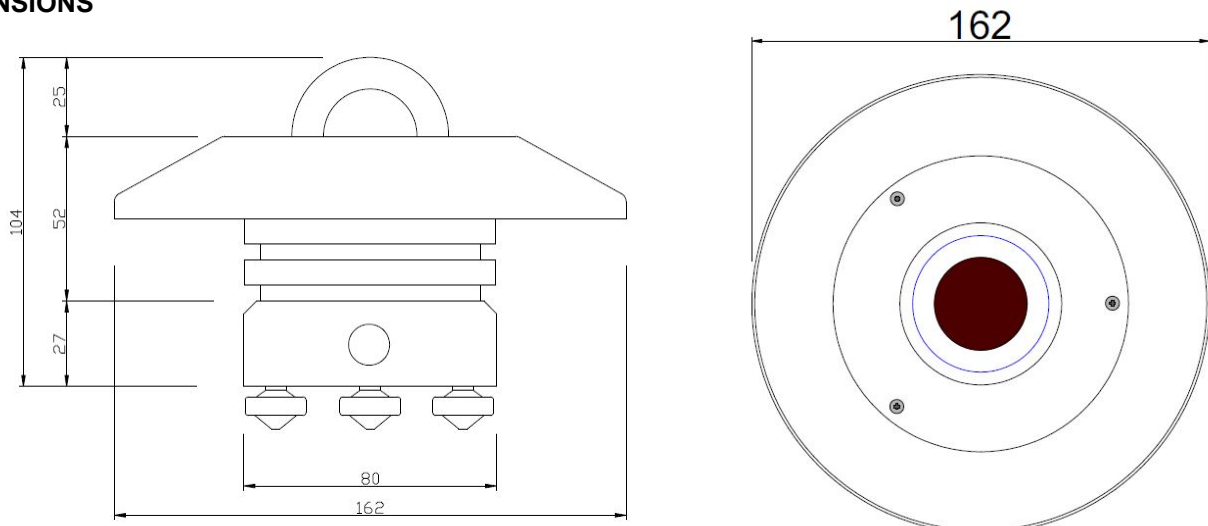
- Pyranometer with sun screen
- M8 4pin male connector
- Instruction sheet
- Calibration Report

### CALIBRATION:

Date:..... Operator: .....

S/N:..... Modbus Node: .....

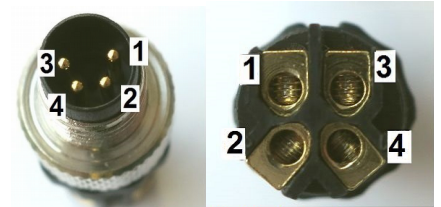
### DIMENSIONS



## CONNECTIONS

See the table below. Once connected the irradiance values comes out instantly.

# pin	SoiSol Cable Color	Description
1	Green	RS485+/B, communication bus non inverting bus signal
2	<b>Red</b>	Power supply 12 ÷ 30Vdc
3	Green/White	RS485-/A, communication bus inverting bus signal
4	<b>Black</b>	Power supply / 0 Vdc



**Fig.1 Front and back view of male connector**

Fig.1 has correspondence with the rear side where you have to connect wires

Data is accessible through Modbus's functions by 16 bits units called "registers". In the current implementation of PYRA-485 these registers are available:

