CT100EU AC Controller

1.1.Product Feature

- The max power is 22dbm, the transmission distance reach 3~5 km in open area
- Built in 30A relay, switching power up to 3kw
- With scene combination function and timing switch
- It has current, voltage and power monitoring functions
- With status report feedback function
- With on-site manual operation function
- Open communication protocol, support Lora transparent transmission and lorawan protocol, and access the third-party Lora gateway with simple configuration

1.2.Product Parameters

Parameter	Feature
CPU	STM32L151
Wireless	LoRa（SX1268/SX1262）
Encryption	AES128
Power	200~240V AC，50HZ
Measuring Load	AC 0~16A
Sleep Power	less then 2.5W
Commnunication	half-duplex
Data Speed	300bps ~ 62.5 kbps
TX Power	Max 22dBm
Sensitivity	-140 dBm
Antenna	SMA
Frequency	SX1268: CN470 SX1262: AS923 EU868 US915
sIZE	112mm X 65mm X 55mm
Working Temperature	-40℃~85℃
Working Humidity	10%~90%RH
Housing	PC
Installation	35mm standard guide rail

1.3.Product Detail



Pic 1-1 Front

1.4.Installation



Pic 1-2 Installation



Pic 1-3 Use Example

1. LoRa Antenna
2. Status Indicator（Red indicates that the relay is open and green indicates that the relay is closed）
3. Manually press the key to open, short press the key to turn off the relay

4. Press the key manually to close, press the key briefly to disconnect the relay
5. Configuration Port
6. AC output _
7. AC output +
8. AC input _
9. AC input +

1.5.Attentions

1. please follow the correct wiring identification diagram for wiring. Incorrect wiring may cause equipment damage
2. please cut off the power supply when wiring. Live wiring may cause electric shock
3. please strictly equip the load and do not overload
4. the equipment shall be installed without direct sunlight, and shall be protected from moisture, dust and rain
5. in case of equipment failure or doubt, please contact the manufacturer

2. Function

Before test, please make sure install LoRa Antenna.

2.1.Function of Button 1

Short press button 1, turn on the relay

2.1.2. Function of Button 2

Short press button 1, turn off the relay

2.5.Antenna

The equipment antenna interface adopts standard SMA and the specification of external thread and internal hole. During installation, pay attention to avoid metal and strong interference equipment. If the installation environment is poor, it is recommended to use a sucker antenna with feeder for installation.

2.6.Data uploading logic

- When the equipment is started, the default relay is disconnected. Report immediately when the switch status of equipment relay is changed.
- When the system reports the cycle time, it reports the data.

3. Paremeter Configuration

Recommend configuration tool SensorTool for reference.
Parameter configuration mainly includes two aspects: sensor correlation: acquisition cycle and reporting cycle, and wireless LoRa related parameters.

3.1.Connecting Period

The default connecting period is 10s, and you can set 1s for the shortest period, and also you can set 65553s for the longest period. The shorter period, the faster respond, but power consumption is higher.

