BOSCH

Transport Data Logger TDL 110

Operating Instructions

Table of Contents

1 About these Operating Instructions

⇒ Ensure that the TDL 110 is working correctly by reading these instructions carefully before using the TDL 110.

1.1 Meanings of the used signal words

⚠ CAUTION

Indicates a hazard that could lead to minor or moderate injuries.

⇒ Always follow these instructions.

NOTICE

Indicates a danger that could lead to damage or destruction of the device or loss of function.

⇒ Always follow these instructions.

1.2 Meanings of INFO and TIP

INFO
General information and instructions that must be followed

TIP
Practical advice

2 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.

2.1 Intended Use

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 (see **INFO** below).
2 Button (see chapter 5 Operation)
3 LED (green/red) (see **Blinking Patterns on page 15**)
4 Mounting holes (4x) (see **Mounting the TDL** on page 7)
5 Battery (see **Changing the Battery** on page 16)
6 Mounting plate (see **Mounting the TDL** on page 7)

INFO
Consider that the humidity sensor should not be covered by labels or stickers. Otherwise the humidity measurement doesn't work.

For further assistance please refer to:

http://www.bosch-connectivity.com/TDL110 or e-mail to: support@bosch-connectivity.com

3 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.

⚠ CAUTION

Opening the Casing without Authorization!

Opening the casing without authorization will void any warranty and includes risks of injury to the user.

⇒ Do not open the housing.

3.1 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 (see **Device Specification** on page 6).

3.2 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 **Recycling** on page 17 .

4 Technical Specifications

4.1 Measured Parameters

- Temperature
- Humidity
- Tilt
- Shock

4.2 Device Specification

Table 1 Device Specifications

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 **Logging Interval** on page 11)
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

4.3 Operating Conditions

Table 2 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

4.4 Resolutions

Table 3 Configurable Resolutions

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

4.5 Accuracies

Table 4 Accuracies

Attribute	Value
Temperature:	0.5 °C
Humidity:	±5 % rH / ±10 % $rH_{max.}$
Acceleration/Shock:	±10 %

5 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.

