ES105-5-CO2 / ES105-5-PM

High Integrated Out-Door Weather Station
CO_2, PM2.5, Illumination, Temperature, Humidity, Noise, Atmospheric Pressure Sensor

The ES105 series is an intergraded outdoor sensor unit for all types of environmental and weather monitoring sensors include illumination, temperature, humidity, noise, Atmospheric Pressure and CO2 or PM2.5&10. The monitored data is output through RS-485 interface by Modbus protocol. The ES105 sensor unit accepts 10~30Vdc power input voltage and is protected by the IP65 grade Anti-U/V lightweight ABS louver radiation shield. With the optional NBIoT/WiFi gateway WR222 or LoRa end node LC144, the data can be monitor on the cloud platform.
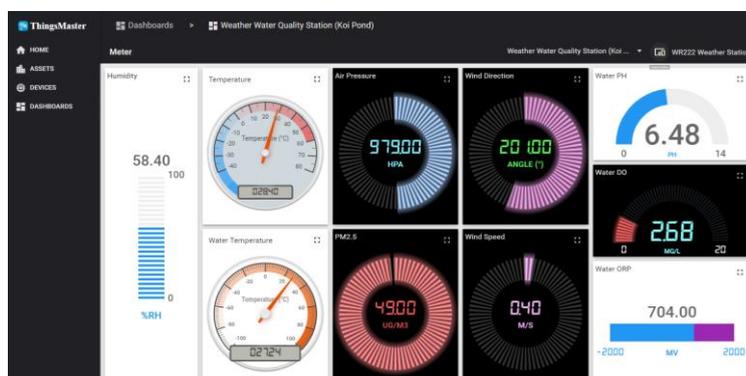
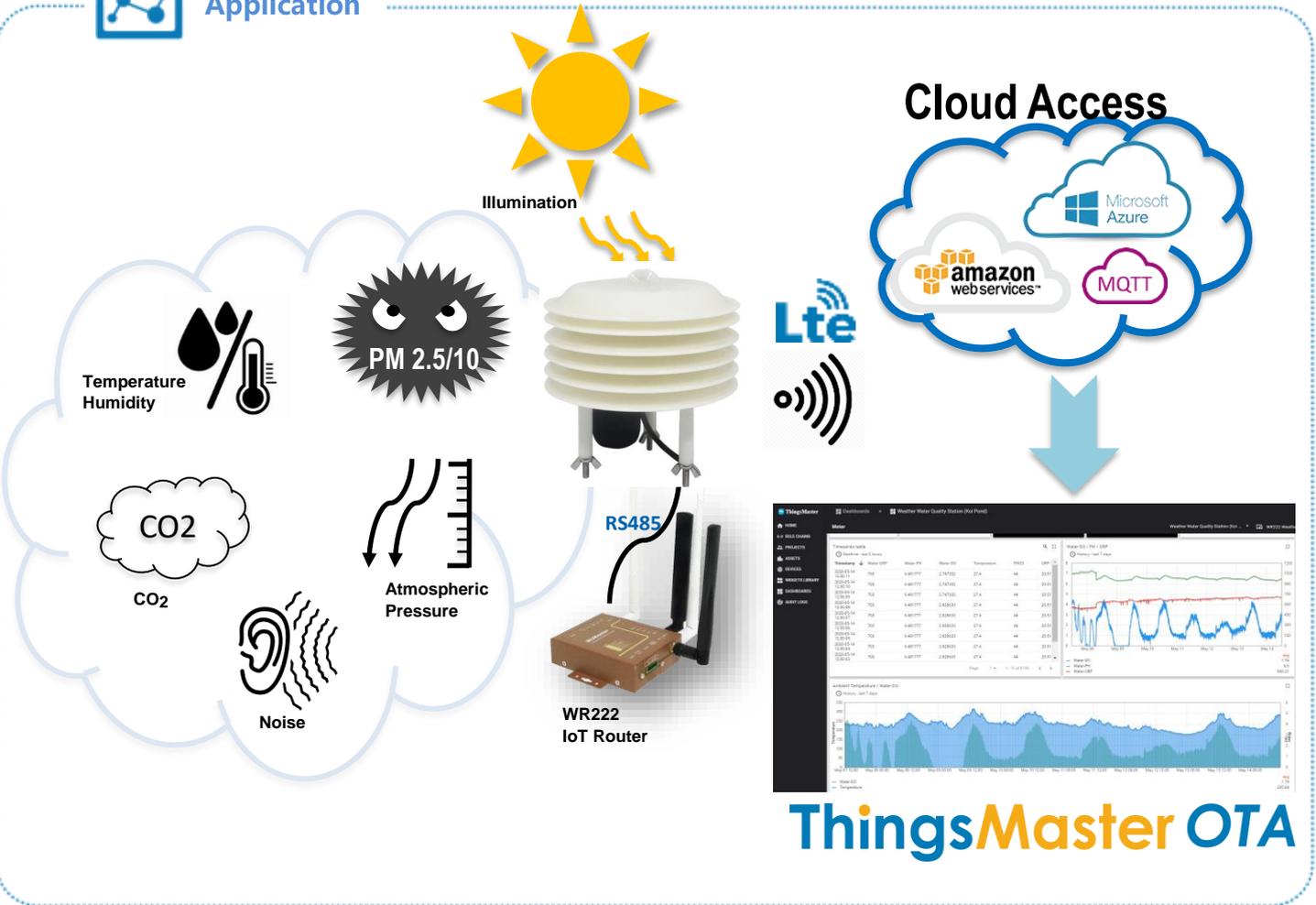| One-piece shutter box structure	Multi-sensor set	A variety of detection options	Highly sensitive easy to install	Superior performance long-term stability

