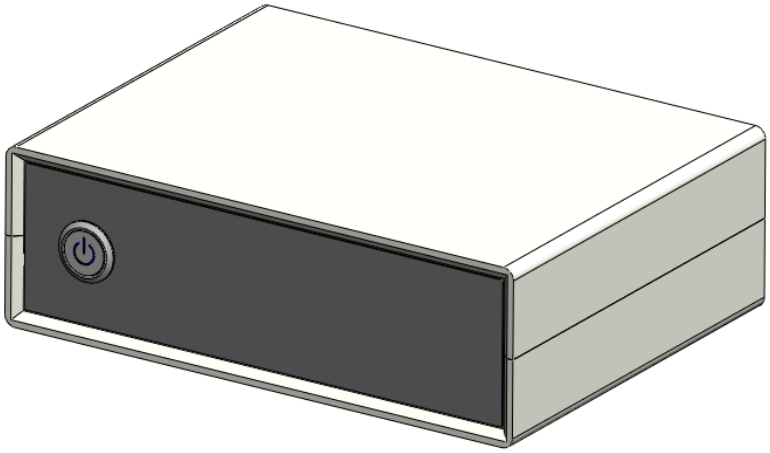
BalanceTutor Interface Box

User Manual

March 2024



Connecting your BalanceTutor to the digital world

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This user manual covers operation procedures for the following MediTouch product:

Product name: BalanceTutor Interface Box

Product model: BTIB1

Ordering information:

Product description: BalanceTutor Interface Box

Part Number: HMBTIB1

Date	Change description	Written by	Ver.
15 Nov 2023	Initial version	Ziv K.	231115
04 Mar 2024	Adding: MediTouch & Noraxon system setup, Synch Out Socket Cable	Ziv K.	240304

E&EO

Contents

1 General

1.1 Product Description

The BalanceTutor Interface Box (BTIB) serves as a supplementary module designed to transmit variables from the BalanceTutor software to analog output lines in real-time. Through a network connection between the BalanceTutor and the BTIB, a substantial volume of data and a rapid flow of information can be seamlessly conveyed to the analog output lines.

1.2 Intended Use

This product can be used for researchers as an important tool to investigate and deeply understand human gait and kinematics in real-time and offline.

1.3 Glossary of Terms

TERM	DESCRIPTION
BTIB	Abbreviation for the BalanceTutor Interface Box
Channel	Represents any one of the 1 to 12 analog outputs in the terminal block
Terminal Block	Housing of 14 screw based connections. This block has 12 (1-12) analog output lines and 2 (13-14) common (0v) output lines.
System	An integration of few devices such as BalanceTutor, BTIB and other device that electrical connection applied.
BT	BalanceTutor Product name
PCM	Pulse Code Modulation
TCP	Transmission Control Protocol

1.4 User Responsibility

This Product will perform as described in this User Manual and the accompanying labels and/or inserts, when it is assembled, operated, maintained and repaired in accordance with the instructions provided. A defective product should not be used. Parts that are broken, missing, plainly worn, distorted or contaminated should be replaced immediately. Should such repair or replacement become necessary, it is recommended that a telephone or written request for service advice be made to MediTouch. This product or any of its parts should not be repaired other than in accordance with instructions provided by MediTouch authorized representatives or by MediTouch trained personnel. The Product must not be altered without the prior written approval of the MediTouch Quality Assurance Department. The user of this product shall bear the sole responsibility for any malfunction which results from improper use, out of range voltage and current, bad and or poor connections and damage.

1.5 Safety, Warnings, Precautions, Prohibitions

- **Read the Manual:** Always read and understand the user manual provided before operating the equipment. Follow the instructions and guidelines carefully.

- **Qualification:** The user of this equipment need to have basic understanding in electrical wiring to allow safe wire up between the integrated parts in the system. The user must be fully aware the nature of the electrical signals generated in the terminal block

- **Electrical Safety:** Use grounded outlets and appropriate voltage levels Keep electrical components away from liquids. Unplug equipment during maintenance or cleaning. The system must not be installed near high voltage lines, that may cause electric and magnetic interference e.g. an x-ray device, motors or transformer with high connection power, as this may interfere with the transmitted signals.

- **Proper Environment:** Use the equipment in a suitable environment with adequate ventilation, lighting, and appropriate temperature and humidity conditions.

