ES108

Integrated Outdoor Weather Station Temperature, Humidity, Noise, Atmospheric Pressure, Illumination, Rain, Wind Speed/ Direction CO2 or PM2/10 Sensor

The **ES108** is a compact, lightweight, all-in-one outdoor environmental sensor unit designed to support a broad range of monitoring applications. It integrates multiple sensor types, including temperature, humidity, noise, atmospheric pressure, wind speed and direction, illumination, rainfall, solar radiation, and either CO_2 or PM2.5/PM10 concentrations. Sensor modules can be flexibly configured based on user-specific measurement requirements. Data output is provided via an RS-485 interface using the Modbus protocol.

The unit is housed in a **lightweight louvered radiation shield**, featuring adjustable height and a waterproof PG7 cable gland for enhanced pull resistance. Its **integrated die-cast waterproof connector** with interlocking design ensures long-term durability, offering resistance to UV exposure, heavy rain, freezing temperatures, corrosion, and rust.

The ES108 supports a **10–30VDC power input** and is easily mountable on pole tops with the installation kit. When connected to optional communication gateways—such as the **WR222 NB-IoT/WiFi gateway**, **LC144 LoRa end node**, or **SCB111-RS485 NB-IoT outdoor gateway**—real-time monitoring and data visualization can be achieved via cloud platforms.

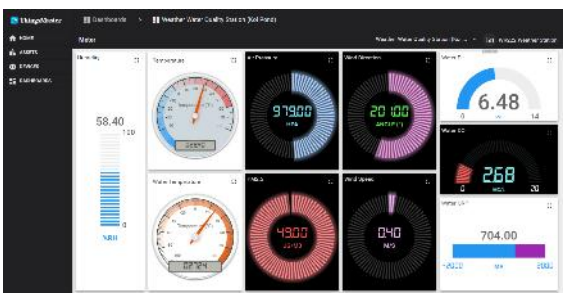
The ES108 is ideally suited for **agricultural**, **residential**, and **industrial environmental monitoring**, as well as **remote weather station deployments**.

Modbus

Temperature · Humidity · Noise · Wind Direction · Wind Speed · Atmospheric Pressure · CO2 · PM2.5 · Illuminance · Solar Radiation · Rainfall

