LoRa Communication Gateway

User Manual

Applied to:

SC2-A470M1

SC2-A868M1

SC2-A915M1

SC2-B470M1

SC2-B868M1

SC2-B915M1

SC2-A470M2

SC2-B470M2

Thank you for selecting products of JIANGSU SFERE ELECTRIC CO., LTD. For your convenience of purchasing and safely, correctly and efficiently use of this product, please read this user manual carefully and pay attention to following points when using this product.

CAUTION：

◆ The device must be installed and maintained by professionals;

◆ The input signal and power supply must be cut off before any internal or external operation of the device,

◆ A suitable voltage detection device must be always used to confirm that there is no voltage at all parts of the meter;

◆ The electrical parameters provided to the device must be within the rated range

The following conditions will cause damage to the device or abnormal operation of the device:

◆ The voltage of auxiliary power supply is out of range;

◆ The frequency of auxiliary power supply is out of range;

◆ The polarity of current or voltage input is incorrect;

◆ The communication plug is removed with the power on;

◆ The terminals are not connected as required.

Please don't touch the terminals when the meter is in operation!

The latest version of this manual can be downloaded on our company's homepage, and some corresponding test software downloads are also provided. If you need the electronic version of the user manual, please contact our technical service department.

Content

1. Version information

Version number	Author	Date	Description
V1.0.0	Ma Longwei	2021.04.23 April 23rd, 2021	Initial version
V1.0.1	Lu Xiaocheng	2021.05.07 May 7th, 2021	Modify the RS485 baud rate support range

2. Quick start

SC2, hereinafter referred to as LoRa communication gateway, can realize the communication between serial port and LoRa. This chapter mainly introduces the transparent transmission test guidance of the product.

The related software involved is as follows:

SmartHMI ： Sfere general-purpose small gateway configuration tool, which integrates configuration, debugging, and monitoring, is simple and easy to use.

If you have purchased SC2, there will be the following accessories:

Three conditions must be met for the sender and receiver of data transparent communication:

- Same frequency band
- Same frequency
- Same rate

This example uses the following parameters for configuration:

Parameter	LoRa Communication Gateway A	LoRa Communication Gateway B
Frequency band	470	470
Frequency	480M	480M
Rate	5.5K	5.5K

(1) Use the USB to 485 tool to connect the LoRa communication gateway A and B to the serial device (replaced by a PC), install the antenna on the LoRa communication gateway, and then power on.

(2) Open the SmartHMI software, select the model of DTU--->SC2, and click Login.
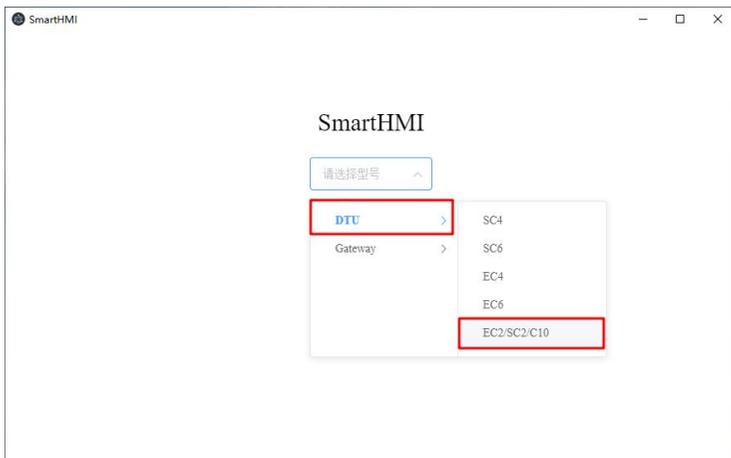
(3) As shown in the figure, click to open the serial port in turn (select the serial

