Outdoor Environment IoT Sensor

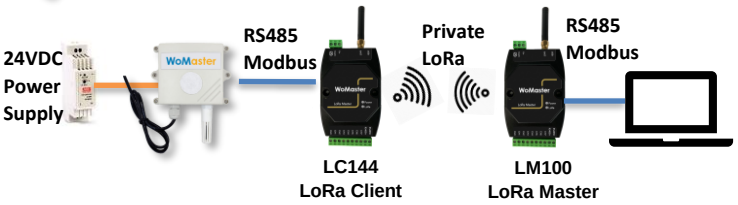
- Outdoor Protective Design against direct ultraviolet radiation
- Single or multiple parameters in small shutter, small size, light weight and easy to install
- 2-Wire RS485 Modbus output to connect to optional cellular gateway WR222 or LC144/LR140 LoRa/LoRaWAN nodes
- 24(10-30) VDC Power Input and Real-time measurement
- 4~20mA or 0~10V Output by Special Order

Model			Measurement	Accuracy	Dimension
ES102-TH	**Outdoor Temperature and Humidity Sensor**		Temperature: -40~+80°C Humidity: 0%~100%RH	Temperature accuracy: 0.5°C(25°C) Humidity: 3%RH (5%RH~95%RH, 25°C)	110x85x44(mm)
ES101-AT	**Outdoor Air Atmospheric Pressure Sensor**		air pressure:0-120kpa	Air Pressure ±0.15kpa (25°C/75Kpa)	110x85x44(mm)
ES101-NL	**Outdoor Noise Level Sensor**		30~120dB (20Hz~12.5KHz)	0.5dB	110x85x44(mm)
ES101-UW	**Outdoor Ultrasonic Wind Speed Direction Sensor**		0~70Meters/Second Compass , 360 degree	0.1Meter/Second 1 degree	Base Φ141mm Height 115mm
ES101-WS	**Outdoor Anemometer Wind Speed Sensor**		0~70Meters/Second	0.3Meter/Second	Base Φ80mm Height 160mm
ES101-WD	**Outdoor Wind Direction Sensor**		Compass , 360 degree	1 degree	Base Φ80mm Height 190mm
ES101-RG	**Outdoor Rain Measurement Sensor**		0~4mm/Min (Max.8mm/Min)	0.5mm/Min	Φ200mm
ES101-UV	**Outdoor UV Measurement Sensor**		0~15 mW/ cm2	UV Strength: ±10% FS 0.01 mW/ cm2	110x85x44(mm)
ES101-SR	**Solar Radiation Sensor**		1800 w/m^2 0.3 ~3 um	1 w/m^2	Base Φ80mm Height 90mm
ES101-FL (5M/10M /20M/30M	**Outdoor Flood Water Detection Sensor**		Water Detection Length 5M, 10M, 20M, 30M	Water Leakage	110x85x44(mm)

