

SHINEVER®



User Guide

Smart Home Stations

(SHS-101/102/103)

Standards and Safety

The Smart Home Stations Devices including SHS-101, SHS-102 and SHS-103 from INNOVATAG SOLUTIONS have been designed to meet the following standards:

	<i>The Smart Home Stations devices, SHS-101, SHS-102 and SHS-103 modules are all meets the requirements for CE-RED marking per EN61326-1</i>
RoHS	<i>The Smart Home Stations devices, SHS-101, SHS-102 and SHS-103 modules are all meets the requirements for RoHS marking</i>
	<i>Install Smart Home Stations PowerSafe Module in accordance with local and national electrical</i>

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Care and Handling of Your Smart Home Station

The SHINEVER® Smart Home Stations units are designed to be used as devices in home environment. It is important that you handle these units carefully to avoid hardware damage and data loss. Please read the following warnings before attempting to install, use, or move your Smart Home Stations units:

- ✓ *Do not use power adapter which provides more than 3.3V ~ 5.5V DC for the device to avoid possible hardware damage and potential data loss. You can safely use power adapter which is lower than 5.5V DC for the units.*
- ✓ *Do not attempt to open the device case, especially when it's on power and operation to avoid possible hardware damage or data loss.*
- ✓ *Incorrect handling, such as dropping the units, can cause data loss and damage hardware.*
- ✓ *Do not set any liquids or drinks on the units. Liquids can damage the internal electronics.*
- ✓ *Do not block airflow around the units while the units are turned on.*
- ✓ *Do not stack anything on top of the units; this can overheat and damage your devices.*

Introduction

Thanks for your selection of [Smart Home Stations](#) (SHS-101/102/103). The SHS-101/102/103 devices are equipment specifically designed for which can provide real-time environment data, GPS / Baidu navigation data, EMG health data and so on, and transmitted the data to data server or mobile devices through multiple communication means, such as Wi-Fi, Blue Tooth (BLE), LoRaWAN, and NFC communication protocols.



The [Smart Home Stations](#) devices fit greatly for personal and family usage and also fit for business situation in some cases. The devices are powered with 220/110V AC to 3.3V DC adapter and for some device as SHS-101, additional 5.0V DC power is needed for specific

sensors.

Hardware

1. Product Package:

Your Smart Home Stations device components are listed below:

- ✓ Smart Home Stations – Station :
SHS-101 or SHS-102 or SHS-103
- ✓ Power Adapter:
110V AC or 220V AC to 3.3V DC Adapter with miniUSB connector to the unit
110V AC or 220V AC to 5.0V DC Adapter with miniUSB connector to the unit (Optional for SHS-101 unit)
- ✓ User Manual: the user guide of product
- ✓ Warranty Card

2. Product Components:

- ✓ Air Window :
Air flow window for Air-Quality sensors (SHS-101)
- ✓ 5.0V DC Input Connector:
The miniUSB connector for the 5.0V DC power input to the unit (Optional for SHS-101)

3. Power-On Setup:

Step 1: Open the package and put the unit on a surface and keep it stabilized

Step 2: Plug-in the end of power adapter with miniUSB connector which comes with the device package, to one of the unit's miniUSB interfaces ("COM") on the back of unit



Note: Please be aware that you need to connect one of the power outlets with the miniUSB power adapter. You can use the outlet on the left side for data communication, if you need to upgrade the software of the device or transfer to the data from the device to PC with UART data communication.

Software

1. System Requirement:

Your Smart Home Stations device can be controlled for the configuration and data display and other functions with mobile equipment such as a smart phone or tablet. The system has the following requirements:

- 1) Operating System: Android 8.0
- 2) Mini SDK Version: 19

2. Software Download:

Your Smart Home Stations APP can be downloaded with two methods:

- 1) Download the application from the official APP website:
<http://www.smarthomestations.com/download>
- 2) Download by accessing the QR Code:



User Interfaces



1. The APP User Interfaces:

Your Smart Home Stations device can be controlled for the configuration and data display and other functions with mobile equipment such as a smart phone or tablet. The system has the following requirements:

- Operating System
Android 8.0
- Mini SDK Version: 19

2. The APP Main Toolbar:

The APP Main Toolbar is on the top of the all the APP pages:



In the main toolbar, there are five icons which are the entries of five data and function pages, Environment Data Dashboard page, Data Monitoring page, Location Coordinates and Map page, Data History page and Emergency Alarm page:



Environment Data Dashboard: contains a list of all the environment data including Air Quality Data, Environment Data, and Location Coordinates data and so on.



Data Monitoring: the page displays two selected data to monitor with progress bar charts. The charts can be configured with selected data, color, text size and other parameters.



