

Transport Data Logger TDL 110

Operating Instructions



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About these Operating Instructions

Ensure that the TDL 110 is working correctly by:

- ▶ Reading these instructions carefully before using the TDL 110.
- ▶ Always following these instructions.



Caution

Indicates a hazardous situation in which the user must proceed as noted.

- ▶ Always follow these instructions.



Notice

Indicates a non-critical situation which should be noted to avoid damage to materials.

- ▶ Always follow these instructions.



INFO

General information and instructions that must be followed



TIP

Practical advice

1 Introduction and Intended Use

By being attached to the shipment and measuring and recording relevant parameters like temperature, humidity, tilt and shock, the TDL makes the delivery process of goods visible and traceable. These measurements are then documented and visualized through a mobile application. Since the limits of each parameter can be individually configured, any violation of these limits is traceable and clearly assignable to the stations throughout the entire transport process.

The Transport Data Logger is designed according to the information provided in the data sheet. Any use or operation which requires specific requirements and standards which aren't explicitly mentioned in the data sheet must be validated and tested on customer's own responsibility.



Figure 1: Overview TDL

- 1 Surface: place your shipment code here
- 2 Button (see chapter 5 Operation)
- 3 LED (green/red) (see chapter 5.5 Blinking Pattern)
- 4 Mounting holes (4x) (see chapter 4 Mounting the TDL)
- 5 Battery (see chapter 6.1 Changing the Battery)
- 6 Mounting plate (see chapter 4 Mounting the TDL)

For further assistance please refer to: <http://www.bosch-connectivity.com/TDL110> or e-mail to: support@bosch-connectivity.com

2 Safety and Environment



Caution Lithium Battery!

The device contains a lithium battery. Handling the battery incorrectly could cause a fire.

- ▶ **Use only original or approved batteries.**
- ▶ **Read and follow the valid transportation regulations.**



Notice Forfeiting the Warranty!

Opening the casing without authorization could present risks to the user and will void any warranty.

- ▶ **Do not open the housing.**
- ▶ **Use only original or approved spare parts.**

2.1 Radio Frequency Radiation Exposure and Further Information

The radiated output power of the device is far below the FCC radio frequency exposure limits. Nevertheless, the device shall be used in such a manner that the potential for human contact during normal operation is minimized.

2.2 Disposal

Disposing of this product correctly will help save valuable resources and prevent any potential negative effects on human health and the environment, which could otherwise arise from inappropriate waste handling.

Please contact your local authority for further details of your nearest designated collection point. Penalties may be applicable for incorrect disposal of this waste, in accordance with your national legislation. For further information please refer to chapter [7.1 Recycling](#).

3 Technical Specifications

3.1 Measured Parameters

- ▶ Temperature
- ▶ Humidity
- ▶ Tilt
- ▶ Shock

3.2 Device Specification

Attribute	Value
Dimension (W x H x D):	91 mm x 102 mm x 25 mm
Weight:	100 g
Power Supply:	CR 123A Lithium Battery
Battery Lifetime:	2 Years (10 min. Measuring Cycle, +25 °C)
Enclosure Protection Class:	IP 54
Electrical Protection Class:	III
Measuring Cycle (selectable):	1 min ... 4 hours
Memory Capacity:	2 Years (15 min. Measuring Cycle, see Table 5: Logging Intervals)
Communication:	Bluetooth 4.0 (Low Energy)
Bluetooth Frequency Band:	2.402 ... 2.480 GHz
Transmission Power:	5 dBm
Recommended Storage Temperature:	0 °C ... +40 °C

Table 1: Device Specifications

3.3 Operating Conditions

Attribute	Range
Operating Temperature Range:	-25 °C ... +80 °C
Humidity Range:	0 % rH ... 100 % rH (non-condensing)
Shock/Acceleration Range:	± 8.0 g per axis; ±13.8 g three-dimensional

Table 2: Operating Conditions

3.4 Resolutions

Attribute	Resolution
Temperature:	0.5 °C
Humidity:	1 % rH
Tilt:	0°... 150° (30° steps)
Shock:	0.1 g

Table 3: Configurable Resolutions

3.5 Accuracies

Attribute	Value
Temperature:	± 0.5 °C (0 °C ... +60 °C) ± 1 °C (-25 °C ... +80 °C)
Humidity:	± 5 % rH typical ± 10 % rH maximum (20 % rH ... 80% rH at 25 °C)
Acceleration/Shock:	± 10 %

Table 4: Accuracies

4 Mounting the TDL

The TDL comes with an integrated mounting plate at the bottom side. The mounting plate provides four mounting holes for screw fastening purposes.

