



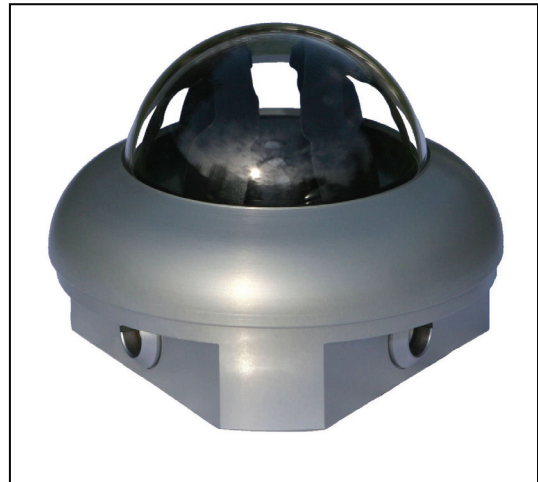
Sunshine Pyranometer type SPN1-MS1

SPN1-MS1 Instructions

Introduction

The SPN1-MS1 is a special development for MeteoSwiss of the standard SPN1 Sunshine Pyranometer with the following features:

- Fits the MeteoSwiss heating and ventilating dome.
- Lemo connectors are provided for the data logger and serial connections.
- Custom firmware provides a sunshine duration threshold of 200 W.m^{-2} in the direct beam.



Check Packing List

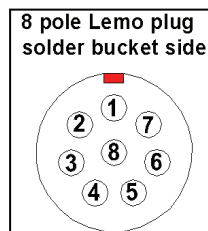
The SPN1-MS1 is supplied with a 5-pin and an 8-pin Lemo connector, and a calibration certificate.

Mounting and Connections

Use the three M5 tapped holes in the base to mount the SPN1 inside the MeteoSwiss heating and ventilating dome. Do not touch any socket cap screws under the flange holding the dome. These are sealed during manufacture. Mount the dome horizontally – no polar alignment or routine adjustment needed. Connect the power, data logger, and serial port if required, using the connection details below.

Data Logger Connection

using 8-pole Lemo plug



Pin	Function	Notes
1	Total	Total output: $1\text{mV} = 1\text{W.m}^{-2}$
2	Diffuse	Diffuse output: $1\text{mV} = 1\text{W.m}^{-2}$
3	Sig Gnd	Signal ground (connected internally to Power 0V)
4	Sun	Contact closure on Sunshine
5	Power 0V	Power for SPN1-MS1 electronics, 5 - 15V DC, 2mA **
6	Power V+	
7	Htr -	Power for internal SPN1-MS1 heater, 12V DC, 1.5A max **
8	Htr +	
Shell	Screen	Connects to SPN1-MS1 case *

Pin 1 (Total output) and pin 2 (Diffuse output): connect to data logger voltage inputs. The normal range of this output is 0V – 1.5V

Pin 3: connect to data logger signal ground or –ve input terminal.

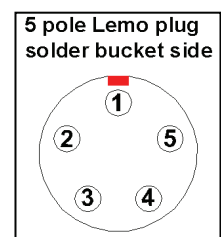
Pin 4: connect to a data logger digital input. It gives a short circuit to ground when sunshine is present, and open circuit with no sunshine. Alternatively, connect to a resistance input, with a precision resistor in parallel.

Pins 5 and 6 (SPN1-MS1 power): apply >5V to power the SPN1 and enable the sensor output signals.

Pins 7 and 8 (internal heater power): connect to a 12V DC 1.5A power supply. The actual heater current depends on the temperature. This internal heater may not be needed if using the MeteoSwiss heating and ventilating dome

Serial Port Connection

using 5-pole Lemo plug



Pin	Function	Notes
1	GND	Ground
2	CTS	Power for SPN1-MS1 electronics. Connect to RTS of PC serial port **
3	Rx	Received data into SPN1-MS1
4	-	(not implemented)
5	Tx	Transmitted data from SPN1-MS1
Shell	Screen	Connects to SPN1-MS1 case *

* Note: Use screened cable. Clamp braid to connector shells and terminate at datalogger or PC case or ground. To avoid ground loops do not interconnect braids elsewhere.

