SPORT DRIVE

DEALER MANUAL

Fourth generation BIKE FUN International bicycles

Version 4.3, 6/2024

CONTENTS:

1 INTRODUCTION

This manual provides technical support to dealers and covers the fourth-generation of the Sport Drive electric drive system. Electric bicycles and batteries are manufactured in accordance with the EN 15194:2017 standard. Pedal (ride) support is enabled at speed up to 25 km/h ± 10%, bicycle walk assist operates at speed up to 6 km/h and nominal motor output is up to 250 W. Support is activated by a revolution sensor located in the bottom bracket set so that the pedal is turned by the set angle while maintaining the minimum cadence. Support output is set on the display and includes a torque sensor on the bicycle to detect the force applied to the pedals.

1.1 Bicycle wiring connections

Figures 1.1, 1.2 and 1.3 depict the wiring connections for the individual bicycle electrical components. More detailed instructions for connecting these parts are provided in Chapter 4.

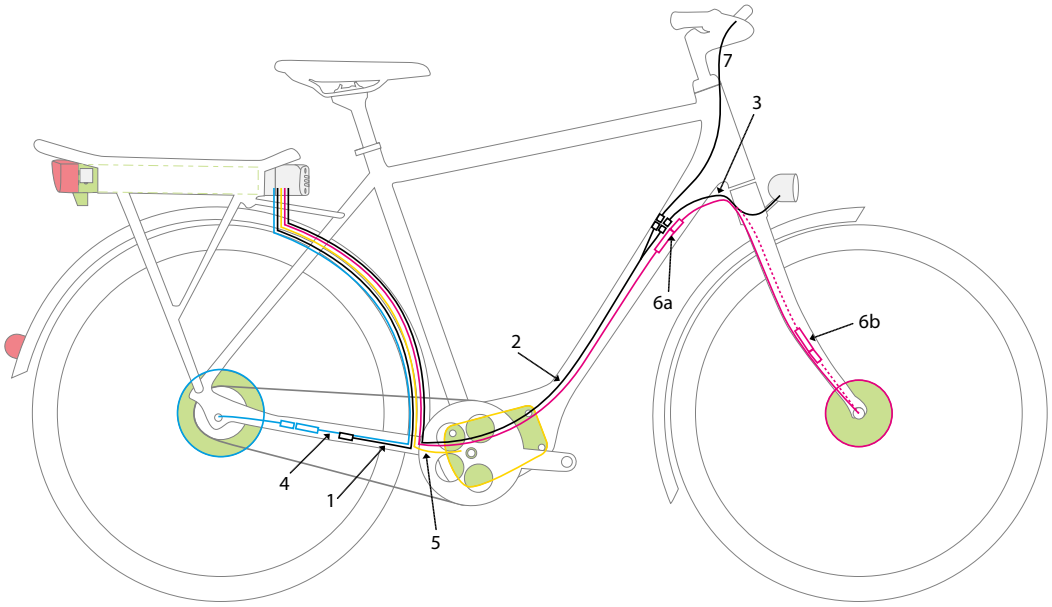


Figure 1.1 Block scheme of the bike connection with carrier battery

1	Speed sensor cable
2	Extension cable for the display
3	Front light cable
4	Extension cable for the rear motor
5	Revolution sensor (front or rear motor) / extension cable for the motor and extension cable for the sensor (mid-motor)
6a	Extension cable for the front motor
6b	Extension cable for the front motor
7	Display cable

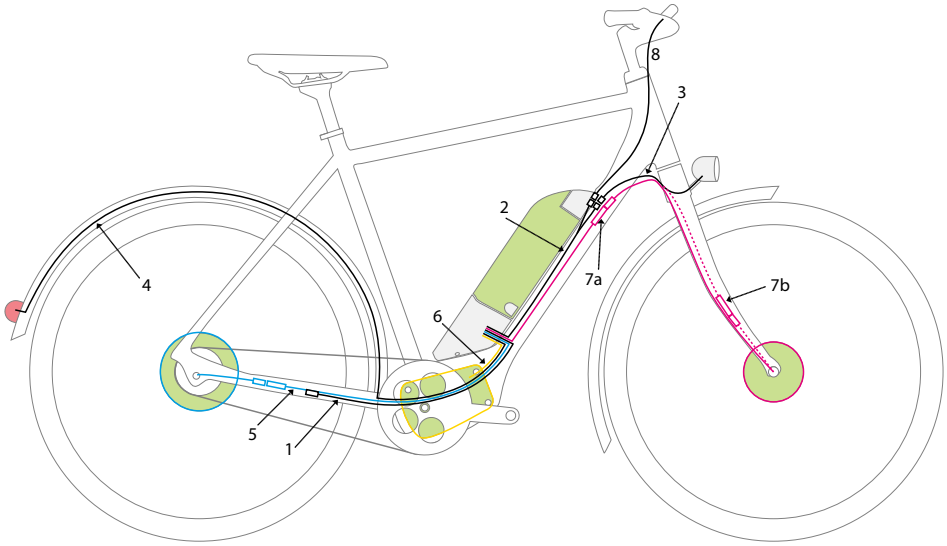


Figure 1.2 Block scheme of the bike connection with semi-integrated battery

1	Speed sensor cable
2	Extension cable for the display
3	Front light cable
4	Rear light cable
5	Extension cable for the motor - rear
6	Revolution sensor cable (front or rear motor) / phase cables and sensor cables for the mid-motor
7a	Extension cable for the front motor - option A
7b	Extension cable for the front motor - option B
8	Display cable

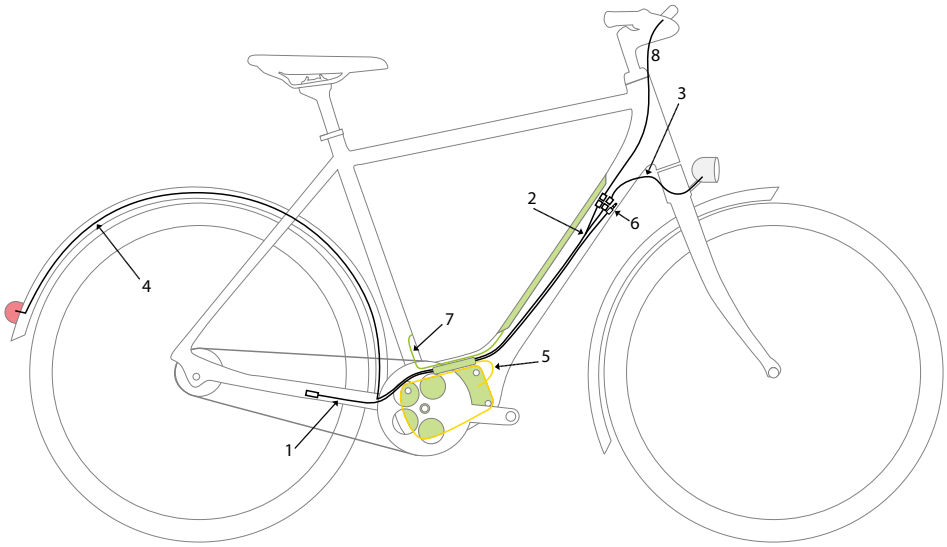


Figure 1.3 Block scheme for connecting the bicycle with a fully integrated battery

1	Speed sensor cable
2	Extension cable for the display
3	Front light cable
4	Rear light cable
5	Phase cables and sensor cables for mid-motor
6	Diagnostic connector
7	Charging connector
8	Display cable

1.2 Display

The display is only used to control the bicycle and to show travel data. The display is used to switch the electrical system on and off, to adjust the support level, to activate walk assist, to control tachometer functions and to control the lights (if lights are available).
Five display options are available:

