Appcon Wireless LS820 Sensor LoRaWAN Data Logger Instruction Manual

AppconWireless

RS485 Sensor LoRaWAN Data Logger LS820
V3.0

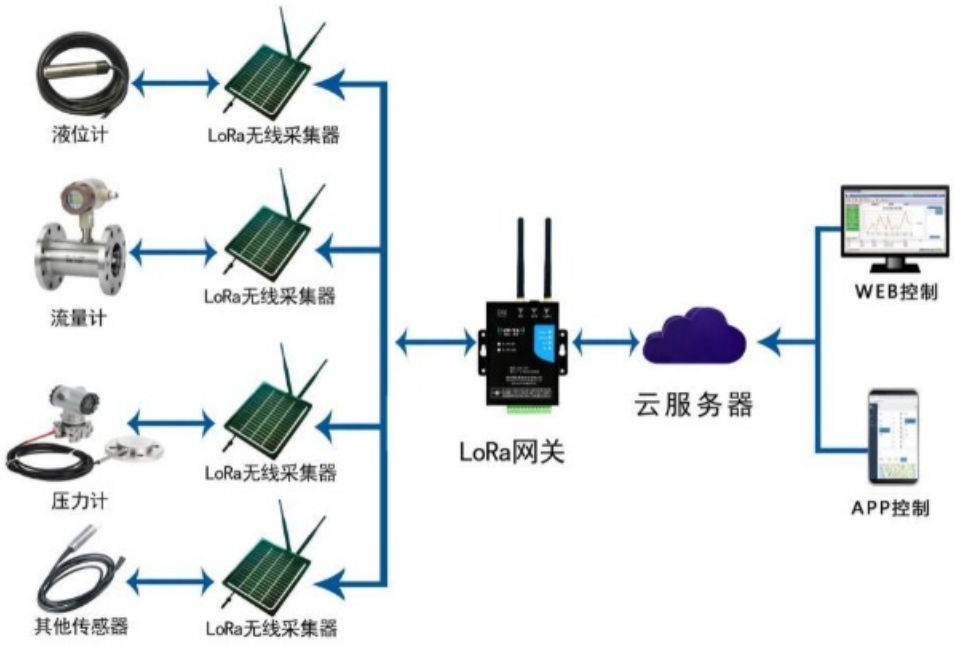
Contents

Product Overview

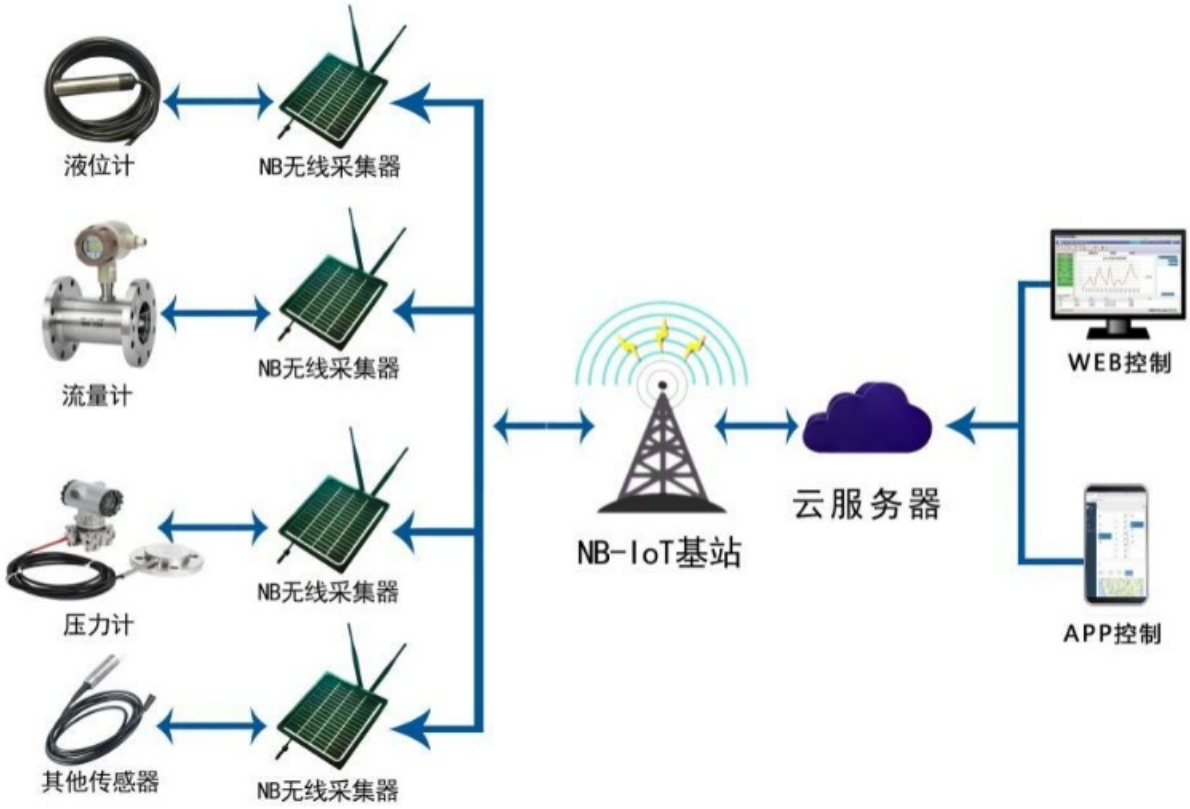
LS820 is a high-performance, low power consumption, long distance RS485 sensor data logger device. LS820 can be connected to max 3 MODBUS-RTU RS485 sensors and actively power these RS485 sensors in the configured period to achieve long-distance, ultra-low power wireless transmission of sensor data to the LoRaWAN/LoRa network. LS820 consists of Solar panel, Lithium battery, GPS module and LoRa radio board. It can support the sensor for pressure, liquid level, liquid flow and other related RS485 sensors. Benefits from LoRa and IP66 design, this device features stability and reliability and can cover a long transmission range while keeping ultra-low power consumption, ideal for outdoor use.