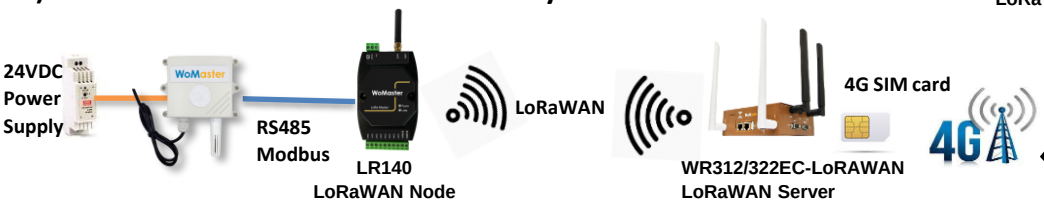
Application

1) Sensor Connect to PC/HMI/PLC

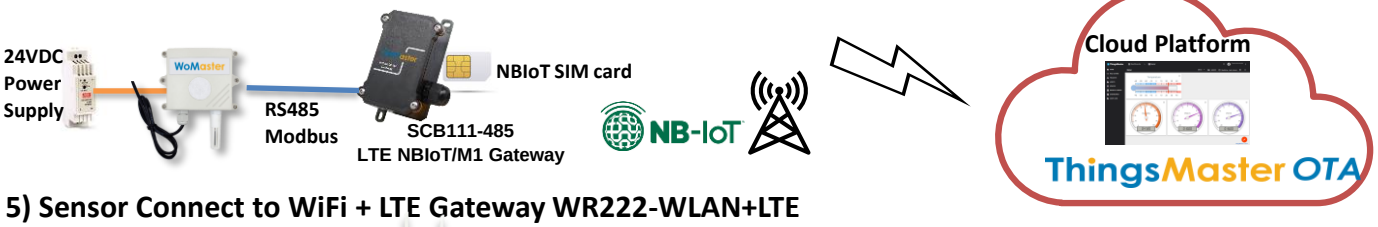
2) Sensor Connect to Private LoRa to PC/HMI/PLC



3) Sensor Connect to LoRaWAN Gateway



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



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

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

Outdoor Temperature and Humidity Sensor

ES102TH

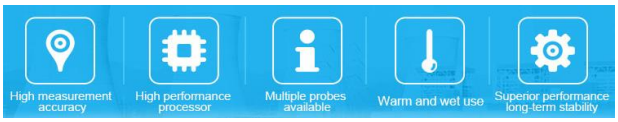
Outdoor Protective Design

- 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
- Single or multiple parameters both can use small shutter, small size, light weight and easy to install

Optional IoT Router and Cloud Platform - ThingsMaster

- Support Modbus to connect optional NBIoT Gateway WR222 for one or many sensors
- Real-time online monitoring, analysis, reporting
- Remote cloud security and visual management

Modbus



Features & Benefits

Probe measuring temperature:	-40~+60°C
Probe measuring humidity:	Relative humidity 0%~100%RH
Signal output	RS485 2-Wire output (Modbus protocol)
Working voltage	10~30VDC
Maximum power consumption	≤0.4w
Accuracy	Temperature accuracy: 0.5°C(25°C) Humidity: 3%RH (5%RH~95%RH, 25°C)
Long-term stability	Temperature: ≤0.1°C/year Humidity: ≤ 1%/year
Response time	Temperature: ≤18/sec(1m/s wind speed) Humidity: ≤6 seconds (1m/s wind speed)

Register Address	PLC or Configuration Address	Content	Description
0000 H	40001	Humidity	Range：0-100.0%RH； Upload data 10 times real data
0001 H	40002	Temperature	Range：-40-80℃； Upload data 10 times real data
07D0 H	42001	Slave ID	1 ~ 254 (Factory Default 1)
07D1 H	42002	Baud Rate	0=2400 1=4800 2=9600(Default)

Ordering Information

Model Name	Description
ES102TH	Outdoor Temperature and Humidity Sensor, -40~+60°C, 0~100%RH, RS485 Modbus, 10-30V Power
	Package List
	1 x Product Unit, 1 x Quick Installation Guide
	2x Expansion plugs, 2 x Self-tapping screws

*4~20mA / 0~5V / 0~10V output by request

Outdoor Air Atmospheric Pressure Sensor

ES101AT

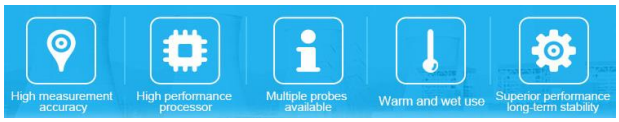
Outdoor Protective Design

- 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
- Single or multiple parameters both can use small shutter, small size, light weight and easy to install

Optional IoT Router and Cloud Platform - ThingsMaster

- Support Modbus to connect optional NBIoT Gateway WR222 for one or many sensors
- Real-time online monitoring, analysis, reporting
- Remote cloud security and visual management

Modbus



Features & Benefits

Testing Range:	air pressure:0-120kpa
Digital Signal output	RS485 2-Wire output (Modbus protocol)
Working Voltage	10-30VDC
Power consumption	≤0.5w
Accuracy	Air Pressure ±0.15kpa (25°C/75Kpa)
Long term stability	Air pressure -0.1kpa/year Temperature ≤0.1°C/year
Response Time	≤1S
Working Environment	-20-+60°C , 0% - 80%RH

Register Address	PLC or Configuration Address	Content	Description
0000 H	40001	Air Pressure	Range：0 ~ 120Kpa Upload data 10 times real data
07D0 H	42001	Slave ID	1 ~ 254 (Factory Default 1)
07D1 H	42002	Baud Rate	0=2400 1=4800 2=9600(Default)