3.2. Uploading Period

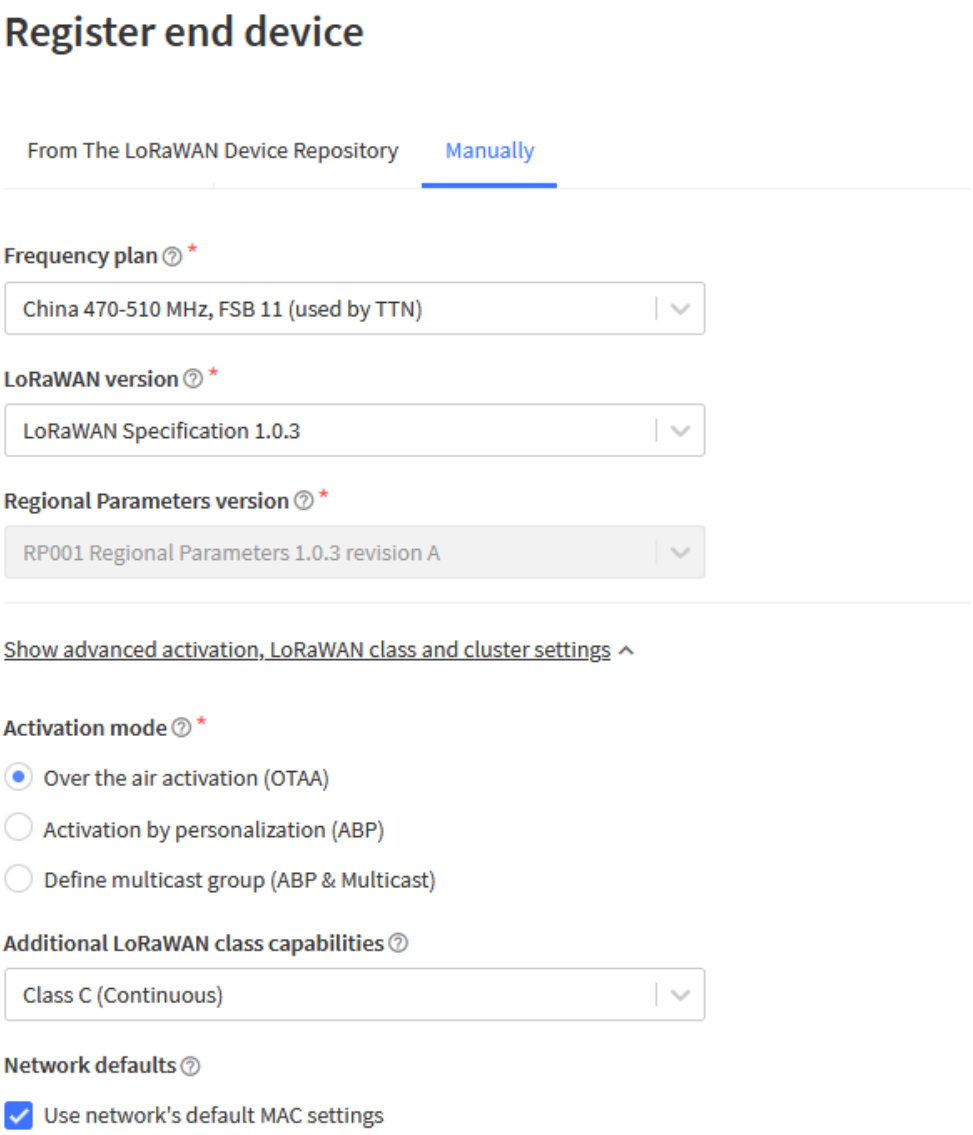
The default uploading period is 600s as heartbeat transmission. That means from factory set, the controller upload information every 10mins, and it is configurable according to real applications.

3.3.Wireless LoRa Parameters

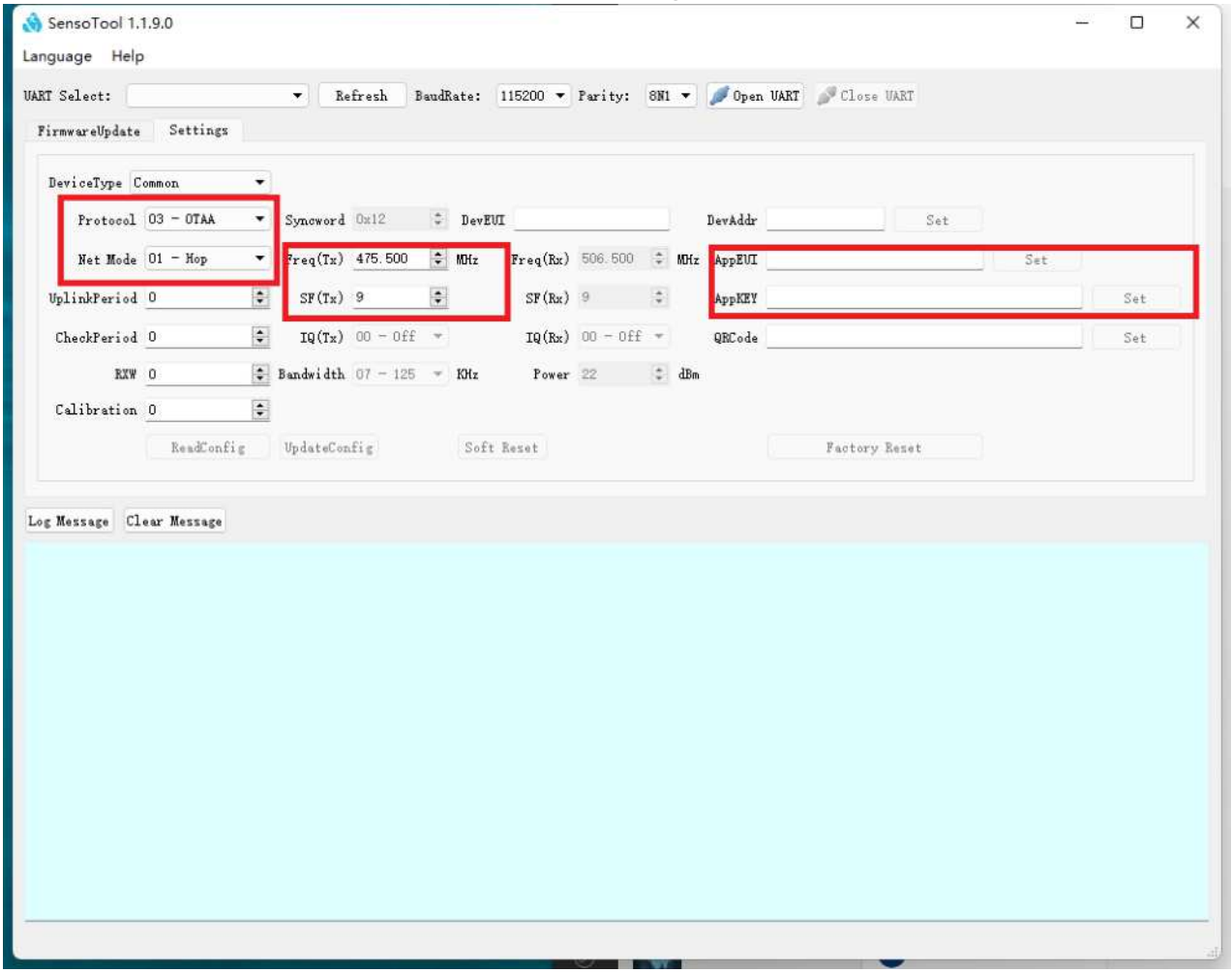
As there are too many LoRa parameters, you can refer to Rejeee AT command.

