



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		General Parameters	
Model	Description	Power Supply for Sensor	5V/12V (depending on sensor types)
4G-SH-03	Built-in Rechargeable Battery Wall Power and Solar Power	Number of Sensor Connections	4 interfaces on device, can connect up to 32 sensors with extension hubs(*)
4G-SH-04	No Battery Wall Power only	Communication Protocol for Sensor	Modbus-RTU RS485
Power Supply			Maximum Sensor Load 12V/1A, 5V/2A (**)
Power Consumption	It depends on the combination of sensors	Data Upload	SenseCAP Portal (default) User's Server (MQTT Server)
Wall Power	DC 12V/2A	APN	Supports configuring APN
Battery (4G-SH-03 Built-in)	Voltage: 7.4V Capacity: 6000mAh (rechargeable) Operating temperature: 0 °C ~ +45 °C (charge) -20 °C ~ +60 °C (discharge)	Switch/ LED Indicator	Switching power supply Red LED indicates equipment status
Solar Power (optional)	Maximum power: 12wp size: 340*255mm	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 °C ~ +60 °C 4G-SH-04: -40 °C ~ +70 °C
Operating Humidity	0 to 100 %RH (non-condensing)
Installation Method	Wall or pole mounting
Device Weight(NW)	876g

4G Band:
LTE-FDD: B1/B3/B7/B8/B20/B28A
LTE-TDD: B38/B40/B41
WCDMA: B1/B8
GSM/EDGE: B3/B8

4G Features

Transmission Rate:
LTE-FDD (Mbps) : 150 (DL) /50 (UL)
LTE-TDD (Mbps) : 130 (DL) /30 (UL)
DC-HSPA+ (Mbps) : 42 (DL) /5.76 (UL)
WCDMA (Kbps) : 384 (DL) /384 (UL)
EDGE (Kbps) : 296 (DL) /236.8 (UL)
GPRS (Kbps) : 107 (DL) /85.6 (UL)