Location Coordinates: display the latitudes and longitudes of the user current location and the map accordingly. The location coordinates can be configured for sending alarm.



Data History Chart: Display selected data history chart and the data can be saved in a file which can be configured for specific formats.



Emergency Alarm: Send quick alarm message in emergency situation. The default information sent with the alarm message includes location coordinates and other pre-configured parameters. The message can be sent through LoRaWAN communication channel, Bluetooth channel, WIFI channel, based on the configuration.

3. Communication Toolbar:

Under the APP Main Toolbar, is the APP Communication Toolbar, which is enable or disable the different communication channels:



In the Communication Toolbar, there are four toggle buttons to allow enabling or disabling the communication channels:

- **NFC Communication:** Enable NFC function will allow the APP to pair the mobile phone to the device through Bluetooth automatically. When you tap the phone back to the device within 10 cm, the APP will connect the device through Bluetooth automatically and the data from the device will start to display on the APP pages.



Note: Please be aware that the NFC toggle button by default is enabled and unless to disable the NFC function, tap the phone back to the device will always bridge the mobile phone with the device through Bluetooth communication.

- **LORA Communication:** Enable LoRa function will allow the device to start sending data through LoRa communication channel with pre-defined frequency and selected data types.



Note: Please be aware that the LoRa toggle button by default is dis-abled and unless the user enables the LoRa function, the device will not send the data through LoRa communication and also, only after the APP (mobile phone) connected with the device, the LoRa enabling command can be setup to the device through Bluetooth channel.

- **BLE Communication:** At any time, if the user enables the BLE function, the APP will display a list of detected, available Bluetooth servers and allow the APP to connect with it through BLE (Bluetooth with Low Energy) communication channel:



The Smart Home Stations device will be listed in the BLE device list as an item started with “DEVICE_SHS” and followed by SHS version number and other small version numbers.



Note: Please be aware that the BLE toggle button by default is dis-abled and when the user enables the

button, the BLE device list will be popped up for connecting the device. Once the device is connected, the toggle button is turned on unless to disable the communication which turns off the BLE.

- **WIFI Communication:** At any time, if the user enables the WIFI function, the APP will display a list of detected, available WIFI servers and allow the APP to connect with it through WIFI communication channel.

4. Data and Function Pages:

With main toolbar buttons, user can enter the APP data and function pages:

Environment Data

Dashboard Page:

The Environment Data

Dashboard page contains three sessions of data: Environment data including Temperatures, Pressure, and Humidity; Air Quality data including PM2.5, PM10, CO2 and TVOC; Location Coordinates data including latitude and longitude.





Note: the data displayed on the page will be refreshed through BLE communication automatically with a pre-defined frequency.

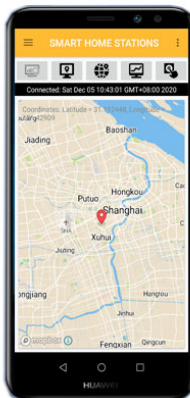
Data Monitoring Page:

The Data Monitoring page allows user to select two specific data to dynamically display by progress bar graph charts. The elements of the graph charts, such as size, color and details, can be setup to fit user's specific needs for high quality data graph charts.



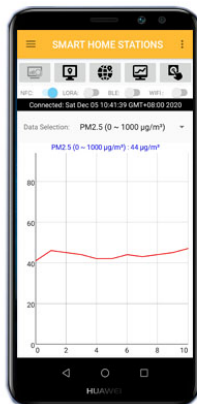
Location Coordinates Page:

The Location Coordinates page provides current location's latitude and longitude, and the location map accordingly. If the user's location is dynamically change, the coordinates and the map will change accordingly. The map can display with different zooms and styles.



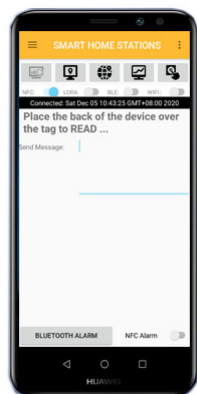
Data History Chart Page:

The APP user can select one data in which the user is specifically interested to display the history change with line graph chart. The graph chart can be modified with different scales in both X and Y coordinate axis. The history data can be saved into a file in the mobile devices.



Emergency Alarm Page:

The Emergency Alarm page allows user to send rescue message in emergent situation, along with pre-defined the environment, air quality and geographical coordinates data. The message can be send by Bluetooth if the APP (mobile phone) has been connected with the device by BLE.



The APP user can also send out the rescue message by enabling the “NFC ALARM” toggle button and followed by tapping the phone to the

device to send out the message with the device's LoRa communication channel.



