

# 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





# 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

<sup>&</sup>lt;sup>1</sup> <u>https://www.sluuf.com/lang\_en/buy/115591/Youyun-USB-to-RS485-converter-TTL-serial-port-industrial-gra.html</u>

<sup>&</sup>lt;sup>2</sup> <u>https://drive.google.com/drive/folders/1KLEUnki07eh\_HA6RxGmL-CWiR2vvgHWS?usp=sharing</u>





Fig.2 485/RS232 to USB adapter

Table 2 F	Din Ser		Descri	ntion
	III Sec	luence	Descii	μισπ

PIN	Equipment wiring
	Ground line
B-/RX	RS485 B-
	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;
- 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.

Product:	TF03	•
COM:	COM12	•
Baudrate:	115200	•

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".

清	<b>余窗口</b> 打开文件		-
端口	문 WDP 👤	7 HEX显示 保存数据 □ 接收数据到文件 ☑ HEX发送 □ 定时发送: 1000 ms/次 □ 加回车换	行
远程	COM3 Intel(R) Active Management	Technology - SOL 超时时间: 20 ms 第 1 字节至末尾加校验: ModbusCRC16 -	
本地	TCPServer		^
【PCI 当然	时]存了哪多短: 就是嘉立创! [进入] 发送		~
		Fig.9 Select COM port	
	<b>清除窗口</b> 打开文件	发送文件 停止 <b>青发送区</b> [ English 保存参数 ] 扩展 —	
	端口号 COM12 Silicon Labs Dual CP:-	✓ HEX显示 保存数据 F 接收数据到文件 / HEX发送 F 完时发送 1000 ms/次 F 如四年换行	
	美闭串口 之 更多串口设置	✓ 加时间戳和分包显示, 超时时间: 20 ms 第 1 字节至末尾加校验: None _ FF 13	
	▼ RTS ▼ DTR 波特率: 115200 ▼	^	
-	▲「CDF] 件】 卿参短( 当然就是喜立句) 「讲入] 发送	~	

Fig.5 Parameter setting

 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.



[ (★有新	版本V5.13.1	1★)SSC	OM V5	.12 串口/0	网络数据训	司试器,作	作者:习小猛	(大虾丁丁),2	51805	i8@qq.com. QQ群:5250	)2449 —		2	×
通讯端口	串口设置	显示	发送	多字符串	小工具	帮助	回报作者	PCB打样						
								1	多	条字符串发送   stm32/GD32	ISP   STC/IAP15 ISP			
									IF	02 00 00 00 00 00	<u>地址4</u> 床1开到显 38天注释	F	1000	^
									<b>v</b>		39无注释	0	1000	·
									2		40天注释		1000	
										5A 05 6F 00 CE	485下使能Modbus协议		1000	
									Ľ	5A U4 11 6F		-	1000	
										01 06 00 84 4B 00	ibus下设置19200波特型	0	1000	
									7	01 06 00 80 00 00	Modbus下保存配置	0	1000	
									P				1000	
									IF.			0	1000	
												╠	1000	~
state stern								11222 - 41	<u> </u>		**/G±4	1	1	_
消除菌口	<u>1</u>	11					1	友医又件	17511	<b>清友</b> 医区   English	【保存参数   隐藏   一			_
端口号 COM	12 Silicon	Labs D	ual CP:	▼ <del>▼</del> HE	<u>喝示 </u> _ (	保存数据	■ □ 接收	数据到文件	HE	【发送 □ 定时发送: 1000	ms/次 □ 加回车换行			
(1) 关闭	串口 🕑	更多	串口设:	희 [오 加	时间戳和分	)包显力	<mark>下,</mark> 超时时间	]: 20 ms	第 1	字节至末尾加校验: None	FF 13	J.		
RTS 🔽	DTR 波特型	氧:  1152	200	-							^			
【PCB打样】 当然就是嘉	哪家强? 立创![进入	ן צ	发送								~			
【升级到SS	COM5.13.1 🕽	★2. ★	RT-Thr	ead中国人	的开源免	费操作	系统 ★新一	代WiFi芯片	兼容82	66支持RT-Thread ★8KM远;	距离WiFi可自组网			
www.daxia	.com S:0		R:0		COM12	已打开	115200bp	s,8,1,None	None	ł.	C	TS=	0 DSF	1=

