

# G-9921 LoRa to RS-232/485/422 Converter

## User Manual

### 1. Overview

LoRa is a long-range wireless communication solution. Compared to GPRS and 4G solutions, LoRa does not require a monthly network access fee and has a longer range than WiFi and Zigbee. As a result, LoRa is increasingly used in small data long-distance communication. G-9921 utilizes SEMTECH's LoRa™ patented modulation technology, which can achieve a reception sensitivity of -142dBm and an output power of +22dBm, with an outdoor line-of-sight communication range of 5km. It features long-range, low power consumption, and strong anti-interference capabilities. G-9921 is a serial port to LoRa converter, offering three types of serial interfaces: RS-232/485/422.

### 2. Product Features

- ◎ Data Interfaces: RS-232/422/485 SMA female antenna interface
- ◎ Frequency Range: 464-515 MHz
- ◎ Modulation: Supports both LoRa direct-sequence spread spectrum technology and GFSK (Gaussian Frequency Shift Keying) transmission
- ◎ Wireless Channels: 255 selectable channels, each with a 0.2MHz interval
- ◎ Network Topology: Star, tree, chain, mesh network
- ◎ Transmission Modes: Transparent transmission and fixed-point transmission
- ◎ Serial Transmission Rate: Configurable from 1200 to 115200bps
- ◎ Air Transmission Rate: 6 levels adjustable (0.3/1.2/2.4/4.8/9.6/19.2Kbps)
- ◎ Power Supply: DC9V-30V, 12V/50mA (max)
- ◎ Transmission Distance: Wireless carrier wave up to 5000 meters
- ◎ Reception Sensitivity: -142dBm
- ◎ Transmission Power: 22dBm, adjustable in multiple steps of 1dBm
- ◎ Antenna Connection: SMA male rod antenna / suction cup antenna
- ◎ Surge Protection: Power, differential mode 1KV, common mode 2KV (1.2/50 μ S)
- Signal, RS-485/422: differential mode 1KV, common mode 2KV (10/700 μ S)
- RS-232: 600W
- ◎ ESD Protection: Contact 6kV, air 8kV
- ◎ Dimensions: 97mm × 65mm × 22mm (excluding antenna)

◎ Weight: 120g  
 ◎ Operating Environment: -40° C to 85° C, relative humidity from 5% to 95%

### 3. Hardware Description

#### 3.1 Indicators

PWR: Red; stays on when powered normally.  
 TXD: Green; serial transmission indicator (flashes when sending data).  
 RXD: Yellow; serial reception indicator (flashes when receiving data).

#### 3.2 Button Definitions

Reset:  
 1. Short press (1 second): Enters command mode.  
 2. Long press (5 seconds): Restores factory settings.

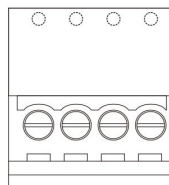
### 4. Terminal Pins

#### 1. RS-232 Pin Definitions

No.	Signal	Description
2	RXD	RS-232 Receive
3	TXD	RS-232 Transmit
5	GND	Signal Ground
7	RTS	Request to Send
8	CTS	Clear to Send
1、4、6、9	NC	Floating (Unused)

#### 2. RS-485/422 Pin Definitions

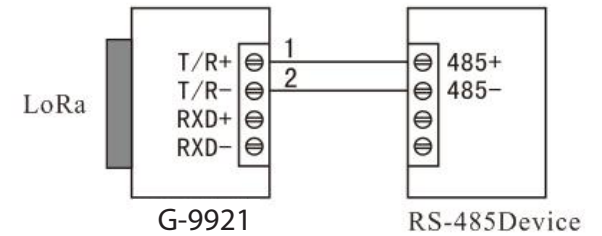
No.	Signal	Description
1	T/R+	RS-485+: Transmit Positive
2	T/R-	RS-485-: Transmit Negative
3	RXD+	RS-422 Receive+: Receive Positive
4	RXD-	RS-422 Receive-: Receive Negative