Modbus

Features & Benefits

- ### High Integrated Monitoring
    – Intergraded multiple sensors
    – Central management by sharing a signal output
    – Support Industrial Modbus RTU protocol, RS485

- ### Outdoor Protective Enclosure
    – Prevent direct ultraviolet radiation to the sensors
    – Avoid rapid aging of sensors under harsh environmental conditions such as strong winds, rain, and snow
    – The sensor parts are ventilated for truly sensing the changes in external detection parameters

- ### Flexible Design
    – Customized Shutter Height
        • Single or multiple parameters both can use small shutter, small size, light weight and easy to install
    – Customized Monitoring parameters
        • Each parameter is independent and high sensitivity, users can freely integrate monitoring parameters

- ### Work with IoT Cloud Platform - ThingsMasterOTA
    – Real-time online monitoring, analysis, reporting
    – Remote cloud security and visual management

Illumination

Temperature
Humidity

PM 2.5/10

CO2

CO2

Atmospheric
Pressure

Noise

RS485

WR222
IoT Router

Cloud Access

Microsoft Azure

amazon webservices™

MQTT

Lte

ThingsMaster OTA

Dimensions

140

78

145

67

Main Device

90

144.5

Ø80.6

7 12.5 12.5

45

32.5

20

12.5 12.5

5.5

8-Ø5

Mount Kit

(mm)

Application
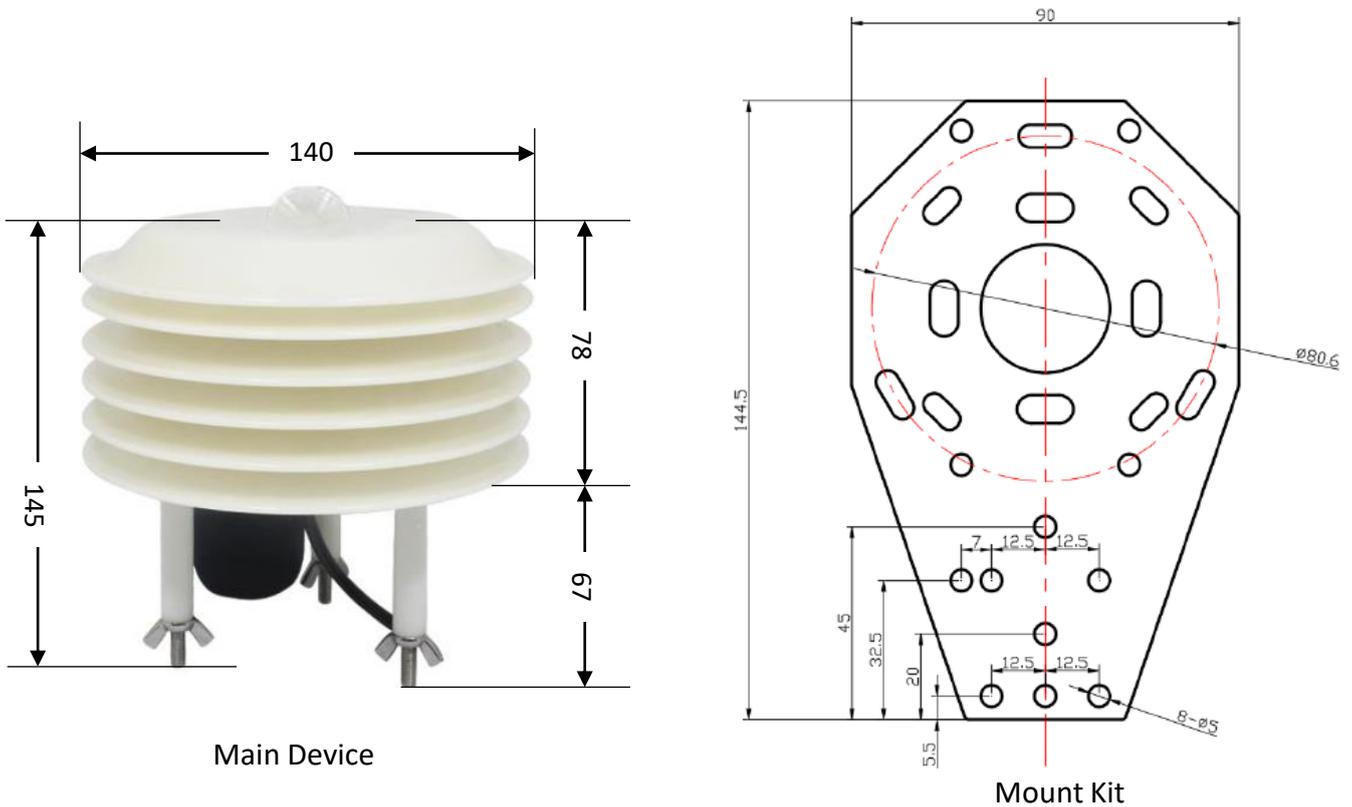
1) **Sensor Connect to PC/HMI/PLC**