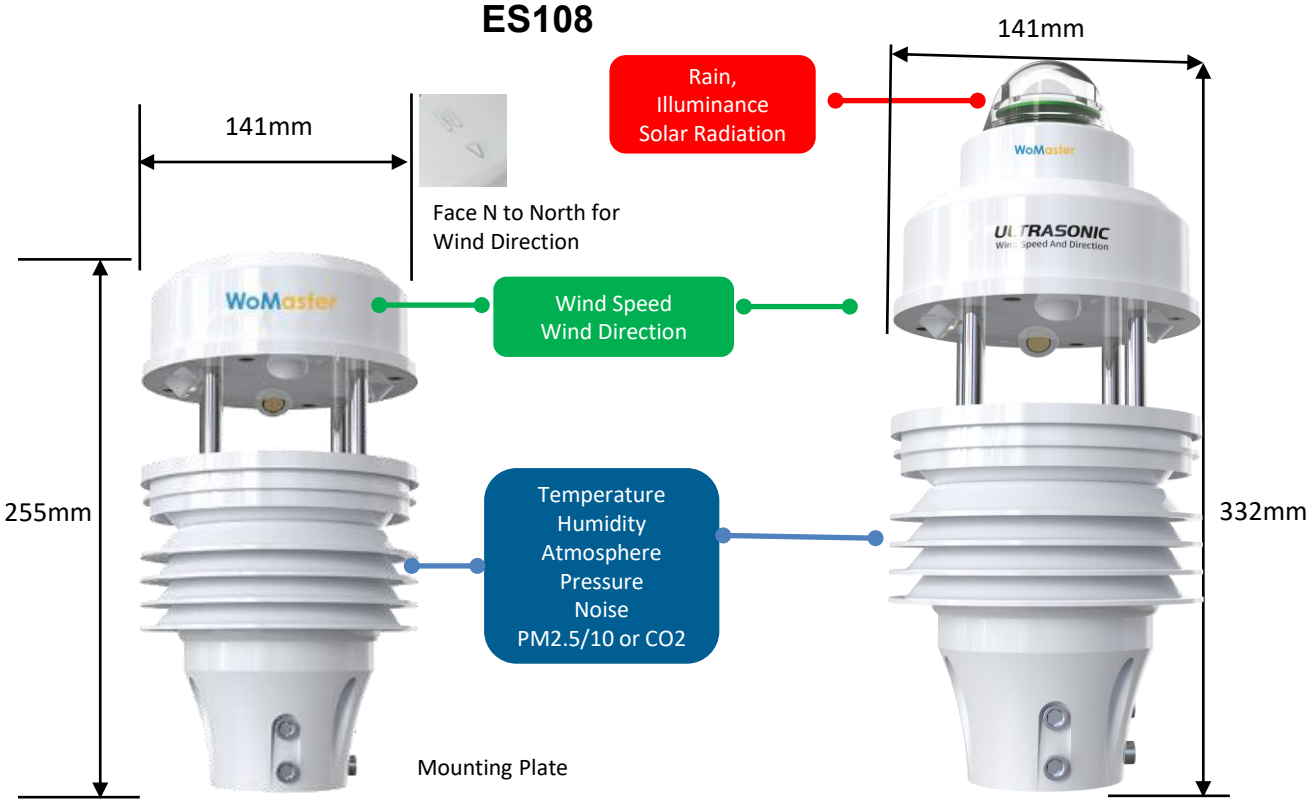
Features & Benefits

- **Ultrasonic Wind Speed and Direction** sensor uses four ultrasonic transducers arranged in a two-dimensional plane to alternately transmit and receive signals. By measuring the time difference of ultrasonic wave propagation in air, it accurately determines wind speed and direction.
- **Noise-** High-sensitivity capacitive microphone with a built-in electret condenser as the sound sensing element, the device performs sound intensity measurement with stable signals and high accuracy
- **Atmosphere Pressure-** The **atmospheric pressure transmitter** consists of a sensing element and a microprocessor. The sensing element applies the measured pressure to a specific surface area, converting it into displacement or strain. This is then converted into an electrical signal proportional to the pressure by a displacement-sensitive component or strain gauge.
- **PM2.5/PM10-** Using the **laser scattering principle** with a **built-in fan as the airflow driver**, the sensor features an **integrated insect-proof mesh** to prevent insects from interfering with the measurement, ensuring accurate and reliable data.
- **CO2-** Utilizes **NDIR (Non-Dispersive Infrared)** technology for CO_2 concentration measurement. It features **dual-channel detection**, including both a measurement and a reference channel, significantly enhancing data accuracy and consistency—outperforming common single-channel products on the market.
- **Illumination-** Illuminance is measured using a **high-precision photosensitive transmitter**, with output values expressed in **Lux**.
- **Solar Radiation-** The device adopts a **high-precision photosensitive sensor** with **broad-spectrum absorption**, capable of measuring **solar radiation in the spectral range of 0.3 to 3 μm**.
- **Rain-** The device uses an **optical sensing principle** to measure rainfall, with multiple built-in optical probes ensuring reliable detection. Unlike traditional mechanical rain sensors, the **optical rain sensor** is more compact, highly sensitive and reliable, smarter, and easier to maintain.
- **Work with IoT Cloud Platform - ThingsMasterOTA**
  - Real-time online monitoring, analysis, reporting
  - Remote cloud security and visual management

