TOPFLYtech **T-Hub** BLE I/O extender

For I/O addition to BLE devices

User Manual

20240808

Contents

Document Purpose

The purpose of this user manual is to provide information about the TOPFLYtech T-Hub I/O extender. It covers the main features of the device and instructions for its use.

TOPFLYtech may make changes to the specifications and features of this manual without prior notice.

Legal Information

Document Version and History

20240808	First version

Safety Information

The following information is provided to ensure safe operation of the device. Please read them carefully before starting to use the device:

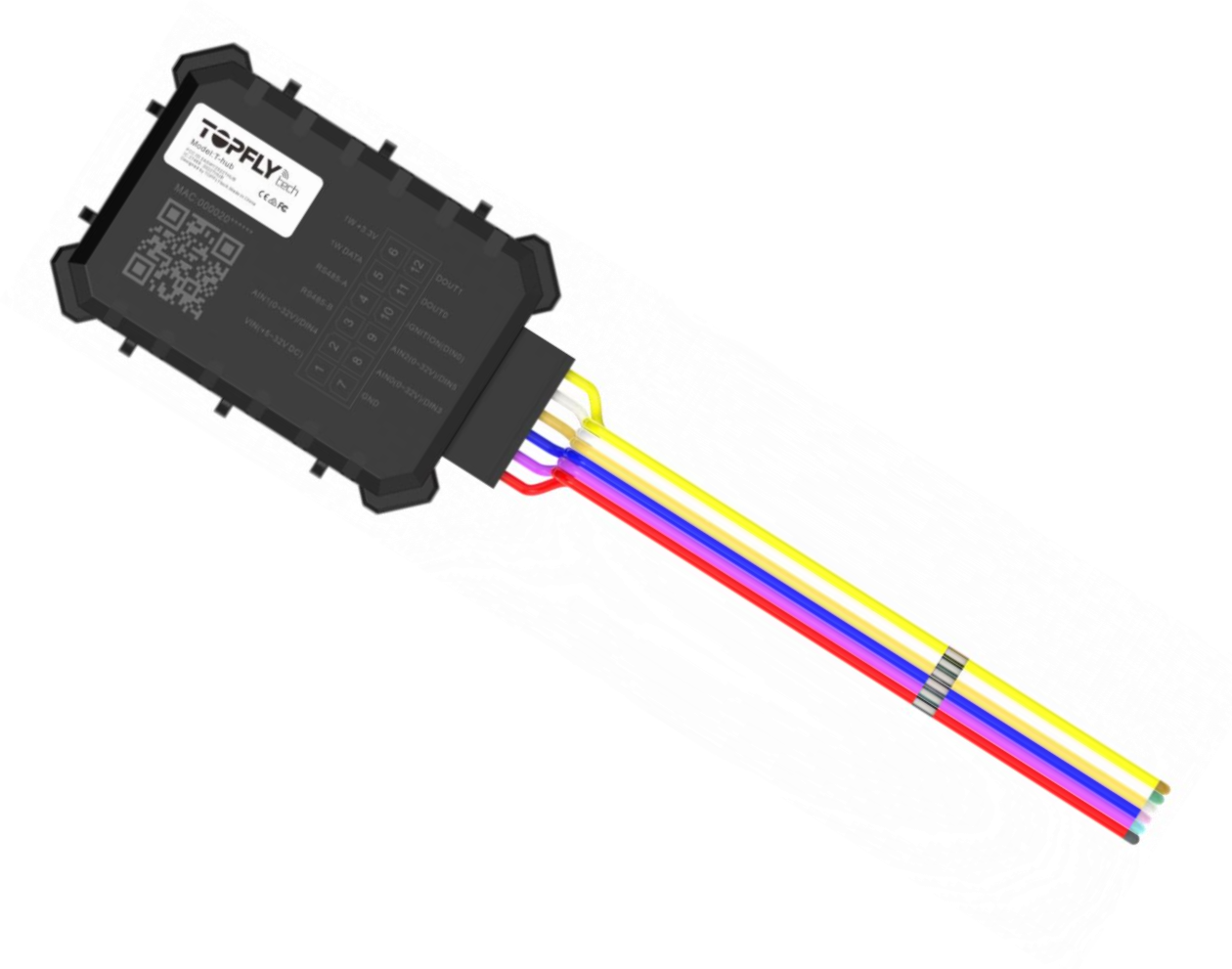
- Do not disassemble the device. If the device case is damaged or the insulation of the wires is compromised, disconnect the power cables from the power supply first.
- It is important to remember that all wireless data transmission devices generate interference that can affect other devices nearby.
- Installation or dismantling of the device should only be carried out by qualified personnel.
- The device must be securely fixed as described in the installation instructions.
- Configuration must be carried out using a second safety class computer with an independent power supply.
- Ensure that the device is installed in a location that is protected from adverse environmental conditions for long periods.
- Dispose of used batteries in accordance with environmental regulations.
- For configuration, use quality, certified cables. TOPFLYtech accepts no liability for damage or loss resulting from the use of unsuitable cables.
- Caution! Do not incorrectly connect the wires marked red (positive power supply) and black (negative/chassis) to the wrong poles of the battery. The device has reverse polarity protection, but if connected improperly, the device will not work.
- Disconnect the device from the power supply before disassembling it to insert or replace the SIM card.
- To disconnect the device from the power supply, you need to unplug the device's 6-pin connector or disconnect the wires from the vehicle's power supply.
- Make sure that the cross-sectional area of the wires is at least 18 AWG (0.75 mm^2).
- Use good splicing techniques as crimping or soldering.
- Install the device in a restricted-access location that is not visible or easily accessible to the driver.
- Waste from the equipment must not be disposed of with household waste. The product must be sent to specific collection points at the end of its useful life.