- Ultra-low power consumption when it is standby.
- The standby current less than 6uA.
- 2600mAh 12V lithium battery built inside.
- GPS position available.
- Support Modbus protocol and LoRaWAN network.
- Built-in large capacity lithium battery and solar panel. Users do not need to charge and replace the battery.
- IP66 waterproof design, screw holes fixed on the wall, small size and easy installation.
- Set the sampling period and transmit the sensor data periodically.
- Sensor data can upload to the cloud server/LoRaWAN server.
- Support pressure liquid level sensors, soil sensor, air sensor and other RS485 sensors.
- Support 3 MODBUS-RTU RS485 sensors for one LS820

Wireless data transmission uses LoRa, LoRaWAN and NB-IoT solutions:
LoRa Solution (LS820L): Semtech’s low-power long-range LoRa spread spectrum wireless data transmission solution Sx1276, with a signal coverage of 1km.



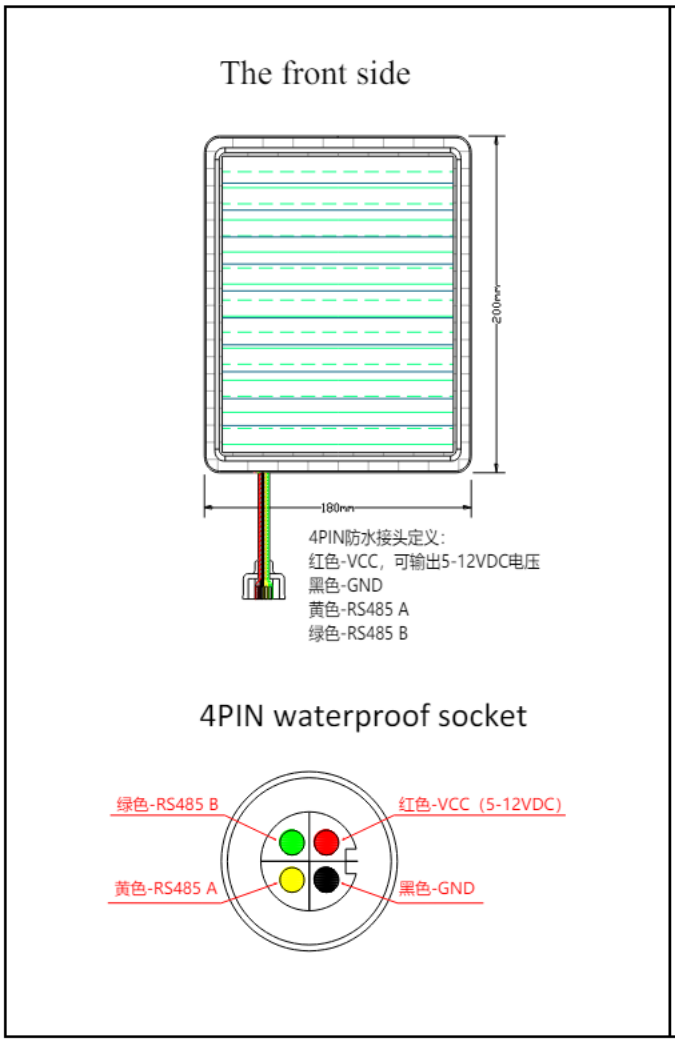
NB-IoT solution (LS820N): Based on MTK high-performance NB-IoT chip, full Netcom network standard, adapting to the three major operator networks, low-power design, data is uploaded directly to the user cloud platform through NB base stations.