port number corresponding to A and B, serial port parameters: 9600, N.8.1), enter the configuration mode, read the parameters, configure the parameters in the above table, and update the configuration. After the configuration is updated successfully, click OK in the pop-up dialog box.
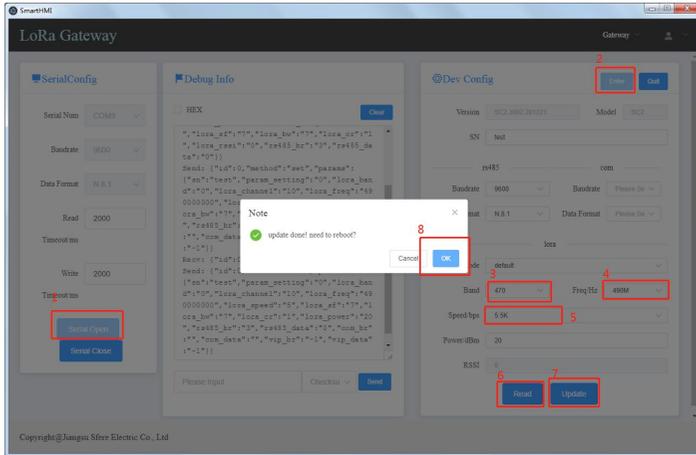
(4) In the SmartHMI debugging information column, LoRa communication gateway A sends data, and LoRa communication gateway B can receive data.
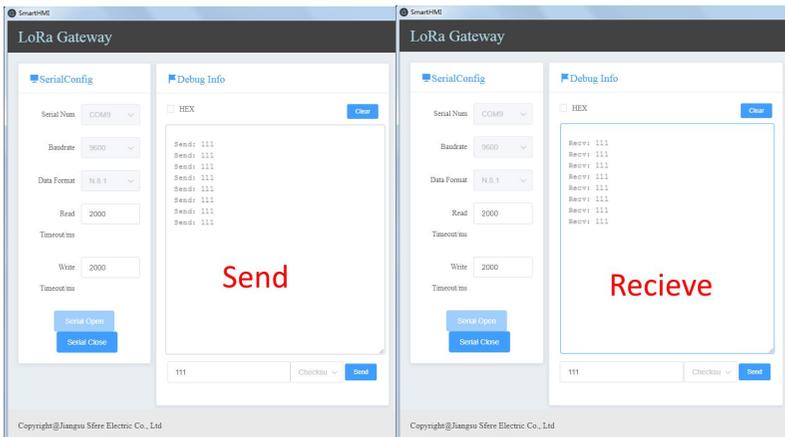
3. Product overview

The LoRa communication gateway uses a serial port for data transmission and reception, which reduces the threshold for wireless applications and can realize one-to-one or one-to-many communication.

3.1 Naming description

SC2 - <u>A</u> <u>470</u> <u>M1</u>

Transmit power:
M1: 100mW
M2: 1W

Frequency band:
470: 470M~510M
868: 848M~888M
915: 895M~935M

Operating voltage:
A:AC/DC 80~270V
B:DC 20~36V
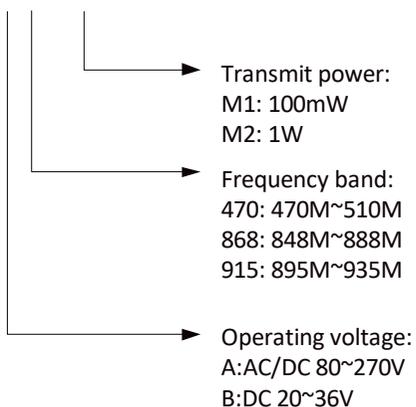
3.2 Product parameters

Model	SC2-A470M1	SC2-A868M1	SC2-A915M1	SC2-B470M1
	SC2-B868M1	SC2-B915M1	SC2-A470M2	SC2-B470M2
LoRa interface				
Working frequency band	470：470M~510M 868：848M~888M 915：895M~935M			
Transmit power	M1： Max. 100mW, M2: Max. 1W			
Receiving sensitivity	-138dBm@0.3Kbps			
Hardware parameters				
RS485 interface	Baud rate: 1200bps~9600bps Data format: N.8.1, O.8.1, N.8.2, E.8.1			
Operating voltage	AC/DC 80~270V or DC 20~36V			
Operating temperature	-25°C -- 70°C			
Storage temperature	-40°C -- 85°C			
Relative humidity	≤95%RH, no condensation			
Working altitude	≤2000m			
Anti-pollution grade	No corrosive gas			
Protection level	IP20			
Insulation	Signal, power, output terminal to case resistance>100MΩ			
Withstand voltage	Input and power supply 2kV, input and output 2kV, power supply and output 2kV			

3.3 Interface description

Antenna interface

SMA antenna base (outer screw and inner hole).