Fig.6 Enable Modbus protocol

Land Land Land Land Land Land Land Land		ı x	
通讯端口 串口设置 显示 发送 多字符串 小工具 帮助 回报作者 PCB打样			
01 00 00 12 59 59 22 00 3D 01 00 00 12 59 59 22 00 3D 01 🔥 多条字符串发送   stm32/GD32 ISP   STC/IAP15	ISP		
00 00 12 59 59 22 00 3C 01 00 00 11 59 59 22 00 3C 01 00	<u></u>		1
00 11 59 59 22 00 3D 01 00 00 12 59 59 22 00 3C 01 00 00	0	1000	-
11 59 59 22 00 3C 01 00 00 11 59 59 22 00 3D 01 00 00 12	0	1000	
59 59 22 00 3D 01 00 00 12 59 59 22 00 3C 01 00 00 11 59	0	1000	
59 22 00 3D 01 00 00 12 59 59 22 00 3D 01 00 00 12 59 59 V 5A 05 6F 00 CE 485下使能机odbu	s协议 0	1000	
22 00 3D 01 00 00 12 59 59 22 00 3D 01 00 00 12 59 59 22 V 5A 04 11 6F 485下保存配	置回	1000	-1
00 3C 01 00 00 11 59 59 22 00 3D 01 00 00 12 59 59 22 00 ▼ 01 06 00 83 00 00 Ibus下设置19200	波特季 0	1000	
3D 01 00 00 12 59 59 22 00 3C 01 00 00 11 59 59 22 00 3D ▼ 01 06 00 84 48 00 Ibus下设置19200	波特季 0	1000	
01 00 00 12 59 59 52 20 3C 01 00 00 11 59 59 22 00 3D 01 ▼ 01 06 00 80 00 00 Modbus下保存	記置の	1000	
	0	1000	
[14:55:45 395] #→ <>54.04 11 GF □ 59.59 22:00 3C 01:00:00	0	1000	
11.54.05.11.07.0	0	1000	
[14:55:46 723]///→ FF 201 06 00 82 00 01 关闭modbu	. 0	1000 -	-11
			-
【 <u>清除窗口</u> 】 <u>打开文件</u> 】			
端口号 COM12 Silicon Labs Dual CP: 🚽 🔽 HEX显示 🛛 保存数据 🔽 接收数据到文件 🔽 HEX发送 🔽 定时发送: 1000 ms/次 🗌 加回2	E换行		
● 町田田口 → 更多串口设置 ✓ 加时间職和分包昇示, 超时时间: 20 ms 第1 字节至末尾加校验: None ▼			
	~		
Krubi H-1 柳刻理()  当然就是嘉立创![进入]发送	~		
【升级到SSCOM5.13.1】★2. ★RT-Thread中国人的开源免费操作系统 ★新一代WiFi芯片兼容8266支持RT-Thread ★8RM远距离WiFi可自组网			
www.daxia.com S:9 R:452 COM12 已关闭 115200bps,8,1,None,None	CTS	=0 DSR=	1

#### 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.

<b>清除窗口</b> 打开文件		发送文件 停止 <b>清发送区 English 保存参数 扩展</b>	<u> </u>
端口号 COM12 Silicon La	bs Dual CP: 💌	☑ HEX显示 保存数据 □ 接收数据到文件 ☑ HEX发送 □ 完时发送: 1000 ms/次 □ 加回	车换行
打开串口	更多串口设置	✓ 加时间戳和分包显示, 超时时间: 20 ms 第 1 字节至末尾加校验: ModbusCRC16 ▼ CD 46	3
☑ RTS ☑ DTR 波特率:	115200 💌		^
【PCB打样】哪家强? 当然就是嘉立创! [进入]	发送		~

#### 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.

L (★有新版本V5.13.1★)SSCOM V5.12 串口/网络数据调试器,作者:习小猛(大虾丁丁),2618058@qq.com. QQ群: 52502449 —		>	×
通讯端口 串口设置 显示 发送 多字符串 小工具 帮助 回报作者 PCB打样			
11 5A 05 11 00 70			
[14:55:46.723]收←◆FF	F	1000	~
正在打开串口 10 38天注释 38天注释	0	1000	
	0	1000	
[14:59:58:260]收 ← 01 03 02 00 27 F8 5F 40元注释	0	1000	
15:09:06.8291岁→◇01 06 00 83 00 00 78 22 □	0	1000	
15:09:06.834收 ← ●01 06 00 83 00 00 78 22	0	1000	
15:09:07.491 发→◇01 06 00 84 4B 00 FF 13 □	0	1000	
15:09:07.495]收←◆01 06 00 84 4B 00 FF 13	L-	1000	
15:09:08.107) 发→◇01 06 00 80 00 00 88 22 □		1000	
	6	1000	
[15:09:08.532]版←●FF 48无注释 48无注释	O	1000	~
<b>清除窗口</b> 打开文件 发送文件 停止 清发送区 □ English 保存参数 隐藏 —			
端口号 COM12 Silicon Labs Dual CF:▼ ▼ 1000 ms/次 F 加容表示 保存教报 F 接收数据到文件 ▼ 1000 kg F 定时发送: 1000 ms/次 F 加回车换行			
● 美词串口  ⑦ 更多串口设置 □ 加时间戳和分包显示。超时时间: 20 ms 第 1 字节至末尾加按验: ModbusCRC16 - 78 22 □ 78 22 □ 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
▼ RTS ▼ DTR 波特率: 115200 ▼			
【PCB打样】哪家强? 当然就是嘉立创! [进入] 发送			
【升级到SSCOM5.13.1】★2. ★RT-Thread中国人的开源免费操作系统 ★新一代WiFi芯片兼容8266支持RT-Thread ★8RM远距离WiFi可自组网			
www.daxia.com S:51 R:484 COM12 已打开 115200bps,8,1,None,None C	rs=(	D DSR	= //

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.