1.2.1 Grip display

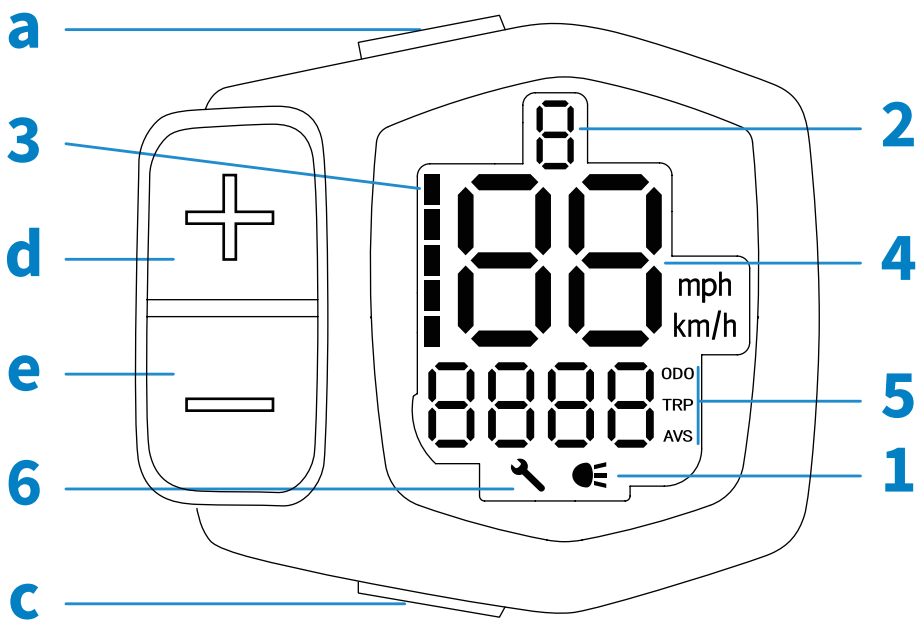


Figure 1.4 Grip display functions

SYMBOLS:	
1	Light indicator
2	Support level indicator
3	Battery charge indicator
4	Speed indicator
5	Tachometer (ODO, TRP, AVS)
6	Service indicator

BUTTONS:	
a	On/Off
c	Walk Assist / Light Control
d	Increase Support Level
e	Decrease Support Level

1.2.2 Compact display

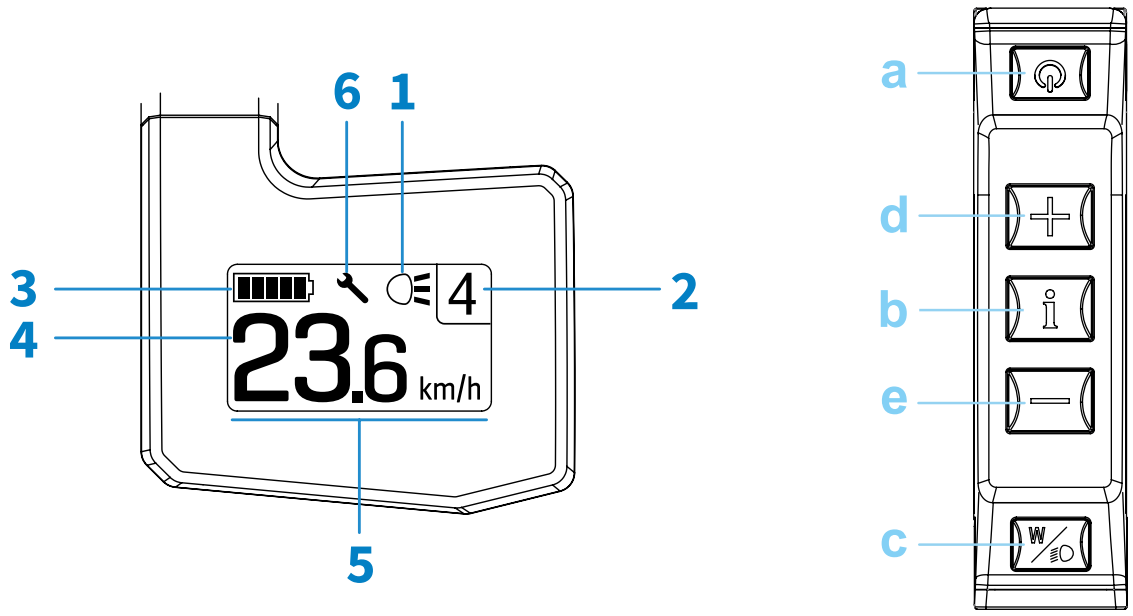


Figure 1.5 Compact display functions

SYMBOLS:	
1	Light indicator
2	Support Level indicator / Walk Assist
3	Battery charge indicator
4	Speed indicator
5	Tachometer (ODO, TRP, AVS)
6	Service indicator

BUTTONS:	
a	On/Off
b	INFO (Tachometer controls)
c	Walk Assist / Light Control
d	Increase Support Level
e	Decrease Support Level

1.2.3 Grip Pro display

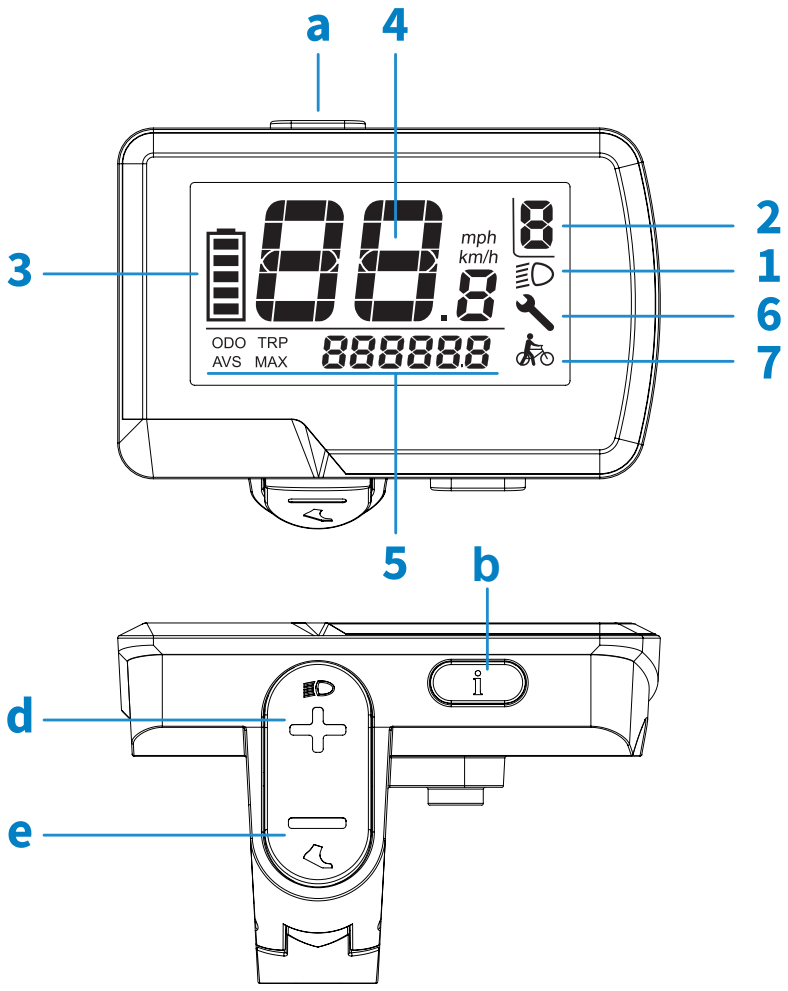


Figure 1.6 Grip Pro display functions

SYMBOLS:	
1	Light indicator
2	Support Level indicator
3	Battery charge indicator
4	Speed indicator
5	Tachometer (ODO, TRP, AVS, MAX)
6	Service indicator
7	Walk assist

BUTTONS:	
a	On/Off
b	INFO (Tachometer controls)
d	Increase Support Level / Light Control
e	Decrease Support Level / Walk Assist