RS485 interface

RS485 interface: RS485 has two leads, A and B respectively. When connecting to the device, A is connected to A, and B is connected to B.

Reset button

Reset button: This button is for restoring factory settings. When the device is in normal working status, press this button and hold until all the indicators are off and then release it to restore the device's setting parameters to the factory configuration status (serial port parameters: 9600, N.8.1).

3.4 Working indicator

Indicator light	Features	Description
⏻	Power Indicator	Always on when the power input is correct
🖧	Communication indicator	Flashing during LoRa data transmission

3.5 Dimensions
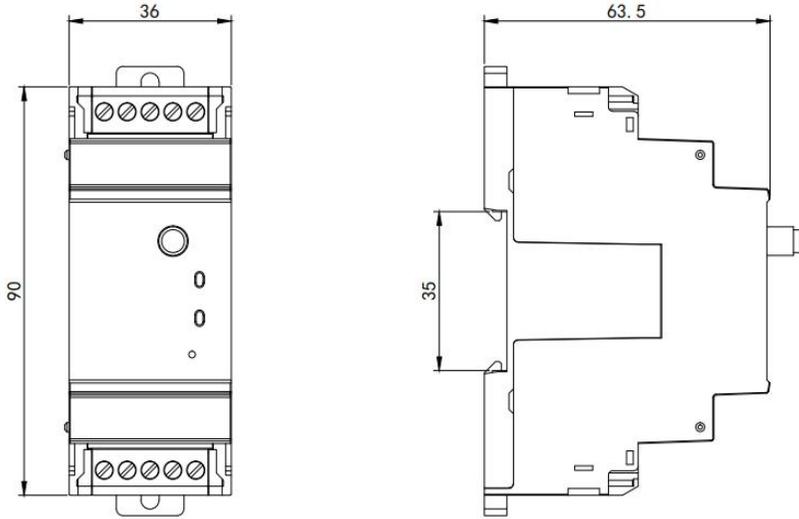
4. Application Cases

4.1 Features of LoRa Solution

1. The LoRa communication gateway is a half-duplex communication method (similar to wired 485). Only one device can send data in the same channel at the same time, and it does not support multiple slave devices to send data to the host device at the same time.

2. The LoRa communication method takes a long time in the air and is not suitable for scenarios with high real-time requirements.

3. The lower the LoRa rate, the longer the transmission distance, the stronger the anti-interference ability, and the longer it takes to send data.

4.2 Modbus data acquisition

● Applicable scenarios: data collection for power meters, water meters, etc.

● Applicable mode: transparent transmission mode

● Matching products: can be matched with smart wireless power meters

● Application details:

The meter reading software issues Modbus query commands to the LoRa communication gateway (master station), and the LoRa communication gateway (master station) wirelessly transmits the Modbus query commands to the LoRa communication gateway (slave station) or smart wireless power meter (slave station) through LoRa, The Modbus device under the slave station selects to report data according to the query instruction, and complete a data collection via the following process:

Slave → Master → Meter reading software
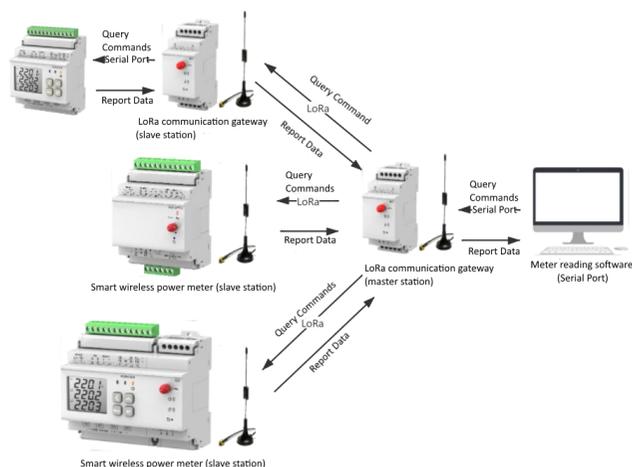
- **Speed setting:**

1. When there is less penetration of solid walls, you can try to select the rate of 3.1K and 5.5K; When there is more penetration of solid walls, you can try to use the rate of 0.3K for testing. Obstacles will shorten the communication distance, which is subject to the actual test.

