LoRa Communication Gateway

User Manual

Applied to: SC2-A470M1 SC2-A868M1 SC2-A915M1 SC2-B470M1 SC2-B868M1 SC2-B915M1 SC2-A470M2 SC2-A470M2 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.

1. Version information	1
2. Quick start	1
3. Product overview	4
3.1 Naming description	
3.2 Product parameters	5
3.3 Interface description	6
3.4 Working indicator	6
3.5 Dimensions	7
4. Application Cases	7
4.1 Features of LoRa Solution	7
4.2 Modbus data acquisition	7
5. Product function	9
5.1 Working mode selection	9
5.2 Parameter configuration	9
5.3 Signal strength indicator	
5.4 Firmware upgrade	

Content

1. Version information

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

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

 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.

SmartHMI			
请选择型号 へ			
DTU	> SC4		
Gateway	> SC6		
	EC4		
	EC6	_	
	EC2/SC2/C10		

(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.

SerialCon	fig	EDbug Info	@Dev Config	Enter Out
Serial Num		HEX Cour	Version SC2 3002 201221	Model SC2
		", "lora_sf": "7", "lora_bw": "7", "lora_cr":"l	SN test	
Bandrate		","lora_rss1":"0","rs405_br":"3","rs405_da ta*:"0"])		
		Send: ["id":0, "method":"set", "params":	rs485	com
Data Format		d":"0","lora_channel":"10","lora_freq":"49	Bandrate 9600 V	Baudrate - Please Se
Read		ora bw":"7", " Note	× mat N.8.1 V	Data Format Please Se ~
		", "za685_bz":	8	
Timeout/ms		:*-1*)}	loca	
These		Recy: ["id":C	Cancel OK default	
		("sn":"test","param_setting":"0","lora_ban		Free Hz 490M
Timeout/ms		0000000", "lora_speed": "5", "lora_sf": "7", "1		
		ora_bw":"7","lora_or":"1","lora_power":"20	Speed bps 5.5K	
	open	:"","com_data":"","vip_br":"~1","vip_data"	Power/dBm 20	
Seria	al Close		Peer	
		Please Insul	67	
			Read	Update

(4) In the SmartHMI debugging information column, LoRa communication gateway A sends data, and LoRa communication gateway B can receive data.

oRa Gateway		LoRa Gateway	
SerialConfig	Debug Info	SerialConfig	EDebug Info
Serial Num COM9 🗸	HEX Crear	Serial Num COM9 ~	HEX Clear
Baudrate 9600 V	Send: 111 Send: 111 Send: 111	Bandrate 9600 V	Recv: 111 Recv: 111 Recv: 111
Data Format N.B.1 ~	Send: 111 Send: 111	Data Format N.8.1 ~	Recv: 111 Recv: 111 Recu: 111
Read 2000	Send: 111 Send: 111 Send: 111	Read 2000	Recv: 111 Recv: 111
Timeoutins		Timeoutins	
Write 2000 Timeout ins	Send	Write 2000 Timeout ins	Recieve
Serial Open		Serial Open Serial Close	
	111 Chiecksu V Send		111 Checksu V Serv
pyright@Jiangsu Sfere Electric Co.,	Ltd	Copyright@Jiangsu Sfere Electric Co., I	Ltd

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



3.2 Product parameters

		-			
Madal	SC2-A470M1	SC2-A868M1	SC2-A915M1	SC2-B470M1	
Model	SC2-B868M1	SC2-B915M1	SC2-A470M2	SC2-B470M2	
LoRa interface					
Marking framman	470: 470M~!	510M			
working frequency	868: 848M~888M				
band	915: 895M~9	935M			
Transmit power	Fransmit power M1: Max. 100mW, M2: Max. 1W				
Receiving sensitivity	-138dBm@0.3	3Kbps			
Hardware parameters					
	Baud rate: 1200bps~9600bps				
RS485 Interface	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 termin	al to case resist	tance>100MΩ	
Withstand voltage	Input and popower supply	ower supply 2 and output 2k	kV, input and /	l 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
Ф	Power Indicator	Always on when the
		power input is correct
P	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 \rightarrow Master \rightarrow 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.

Version	SC2 3002 2012	21 N	Iodel SC2
SN	test		
F	s485		
Baudrate	9600	Baudrate	Please Se 🗸
Data Format	N.8.1	Data Format	Please Se 🗸
		lora	
Mode	default	lora	
Mode Band	default 470	lora Freq/Hz	490M
Mode Band Speed/bps	default 470 -	lora Freq/Hz	490M
Mode Band Speed/bps Power/dBm	default 470 5.5K 20	lora Freq/Hz	490M

(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
	Frequency
	Transmit power
Custom	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.