1.2.4 Square display

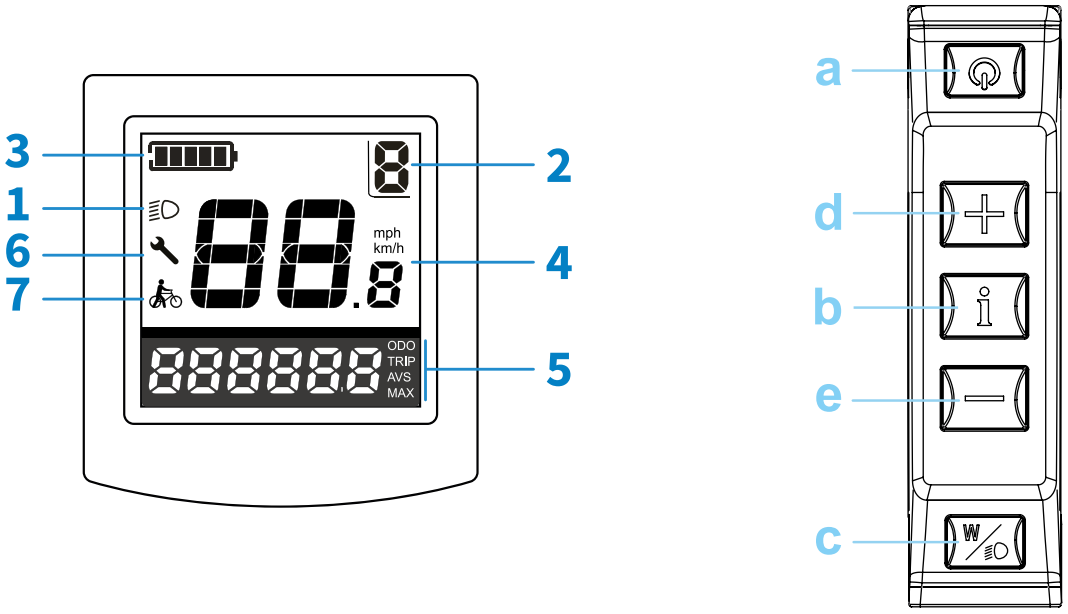


Figure 1.7 Square display functions

SYMBOLS:	
1	Light indicator
2	Support Level indicator
3	Battery charge indicator
4	Speed indicator
5	Tachometer (ODO, TRP, AVS, MAX)
6	Service indicator
7	Walk assist

BUTTONS:	
a	On/Off
b	INFO (Tachometer controls)
c	Walk Assist / Light Control
d	Increase Support Level
e	Decrease Support Level

1.2.5 Color display

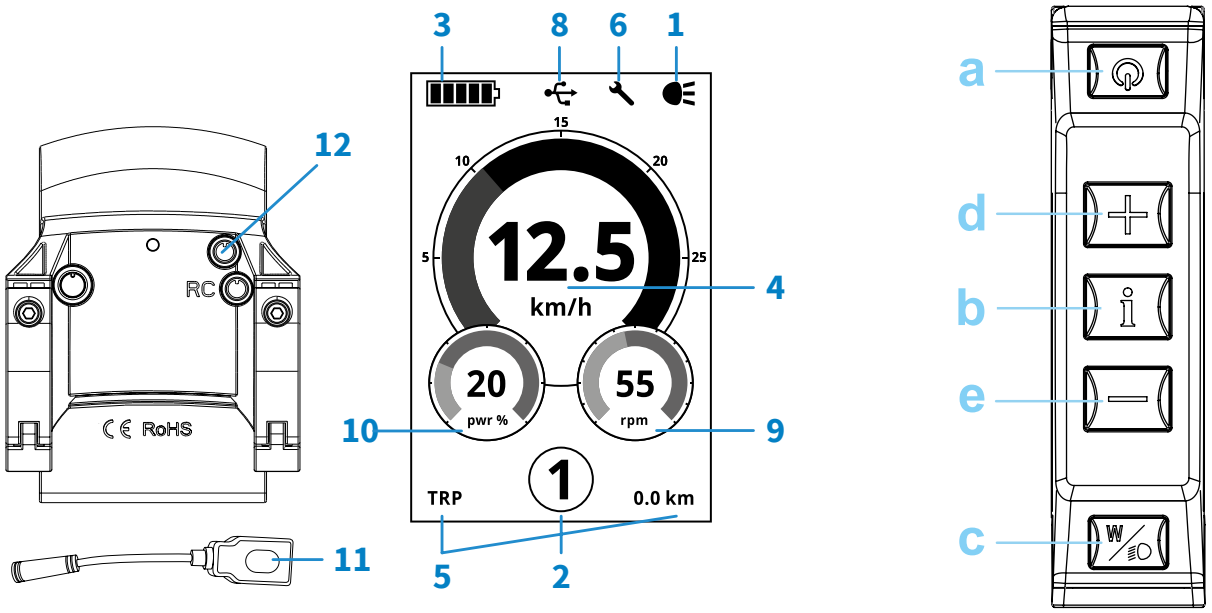


Figure 1.8 Color display functions

SYMBOLS:	
1	Light indicator
2	Support Level indicator / Walk Assist
3	Battery charge indicator
4	Speed indicator
5	Tachometer (ODO, TRP, AVS, MAX)
6	Service indicator
8	USB connection indicator
9	Cadence
10	Motor output power in %
11	USB cable
12	USB cable connection connector

BUTTONS:	
a	On/Off
b	INFO (Tachometer control)
c	Walk Assist / Light Control
d	Increase Support Level
e	Decrease Support Level

1.2.6 Display functions

1. Light indicator - if the lights are on (briefly press the Walk Assist / Light Control button on the Grip, Compact, Square, or Color display. Press and hold the Increase Support Level button on the Grip Pro display for a minimum of two seconds) and the light indicator is illuminated regardless of whether lights are installed or not.

2. Support Level indicator - current support level. The number of support level depends on the technical configuration of your bicycle (bikes with a revolution sensor have eight levels of assistance, bikes with torque / revolution sensor have four support levels). The walk assist indicator is shown (see point 7) instead of the support level if you activate the Walk Assist function on the Compact display or the Color display.

3. Battery charge indicator – shows the battery charge graphically or as a percentage from 0% to 100% (except for the Grip display). The battery charge indicator flashes when the battery is fully discharged, and support is not available.

Figure 1.9 Battery charge indicator

4. Speed indicator – bicycle speed in km/h or mph. See Chapter 3.4.4 to change the units

5. Tachometer (ODO, TRP, AVS, MAX) - Trip statistics: ODO (total bicycle mileage – may be changed in the diagnostics), TRP (daily mileage), AVS (daily average speed) and MAX (maximum speed). The MAX function is only available for Grip Pro, Square, and Color displays. Maximum speed is reset when the display is switched off. The tachometer is controlled using the INFO button; press briefly to cycle through the displayed functions and press and hold the INFO button for three seconds to zero out both TRP and AVS values.

ATTENTION:

- The MAX function is not available for Compact and Grip displays.

ATTENTION:

- For the Grip display, the displayed functions change by holding down the Increase Support Level button for three seconds, and the TRP and AVS are reset by simultaneously holding down the Increase Support Level and Decrease Support Level buttons.

6. Service interval – a wrench icon appears to tell the customer when to visit the dealer. This interval may be adjusted in the Diagnostics, which is only accessible to dealers (see Chapter 3.4.2.).

7. Walk Assist – shows when walk assist is activated. Press and hold the Walk Assist / Light Control button for more than two seconds to activate this feature on Grip, Compact, Square, and Color displays. Press and hold the Decrease Support Level button for more than two seconds to activate this feature on Grip Pro displays. The Walk Assist indicator is shown on Compact and Color displays instead of the Support Level indicator. The Grip display does not have a walk assist indicator.

8. USB connection indicator – indicates when an external device is connected to the display output.

ATTENTION:

- Do not use the USB if the battery is completely or nearly discharged.
- Connecting an external device has an impact on battery capacity.

9. Cadence – current riding cadence (rotation speed at which the cyclist is pedalling / the pedals are turning).

10. Motor output power in % – current motor output power from 0% to 100%.

11. USB cable – cable for connecting an external device to the display output (e.g. a mobile phone).

12. USB cable connection connector – display output for the USB cable connection

ATTENTION:

- Disconnect the USB cable when no external device is connected to avoid losing the cable and cover the port with the provided cap.

a. On / Off - Press this button to switch the electrical system on and off.

b. INFO (Tachometer control) - (see point 5)

c. Walk Assist / Light Control – press briefly to turn the lights on or off (if lights are available). Pressing and holding this button for more than two seconds activates walk assist for up to 6 km/h, but this is only active as long as the button is pressed. Diagnostics may be used to adjust the speed and output power for this support.

d. Increase Support Level – press to add one support level and press and hold to continuously increase support.

e. Decrease Support Level - press to subtract one support level and press and hold to continuously decrease support.

ATTENTION:

- Grip and Grip Pro displays do not support continuously increasing and decreasing support levels.