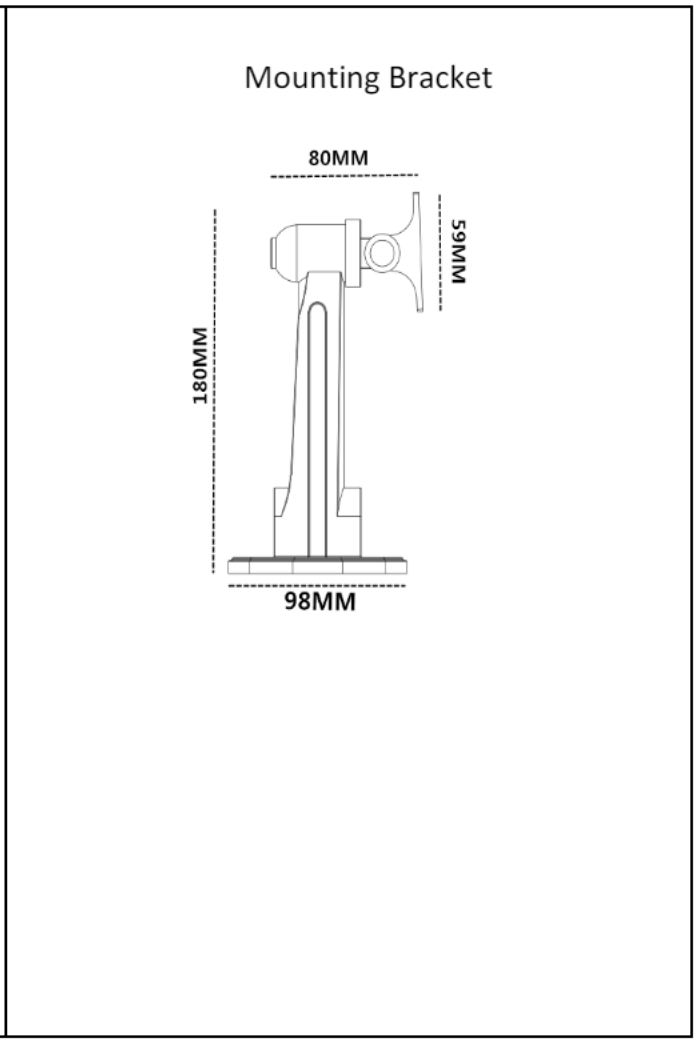


Technical Specifications

Type of wireless	LoRa /LoRaWAN solution	NB-IoT solution
Frequency	433MHz,490MHz,868MHz, 915MHz	All bands
Range	2 km to 10km line of sight	NB-IoT network coverage
Power	2600mAh lithium battery (high and low temperature battery is optional)	
	5W charging solar panel (charging current max 300mA)	
Port	RS485 port, the red is VCC(12V). the black is GND. The yellow is 485A, The Green is 485B.	
Transmitting Currency	<130mA	
GPS paramter	Support GSP and BD position positioning accuracy ≤2.5m	
Standby Currency	6uA	
Operation Conditions	Outdoor, -20~55°C humidity 0–95%;	
Waterproof	IP66	
Sleep power consumption	10uA	
LED Indication	Enter the configuration mode, blue slow flashing (if there is no operation, it will automatically exit after 30 seconds and start sleep); When sending data, the blue light flashes. Detect every 10 seconds and the red light flashes one time. When the solar panel is charged, the red light is on, and the light is off after full charge.	
Parameter configuration	Connect the data cable, the magnet attracts the Hall switch to enter the configuration mode, configure the parameters and collect data commands	
method of sensor data collection	Timing report, the minimum can be set for 1 minute, the longest is 65536 minutes, if not set, it will not be reported.	
Alarm threshold	The sensor alarm value can be set. When an alarm occurs, it will be reported three times within 1 minute; if it is not set, it will not be reported.	
size and weight	200*180*30mm, 770g (with lithium battery)	

Dimension.

