

Anemometer - Wind Speed



Installation Guide

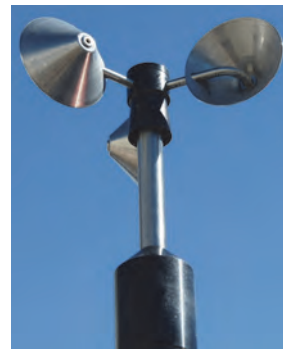
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Description.

The Anemometer is a highly responsive three or six cup anemometer that produces an output pulse with a frequency proportional to the wind speed. This pulse is then processed and converted for suitable communications.

The Anemometer is made from stainless steel and anodized aluminium. Stainless steel shafts, bearings, and fittings are used throughout. The three or six cups on the head have been hand balanced to provide precision balancing of the cup assembly on the shaft. This instrument has been thoroughly tested before leaving the factory and is ready to be installed.



Features.

- Rugged Construction.
- Measures Wind Speeds up to 60 or 80m/s (216 or 288Km/hr.)
- Working Temperature of -5 to 60°C.
- Various Output Types.
- High Accuracy.
- Easy Installation.

Ordering Information.

3 Cup Anemometers: (range 0~60m/s, starting speed 1.5m/s).

- WS3-CL:** Wind Speed 3 Cup with 4~20mA output.
WS3-USB: Wind Speed 3 Cup with USB Modbus RTU output.
WS3-RS485: Wind Speed 3 Cup with RS-485 Modbus RTU output.
WS3-PS: output. Wind Speed 3 Cup with Pulse output.

6 Cup Anemometers: (range 0~80m/s, starting speed 0.45m/s).

- WS6-CL:** Wind Speed 3 Cup with 4~20mA output.
WS6-USB: Wind Speed 3 Cup with USB Modbus RTU output.
WS6-RS485: Wind Speed 3 Cup with RS-485 Modbus RTU output.
WS6-PS: output. Wind Speed 3 Cup with Pulse output.

Product Liability. This information describes our products. It does not constitute guaranteed properties and is not intended to affirm the suitability of a product for a particular application. Due to on-going research and development, designs, specifications, and documentation are subject to change without notification. Regrettably, omissions and exceptions cannot be completely ruled out. No liability will be accepted for errors, omissions or amendments to this specification. Technical data are always specified by their average values and are based on Standard Calibration Units at 25C, unless otherwise specified. Each product is subject to the 'Conditions of Sale'.

Warning: These products are not designed for use in, and should not be used for patient connected applications. In any critical installation an independent fail-safe back-up system must always be implemented.

Specifications.

Common Specifications:

| | | |
|----------------------------------|------------------|---|
| Accuracy | | ±2%. |
| Resolution | | 0.2m/sec. |
| Time From Power To Output Stable | | 3 Seconds. |
| Cable | | 5m, UV resistant. |
| Range | 3 Cup: | 0~60m/sec (216Km/hr.) |
| | 6 Cup: | 0~80m/sec (288Km/hr.) |
| Wind Speed Average Time | | 3 Seconds. |
| Start Speed | 3 Cup: | 1.5m/sec. |
| | 6 Cup: | 0.45m/sec. |
| Operating Temperature | | -5°~60°C. (Anemometer may stop turning due to freezing below 0°C.) |
| EMC Compliances | | Emissions EN 55022-A. Immunity EN 50082-1. |
| Safety Compliances | | EN 60950. |
| Dimensions | - Overall | H=180mm, CupØ=150mm. |
| | - Mounting Plate | L=70mm, W=38mm, H=6.5mm, PCD=55mm. |

Current Output Specifications:

| | |
|-----------------|--------------------------------|
| Output | 4~20mA, 2 wire (Loop Powered). |
| Load Resistance | 600Ω @ 24Vdc. |

RS485 Output

Specifications:

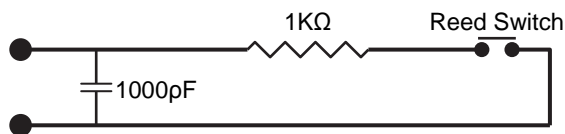
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|-----------|---|
| Output | RS485. |
| Baud Rate | 9600. |
| Format | 8 Bit, No Parity, 1 Stop Bit (<i>non selectable</i>). |
| Protocol | MODBUS RTU. |