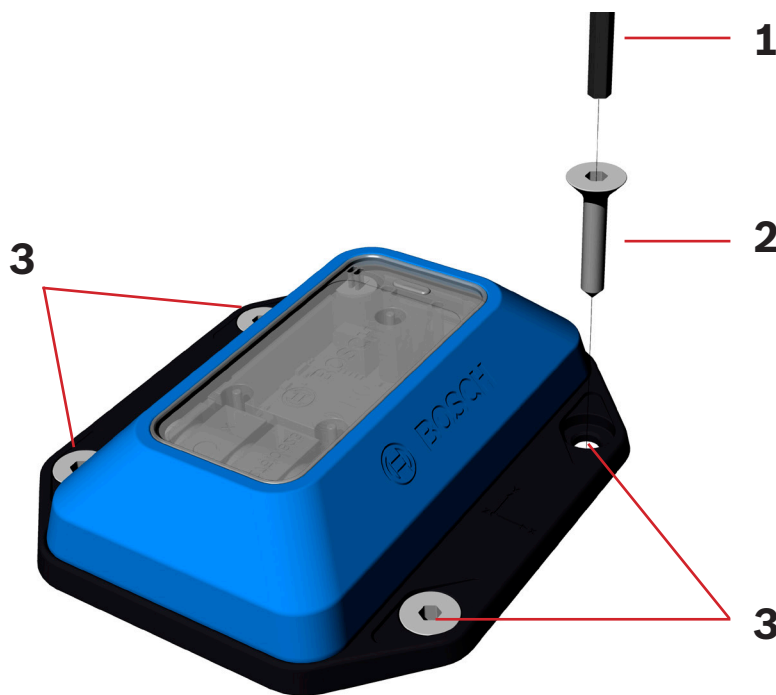


Figure 2: Mounting the TDL using screws

- 1 Screwdriver
- 2 Screw
- 3 Mounting holes

In general, the TDL can be mounted in any position as required. The fastening, depending on the specific requirements, can be carried out with screws or with double-sided adhesive tape.

In case shock shall be measured a direct and non-absorbing connection between the TDL and the monitored good is required. For achieving this we recommend using either screws or a fiber-reinforced adhesive tape. Recommended screws are either M5 countersunk head or M4 carriage bolt.

5 Operation

You need to download the Transport Data Logger app to use the TDL 110. The required app “Transport Data Logger” is available in your Google Play Store or Apple App Store free of charge. Type “Bosch Transport Data Logger” or the product number/order number (0273600024001) of your device in your app store’s search box to find the app easily. The app runs on Android version 5 (Lollipop) or higher and on iOS version 9 or higher.

You can customize the way that the TDL measures and records data in accordance with your individual requirements in the app. You can also control and record data from as many TDL units as required.

5.1 Connecting to the TDL

1. Activate Bluetooth LE on your smartphone. For devices running Android 6, enable GPS as well.

i INFO

To enable Bluetooth LE Android 6 requires localization service to be activated.