1.3 Battery

The battery is a consumable product and subject to wear. This means that its capacity degrades over time. We guarantee that the battery will maintain 80% of its original capacity after 600 full capacity dis-charge cycles (1 full dis-charge cycle is equivalent to several dis-charge actions, accumulating to one full battery capacity dis-charge) or after two years. Whichever occurs first.

Battery electronics (BMS) take care of the battery cells, protect them from dangerous situations and their settings ensure their long-term proper function. Protection against short circuiting, overcharging, undercharging, high and low temperature and defective cell protection are all implemented.

As lithium batteries are classified in UN3481 class 9, the battery is supplied in ADR transport packaging certified for ground transportation. We recommend you keep this packaging should the need arise to ship the battery in the future.

1.3.1 Use

The batteries use precise detection of state of charge (SOC) in the range of 100% to 0%. The real State of charge depends on storage (5 to 15 °C) and usage temperature (-5 to 40°C). To ensure optimal battery function, the battery should be at least at room temperature before use.

If the battery has not been used for more than 48 hours, it will automatically enter sleep-mode. Briefly press the battery charge indicator on the battery to activate the battery out of sleep-mode.

If the battery has not been used for more than 30 days, it will automatically enter deep-sleep-mode. Connect the battery to the charge for at least 5 seconds to activate the battery.

ATTENTION:

- New batteries are always delivered in deep-sleep-mode and they must be connected to a charger for a minimum of 5 seconds for activation.

1.3.2 Storage

- **Short-term storage (a few weeks):** in a dry place at room temperature
- **Long-term storage (several months):** in a dry and cool place (5-15°C) charged to approximately 50% capacity

If the battery is not used regularly, we recommend charging the battery once every three months (at least once every six months) to approximately 50% of capacity.

1.3.3 Charging

Both offered chargers have optimised settings to ensure the best possible battery charging. To extend the service life of the battery, a standard two-amp charger is recommended. A four-amp rapid charger is offered for rapid charging. The battery charging times are specified in Table 1.1. Both chargers use two-colour LEDs to indicate charging status. Red indicates the battery is charging and green indicates that the battery is charged, or no battery is connected to the charger. The red LED flashes if an error occurs.

Battery type	charging time on 2-amp charger		charging time on 4-amp charger	
	50% -> 100%	0% -> 100%	50% -> 100%	0% -> 100%
300 Wh	03:00	04:30	01:30	02:30
400 Wh	03:45	06:00	01:45	03:00
500 Wh	04:15	07:30	02:00	03:30

Table 1.1 Charging time based by charger and battery type

The battery may be charged on or off the bicycle (for charging the fully integrated battery off the bicycle, use charging adapter). The charger is designed for indoor use, and it is recommended to charge batteries at room temperature. The permitted charging temperature range is from 5°C to 35°C.
Batteries may be charged regardless of their current charge. It is recommended to recharge the battery continuously to extend its life. From time to time, we recommend (at least twice a year) to fully discharge the battery to 0%. This automatically recalibrates the battery.

1.3.4 Range

Bicycle range depends on a number of factors (set support level, the intensity of the rider's pedalling (power output), weather conditions, route profile, road character, tire pressure, weight of the rider and luggage).

Range indication in the chart is based on experiences of regular users in regular conditions.

Users may have lower and higher range values compared to those specified in Table 1.2 given the conditions specified above.

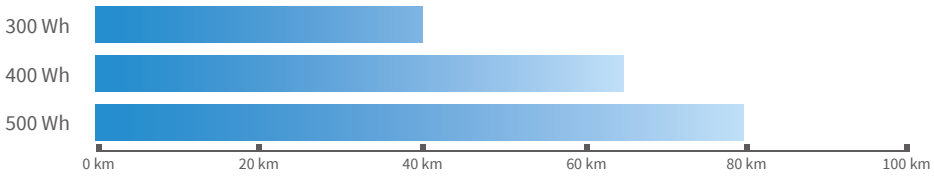


Table 1.2 Average range values based on the real-world experience of users for the individual types of offered batteries

ATTENTION:

- Batteries are delivered in deep-sleep-mode. Connect to a charger to wake up the battery (for a minimum of 5 seconds).
- Use solely original Sport Drive charger to charge batteries.
- Follow the safety instructions provided on the charger.
- The battery warranty will be invalid if the battery is opened or if a non-original Sport Drive charger is used to charge the battery.
- Do not expose batteries or chargers to high temperatures, excessive moisture, or liquids.
- Use the original ADR-approved packaging certified for land transport to transport the battery.

Tip:

- Charge the battery even when it is half charged. This will extend its service life.

1.4 Control unit

The control unit handles communication and control of the electric bicycle. Motor output power is controlled based on the support settings, and the signals from the bottom bracket sensor (the torque revolution or revolution sensor). The support activation angle is adjustable in the diagnostics using the starting reaction option in three levels: SLOW, NORMAL, or QUICK (Fig. 3.14). Electric bicycle output power is gradually reduced as the battery charge drops below 10%. Pedal support and walk assist are both disabled once the battery is discharged (0%). Even if the battery is discharged, we guarantee that the display and lights (if powered from the e-bike battery) will remain operational for a minimum of an additional two hours. The control unit will then completely switch off the electrical system.

The control unit provides electrical system diagnostics during use by recording errors (see Chapter 3.4.7) and using tests in diagnostics (see Chapter 3.4.13). All settings, including tachometer values, are saved in the control unit.

ATTENTION:

- If the battery is completely discharged, the control unit activate an internal protection and both the electric system and the connected diagnostics cannot be switched on.
- If the control unit overheats, support is deactivated until the control unit cools down.
- If the bicycle is left idle for ten or more minutes (without the pedals moving or any button being pressed on the display), the electric system automatically switches off.
- At low battery level, it is important to remember that a 0% battery level automatically disables support, which may lead to unexpected deceleration of the bicycle itself.

1.5 Motor

Sport Drive e-bikes use front, mid, or rear BLDC (brushless direct current) motors. Nominal motor output is 250 W. The technical specifications are provided in Chapter 1.8.

1.6 Bottom bracket (BB) set

The BB set contains the revolution or torque revolution sensor, which provides the control unit with pedal speed information (forward or backward) and torque (the amount of force applied on the pedals). This signal activates or deactivates support (motor operation). The technical specifications are provided in Chapter 1.8.

1.7 Speed sensor

The speed sensor monitors wheel speed and is mounted on the rear frame assembly. A magnet is installed in the rear wheel assembly (Fig. 4.43 or 4.44). The wheel diameter may be changed in diagnostics to ensure speed is calculated properly (Fig. 3.13).

1.8 Technical specifications

Nominal e-system voltage:	36 V
Maximum support speed:	25 km/h ±10%
Walk assist:	adjustable up to 6 km/h
Type of display:	Grip/Compact/Grip Pro/Square/Color display
Battery	
Battery location:	integrated / on the lower tube frame / on rear carrier
Battery type:	Li-Ion battery module, 36 V nominal voltage
Power (capacity):	300 Wh, 400 Wh, 500 Wh
Battery charge indicator:	4 LED indicator on battery / 5-section indicator on display
Protection:	undercharging, overcharging, short circuiting, under temperature, over temperature, defective cell protection
Chargers	
Input parameters:	100 ~ 240 VAC, 50/60 Hz
Output parameters:	41.5 V / standard 2-amp charger / 4-amp fast charger
Charging times:	2.5 h - 7.5 h (depending on charger and type of battery)
Motor types:	
Type:	**Sport Drive M123 front motor**
Gearbox:	planetary gearbox with freewheel
Type:	BLDC (brushless direct current) motor
Output:	nominal 250 W (peak 330 W)
Sensor type:	NCTE SBBRF - revolution sensor
Type:	**Sport Drive M155 rear motor**
Gearbox:	planetary gearbox with freewheel
Type:	BLDC (brushless direct current) motor
Output:	nominal 250 W (peak 400 W)
Sensor type:	NCTE SBBRF - revolution sensor, NCTE SBBRT – torque revolution sensor
Type:	**Sport Drive MD250S mid motor**
Type:	BLDC (brushless direct current) motor
Output:	nominal 250 W (peak 500 W)
Sensor type:	torque revolution sensor integrated inside the motor

2 INSTALLATION OF THE DIAGNOSTIC PROGRAM

Diagnostics must be installed prior to initial use (see below). When diagnostics is launched, it first checks for any available updates for diagnostics, bicycle firmware and other useful downloadable documents. The diagnostic program is compatible with Windows 7, 8, 8.1 and 10.