Acronyms and abbreviations

2G - Second generation cellular technology
3G - Third generation cellular technology
4G – Fourth generation cellular technology
AC/DC - Alternating current/Direct current
AIN - Analog input
APN - Access point name
CAN - Controller area network
DIN - Digital input
DOUT - Digital output
FMS - Fleet management system
FW - Firmware
HDOP - Precision horizontal dilution
GLONASS - Global Navigation Satellite System
GMT - Greenwich Mean Time
GNSS - Global Navigation Satellite System
GPRS - General Packet Radio Service
GPS - Global Positioning System
GSM - Global System for Mobile Communications
IP - Internet protocol (address)
OBD - On-board diagnostics
OTA – Over-the-air
LED - Light Emitting Diode
LTE - Long Term Evolution
PCB - Printed Circuit Board
SMS - Short Message Service
SW - Single-Wire or Software or Switch
TCP - Transmission Control Protocol
UDP - User Datagram Protocol
UMTS - Universal Mobile Telecommunications System
USB - Universal Serial Bus
VCOM - Virtual communication port

About this device

TopFlyTECH's T-Hub compact device is a versatile BLE-based I/O extender designed to be used for a wide range of fleet management, tracking, security and safety functions. The T-Hub incorporates state-of-the-art solid-state electronics and a micro controller, enabling the precise collection of inputs and outputs and the efficient transfer of this data via BLE 5.1 to listening devices. This provides customers with cost-effective and secure control. Its rugged and compact IP42-rated enclosure has made it a popular choice in a variety of sectors, including commercial transportation, corporate fleet management, logistics, heavy machinery, shipping and more. The T-Hub I/O extender is a complete product that meets the diverse needs of customized solutions. It provides the customer with a cost-effective, efficient and safe environment remote monitoring method. It's suitable for using in commercial cold-chain transport/storage and other segments.



Product Specifications

General Specifications	
Ingress Protection Rating	IP42
Dimensions	40x56x15.5mm (1.57x2.2x0.61”)
Weight	22g (0.77 oz)
Operating Temperature	-20°C ~ +80°C (-22°F ~ 176°F)
Power Output (dBm)	-20, -16, -12, -8, -4, 0, 4, 8 (default: 4dBm)
BLE Long Range	Yes
Transmission Range (BLE 5.1)	- Up to 200m (656 ft) (Open Field, Power: 4 dBm (BLE5.1) - Up to 400m (1312 ft) (Open Field, Power: 8 dBm, BLE5.1)
DOUT max current	200 mA each
1-Wire Pull-up	Disabled, weak, strong
1-Wire Power supply	+3.3V DC @ 50mA
RS485 Baud rates	1200, 2400, 4800, 9600, 14400, 19200, 28800, 31250, 38400, 56000, 57600, 76800, 115200, 230400, 250000
Interfaces	
Digital Input (DIN)	Up to 4 (1 for ACC)
Analog Input (AIN)	Up to 3
Communication ports	RS485: 1 1-Wire: 1
Programming port	Virtual (Bluetooth app)
Power supply	Micro USB or +5~32V DC supply
Diagnostic LED	1, red, switchable

Individual device ID

Every T-Hub has a laser engraved MAC address both human readable and in a QR code format.