Ordering Information

Model Name	Description
ES101AT	Outdoor Air Atmospheric Pressure Sensor, 0-120kpa, RS485 Modbus, 10-30V Power
	Package List
	1 x Product Unit
	2x Expansion plugs
	2 x Self-tapping screws
	1 x Quick Installation Guide

*4~20mA / 0~5V / 0~10V output by request

Outdoor Noise Level Sensor

ES101NL

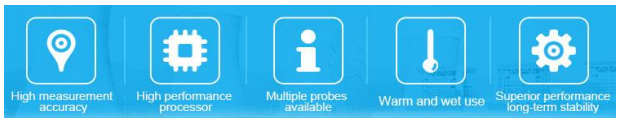
Outdoor Protective Design

- 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
- Single or multiple parameters both can use small shutter, small size, light weight and easy to install

Optional IoT Router and Cloud Platform - ThingsMaster

- Support Modbus to connect optional NBIoT Gateway WR222-WLAN-NB for one or many sensors
- Real-time online monitoring, analysis, reporting
- Remote cloud security and visual management

Modbus



Features & Benefits

Noise measurement range	30~120dB (20Hz~12.5KHz)
Noise resolution	0.1dB
Accuracy	0.5dB
Signal output	RS485 2-wire output (Modbus protocol)
Operating Voltage	10~30VDC
Power consumption	<0.18W
Working Environment	-20-+60°C , 0-80%RH
Response time	<3 seconds

Register Address	PLC or Configuration Address	Content	Description
0000 H	40001	Instantaneous Noise Value	Range：30~120dB Upload data 10 times real data
07D0 H	42001	Slave ID	1 ~ 254 (Factory Default 1)
07D1 H	42002	Baud Rate	0=2400 1=4800 2=9600(Default)

Ordering Information

Model Name	Description
ES101NL	Outdoor Noise Level Sensor, 30~120dB (20Hz~12.5KHz), RS485 Modbus, 10-30V Power
	Package List
	1 x Product Unit
	2x Expansion plugs
	2 x Self-tapping screws
	1 x Quick Installation Guide

*4~20mA / 0~5V / 0~10V output by request

Outdoor Anemometer Wind Speed Sensor

ES101WS

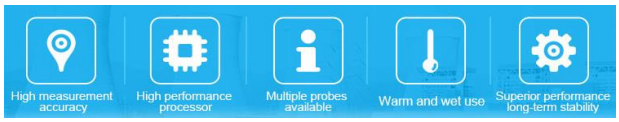
Outdoor Protective Design

- Prevent direct ultraviolet radiation to the sensors
- Avoid rapid aging of sensors under harsh environmental conditions such as strong winds, rain, and snow

Optional IoT Router and Cloud Platform - ThingsMaster

- Support Modbus to connect optional NBIoT Gateway WR222-WLAN-NB for one or many sensors
- Real-time online monitoring, analysis, reporting
- Remote cloud security and visual management

Modbus



Features & Benefits

Housing Material	Polycarbonate
Wind measurement range	0~70Meters/Second
Resolution	0.1Meter/Second
Signal output	RS485 2-wire output (Modbus protocol)
Operating Voltage	10~30VDC
Power consumption	<0.3W
Working Environment	-20-+60°C , 0-80%RH
Response time	<0.5 seconds

Register Address	PLC or Configuration Address	Content	Description
0000 H	40001	Instantaneous Wind Speed	Range：0 ~ 70m/s Upload data 10 times real data
07D0 H	42001	Slave ID	1 ~ 254 (Factory Default 1)
07D1 H	42002	Baud Rate	0=2400 1=4800 2=9600(Default)

Ordering Information

Model Name	Description
ES101WS	Outdoor Anemometer Wind Speed Sensor, 0~70Meters/Second, RS485 Modbus, 10-30V Power
	Package List
	1 x Product Unit
	4 x Mounting Screws
	1 x Quick Installation Guide