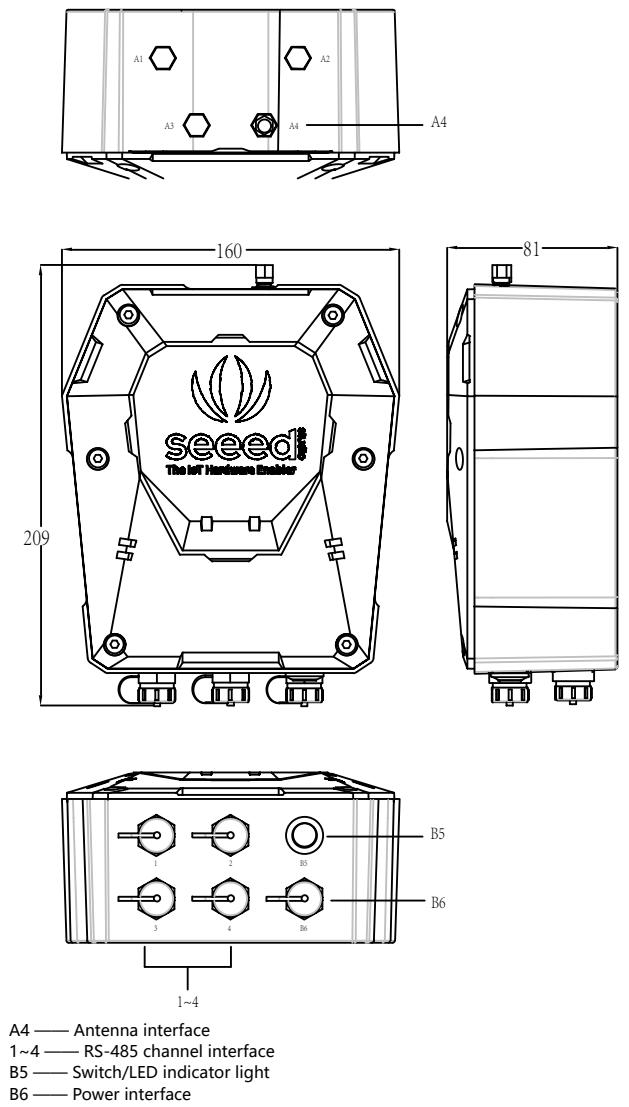
GPS

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

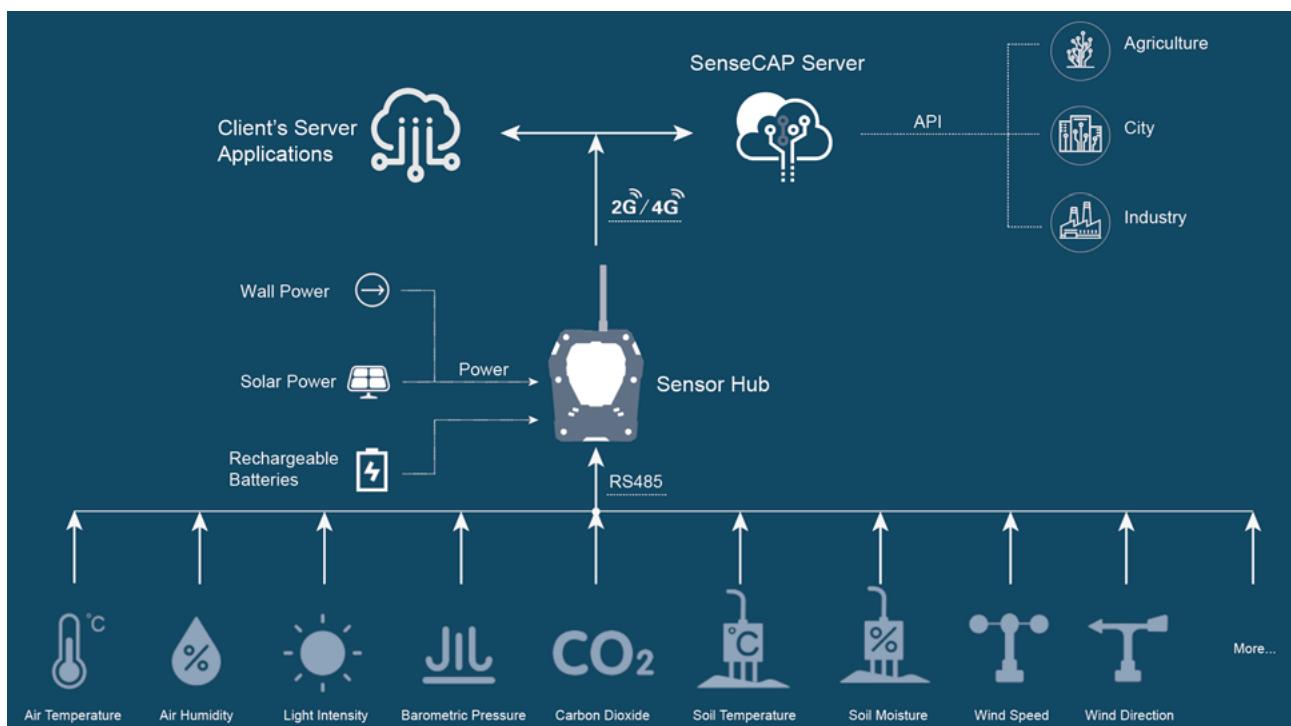
4G Antenna

0-4 dBi gain / Linear polarization / Omnidirectional / SMA-J connector

Dimensions

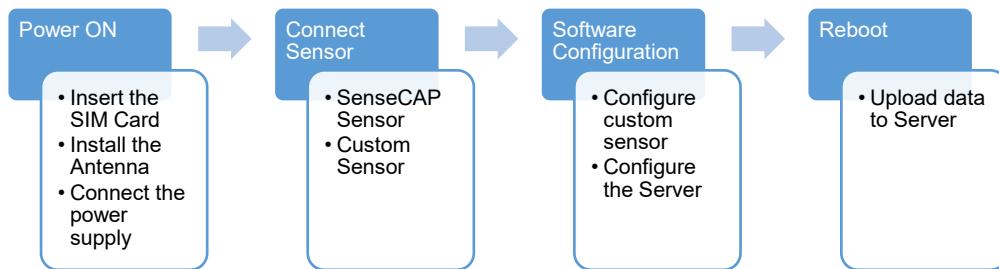


System Architecture



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°C nor discharge when it's lower than -20°C. Hence, when it's lower than 0°C, the device will stop charging and resume charging when the temperature is higher than 0°C. 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 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
CO2 Sensor	Carbon Dioxide (CO2)
PAR Sensor	Photosynthetically Active Radiation (PAR)
pH Sensor	pH
ECTDS Sensor	Water Electrical Conductivity, Total Dissolved Solids
Soil Temperature and Moisture Sensor	Soil Temperature, Soil Moisture
Soil Temperature, Moisture and EC Sensor	Soil Temperature, Soil Moisture, Soil Electrical Conductivity (EC)
Leaf Wetness and Temperature Sensor	Leaf Wetness, Leaf Temperature
Light Intensity Sensor	Light Intensity

