



TP-BT-Pro User Manual

Dear Customers,

Thank you for your purchase, and congratulations on choosing our product.

This patented Bluetooth Optical Probe has been designed to meet your expectations for compatibility with electricity, water, gas, and heat meters in compliance with IEC62056-21, ANSI, and ANSI-Type2 standards. It is manufactured using high-quality materials and undergoes strict quality control throughout the entire production process.

This user manual is provided to guide you in using and programming the device.

To ensure optimal performance and efficiency, we highly recommend that you read the entire user manual carefully before using the product. Please retain this manual for future reference. If you pass the product on to another user, kindly ensure the manual is included.

About TP-BT-Pro

TP-BT-Pro Bluetooth optical probe supports Classic Bluetooth and Bluetooth LE 5.4, with a low-power chip, the battery life is extended multiple times, lasting up to a month on a single charge. It features 30-minutes PD fastcharging, a Type-C port, an LED flashlight, and IP65 durability. With a silicone protective case and Bluetooth OTA updates, it is compatible with IEC, ANSI, and DL/T-645 protocols for global use. Certified by the Bluetooth SIG, our product ensures high quality and reliability.



Fig.1 Standard Support

Items in package

The package includes 5 configured accessories, which are also available as separate spare parts. For additional spare parts, please contact Tespro China. As these accessories are custom-designed, they cannot be supplied by other manufacturers.



Fig.2 Accessories

1. Charger Adapter

To charge the Bluetooth optical probe

2. Charger-Cable

Work as a charging cable

3. Satety Strap

To easily carry and to prevent accidental fall

4. USB Data Cable(Optional)

To communicate when TP-BT-Pro works as an USB probe

5. Protective Case

Silicone protective cover, shockproof and drop-resistant, provides enhanced protection for the Bluetooth optical probe.

Overview

The TP-USB-Pro is a high-performance optical probe for smart metering, offering seamless data communication and calibration. Compact and user-friendly, it supports both USB and Bluetooth connectivity, featuring dual modes with BLE (Bluetooth Low Energy) for extended battery life and SPP (Classic Bluetooth) for versatile communication. Key features include long battery life, fast charging, IP65 waterproof rating with a Type-C charging port, built-in flashlight, and OTA wireless firmware upgrades. The device is equipped with a durable silicone protective cover for shock resistance, ensuring reliable performance. The TP-USB-Pro is the ideal tool for efficient meter testing, data management, and long-lasting performance.

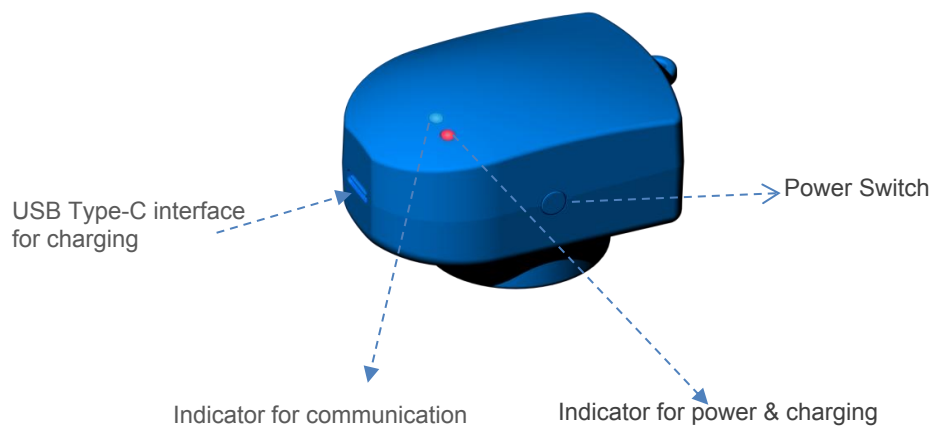


Fig.3 Component descriptions

Bluetooth Indicator Definitions

1. Probe States:

- Standby: When power-on the power indicator lights up in green.
- When the device is powered on, a single green light flash indicates that the current operating mode is Classic Bluetooth (SPP). If there is no flash, the current operating mode is Low Energy Bluetooth (BLE).
- 5 seconds after startup, the green light enters the connection detection status. If the optical probe is not connected, the green light will flash at 1-second intervals. Once the Bluetooth connection is established, the green light will remain steadily on.
- Communication: During communication the green LED stays on.

