SENSECAP

LoRaWAN Gateway and Wireless Sensor Catalog

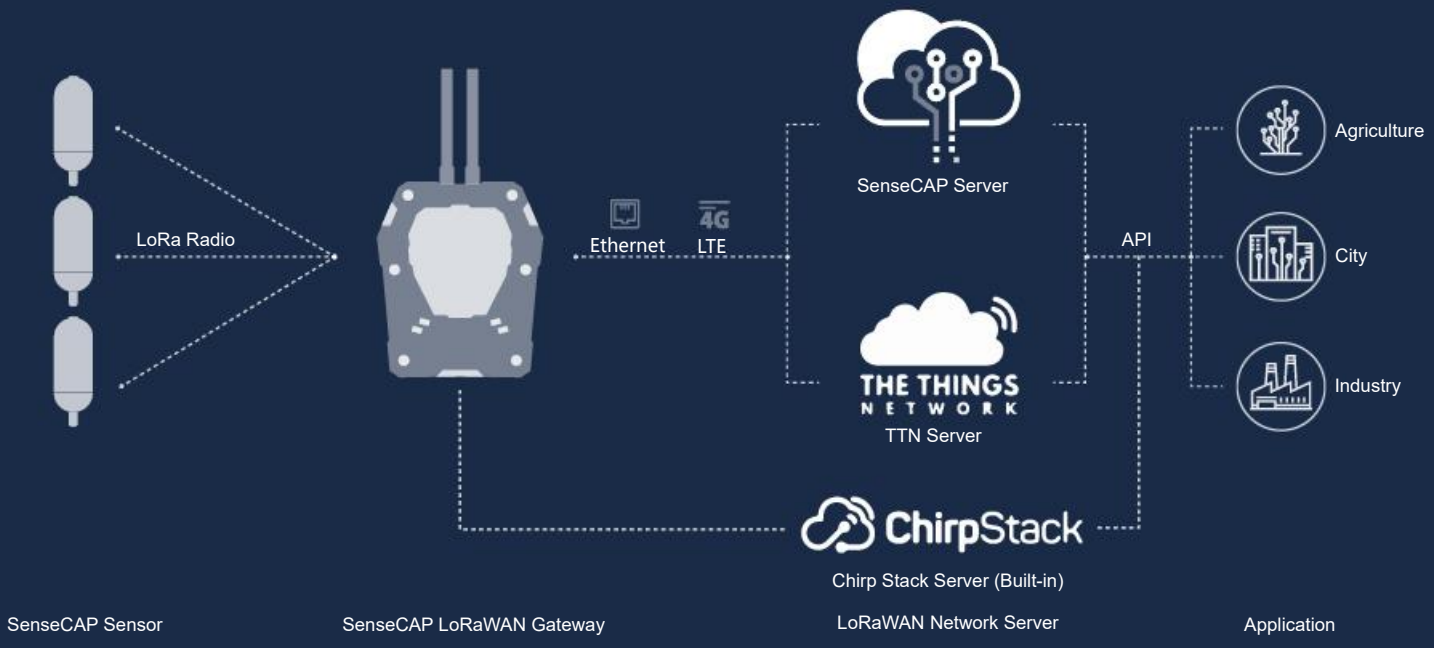
Version: V1.7

solution.seeedstudio.com

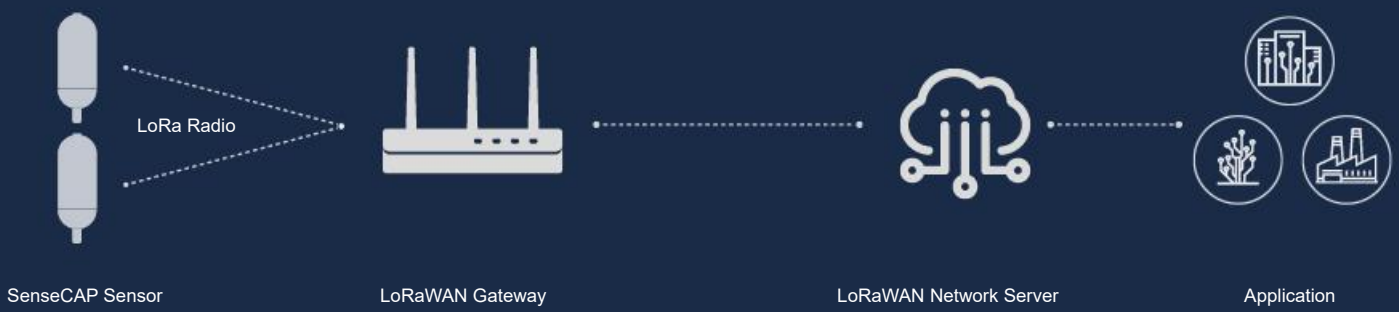
Contents

System Architecture

SenseCAP Architecture



SenseCAP Sensor + Other LoRaWAN Gateway Architecture



About SenseCAP

SenseCAP is an industrial wireless sensor network that integrates easy-to-deploy hardware and data API services, enabling low-power, long-distance environmental data collection. SenseCAP includes several versions, such as LoRaWAN, SensorHub-LTE, etc.

SenseCAP LoRaWAN version products include LoRaWAN Gateways and Sensor Nodes. Based on LoRaWAN protocol, it can realize one-to-many, long-distance networking, and bilateral communication. The LoRaWAN gateway supports Ethernet and 4G. The sensor node is powered by a high-capacity battery that lasts up to 3 years (uploading data once per hour). It also supports hot-swap, making it easy for maintenance and upgrading.

SenseCAP provides an easy-to-use portal. Users can scan the QR code with the App to bind the device with its respective account, manage the devices, and check sensor data on the portal. SenseCAP Portal provides API for users to develop based on the data on the portal further.

Features of SenseCAP LoRaWAN Gateway

- Support LoRaWAN protocol Class A
- Cortex A8 processor, Linux system, stable and reliable
- Ultra-wide-distance transmission: 10km in line of sight scene, 2 km in the urban scene
- Support multiple ISM bands: EU868, US915, AU915, AS923
- Support remote modification of Node collection frequency
- 4G and Ethernet connectivity, suitable for multiple scenes.
- Provides a variety of cloud services and data API interfaces
- Industrial grade protection: IP66 enclosure, suitable for outdoor applications
- Operating temperature -40℃ to +70℃

Features of SenseCAP LoRaWAN Sensors

- Support LoRaWAN protocol Class A
- High reliability and stability
- Ultra-wide-distance transmission: 10km in line of sight scene, 2 km in the urban scene
- Battery life ≥ 3 years
- Support remote modification of Node collection frequency
- Support the local modification of EUI, AppKey, AppEui
- Rapid installation and deployment
- IP66 enclosure, suitable for outdoor applications

Application

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

SenseCAP LoRaWAN Gateway can access SenseCAP Server, The Thing Network Server and The ChirpStack open-source LoRaWAN Network Server.

