



Bio Instruments S.R.L.

SENSORS AND SYSTEMS
FOR MONITORING GROWING PLANTS

DWS-11z
Weather Station



Introduction

The DWS-11z Weather Station is a complex sensor, which integrates Pyranometer, Air Temperature and Humidity Sensor in a passive radiation shield, Precipitation Gauge, and Anemometer. The DWS may also include optional Leaf Wetness sensor. All environment sensors are connected to the intermediate data logger with 2.4 GHz transceiver. The DWS-11z is supplied with fixing accessories for mounting on the Mast.

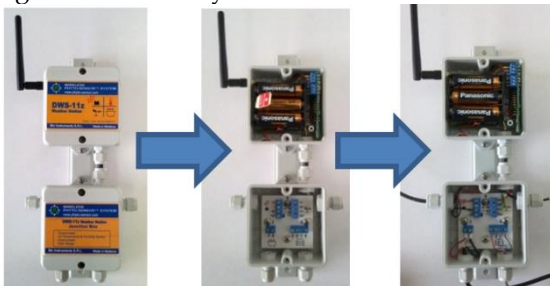


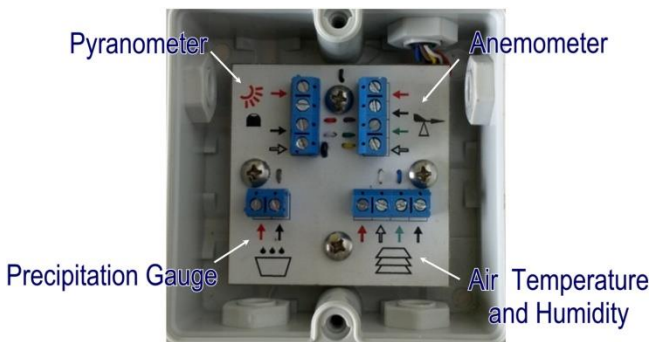
First start

The DWS-11z shall be energized and put into operation only after the PM-11z is activated. The appropriate procedure is described in the documentation for the PM-11z Phytomonitor.

When the PM-11z is active, please do the following operations with the DWS-11z:

1. Fix the Intermediate data logger on the mast. Attach the antenna, which must be parallel to the antenna of the PM-11z. Provide no or minimal obstacles between antennas for best RF propagation.
2. Mount all sensors of the DWS-11z according to appropriate guides (wire colours).
3. Unscrew two bolts of the Junction box, and connect cables of sensors following the connection diagram shown on the PCB. Then, close the Junction box by fixing two bolts firmly.





4. Open the upper box by unscrewing two bolts.
5. Remove the isolating slip from the battery compartment.



From this moment, the DWS-11z begins to communicate with the PM-11z to register in its network.

6. After successful registration of the DWS-11z in the

network, you may close the box and fix two bolts firmly.

Pyranometer

The Pyranometer is a silicon-cell photodiode device based on the SP-110 Pyranometer (Apogee Instruments, USA), and calibrated to estimate all of the solar radiation energy in Watts per square meter.

All silicon-cell photodiode pyranometers sub-sample the shortwave radiation spectrum (from 300 to 1000 nm), and are calibrated to predict all of the solar radiation (from 280 to 2800 nm). For this reason, they should only be used to measure unobstructed solar radiation. The pyranometers should not be used to measure electric lights, under canopies of vegetation or to measure reflected radiation.

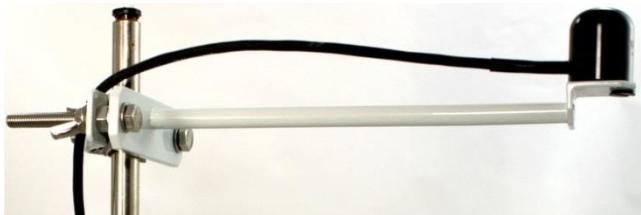
This cosine-corrected sensor is designed to maintain its accuracy when radiation comes from low zenith angles.

The sensor has not less than 4-m wire-ended cable for easy and trouble free connection to the DWS-11z.

Installation

Pyranometer is supplied with the special holder for

mounting on a mast. Keep the Pyranometer at vertical position. The sensor should be mounted with the cable pointing toward the nearest magnetic pole. For example: in the Northern Hemisphere, point the cable toward the North Pole. In the Southern Hemisphere, point the cable toward the South Pole.



Specifications:

Cable length: 3 m

Range: 0 to 1,750 W m⁻²

Dimensions: 2.4 cm diameter, 2.75 cm high

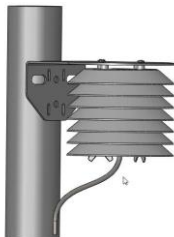
Air Temperature and Humidity Sensor

This sensor takes both measurements simultaneously for the best possible accuracy. The included radiation shield is designed to improve air temperature readings by minimizing radiation and maximizing airflow over the surface of the sensor.

The sensor has not less than 4-m wire-ended cable for easy and trouble free connection to the DWS-11z.

Installation

The sensor is supplied with the special holder for mounting on a mast. Keep the sensor at vertical position.



