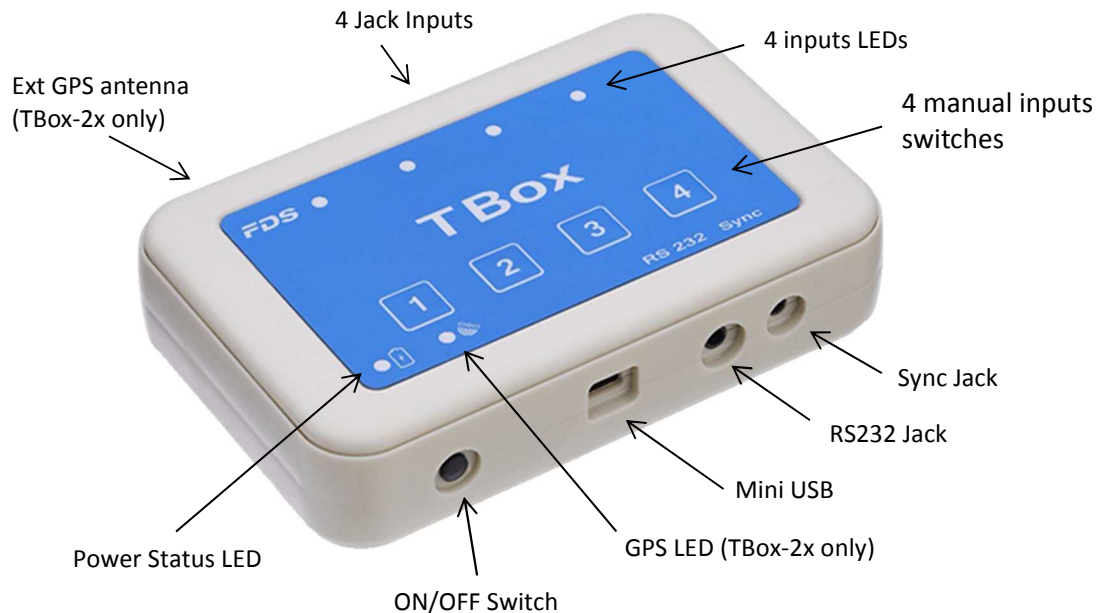


1. Appearance



2. Power ON/OFF

The ON/OFF switch has 3 functions:

1) Switch ON / OFF the TBox

- a) Press briefly the ON/OFF button (0.5s – 1.5s) until the battery status is indicated on the Input's LED's 1 – 4
- b) Release the ON/OFF button and repress it within 1 second, and hold down until the 4 inputs LEDs are ON, and the audible beep signal is emitted (provided that the buzzer is not deactivated)

2) Battery status

Press and hold the ON/OFF button

The Inputs LEDs (1 – 4) will illuminate to indicate the battery charge status

4 LEDs ON green: 75-100 %

3 LEDs ON green: 50-75%

2 LEDs ON green: 25-50%

1 LED ON green: 10-25%

1 LED ON red : < 10% (TBox will only power on with external power applied)

3) Reactivate Bluetooth advertising

3. Power Status LED

	TBox On/Off	USB	Battery
Yellow ON	OFF	connected	Battery Charging
Green ON	OFF	connected	100% charged
Yellow blinking	ON	connected	Battery Charging
Green blinking	ON	connected	100% Charged
Green blinking	ON	disconnected	> 25%
Red blinking	ON	disconnected	Low battery

4. Timing Inputs

The TBox models 1x, 2x offers 4 inputs.

- Manual Push Buttons (inputs 1 to 4)
- Jack-Mono inputs (inputs 1 to 4)
 - Working contact without potential (short-circuit)

Each press of the button or short-circuits on the Inputs are stored in the TBox memory, with associated date and time of impulse as CSV files.

The user has the ability to configure a locking time using the “TBox-Setup” app. This facility allows the blocking of undesired impulses corresponding to the channel configured.