2. Power Switch

- A short press and hold for 3 seconds will make the green light remain on, indicating that the device has finished powering on.
- A short press and hold for 3 seconds will cause the green light to turn off, indicating that the device has finished powering off.
- Automatic shutdown: The device will automatically power off if there is no communication for 5 minutes (shutdown time can be configured).

3. Flashlight Function:

- Double-click the power button to turn on the flashlight mode.
- Double-click the power button to turn off the flashlight.

4. Indicator for power & charging

- Charging: During charging the power indicator turns red.
- During charging, the green light will be off. Once charging is complete, the red light will turn off, and the green light will resume normal indication.

5. Indicator for communication

- The blue light is the data transmission indicator, and the yellow light is the data reception indicator. The blue light will flash when the optical probe is sending data, and the yellow light will flash when it is receiving data.

6. USB Type-C port for charging

- A. Interface for charging
- B. Interface to let TP-BT-Pro work as USB probe using data cable

7. Battery indication and charging

Power-on and battery states can be indicated by the red LED:

- When the probe power on the red LED lights up in different conditions to show the remains of energy in battery:
 1. If the battery level is above 30%, the red light will not be illuminated.
 2. If the battery level is between 20% and 30%, the red light will flash 3 times.
 3. If the battery level is between 10% and 20%, the red light will flash 2 times.
 4. If the battery level is between 0% and 10%, the red light will flash 1 time.

8. Charging

- The red light turns on, and the green light turns off.
- Once charging is complete, the red light turns off, and the green light resumes its normal sampling state .

9. Bluetooth Probe Pairing in BLE mode

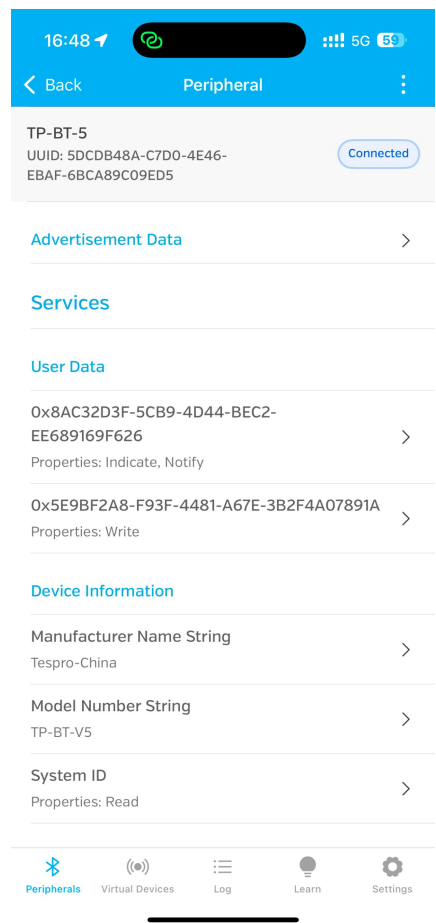


Fig.4 Bluetooth Probe Pairing in IOS System (BLE mode)

Note: BLE Service List:

User Data: UUID = 181C Includes:

- Data Subscription Reception Service: UUID = 0x8AC32D3F-5CB9-4D44-BEC2-EE689169F626
- Data Writing and Sending Service: UUID = 0x5E9BF2A8-F93F-4481-A67E-3B2F4A07891A

Device Information: UUID = 180A Includes:

- Manufacturer Name String: UUID = 2A29
- Model Number String: UUID = 2A24
- System ID: UUID = 2A23

Battery Service: UUID = 181C Includes:

- Battery Level: UUID = 2A19

OTA Service: UUID = AE5D1E47-5C13-43A0-8635-82AD38A1381F Includes:

- Data Subscription Reception Service: UUID = 0xA3DD50BF-F7A7-4E99-838E-570A086C661B
- Data Sending Service: UUID = 0xA2E86C7A-D961-4091-B74F-2409E72EFE26