Register hex	Register dec	Description	Access	NV save																
<b>0x0101</b>	<b>257</b>	<b>Current irradiance level [W/m<sup>2</sup>]</b>	R																	
<b>0x8802</b>	<b>34818</b>	<b>Current body temperature [°C]</b> , 2-complement value, fixed point 14.2 format (14 bits integer, 2 bits fractional)	R																	
<b>0x0103</b>	<b>259</b>	<b>Status</b> , bit coded <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Bit</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Factory calibration/configuration 1 = OK; 0 = need recalibration</td> </tr> <tr> <td>1</td> <td>Not volatile parameters 1 = OK; 0 = default loaded, need to be changed/saved</td> </tr> <tr> <td>2</td> <td>Not used</td> </tr> <tr> <td>3</td> <td>Not used</td> </tr> <tr> <td>4</td> <td>Not used</td> </tr> <tr> <td>5</td> <td>Watchdog 1 = reset by watchdog timeout occurred; 0 = normal operation</td> </tr> <tr> <td colspan="2">all undefined bits read as 0</td> </tr> </tbody> </table>	Bit	Description	0	Factory calibration/configuration 1 = OK; 0 = need recalibration	1	Not volatile parameters 1 = OK; 0 = default loaded, need to be changed/saved	2	Not used	3	Not used	4	Not used	5	Watchdog 1 = reset by watchdog timeout occurred; 0 = normal operation	all undefined bits read as 0		R	
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<b>0x8001</b>	<b>32769</b>	<b>Serial number</b> , least significant word	R																	
<b>0x8002</b>	<b>32770</b>	<b>Serial number</b> , most significant word	R																	
<b>0x8003</b>	<b>32771</b>	<b>Firmware main version</b> , hexadecimal	R																	
<b>0x8004</b>	<b>32772</b>	<b>Firmware minor version</b> , hexadecimal	R																	
<b>0x8005</b>	<b>37773</b>	<b>Node address</b> , range 1 ÷ 247, decimal, <b>default 1</b>	R/W	Y																
<b>0x8006</b>	<b>32774</b>	<b>Bitrate</b> , coded, range 0 ÷ 4, decimal, <b>default 1</b> 0 – 9600 bps 1 – 19200 bps 2 – 38400 bps 3 – 57600 bps 4 – 115200 bps	R/W	Y																
<b>0x8007</b>	<b>32775</b>	<b>Serial configuration</b> , coded, range 0 ÷ 3, decimal, <b>default 0</b> 0 – 8N1 (8 bit / no parity / 1 stop bit) 1 – 8E1 (8 bit / even parity / 1 stop bit) 2 – 8O1 (8 bit / odd parity / 1 stop bit) 3 – 8N2 (8 bit / no parity / 2 stop bit)	R/W	Y																
<b>0x8008</b>	<b>32776</b>	<b>Serial reply delay [ms]</b> , range 0 ÷ 100, decimal, <b>default 1</b>	R/W	Y																
<b>0x0104</b>	<b>260</b>	Pitch , <b>inclination along X</b> axixs	R																	
<b>0x0105</b>	<b>261</b>	Roll , <b>inclination along Y</b> axixs	R																	
<b>0x8101</b>	<b>33025</b>	<b>Not volatile params save command</b> , write 1 to execute (then wait 1 s before to send next message)	W																	
<b>0x8102</b>	<b>33026</b>	<b>Software reset command</b> , write 1 to execute (then wait 6 s before to send next message)	W																	

## CALIBRATION

It is recommended to send to factory for verifying calibration after 2 years of outdoor work.

## MAINTENANCE

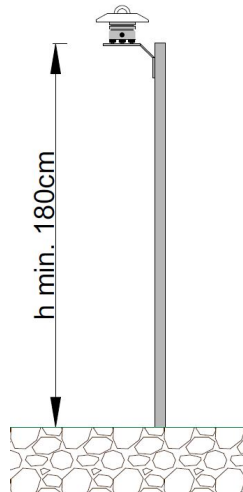
Reading is reduced if the dome is not clean.

1. Keep the dome clean using water or alcohol.

2. Keep instrument levelled.
3. Recalibrate every 2 years.

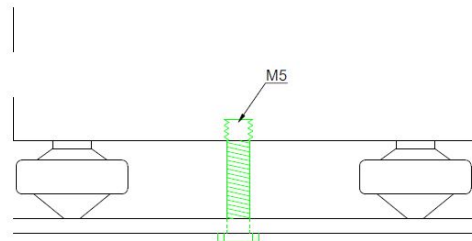
## INSTALLATION

It is recommended to install the product at a minimum height of 180cm above the ground.



There are the following **fixing types**:

- With M5 screw on flat bases;
- Bracket on pole;
- Inclinable bracket in degrees



M5 screw on flat bases

\*screw's thread must be 0,4cm + distance between the pyranometer and the base. (approx. 1,5 - 1,8 cm long.)

## USER INFORMATION

**Read this document carefully before installation.**

Warranty is 2 years from date of invoice, subject to correct installation and use. Soluzione Solare accepts no liability for any loss or damage arising from incorrect use of the product. This device conforms to the EU 'CE' guideline 89/336/EEC. Unauthorised modifications may void the warranty and CE validity. Visit our website for the latest product support information.

## CONTACTS

Other information about our solar devices are available at: [www.soluzionesolare.com/products/](http://www.soluzionesolare.com/products/)

For technical support, contact: [support@soluzionesolare.it](mailto:support@soluzionesolare.it)



GoodWe  
EZLogger-Smx-485



Huawei  
SmartLogger  
1000/2000/3000



SMA  
Data Manager M



Sungrow  
COM100



**DICHIARAZIONE DI CONFORMITÀ ISO 9060  
ISO 9060 COMPLIANCE STATEMENT**

Dichiara sotto la propria responsabilità che i nostri prodotti:  
*declares under our sole responsibility that the our product:*

**PYRA-420, PYRA-485**

al quale si riferisce questa dichiarazione, è conforme alle norme europee armonizzate come pubblicato nella Gazzetta Ufficiale della CE, basato sul seguente standard:  
*to which this declaration relates, is in conformity with European Harmonised Standards as published in the Official Journal of the EC, based on the following standard:*

**ISO 9060**

[Solar energy – Specification and classification of instruments for measuring hemispherical solar and direct solar radiation]

Vicenza, 1 January 2019

Il legale rappresentante  
*Legal representative*

  
A. Calatroni