Electrical Connections

The wiring harness for the T-Hub is 600mm long and consists of 6 color coded conductors. It is equipped with a 6-position Micro-fit connector. The numbering is viewed from the back (wire side) of the harness connector.

PIN	COLOR	FUNCTION			
1	Red	Vin (5-32V DC)	**7**	Black	GND
2	Purple	AIN1/DIN4	**8**	Light blue	AIN0/DIN3
3	Blue	RS485-B	**9**	Pink	AIN2/DIN5
4	Orange	RS485-B	**10**	White	DIN0 (ACC)
5	Gray	1-Wire Data	**11**	Green	DOUT0
6	Yellow	1-Wire +3.3V	**12**	Brown	DOUT1

First Steps

Powering on

Connect the USB cable or wire the device to the vehicle battery/bench power supply.

Powering off

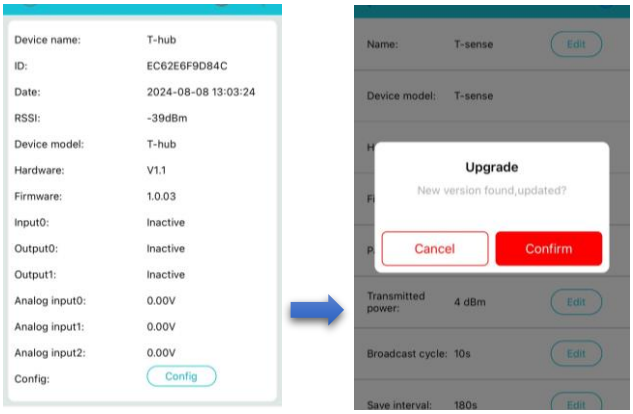
The device will power off when the power supply is interrupted, as there is no internal battery.

Reading sensor information through cellphone

1. Install the app called “TFTBLE” from Google Play or Apple app store.
2. Turn on the cellphone Bluetooth.
3. Run “TFTBLE” app and allow all the permissions it needs.
4. Power on the sensor by following the steps above (Powering on)
5. Find the device model which named as “T-Hub” or by the MAC address.
6. The sensor ID will be shown in the app. It also can be got by scanning the QR code on product label.

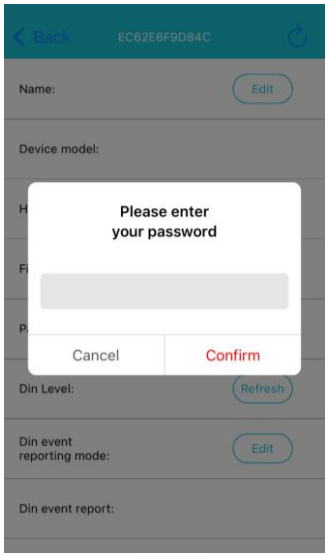
How to upgrade the hub firmware

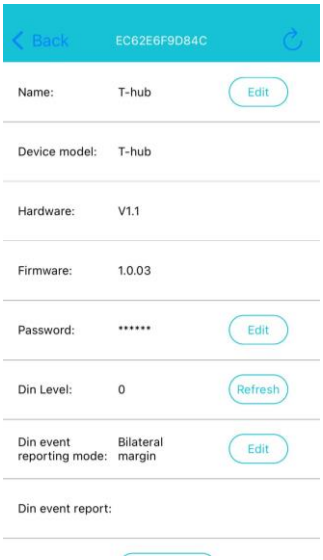
1. Click “Config” button.
2. If there is a new version firmware, the app will show an upgrade button.
3. Tap “Confirm” to upgrade the firmware.
4. Wait for a while. In the process of updating, please keep the cellphone close to the sensor.



How to configure the hub by cellphone

1. Run TFTBLE app, find your device, and click the “Config” button.
2. Input the password. The default password is 654321.
3. Then you can change any configuration.