Technical Specifications

Items	Features
Communication Interface	BLE and SPP dual-mode
Supported Standard	IEC-62056, ANSI, and DL/T-645 protocols, fitting global meter standards
Battery Feature	800/1000 mAh (Optional)
Battery Charging Time	30 mins-2C PD Fast Charge
Computer Communication Port	Type C- USB 3.0/ OTG
Sensor Light Wave Length	~ 900 nm.
Number Of Keys	1 Keys (Power)
LED Indicators	4 LEDS (Power/ Communication/ Charg/ BLE)
Magnet Holding Power	N40 / N54 (Optional)
Maximum Data Rate	57600 in normal and max.115200 available
USB Connection Optical Probe Model	Supported(Add Data Cable)
Width & Height	31,5 mm / 33,5 mm
Weight	65 gr
Transparent Communication Mode	IEC 62056-21 Mode C / Mode E /User Mode ANSI C12.18 / ANSI C12.18-2006 type2
Smart Communication Mode	There is (IEC 62056-21 Mode C / Mode E)
Maximum Frame Length(MTU)	512 bytes
Silicone Protection	Yes (Included)
Safety Strap	Yes (Included)
Working Environment	-40 ° C - +70 ° C
Enclosure Material	PC
Protection Class	IP 65
Firmware And Configuration Update	OTA
Working Days	Max 100 hours
Standby Time	~1 Year
LED Flashlight	Yes (Include)
Auto power-off	Default auto power-off after 5 minutes (adjustable)

AT Command Protocol

The TP-BT-Pro optical probe supports an integrated AT protocol stack for configuring internal parameters. By default, the AT command support is disabled. To enable the AT command support, you need to send the following command via Bluetooth: `at+open=1\r\n`. Once the probe receives this command, it will return: `ok`. This indicates that the AT command support has been enabled.

Note: Each AT command must end with a carriage return and newline (`\r\n`: 0x0D 0x0A). If you're unsure how to use the commands, simply enter: `at+help\r\n`

The device will return help information.

Help Command: `at+help\r\n`

Return: [Help Information]

AT --> Test command

AT+HELP --> AT command help

AT+OPEN --> Turn on or off AT command support = 0|1

AT+TRACE --> Turn on or off log = 0|1

AT+BLEOPEN --> Turn on or off BLE support = 0|1

AT+SPPOPEN --> Turn on or off SPP support = 0|1

AT+SPPNAME --> Set SPP Adv name = xxxxxxxx

AT+BLENAM --> Set BLE Adv name = xxxxxxxx

AT+BLEPINOPEN --> Turn on or off BLE pairing password = 0|1

AT+SPPPINOPEN --> Turn on or off SPP pairing password = 0|1

AT+BLEPIN --> Set BLE pairing code = 123456

AT+SPPPIN --> Set SPP pairing code = 1234

AT+VER --> software version =?

AT+TXPOWER --> Set the transmit power = 0|1|2|3|4

AT+ADVTXPOWER --> Set the broadcast transmit power = 0|1|2|3|4

AT+INITUART --> Default optical port baud rate =9600,N,8,0

AT+SETUART --> Configure the optical current baud rate =9600,N,8,0

AT+CNTSTOPADV --> Stop broadcasting immediately after connection = 0|1

AT+IEC --> Configure IEC on or off = 0|1

AT+IECSTARTUART --> Configure IEC start communication baud rate
=9600,N,8,0

AT+IECACKUART --> Configure IEC Ack baud rate after handshake
=9600,N,8,0

AT+ANSI --> Configure ANSI on or off = 0|1

AT+IRDA --> Configure IRDA on or off, current not support = 0|1

AT+LG --> Configure LG private protocol = 0|1

AT+FrameMAX --> Maximum data frame buffer size = xx

AT+FrameMIN --> Minimum data frame buffer size = xx

AT+BROADCASTTIME --> Broadcast time, default 300s = 300

AT+SLEEPTIME --> Time of enter sleep mode without data = 300

AT+IECRESEND --> Configure IEC start cmd Resend on or off = 0|1

AT+BDAOPEN --> Configure BDA white List on or off = 0|1

AT+BDA --> Configure white BDA = 112233AABBFF

AT+HELP --> AT help

Note: For detailed instructions on how to use the AT commands, please refer to the help documentation.

Firmware Update

The TP-BT-Pro optical probe supports Over-the-Air (OTA) wireless firmware updates. If the customer requires adjustments or improvements to the probe's firmware, they can contact Tespro China for custom firmware solutions. Once the latest firmware is provided, customers can use the OTA method for upgrading. We offer professional OTA update tools, which support both Android and iOS platforms.



Fig. 5: Bluetooth Probe OTA Tools (BLE mode)

Application SDK

The TP-BT-Pro optical probe provides BLE SDK examples for both Android and iOS. These are Java source code samples that allow customers to quickly integrate Bluetooth functionality into their own applications.



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