

PWS100

Present Weather Sensor



The PWS100 Present Weather Sensor is a laser-based sensor capable of determining precipitation and visibility parameters for automatic weather stations including road, marine and airport stations. Due to its advanced measurement technique and fuzzy logic algorithms, the PWS100 can determine individual precipitation particle type from accurate size and velocity measurements and the structure of the received signal. Auxiliary measurements of temperature and relative humidity (RH) provide improved particle classification.

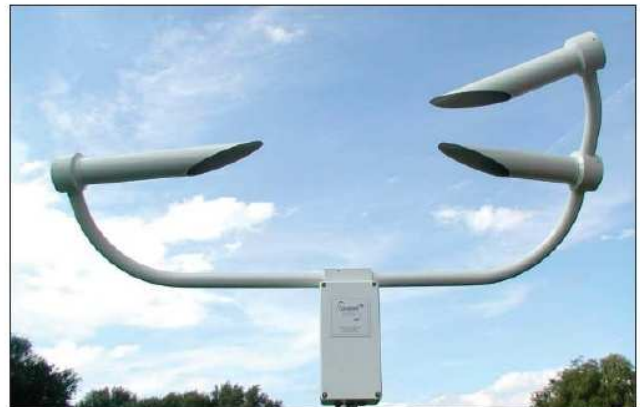
The PWS100 consists of a Digital Signal Processor (DSP) housing unit connected to a sensor arm that contains one laser head and two sensor heads. Each sensor head is 20° off axis to the laser unit axis—one in the horizontal plane and the other in the vertical plane. The PWS100 ships with a mounting bracket that attaches the DSP housing to a mast or pole.

Features

- Uses Laser Doppler Anemometry techniques to calculate hydrometeor size and velocity
- Identifies many precipitation types including drizzle, rain, snow, hail and graupel
- Outputs visibility and precipitation related weather codes such as those detailed in the World Meteorological Organization (WMO) SYNOP code, those used as part of a METAR weather report and those previously used by the US National Weather Service (NWS)
- Determines visibility values for up to 10 km, with an accuracy of $\pm 10\%$.
- Calculates rain rate from volume of detected hydrometeors
- Includes a hood heater to prevent ice from forming.
- Uses a digital signal processor (DSP) that improves processing speed and accuracy
- Designed for long term, unattended operation

24 Vdc/12 Vdc Power Supply

Campbell Scientific offers the 25295 power supply that supplies both 24 Vdc and 12 Vdc power. The hood heater uses 24 Vdc, and the sensor uses 12 Vdc. The 25295 consists of a 24-Vdc, 10-A Din Rail mounted power supply and a Morning Star SunSaver-10 10-A, 12-V Regulator housed in an environmental enclosure. Access to ac power is required. The 12 Vdc battery is ordered separately.



Optional Temperature/RH Sensor

The CS215-PWS accurately measures temperature and relative humidity. Its cable is fitted with a connector that attaches to the PWS100. The CS215-PWS needs to be housed in the 41303-5A radiation shield that mounts to a mast, tower leg, or crossarm.

Sensor Calibration

Accurate calibration of the sensor can easily be done in the field with the PWC100 Calibrator. This calibrator simulates particle and visibility data for the PWS100, allowing verification of the calibration constants held within the system.

Ordering Information

Present Weather Sensors

PWS100 Present Weather Sensor (select a Temperature Range; see below).

Temperature Range Options (Choose One)

-ST Tested -25° to +50°C

-XT Tested -40° to +70°C

24 Vdc/12 Vdc Power Supply

25295 PWS100 24 Vdc /12 Vdc Power Supply. Must choose an enclosure option and a 12 Vdc battery (see below).

Enclosure Options (Choose One)

-12 12/14 inch Enclosure with One Conduit

-16 16/18 inch Enclosure with One Conduit

Enclosure Mount Options

-MM Tripod Mast Mounting

-TM Tower Mounting

12 Vdc Battery Choices for 25295

BP12 12-Ahr Sealed Rechargeable Battery with mounts.