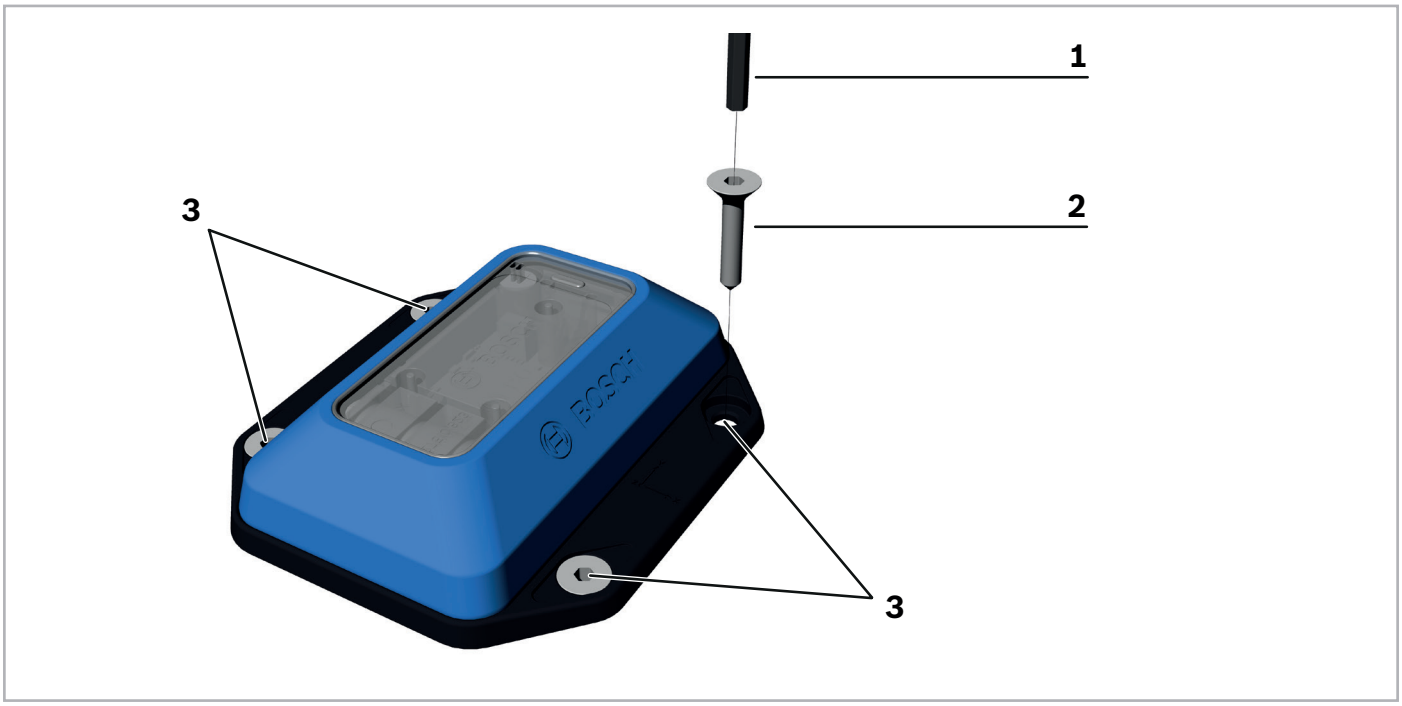


Figure 2 Mounting the TDL using screws

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.

5.1 Mounting with Screws

Recommended screws:
M5 or M4 (recommended with washer) raised cheese head / pan head / round head screws.

Recommended tightening torque: 1 Nm

5.2 Mounting with Adhesive Tape

Tape specifications: Double-sided fiber-reinforced adhesive tape (tested with Tesa 56172-00003)

6 Operation

You need to install the Transport Data Logger app to use the TDL 110. The required app **Transport Data Logger** is available on the Google Play Store or Apple App Store. The app runs on Android version 5 (Lollipop) or higher and on iOS version 9 or higher.

6.1 Installing the App

1. 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.
2. Select the app to download and install it.

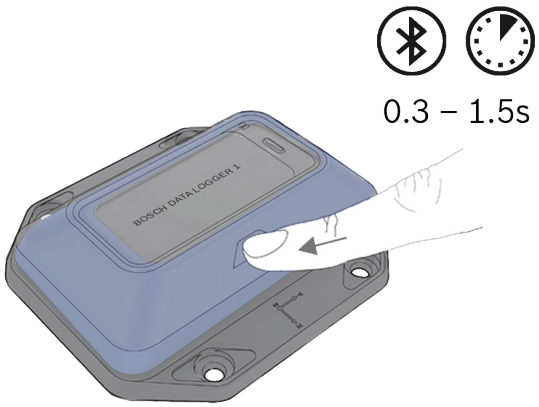
You can customize the way that the TDL measures and records data in accordance with your individual requirements in the app. You can also control and record data from as many TDL units as required.

6.2 Connecting to the TDL

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

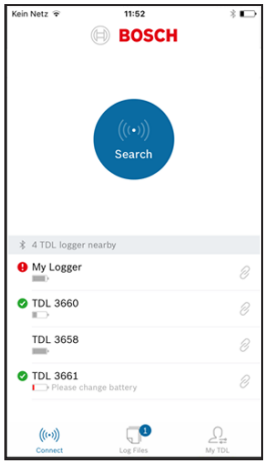
INFO
To enable Bluetooth LE Android 6 requires localization service to be activated.

2. To activate the TDL, press the button on the device for about 1 s (0.3 to 1.5 seconds).



INFO
For correct activation 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**.



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.