SerialConfig	E Debug Info	ODev Config
Serial Num COM9	. HEX Clear	Version SC2.3002.201221 Model SC2
Baudrate 9600	Recv: ("id":0,"ack":true) Send: ("id":0,"method":"reboot")	SN test
	Recv: ("id":0, "ack":true) Send: ("id":0, "method": "get", "parame":[])	rs485 com
Data Format N.S.1	Recv: ("id":0,"ack":true,"values": ("vermion":"SC2.3002.201221","model":"SC2" "an":"set""	Baudrate 9600 v Baudrate Phone Se v
Read 2000	d":"0", "lora_Note	× mat N.8.1 V Data Format Pieces Se v
Timeout/ms	", "lors_sf";" vpdate done! need to reboot? ", "lors_pest" ta":"0")	lora
Write 2000	Send: ("id":L	ode offaut
Timeout/ms	d":"0", "lora_channel":"10", "lora_freq":"49 00000000","lora_speed":"5","lora_sf":"7", "1	Band 470 V Freq Hz 490M
	ora_bw":"7","lora_or":"1","lora_power":"20	Speed/bps 5.5K
Serial Close	:"","com_data":"","vip_br":"-1","vip_data" :"-1"))	Power/dBm 20
		RSSI 0
	Please Input Checksu V Send	Read Update

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.

SerialConfig	EDebug Info	ODev Config Upgrade	
Serial Num COM9 ~	HEX Citar	Version SC2.3002.201221	
Baudrate 9600 v	Recv: ("id":0, "ack":true) Send: {"id":0, "method":"reboot") Recv: {"id":0, "ack":true}	SN test	
Data Format N.S.1 v	<pre>Send: {"id":0,"method":"get","params":[]} Recv: {"id":0,"ack":true,"values": {"version":"SC2.3002.201221","model":"SC2"</pre>	rs483 com Baudrate 9600 V Baudrate Pleose Se V	
Read 2000	<pre>,"sn":Ttest,"param_metting":"0","lora_bas d":"0","lora_channel":"10","lora_speed":"5 "."lora_power":"20"."lora_fred":"4000000</pre>	Data Format N.8.1 V Data Format Please Se V	
Timeoutins	, xxx_yows		
Write 2000	Send: {"id":0, "method":"set", "params":	Mode detaut	
Timeoutins	("sn":"test","param_setting":"U","iora_ban d":"0","lora_channel":"10","lora_freq":"49	Band 470 V FreqHz 400M	
0.000	ora_bw*:"7", *lora_cr":"1", *lora_power": "20	Speed bps 5.5K	
Serial Close	<pre>;"","com_data":"","vip_br":"-1","vip_data" :"-1"))</pre>	Power/dBm 20	
_	Please Input Checksu v Stnd	RSSI 0	

(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.

omm Confi	ε		Receive	
ort:	0019	-		
audrate:	9600	Ŧ		
latabit:	8	*		
topbit:	1	Ŧ		
arity:	None	¥		
lowCtrl:	NoFlow	Ŧ		
	pen			
echo hex rec hex sen send en	e d .ter (OdH C	1 4 0	Single Send Bultiple Send Send File	Beceive file
Cler	ar Rece			6 1

(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.

Conn Confi	¢		Receive		
Port:	C089				
Baudrate:	9600	*			
Databit:	8	-			
Stopbit:	1	-			
Parity:	None	Ŧ			
FlosCtrl:	NoFlow	-	Send over		
Auxiliary Cocho Aux rec Aux rec Aux ser Send er	Option e d ster(OdH (DaH)	Single S OK Besive file Pretecil: Efer + Advers: 255 Timbet: 3 x 6+ 127 Pretecil: Ser + Advers: 255 Timbet: 3 x 6+ 127	Go APP	
Cle	ar Rece		05 📝 Auto go A27	Cancel	

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.

onn Confi	4	Receive	
ort:	C099 -		
laudrate:	9500 *		
latabit:	8 *		
topbit:	1		
arity:	None -		
lowCtrl:	HoFlow -	Send over	
Clo:	se port	Send succeed	
wiliary	Option		
echo			
hex rec	e .	Single S OK Receive file	
hex ser	id . (ownow)	Protocol: Sfere V Address: 255 TimeOut: 3 s Go IAP	Go APP
_ send er	iter (Jan Jan)	C:/Users/dell/Desktop/SC2.3002.201221.bin	0pen
		100% 🗟 Auto go APP	Cancel
(Clar	r Baca		

(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;

Conn Confi	6		Receive	
Port:	C089	w		
Baudrate:	9500	¥		
Databit:	8	v		
Stopbit:	1	*		
Parity:	None	*		
FlowCtrl:	HoFlow	*	Send over	
Kuziliary echo hex rec hex sen send en	Option e d ster (OdH 0	1480	Single S OK Receive file Protect: Stere V Address 205 Titedbat: 3 & Ge 1AP C./Neart/dall/bektty/S02 2002 20121 kin	Go APP Open
C1+	ur Rece		1004 🗹 Aste go AFF	Cancel

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Technical specifications are subject to change without prior notice.