Specifications

Humidity Resolution: 0.1% RH

Humidity Range: 0-100% RH

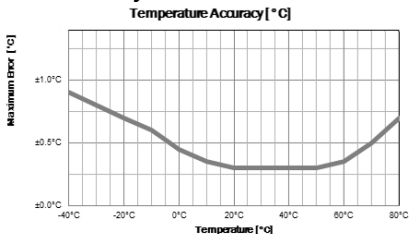
Humidity accuracy:

		Humidity Accuracy [%RH]								
		±5%	±5%	±5%	±5%	±5%	±5%	±6%	±10%	
Humidity [%RH]	100%	±5%	±5%	±5%	±5%	±5%	±5%	±6%	±10%	
	95%	±5%	±5%	±4%	±4%	±4%	±4%	±5%	±8%	
	90%	±5%	±4%	±2%	±2%	±3%	±3%	±4%	±8%	
	85%	±5%	±4%	±2%	±2%	±3%	±3%	±4%	±8%	
	80%	±4%	±4%	±2%	±2%	±3%	±3%	±4%	±6%	
	75%	±4%	±4%	±2%	±2%	±3%	±3%	±4%	±6%	
	70%	±4%	±4%	±2%	±2%	±3%	±3%	±4%	±6%	
	65%	±4%	±4%	±2%	±2%	±3%	±3%	±4%	±6%	
	60%	±4%	±3%	±2%	±2%	±2%	±2%	±3%	±5%	
	55%	±4%	±2%	±2%	±2%	±2%	±2%	±3%	±5%	
	50%	±4%	±2%	±2%	±2%	±2%	±2%	±3%	±5%	
	45%	±4%	±2%	±2%	±2%	±2%	±2%	±3%	±4%	
	40%	±4%	±2%	±2%	±2%	±2%	±2%	±3%	±4%	
	35%	±4%	±3%	±2%	±2%	±2%	±2%	±3%	±4%	
	30%	±4%	±3%	±2%	±2%	±2%	±2%	±3%	±4%	
	25%	±4%	±3%	±2%	±2%	±2%	±2%	±3%	±4%	
20%	±4%	±4%	±2%	±2%	±3%	±3%	±3%	±4%		
15%	±5%	±4%	±2%	±2%	±3%	±3%	±4%	±5%		
10%	±8%	±5%	±3%	±3%	±4%	±4%	±5%	±8%		
5%	±8%	±8%	±5%	±5%	±5%	±6%	±6%	±10%		
0%	±12%	±12%	±5%	±5%	±6%	±6%	±10%	±12%		
		0°C	10°C	20°C	30°C	40°C	50°C	60°C	70°C	80°C
		Temperature [°C]								

Temperature Range: -40°C to 60°C

Temperature Resolution: 0.1°C

Temperature accuracy:



Operating Environment: -40°C to 80°C

Anemometer

The anemometer enables to measure wind-related conditions such as wind speed and wind direction.

The Anemometer measures the average **wind direction** in one minute intervals. The value of the wind direction and number of pulse counts (magnitude) are used to resolve the wind direction into X and Y vector components. The vector components from multiple one-minute readings are summed together. The X and Y components are combined to store the “dominant” or “weighted average” wind direction for the measurement interval.

NOTE: When there is no wind, the vector math for direction will resolve to zero (North) — regardless of

the actual direction of the wind vane.

The Anemometer integrates **wind speed** pulses for one minute. The highest one-minute count in each measurement interval becomes the value for the gusts data. The average of the one-minute counts becomes the average speed for each measurement interval.

Installation

Please follow the 'Davis Cup Anemometer Installation Guide' (Version 3).

Specifications

Wind Direction: 1° increments

Accuracy: ± 7°

Wind Speed Range: 1 to 58 m/s (4 to 209 km/h),

Accuracy: ± 5%

Rain Gauge

The Rain Gauge has a double-spoon tipping bucket with 0.25 mm resolution.

Power

The DWS-11z is powered by three AA Alkaline batteries.

Sampling Time

A User defines data recording time and period for data transmitting to the PM-11z. The recommended values are 30 min and 1 hour accordingly. This mode provides over 6 months before changing the batteries.

Every sensors take measurements 10 times evenly during the period of data recording, so the average of those ten readings is recorded. For instance, of the data recording period is 30 minutes, the data readings are made every 3 minutes and the average of those 10 readings is recorded.

Readings

The DWS-11z represents the following readings:

The screenshot shows a software window titled "PM-11z Data View" with a menu bar containing "Filter", "Delete", "Export", and "Chart". Below the menu bar is a table with the following data:

Date / Time	DWS-11z-042: Solar Radiation	DWS-11z-04231: Air Temperature	DWS-11z-0423: Relative Humidity	DWS-11z-04231: Dominant Wind	DWS-11z: Wind Gusts	DWS-11z-04231: Average Wind	DWS-11z-042319: Precipitation (mm)	DWS-11z-042: Battery (%)
2013-02-11 10:30:00	82	16.9	41.3	112	2.2	1.2	1.0	86
2013-02-11 09:30:00	75	16.2	41.2	112	1.3	1.0	0.0	79

- Date and time of a record
- Solar Radiation in Watts per square meter
- Air Temperature in °C
- Relative Humidity in %RH
- Dominant Wind Direction in ° (North=0°)
- Wind Gust Maximum Speed in m/s
- Wind average speed in m/s
- Precipitation in mm
- Battery Status in % of full charge. 5% is low threshold for replacement of batteries.

Customer Support

If you ever need assistance with your DWS-11z, or if you just have questions or feedback, please e-mail at support@phyto-sensor.com. Please include as part of your message your name, address, phone, and fax number along with a description of your problem.



Phyto-Sensor Group

Bio Instruments S.R.L.

20 Padurii St., Chisinau MD-2002

REPUBLIC OF MOLDOVA

Tel./Fax: +373-22-550026

info@phyto-sensor.com

www.phyto-sensor.com