SenseCAP Sensor can be used not only with the SenseCAP LoRaWAN Gateway but also with other standard LoRaWAN gateways. The Sensor is designed with a fixed LoRa channel, which can not be modified by users. The supported channels are as follows. Please refer to the user manual for how to connect this device with a LoRaWAN gateway.

EU868	
Uplink	Frequency(MHz): 868.1, 868.3, 868.5, 867.1, 867.3, 867.5, 867.7, 867.9 (SF7BW125 to SF12BW125)
Downlink	Multiplexing the frequency points of the 8 uplink channels. 869.525MHz -SF9BW125 (RX2 downlink only)
US915	
Uplink	Frequency(MHz): 903.9, 904.1, 904.3, 904.5, 904.7, 904.9, 905.1, 905.3 (SF7BW125 to SF10BW125)
Downlink	Frequency(MHz): 923.3, 923.9, 924.5, 925.1, 925.7, 926.3, 926.9, 927.5 (SF7BW500 to SF12BW500)
AU915	
Uplink	Frequency(MHz): 916.8, 917.0, 917.2, 917.4, 917.6, 917.8, 918.0, 918.2(SF7BW125 to SF10BW125)
Downlink	Frequency(MHz): 923.3, 923.9, 924.5, 925.1, 925.7, 926.3, 926.9, 927.5 (SF7BW500 to SF12BW500)
AS923	
Uplink	AS1 Frequency(MHz): 923.2, 923.4, 922.2, 922.4, 922.6, 922.8, 923.0, 922.0, 922.1 AS2 Frequency(MHz): 923.2, 923.4, 923.6, 923.8, 924.0, 924.2, 924.4, 924.6, 924.5
Downlink	AS1: Uplink channels 1-10 (RX1) 923.2 - SF10BW125 (RX2) AS2: Uplink channels 1-10 (RX1) 923.2 - SF10BW125 (RX2)

* Please refer to Frequency Plans for specific parameters.

SENSECAP

An Industrial Wireless Sensor Network Solution

SenseCAP Gateway - LoRaWAN

Introduction

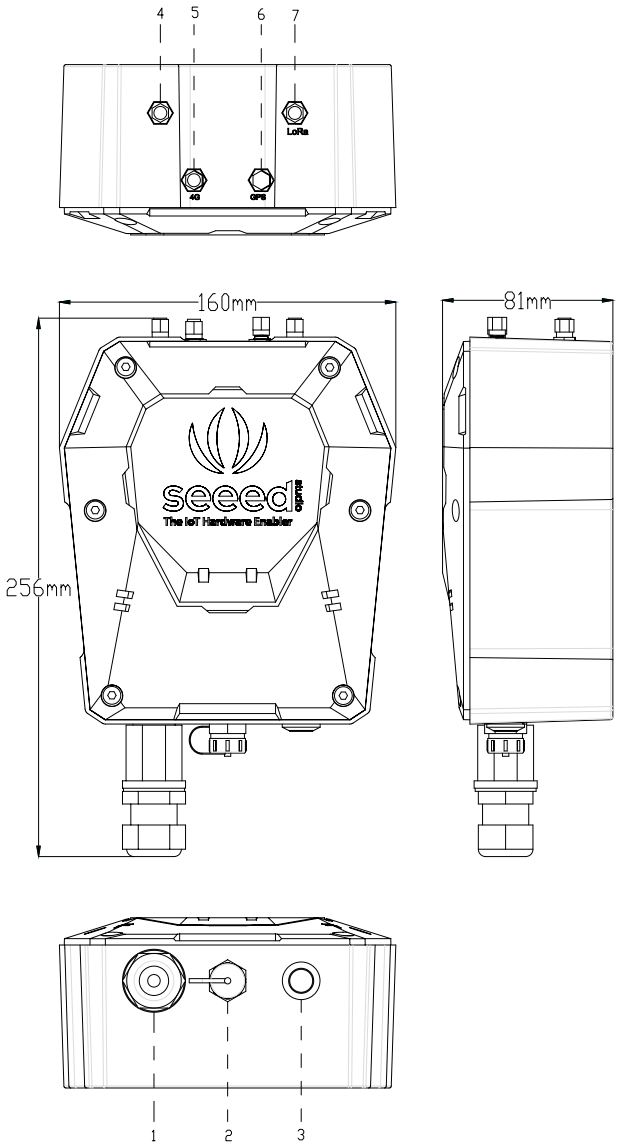
SenseCAP LoRaWAN Gateway(*) is based on LoRaWAN®(**) protocol, applicable for low-power, long-distance environmental data collection and monitoring in scenarios such as smart agriculture and smart city, etc. As the central device of the LoRa network, the gateway is used for collecting data from different Sensor Nodes and transmit the data to the SenseCAP Portal via 4G or Ethernet cable. Equipped with a high-performance processor and telecom-operator-level LoRa chip, this gateway ensures stable and high performance in a large-scale network. The gateway is designed with an IP66-protection-level enclosure, making it suitable for industrial applications in severe outdoor environments.

Specifications

Product Model	
Model	Region
LoRa-G-868-E/4G	European, Africa, Asia (India etc.)
LoRa-G-923-E/4G	Japan, Malaysia, Singapore, Brunei, Cambodia, Hong Kong, Indonesia, Laos, Taiwan, Thailand, Vietnam, Peru etc.
LoRa-G-915-E/4G	USA, Canada and South America
LoRa-G-AU915-E/4G	Australia, etc.
LoRa Parameters	
Protocol	Based on LoRaWAN v1.0.2 protocol
Channel Plan	EU868/US915/AU915/AS923
Power Output	25dBm
Sensitivity	-139dBm (SF12BW125)
General Parameters	
CPU	TI AM3358 Cortex-A8 1GHz
System	Linux Debian
RAM	DDR3 512MB
Memory	8GB eMMC
Ethernet	100Mbps FE (RJ-45)
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: 850/900/1800/1900MHz
4G Features	Support non-CA Cat 4 FDD and TDD LTE-FDD: Max 150Mbps (DL), Max 50Mbps (UL) LTE-TDD: Max 130Mbps (DL), Max 30Mbps (UL)

General Parameters	
UMTS Features	Support 3GPP R8 DC-HSDPA, HSPA+, HSDPA, HSUPA and WCDMA DC-HSDPA: Max 42Mbps (DL) HSUPA: Max 5.76Mbps (UL) WCDMA: Max 384Kbps (DL), Max 384Kbps (UL)
LoRa Antenna	2.5dBi gain / Vertical polarization / Omni-directional / SMA-J connector
4G Antenna	0-4 dBi gain / Linear polarization / Omni-directional / SMA-J connector
LED Indicator	Indicating network condition (online/ offline)
Grounding	Reserved 1 screw hole for GND
Power Consumption	3.6W
Power Supply	DC 12V/2A
IP Rating	IP66
UV Resistance	anti-aging (from rain/sun exposure): UL746C F1
Enclosure Material	PC
Operating Temperature	-40 ℃ to +70 ℃
Operating Humidity	0 to 100 %RH (non-condensing)
Installation Method	Wall or pole mounting
Device Weight	777g

Device Dimensions



1. Ethernet Port
2. Power Connector
3. LED
4. Reserved
5. 4G Antenna Connector
6. Reserved
7. LoRa Antenna Connector

Certification

** The LoRaWAN® name and the associated logo are licensed by the LoRa Alliance.
* SenseCAP LoRaWAN Gateway can access SenseCAP Server, The Thing Network Server and The ChirpStack open-source LoRaWAN Network Server. However, it can only be used with SenseCAP Sensor.