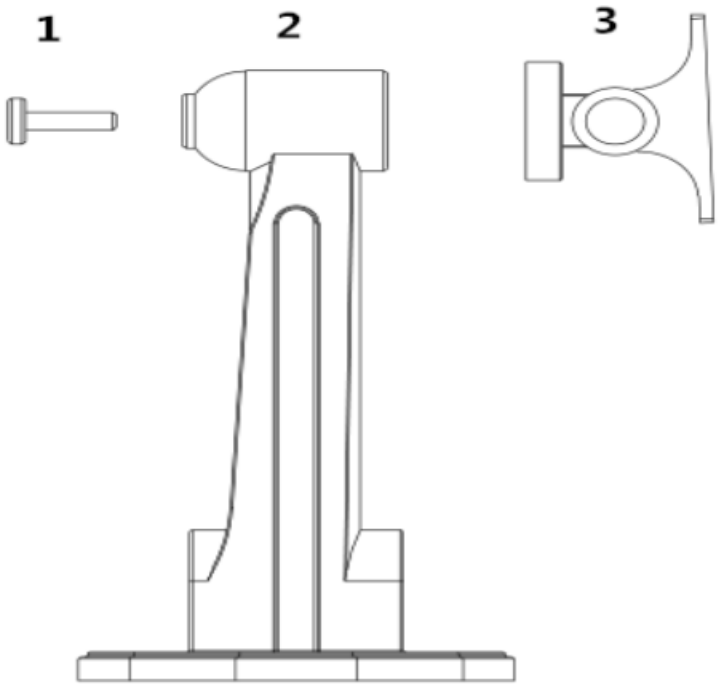




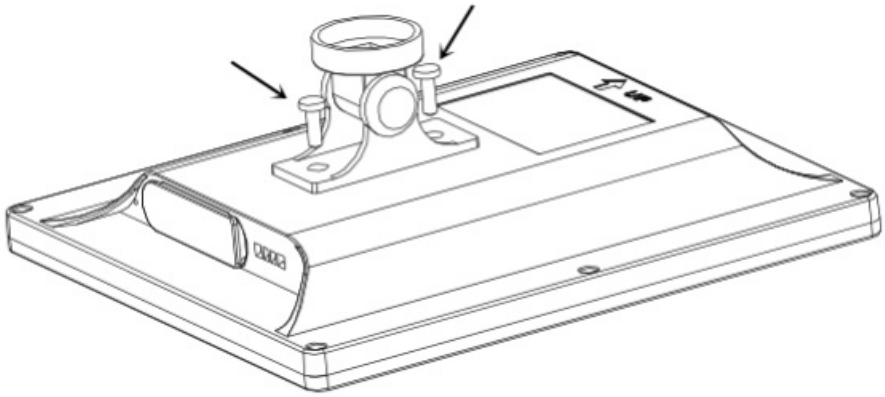
Installation of LS820

When installing LS820, try to make the antenna perpendicular to the horizontal plane, and the wireless communication is the best.
When installing the LS820, as shown in the figure below, it can be installed close to the wall in parallel or fixed, or parallel to the ground. It can be relatively open (within 1 meter) around the collector, without obstruction, and the wireless communication effect is the best.

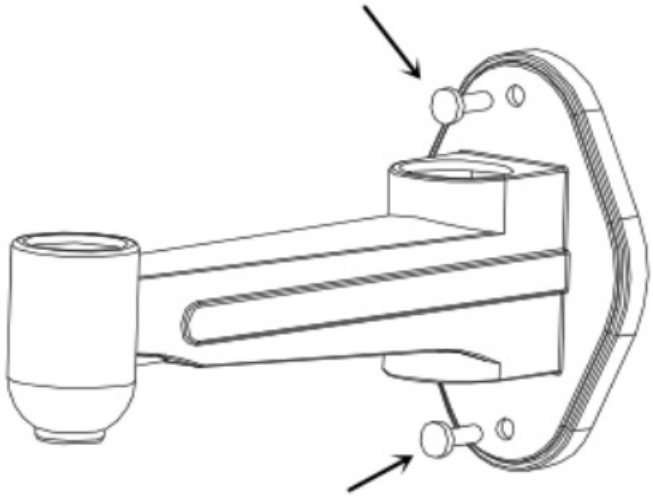
a, There are three parts of bracket.



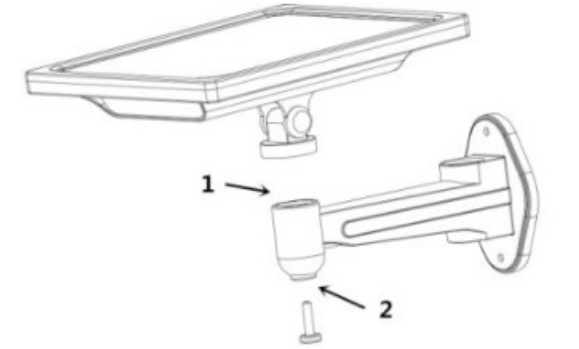
b, Install the bracket on the solar panel

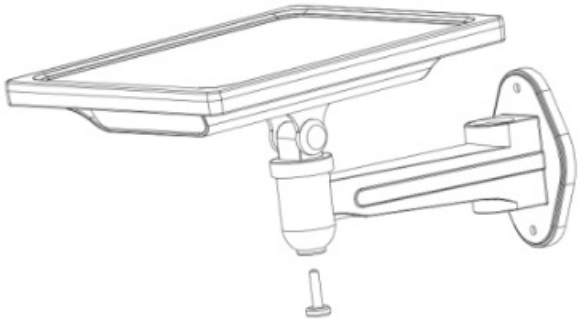


c, Install the bracket on the wall



d, Connects the solar main board with the bracket, insert the bracket into the main part and tighten the reinforcement