2. To activate the TDL, press the button on the device for 0.3 to 1.5 seconds.

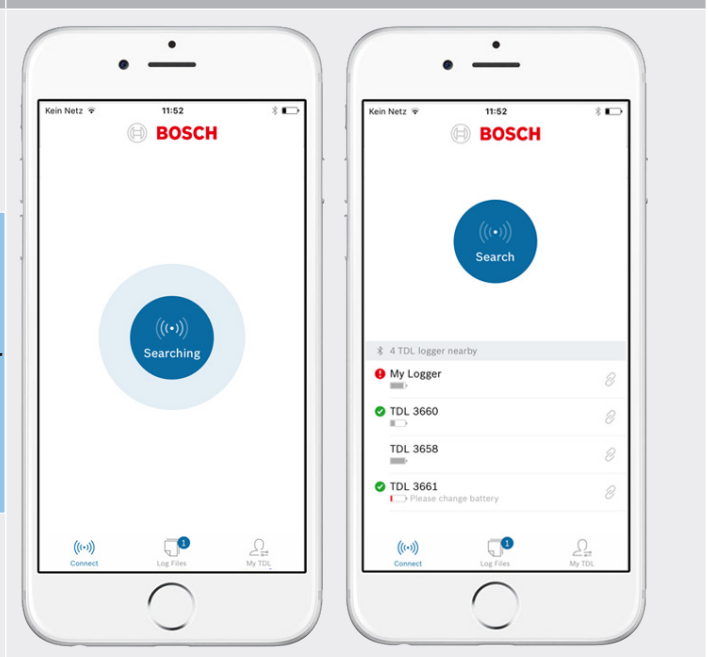
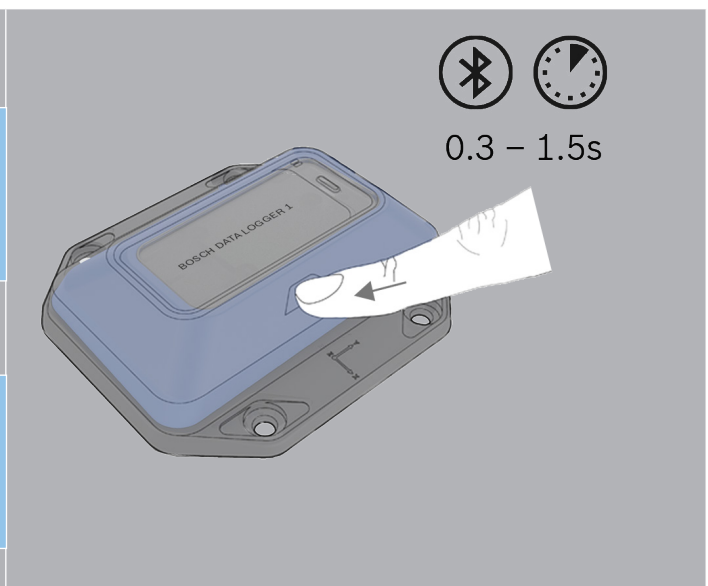
i INFO

For correct functionality it is important to press and hold the button between 0.3 and 1.5 seconds.

3. Start the Transport Data Logger app.
4. To find the activated TDL, tap “Search”.
5. Locate and select the TDL from the list.
6. Confirm the connection by selecting “Pair”.

i INFO

1. Pairing must be completed within 30 seconds.
2. If Pairing was canceled via the app, turn Bluetooth off/on or wait for five minutes.
3. In case a password is required, please enter six times zero (000000) which represents a standard password.



5.2 Configuring the TDL

To configure your TDL, follow the steps shown in the app.

1. Choose and enter a name for the TDL (optional).
2. Enter an e-mail address to transfer data (optional). This e-mail address will be the default recipient address when sending data via e-mail.
3. Tap “Continue”.

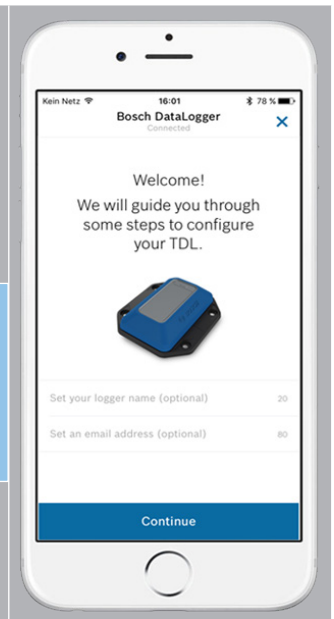


Notice

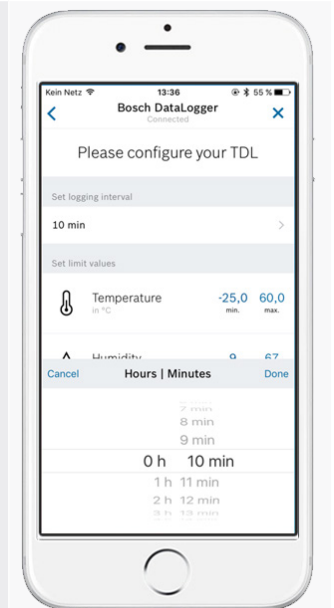
Convention for Characters

Only defined characters are allowed for the e-mail address and TDL name.