E.g. – to ignore multiple inputs from dirt or snow dust

5. Mini-USB

The Mini-USB connector has various functions including:

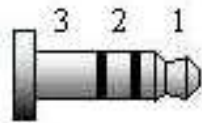
- External power supply and battery charging
- COM port emulation for RS232 communication and data transfer
 - Real time of day in many formats (FDS, TAG Heuer, Alge, Seiko)
 - Configure the TBox options and parameters (with the app “TBox-Setup”)
- 2GB USB Flash Drive
 - All impulse data are stored in a .csv file on the drive. A new file is created every time the TBox is switched ON
 - User needs to maintain sufficient memory availability to ensure storage of impulse data
 - The space required for a competition of 1000 times is approximately 40 Kbytes

6. RS232

Jack-Stereo connection 3.5mm.

In conjunction with the TBox-Setup, the protocol output can be configured by the user.

- FDS / TAG Heuer / Alge / Seiko Time of day protocol
- Serial printer
- Display Output (TAG Heuer / Alge Protocol)

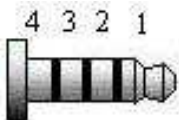


- 1: TBox TXD
- 2: TBox RXD
- 3: GND

7. In/Out Synchro

Jack-4pin connection 2.5mm.

- Allows to synchronize the TBox with other timing systems



- 1: TBox +3.3V
- 2: TBox Sync In
- 3: TBox Sync Out
- 4: GND

TBox Sync In:

Internal resistor to Vcc: 10 kOhm

Active state: Tie to Gnd, Sink current 0.3mA

Inactive state: Leave unconnected

TBox Sync Out:

Min ext resistor to Vcc: 1kOhm

Max Vcc: 5V

Active state: Tied to Gnd (1ms)

Inactive state: Open circuit

8. Synchronization

There are four different methods to synchronize the TBox.

After power up, all 4 inputs LEDs will flash yellow as long as the TBox is not synchronized.

a) Sync at Zero.

- This is the default synchro method. Once the TBox is switched ON, the first impulse will sync the internal time at Zero

b) GPS Sync

- Only possible with models including GPS (TBox-2x)
- To start the GPS Sync, ensure TBox is powered off, hold down the button “Input 1” whilst powering ON the TBox
- The sync will commence once the TBox receives sufficient GPS data
- Once synchronized, the internal clock drift is constantly compensated by GPS signals (as long as GPS coverage is maintain)

c) External.

- Not yet implemented.

d) Sync via app

- All synchro methods presented above can be controlled manually or automatically by our Timing Applications
- It is also possible to synchronize the TBox to a user define time of day, using one of the 4 inputs

9. Bluetooth

A Bluetooth connection can be established with compatible FDS timing or setup Apps.

After power up, the TBox advertises its presence for 2 minutes. During this period the box can be detected and connected by the user App. To re-establish detection after the 2 minute period simply momentarily press the power button to reactivate the Bluetooth advertising process.

10. How to update the TBox Firmware

Update the firmware is an easy task. No software is required.

- a) Copy and paste the “.bin” file to the USB Flash Drive root directory of the TBox.
Note that you should have only ONE firmware file on the drive. If you want to save the previous “.bin” files, create a sub-directory
- b) Ensure that you have no file called “UPDATLOG.txt” on the Flash Drive. If so delete it
- c) Disconnect your TBox from your PC
- d) Ensure that the TBox is OFF, then press the ON/OFF button
The 4 Inputs LED’s will switch Yellow then Green to indicate that the firmware updated successfully
- e) A file “UPDATLOG.txt” is created on the Drive to confirm that the new firmware is installed
- f) Once the operation completed, it is advised to remove the “.bin” file from the root directory

11. Technical specifications

Operating temperature:	-20°C to 70°C
Precision:	1/1 to 1/1000s
Time drift: TBox-10, TBox-20 TBox-11, TBox-21	+/- 3ppm from -20°C to 70°C 1ppm @ 20°C; max 2.5ppm from -20°C to 70°C
External power input:	USB compatible (5V +/- 10%) up to 1A
Battery: TBox-10, TBox-20 TBox-11, TBox-21	LiPo 1500mAh LiPo 2200mAh
Autonomy: TBox-10, TBox-20 TBox-11, TBox-21	50 - 100 hours (100 hours with GPS inactive) 70 - 150 hours (150 hours with GPS inactive)
Bluetooth module:	BLE-4.1
Dimension:	124x80x31mm (Without GPS) 124x86x31mm (With GPS connector)
Weight:	170gr - 180gr

12. Copyright and Declaration

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