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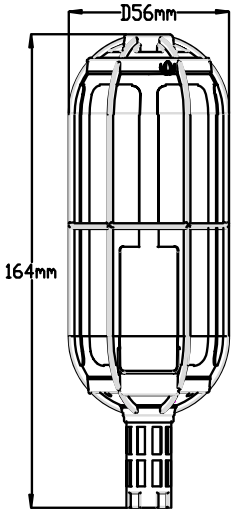
An Industrial Wireless Sensor Network Solution

SenseCAP Wireless Air Temperature and Humidity Sensor - LoRaWAN

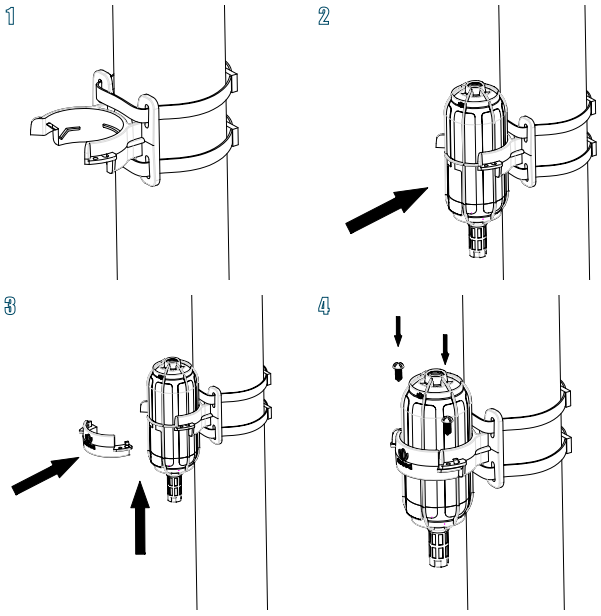


Specifications

Air Temperature	
Range	-40 ℃ to +85 ℃
Accuracy	±0.3 ℃
Resolution	0.1 ℃
Drift	＜ 0.03 ℃ /year
Air Humidity	
Range	0 to 100 %RH (non-condensing)
Accuracy	±2 %RH
Resolution	1 %RH
Drift	＜ 0.25 %RH/year
General Parameters	
Product Model	*LoRa-S-868/915/AU915/923-TH-01
Microcontroller	Ultra-low-power MCU
Support Protocol	Based on LoRaWAN v1.0.2 protocol
LoRa Channel Plan	EU868 / US915 / AU915 / AS923
LoRa Power Output	16 dBm (EIRP)
Sensitivity	EU868: -137.5dBm(SF12, BW125KHz) US915/AU915/AS923: -136.5dBm(SF12, BW125KHz)
Current Consumption	5 μA (sleep mode) 120 mA max(active mode)
Communication Distance	2 to 10 km (depending on different antennas and environments)
Battery Life	≥ 3 year (upload data once per hour)
Battery Voltage	3.6V
Battery Capacity	19Ah (Non-rechargeable)
IP Rating	IP66 (Sensor Node) IP65 (Sensor Probe)
UV Resistance	anti-aging (from rain/sun exposure): UL746C F1
Enclosure Material	PC
Operating Temperature	-40 ℃ to +85 ℃
Operating Humidity	0 to 100 %RH (non-condensing)
Device Weight	236g

Installation

Please refer to the user manual for more details.



Certification

* LoRa-S-868-TH-01, LoRa-S-915-TH-01,LoRa-AU915-TH-01, LoRa-AS923-TH-01. LoRa-S-915-TH-01 is US915 version. Other sensor models are similar.

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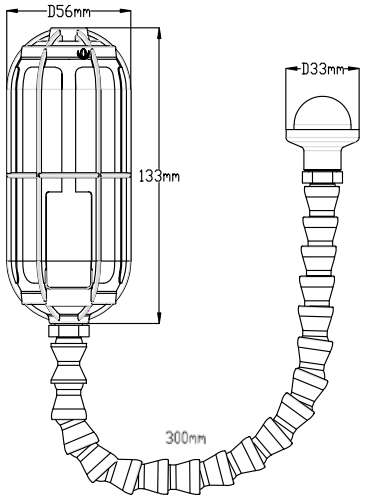
SenseCAP Wireless Light Intensity Sensor - LoRaWAN

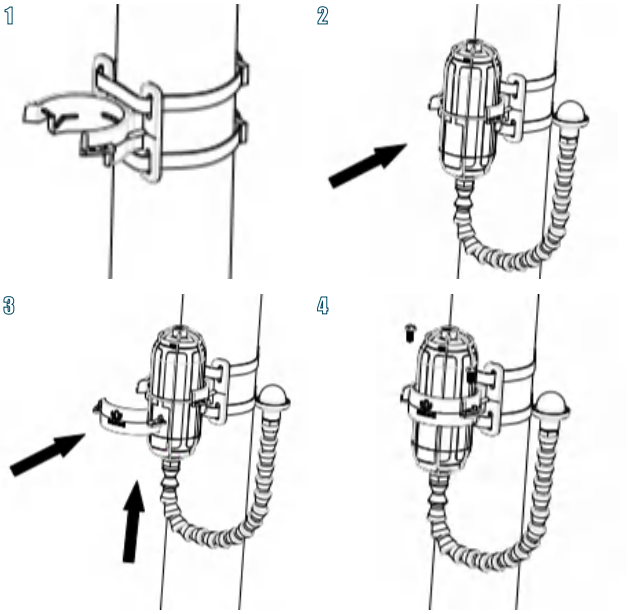


Specifications

Light Intensity	
Range	0 to 188000 Lux
Sensitivity	0.045 Lux/LSB
Resolution	0.045 Lux
General Parameters	
Product Model	LoRa-S-868/915/AU915/923-Light Intensity-01
Microcontroller	Ultra-low-power MCU
Support Protocol	Based on LoRaWAN v1.0.2 protocol
LoRa Channel Plan	EU868 / US915 / AU915 / AS923
LoRa Power Output	16 dBm (EIRP)
Sensitivity	EU868: -137.5dBm(SF12, BW125KHz) US915/AU915/AS923: -136.5dBm(SF12, BW125KHz)
Current Consumption	5 μA (sleep mode) 120 mA max(active mode)
Communication Distance	2 to 10 km (depending on different antennas and environments)
Battery Life	≥ 3 year (upload data once per hour)
Battery Voltage	3.6V
Battery Capacity	19Ah (Non-rechargeable)
IP Rating	IP66
UV Resistance	anti-aging (from rain/sun exposure): UL746C F1
Enclosure Material	PC
Operating Temperature	-40 ℃ to +85 ℃
Operating Humidity	0 to 100 %RH (non-condensing)
Device Weight	288g

Installation

Please refer to the user manual for more details.