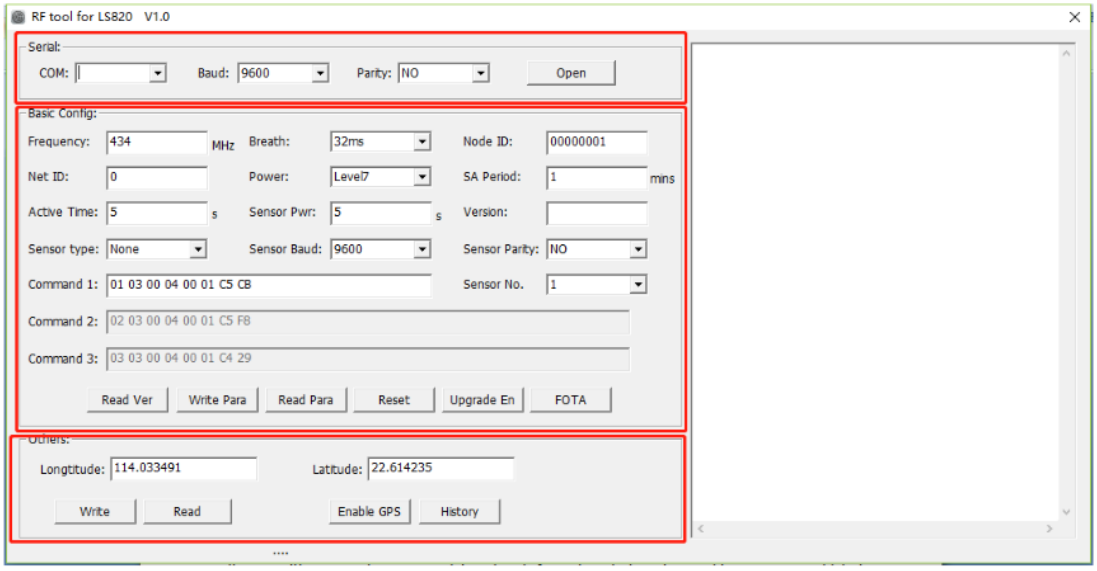




Parameter configuration

After connecting the collector to the computer through the RS485 data cable, enter the configuration mode through the magnetic control switch (close a magnet close to the magnetic control switch, the indicator light is always on, indicating that the configuration mode has been entered). At this time, the collector is in the setting state. “Sensor Terminal Configuration Tool”, click “Serial Port” to pop up the “Serial Port Configuration Page”, select the COM port of the collector to connect to the computer, use the baud rate of 9600, and open with NO.

1. The collection period can be customized. When this period expires, the RS485 sensor data is collected and sent to the server.
2. The device has an automatic positioning function, and the positioning is updated once a day.
3. Magnetic suction can trigger the collection of data and report the data.
4. The reported data is stored locally. As a backup, the user can read the saved local data from the local through the serial port, or remotely access the saved data.
5. The server or the master device can send the configuration parameter of LS820 (the sensor data acquisition period)
6. The command to active the sensor can be set.



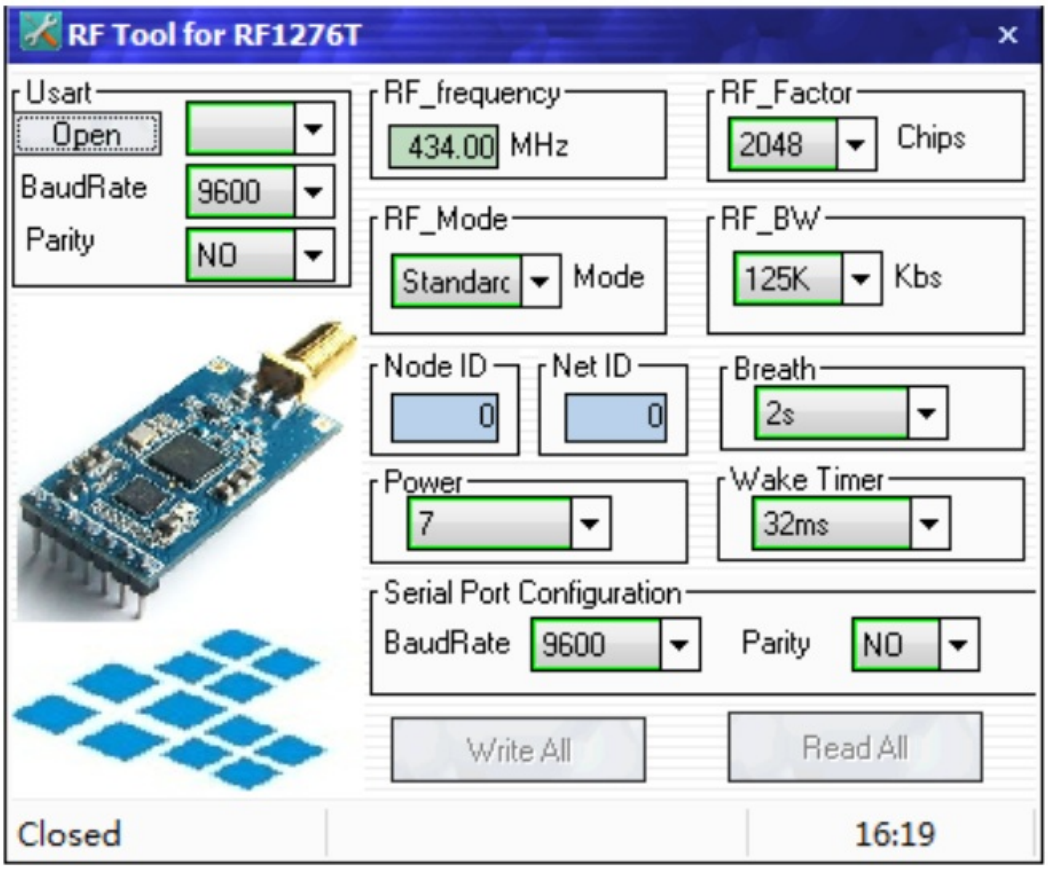
There are 4 parts on the RF tool. The left area is the parameter configuration and the upper part on the left is the serial port configuration area. The middle left is the basic parameter configuration area of LS820. and the following is the positioning and historical record reading area. The blank part on the right is the print area display area, which is the debugging information output window. The collector will output the current debugging information during the working process, which is convenient for users to view.