Tip:

- Connect the PC to the Internet before starting the installation, to download all necessary updates.

2.1 Installation process

ATTENTION:

- Diagnostics are automatically installed in c:\SPORTDRIVE\

Select a language for the diagnostic software installation (all advice and explanations will be in this language) and press OK to confirm.

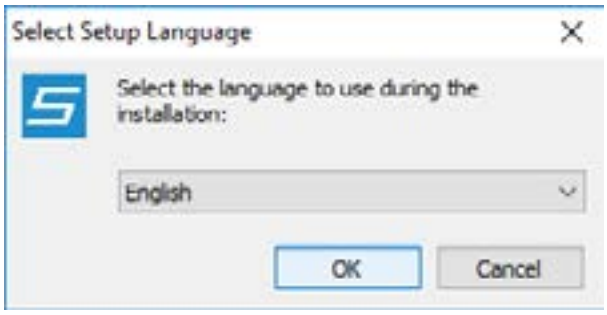


Figure 2.1 Driver installation - language selection

Click on “Next” to continue.

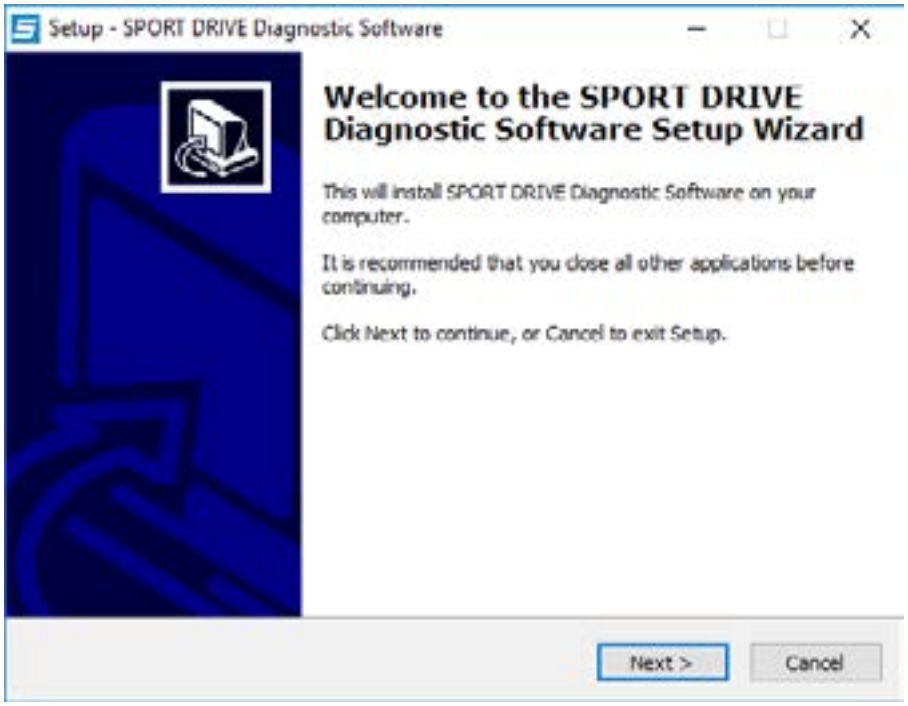


Figure 2.2 Diagnostics installation – about the installation

Click on “Install” to install the software.

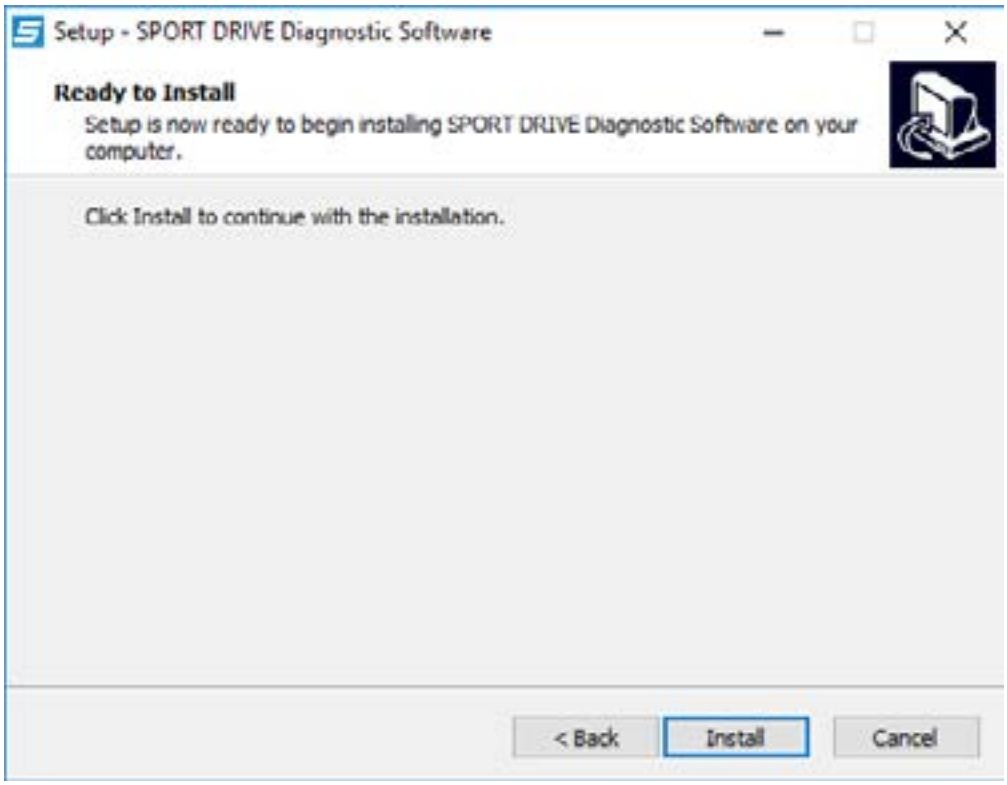


Figure 2.3 *Diagnostics installation – installation*

To add the dealer logo to be printed on reports, click on “dealer logo” (Fig. 2.4) and then select the image you want to use (Fig. 2.5). A new installation is required to add or change the logo later.