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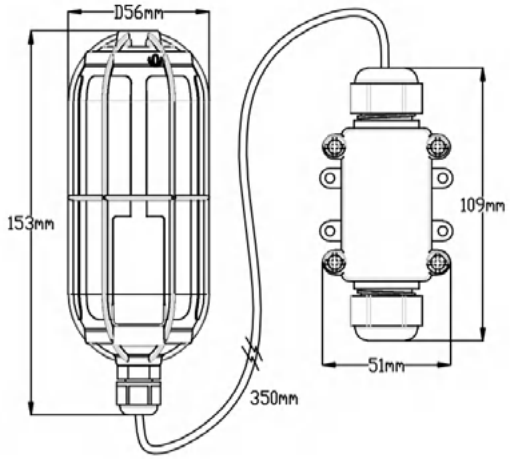
SenseCAP Wireless CO2 Sensor - LoRaWAN



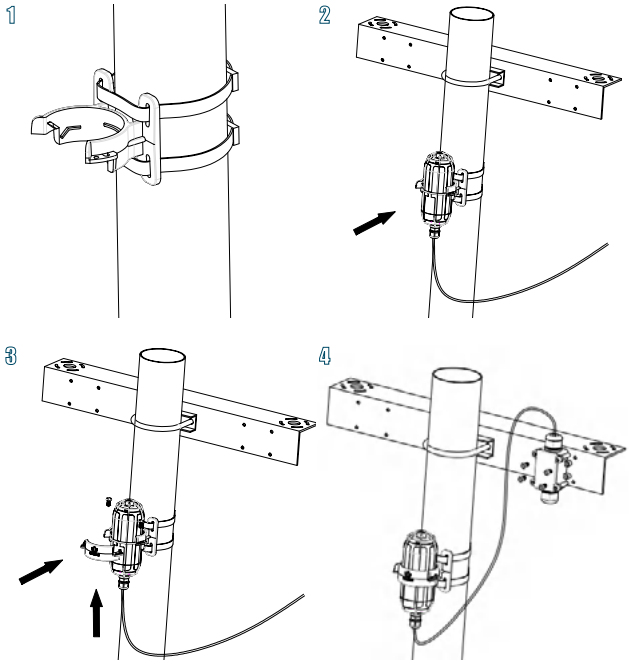
Specifications

CO2		
Parameters	Condition	Value
Range	-	0 to 40000 ppm
Accuracy	400 to 10000ppm	±(30 ppm + 3 %MV)
Resolution	-	1 ppm
Temperature Stability	T = 0 to 50 ℃ 400 to 10000 ppm	±2.5 ppm / ℃

General Parameters	
Product Model	LoRa-S-868/915/AU915/923-CO2-01
Microcontroller	Ultra-low-power MCU
Support Protocol	Based on LoRaWAN v1.0.2 protocol
LoRa Channel Plan	EU868 / US915 / AU915 / AS923
LoRa Power Output	16 dBm (EIRP)
Sensitivity	EU868: -137.5dBm(SF12, BW125KHz) US915/AU915/AS923: -136.5dBm(SF12, BW125KHz)
Current Consumption	5 μA (sleep mode) 120 mA max(active mode)
Communication Distance	2 to 10 km (depending on different antennas and environments)
Battery Life	≥ 3 year (upload data once per hour)
Battery Voltage	3.6V
Battery Capacity	19Ah (Non-rechargeable)
IP Rating	IP66 (Sensor Node) Indoor (Sensor Probe) *
UV Resistance	anti-aging (from rain/sun exposure): UL746C F1
Enclosure Material	PC
Operating Temperature	0 ℃ to +50 ℃
Operating Humidity	0 to 95 %RH
Device Weight	319g

Installation

Please refer to the user manual for more details.



Certification

* The Sensor Probe's membrane is not waterproof !

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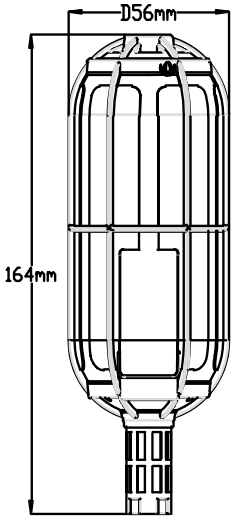
An Industrial Wireless Sensor Network Solution

SenseCAP Wireless Barometric Pressure Sensor - LoRaWAN



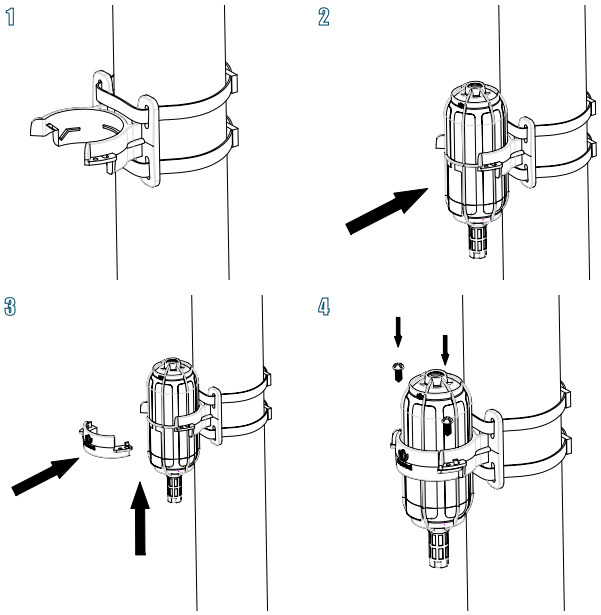
Specifications

Barometric Pressure		
Parameters	Condition	Value
Range	-	300~1100 hPa
Resolution	-	1 Pa
Relative Accuracy	700 to 900 hPa 25 to 40 ℃	±0.12 hPa
Absolute Accuracy	300 to 1100 hPa -20 to 0 ℃	±1.7 hPa
Absolute Accuracy	300 to 1100 hPa 0 to 65 ℃	±1.0 hPa
Temperature Coefficient Offset	900 hPa 25 to 40 °C	1.5 Pa/K
Drift	-	±1.0 hPa/year

General Parameters	
Product Model	LoRa-S-868/915/AU915/923-Baro-01
Microcontroller	Ultra-low-power MCU
Support Protocol	Based on LoRaWAN v1.0.2 protocol
LoRa Channel Plan	EU868 / US915 / AU915 / AS923
LoRa Power Output	16 dBm (EIRP)
Sensitivity	EU868: -137.5dBm(SF12, BW125KHz) US915/AU915/AS923: -136.5dBm(SF12, BW125KHz)
Current Consumption	5 μA (sleep mode) 120 mA max(active mode)
Communication Distance	2 to 10 km (depending on different antennas and environments)
Battery Life	≥ 3 year (upload data once per hour)
Battery Voltage	3.6V
Battery Capacity	19Ah (Non-rechargeable)
IP Rating	IP66 (Sensor Node) IP65 (Sensor Probe)
UV Resistance	anti-aging (from rain/sun exposure): UL746C F1

Installation

Please refer to the user manual for more details.



