



Solar PV Monitoring & Analytics

Datasheet & Installation Guide Wind Direction Sensor [WD 150IN]

Internet of Things

Solar Energy



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MODEL

WD 150IN

DATASHEET

Introduction

Wind Direction Sensor is designed with rugged components stand up to hurricane force winds, yet is sensitive to a light breeze. It includes sealed bearings for long life.

Theory of Operation

Wind direction is defined as the direction of the source of the wind flow measured in degrees from true north in a clockwise increasing angle.

A potentiometer is mounted directly to the Vane shaft and rotates with the shaft. Changes in wind direction are sensed by a balanced vane assembly and this rotation moves the potentiometer. When a voltage (V_{in}) is connected across the potentiometer, the output from the wiper of the potentiometer is a voltage form 0 to V_{in} as a direct function of wind direction. This is converted to an analog signal by the internal electronics.

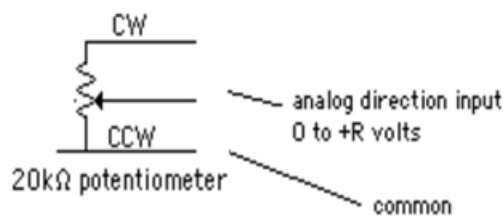
Specifications

Sensor Type	Wind Vane Potentiometer Type
Material	Control Head UV-resistant ABS
Wind Vane	Polycarbonate
Range	0 to 360 deg
Potentiometer Range	20 k Ω
Accuracy	$\pm 3\%$
Output	A. 0 – 5 V _{DC}
A, B, C are 3 different models	B. 4-20ma
	C. MODBUS RTU
Supply	12 to 24 V _{DC}
Operating Temperature	- 40 ~ 75 ° C
Color Code	Brown: Supply
	Black: Ground
	Blue: Output
Sensor Cable Length	2m



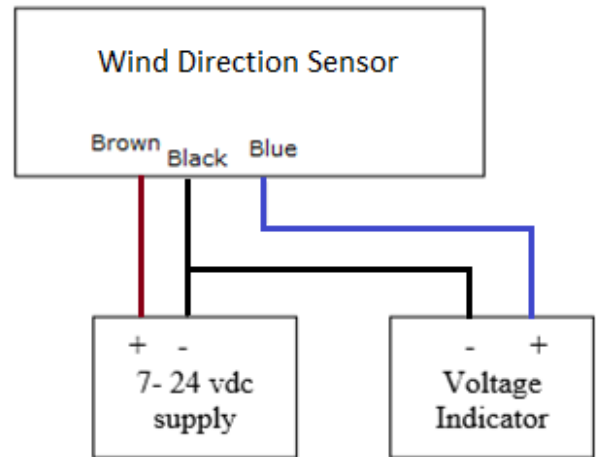
Wiring Diagram

Internal Circuit:



I/O Specifications for 0-5V Sensor Output

- Brown- Input 12VDC
- Black- Ground
- Blue- Output (0 to 5 VDC);



0-5 Vdc Sensor Output Wiring Diagram

I/O Specifications for 4-20ma SensorW Output

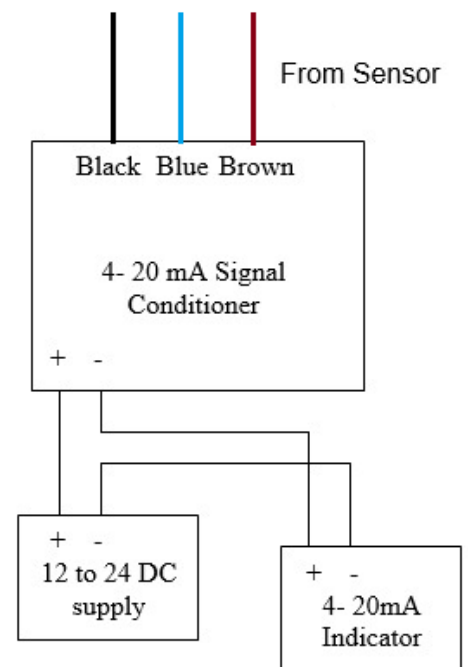
Input

Raw Sensor Input

- Brown-, Black & Blue

Output

- + & - ports with 4-20ma Output



4-20ma Sensor Output Wiring Diagram

INSTALLATION

Guidelines

The wind direction sensor comes in two different parts. We have the sensor body and the vane which is to be mounted on the sensor body.