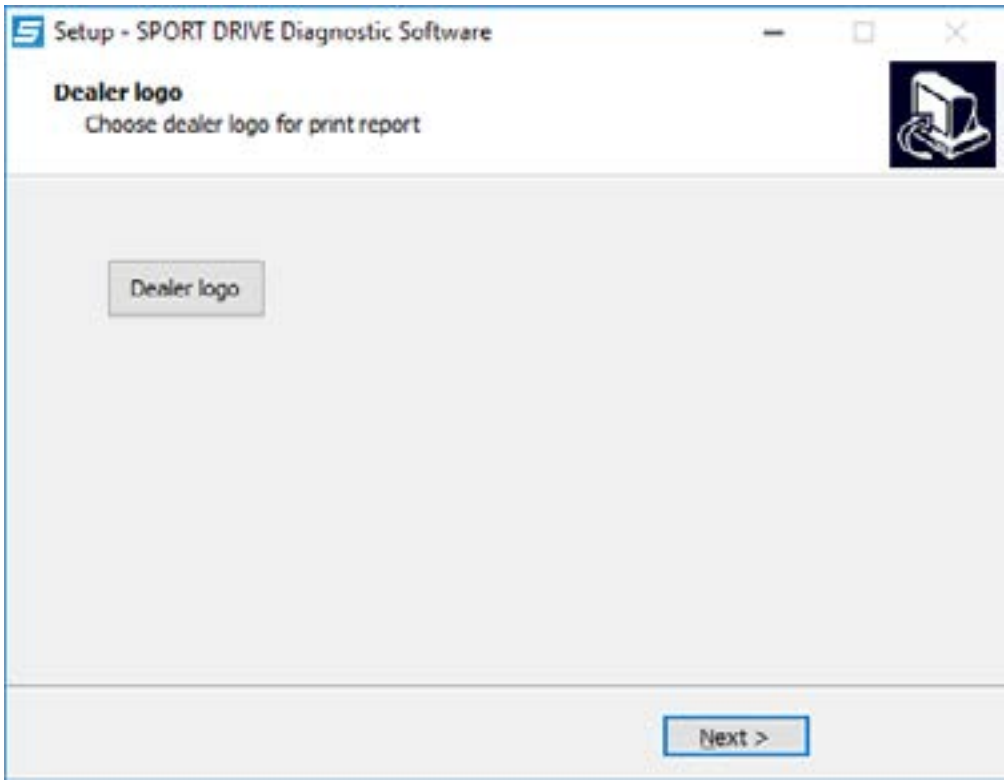


Figure 2.4 *Diagnostics installation – dealer logo*

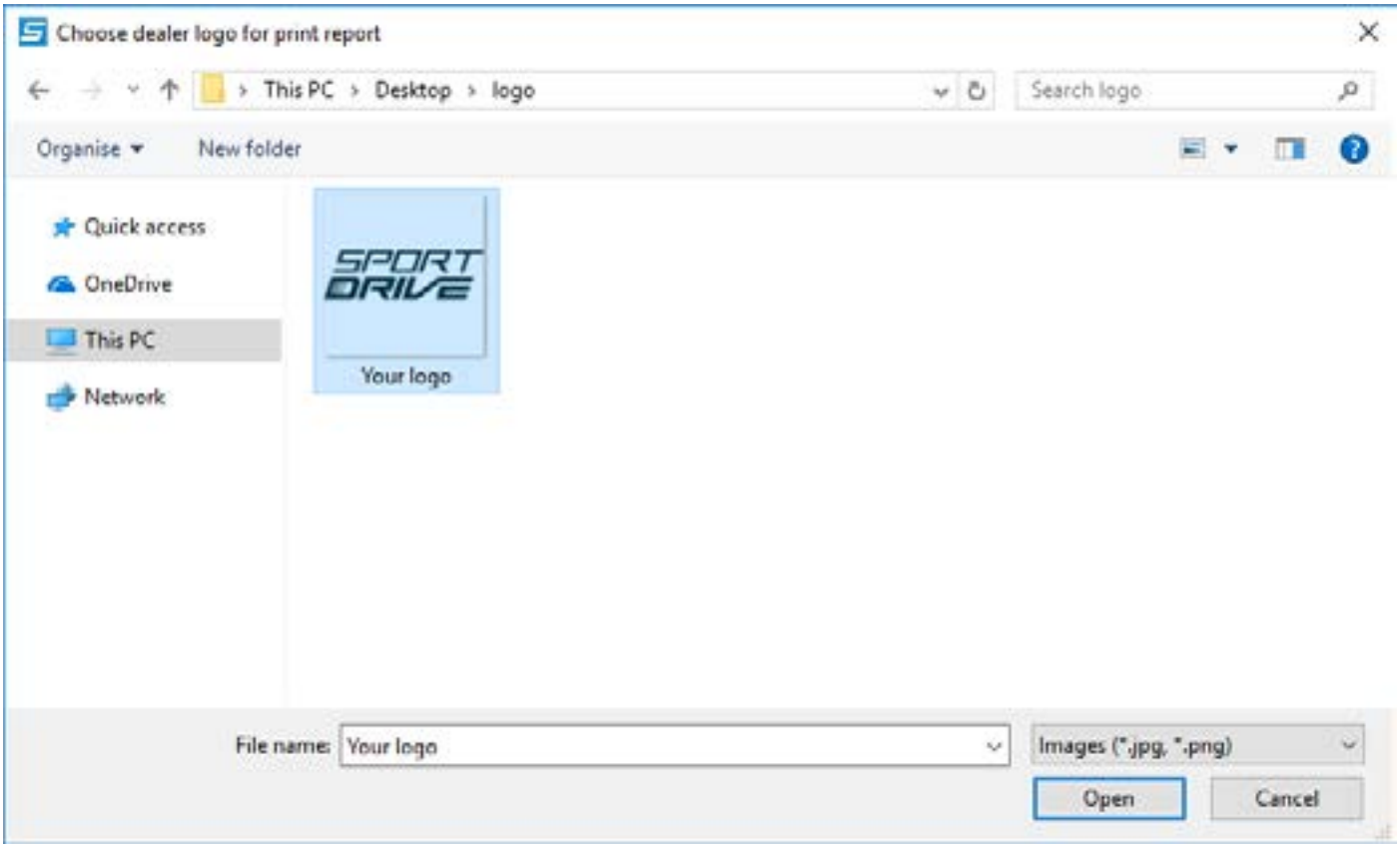


Figure 2.5 *Diagnostics installation – selecting a dealer logo*

Choose if you want to launch the application or not and then complete the installation by pressing “Finish”.

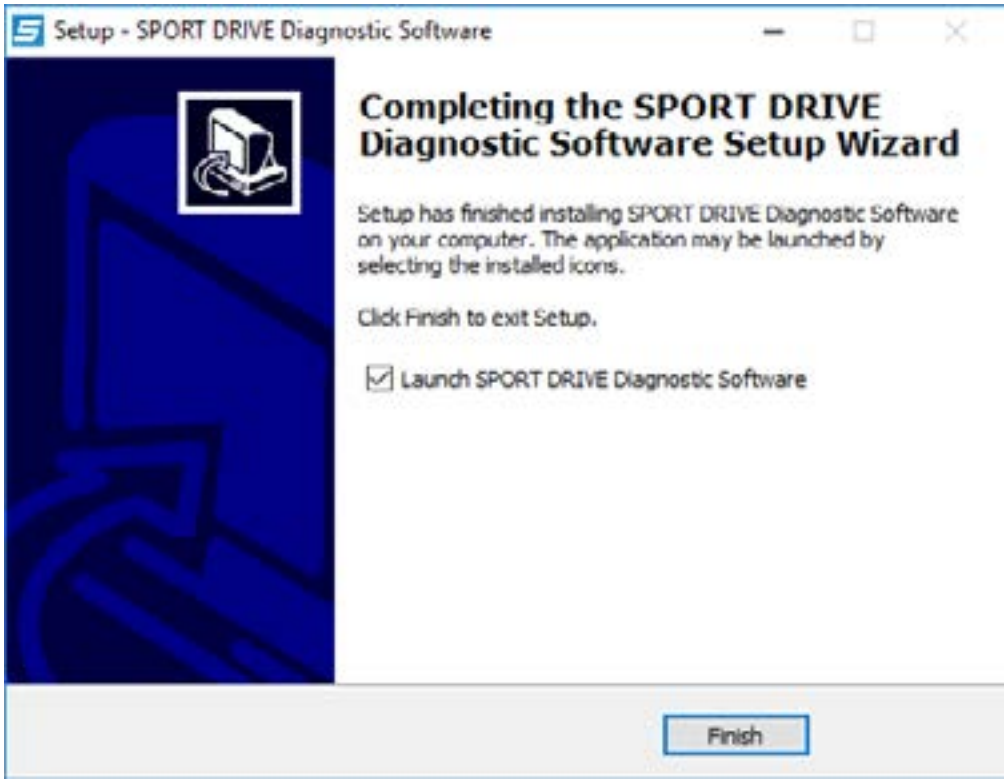


Figure 2.6 *Diagnostics installation – completion*

If you had a previous version of the PEAK Can driver installed, you will need to restart your computer.