24VDC Power Supply — RS485 Modbus — PC

2) **Sensor Connect to Private LoRa to PC/HMI/PLC**

24VDC Power Supply — RS485 Modbus — LC144 LoRa Client — Private LoRa — LM100 LoRa Master — RS485 Modbus — PC

3) **Sensor Connect to LoRaWAN Gateway**

24VDC Power Supply — RS485 Modbus — LR140 LoRaWAN Node — LoRaWAN — WR312/322EC-LoRAWAN LoRaWAN Server — 4G SIM card — 4G

4) **Sensor Connect to LTE NBIoT Gateway SCB111-485-NB**

24VDC Power Supply — RS485 Modbus — SCB111-485 LTE NBIoT/M1 Gateway — NBIoT SIM card — NB-IoT

5) **Sensor Connect to WiFi + LTE Gateway WR222-WLAN+LTE**

24VDC Power Supply — RS485 Modbus — WR222-WLAN+LTE 4G LTE Gateway — SD card for Storage — 4G SIM card — 4G

Cloud Platform — ThingsMaster OTA

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

Temperature & Humidity

Measuring Range	Temperature: -40-120 °C (Sensor Measuring Range)
	Humidity: 0%RH-100%RH
Accuracy	Temperauture±0.5°C (25°C) Humidity:±3%RH (5%-95% RH, 25°C)
Long term stability	Temperature ≤0.1°C/year Humidity ≤1%RH/year
Response time	<15/Sec (at 1m/s wind speed)

Illumination

Measuring Range	0~200000 Lux
Accuracy	±7% (25°C)
Long term stability	≤0.5°C/ Year
Response time	0.1 Sec.

CO2 (Either CO_2 or PM2.5/PM10)

Measuring Range	0~5000ppm
Accuracy	±40ppm +3%FS (25°C)
Long term stability	≤30ppm/year
Response time	<10/S (1m/s wind speed)

PM2.5/PM10 (Either CO2 or PM2.5/PM10)

Measuring Range	0~1000ug/m3
Resolution	1ug/m3
Accuracy	±10%
Response time	<90 Sec.

Atmospheric Pressure

Measuring Range	0~120Kpa
Accuracy	±1.5Kpa (25°C)
Long term stability	0.1Kpa/Year
Response time	≤1 Sec.

Noise

Measuring Range	30dB~120dB
Frequency Range	20Hz~12.5Hz
Accuracy	±0.5dB
Long term stability	<2%
Response time	≤3 seconds

System Parameters	
Power Range	DC 10~30V, 0.8W Power consumption
Enclosure Material	Shelter Box, Plastic ABS, Anti-U/V, UL94 V0
Enclosure Protection	IP65 Protection Level
Enclosure Dimension	140mm (Diameter) x 114mm (High)
Communication	Modbus RTU protocol, 2-Wire RS-485 RS485 Modbus RTU Pulling & Waiting Time ≥ 200mS
Op. Temperature	-40 ~ 60°C, 0~100% Humidity, No Condensing

Modbus Register Information			
Parameters Function	**Register Add. (HEX / DEC)**	**PLC Add. (Index Number)**	**Note**
Device ID Storage Add.	07D0H / 2000	2001	R/W , System Factory Default ID: 1
Serial Baud Rate Add.	07D1H / 2001	2002	R/W , Default: 2 2(9600), 0(2400), 1(4800)
Humidity	01F4H / 500	501	R/O , Real Value = Read Value/10
Temperature	01F5H / 501	502	R/O ,Real Value = Read Value/10
Noise	01F6H / 502	503	R/O , Real Value = Read Value/10
CO2 or PM2.5	01F7H / 503	504	R/O. CO2 /PM2.5 Real Value = Read Value
PM10	01F8H / 504	505	R/O, Real Value = Read Value, (Available on ES105-PM)
Atmospheric Pressure	01F9H / 505	506	R/O, Real Value = Read Value x10
Light Intensity (High)	01FAH / 506	507	R/O, Real Value = Read Value
Light Intensity (Low)	01FBH / 508	508	R/O, Real Value = Read Value
			R/W: Read & Write, R/O: Read Only

Ordering Information

Model	Description
ES105-5-PM	High Integrated Environmental Sensor Shelter Box, Temperature, Humidity, PM2.5/10, Illumination, Noise, Modbus RTU protocol, 2-wire RS-485 , 10~30VDC
ES105-5-CO$_2$	High Integrated Environmental Sensor Shelter Box, Temperature, Humidity, CO$_2$, Illumination, Noise, Modbus RTU protocol, 2-wire RS-485, 10~30VDC
	Package List
	1 x Multiple Sensor Shelter Box
	1 x QIG