Tools and Materials Needed

Please make sure you have all the necessary material as mentioned below:

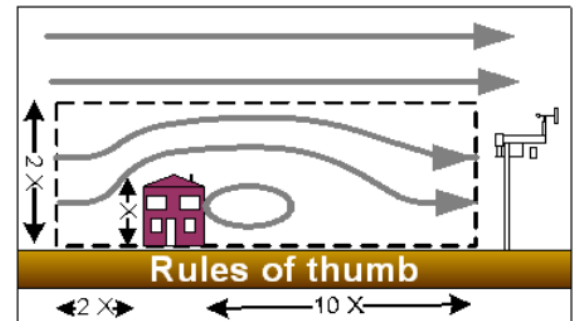
- | | | |
|-----------------------------|--------------------------------------|---------------------|
| - Wire cutters and stripper | - Electrical tapes to cover the wire | - Adjustable Wrench |
| - Multi meter | - Cable ties | - Screwdriver |

Location Recommendation

In order to report accurate weather information, you must take care in deciding where to place your weather station. The process of deciding how and where to install your weather station is called "Siting". Siting is the single most important factor in ensuring accurate readings. In fact, siting influences the accuracy of weather readings much more than the quality of the weather instruments themselves.

When selecting your mounting system, take into consideration that you will occasionally need to access the anemometer for preventive maintenance. Use the following guidelines to determine the best location for mounting the wind speed sensor

- Allow sufficient clearance for the wind direction sensor.
- Mount the vane leveled in unobstructed air on the north side (in the northern hemisphere) of your PV array
- Install the direction sensor in a location where wind flow is unobstructed by trees and nearby buildings.
- **Rule of Thumb-** Near a building, mount the sensors outside the zone of influence. Horizontally this extends roughly twice the height of the building upstream and ten times downstream. Vertically it extends to about twice the height of the structure



If the requirement is to measure the true local conditions

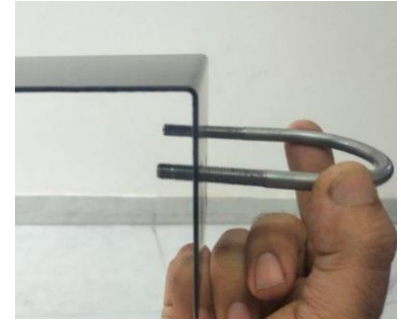
- Mount the sensor so that the wind vane is at least 7 feet (2.1 m) above obstructions such as trees or buildings that may obstruct wind flow
- Mount the sensor as the highest object for 50 feet in all directions.

Mounting

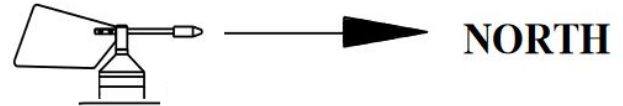
The Wind Direction sensor contains a flat plate which helps to mount it on any flat LEVEL surface.

Steps for Mounting:

1. With the supplied U-bolt, the sensor suite can be mounted on a pole or rod
2. While holding the mounting base of the sensor suite against the pole, place the two ends of the U-bolt around the pole and through the two holes in the C-shaped bracket on the base.
3. Mount the vane leveled in unobstructed air on the north side (in the northern hemisphere) of your PV array



4. Gently slide vane assembly down onto the stainless-steel shaft
5. Use the allen wrench provided to tighten the set screw slightly on the side of the wind vane.



NOTE: DO NOT PUT EXCESS PRESSURE ON THE ALLEN WRENCH AS THIS CAN DAMAGE THE SENSOR PERMANENTLY

6. Spin the wind vane, if they do not spin freely, loosen the set screw, then retighten the set screw.
7. Repeat above step until the wind vane spin freely
8. When the sensor is properly oriented, tighten the hex nuts with a wrench.

Local Testing: Spinning the wind vane assembly will produce an output. To verify sensor output, monitor this signal with either a data logger or a multimeter.

Example:

- Sensor with output Type 0-5V should give 0 V output reading on a multimeter when pointed towards North.
- Sensor with output Type 4-20ma should give 4ma output reading on a multimeter when pointed towards North

Caution

Do not Open the sensor bottom. This can permanently damage the sensor and void warranty.



Guidelines for Securing Cables

- To prevent fraying or cutting of cables, secure them so they will not whip about in the wind.
- Secure cable to a metal pole using cable ties or by wrapping tape around both the cables and the pole.
- Place clips or ties every 3' – 5' (1 – 1.6 m).