*4~20mA / 0~5V / 0~10V output by request

Outdoor Wind Direction Sensor

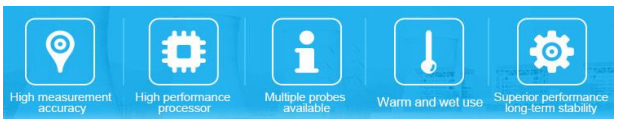
ES101WD

Outdoor Protective Design

- Prevent direct ultraviolet radiation to the sensors
- Avoid rapid aging of sensors under harsh environmental conditions such as strong winds, rain, and snow

Optional IoT Router and Cloud Platform - ThingsMaster

- Support Modbus to connect optional NBIoT Gateway WR222-WLAN-NB for one or many sensors
- Real-time online monitoring, analysis, reporting
- Remote cloud security and visual management



Modbus

Features & Benefits

Wind measurement range	Compass , 360 degree
Accuracy	1 degree
Resolution	1 degree
Signal output	RS485 2-wire output (Modbus protocol)
Operating Voltage	10~30VDC
Power consumption	<0.3W
Working Environment	-20-+60°C , 0-80%RH
Response time	<0.5 seconds

Register Address	PLC or Configuration Address	Content	Description
0000 H	40001	Wind Direction	Angle value with one decimal place(0-3599) Uploaded data is 10 times larger than the angle value with one decimal place
0001 H	40002	Wind Direction	Integer angle value (0-359) Uploaded data is actual value
07D0 H	42001	Slave ID	1 ~ 254 (Factory Default 1)
07D1 H	42002	Baud Rate	0=2400 1=4800 2=9600(Default)

Ordering Information

Model Name	Description
ES101WD	Outdoor Wind Direction Sensor, Compass , 360 degree, RS485 Modbus, 10-30V Power
	Package List
	1 x Product Unit
	4 x Mounting Screws
	1 x Quick Installation Guide

*4~20mA / 0~5V / 0~10V output by request

Outdoor Rain Measurement Sensor

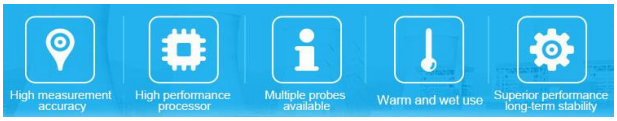
ES101RG

Outdoor Protective Design

- Prevent direct ultraviolet radiation to the sensors
- Avoid rapid aging of sensors under harsh environmental conditions such as strong winds, rain, and snow

Optional IoT Router and Cloud Platform - ThingsMaster

- Support Modbus to connect optional NBIoT Gateway WR222-WLAN-NB for one or many sensors
- Real-time online monitoring, analysis, reporting
- Remote cloud security and visual management



Modbus

Features & Benefits

Housing	#304 Stainless, 200mm Diameter
Measurement Range	0~4mm/Min (Max.8mm/Min)
Resolution	0.5mm/Min
Signal output	RS485 2-wire output (Modbus protocol)
Operating Voltage	10~30VDC
Working Environment	0-+50°C , 0-95%RH

Register Address	PLC or Configuration Address	Content	Description
0000 H	40001	Rain Measurement	Range：0~4mm/Min Upload data 10 times real data
07D0 H	42001	Slave ID	1 ~ 254 (Factory Default 1)
07D1 H	42002	Baud Rate	0=2400 1=4800 2=9600(Default)

Ordering Information

Model Name	Description
ES101RG	Outdoor Rain Measurement Sensor, 0~4mm/Min (Max.8mm/Min), RS485 Modbus, 10-30V Power
	Package List
	1 x Product Unit
	3 x Screws
	1 x Quick Installation Guide

*4~20mA / 0~5V / 0~10V output by request

Outdoor UV Measurement Sensor

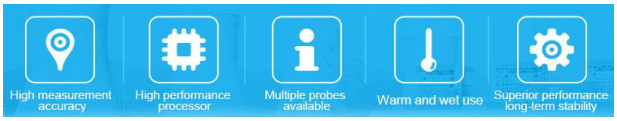
ES101UV

Highly Sensitive UV measurement

- The ultraviolet measurement is highly sensitive to 240-370nm to accurately measure ultraviolet intensity
- The transparent window adopts high-quality light-transmitting materials for over 98% of ultraviolet transmittance.
- Wall Mount Enclosure for outdoor environment

Optional IoT Router and Cloud Platform - ThingsMaster

- Support Modbus to connect optional NBIoT Gateway WR222-WLAN-NB for one or many sensors
- Real-time online monitoring, analysis, reporting
- Remote cloud security and visual management



