SENSECAP

SenseCAP Sensor Hub Catalog V3.1

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SENSECAP

An Industrial Wireless Sensor Network Solution

SenseCAP Sensor Hub - 4G Data Logger

Features

- Collection of various environmental data
- Support offline caching
- Support using with standard Modbus-RTU RS485 sensors
- Support uploading to any server (SenseCAP Server/ User's Server)
- Support 4G/3G/2G communication,supporting global LTE frequency band
- Built-in GPS positioning function
- Two power supply options available: DC only, Solar Power
- Easy to install and deploy
- Industry standards, suitable for harsh outdoor environments

Applications

- Smart Agriculture
- Smart City
- Smart Buildings
- Smart Industry
- Environmental Monitoring
- Other Wireless Sensing Applications

Introduction

SenseCAP Sensor Hub is a powerful 4G data logger that can connect to a maximum of 32 RS-485 sensors. It is designed with industry standards, robust and stable. IP66 rated, waterproof and dustproof, it is highly suitable for long-term remote environmental monitoring in outdoor application scenarios. Sensor Hub Data Logger is an easy-to-deploy 4G cellular station. It uses the MODBUS-RTU RS485 protocol to communicate with sensors and is able to collect various sensor data simultaneously.

Sensor Hub consists of 4 RS485 data channels. With extension hubs / RS485 splitters, it can connect with a maximum of 32 sensors at one time. The data is collected and sent to the cloud (either to the SenseCAP server or the client's private server) via 4G/3G/2G (as shown in the system architecture below). Designed with industry standards and IP66 rated, Sensor Hub is suitable for outdoor and harsh environments, resistant from UV, rain, and dust, etc. GNSS is embedded for location tracking.

SenseCAP Sensor Hub 4G Data Logger can work with any sensors that support MODBUS-RTU RS485 protocols and 5V/12V power supply. And we also provide a wide range of industrial-grade RS485 sensors for your selections. These sensors all come with waterproof aviation connectors, you can plug them into Sensor Hub within seconds to make it work.

Specifications

Product Model	
Model	Description
4G-SH-03	Built-in Rechargeable Battery Wall Power and Solar Power
4G-SH-04	No Battery Wall Power only

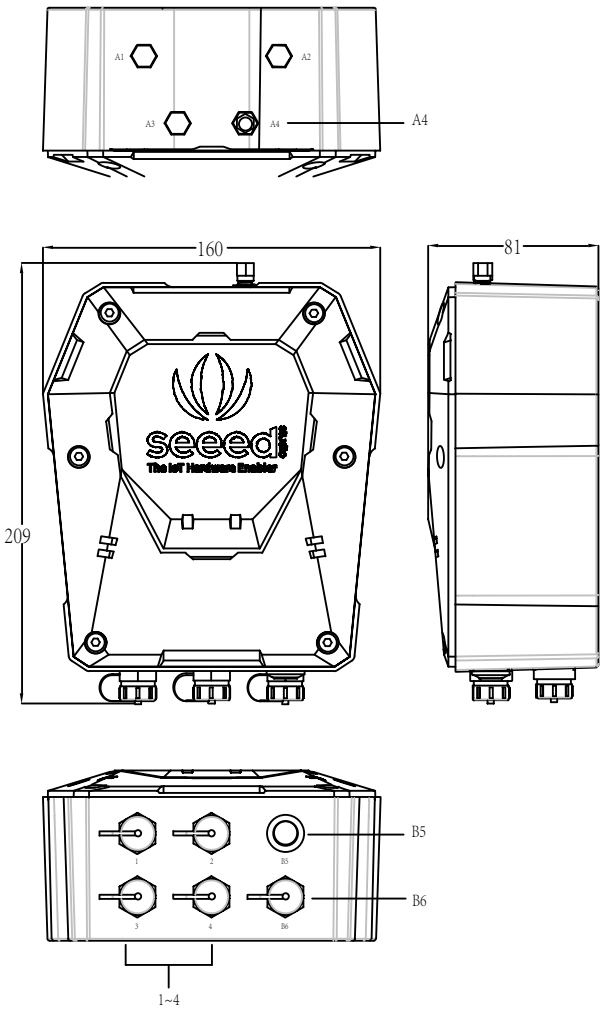
Power Supply	
Power Consumption	It depends on the combination of sensors
Wall Power	DC 12V/2A
Battery (4G-SH-03 Built-in)	Voltage: 7.4V Capacity: 6000mAh (rechargeable) Operating temperature: 0 ℃ ~ +45 ℃ (charge) -20 ℃ ~ +60 ℃ (discharge)
Solar Power (optional)	Maximum power: 12wp size: 340*255mm

