

Quick Implementation of TF03-RS485 and Computer Communication Operation Instructions

1. Overview

This document provides methods to test RS485 communication, which enables first-time users to quickly understand the tools and methods for conducting tests. Connect the LiDAR to the PC by consulting the corresponding instruction manual, and complete product testing by sending commands to obtain distance values, modify the baud rate & the address fields etc.

This document applies to the product model: TF03-RS485 (*note: please verify the product hardware version before testing*).

2. Test Preparation

2.1. Necessary Tools

Tools			 WINCC_TF.exe
Name	USB-RS485 Adapter ¹	TF03-RS485 LiDAR	 sscom5.12.exe Serial port testing tool ²

3. RS485 Communication Test

3.1. Pin Description

TF03-RS485 support wide range of voltage supply, with power supply options between 5 and 24V. TF03-RS485 supports both RS485 and RS232 communication interfaces, the default being the RS485 interface:

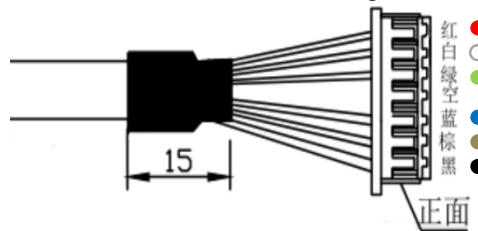


Fig.1 Pinout

Table 1 Pin Sequence Description

Number	Colour	Function	Explanation
1	Red	VCC	5-24V
2	White	RS485-B	RS485-B reception
3	Green	RS485-A	RS485-A send
4	Black	GND	GND

¹ https://www.sluuf.com/lang_en/buy/115591/Youyun-USB-to-RS485-converter-TTL-serial-port-industrial-gra.html

² https://drive.google.com/drive/folders/1KLEUnki07eh_HA6RxGmL-CWiR2vvgHWS?usp=sharing



Fig.2 485/RS232 to USB adapter

Table 2 Pin Sequence Description

PIN	Equipment wiring
GND	Ground line
B-/RX	RS485 B-
A+/TX	RS485 A+
5V	Device power supply

3.2. Connection Instructions

3.2.1. Connect by USB-RS232/485 Adapter

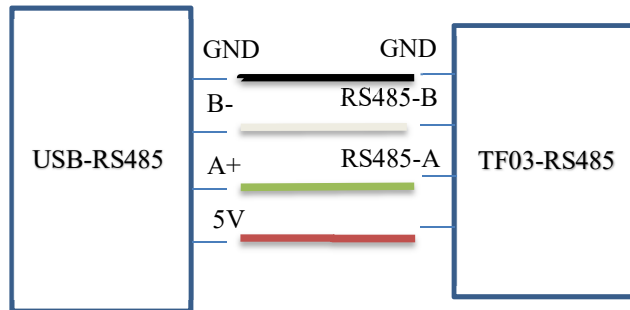


Fig.3 Interfacing USB-RS485 with TF03-RS485

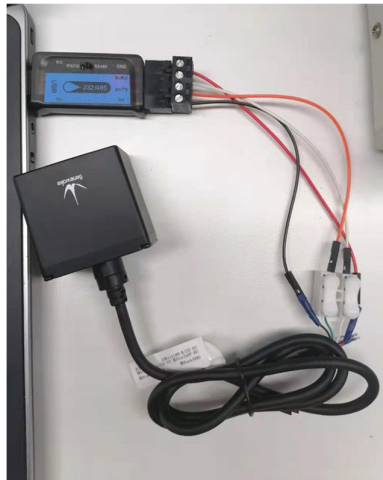


Fig.4 Interfacing USB-RS485 with TF03-RS485 (actual connection)

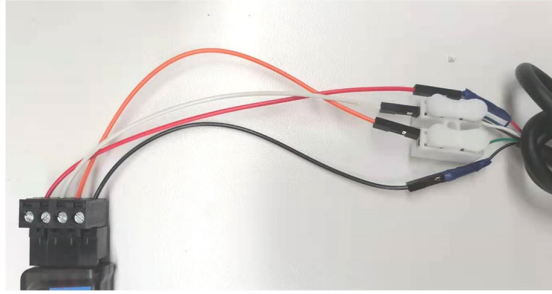


Fig.5 Interfacing USB-RS485 with TF03-RS485 (zoomed)

3.3. Test Steps

3.3.1. Get distance value

After RS485-USB, LiDAR and PC are connected, faint red light RS485 be seen from the LiDAR lens.



