

AeroSense 4-in-1 Ultrasonic Weather Sensor - Mast-Mount

Overview

The AeroSense 4-in-1 Ultrasonic Weather Sensor - Mast-Mounted is a compact, robust, and highly accurate ultrasonic weather station designed for industrial, agricultural, and meteorological applications. It measures Wind Speed, Wind Direction, Air Temperature, and Relative Humidity in a single, maintenance-free enclosure. Utilizing RS485 Modbus RTU, it is optimized for seamless integration with PLCs, RTUs, and SCADA systems.



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Technical Specifications

Parameter	Value	Accuracy
Operating Voltage	10V to 24V DC (12V DC Nominal)	-
Power Consumption	< 1.0 W	-
Communication Protocol	RS485 Modbus RTU (up to 2000 meters)	-
Baud Rate	9600 bps (Default), 8-N-1	-
Wind Speed - Measuring Range	0.2 to 40 m/s	$\pm(0.2 \text{ m/s} \pm 0.02v)$, where v is the actual wind speed
Wind Direction - Measuring Range	0 to 359.9°	$\pm 2^\circ$
Air Temperature - Measuring Range	-20°C to +60°C	$\pm 0.5^\circ\text{C}$
Relative Humidity- Measuring Range	0% to 99% RH	$\pm 3\% \text{RH}$
Operating Temperature	-20°C to +60°C	-
Operating Humidity	0% to 99% RH	-
Ingress Protection (IP Rating)	IP65	-
Housing Material	UV-resistant - ABS engineering plastic	-

Dimensions:



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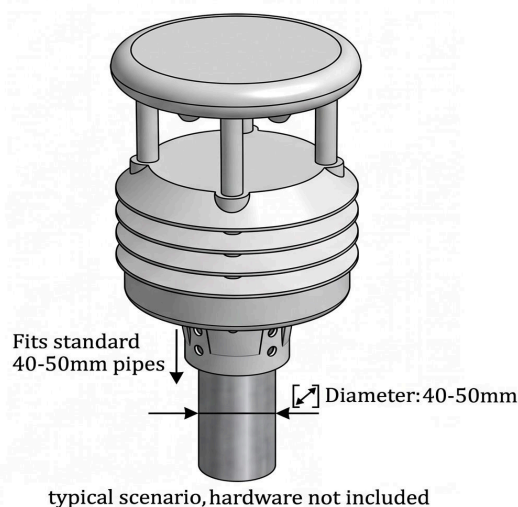
Wiring Interface

Wire Color	Signal Function	Description
RED	VCC	Power Supply Positive (10V - 24V DC)
BLACK	GND	Power Negative / Ground
YELLOW	RS485-A	Modbus Data Plus (D+)
BLUE	RS485-B	Modbus Data Minus (D-)

Mounting & Installation Instructions

1. Find True North: Locate the alignment marker on the top dome. This marker must point exactly towards True North before securing the unit.
2. Mast Installation: Slot the bottom mounting collar over a standard installation pole (usually 40mm or 50mm outer diameter).
3. Leveling: Ensure the sensor is mounted perfectly vertically. If the unit does not sit level, the geometry within the ultrasonic measurement path will be skewed, causing directional and speed errors.
4. Securing: Tighten the set screws located around the bottom collar to lock the sensor onto the mast. Do not over-torque to avoid cracking the housing.
5. Clearance: Mount the unit at least 2 meters above ground level. Keep the measurement gap completely free from obstructions and position the sensor away from walls, trees, or HVAC exhausts to prevent artificial wind turbulence.

Mounting Scenario



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Modbus Register Map

Parameter	Register (Hex)	PLC Address	Data Type	Scaling & Parsing
Air Temperature	0x0000	40001	16-bit Signed	Value / 10 (°C)
Relative Humidity	0x0001	40002	16-bit Integer	Value / 10 (%)
Wind Speed	0x0002	40003	16-bit Integer	Value / 10 (m/s)
Wind Direction	0x0003	40004	16-bit Integer	Direct Value (°)

Applications

- **Agricultural & Smart Farming:** Monitoring field microclimates, evapotranspiration rates, and automating greenhouse climate control systems.
- **Renewable Energy Optimization:** Tracking ambient conditions for wind turbine safety. The 5-parameter model is highly specific to solar farms for correlating panel energy output with real-time solar irradiance.
- **Industrial & Construction Safety:** Providing critical wind shear and speed alerts for tower cranes, suspended scaffolding, and open-pit mining operations.
- **Environmental & Meteorological:** Integration into municipal smart city grids, local pollution tracking stations, and automated highway weather alert systems.
- **Building Automation:** Feeding ambient temperature, humidity, and wind data into commercial HVAC systems to optimize heating and cooling loads.

Important Notes

1. **Transducer Protection:** *Never touch, press, or insert objects into the ultrasonic transducers located in the measurement gap. Damage to these nodes will permanently destroy the sensor's ability to measure wind.*
2. **Strict Leveling Requirements:** *The sensor must be mounted perfectly vertically on its mast or bracket. Any tilt will disrupt the horizontal ultrasonic time-of-flight geometry, resulting in dropped or skewed wind vectors.*
3. **True North Alignment:** *The physical "N" marker on the top plate or dome must be manually aligned to geographic True North during installation. Modbus data does not auto-correct for orientation.*
4. **Clearance Zones:** *Mount the unit at least 2 meters above ground level. Keep it far away from walls, dense tree canopies, or HVAC exhaust vents to prevent artificial wind turbulence and thermal contamination.*
5. **Electrical Safety:** *Verify your power supply is strictly within the range before applying power. Reversing the RED (VCC) and BLACK (GND) wires, or applying AC voltage, will instantly destroy the internal RS485 communication transceiver.*

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