USB Output Specifications:

| | |
|-----------|---|
| Output | USB (Std Male Type A, 5Vdc Powered). |
| Baud Rate | 9600. |
| Format | 8 Bit, No Parity, 1 Stop Bit (<i>non selectable</i>). |
| Protocol | MODBUS RTU. |

Pulse Output Specifications:

| | |
|--------|------------------------------------|
| Output | Pulse: 12Vdc @15mA Max. |
| | 3 Cup: 2 pulses per metre of wind. |
| | 6 Cup: 3 pulses per metre of wind. |



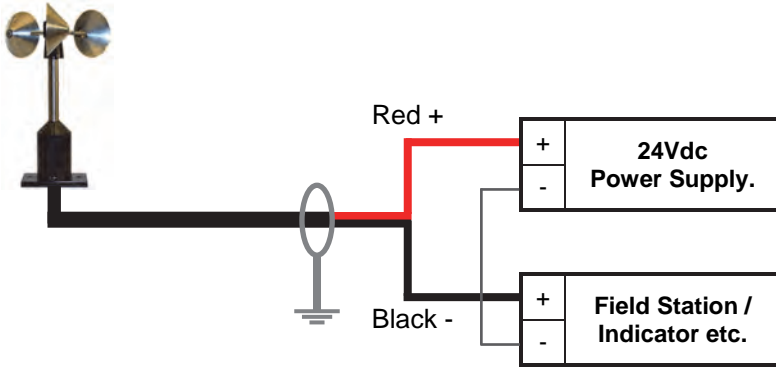
Signal Processing Specifications.

- **Default:** A 3 second averaging moving window operates. This means that every 1 second poll, returns the average of the immediate last 3 seconds.
- MODBUS readings are sent as a whole number (integer) in m/sec x 10.

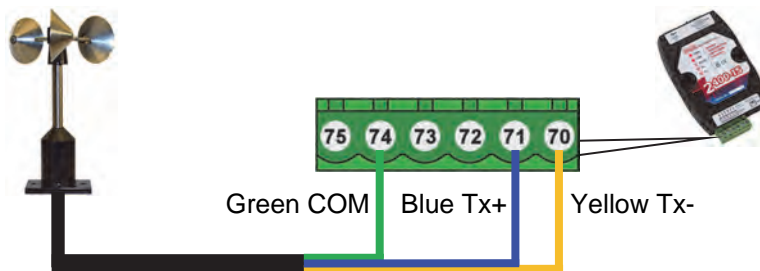
Connections & Wiring.

All Anemometers come fitted with a 5 metre UV resistant cable.

WS3-CL & WS6-CL Loop Powered Output.



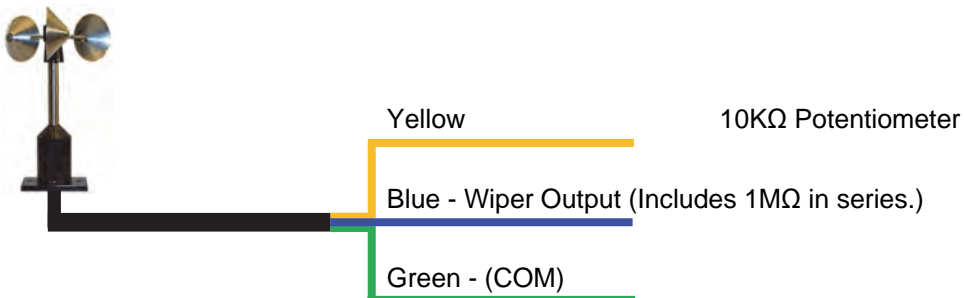
WS3-RS485 & WS6-RS485 RS485 Output.
2400-IS Serial Converter used in this Example:



WS3-USB & WS6-USB USB Output.
USB Connector = standard male type A.



WS3-PS & WS6-PS Pulse Output.



Site Selection.

Location of the sensor is critical for accurate wind measurements. The standard exposure of an anemometer or vane on open level terrain is 10 metres above the ground. Open, level terrain is defined as level ground with no obstruction within 300 metres. In locations where obstructions are not large, such as residential areas, and are distributed more or less evenly, the sensors may be placed at an effective height of $h+10$ metres, where h is the approximated height (in metres) of the various obstacles. As an example, in a location where trees and buildings reach to about 5 metres, the sensor should be placed on a 15 metre mast to avoid erroneous results.