Fig.6 Lidar output red light

Open the software "WINCC_TF" to switch communication protocols:

- 1) Find "product" in the "Setting" and select TF03;
- 2) Choose the right "COM" port (The port number can be found in PC Settings->Devices->Bluetooth and other devices. If the adapter is not recognized, the drivers may not be installed, please install the driver);
- 3) Set baud rate to 115200 (TF03 default baud rate is 115200). Then click on "Connect" below and the software displays a graph of the measured distance data. For example, the current acquired distance value is 242cm and the signal strength is 277.

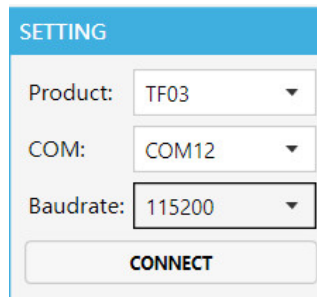


Fig.7 Parameter setting

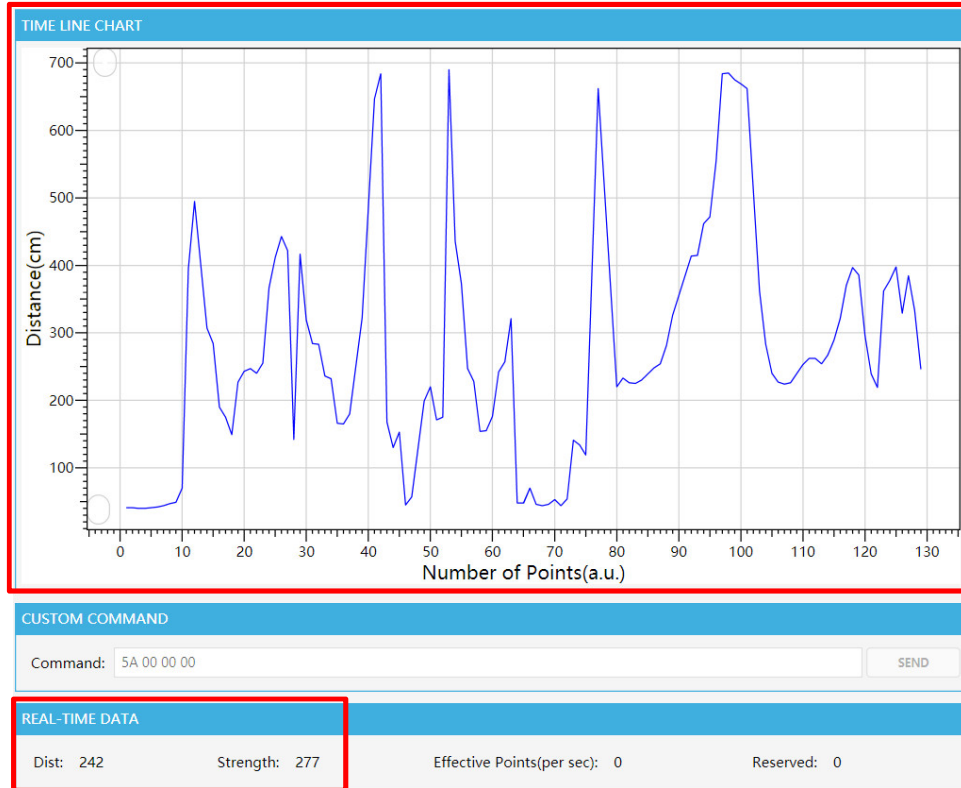


Fig.8 Display of LiDAR distance values

3.3.2. Enable Modbus Protocol

The TF03-RS485 uses the RS485 communication interface by default. To modify the baud rate for Modbus protocol, first enable the Modbus protocol with the Serial Assistant:

- 1) Open the Serial Assistant (any serial port utility can be used) and select right COM, and set the baud rate to 115200. Select Checksum as "None".

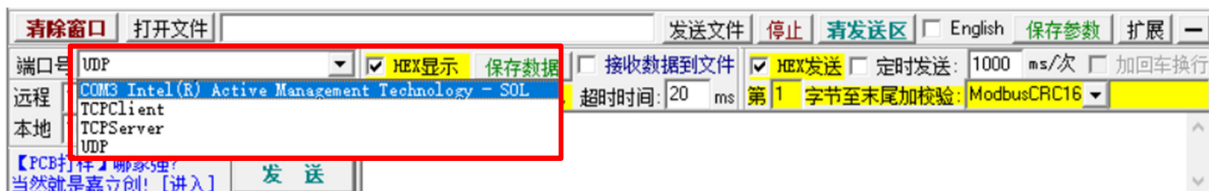


Fig.9 Select COM port



Fig.5 Parameter setting

- 2) Click "Expand" to open the Multi String Send window and send the command to enable the Modbus protocol. The commands are as follows:

Enable Modbus protocol: **5A 05 6F 00 CE**

Save configuration: **5A 04 11 6F**

Send the above commands in sequence. Then reboot the device to proceed to the next step.