General Parameters	
Power Supply for Sensor	5V/12V (depending on sensor types)
Number of Sensor Connections	4 interfaces on device, can connect up to 32 sensors with extension hubs(*)
Communication Protocol for Sensor	Modbus-RTU RS485
Maximum Sensor Load	12V/1A，5V/2A（**）
Data Upload	SenseCAP Portal（default） User's Server (MQTT Server)
APN	Supports configuring APN
Switch/ LED Indicator	Switching power supply Red LED indicates equipment status
Grounding	Reserved 1 screw hole for GND
IP Rating	IP66
UV Resistance	Anti-aging (from rain/sun exposure): UL746C F1
Enclosure Material	PC

SenseCAP Sensor Hub - 4G Data Logger

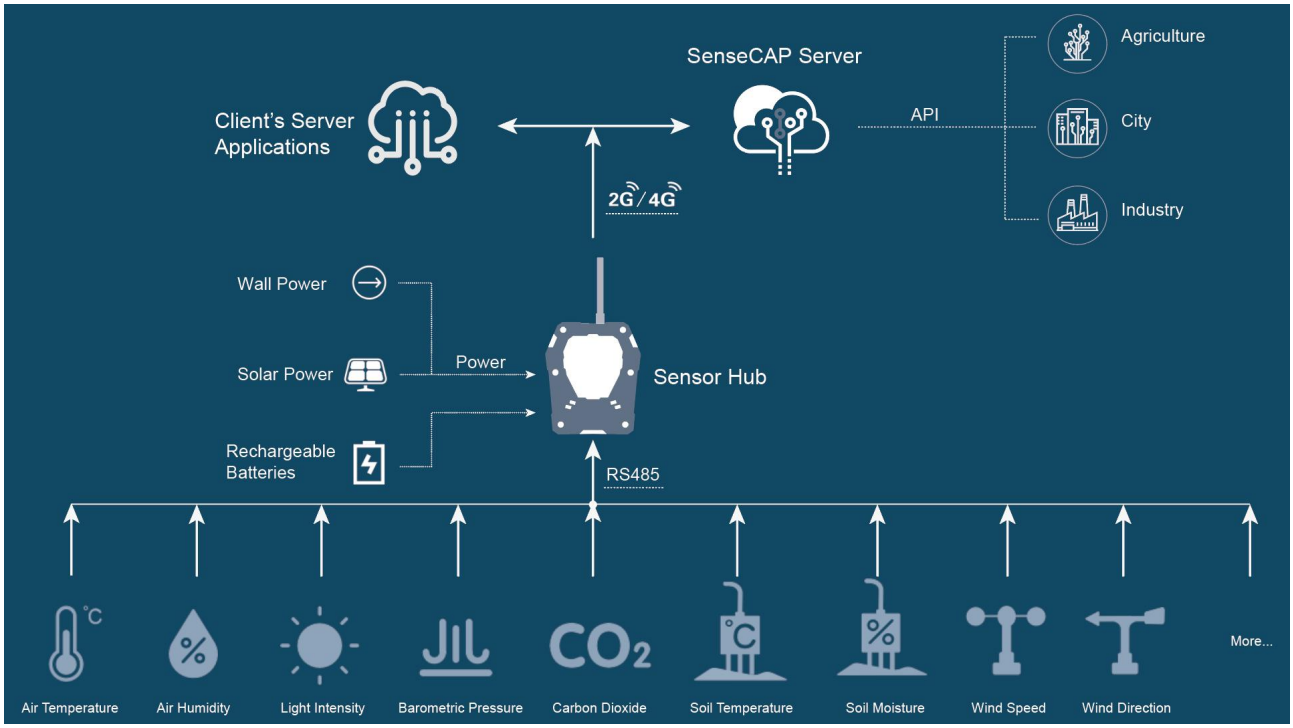
General Parameters	
Operating Temperature	4G-SH-03: -20 ℃ ~ +60 ℃ 4G-SH-04: -40 ℃ ~ +70 ℃
Operating Humidity	0 to 100 %RH (non-condensing)
Installation Method	Wall or pole mounting
Device Weight(NW)	876g
4G Features	4G Band: LTE-FDD: B1/B2/B3/B4/B5/B7/B8/B12/ B13/B18/ B19/B20/B25/B26/B28 LTE-TDD: B38/B39/B40/B41 WCDMA: B1/B2/B4/B5/B6/B8/B19 GSM/EDGE: B2/B3/B5/B8 LTE: LTE FDD: Max 150Mbps (DL)/Max 50Mbps (UL) LTE TDD: Max 130Mbps (DL)/Max 30Mbps (UL) UMTS: DC-HSDPA: Max 42Mbps (DL) HSUPA: Max 5.76Mbps (UL) WCDMA: Max 384Kbps (DL)/Max 384Kbps (UL) GSM: EDGE: Max 296Kbps (DL)/Max 236.8Kbps (UL) GPRS: Max 107Kbps (DL)/Max 85.6Kbps (UL)
GPS	Channel: 33 (Tracking)/ 99 (Acquisition)/ 210 (PRN) C/A Code SBAS: WAAS, EGNOS, MSAS, GAGAN Horizontal Position Accuracy: Autonomous: <2.5m CEP Velocity Accuracy: Without Aid: <0.1m/s
4G Antenna	0-4 dBi gain / Linear polarization / Omni-directional / SMA-J connector