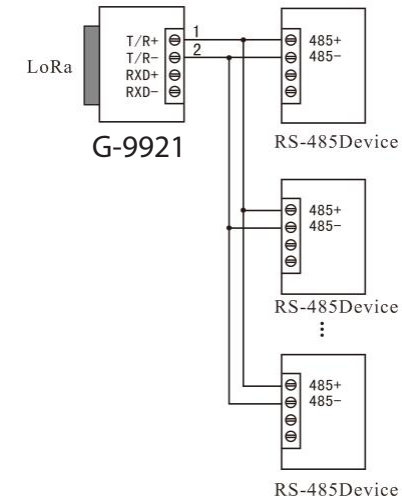
T/R+ T/R- RXD+ RXD-

### 5. Communication Connection Diagrams

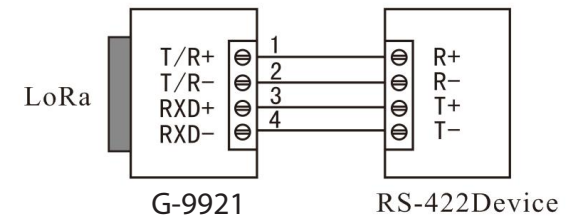
#### 1. RS-485 Point-to-Point / Half-Duplex



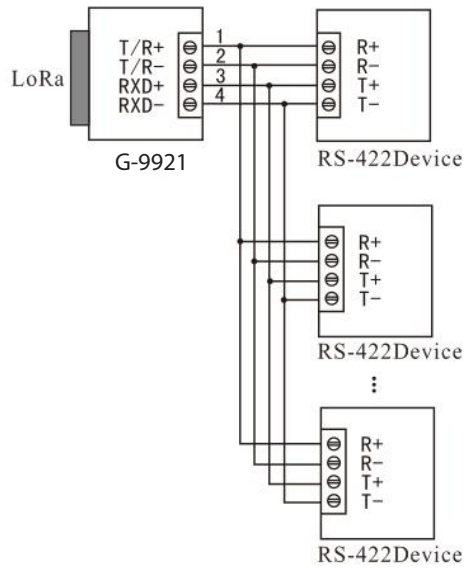
#### 2. RS-485 Point-to-Multi-Point / Half-Duplex



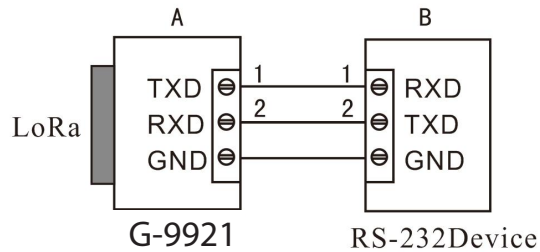
#### 3. RS-422 Point-to-Point / Full-Duplex



#### 4. RS-422 Point-to-Multi-Point / Full-Duplex



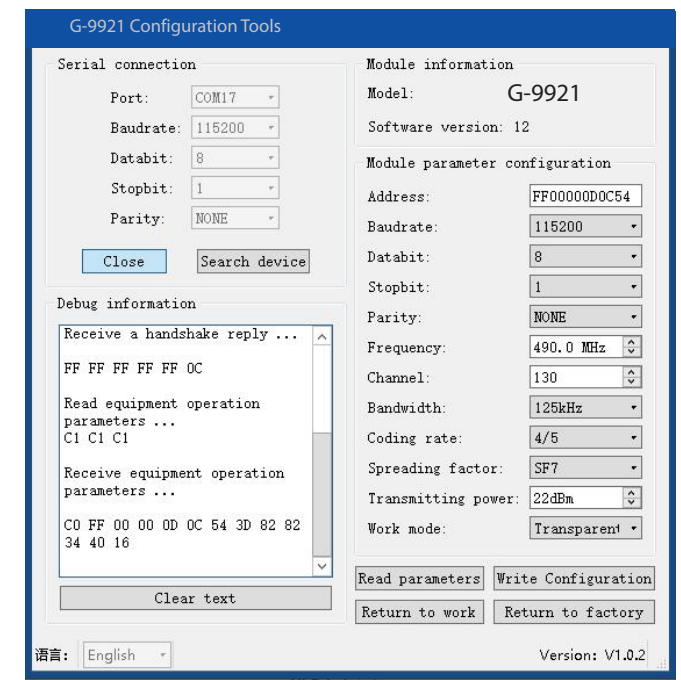
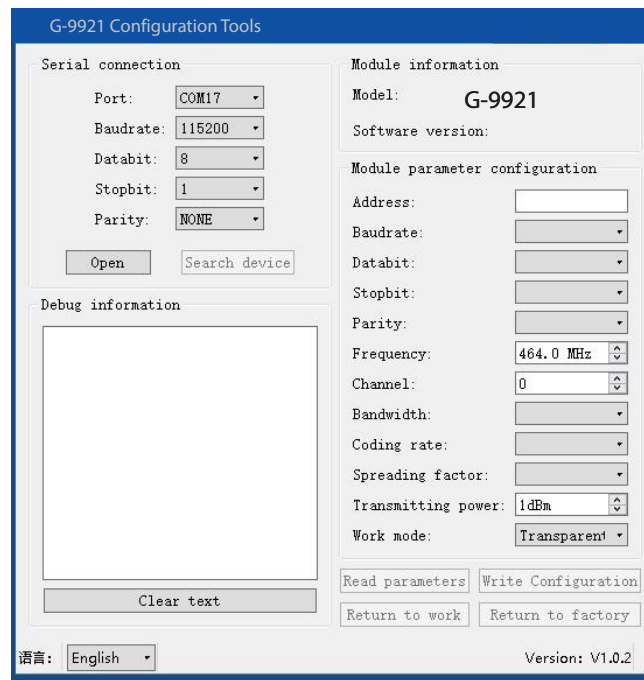
## 5. G-9921 RS-232 Interface Communication