► **Allowed characters:** [A-Z][a-z][0-9][@.,;/\|+*_ _]



4. Configure the logging interval. The measurement frequency depends on the required monitoring period of the TDL. As an aid for configuration refer to the overview of the recommended configuration intervals in [5.2.1 Logging Interval](#).



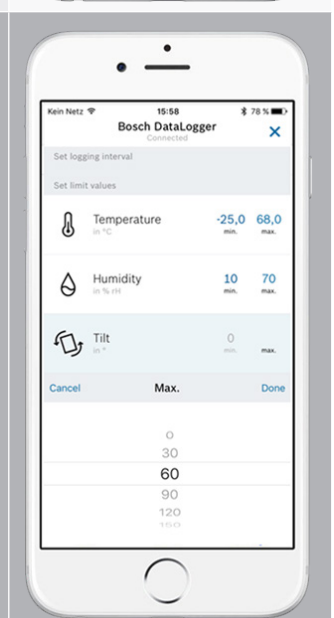
5. Choose a measurement parameter (temperature, humidity, tilt, shock) by tapping “Set values”.
6. Swipe up and down to configure minimum and maximum values.



INFO

At least one value must be configured. However the temperature, humidity and tilt measurement values will be recorded even without the configuration of a threshold value.

7. Tap “Continue”.



8. Enter your desired PIN and confirm.

Notice **No TDL Access!**

You cannot configure the TDL without a valid PIN. It is impossible to reset the PIN; even at the factory.

► **Always make a note of the PIN and store it in a safe place.**

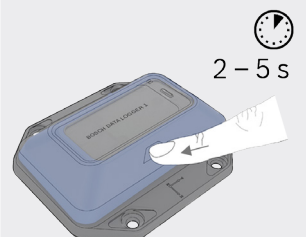
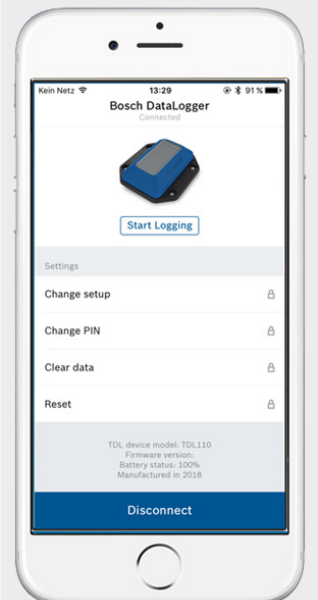
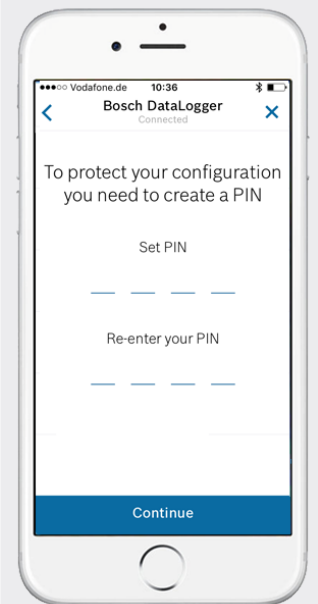
9. To start logging immediately, tap “Start logging” and confirm that logging will start only when the TDL device is disconnected. The device confirms logging start by flashing three times the green LED. To start logging later, tap “Disconnect” in the app. The device confirms the disconnection by flashing three times the red LED.

Then press the button on the TDL for 2 to 5 seconds when you want to start logging. The TDL blinks green three times to confirm that logging has started.

i INFO

The measurement starts immediately after you tap on “Start logging”. The TDL uses its current position as a reference for the tilt measurement.

If you configure the TDL in a different position to its final mounting position we suggest to tap “Disconnect” in the app and activate the TDL later in its final mounting position with a button press of 2 to 5 seconds.