Dimensions



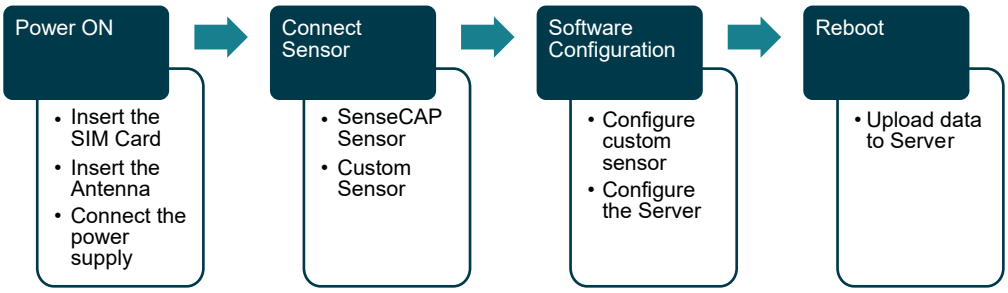
A4 —— Antenna interface
1~4 —— RS-485 channel interface
B5 —— Switch/LED indicator light
B6 —— Power interface

System Architecture



SenseCAP Sensor Hub - 4G Data Logger

How it works (***)



Notes

* Sensor Hub can be connected to more sensors with 1-to-4 RS485 splitters/extension hubs. Depending on the sensors' impedance, the maximum number of sensors to be connected is 32, the actual number depends on different sensor types.

** On Sensor Hub there are 4 interfaces. Each interface supports both 12V and 5V power supply and is powered by the same bus. However, the 5V and 12V are two independent buses respectively. At any one time, the maximum load of each bus should not exceed 12V/1A or 5V/2A. For example, if connected to sensors supporting sleep/wake-up mode, each interface is powered and collecting data in turn from interface 1 to 4, so the sensors will be powered at the same time. During this time, the total load should not exceed 12V/1A or 5V/2A. If connected to sensors that need constant power supply, the load on all four ports should exceed 12V/1A or 5V/2A the whole time.

*** Please refer to the User Guide for detailed instructions. For software configuration, connect Sensor Hub to your computer (either Windows or MacOs) with a serial cable to set the parameters. If using Sensor Hub with SenseCAP sensor probes with waterproof aviation connector, it can work instantly after being connected and powered on.

Differences between the Model 4G-SH-03 and 4G-SH-04?