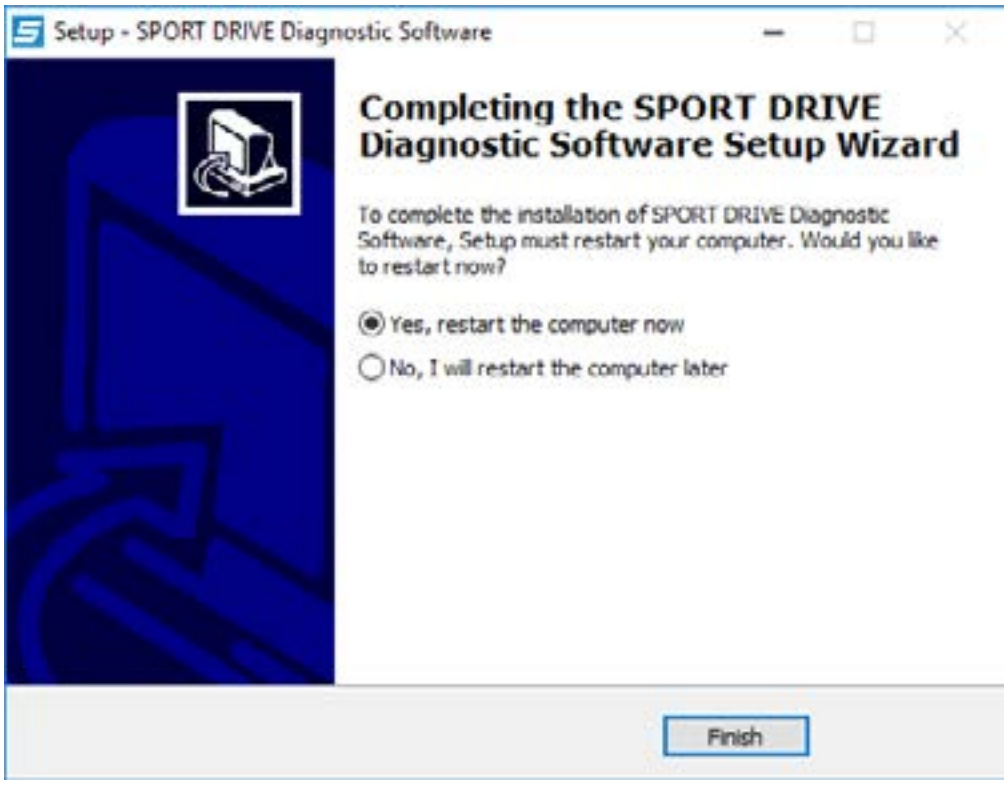


Figure 2.7 Diagnostics installation – restarting

If you have .NET Framework software older than version 4.8.1 installed on your computer, you will be prompted to update it.

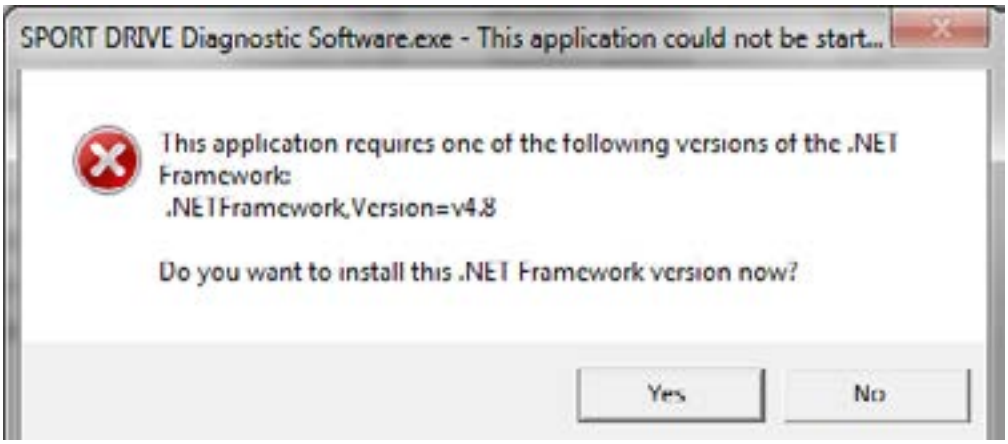


Figure 2.8 .NET Framework installation

3 DIAGNOSTICS

3.1 Updating the diagnostic program

The diagnostic program is updated automatically. If a new version of the diagnostics, control unit firmware or manual is available and if the computer is online, everything will be downloaded and updated automatically.

3.2 Diagnostics connection

a) Using the PEAK Can cable

Figure 3.1 Diagnostics (PEAK)

CARRIER BATTERY

1	Connect the diagnostics (PEAK) to the PC using the USB connector (Fig. 3.1).
2	Place the battery in the carrier but do NOT slight completely in.
3	Unscrew the Phillips screw from the rear light and place the light on the bicycle carrier.
4	Connect the diagnostic cable to the bicycle using the 3.5 mm jack connector (Fig. 3.2).
5	Start the diagnostic program.
6	Click on “Connect” (this connects the diagnostics to the battery).
7	Push the battery completely into the carrier and switch on the electrical system.

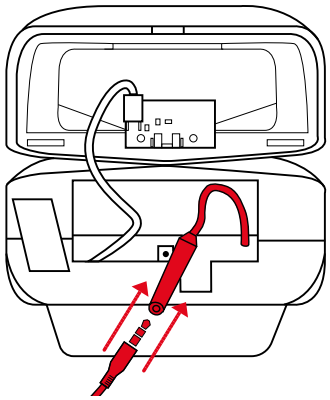


Figure 3.2 Connecting diagnostics to the carrier battery

SEMI-INTEGRATED DOWN TUBE BATTERY

1	Connect the diagnostics (PEAK) to the PC using the USB connector (Fig. 3.1).
2	Connect the diagnostic cable to the bicycle using the 3.5 mm jack connector (Fig. 3.3).
3	Start the diagnostic program.
4	Click on “Connect”.
5	Insert the battery into the bicycle and switch on the electrical system.

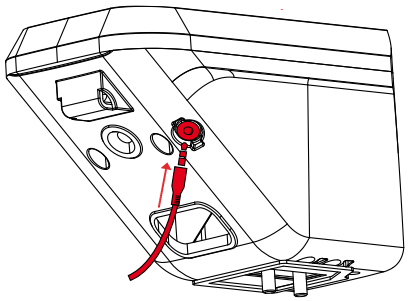


Figure 3.3 Connecting diagnostics to the semi-integrated down tube battery

FULLY INTEGRATED BATTERY

1	Connect the diagnostics (PEAK) to the PC using the USB connector (Fig. 3.1).
2	Remove the cover from the side of the bicycle (Fig. 3.4a) or headset cover (Fig. 3.4b) and remove the display extension cable.
3	Connect the diagnostic cable to the bicycle using the 3.5 mm jack connector
4	Start the diagnostic program.
5	Click on “Connect“ (this connects the diagnostics to the battery).
6	Switch on the electrical system.

ATTENTION!

After disconnecting the diagnostic cable, cover up the connector or re-install the light.

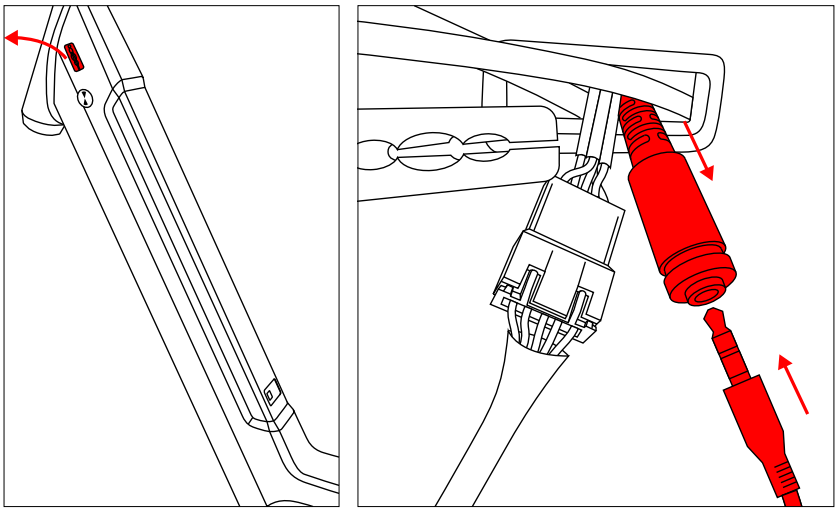


Figure 3.4a Connecting diagnostics to the fully integrated battery

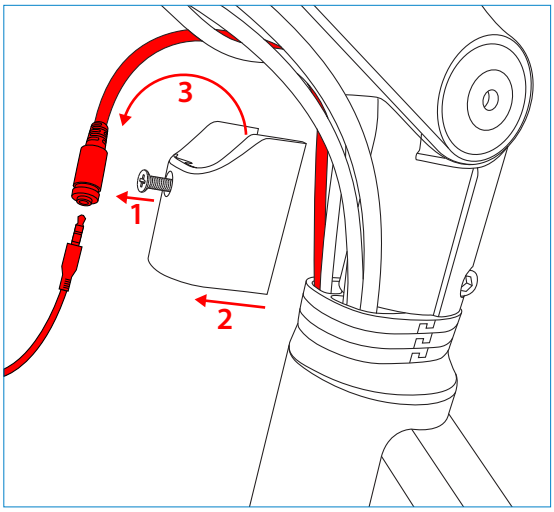


Figure 3.4b Connecting diagnostics to the fully integrated battery

b) Bluetooth connectivity

ALL TYPES OF BATTERIES	
1	Start the diagnostic program
2	The “Bluetooth connection” option is located in the upper right-hand corner (Fig. 3.5)
3	Switch on the electrical system
4	Select the e-bike you want to connect to from the list (using the frame number) and then press “Select Device” (Fig. 3.6)