- **Cables and Wires:** Ensure cables are not tangled or damaged. Keep cables away from heavy traffic areas to prevent tripping hazards

1.6 Regulation

1.6.1 Company details

Name: MediTouch Ltd (SRN: IL-MF-000025321)

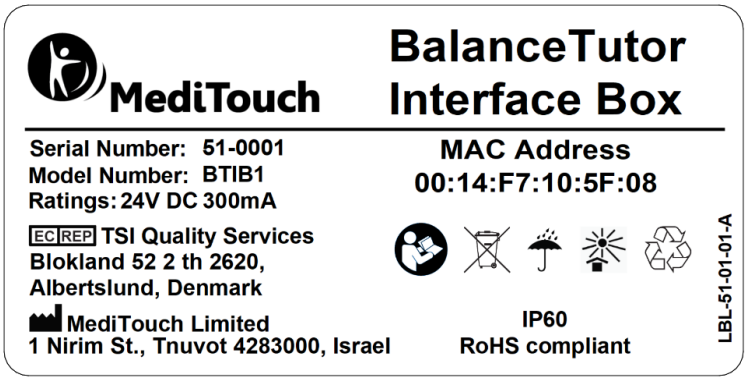
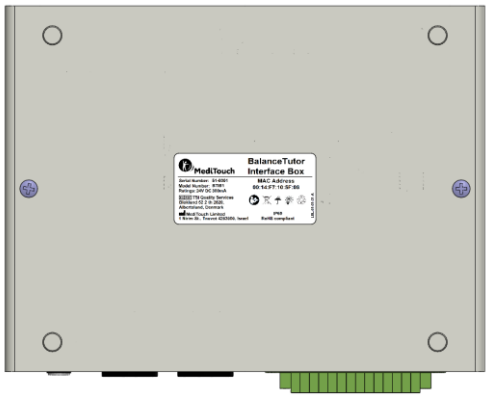
Address: 1 Nirim St., Tnuvot, 4283000 Israel

1.6.2 EU Representative

Name: TSI Quality Services (SRN: DK-AR-000017664)

Address: Blokland 52 2 th 2620, Albertslund, Denmark

1.7 Name Plate

IMAGE	LOCATION
	

1.8 Labels & Marks

IMAGE	MESSAGE
	Refer to user manual
EC REP	Name and Address of European Representative
	Manufacturer name and address
IP60	The product offers total protection from dust and no protection from water

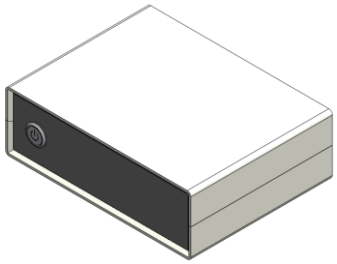
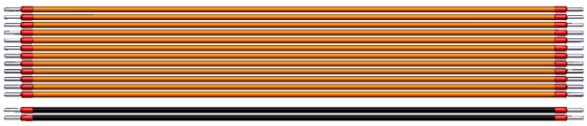
1.9 Warranty

1-year limited hardware warranty

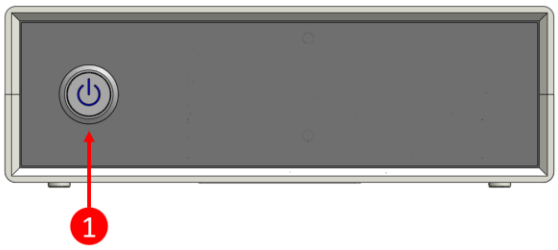
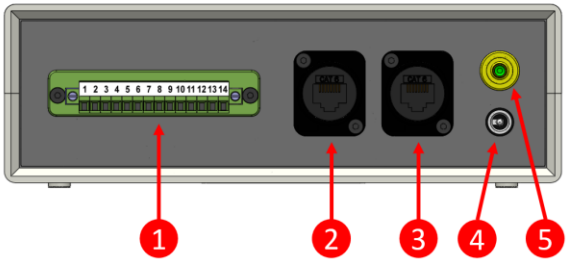
2 Preparing the product for use

2.1 Unpacking & Component Identification

The package consist of the following components:

#	ITEM	IMAGE
1	BTIB	
2	100-240v AC to 24V DC adapter	
3	EU or US power cable	 or 
4	Network cable 3m length	
5	Terminal block wires kit: Signal wire 30cm (Orange) – 12pcs Common wire 30cm (Black) – 2pcs	
6	Sync Out Socket Cable	
7	User Manual	

2.2 Product Interfaces

1. **Power Button** – Turns ON and OFF the BTIB from power source. When ON a blue LED lights ON and lights OFF when OFF.	
1. **Terminal Block** – A 14 position detachable screw terminal plug that accept stripped and tinned wires or crimped with ferule terminals. Terminal 1-12 are signal lines Terminals 13-14 are common lines 2. **LAN 1** – Ethernet connector 1 3. **LAN 2** – Ethernet connector 2 4. **DC IN** – Input DC socket 2.1mm standard. Accepted voltage is 24v only. 5. **Ground** – Banana socket 4mm standard. Grounding purposes and potential equalization.	