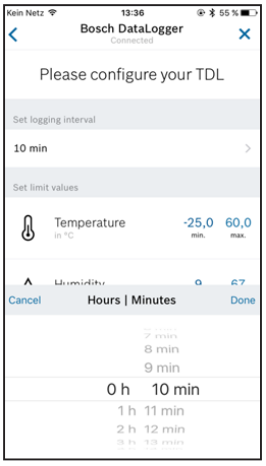
6.3 Configuring the TDL

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

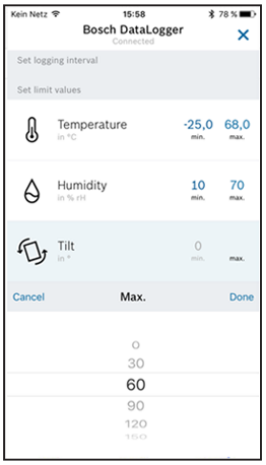
INFO – Convention for Characters
Only defined characters are allowed for the e-mail address and TDL name.
Allowed characters: [A-Z][a-z][0-9][@.,;/\|+-*_]

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**.

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 **Logging Interval** on page 11.



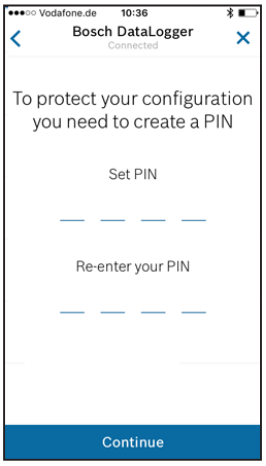
5. Choose a measurement parameter (temperature, humidity, tilt, shock) by tapping **Set values**.
6. Swipe up and down to configure minimum and maximum values.



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 without valid PIN!

You cannot configure the TDL without a valid PIN. Consider that it is impossible to reset the PIN, even at the factory.

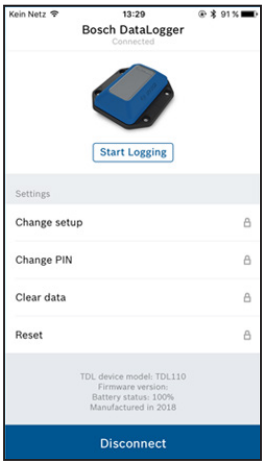
⇒ Always make a note of the PIN and store it in a safe place.

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.

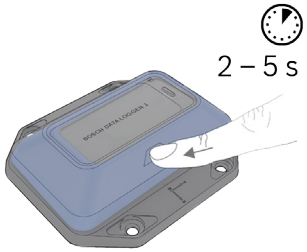
10. To start logging later:

a. Tap **Disconnect** in the app.
The device confirms the disconnection by flashing three times the red LED.

b. 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.



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.



6.3.1 Logging Interval

Table 5 Logging Intervals

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

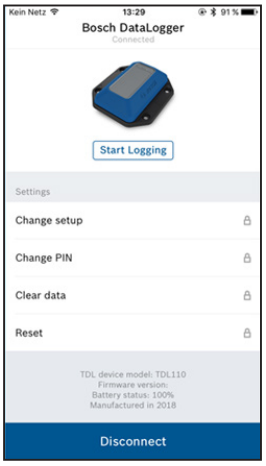
These recommendations are based on assumptions, made for a specific number of shocks and tilts per day.

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.

6.4 Settings

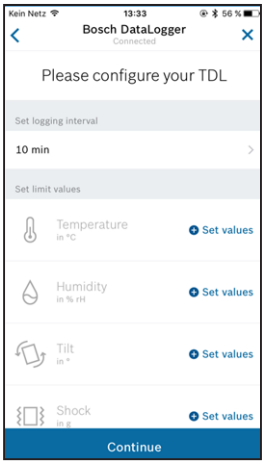
You can change the settings of your TDL at any time. Any change to the settings is protected by the PIN. To change settings, please connect to the respective TDL. Logging is stopped during the TDL configuration.