4G-SH-03: with a built-in rechargeable battery.
When there is a power outage, this model can continue working with the power from its battery. It can be used with both a DC power adapter or a **solar panel**. However, the built-in lithium battery can't be recharged when the temperature is lower than 0℃ nor discharge when it's lower than -20℃. Hence, when it's lower than 0℃, the device will stop charging and resume charging when the temperature is higher than 0℃. There is a risk of the device stop working after the battery is exhausted.

4G-SH-04: DC only version.
It does not have a built-in battery, can be used with both a DC adapter or a **solar power system**.

SenseCAP Sensor

Sensor	Measurements
SenseCAP ONE S900 9-in-1 Compact Weather Sensor	Air Temperature, Air Humidity, Barometric Pressure, Light Intensity, Wind Speed (ultrasonic), Wind Directi on (ultrasonic), Rain (optical), PM2.5, PM10
SenseCAP ONE S700 7-in-1 Compact Weather Sensor	Air Temperature, Air Humidity, Barometric Pressure, Light Intensity, Wind Speed (ultrasonic), Wind Direction (ultrasonic), Rain (optical)
SenseCAP ONE S500 5-in-1 Compact Weather Sensor	Air Temperature, Air Humidity, Barometric Pressure, Wind Speed (ultrasonic), Wind Direction (ultrasonic)
SenseCAP ORCH S4 4-in-1 Weather Sensor	Air Temperature, Air Humidity, Barometric Pressure, Light Intensity
Soil Temperature , Moisture and EC Sensor	Soil Temperature, Soil Moisture, Soil Electrical Conductivity (EC)
pH Sensor	pH
Soil Temperature and Moisture Sensor	Soil Temperature, Soil Moisture
Light Intensity Sensor	Light Intensity
Leaf Wetness and Temperature Sensor	Leaf Wetness, Leaf Temperature
CO2 Sensor	Carbon Dioxide (CO2)
ECTDS Sensor	Water Electrical Conductivity, Total Dissolved Solids
PAR Sensor	Photosynthetically Active Radiation (PAR)

Sensor Specifications

SenseCAP ONE S900 9-in-1 Compact Weather Sensor

Air Temperature	
Range	-40 ℃ ~ +85 ℃
Accuracy	±0.1 ℃
Resolution	0.01 ℃
Air Humidity	
Range	0 ~ 100 %RH
Accuracy	±1.5 %RH
Resolution	0.01 %RH
Barometric Pressure	
Range	300 ~ 1250 hPa
Accuracy	±50 Pa
Resolution	10 Pa
Light Intensity	
Range	0 ~ 188000 Lux
Accuracy	± (5%*Value)
Resolution	5 Lux
Wind Speed (ultrasonic)	
Range	0 ~ 60 m/s
Accuracy	±3%
Resolution	0.1 m/s
Wind Direction (ultrasonic)	
Range	0 ~ 360°
Accuracy	±3°
Resolution	0.1°
Rain (Optical)	
Range	0 ~ 200 mm/h
Accuracy	±10%
Resolution	0.2/0.02 mm/h
PM2.5	
Range	0 ~ 1000 μg/m^3
Accuracy	±10%
Resolution	1 μg/m^3
PM10	
Range	0 ~ 2000 μg/m^3
Accuracy	±15%
Resolution	1 μg/m^3
Other	
Communication Protocol	RS-485(Modbus-RTU) / With Waterproof Aviation Head
Cable Length	3 Meters
Operating Temperature	-40 ℃ ~ +85 ℃
Operating Humidity	0 ~ 100 %RH
IP Rating	IP66
Device Weight	2900g