General Parameters	
Enclosure Material	PC
Operating Temperature	-40 to +85 ℃ (full accuracy: 0 to 65℃)
Operating Humidity	0 to 100 %RH (non-condensing)
Device Weight	237g

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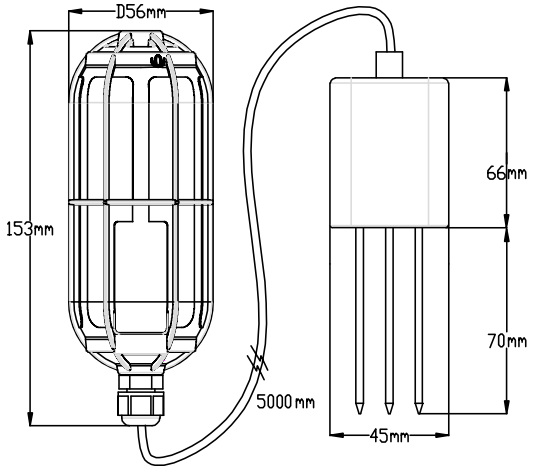
SENSECAP

An Industrial Wireless Sensor Network Solution

SenseCAP Wireless Soil Moisture and Temperature Sensor - LoRaWAN

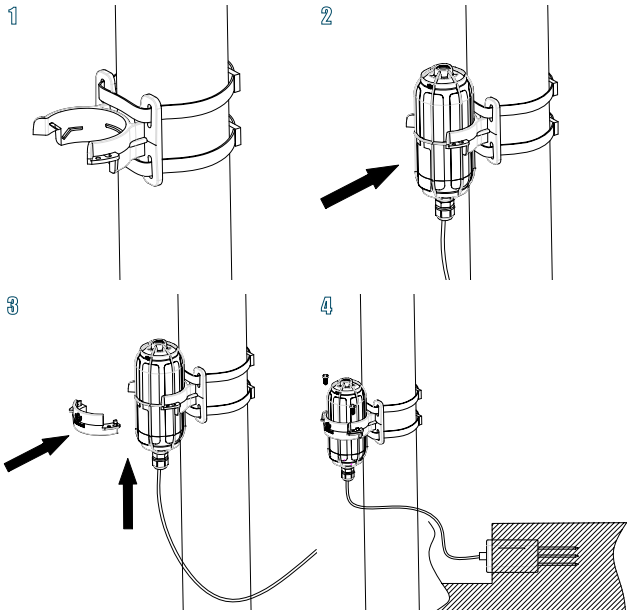


Specifications

Soil Temperature	
Range	-30 ℃ to +70 ℃
Accuracy	±0.5 ℃
Resolution	0.1 ℃
Soil Moisture	
Range	From completely dry to fully saturated (from 0% to 100% of saturation)
Accuracy	±2% (0 to 50 %) ±3% (50 to 100 %)
Resolution	0.03%(0 to 50 %); 1%(50 to 100 %)
General Parameters	
Product Model	LoRa-S-868/915/AU915/923-Soil MT-01
Microcontroller	Ultra-low-power MCU
Support Protocol	Based on LoRaWAN v1.0.2 protocol
LoRa Channel Plan	EU868 / US915 / AU915 / AS923
LoRa Power Output	16 dBm (EIRP)
Sensitivity	EU868: -137.5dBm(SF12, BW125KHz) US915/AU915/AS923: -136.5dBm(SF12, BW125KHz)
Current Consumption	5 μA (sleep mode) 120 mA max(active mode)
Communication Distance	2 to 10 km (depending on different antennas and environments)
Measuring Area	A cylinder area (with the probe as the center, diameter: 7cm, height: 7cm)
Battery Life	≥ 3 year (upload data once per hour)
Battery Voltage	3.6V
Battery Capacity	19Ah (Non-rechargeable)
IP Rating	IP66
UV Resistance	anti-aging (from rain/sun exposure): UL746C F1
Enclosure Material	PC
Operating Temperature	-30 ℃ to +70 ℃
Operating Humidity	0 to 100 %RH (non-condensing)
Device Weight	415g

Installation

Please refer to the user manual for more details.



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LoRaWAN

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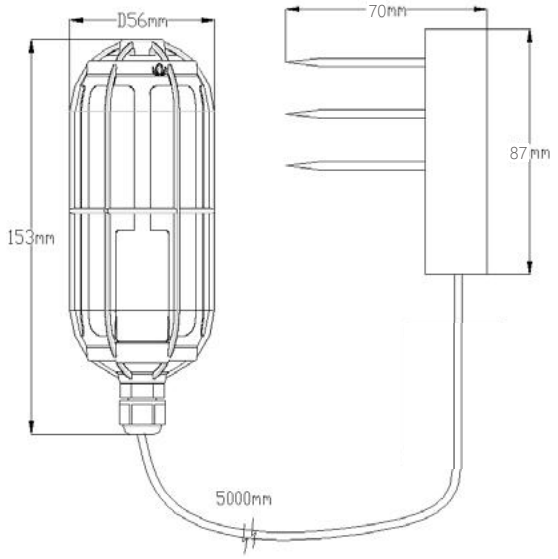
SenseCAP Wireless Soil Temperature, VWC & EC Sensor - LoRaWAN