BP24 24-Ahr Sealed Rechargeable Battery with mounts.

Ordering Information Continued

Temperature/RH Probe and Radiation Shield

- CS215-PWS** Optional Temperature/RH Probe for PWS100. Requires the 41303-5A radiation shield; see below.
- 41303-5A** R. M. Young 6-Plate Gill Solar Radiation Shield for optional CS215-PWS.

Calibrator

- PWC100** Field calibrator for the PWS100.

Specifications

Physical

Measuring Area: 40 cm² per light sheet

Operating Temperature Range

Standard: -25° to +50°C

Extended: -40° to +70°C

Relative Humidity Range: 0 to 100%

IP Rating: IP 66 (NEMA 4X)

Housing Materials: Iridite NCP conversion coated aluminium (RoHS compliant) and hard anodized aluminium. Outer parts also coated with marine grade paint.

Weight: 18 lb (8.2 kg)

Shipping Weight: 45 lb (20.4 kg)

Overall Dimensions: 45.28 x 27.56 x 15.75 in.
(1150 × 700 × 400 mm)

Laser Head Lens Diameter: 1.97 in. (50 mm)

Sensor Head Lens Diameter: 1.97 in. (50 mm)

Mountings: V-bolt mounting to mast or pole with outer diameter from 1.25 in. to 2.07 in.

Electrical

Power Requirements

DSP Power: 9 to 24 Vdc, or 9 to 16 Vdc with CS215-PWS Temperature and RH sensor

Current Consumption: 200 mA to 1 A

Hood heater: 24 Vac or dc, 7 A

Communication: RS-232, RS-422, or RS-485

Baud rate: Selectable from 300 bps to 115.2 kbps

Control Unit: Custom DSP Board

EMC Compliance: Tested and conforms to BS EN61326:1998

Optical

Laser Source: Near-infrared diode; eye safe Class 1M unit output.

Peak wavelength: 830 nm

Modulation Frequency: 96 kHz

Receivers: Photodiode with band pass filters

Spectral Response: Maximum spectral sensitivity at 850 nm, 0.62 A/W (0.6 A/W at 830 nm)

Lens Check Light Source: Near-infrared LED

Measurement

Particle Size: 0.1 mm to 30 mm

Size Accuracy: ±5% for particles greater than 0.3 mm

Particle Velocity: 0.16 ms⁻¹ to 30 ms⁻¹

Velocity Accuracy: ±5% for particles >0.3 mm

Types Of Precipitation Detected: Drizzle, Rain, Snow Grains, Snow Flakes, Hail, Ice Pellets, Graupel, Mixed (combination of types above)

Data Output:

- Raw parameter output (particle size, particle velocity, signal peak value, signal pedestal value)
 - WMO SYNOP codes (4680, W_a W_a - precipitation and obscurant type)
 - WMO METAR codes (4678, W_a W_a - precipitation and obscurant type)
 - NWS code
 - Drop size distribution (DSD) statistics
 - Particle type
- Distribution
- Size/velocity intensity maps
 - Precipitation rate
 - Precipitation accumulation
 - Visibility range and internal checks (temperatures, lens contamination, processing limits).

Rain Rate Intensity Range: 0 to 400 mm h⁻¹

Rainfall Resolution: 0.0001 mm

Rain Total Accuracy: typically ±10% (accuracy figures are for laboratory conditions with reference particles and standards; accuracy will be degraded for windy conditions, frozen precipitation, and very high rainfall rates)

Visibility Range: 0 to 20,000 m

Visibility Accuracy: ±10% for up to 10,000 m

Visibility measurement interval: User selectable from 10 seconds to 2 hours.

External Sensors: SDI-12 compatible sensors supported such as the CS215-PWS Temperature and RH Probe

CS215-PWS

Refer to the CS215 manual or product brochure for the specifications.