2. This data acquisition scheme is also suitable for DL/T 645 and other similar Modbus protocol acquisition methods.

3. In order to avoid signal interference, the data of only one slave device can be collected at the same time, and multiple slave devices are not supported to report data at the same time.

4. The 485 bus of this LoRa communication gateway supports up to 32 Modbus devices.

5. The rate level of LoRa has a great influence on the transmission time, so you should pay attention to the setting of Modbus receiving timeout

5. Product function

5.1 Working mode selection

Operating mode	Introduction to Mode
Configuration mode	It is used to query and set the parameters of the LoRa communication gateway.
Transparent transmission mode	It can realize one-to-one or one-to-many data transparent transmission, playing the role of serial port wireless extension.

5.2 Parameter configuration

(1) Enter configuration mode, click to read configuration.

(2) Configure RS485 parameters.

Parameter	Description
Baud rate	1200bps~9600bps
Data Format	N.8.1, E.8.1, O.8.1, N.8.2

(3) Configure LoRa parameters.

LoRa has two configuration modes: Default and custom.

Default configuration mode: It is necessary to ensure that the **frequency band, frequency, and rate** of each communication gateway are consistent.

Custom mode: It is necessary to ensure that the **frequency, spread spectrum, bandwidth, and coding rate** of each communication gateway is consistent.

Mode	Parameter
Default	Frequency band
	Frequency
	Rate
	Transmit power
Custom	Frequency
	Transmit power
	Spread spectrum
	Bandwidth
	Code rate

(4)   Click to update configuration.

(5)   A prompt box will pop up when the configuration is updated successfully, click OK.
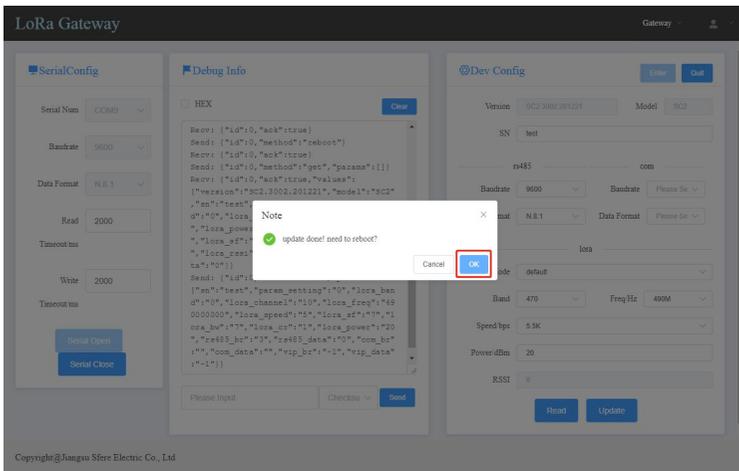
5.3 Signal strength indicator

This function can check the signal strength of both parties in communication, which can provide a reference for evaluating the communication quality of the LoRa communication gateway.

(1)   First, set the frequency band, frequency and rate of LoRa communication gateway A and LoRa communication gateway B to ensure that both parties can communicate.

(2)   The LoRa communication gateway A enters the configuration mode.

(3)   LoRa Communication Gateway B uses serial port tool to send data periodically.

Click **Read Parameters** on SmartHMI to view the signal strength (the larger the value is, the more stable it is).

Note: It is recommended to use the signal strength within the range of -120~0.