** Note: the SPN1-MS1 draws power from Power V+, CTS, or Htr +, whichever provides the highest voltage.

Maintenance

Keep the glass dome clean using clean water, with mild detergent or Isopropyl Alcohol for difficult deposits. If any two of the three blue desiccant indicators turn pink - unscrew the desiccant capsule from the indicator cap, and replace with a fresh one (type SPN1-SD). Recalibration every 2 years is recommended.

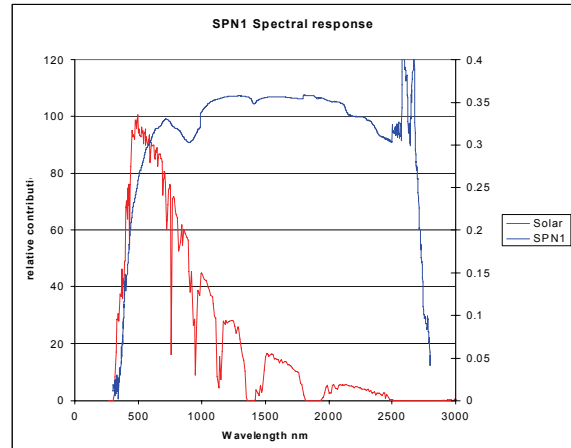
SPN1-MS1 Specifications

The following accuracy figures give 95% confidence limits, i.e. 95% of individual readings will be within the stated limits under normal climatic conditions.

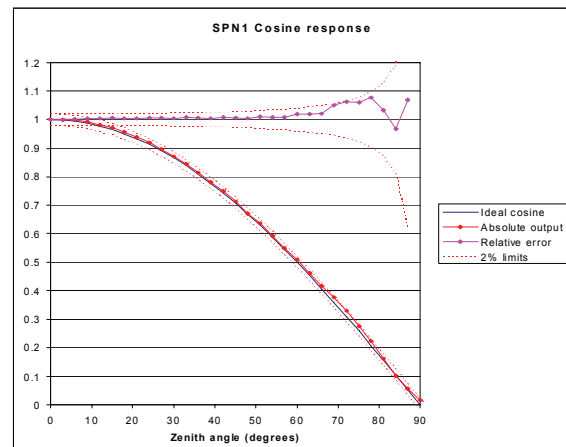
Overall accuracy: Total (Global) radiation and Diffuse radiation	±5% Daily integrals ±5% ±10 W.m ⁻² Hourly averages ±8% ±10 W.m ⁻² individual readings
Resolution	0.6 W.m ⁻² = 0.6mV
Range	0 to >2000 W.m ⁻²
Analogue output sensitivity	1mV = 1 W.m ⁻²
Analogue output range	0-2500mV
Sunshine status threshold	200 W.m ⁻² in the direct beam

Other specifications

Accuracy: Sunshine status	±10% sun hours with respect to the threshold
Accuracy: Cosine Correction	±2% of incoming radiation over 0-90° Zenith angle
Accuracy: Azimuth angle	± 5% over 360° rotation
Temperature coefficient	± 0.02 % /°C typical
Temperature range	-20 to + 70°C
Stability	Recalibrate every 2 years.
Response time	< 200ms
Spectral Response	400-2700nm
Spectral sensitivity	10% typical
Non-linearity	<1%
Tilt response	negligible
Zero Offsets	< 3W.m ⁻² for a change of 5°C/hour in ambient temperature. <3 W.m ⁻² dark reading
Latitude capability	-90° to + 90°
Environmental: Sealing	IP67
Sunshine status output	No sun = open circuit Sun = short circuit to ground
Power requirement	2mA (excluding heater power), 5V – 15V DC
Heater power	12V – 15V DC, up to 1.5 A
Heater control	Continuously variable up to 20W output for external temperatures below 0°C
Lowest snow & ice-free temperatures (using internal heater)	-20°C at 0 m/s wind speed -10°C at 2 m/s wind speed
Mounting options:	3 x M5 tapped holes in base; 108mm pcd, 120° spacing
Size & Weight	140mm dia x 100mm high, 786 gm



Spectral response of the Sunshine Pyranometer (thermopile, diffusers and dome combined), shown with the solar spectrum at ground level.



Typical cosine response of the Sunshine Pyranometer compared to the ideal cosine curve. The upper curve shows the relative accuracy.

Notices

Patents: The SPN1 Sunshine Pyranometer is protected by patents EP1012633 & US 6417500.

EMC certification: available on request.