SenseCAP ONE S700 7-in-1 Compact Weather Sensor

Air Temperature	
Range	-40 ℃ ~ +85 ℃
Accuracy	±0.1 ℃
Resolution	0.01 ℃
Air Humidity	
Range	0 ~ 100 %RH
Accuracy	±1.5 %RH
Resolution	0.01 %RH
Barometric Pressure	
Range	300 ~ 1250 hPa
Accuracy	±50 Pa
Resolution	10 Pa
Light Intensity	
Range	0 ~ 188000 Lux
Accuracy	± (5%*Value)
Resolution	5 Lux
Wind Speed (ultrasonic)	
Range	0 ~ 60 m/s
Accuracy	±3%
Resolution	0.1 m/s
Wind Direction (ultrasonic)	
Range	0 ~ 360°
Accuracy	±3°
Resolution	0.1°
Rain (Optical)	
Range	0 ~ 200 mm/h
Accuracy	±10%
Resolution	0.2/0.02 mm/h
Other	
Communication Protocol	RS-485(Modbus-RTU) / With Waterproof Aviation Head
Cable Length	3 Meters
Operating Temperature	-40 ℃ ~ +85 ℃
Operating Humidity	0 ~ 100 %RH
IP Rating	IP66
Device Weight	1600g

Sensor Specifications

SenseCAP ONE S500 5-in-1 Compact Weather Sensor

Air Temperature	
Range	-40 ℃ ~ +85 ℃
Accuracy	±0.1 ℃
Resolution	0.01 ℃
Air Humidity	
Range	0 ~ 100 %RH
Accuracy	±1.5 %RH
Resolution	0.01 %RH
Barometric Pressure	
Range	300 ~ 1250 hPa
Accuracy	±50 Pa
Resolution	10 Pa
Wind Speed (ultrasonic)	
Range	0 ~ 60 m/s
Accuracy	±3%
Resolution	0.1 m/s
Wind Direction (ultrasonic)	
Range	0 ~ 360°
Accuracy	±3°
Resolution	0.1°
Other	
Communication Protocol	RS-485(Modbus-RTU) / With Waterproof Aviation Head
Cable Length	3 Meters
Operating Temperature	-40 ℃ ~ +85 ℃
Operating Humidity	0 ~ 100 %RH
IP Rating	IP66
Device Weight	1500g

SenseCAP ORCH S4 4-in-1 Weather Sensor

Air Temperature	
Range	-40 ℃ ~ +85 ℃
Accuracy	±0.3 ℃
Resolution	0.1 ℃
Air Humidity	
Range	0 ~ 100 %RH
Accuracy	±2 %RH
Resolution	1 %RH
Barometric Pressure	
Range	300 ~ 1100 hPa
Accuracy	±1 hPa
Resolution	1 Pa
Light Intensity	
Range	0 ~ 188000 Lux
Accuracy	± (5%*Value)
Resolution	0.045 Lux
Other	
Communication Protocol	RS-485(Modbus-RTU) / With Waterproof Aviation Head
Cable Length	2 Meters
Operating Temperature	-40 ℃ ~ +65 ℃
Operating Humidity	0 ~ 100 %RH
IP Rating	IP66 (Waterproof Box) IP65 (Shield)
Device Weight	870g

Sensor Specifications

Soil Temperature , Moisture and EC Sensor

Soil Temperature	
Range	-40 ℃ ~ +80 ℃
Accuracy	±0.5 ℃
Resolution	0.1 ℃
Soil Moisture	
Range	From completely dry to fully saturated (from 0% to 100% of saturation)
Accuracy	±2% (0 ~ 50 %) ±3% (50 ~ 100 %)
Resolution	0.03 % (0 ~ 50 %) 1% (50~100%)
Soil Electric Conductivity	
Range	0 ~ 20000 us/cm
Accuracy	±3% (0 ~ 10000 us/cm) ±5% (10000 ~ 20000 us/cm)
Resolution	10 us/cm (0 ~ 10000 us/cm) 50 us/cm (10000 ~ 20000 us/cm)
Other	
Communication Protocol	RS-485(Modbus-RTU) / With Waterproof Aviation Head
Measuring Area	A cylinder area (with the probe as the center, diameter: 7cm, height: 7cm)
Cable Length	5 Meters
Operating Temperature	-40 ℃ ~ +85 ℃
Operating Humidity	0 ~ 100 %RH
IP Rating	IP68
Device Weight	270g
Probe Size	Length 70mm, diameter 3mm

pH Sensor

pH	
Range	0 ~ 14 pH
Accuracy	±0.01 pH
Resolution	0.01 pH
Other	
Communication Protocol	RS-485(Modbus-RTU) / With Waterproof Aviation Head
Cable Length	5 Meters
Operating Temperature	0 ℃ ~ +60 ℃
Operating Humidity	0 ~ 100 %RH
IP Rating	IP68
Device Weight	300g