Parameter	Clarification
Frequency	433MHz 490MHz, 868MHz, 915MHz
Breath	2,4,8,16,32,64ms (2Ms-5Kbps,4Ms-3Kbps,8Ms-1.7Kbps,16Ms-1Kbps, 32Ms-0.5Kbps,64Ms-0.3Kbps)
Node ID	0-65535
Net ID	0-255
Output power	Level 7 6 5 4 3 2 1 dBm 19.5-20 17.5-18 14.5-15.5 11.5-12.5 8.5-9.5 5.5-6.5 5.5-6.5 mA 110-120 90-100 60-70 45-55 40-45 30-40 30-40
Sample period	0-65535mins set"0"means the LS820 is closed.
Sensor type	There are some defined sensors by RF tool.0x00 is no defined sensor.0x01 is YD-10mh level sensor. 0x02 is BL-100. 0x02 is L2MBV laser sensor
Active time	This parameter indicates the waiting time for receiving after sending data. The unit is calculated in seconds. Within this time, instructions issued by the server can be received, ranging from 0 to 30 seconds

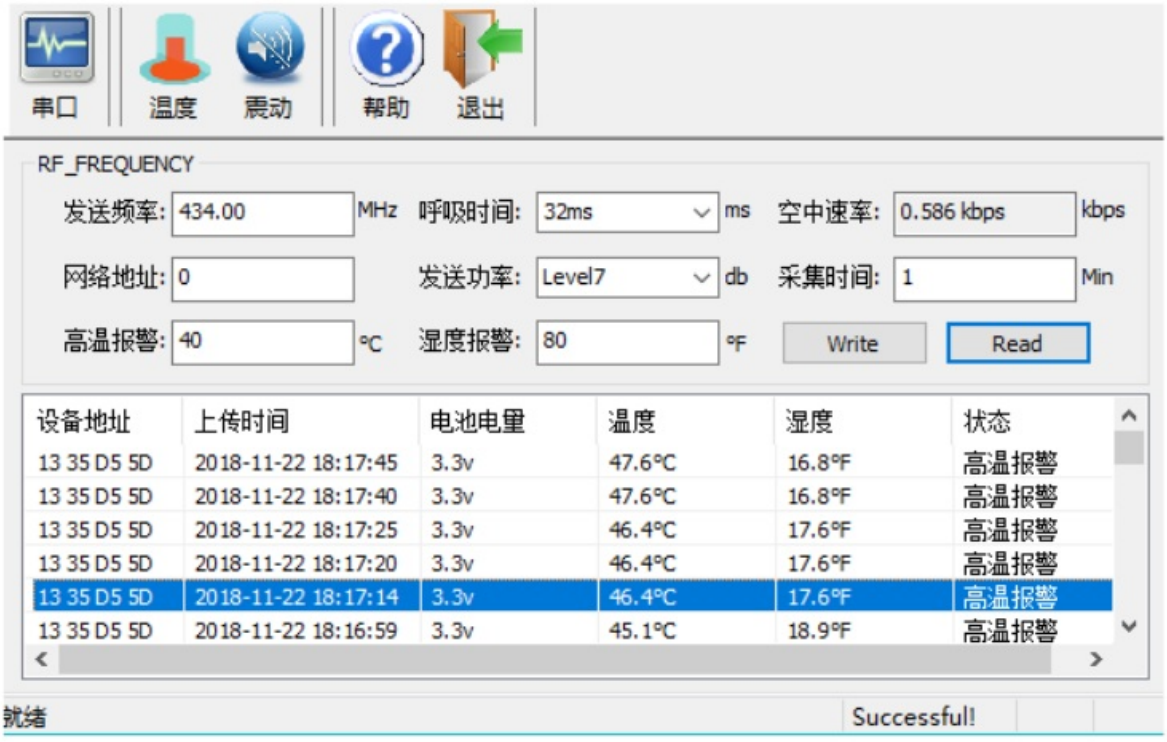
Sensor Pwr	It indicates how long time LS820 starts collecting data after supplying power to the sensor. The range is 0 to 30 seconds, which can be set
Sensor Command	Command sent when getting the sensor data
SA period	Indicates the period of sensor data upload to master. It is designed as minutes, the range is 0 ~65535, and the setting is 0, which means that LS820 does not enable the function.
Node ID	the unique ID of LS820, the range can be set from 0~4294967295.
Write Para	Write the parameter.
Read Para	Read the parameter.
Read Ver	Read the version number of LS820
Longitude and Latitude	This parameter is the positioning data of the equipment. It is 0 when used for the first time. You can set it manually; The collector updates the positioning information once every 24 hours and starts the positioning once 2 minutes after the first power on