Note: Please be aware that the “NFC ALARM” toggle button is to allow enabling quick sending of the rescue message by just tapping the phone to the SHS device regardless of Bluetooth connection status between the mobile phone and the SHS device. This is a quicker way in emergency situation, comparing with connecting Bluetooth first and then sending the message.

Features

Environment Data Measurement:

1. Air Quality – CCS811:

Your Smart Home Station device is equipped with CCS811 Air Quality module as a digital gas sensor solution that senses a wide range of Total Volatile Organic Compounds (TVOCs), including equivalent carbon dioxide (eCO₂) and metal oxide (MOX) levels. VOCs are often categorized as pollutants and/or sensory irritants and can come from a variety of sources like construction materials (paint, carpet, etc.), machines (copiers, processors, etc.) and even people (breathing, smoking, etc.). This functionality with SHS-101 is intended for indoor air quality monitoring in personal devices such as watches and phones.

The SHS-101 onboard CCS811 module supports multiple measurement modes that have been optimized for low-power consumption during an active sensor measurement and idle mode extending battery life in portable applications.



Note: Please be aware that the CCS811 datasheet recommends a burn-in of 48 hours and a run-in of 20 minutes (you must allow 20 minutes for the sensor to warm up and output valid data).

Specification:

- Module: ScioSense CCS811B-JOPD LGA10 Ultra-Low Power Digital Gas Sensor for Indoor Air Quality
- Total Volatile Organic Compound (TVOC) Range: 0 to 29,206 ppb (parts per billion)
- CO₂ (eCO₂) Sensing Range: 400 ppm (parts per million) to 32,768 ppm
- Operating Modes: 5

2. Atmospheric – BME280:

The Smart Home Station device is equipped with BME280 Atmospheric Sensor, an environmental sensor with temperature, barometric pressure and humidity. This sensor is great for all sorts of weather/environmental sensing. The BME280 is the next-generation of sensors from Bosch, and is the upgrade to the popular BMP085/BMP180/BMP183 - with a low altitude noise of 0.25m and the same fast conversion time.

Specification:

- Module: Bosch BME280 Humidity + Barometric + Pressure + Temperature Sensor
- Temperature Range: -40 °C ~ +85 °C; Accuracy: ±1.0°C
- Humidity Range: 0 - 100% RH; Accuracy: ±3% from 20-80%
- Pressure Range: 30,000Pa to 110,000Pa; Relative Accuracy: 12Pa, Absolute Accuracy: 100Pa

- Altitude Range: 0 to 30,000 ft (9.2 km); Relative Accuracy: 3.3 ft (1 m) at sea level, 6.6 (2 m) at 30,000 ft

3. Particulate Matters (PM2.5/PM10) – HPM115S0:

Your Smart Home Station device SHS-101 has an on-board Honeywell HPM Series Particulate Matter Sensor HPM115 which is a laser-based sensor detecting and counting particles using light scattering. A laser light source illuminates a particle as it is pulled through the detection chamber. As particles pass through the laser beam, the light reflects off the particles and is recorded on the photo or light detector. The light is then analyzed and converted to an electrical signal to calculate particle concentration.



Specification:

- Module: Honeywell HPM115S0-XXX/001/HAK Standard Particulate Matter Sensor
- Operating Principle: Laser Scattering
- Detection: PM2.5, PM10
- Concentration Range: 0 $\mu\text{g}/\text{m}^3$ to 1,000 $\mu\text{g}/\text{m}^3$
- Accuracy (at 25°C \pm 5°C): PM2.5: \pm 15 $\mu\text{g}/\text{m}^3$ (0 $\mu\text{g}/\text{m}^3$ to 100 $\mu\text{g}/\text{m}^3$), PM2.5: \pm 15 % (100 $\mu\text{g}/\text{m}^3$ to 1000 $\mu\text{g}/\text{m}^3$)
- Response Time: < 6s
- Storage Temperature: -30°C to 65°C [-22°F to 149°F]
- Humidity (operating and storage): 0 %RH to 95 %RH non-condensing
- Laser Class: Laser Class 1: IEC/EN 60825-1: 650 nm

4. GPS (Global Positioning System) – NEO-6MV2:

The on-board NEO-6MV2 is a GPS (Global Positioning System) module and is used for navigation. The module simply checks its location on earth and provides output data which is longitude and latitude of its position. It is from a family of stand-alone GPS receivers featuring the high performance u-blox 6 positioning engine. The compact architecture, power and memory options make NEO-6 modules excellent navigation performance even in the most challenging environments.