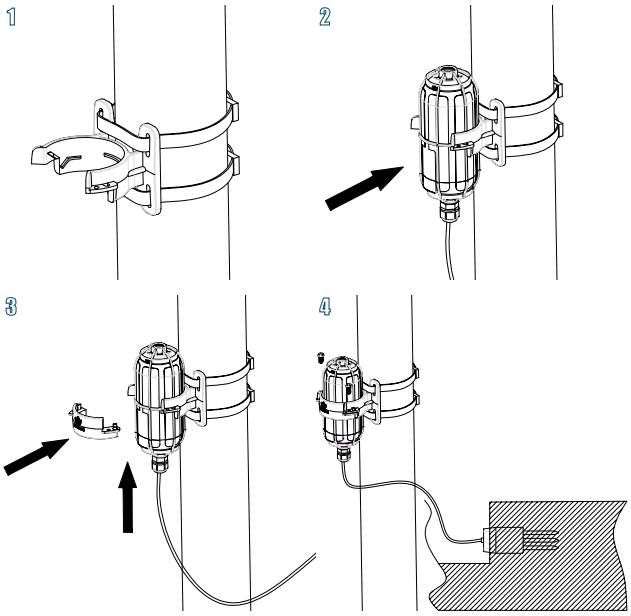


Specifications

Soil Temperature	
Range	-40 ℃ to +80 ℃
Accuracy	±0.5 ℃ from −40 to 0 ℃
Resolution	0.1 ℃
Soil Volumetric Water Content	
Range	From completely dry to fully saturated (from 0% to 100% of saturation)
Accuracy	±3 % (0~51%) ±5 % (51~100%)
Resolution	0.1 % (0~51%); 0.3% (51~100%)
Soil Electrical Conductivity	
Range	0 to 23000 uS/cm
Accuracy	±5% from 0~7000uS/cm ±15% from 7000~23000uS/cm
Resolution	10 uS/cm (0~7000uS/cm) 50 uS/cm (7000~23000uS/cm)
General Parameters	
Product Model	LoRa-S-868/915/AU915/923-Soil Temp&VWC&EC-01
Microcontroller	Ultra-low-power MCU
Support Protocol	Based on LoRaWAN v1.0.2 protocol
LoRa Channel Plan	EU868 / US915 / AU915 / AS923
LoRa Power Output	16 dBm (EIRP)
Sensitivity	EU868: -137.5dBm(SF12, BW125KHz) US915/AU915/AS923: -136.5dBm(SF12, BW125KHz)
Current Consumption	5 μA (sleep mode) 120 mA max(active mode)
Communication Distance	2 to 10 km (depending on different antennas and environments)
Battery Life	≥ 3 year (upload data once per hour)
Battery Voltage	3.6V
Battery Capacity	19Ah (Non-rechargeable)
IP Rating	IP66

Installation

Please refer to the user manual for more details.



General Parameters	
UV Resistance	anti-aging (from rain/sun exposure): UL746C F1
Enclosure Material	PC
Operating Temperature	-40 ℃ to +60 ℃
Operating Humidity	0 to 100 %RH (non-condensing)
Device Weight	385g

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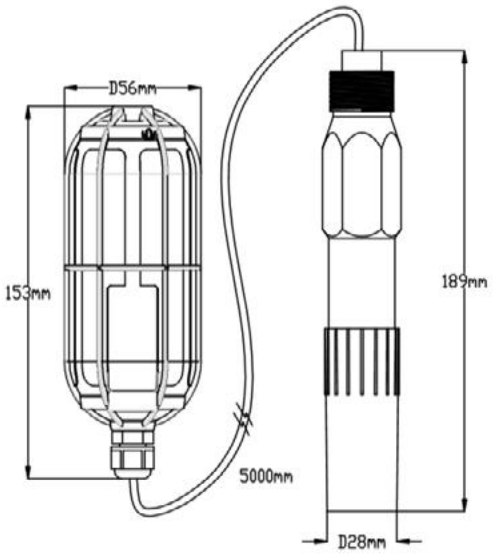
SenseCAP Wireless pH Sensor

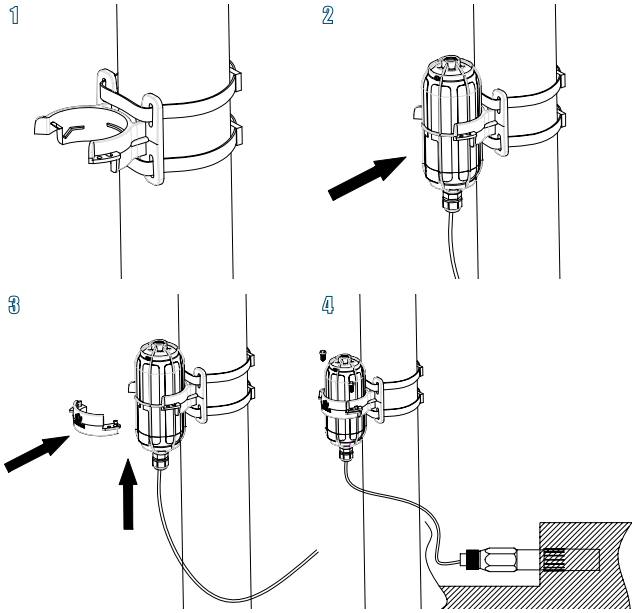


Specifications

pH	
Range	0~14 pH
Accuracy	±0.1 pH
Resolution	0.1 pH
General Parameters	
Product Model	LoRa-S-868/915/AU915/923-pH-01
Microcontroller	Ultra-low-power MCU
Support Protocol	Based on LoRaWAN v1.0.2 protocol
LoRa Channel Plan	EU868 / US915 / AU915 / AS923
LoRa Power Output	16 dBm (EIRP)
Sensitivity	EU868: -137.5dBm(SF12, BW125KHz) US915/AU915/AS923: -136.5dBm(SF12, BW125KHz)
Current Consumption	5 μA (sleep mode) 120 mA max(active mode)
Communication Distance	2 to 10 km (depending on different antennas and environments)
Battery Life	≥ 3 year (upload data once per hour)
Battery Voltage	3.6V
Battery Capacity	19Ah (Non-rechargeable)
IP Rating	IP66
UV Resistance	anti-aging (from rain/sun exposure): UL746C F1
Enclosure Material	PC
Operating Temperature	-20 ℃ to +50 ℃
Operating Humidity	0 to 100 %RH (non-condensing)
Device Weight	594g

Installation

Please refer to the user manual for more details.



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LoRaWAN

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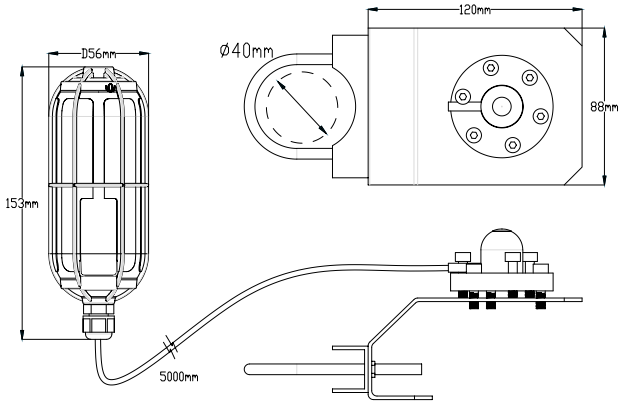
SenseCAP Wireless PAR Sensor - LoRaWAN