Modbus

Features & Benefits

Accuracy	UV Strength: ±10% FS
Measurement	0~15 mW/ cm2
Sensitivity	0.01 mW/ cm2
UV Index	0~15
Wave Length Range	240-370 nm
Digital Signal output	RS485 2-Wire output (Modbus protocol)
Working Voltage	10-30VDC
Power consumption	0.1w
Response Time	0.2 Second
Working Environment	-40-+60°C , 0% - 80%RH

Register Address	PLC or Configuration Address	Content	Description
0000 H	40001	UV Measurement	Uploaded data is 100 times of Actual Value
0001 H	40002	UV Index	Actual value
07D0 H	42001	Slave ID	1 ~ 254 (Factory Default 1)
07D1 H	42002	Baud Rate	0=2400 1=4800 2=9600(Default)

Ordering Information

Model Name	Description
ES101UV	Outdoor UV Sensor, 0-15 mW/ cm2, RS485 Modbus, 10-30V Power
	Package List
	1 x Product Unit, 1 x Quick Installation Guide
	2x Expansion plugs, 2 x Self-tapping screws

*4~20mA / 0~5V / 0~10V output by request

Solar Radiation Sensor

ES101-SR

The ES101SR Solar Radiation Sensor utilizes the photoelectric method to measure solar radiation with a spectral range from 0.3 to 3μm. It adopts high precision photosensitive elements with wide spectrum absorption, high absorption, and good stability. The dust cover provides 95% transmittance of radiation and gives a excellent dust-proof and water-proof protection with special treatment to reduce dust adsorption and enhance the measurement accuracy.

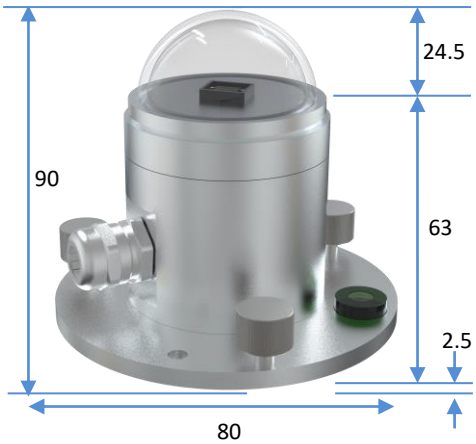
The ES101SR supports standard Modbus RTU protocol with a 2-wire RS-485 communication interface that can be integrated with an IoT gateway, like as WR222, WR312, which with 4G/LTE, NB, WiFi transmission technologies, or through the cost efficiency solution - LoRa End-Node LC144, NBIoT End-Node NC144 to upload environmental data to the cloud server for monitoring.