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



6.4.1 Changing the Setup

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



NOTICE

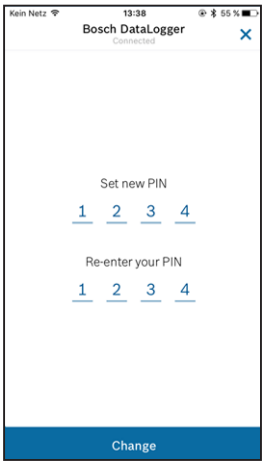
No TDL Access without valid PIN!

You cannot configure the TDL without a valid PIN. Consider that 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.

6.4.2 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 without valid PIN!

You cannot configure the TDL without a valid PIN. Consider that 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.

6.4.3 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.

6.4.4 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**.
   The LED blinks red three times to confirm the reset.

6.5 Reading and Transferring Data

6.5.1 Reading the Data

1. Connect your smartphone to a configured TDL.

TIP – 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.

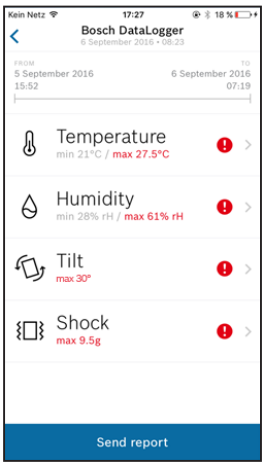
NOTICE

Risk of Data Loss!

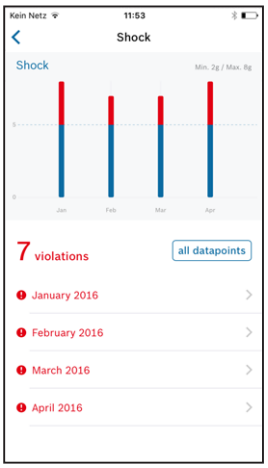
An interrupted connection can cause damage to data.

⇒ 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.



6.5.2 Exchanging the Data

1. Follow the steps in **Reading the Data** on page 13 until the summary screen appears. Alternatively, choose a recent log file from the **Log Files** folder and open it. Go to the summary screen.

INFO – E-Mail Account
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 predefined address (see **Configuring the TDL** on page 9). You can add additional addressees 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 where 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

INFO – 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.

6.6 Blinking Patterns

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

Figure 3 LED on the TDL

Color	Behavior	Meaning	Triggered by	
			Mobile App	Device
	Blinks 3 times (2 Hz)	TDL starts logging	Tap **Start Logging**	After transferring the configuration push the button for 2 to 5 s
		TDL continues logging	Tap **Disconnect** while logging	
	Blinks 3 times (2 Hz)	TDL does not start logging	Tap **Disconnect** while not logging	
		TDL has been reset	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

7 Maintenance

⚠ CAUTION

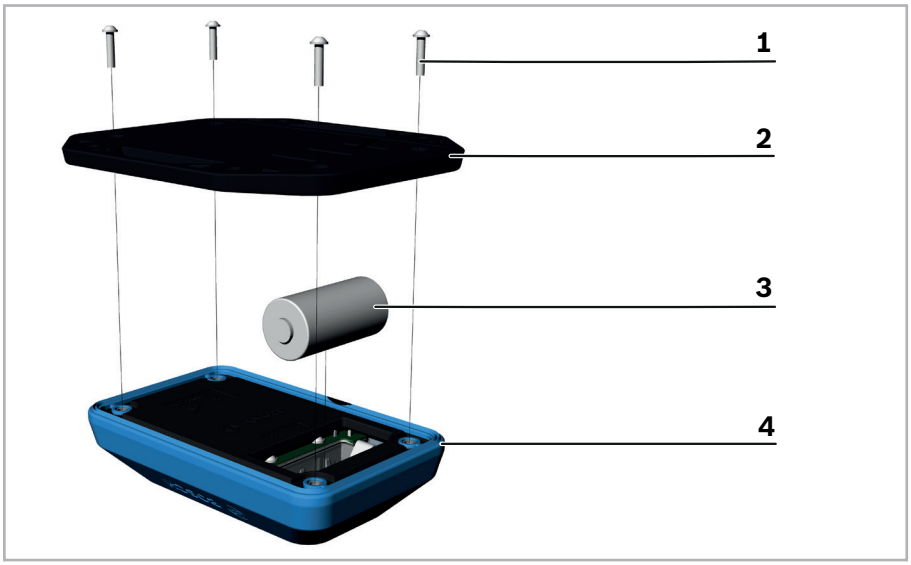
Damage to Materials can cause Risk of Fire!