## 6. LoRa Configuration

### 6.1 Configuration Steps

LoRa devices must be configured with the same LoRa parameters to communicate with each other. These parameters include: spreading factor, bandwidth, coding rate, and frequency. After powering on the device, short press the Reset button for 1 second to enter the configuration mode. Use the configuration tool to perform the configuration.



### Parameter Definitions:

1. Baud Rate: The baud rate for serial communication, selectable from 1200 to 115200 bps.
  2. Parity: The parity for serial communication, which can be None, Odd, or Even.
- The data bits are fixed at 8, and the stop bits are fixed at 1.
3. Frequency: 464 to 515MHz, default is 490MHz. As the default antenna is for 490MHz, it is recommended to choose a frequency between 470 and 510MHz to avoid antenna mismatch. Different LoRa networks are mainly distinguished by different frequencies to prevent interference.
  4. Channel: After setting the frequency, the channel will change automatically.
  5. Bandwidth: 125 to 500KHz.
  6. Coding Rate: 4/5 to 4/8.
  7. Spreading Factor: SF5 to SF12, larger values result in slower data transmission.
  8. Transmit Power: 1 to 22dBm.

9. Operation Mode: Transparent transmission / Fixed-point transmission.

9.1 Example of Fixed-point Transmission:

1. Query Module Address

When sending c1c1c1 for a query, the module returns the 2nd to 7th bytes as the current module address, and the 10th byte indicates the receiving channel.

Eg: CO FF 00 00 03 0A 53 3D 82 82 B4 40 16

Address: FF 00 00 03 0A 53

Receiving Channel: 82

2. Fixed-point Transmission

After enabling fixed-point transmission, data should be sent through the serial port in a specific format.

Eg: FF 00 00 03 0A 53 82 31323334353637383930 - This data packet represents sending data 31323334353637383930 to the module with the address FF 00 00 03 0A 53 and the receiving channel 0x82. The total packet length should not exceed 200 bytes during packaging (the excess will be truncated).

After configuring the parameters, click "Write Configuration" and then click "Return to Operation Mode" to enter the normal communication mode. The default mode after powering on is the normal communication mode, and users can communicate by sending data using a serial debugging assistant connected via the serial port.

## 6.2 Precautions

All devices in the same communication network must have identical LoRa parameters.

In the same communication network, when one device sends data, all devices will receive it.

## 7. Usage Steps

1. Install the antenna into the antenna interface of the device.  
2. If there is only one LoRa communication network, no configuration is needed. However, to prevent interference with other users, it is recommended to configure a specific frequency, which can be any value between 470 and 510MHz.

3. Connect all LoRa devices to the power adapter. At this time, the PWR light should be red.

4. Now, any data received by the serial port (RS-232/485/422) of any LoRa device will be sent to the serial port of other LoRa devices.