2.3 3rd Party Device Connection

The BTIB is an analog output device that converts TCP information to electrical modulated signals. The output of the BTIB is a voltage source and not a current source.

Following some electrical properties that will help you during the connection:

PARAMETER	SPECIFICATION	
	TERMINALS 1-8	TERMINALS 9-12
Output Range	0~10Vdc	-10~10Vdc
Load Resistance	Min. 2KΩ	Min. 4KΩ
Power Dissipation	Max. 15mA @ 10Vdc	
Conversion Time	0.2msec	

Please consult with MediTouch support if you are not sure how to perform a proper connection between the BTIB and your device.

2.4 Analog Signals Coding

Conversion table for BT software-transmitted variables and their electrical representations.

TERMINAL No.	TERMINAL NAME	VOLTAGE OUTPUT	CONVERSION OUTPUT DESCRIPTION		CHARACTERISTIC
1	Delta Time	0.1V	1msec	Time interval between two samples, measured in milliseconds (msec)	Hold value until change
		0.2V	2msec		
		0.3V	3msec		
		…	…		
		10.0V	100msec		
2	Software States	0.0V	N/A	The current state of the BalanceTutor software	Hold value until change
		1.0V	Software Down		
		2.0V	Software Up		
		3.0V	Treatment Started		
		4.0V	Treatment Stopped		
		5.0V	Treatment Finished		
		6.0V	Evaluation Started		
		7.0V	Evaluation Completed		
		8.0V	Emergency Pressed		
		9.0V	Emergency Released		
3	Perturbation Direction	0.0V	None	Perturbation events	No change
		5.0V	Acceleration		Hold value until speed is back to initial speed
		6.0V	Deceleration		
		7.0V	Left		Hold value until platform back to center
		8.0V	Right		
4	Perturbation Intensity	0.0V	N/A	Intensity level	No change
		0.1V	1		Hold value until platform back to center or speed back to initial speed
		0.2V	2		
		0.3V	3		
		…	…		
		3.0V	30		
5	UI Treadmill Speed	0.0V	0.0km/h	Treadmill target speed	Hold value until change
		0.1V	0.1km/h		
		0.2V	0.2km/h		
		…	…		
		7.0V	7.0km/h		
6	Applied Load	0.00000V	0.00Kg	Subject applying vertical loads to the platform Resolution calculation: $\text{Res} = \frac{300\text{Kg}}{2^{12}\text{Bit}} = 0.07324\frac{\text{Kg}}{\text{Bit}}$ Exp. 2.5V at output is 75.0Kg of load	Hold value until change
		0.00244V	0.07Kg		
		0.00488V	0.15Kg		
		0.00732V	0.22Kg		
		…	…		
		10.0000V	300.0Kg		
7	Synchronization	0.0V	Treatment or Evaluation is OFF		Hold value until change
		5.0V	Treatment or Evaluation is ON		
8	Reserved	N/A	N/A		N/A

TERMINAL No.	TERMINAL NAME	VOLTAGE OUTPUT	CONVERSION OUTPUT DESCRIPTION		CHARACTERISTIC
9 10	Actual Treadmill Speed Actual Lateral Speed	-10.000V -9.995V -9.990V … 0.000V … 9.990V 9.995V 10.000V	-3350RPM -3348RPM -3347RPM … 0RPM … 3347RPM 3348RPM 3350RPM	Rate at which the drivers control the servo motors. Resolution calculation: $\mathrm{Res} = \frac{3350\mathrm{RPM}}{2^{11}\mathrm{Bit}} = 1.636\frac{\mathrm{RPM}}{\mathrm{Bit}}$ Exp. 2.388V at output is 800RPM	Hold value until change
11 12	COP X COP Y	-10.000V -9.995V -9.990V … 0.000V … 9.990V 9.995V 10.000V	-1000.0mm -999.5mm -999.0mm … 0.0mm … 999.0`mm 999.5mm 1000.0mm	Center of Pressure along X and Y axes Resolution calculation: $\mathrm{Res} = \frac{1000\mathrm{mm}}{2^{11}\mathrm{Bit}} = 0.48828\frac{\mathrm{mm}}{\mathrm{Bit}}$ Exp. -3.58887v at output is -359mm	Hold value until change
13	Common	0V	Common line (0v)		
14	Common	0V	Common line (0v)		

3 Setup & Configurations

This chapter describes how to connect your BTIB to the BalanceTutor and your 3rd party devices.