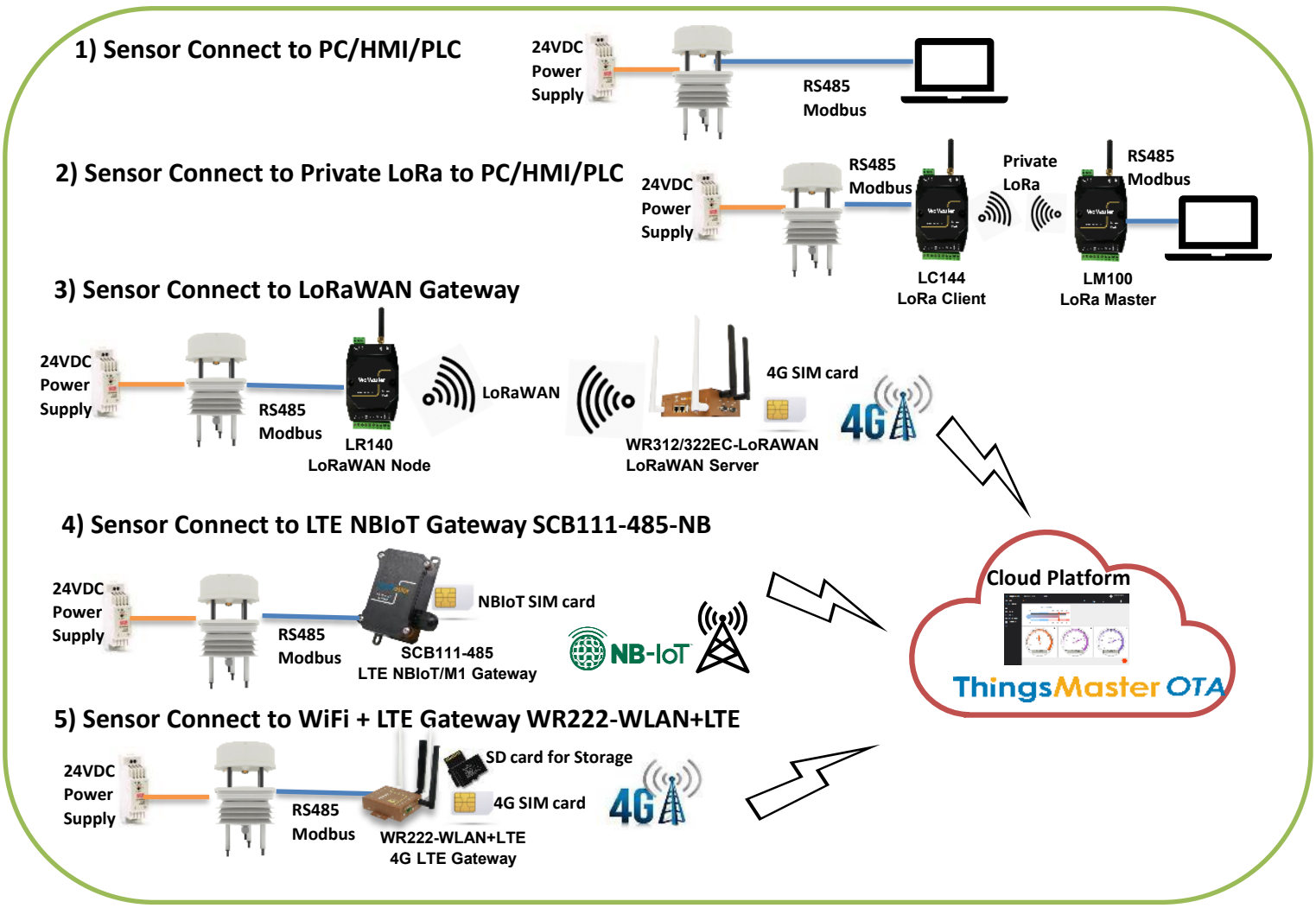


Application

Dimensions



Application



Optional Accessory

Item	
MDR-40-24	Din-Rail Power Supply INPUT:85-264VAC, 120-370VDC, OUTPUT: 24VDC/1.7A, -20 ~ +70℃
ThingsMaster OTA-5GW	ThingsMaster OTA for 5 gateways, One Year License
LM100	LoRa Master / Modbus RTU Client (Must work with LC144) (with LoRa antennas)
LC144	LoRa End-Node, 8CH AIO, 1 Modbus RTU 485 2-wire, 2 x 0~10V input, 2 x 4~20mA input, 1 x 0~10V Output, Open Collect (O.C.), 1 x 4~20mA Output, 1 x PWM Output (0~5V), 1 x PWM (0~10V), Open Collect (O.C.) Type, 1 x SMA /LoRa Antenna (Must work with LM100 or LM200)
LR140	LoRa WAN End-Node, 4CH AI, 1 Modbus RTU 485 Host, 1 x RS485 Host, 2-wire, 1 x SMA /LoRa Antenna Connector (with LoRa antennas)
WR322GR-EC-LTE-LORAWAN	Industrial LoRaWAN Gateway, 2GbE+2COM, LTE 2SIM, (with LTE and LoRa antennas)(Must work with LR140)
WR312GR-EC-LORAWAN	Industrial LoRaWAN Gateway, 2GbE+2COM (Must work with LR140)
WR222-WLAN+LTE	Industrial Wireless IIoT Field Router, 2FE+1COM, SD, 802.11b/g/n WLAN, 1SIM (with WiFi, LTE Antennas)
SCB111-485-NB-DC	Outdoor Modbus RS485 to NB-IoT / LTE Cat M1 Gateway