Sensor Specifications

SenseCAP ONE S700 7-in-1 Compact Weather Sensor



Air Temperature

Range	-40 °C ~ +85 °C
Accuracy	±0.1 °C
Resolution	0.01 °C

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 °C ~ +85 °C
Operating Humidity	0 ~ 100 %RH
IP Rating	IP66
Device Weight	1600g

SenseCAP ONE S500 5-in-1 Compact Weather Sensor



Air Temperature

Range	-40 °C ~ +85 °C
Accuracy	±0.1 °C
Resolution	0.01 °C

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 °C ~ +85 °C
Operating Humidity	0 ~ 100 %RH
IP Rating	IP66
Device Weight	1500g

Sensor Specifications

SenseCAP ORCH S4 4-in-1 Weather Sensor



CO2 Sensor



Air Temperature

Range	-40 °C ~ +85 °C
Accuracy	±0.3 °C
Resolution	0.1 °C

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 °C ~ +65 °C
Operating Humidity	0 ~ 100 %RH
IP Rating	IP66 (Waterproof Box) IP65 (Shield)
Device Weight	870g

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 °C ~ +50 °C
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

Sensor Specifications

PAR Sensor



Photosynthetically Active Radiation (PAR)

Range 0 ~ 2500 $\mu\text{mol}/\text{m}^2\cdot\text{s}$

Accuracy 1 $\mu\text{mol}/\text{m}^2\cdot\text{s}$

Resolution 400 ~ 700 nm

Other

Communication RS-485(Modbus-RTU) / With
Protocol Waterproof Aviation Head

Cable Length 3 Meters

Cosine Correction 80 degrees at the top

Cosine Response $\leq 10\%$ (Deviation of sun height of 10°
from ideal value on clear day)

Operating Temperature -40 °C ~ +85 °C

Operating Humidity 0 ~ 100 %RH

Device Weight 450g

pH Sensor



pH

Range 0 ~ 14 pH

Accuracy ± 0.01 pH

Resolution 0.01 pH

Other

Communication RS-485(Modbus-RTU) / With
Protocol Waterproof Aviation Head

Cable Length 5 Meters

Operating Temperature 0 °C ~ +60 °C

Operating Humidity 0 ~ 100 %RH

IP Rating IP68

Device Weight 300g

ECTDS Sensor



Water Electrical Conductivity

Range 0 - 20000us/cm

Accuracy 0-10000us/cm, $\pm 3\%$;
10000-20000us/cm, $\pm 5\%$

Resolution 0-10000us/cm, 10us/cm
100000-200000us/cm, 50us/cm

Other

Communication RS-485(Modbus-RTU) / With
Protocol 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

Sensor Specifications

Soil Temperature and Moisture Sensor



Soil Temperature

Range -40 °C ~ +80 °C

Accuracy ±0.5 °C

Resolution 0.1 °C

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 °C ~ +85 °C

Operating Humidity 0 ~ 100 %RH

IP Rating IP68

Device Weight 270g

Probe Size Length 70mm, diameter 3mm

Soil Temperature , Moisture and EC Sensor



Soil Temperature

Range -40 °C ~ +80 °C

Accuracy ±0.5 °C

Resolution 0.1 °C

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 °C ~ +85 °C

Operating Humidity 0 ~ 100 %RH

IP Rating IP68

Device Weight 270g

Probe Size Length 70mm, diameter 3mm

Sensor Specifications

Leaf Wetness and Temperature Sensor



Light Intensity Sensor



Leaf Temperature

Range -40 °C ~ +80 °C

Accuracy ±0.5 °C

Resolution 0.1 °C

Leaf Wetness

Range 0~100%

Accuracy ±5%

Resolution 0.01 %

Other

Communication RS-485(Modbus-RTU) / With
Protocol Waterproof Aviation Head

Cable Length 2 Meters

Operating Temperature -40 °C ~ +85 °C

Operating Humidity 0 ~ 100 %RH

IP Rating IP65

Device Weight 120g

Probe Size 65*13*145mm

Light Intensity

Range 0 ~ 200000 Lux

Accuracy ±6%

Resolution 400~1100nm

Other

Communication RS-485(Modbus-RTU) / With
Protocol Waterproof Aviation Head

Cable Length 2 Meters

Operating Temperature -40 °C ~ +85 °C

Operating Humidity 0 ~ 100 %RH

IP Rating IP66

Device Weight 165g