Display the sensor data by Rf tool

The company provides the RF1276T LoRa wireless data transmission module RF1276T. Users need to set the RF1276T as Central mode, The Breath of LS820 should be the same as the wake-timer of RF1276T. The Frequency and the Net ID should be the same for both LS820 and RF1276T. After the configuration finish, RF1276T can be used as the host computer module to communicate with the sensor and display the sensor data via RF tool.
Appconwireless provides a USB-TTL USB adapter cable, which can connect the TTL host computer module to the computer USB interface for parameter configuration or data acquisition.
The master device has dedicated parameter configuration software, and the wireless parameters (sending frequency, breathing time, network address) need to be set to be consistent with the RS485 sensor.



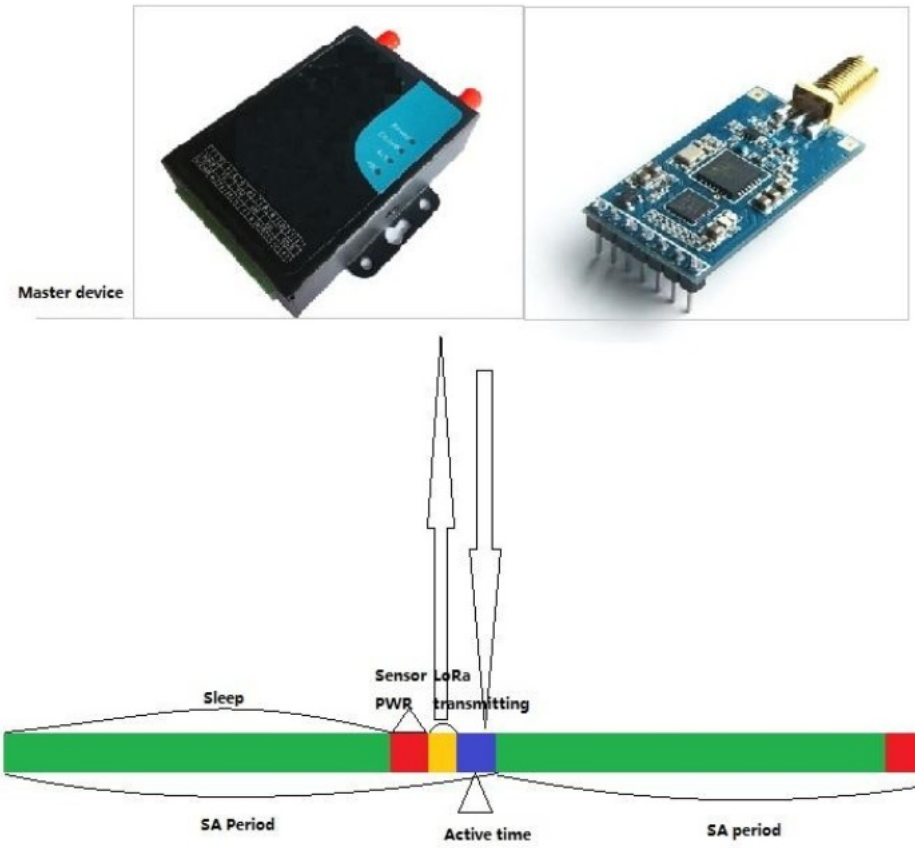
When the sensor is in the working state, the sensor data will be reported regularly according to the set collection time including device ID, upload time, battery power, pressure, level, status, etc.



The sensor will perform a temperature and humidity check every 20 seconds. If any data exceeds the set alarm threshold, the temperature and humidity data (including the alarm status word) will be reported. The acquisition cycle will be re-timed.

The protocol of LS820.

LS820 has the uplink and downlink protocol that are suitable for all RS485 sensing devices. The data packets are also divided into uplink data and downlink data. Uplink data indicates that the data collected by LS820 is sent to the master device. LS820 actively upload the data to the master device. Downlink data means that the master device sends data to LS820. LS820 opens the receiving window after sending sensor data to the master, and there is a limited time (the time set by the rf tool, the maximum is 30S), During this period, the master device can send data to LS820.



Work flow of LS820

Data packet format of LS820.