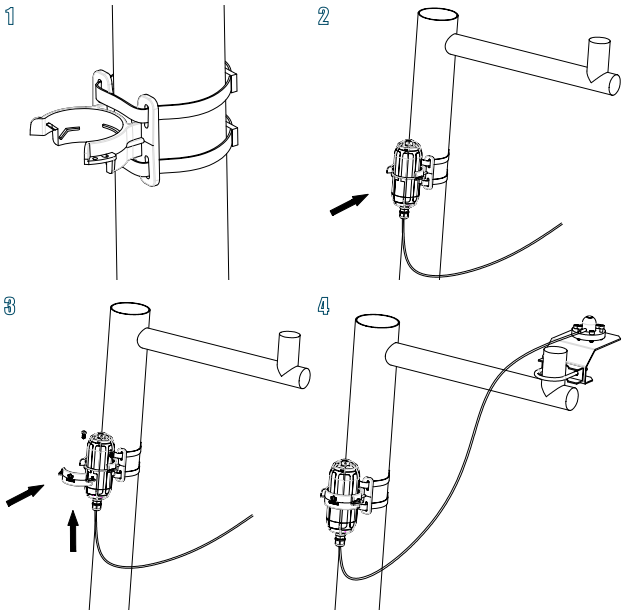


Specifications

Photosynthetically Active Radiation	
Range	0 to 2000 μmol m^{-2} s^{-1} (410 to 655 nm)
Sensitivity	0.2 mV/μmol m^{-2} s^{-1}
Resolution	1 μmol m^{-2} s^{-1}
Non-stability (Long-term Drift)	< 2% / year
Measurement Repeatability	< 1 %
Field of View	180°
General Parameters	
Product Model	LoRa-S-868/915/AU915/923-PAR-01
Microcontroller	Ultra-low-power MCU
Support Protocol	Based on LoRaWAN v1.0.2 protocol
LoRa Channel Plan	EU868 / US915 / AU915 / AS923
LoRa Power Output	16 dBm (EIRP)
Sensitivity	EU868: -137.5dBm(SF12, BW125KHz) US915/AU915/AS923: -136.5dBm(SF12, BW125KHz)
Current Consumption	5 μA (sleep mode) 120 mA max(active mode)
Communication Distance	2 to 10 km (depending on different antennas and environments)
Battery Life	≥ 3 year (upload data once per hour)
Battery Voltage	3.6V
Battery Capacity	19Ah (Non-rechargeable)
IP Rating	IP66
UV Resistance	anti-aging (from rain/sun exposure): UL746C F1
Enclosure Material	PC
Operating Temperature	-40 ℃ to +70 ℃
Operating Humidity	0 to 100 %RH (non-condensing)
Device Weight	326g

Installation

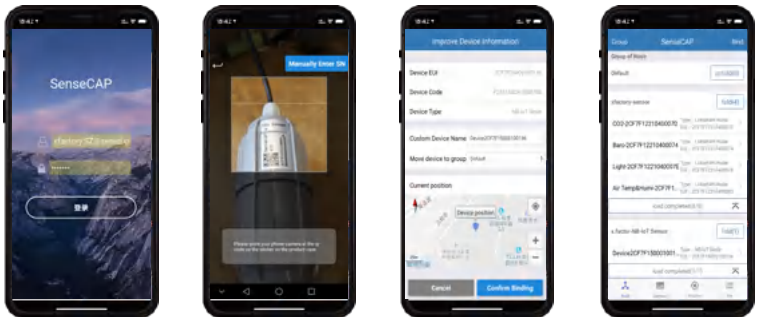
Please refer to the user manual for more details.



Certification

LoRaWAN

SenseCAP Application



SenseCAP App is used to bind devices to your account and check device information.

Download Application:
For iOS, please search for “SenseCAP” in the App Store and download.
For Android, please download SenseCAP Application from:
http://sensecap-app-download.seeed.cn

iOS

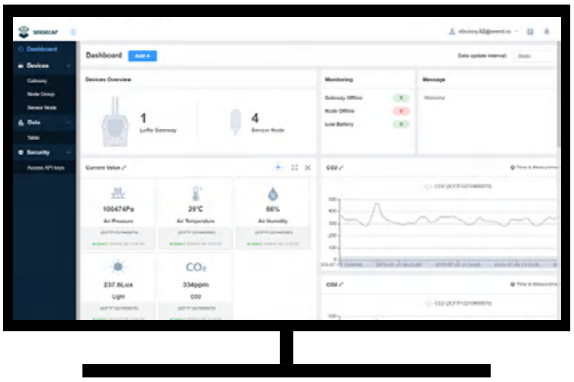
Android

SenseCAP Portal

SenseCAP Portal is a web-based platform which enables

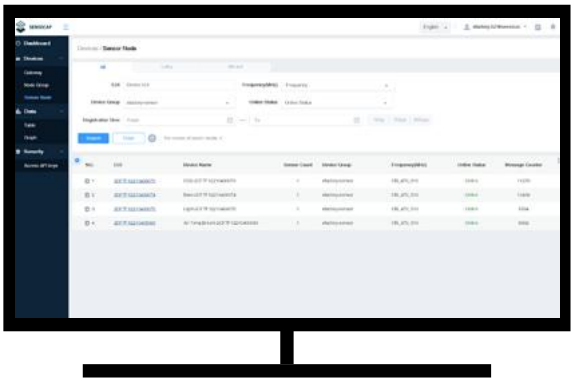
- Device management
- Data management
- API Access Key management

Visit SenseCAP Portal: https://sensecap.seeed.cc
For more info, please visit: https://solution.seeedstudio.com/product/sensecap



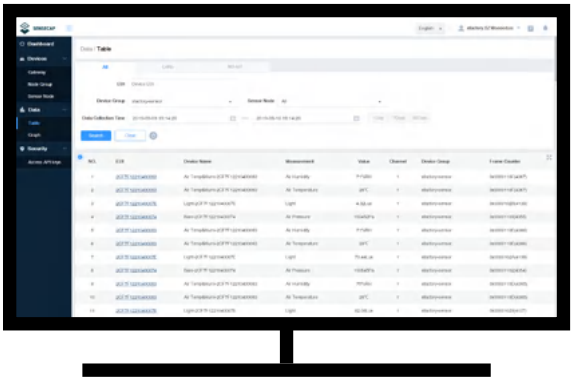
Dashboard

Including Device Overview, Data Upload Interval, Announcement, Scene Data, and Data Chart, etc.



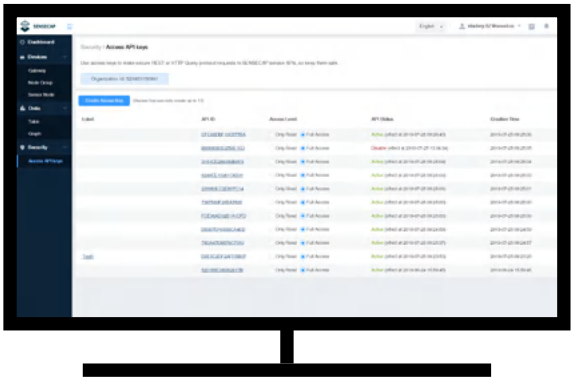
Device Management

Manage SenseCAP devices



Data Management

Manage data, including Data Table and Graph section, providing methods to search for data.