In areas where large obstructions do exist within 300 metres of the sensor, the anemometer can be mounted raised from the top of a building, however the building itself disturbs the wind flow and must be taken into account before installation.

Mounting.

The Anemometer can be mounted using the two holes in the bottom mounting plates. This allows mounting on any flat LEVEL surface.

The Anemometer can also be used in conjunction with a Wind Vane on a single cross-arm to form a wind speed and direction measurement set.

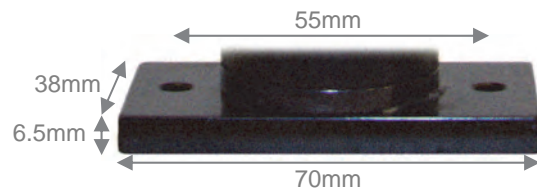
Orientation.

The Anemometer should be mounted with its axis as close to vertical as possible to provide for the best measurement of horizontal wind movement.

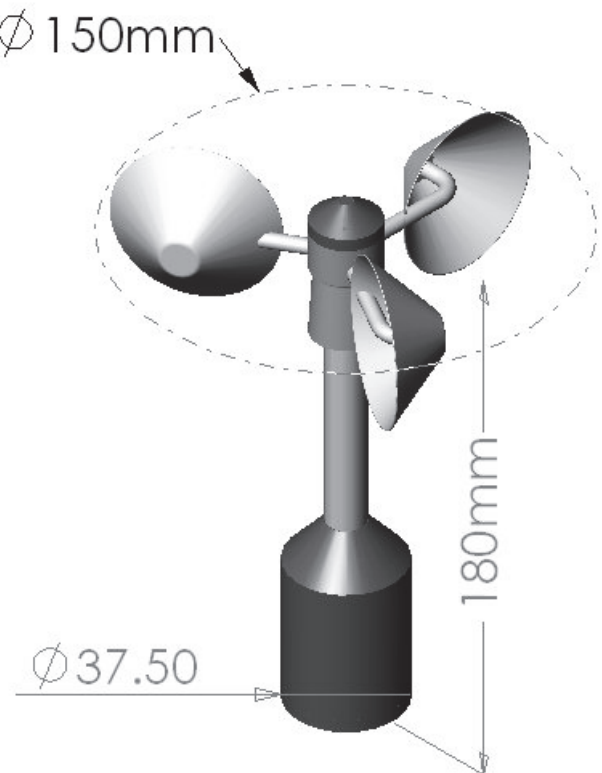
Theory of Operation.

A magnet is mounted directly to the Anemometer shaft and rotates with the shaft. A reed switch is mounted in the base and closes twice for every rotation of the shaft. The pulses produced by this closure is counted by the connected electronics and converted to an output signal (e.g. 4~20mA).

Mounting Plate Dimensions.



Anemometer Dimensions.



USB and RS485 Protocol.

MODBUS RTU slave.

Wind Speed MODBUS RTU Registers and Commands. (WS3-USB, WS3-RS485, WS6-USB and WS6-RS485).

The following registers are used:

Holding Register 1 (Address 0000) for wind speed in m/sec x 10.

These registers are only used for calibration which can only be done using a wind tunnel.

Please contact your supplier if you think calibration is needed.

Holding Register 5 (Address 0004) for Gain.

Holding Register 6 (Address 0005) for Offset.

Holding Register 7 (Address 0006) for Wind speed without gain or offset.

To read Wind Speed in m/sec:

Address - Function Code - Start Address - Quantity of Registers.

Address will always be 01 (one byte).

Function Code will always be 03 (1 byte).

Start address will always be 0000 (2 bytes).

Quantity of Registers will always be 0001 (2 bytes).

Reply will be:

Address - Function Code - Number of Bytes - Value.

Address will always be 01 (one byte).

Function Code will always be 03 (1 byte).

Number of Bytes will always be 02 (1 byte).

Wind Speed Value x 10 (2 bytes MSB First).

The Wind Speed value read from the register is divided by 10 to give the true Wind speed.