Specification:

- Module: u-blox6 NEO-6MV2 GPS Modules
- Receiver Type: 50 Channels , GPS L1 frequency, C/A Code
- Time-To-First-Fix: Cold Start (Autonomous) : 32 s; Warm Start (Autonomous): 32 s
- Sensitivity: Tracking & Navigation: -160 dBm; Reacquisition: -160 dBm
- Horizontal Position Accuracy: Autonomous: 2.5 m; SBAS: 2.0 m
- Velocity Accuracy: 0.1 m/s
- Heading Accuracy: 0.5 degrees
- Operational Limits: Dynamics: ≤ 4 g; Altitude: 50,000 m; Velocity: 500 m/s



Note: Depends on the specific usage environment, the first time in which GPS module responses with reliable data (Cold Start) may take up to 3 ~ 5 minutes, with an out-door external GPS antenna.

5. Your Potential Usage:

- HVAC (commercial and residential)
- Indoor air quality monitors
- Handheld air quality monitors
- Air purifiers (commercial and residential)

- Automotive cabin air purifiers

6. Added-Values to Your:

- Enables the ability to more accurately and cost competitively monitor or control environmental particulate
- Industry-leading long life of 10 years of continuous use
- Proven EMC performance enables the ability to
- perform more accurately in a variety of tough industrial environments
- Faster response time of <6 s allows the HPM Series to respond to environmental conditions in real time
- Enhanced reliability allows for use in harsh environments

7. Differentiation:

- Long life of 10 years offers a more stable operation for continuous usage
- Proven EMC performance, based on IEC61000 stable operation, $\pm 15\%$ accuracy (PM2.5)

System Requirements

System Setup / Configuration:

The following are the system minimum requirements for system setup and configuration:

- Android 4.0 and up
- Mobile device with NFC functionality

Data Display and Storage:

The following are the system minimum requirements for data display and storage:

- Mobile device with Wi-Fi Connection
- Mobile device with Blue Tooth (BLE) Connection
- LoRa gateway devices
- Mobile device with NFC functionality

Specification

MCU – Micro Control Unit:

The Smart Home Stations device is powered by a strong micro-controller with dual onboard high-speed CPUs, 4MB onboard memory and up to 32MB SPI flash memory to provide the device capability of data computing, data transferring, functionality control and rich hardware / software interfaces to all sensor components, with great extension to external modules:

- Module: ESP32-WROOM-32D, Dual CPU processors, clock frequency: 80 ~ 240 MHz
- On-board Memory: 4MB
- SPI Flash Memory: 32MB, 3.3V
- Antenna Type: On-board Antenna
- Certification: RF: FCC/CE-RED/IC/TELEC/NCC; Wi-Fi: Wi-Fi Alliance; BLE: BQB; Environment: RoHS/REACH
- Module Interface: UART, SPI, I2C, GPIO, ADC, DAC
- Input Power: 3.0V ~ 3.6V DC
- Input Current: 500 mA
- Operation Current: 80 mA
- Operation Temperature: -40 °C ~ +85 °C

BLE – Bluetooth Low Energy:

The on-board BLE functionality allows user to connect mobile device application with the device for data communication and functionality control. The user can find the device Bluetooth name started with “SHINEVER” in the available Bluetooth device list and select it to connect the device.

- Protocol: BLE v4.2 BR/EDR
- Module: ESP32-WROOM-32D
- RF: Class-1, Class-2, Class-3; 97 dbm, NZIF Receiver
- Audio: CVSD, SBC

NFC – Near Field Communication:

The NFC communication functionality allows user to connect their mobile device such as smart phones or tablets to the device with BLE communication by tapping the mobile phone to the device. This simplifies the BLE connection between the device and the mobile phones without searching and selecting device name in the available list.

- Protocol: Near Field Communication
- Module: RF430CL330H
- Operating Frequency: 13.56 MHz

- Modulation: FDX – PSK
- Operation Distance: 0 ~ 10 cm
- Industry Standard: ISO 144438

Wi-Fi – Internet Communication:

The device comes with on-board Wi-Fi function for data communication, which allows user to obtain data through local area network by applications in mobile devices such as smart phone and tablets.

- Protocol: 802.11b/g/n (802.11n)
- Module: ESP32-WROOM-32D
- Speed: up to 150M bps
- Frequency: 2.4 GHz ~ 2.5 GHz

LoRa – Long Range Communication:

The LoRa communication functionality transfers the device data to the LoRa server through a long-range distance (5km ~ 10km) and low energy consumption in a pre-defined frequency.

- Protocol: LoRaWAN
- Module: Ra-02 (SX1278)
- Operating Frequency: 433 MHz
- Modulation: LoRa

User Guide Electronic Version:

You can scan and download the electronic version of this User Guide for your reference later.



Part Number: SHS101-20201222001

FCC Caution:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.