5.2.1 Logging Interval

Required Monitoring Time	Recommended Logging Interval
1 month	1 min
3 months	2 min
6 months	4 min
9 months	6 min
12 months	7 min
15 months	10 min
18 months	12 min
21 months	13 min
24 months	15 min

Table 5: Logging Intervals

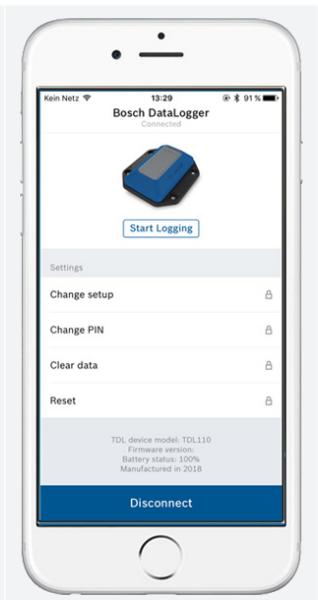
These recommendations are based on assumptions, made for a specific number of shocks and tilts per day.

At the end of the monitoring period the stored data can be analyzed and then cleared. The measurement can be started from scratch again. For logging intervals that are longer than 15 minutes, the battery with a lifetime of 24 months will be the limiting factor.

5.3 Settings

You can change the settings of your TDL at any time. Any change to the settings is protected by the PIN. To change settings, please connect to the respective TDL. Logging is stopped during the TDL configuration.

1. Connect to a previously configured TDL.
2. Swipe down to “Settings”.
3. Tap on the desired setting and make the changes.



5.3.1 Changing the Setup

1. Tap “Change Setup” to set new values.
2. When ready, tap “Change” to apply the new changes.

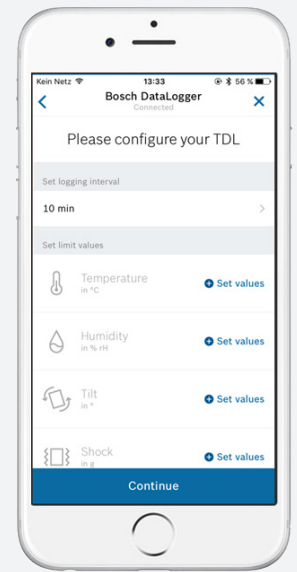


Notice

Storage of Measurement Data

The log files are associated with a specific shipment. Data logging can be interrupted upon request by tapping “Stop logging”.

- ▶ **The data recording will continue and data will be stored in the same file as long as the settings remain unchanged.**
- ▶ **The logging starts over and the data will be stored in a new file if you change settings.**



5.3.2 Changing the PIN

1. Tap “Change PIN” to set a new PIN.
2. Set the new PIN and re-enter the new PIN.
3. When ready, tap “Change” to apply the new PIN.

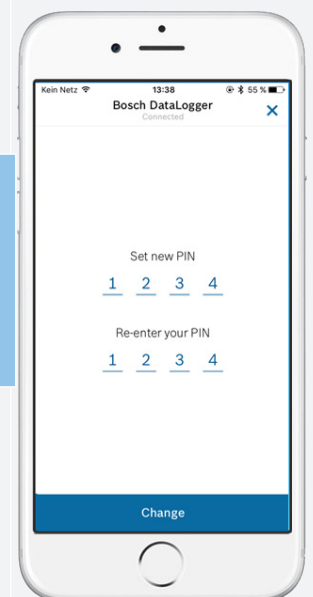


Notice

No TDL Access!

You cannot configure the TDL without a valid PIN. It is impossible to reset the PIN; even at the factory.

- ▶ **Always make a note of the PIN and store it in a safe place.**



5.3.3 Clearing the Data

1. Tap “Clear Data” to clear the logging data. A new window “Do you want to clear all logged data stored on the TDL?” appears.
2. Tap “Clear” to clear the data.

5.3.4 Reset

1. Tap “Reset”. A new window “All setup and logged data will be cleared. Do you want to continue?” appears. After the reset the device will be in the delivery state.
2. Tap “Reset”.
3. The LED blinks red three times to confirm the reset.