Soil Temperature and Moisture Sensor

Soil Temperature	
Range	-40 ℃ ~ +80 ℃
Accuracy	±0.5 ℃
Resolution	0.1 ℃
Soil Moisture	
Range	From completely dry to fully saturated (from 0% to 100% of saturation)
Accuracy	±2% (0 ~ 50 %) ±3% (50 ~ 100 %)
Resolution	0.03 % (0 ~ 50 %) 1 % (50 ~ 100 %)
Other	
Communication Protocol	RS-485(Modbus-RTU) / With Waterproof Aviation Head
Measuring Area	A cylinder area (with the probe as the center, diameter: 7cm, height: 7cm)
Cable Length	5 Meters
Operating Temperature	-40 ℃ ~ +85 ℃
Operating Humidity	0 ~ 100 %RH
IP Rating	IP68
Device Weight	270g
Probe Size	Length 70mm, diameter 3mm

Light Intensity Sensor

Light Intensity	
Range	0 ~ 200000 Lux
Accuracy	±6%
Resolution	400~1100nm
Other	
Communication Protocol	RS-485(Modbus-RTU) / With Waterproof Aviation Head
Cable Length	2 Meters
Operating Temperature	-40 ℃ ~ +85 ℃
Operating Humidity	0 ~ 100 %RH
IP Rating	IP66
Device Weight	165g

Sensor Specifications

Leaf Wetness and Temperature Sensor

Leaf Temperature	
Range	-40 ℃ ~ +80 ℃
Accuracy	±0.5 ℃
Resolution	0.1 ℃
Leaf Wetness	
Range	0~100%
Accuracy	±5%
Resolution	0.01 %
Other	
Communication Protocol	RS-485(Modbus-RTU) / With Waterproof Aviation Head
Cable Length	2 Meters
Operating Temperature	-40 ℃ ~ +85 ℃
Operating Humidity	0 ~ 100 %RH
IP Rating	IP65
Device Weight	120g
Probe Size	65*13*145mm

ECTDS Sensor

Water Electrical Conductivity	
Range	0 - 20000us/cm
Accuracy	0-10000us/cm, ±3%; 10000-20000us/cm, ±5%
Resolution	0-10000us/cm, 10us/cm 100000-20000us/cm, 50us/cm
Other	
Communication Protocol	RS-485(Modbus-RTU) / With Waterproof Aviation Head
Cable Length	Power and Signal Cable: 2 meters Electrode Cable: 5 meters
Operating Temperature	-40 ~ +85°C
Operating Humidity	0 ~ 100 %RH
IP Rating	Electrode: IP68 Transmitter: IP65
Device Weight	540g

CO2 Sensor

CO2	
Range	Maximum range: 400 ~ 5000 ppm Effective range: 400 ~ 3000 ppm
Accuracy	± (50ppm+5%* Value)
Resolution	1 ppm
Other	
Communication Protocol	RS-485(Modbus-RTU) / With Waterproof Aviation Head
Cable Length	2 Meters
Operating Temperature	-10 ℃ ~ +50 ℃
Operating Humidity	0 ~ 85 %RH (non-condensing)
IP Rating	The upper cover breathable film can not soak in water, a small amount of water vapor has no effect
Device Weight	300g

PAR Sensor

Photosynthetically Active Radiation (PAR)	
Range	0 ~ 2500 μmol/m²·s
Accuracy	1 μmol/m²·s
Resolution	400 ~ 700 nm
Other	
Communication Protocol	RS-485(Modbus-RTU) / With Waterproof Aviation Head
Cable Length	3 Meters
Cosine Correction	80 degrees at the top
Cosine Response	≤10% (Deviation of sun height of 10° from ideal value on clear day)
Operating Temperature	-40 ℃ ~ +85 ℃
Operating Humidity	0 ~ 100 %RH
Device Weight	450g

Document Version

Version History

Version	Description	Data	The Modifier
V3.0	Initial version	02-09-2021	Jenkin Lu
V3.1	Add SenseCAP ONE S900	06-15-2021	Jenkin Lu