How to connect to a TOPFLYtech tracker

Add the T-Hub to a transparent channel:

```
BLEIDA,0000,MAC,12#
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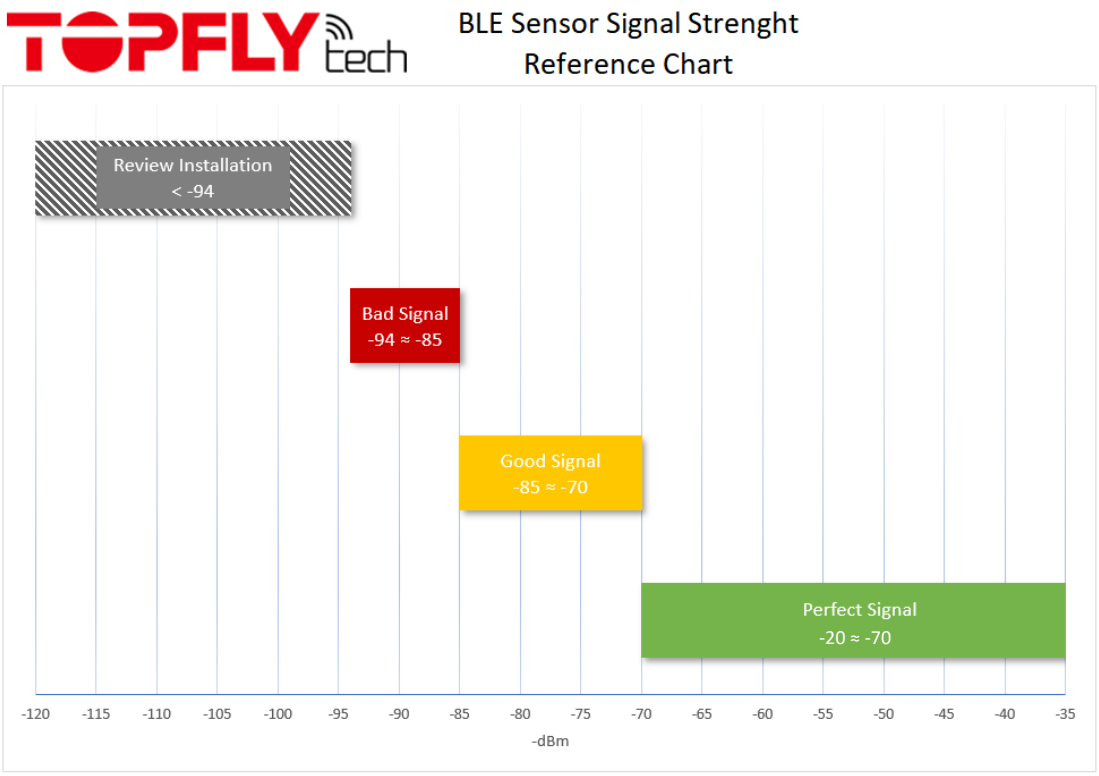
Where 0000 is your default password and MAC is the device's MAC address.
Messages will be sent in transparent mode and its

Connect the sensor to another 3rd party device

Please contact TOPFLYtech if you want to use this sensor with a 3rd party BLE device.

BLE sensor Signal Strength reference Chart



TFT BLE app iOS

https://apps.apple.com/au/app/tftble/id1493908098

TFT BLE app Android

https://play.google.com/store/apps/details?id=com.topflytech.tftble

Quick Troubleshooting

1.1 The APP shows “Loading” all the time

- Terminate the app.
- Check the cellphone Bluetooth status and make sure it is on.
- Make sure all the permissions of the APP are given to app. You can enter <Settings>-<Permissions> to manage it.
- Put the sensor close to the cellphone then run TFTBLE APP again.

Warranty and stocking

The standard warranty for our product lasts for 12 months starting from the date of purchase. To ensure the longevity of your tracker, especially if you plan to store it for an extended period, we recommend a specific maintenance procedure.

If you anticipate leaving the tracker unused for a while, it's advisable to connect it to an external power source and recharge the internal battery for a continuous period of 10 hours every 3 months. This proactive measure will significantly contribute to preserving the lifespan of the internal battery.

FCC Warning

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two

conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation

Caution!

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

IMPORTANT NOTICE:

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

ISEDC Warning

This device complies with Innovation, Science, and Economic Development Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d' Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) l'appareil nedoit pas produire de brouillage, et

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

The device is compliance with RF exposure guidelines, users can obtain Canadian information on RF exposure and compliance.The minimum distance from body to use the device is 20cm.

Le présent appareil est conforme Après examen de ce matériel aux conformité ou aux limites d’intensité de champ RF, les utilisateurs peuvent sur l’exposition aux radiofréquences et la conformité and compliance d’acquérir les informations correspondantes. La distance minimale du corps à utiliser le dispositif est de 20cm.