5.4 Reading and Transferring Data

5.4.1 Reading the Data

1. Connect your smartphone to a configured TDL.

Overview Screen

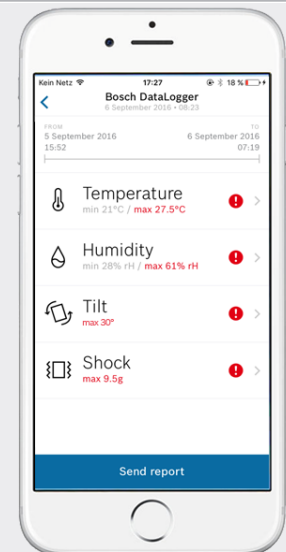
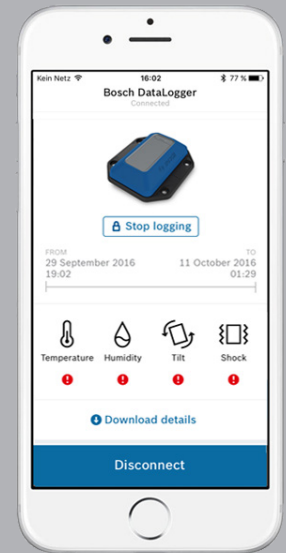
This screen provides an overview of the four parameters, showing you at a glance if any violations have occurred during the logging period. Green check marks indicate that no violation has occurred, whereas an exclamation mark indicates that the limit values have been exceeded at least once during the logging period. If an icon is shown grayed out, no limit value has been defined for this parameter.

2. Tap “Download Details”.
3. Confirm “Stop logging & download”.
4. Enter your PIN.

Notice Risk of Data Loss

An interrupted connection can cause damage to data.
► Do not lock your phone while downloading data.

5. Tap “Show Details”. The summary screen appears.
6. Tap the desired measurement parameter to view those measurements.
7. Tap an entry date for more detailed information.



5.4.2 Exchanging the Data



Notice

E-Mail Account Required

The report will be sent from the e-mail account on your smartphone.

- ▶ **Ensure that the e-mail account on your smartphone is configured correctly.**
- ▶ **Ensure that the e-mail address in the app is valid.**

2. Tap “Send report”.

3. Your smartphone will start your e-mail program and open an e-mail with the pre-defined address (see chapter [5.2 Configuring the TDL](#)). You can add additional addresses if required.

The e-mail contains:

- ▶ General information, such as TDL identification number, TDL name and duration of the transport
- ▶ Configured limit values for all parameters
- ▶ Minimum and maximum values that were measured during the transport
- ▶ A graphical transport summary
- ▶ The CSV file that contains all the raw data and additional information, such as the shock intensity to help analyze the shock event



Notice

Importing Data to Excel

Some programs may show unintended characters due to an incompatible character set.

- ▶ **Ensure that your data reading program is set to UTF-8 character format.**

5.5 Blinking Pattern

The TDL is equipped with a two-color LED to indicate the status of the TDL.



Figure 13: LED on the TDL

Color	Behavior	Meaning	Triggered by	
			Mobile App	Device
	Blinks 3 times (2 Hz)	TDL starts logging TDL continues logging	Tap "Start Logging" Tap "Disconnect" while logging	After transferring the configuration push the button for 2 to 5 s
	Blinks 3 times (2 Hz)	TDL does not start logging TDL has been reset	Tap "Disconnect" while not logging Tap "Reset"	
	Blinks 3 times (10 Hz)	Configuration transmission or change setup has been successful	Transfer a configuration or changed setup to the TDL	
	Blinks 3 times (10 Hz)	Configuration transmission or change setup has failed	Transfer a configuration or changed setup to the TDL Possible reasons: Vibrations or a bad Bluetooth connectivity	
	Blinks reiteratively (0.2 Hz)	Bluetooth is enabled, either connection or advertising		Push the button for 0.3 to 1.5 s
	Lights up for 3 s	No violation has been registered		Push the button for 0.3 to 1.5 s
	Lights up for 3 s	One or more violations have been registered		Push the button for 0.3 to 1.5 s
	Lights up for 1 s	Invalid operation, Bluetooth connection is already established		Any button press
		Invalid operation, TDL is not ready to start logging or is already logging		Button press for 2 to 5 s
	Blinks 5 times (10 Hz)	TDL starts up after battery change		Change of battery

Table 6: Blinking Pattern

6 Maintenance

6.1 Changing the Battery

The battery is accessible from the bottom of the TDL.