3.3.1 Configuration under LoRaWAN

Below picture is CN470 for reference. Frequency should be the same as LoRaWAN Server(NS).



Under LoRaWAN, ABP is SPI=02，OTAA is SIP=03，SF is configurable.



In LoRaWAN mode, users can decide whether to modify APPEUI and appKEY as needed. Just keep consistent with LoRaWAN server. Other relevant parameters do not need much attention. LoRaWAN server will perform rate adaptive ADR operation (automatically modify frequency point, SF and power) according to communication quality.

In ABP mode, the appKEY of the device is used to configure appKEY and networksKEY. The two KEYs are shared.

3.3.3 Terminal parameter description

The main related configuration items for general users are as follows:
* **reporting cycle lft**: data uploading period.
* **detection cycle lcp**: that is, the check period. The equipment reads the relay status according to this cycle.

4.Wireless Data Format

4.1 SIP（02/03）— LoRaWAN

MHDR	FHDR	FPort	FRMPayload=Sensor Data(Message)			MIC
			Data 1	...	Data N	4 Bytes
			Type+Data N Bytes	Type+Data N Bytes	Type+Data N Bytes	

FPort：1
FRMPayload：sensor data(Message)

Refer to Rejeee Sensor Data Format。

4.2 Sensor Data

4.2.1 Device information（0x00)

Type	Value	Value	Value
1 Byte	3 bit	5bit	1 Byte
0x00	Version	Battery Level	Reserve

4.2.2.On/off（0x09)

In most cases, a device has only one channel of switching value, but it meets the status indication of up to eight channels of switching value.

Type 1 Byte	Value 1 Byte	Comment
0x09	on-off state	1-byte unsigned integer. The specific meaning depends on the item. Generally, a single bit represents one channel of switching value (0 or 1), and up to 8 channels of switching value

4.23.3.Current Voltage（0x1A)

The length is 2 wihle only current is included, length is 4 while both current and voltage included

Type	Length	Value	Value
1 Byte	1 Byte	uint16_t	uint16_t
0x1A	2 is current 4 is current+voltage	Current, UnitmA	Voltage, Unit0.1V

4.2.4.Power（0x1B)

The Length is 4 if only Power is included

Type	Length	Value	Value
1 Byte	1 Byte	uint32_t	uint32_t
0x1B	4 is P	Power, unit is Walt	Optional, to be defined

5.CRC Example

The CRC verification algorithm used in this document is as follows

```
static uint16_t get_crc16(uint16_t inData, uint16_t outData) {
outData = (outData >> 8) | (outData << 8);
outData ^= inData;
outData ^= (outData & 0xff) >> 4;
```

```
outData ^= outData << 12;
outData ^= (outData & 0xff) << 5;
return outData;
}

static uint16_t cal_crc16(const uint8_t *pData, const uint32_t len)
{
uint32_t i = 0;
uint16_t crc16 = 0xFFFF;
for (i = 0; i < len; i++) {
crc16 = get_crc16(*(pData++), crc16);
}
return crc16; }
```