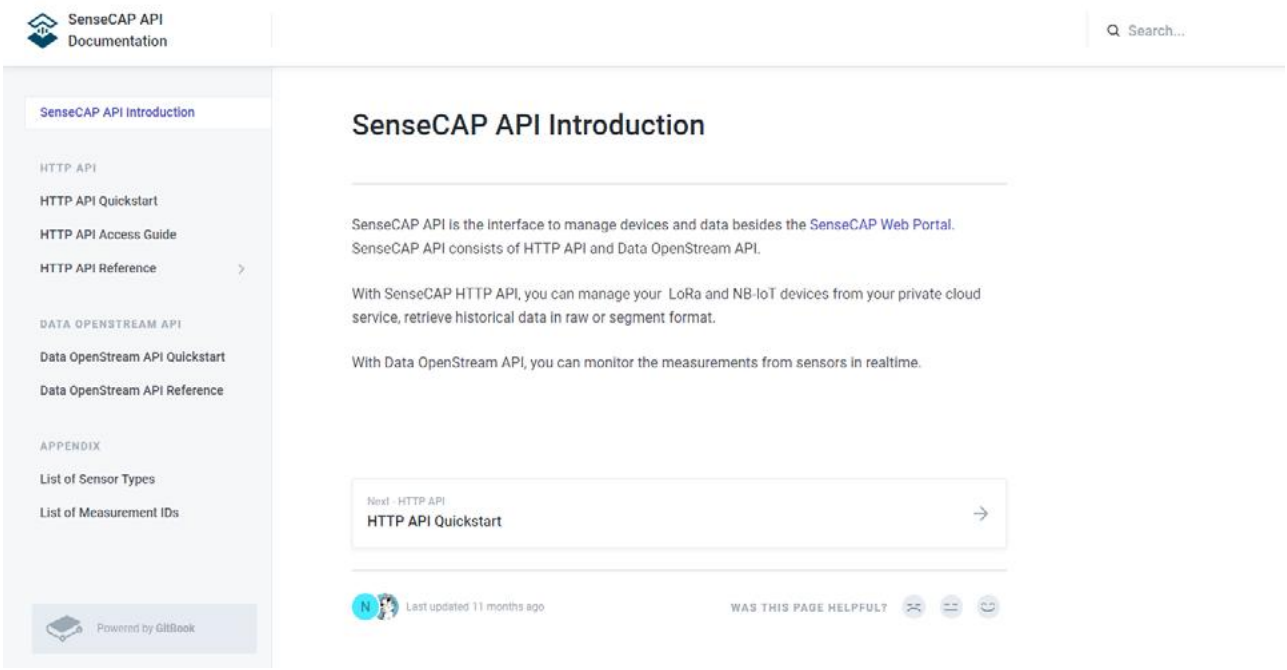


Access Key Management

Manage Access Key (to access API service), including: Key Create, Key Update, and Key Check.

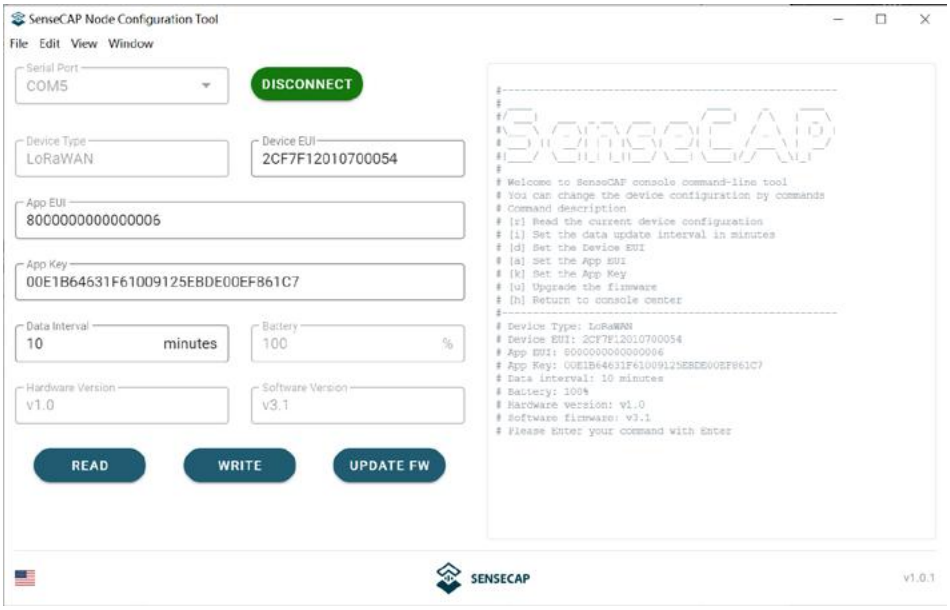
Application Programming Interface (API) Instructions

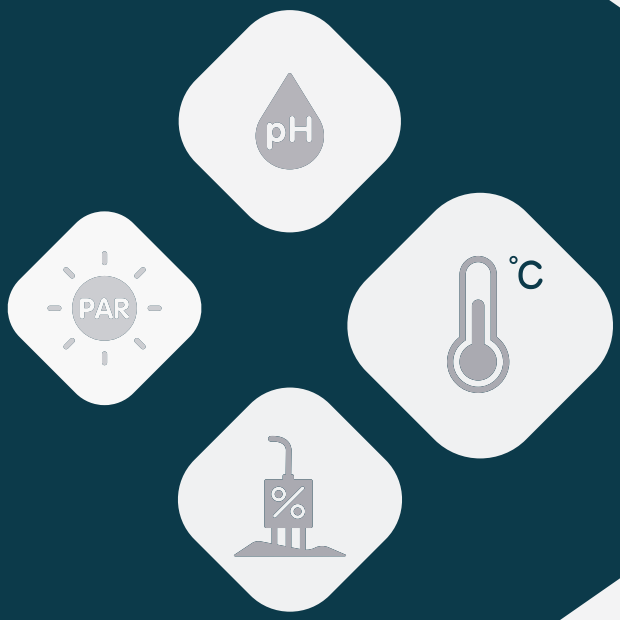
SenseCAP also provides API to support further development.
Please visit this link for more info: https://sensecap-docs.seeed.cc



SenseCAP Tools

SenseCAP provides a config tool to modify Sensor parameters like Device EUI, AppKey, data upload interval etc. For more details, please visit https://github.com/Seeed-Solution/SenseCAP-Node-Configuration-Tool/releases





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