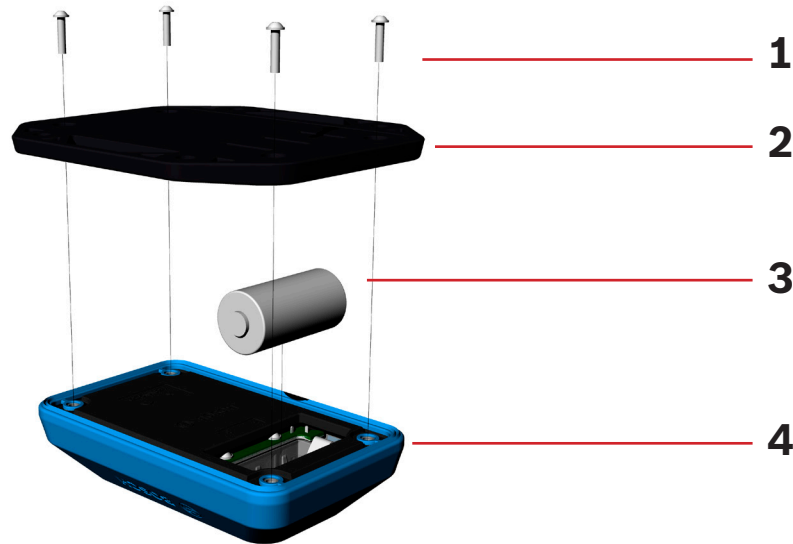


Figure 14: Changing the battery

- 1 Screws (4x Torx T6); Torque 0.5 Nm
- 2 Mounting plate
- 3 Battery
- 4 TDL



Notice

Risk of Data Loss

No data can be measured or stored while the battery is being changed.

► **Always stop logging before removing the battery.**

1. Stop logging. If desired transfer the data to your smartphone (refer to chapter [5.4.1 Reading the Data](#)).
2. Place the TDL down so that its bottom is facing upwards.
3. Remove the four screws by using a Torx T6 screwdriver.
4. Remove the mounting plate.
5. Change the battery (CR 123A Lithium Battery).
6. Position the mounting plate on the TDL.
7. Fasten the four screws with a torque of 0.5 Nm.
8. The TDL is now ready for use and can be configured (see chapter [5 Operation](#)).



Caution

Damage to Materials can cause Risk of Fire!

Liquid which enters the device can cause short circuits and damage the device. This could cause fire, data loss and incorrect measurements.

- **Ensure that the battery cover is positioned correctly.**
- **Always fasten the screws with a torque of 0.5 Nm.**

6.2 Cleaning the TDL

Use only a soft cloth. Avoid using abrasive cloths and materials.



Caution

Damage to Materials can cause Risk of Fire!

Liquid which enters the device can cause short circuits and damage the device. This could cause fire, data loss and incorrect measurements.

- ▶ **Do not use aerosol sprays, solvents, or abrasives.**
- ▶ **Do not spray cleaners directly onto the item.**
- ▶ **Do not allow moisture to enter into any openings.**

7 Annex

7.1 Recycling



Disposal according to the WEEE Directive 2012/19/EU

The unit, accessories and packaging should be sorted for environmental friendly recycling. Do not dispose of the device into household waste! According to the European Guideline 2012/19/EU, electric and electronic devices that are no longer usable must be collected separately and disposed of in an environmentally correct manner.

For disposal in countries outside of the European Union

This symbol is only valid in the European Union (EU). If you wish to discard this product please contact your local authorities or dealer and ask for the correct method of disposal.

7.2 EU Declaration of Conformity

Hereby, Bosch Connected Devices and Solutions GmbH declares that the radio equipment “Transport Data Logger TDL 110” is in compliance with Directive 1999/5/EG. The full text of the EU declaration of conformity is available at the following internet address: [www.bosch-connectivity.com/TDL 110](http://www.bosch-connectivity.com/TDL_110)

7.3 Federal Communications Commission (FCC) Notice

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.

The manufacturer is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. Such modifications may void the FCC authorization to operate this equipment.

NOTE: 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.

7.4 Industry Canada (IC) Notice

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference, including interference that may cause undesired operation.

This Class B digital apparatus complies with Canadian ICES-003.



Complies with
IMDA standards
DB101762



7.5 Export Restrictions

Due to legal regulations the device is not available in the following countries or regions: Cuba, Crimea, Iran, North Korea, Syria and Ukraine.

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