Specifications

	Range	Accuracy (60%RH,25℃)	Resolution	Response Time	Stability (Year)
Temperature	-40℃~+80℃	±0.5℃	0.1℃	≤25s	≤0.1℃/y
Humidity	0%RH~99%RH	±3%RH	0.1%RH	≤8s	≤1%/y
Wind Speed	0~60m/s	±(0.2m/s±0.02*v)	0.01m/s	1s	-
Wind Direction	0~359°	±3°	1°	1s	-
Atmospheric Pressure	0-120kPa	±0.15kPa	0.1kPa	≤8s	-0.1kPa/y
Noise	30dB~120dB	±0.5dB	0.1dB	≤3s	≤3dB/y
CO2	0-5000ppm	±(50ppm+ 3%F·S)	1ppm	≤90s	≤1%/y
PM2.5 / PM10	0-1000μg/m3	50%@0.3μm 98%@>=0.5μm ±3%FS	1μg/m³	≤90s	≤1%/y
Illuminance	0~200000 Lux	±7%	1Lux	≤2s	≤5%/y
Solar Radiation	0~1800W/m²	≤±3%@150W/m²	1W/m²	≤10s	≤±3%
Optical Rain	6cm Diameter Max. 24mm/min	±5%	1mm	-	-

Modbus Register Information			
Parameters Function	**Register Add. (HEX / DEC)**	**PLC Add. (Modbus Add.)**	**Note**
Device ID Storage Add.	07D0H / 2000	2001 (42001)	R/W , System Default Device ID: 1
Serial Baud Rate Add.	07D1H / 2001	2002 (42002)	R/W , Default: 2 2(9600), 0(2400), 1(4800)
Wind Speed	01F4H / 500	501 (40501)	R/O , Real Value = Read Value / 10
Wind Power Scale	01F5H / 501	502 (40502)	R/O ,Real Value = Read Value
Wind Direction	01F7H / 503	504 (40504)	R/O , Real Value 0 North, clockwise 90 East
Humidity	01F8H / 504	505(40505)	R/O, Real Value = Read Value /10
Temperature	01F9H / 505	506(40506)	R/O, Real Value = Read Value /10
Noise Level	01FAH / 506	507(40507)	R/O, Real Value = Read Value /10
PM2.5 / CO2 (-CO2)	01FBH / 507	508(40508)	R/O, Real Value = Read Value
PM10	01FCH / 508	509 (40509)	R/O, Real Value = Read Value
Atmospheric Pressure	01FDH / 509	510 (40510)	R/O, Real Value = Read Value / 10
Illuminance 20W Lux High 16 bits	01FEH / 510	511(40511)	R/O, Real Value = Read Value
Illuminance 20W Lux Low 16 bits	01FFH / 511	512(40512)	R/O, Real Value = Read Value
Illuminance 20W (100Lux)	0200H / 512	513(40513)	R/O, Real Value = Read Value
Optical Rain	0201H / 513	514(40514)	R/O, Real Value = Read Value /10
Solar Radiation	0203H / 515	516(40516)	R/O, Real Value = Read Value
			R/W: Read & Write, R/O: Read Only

System Parameters	
Power Range	DC 10~30V, 1.2W Power consumption
Enclosure Material	Shelter Box, Plastic ABS, Anti-U/V, UL94 V0
Enclosure Protection	IP65 Protection Level
Enclosure Dimension	141 mm (Diameter) x 251 mm (High)
Communication	Modbus RTU protocol, 2-Wire RS-485 RS485 Modbus RTU Pulling & Waiting Time ≥ 200mS
Op. Temperature	-40 ~ 60°C, 0~80% Humidity, No Condensing

Ordering Information

Model	Description
ES108-	Outdoor Integrated Weather Sensor Louver Base (Choose Max.8 modules below, only CO2 and PM cannot combine), RS485 Modbus, 10-30V Power,
UWC	ES108 Ultrasonic Wind Speed/ Direction with Compass
CO2*	ES108 CO2 module 0 to 5000ppm (Either CO2 or PM module, not both)
PM*	ES108 PM2.5/PM10 module 0-1000ug/m3 (Either CO2 or PM module, not both)
TH	ES108 Temperature Humidity sensor module
NL	ES108 Noise module 30dB to 120dB
AT	ES108 Automosphere module 0 to 120kPa
IL	ES108 Illumination module 0 to 200K LUX
RA	ES108 Radiation module 0 to 1800W/m2
RG	ES108 Rain Optical Sensor module 0 to 24mm/min
Pole Holding Bar	Sensor mounting bar for Pole
	Package List
	1 x Device , 1 x QIG