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 mounting plate is positioned correctly.
⇒ Verify that the silicon cover fits smoothly into the indentation of the plate.
⇒ Always fasten the screws with a torque of 0.5 Nm. Otherwise the specified protection class can be lost!

7.1 Changing the Battery

The battery is accessible from the bottom of the TDL.



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

Figure 4 Changing the battery

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 **Reading the Data** on page 13).
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.

The TDL is now ready for use and can be configured (see **Operation** on page 8).

8 Regulatory Notices

8.1 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.

8.2 EU Declaration of Conformity

Hereby, Bosch Connected Devices and Solutions GmbH declares that the radio equipment type **Transport Data Logger TDL 110** is in compliance with Directive 2014/53/EU (Radio Equipment Directive).

- Radio power max. 4 mW
- Frequency band 2400 – 2483.5 MHz

The full text of the EU declaration of conformity is available at the following internet address: **www.bosch-connectivity.com/TDL110**

8.3 Federal Communications Commission (FCC) Notice

FCC has issued an EQUIPMENT AUTHORIZATION to Bosch Connected Devices and Solutions GmbH for XDK110 according to FCC rule parts 15 C with the FCC ID: 2ADSJTDL110

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.

8.4 ISED Canada (IC) Notice

Industry Canada (now ISED Canada) has granted to Bosch Connected Devices and Solutions GmbH the IC ID: 12595A-TDL110.

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.

8.5 IMDA Singapore Notice

Complies with IMDA standards DB101762

The TDL110 has been registered with the Infocommunications Media Development Authority under regulation 20(6) of the Telecommunications (Dealers) Regulations (Cap 323, Rg 6) and approved for sale in Singapore under Dealer's License DB101762.

8.6 Japanese Radio Law (電波法) Notice

R **202-LSE086**

This device is granted pursuant to the Japanese Radio Law (電波法) and registered as radio equipment R: 202-LSE086. This device should not be modified (otherwise the granted designation number will become invalid).

8.7 China Notice

This device has passed the type approval by SRRC and has been grated the CMIIT ID 2016DJ6299.

8.8 Australia Notice

This device complies with the requirements of the relevant ACMA Standards made under the Radiocommunications Act 1992 and the Telecommunications Act 1997.

8.9 Malaysia Notice

MCMC
CIDF17000080

This device complies with the Standard MCMC MTSFB TC T007:2014 under the Common ID CIDF17000080.

8.10 Philippines Notice

NATIONAL TELECOMMUNICATIONS COMMISSION

Type acceptance of this device is issued to Bosch Connected Devices and Solutions GmbH for use in the Philippines subject to existing NTC rules and regulations: Certificate N°. ESD-1714430C.

8.11 Thailand Notice

NBTC Thailand

Declaration of Conformity has been confirmed for this device by Thailand NBTC.

8.12 Bluetooth®

The TDL110 has been granted the Bluetooth® Listing by the BT-SIG.

8.13 Other Certifications

For information on other certifications please, contact our TDL support at **support@bosch-connectivity.com**.

8.14 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.

Neither the TDL nor a potential product derivation, are designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Bosch product could create a situation where personal injury or death may occur.

The same applies for any kind of weapon, or any device or application which is potentially dangerous for human life.

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BCDS-TDL110/0001 (2017-09)