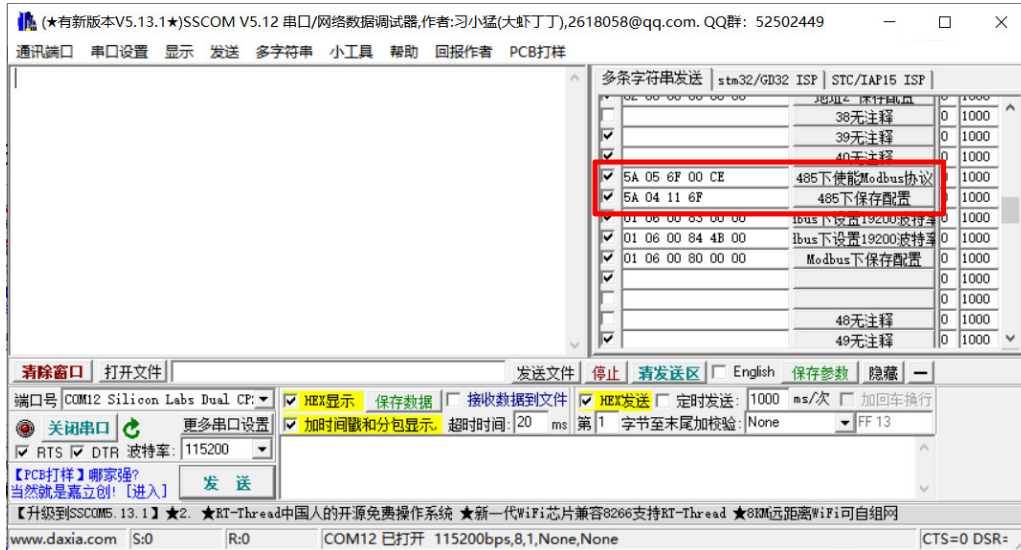


Fig.6 Enable Modbus protocol

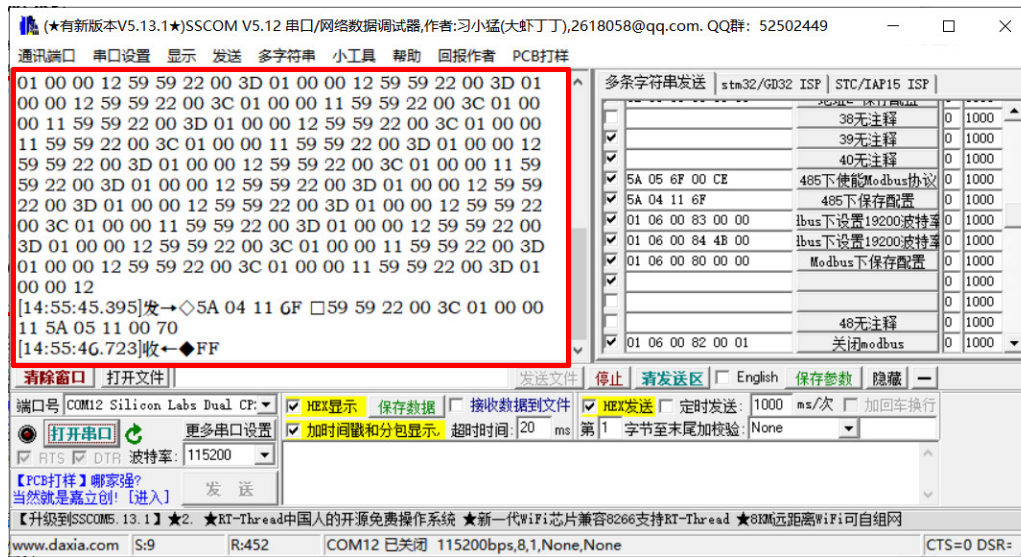


Fig.7 Returned values

3.3.3. Modify the Baud Rate (Modbus Protocol)

Open Serial Assistant, select "ModbusCRC16" for check bit. COM port number and baud rate as above.

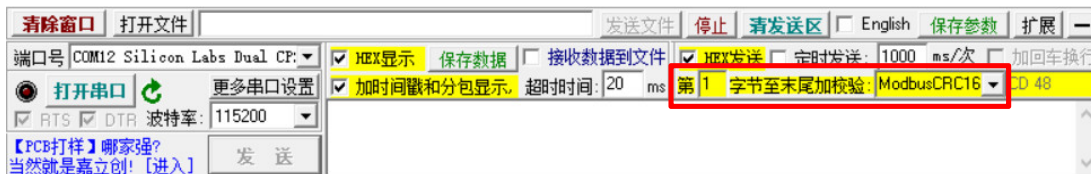


Fig.8 Select "ModbusCRC16" for check bit

To verify whether Modbus is enabled, we send the Get Distance Value command: **01 03 00 00 00 01 84 0A**. If the format of the returned value is: 01 03 02 DH DL CL CH (DH and DL are the high 8bit and low 8bit of Dist respectively; CL and CH are the low 8bit and high 8bit of CRC respectively), and the distance value is correct, it indicates that the Modbus protocol has been successfully enabled.

```
[14:59:58.255]发->◇01 03 00 00 00 01 84 0A □
[14:59:58.260]收←◆01 03 02 00 27 F8 5E
```