5.4 Firmware upgrade

(1)   Click **Firmware upgrade** under **Gateway** in the menu bar of the SmartHMI software tool.
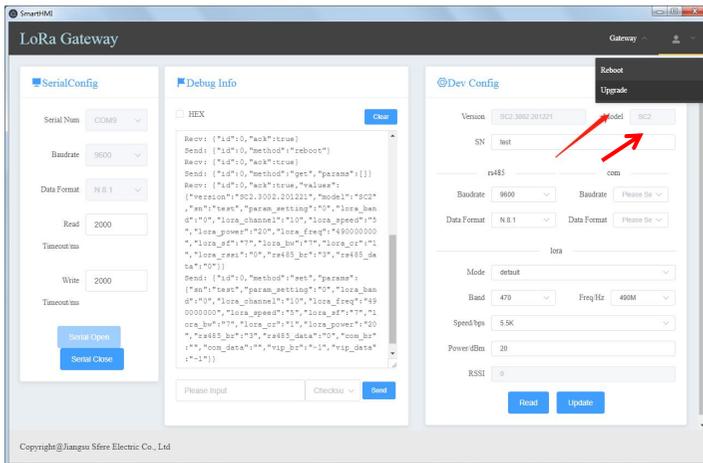
(2)   IAP Tool host computer pop up. Set the parameters of serial port (select the

port number as well as the baud rate, data bit, stop bit and parity check bit of the APP program) and open the serial port.
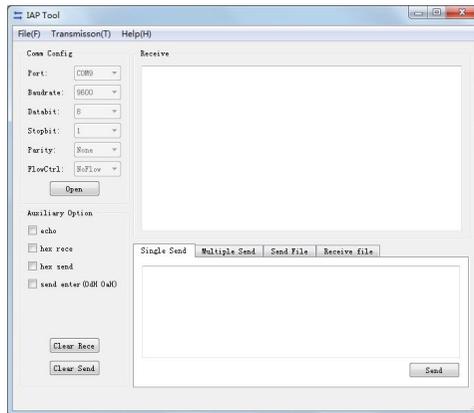
(3) Click the **Send File** button, select **Sfere** as the protocol, and click to enter IAP; The entry is successful, and the power indicator flashes quickly.
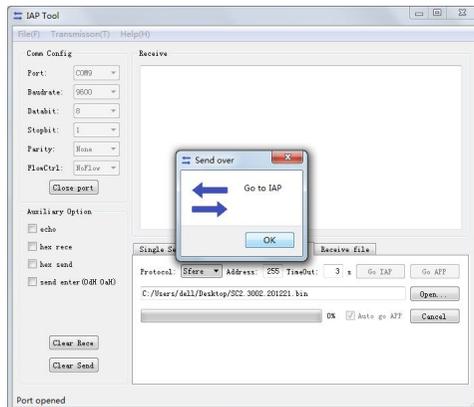
Note: After entering IAP, the communication parameters must be configured as 9600, N.8.1, and the firmware program can be downloaded normally.

(4) Click the **Open** button to add the BIN file which is to be downloaded, and then click the **Send** button.
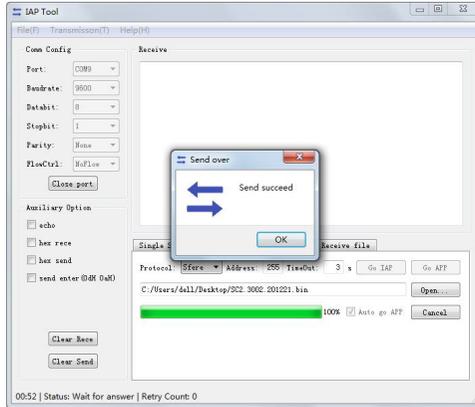
(5) When the **Send Complete** prompt box pops up, click the **OK** button; If you select to enter the APP after completion, you can close the prompt box and enter the application to execute;
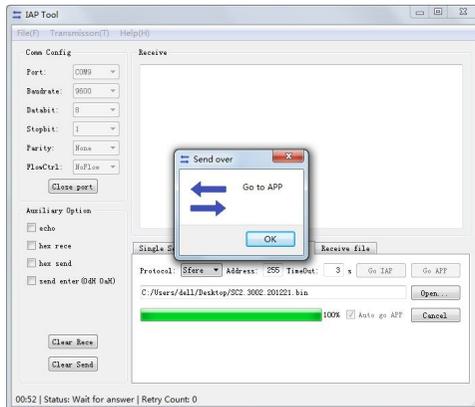
Technical specifications are subject to change without prior notice.