Modbus

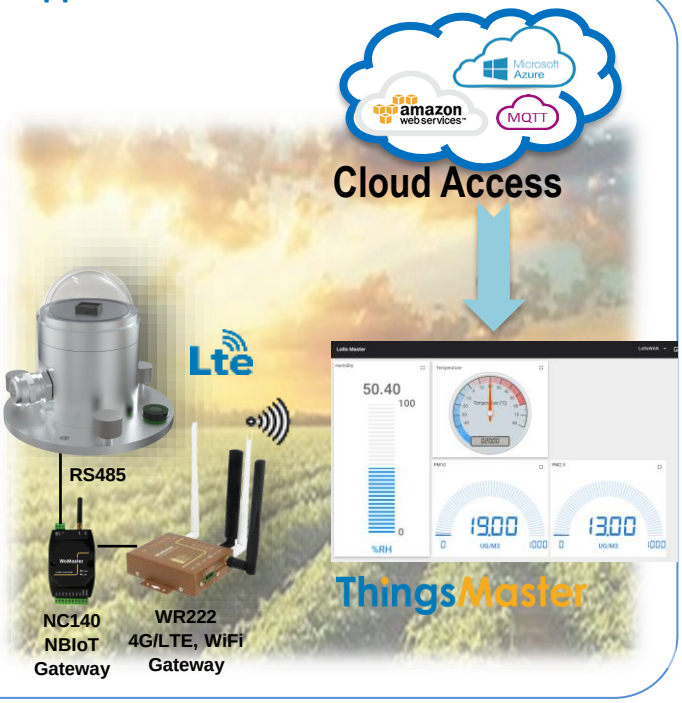
Features & Benefits

- **Excellent Solar Radiation Detection**
  - Photoelectric measuring technology
  - Wide spectral: 0.3 ~3.0μm
  - Wide Measuring Range 1800 w/m²
- **Water-Proof / Anti-Dust**
  - IP65 Ingress Protection
  - Anti Dust Absorption Treatment
  - Anti-U/V Plastic Housing
- **Modbus RTU Standard**
  - 2-Wire RS-485 Communication Interface
  - Simply Data Access
- **Harsh Operating Environment**
  - Wide range power input 10~30V
  - Lower Power Consumption 0.08w
  - Wide Operating Temperature -40~60°C

Dimension (mm)



Application



Solar Radiation Sensor Parameters	
Measuring Range	0 ~1800 w/m²
Spectrum Range	0.3 ~3 um
Accuracy	1 w/m²
Long term stability	≤+/- 2% / Year
Response time	≤ 10 Sec.
System Operating Parameters	
Operating Temperature & Humidity	-40 ~ 60°C, 0~100% RH
Power Input Range	10~30Vdc (V+: Brown, V- : Black)
Power Consumption	0.08w
Communication Interface	2-wire RS-485 (RS485-A: Yellow, RS485-B: Blue)
Enclosure Material	Polycarbonate Plastic & Acrylic
Enclosure Protection	IP65 Protection Level
Enclosure Dimension	80mm (Diameter) x 90mm (High)

Modbus Register Information			
Parameters Function	**Register Add. (HEX / DEC)**	**PLC Add. (Configure. Add.)**	**Note**
Device ID Storage Add.	07D0H / 2000	2001/(32002, 62002)	R/W , System Factory Default ID: 1
Serial Baud Rate Add.	07D1H / 2001	2002/(32003, 62003)	R/W , Default: 2 2(9600), 0(2400), 1(4800)
Real Solar Radiation	0000H / 0	1 / (30001)	R/O(03) , Real Value = Read Value
Offset Value (Solar Radiation)	0052H / 82	83/ (30083 , 60083)	R/W (03/06), 0~1800 w/m²
			R/W: Read & Write, R/O: Read Only

Ordering Information

Model	Description
ES101-SR	Solar Radiation Senor, Modbus RTU protocol, 2-wire RS-485 , 10~30VDC
	Package List
	1 x Sensor
	1 x QIG

Flood / Water Leak Detection Sensor

ES101-FL-5M/10M/20M/30M

The Flood Water Leak Detection Sensor ES101-FL is widely used in communication base stations, undergrounds, IT rooms, warehouses, cabinets and other places where water alarm is needed. The power input, water detection cable and signal output are completely isolated for security operation.

The water detection cable sensors are typically used to detect water leaks under floors but may also be used to detect water levels rising by fitting cable along a wall or surface. Water detection cable is designed to be used in conjunction the ES101-FL, and the length can be customized for 5, 10, 20, 30 meters.

Modbus

Features & Benefits

Power Input	DC10-30V
Power Consumption	0.4W
Detection	Natural Water
Operation Temperature Humidity	-20℃~+60℃ · 0%RH~80%RH
Output	RS485 Modbus
Water Detection Length	5M, 10M, 20M, 30M
Enclosure	IP53 Wall Mount

Register Address	PLC or Configuration Address	Content	Description
0004 H	40005	Measurement	Range：0~10m; Upload real data
0000 H	40001	Slave ID	1 ~ 254 (Factory Default 1)
0001 H	40002	Baud Rate	0=2400 1=4800 2=9600(Default)

Ordering Information

Model Name	Description
ES101-FL-5M	Outdoor Flood Water Detection Sensor, 5 Meter, RS485 Modbus, 10-30V Power
ES101-FL-10M	Outdoor Flood Water Detection Sensor, 10 Meter, RS485 Modbus, 10-30V Power
ES101-FL-20M	Outdoor Flood Water Detection Sensor, 20 Meter, RS485 Modbus, 10-30V Power
ES101-FL-30M	Outdoor Flood Water Detection Sensor, 30 Meter, RS485 Modbus, 10-30V Power