To read Gain, Offset or Raw Wind speed:

Address - Function Code - Start Address - Quantity of Registers.

Address will always be 01 (one byte).

Function Code will always be 03 (1 byte).

Start address (2 bytes) 0004 for Gain or 0005 for Offset or 0006 for Raw Wind Speed.

Quantity of Registers will always be 0001 (2 bytes).

Reply will be:

Address - Function Code - Number of Bytes - Value.

Address will always be 01 (one byte).

Function Code will always be 03 (1 byte).

Number of Bytes will always be 02 (1 byte).

Value of gain or Offset (2 bytes MSB First).

The Gain value read from the register is divided by 10,000 to give the true gain value.

The Offset value read from the register is divided by 10 to give the true Offset value.

The Raw Wind Speed read from the register is divided by 10 to give the true Raw Wind Speed.

To write Gain or Offset:

Address - Function Code - Register Address - Value.

Address will always be 01 (one byte).

Function Code will always be 06 (1 byte).

Register Address will always be 0001 (2 bytes).

Value will be Gain X 10,000 (2 Bytes).

Reply will be:

Address - Function Code - Register Address - Value.

Address will always be 01 (one byte).

Function Code will always be 06 (1 byte).

Register Address (2 bytes) will always be 0004 for Gain or 0005 for Offset.

Gain Value (2 bytes MSB First).

The Gain value written to the register is true gain value x 10,000.

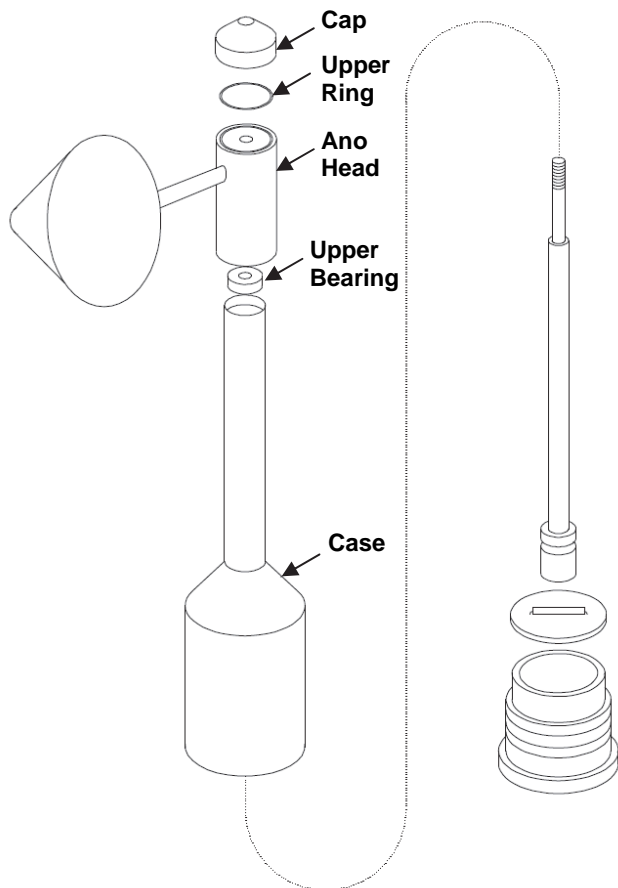
The Offset value written to the register is true Offset value x 10.

Maintenance.

The Anemometer bearings should be inspected annually for wear. The bearings are sealed and protected to prevent dirt and moisture from entering. With time, however, the seals may fail, allowing the bearings to dry out and the bearings to become tight and/or rough. The bearings can be replaced in the field or the unit returned to the factory. Since corrosion can be a problem, using a non corrosive lubricant such as beeswax on all external parts and all screws and fasteners will make disassembly easier.

If the bearings are to be replaced in the field you will need the Anemometer Service Kit that includes one bearing and a shaft with the second bearing attached. The shaft, bearing, magnet holder and magnet are factory assembled and cannot be disassembled.

Anemometer Assembly Diagram.



Intech Weather Station



WS3-WD-THP-TB-CL

Wind Speed (3 cup), Wind Direction, Temperature, Humidity and Barometric Pressure mounted on T-Bar.
Standard: 4-20mA Output.
Option: MODBUS RTU.

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