Orientation

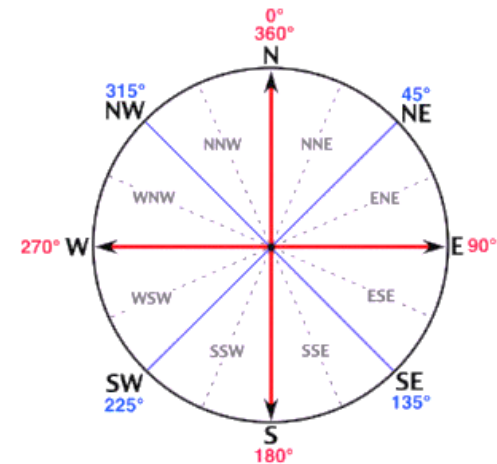
Wind direction must be calibrated to true North. A compass or GPS is required to calibrate the wind direction. Consider a digital compass or GPS for improved accuracy. To calculate the difference between magnetic north and true north for your location (magnetic declination), [link here](#). You need to know your longitude and latitude first based on your address [link here](#).

Calibration

- If using Modbus sensor then the Wind Direction Sensor is factory calibrated.
- If using analog output sensor then use the following info to calibrate.
 - **Output:** 0 - 5 VDC (0 to 360 deg)
 - **Wind Direction** in degrees to North = $72 * \text{Sensor Output voltage (in Volt)}$
 - **Output:** 4-20mA (0 to 360 deg)
 - **Wind Direction** in degrees to North = $22.5 * (\text{Output in mA} - 4)$

If the cable length is insufficient for the installation, additional cable can be added to the existing cable. If this is done, an accuracy de-rating factor must be added to the overall wind direction accuracy of this sensor.

It is highly recommended that the calibration be checked annually



Logger Connections

- For ANALOG output connections (Voltage or Current) , please search for '*Installation Guide – Analog Sensors*' on: <https://trackso.in/trackso-installation-manuals/>
- For MODBUS output connections, please search for '*Installation Guide – MODBUS Sensors*' on: <https://trackso.in/trackso-installation-manuals/>

Sensor Maintenance

- Maintenance includes inspection of mechanical operation and cleaning.
- Rotate vane assembly; look for smooth rotation and a gradual stop.
- Inspect mounting hardware for secure fasteners; mounting pipe must be vertical.
- Replace any loose or corroded fasteners.
- It is recommended to check the ball bearings of the direction sensor every year. If the vane is not rotating smoothly or it creates detectable noise, the bearings must be replaced.
- Clean any accumulation of dirt, dust, or bird droppings that may affect proper rotation of the vane. Use only soapy water and a soft cloth. Never use solvents or abrasive cleansers. Do not immerse the sensor in water.
- Inspect the cable and connections.

Troubleshooting

Situation	Comments
No Wind Direction Detected	<ul style="list-style-type: none">• Loss of supply voltage. Check +12 supply & connecting cables If Voltage is proper check potentiometer <ul style="list-style-type: none">• Step-1 Potentiometer connection at junction at field site may be loose or wire from junction box digitizer may be loose. All the wires should be checked and tightened. If problem persists then follow step ii• Step-2 - Check resistance between two wires coming from the wind vane, it should be varying between 0 to 10Kilo ohm according to wind direction. It is maximum in case of northerly wind. If resistance is having some problem, then servo potentiometer of the wind vane needs to be changed• If both Step 1 and 2 are ok then problem is with the signal conditioner/logger
Wind direction shown by instrument is different from actual wind direction	<ul style="list-style-type: none">• Hold the wind vane wind towards north and observe the reading, then repeat it for east and south. If the difference is almost constant then it means Servo Pot inside wind vane is displaced. In this case hold the wind vane fin towards north and rotate the pot till shows "000" on multimeter or platform and tighten all the screws.• If the difference observed is not constant or nearly equal then POT is not working and needs to be replaced.

Disclaimer

This sensor is a low-cost alternative to the Class 1/Class 2 sensors of the same type. Since this sensor fall under no class, there will be some variation in the real vs. expected values. If you wish to minimise the error/deviation in output values, we recommend that you purchase Class 1/Class 2 sensor.

Please note this product is not manufactured by TrackSo, but sold by TrackSo, warranties are only to the limits extended by the original manufacturer.

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Warranty

Applicable Warranty Term & Conditions is available on - <https://trackso.in/warranty/>

Repair - For all returns for repair or warranty claims, the customer must fill out a “Service Form”. The form is available from our website at <https://trackso.in/service-form/>. A completed form must be submitted online. TrackSo is unable to process any returns for repair or warranty until this form is received. If the form is not received within three days of product receipt or is incomplete, the product will be returned to the customer at the customer’s expense.

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