8.1 Uplink data packet format

Chart 1, the format of uplink data packet

header	**Node ID**	Radio type	Function code	Length of payload	payload	CRC	End byte
1byte	4byte	1byte	1byte	1byte	N bytes	1byte	1byte
5E	05 E8 25 61	C3	01	0N	Check chart 2	Sum Check	16

Chart 2, Payload format

Voltage of battery	GPS_E	GPS_N	Sensor data	Period of sensing	Acitve time	Version number	SN of packet	Solar charge
VCC_ADC	Longitude	Latitude	DATA	SA Period	Active time	Version	No.	On/off
2 bytes	8 bytes	8byte	N bytes	2 bytes	2 bytes	1 byte	2 bytes	1 byte

One example of LS820 receiving Data packet		5E 00 00 00 09 C3 00 23 04 54 42 E3 E0 89 00 00 00 00 41 B4 5F 68 00 00 00 00 33 33 33 33 33 33 33 33 0D 0A 00 01 05 12 00 9E 00 54 16
Header	0x5E	The header of data format The value is fixed as 0x5E
Node ID	0x00 0x00 0x00 0x09	The node ID is the device ID. It can be set through RF tool. It has two bytes.
Radio type	0xC3	0XC3 is lora radio device.
Sensor type	0x00	It represents the type of sensor. There are some defined sensors by RF tool.0x00 is no defined sensor.0x01 is YD-10mh level sensor. 0x02 is BL-100. 0x02 is L2MBV laser sensor.
The length of payload	0x23	The value indicates the data length of the data payload. 0X23 means 35 bytes of data payload
Battery voltage	0x04 0x54	The value indicates the battery voltage of LS820. Users need to transfer the hex value to decimal value. And dividing with 100 is the actual value of voltage. „0x04 0x54" represents the voltage 11.08V.
Longitude	0x42 0xE3 0xE0 0x89 0x00 0x00 0x00 0x00	Longitude and latitude are floating point row data. In the program, the floating point line occupies 4 bytes of memory. In the protocol, longitude and latitude give 8 bytes data. But the last four bytes are reserved and only the first four bytes are valid. These four bytes are floating point line data cast to four bytes.
Latitude	0x41 0xB4 0x5F 0x68 0x00	

	0x00 0x00 0x00	
Sensor data	0x33 0x33 0x33 0x33 0x33 0x33 0x33 0x33 0x0D 0x0A	The sensor data is the raw data of sensor. Different sensors have different sensor data. Please check the specification of every sensor. If there is no sensor connected with LS820. The sensor data is 0xFF 0xFF. LS820 supports max 3 sensors connected. In RF tool, there are „command 1", „command 2", „command 3".. The sensor data display with the sequence of „command 1 , command 2 and command 3". When users adopt 3 same sensors with LS820. The sensors always support the ID to identify with each sensor.
SA period	0x00 0x01	The SA period is how long time that sensor work to get the data. Its unit is minute If it is „0x00 0x00", the sensor doesn"t work. „0x00 0x01" represents 1 min.
Active time	0x05	Active time indicates the waiting time for receiving after sending data. The unit is calculated in seconds. Within this time, instructions issued by the server can be received. The unit is second, its range is from 0 to 30 seconds. 0x05 represents 5 seconds.
Version No.	0x12	It indicates the version number of LS820 0x12 is V1.7
SN of data packet	0x00 0x9E	It indicates the sequence number of data packet. It is a cumulative value, from 0 to 46. The receiving device can send the sending serial number command to enable the sensor to reload the defined SN data packet.
Charging status	0x00	The byte indicates the solar charging status. 0x00 means no solar charging. 0x01 means the solar charging available.
CRC	0x44	The CRC is the checksum byte. It is the last two bit about the sum of previous data.
End byte	0x16	The end symbol of data packet. The fixed value is 0x16

“CRC” is the last two bit about the sum of previous data.
For example, the setting command is „" 0xAE 0xAE 0x00 0x00 0xAE 0x80 0x03 0x02 0x00 0x00 CRC 0x0D 0x0A”
The sum of data before CS is “0xAE+0xAE+0x00+0x00+0xAE+0x80+0x03+0x02+0x00+0x00=0x28F”. CRC is the low bit of the sum. CRC=0x8F.

8.2 Downlink data packet format
Set the sampling period of LS820

head	**Device ID**	Radio type	Function code	Length of payload	Data payload	CRC	End code
1byte	4byte	1byte	1byte	1byte	Sampling period	2byte	1byte
5E	**05 E8 25 61**	C3	A4	Nn	2byte	Sum check	16

Read the history sensor data

head	**Device ID**	Radio type	Function code	length of payload	Data payload	CRC	End code
1byte	4byte	1byte	1byte	1byte	Packet No.	2byte	1byte
5E	**05 E8 25 61**	C2	A6	Nn	2byte	Sum check	16

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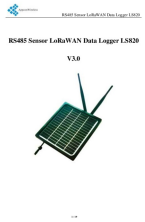
Documents / Resources

	Appcon Wireless LS820 Sensor LoRaWAN Data Logger [pdf] Instruction Manual LS820 Sensor LoRaWAN Data Logger, LS820, Sensor LoRaWAN Data Logger, LoRaWAN Data Logger, Data Logger, Logger

References

- Appconwireless,Professional IoT solution,LoRa radio solution,LoRaWAN solution,Radio data module
- Appconwireless,Professional IoT solution,LoRa radio solution,LoRaWAN solution,Radio data module
- User Manual