3.1 BalanceTutor & BTIB Setup

1. Request the most recent BT software version from MediTouch (conducted by MediTouch tech team).

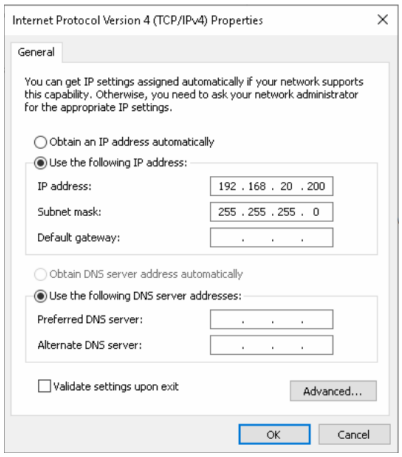
2. Open BT software > Settings > Enable Interface Box

3. Turn ON the BTIB using the provided adapter, and ensure that the power switch remains in the OFF position.

4. Connect the supplied network cable to LAN1 RJ45 socket in the BTIB and the other side to the BT according the following:
   If BT S/N is (last 2 numbers): 01 – 89 then

   - Connect Network cable directly to the available LAN socket in the Advantech computer

   - Set LAN to a static IP (under TCP/IPv4) according the following addresses:



   If BT S/N is above (last 3 numbers): 090 then

   - Connect Network cable directly to the available LAN socket in the Digitax servo driver

5. Perform wire connection between the terminal block analog outputs of the BTIB to the integrated 3rd party device. Follow data and pinout from previous section.
   Turn the BTIB ON

6. Restart the BT software

7. The electrical signals are now prepared for reading at the terminal block.

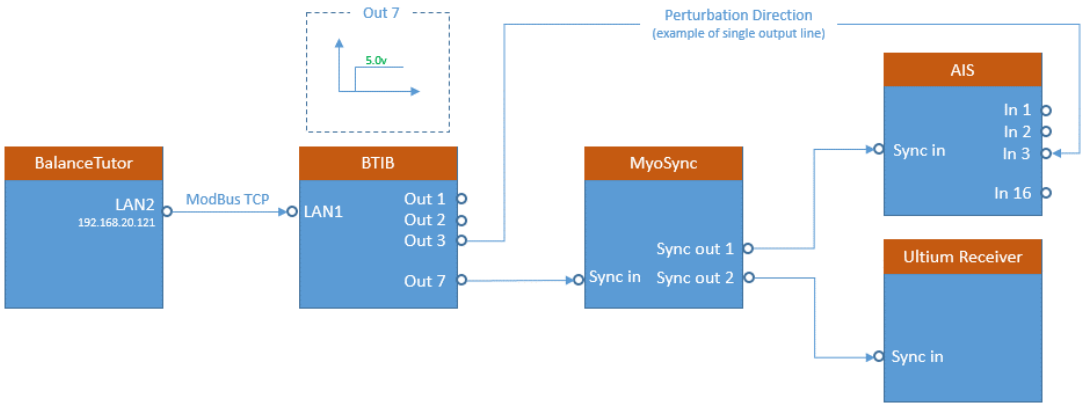
3.2 MediTouch & Noraxon System Setup

This section describes how to connect the MediTouch BalanceTutor perturbation device to the Noraxon Mobile Sensor technologies to a unified echo system, where mutual data can be acquired, and the time base is mutual.

MediTouch

NORAXON

3.2.1 Sync Scheme

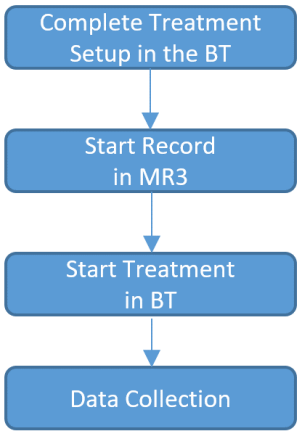


3.2.2 Technical Setup

1. Use network cable and connect between LAN2 of the BalanceTutor to the LAN1 of the BTIB.
   Note: You can use the external RJ45 connector for this purpose and internally wire to LAN2.
2. Use Sync Out Socket Cable and together with a Male to Male Phone plug connect between Out7 of the BTIB and Sync in of the MyoSync.
3. Use Male to Male Phone plug cable and connect between Sync out 1 of the MyoSync to the Sync in of the AIS.
4. Use Male to Male Phone plug cable and connect between Sync out 2 of the MyoSync to the Sync in of the Ultium Receiver.
5. Use USB A to B cables to connect AIS, MyoSync and Ultium Receiver to computer where MR3 is installed.
6. Use the Terminal Block Wire Kit to connect required signals from the BTIB to the input channels of the AIS.

3.2.3 Record Sequence

Following the order of recording with the BalanceTutor and the MR3 software:



4 Troubleshooting

4.1 IP Change

If there arises a requirement to modify the internal IP address of the BTIB, kindly direct your request to MediTouch support.

5 MediTouch Contact Information

MEDITOUCH HEADQUARTER, SERVICE & SUPPORT	
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