Fig.9 Get the distance value (Modbus)

TF03-RS485 only supports common serial port baud rate: 9600, 14400, 19200, 38400, 56000, 57600, 115200, 128000, 230400, 256000, 460800, 500000, 512000, 600000, 750000, 921600, and 1000000. If other baud rates are set, LiDAR will automatically set 115200.

The format of the command to modify the baud rate is:

01 06 00 83 BH1 BH2

01 06 00 84 BL1 BL2

BH1, BH2, BL1, BL2 are the high, secondary high, low and secondary low bytes of the baud rate (HEX). To set the baud rate to 19200 as an example, 19200 (DEC) = 00004B00 (HEX), then BH1=00 BH2=00 BL1=4B BL2=00. The commands are as follows:

Command 1: **01 06 00 83 00 00**

Command 2: **01 06 00 84 4B 00**

Save configuration: **01 06 00 80 00 00 88 22**

Send the commands, then reboot the LiDAR.

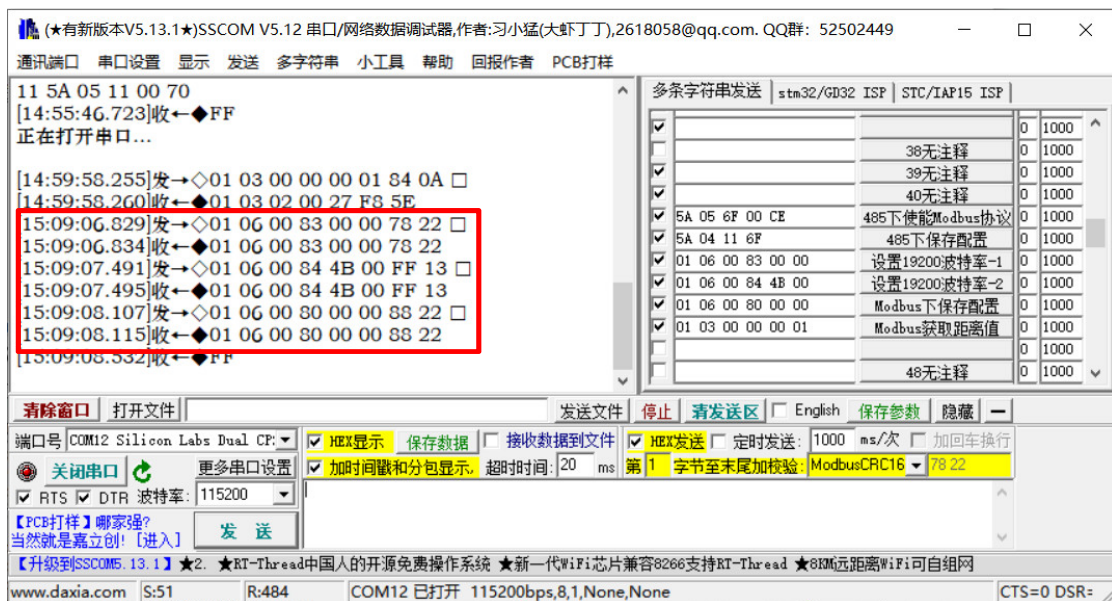


Fig.10 Set baud rate to 19200

3.3.4. Modify address field (Modbus)

Open the Serial Assistant and select the correct baud rate. The format of the command to modify device address field is: 01 06 00 85 IH IL CL CH. In this commands format IH and IL are the high byte and low byte of the ID.

For example, to modify the device address to 2, so IH=00, IL=02, the command would be: **01 06 00 85 00 02 19 E2** (CL=19 CH=E2). Send this command, then save the configuration: **01 06 00 80 00 00 88 22**. The address change takes effect after the device has been rebooted.

```
[15:22:44.750]发->◇01 06 00 85 00 02 19 E2 □
[15:22:44.760]收-<◇01 06 00 85 00 02 19 E2
[15:23:05.494]发->◇01 06 00 80 00 00 88 22 □
[15:23:05.515]收-<◇01 06 00 80 00 00 88 22
```

Fig.11 Modify the address to 2

For more details, please refer to the *TF03 RS485-RS232 manual*. The same method can be followed for the rest of the commands.