Figure 3.5 *Using Bluetooth connectivity for diagnostics*

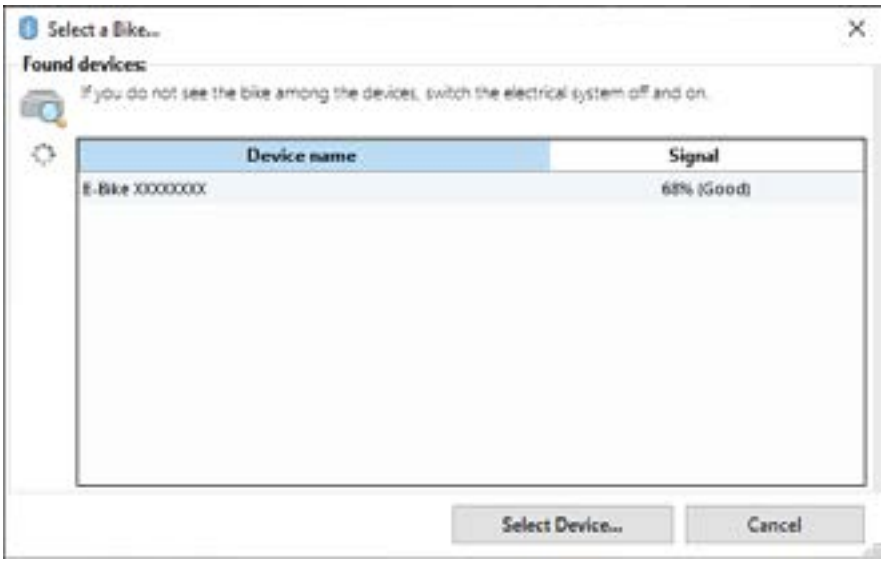


Figure 3.6 *Selecting the e-bike*

Tip:

- If you cannot find your e-bike in the list, switch the electrical system of the bike off and then on again.

WARNING!

The motor and the wheel must be free to rotate when you want to activate “Auto-update”, “Check the bike” or “Motor learning”.

ATTENTION!

The bike will automatically switch off when disconnected from diagnostics. Press the On/Off button on the display to reactivate the bike.

3.3 Problems with diagnostic hardware connections

If you have any problem with diagnostic hardware, the following situations may occur:

1. Diagnostic hardware (PEAK-CAN-USB cable) is not connected to the PC (see 2.1 Installation process).

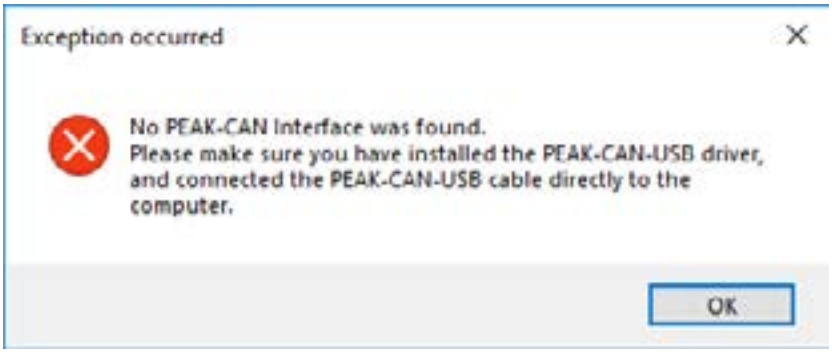


Figure 3.7 *Problems with diagnostic hardware connections 1*

2. Two diagnostic hardware (PEAK-CAN-USB cable) devices are connected to the PC. Disconnect one of them.

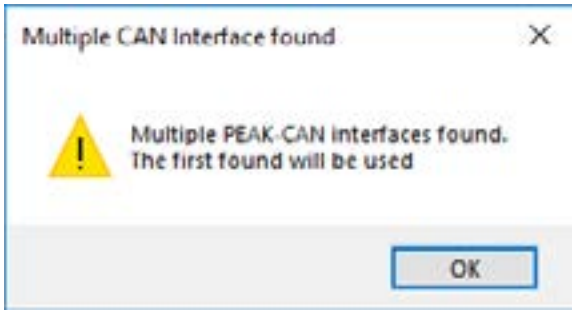


Figure 3.8 *Problems with diagnostic hardware connections 2*

3. Two sessions of the diagnostic software are running
   a. Two diagnostics are running simultaneously, use only one diagnostic program window.
   b. If such a warning appears and no diagnostic window is open, a previous session with the diagnostic software may not have closed properly and it will be necessary to end this task using the task manager. Press CTRL+ALT+DELETE and select Task Manager. End the previous session of the Sport Drive diagnostic software in the Processes tab.

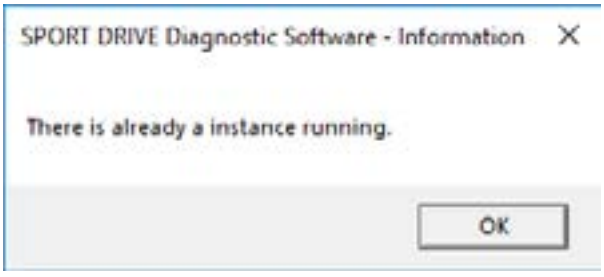


Figure 3.9 *Problems with diagnostic hardware connections 3*

4. Diagnostic hardware connection to PC lost:
   a. Check to ensure diagnostics are properly connected via USB.
   b. Restart the PC.

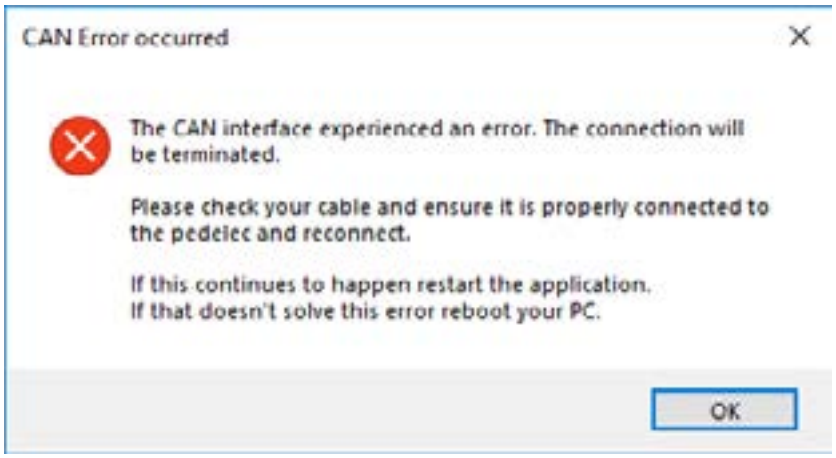


Figure 3.10 *Problems with diagnostic hardware connections 4*

3.4 Description of the diagnostic program

To start diagnostics, first select in the upper right-hand corner the PEAK Can cable (PEAK CAN cable interface) or Bluetooth (Bluetooth connection) as the connection interface and click on “Connect” on the home screen (Fig. 3.11) (see Chapter 3.2 if you selected a Bluetooth connection).

Contact details for the service centre are provided in the upper right-hand corner and the "Manuals and Spare parts” button that opens the directory where the latest manuals, spare part documentation, and other useful links are automatically saved.

The lower bar of the home screen has an indicator showing when diagnostics are online (communicating with the BIKE FUN International server) or offline (not communicating with the BIKE FUN International server and the automatic check is not active).

Figure 3.11 *Diagnostics - home screen*

3.4.1 Bike status overview

The bike status overview with tips (Advise) is the basic diagnostic tool (Fig. 3.12). More detailed explanations for the individual tips are provided in Chapter 3.4.14.

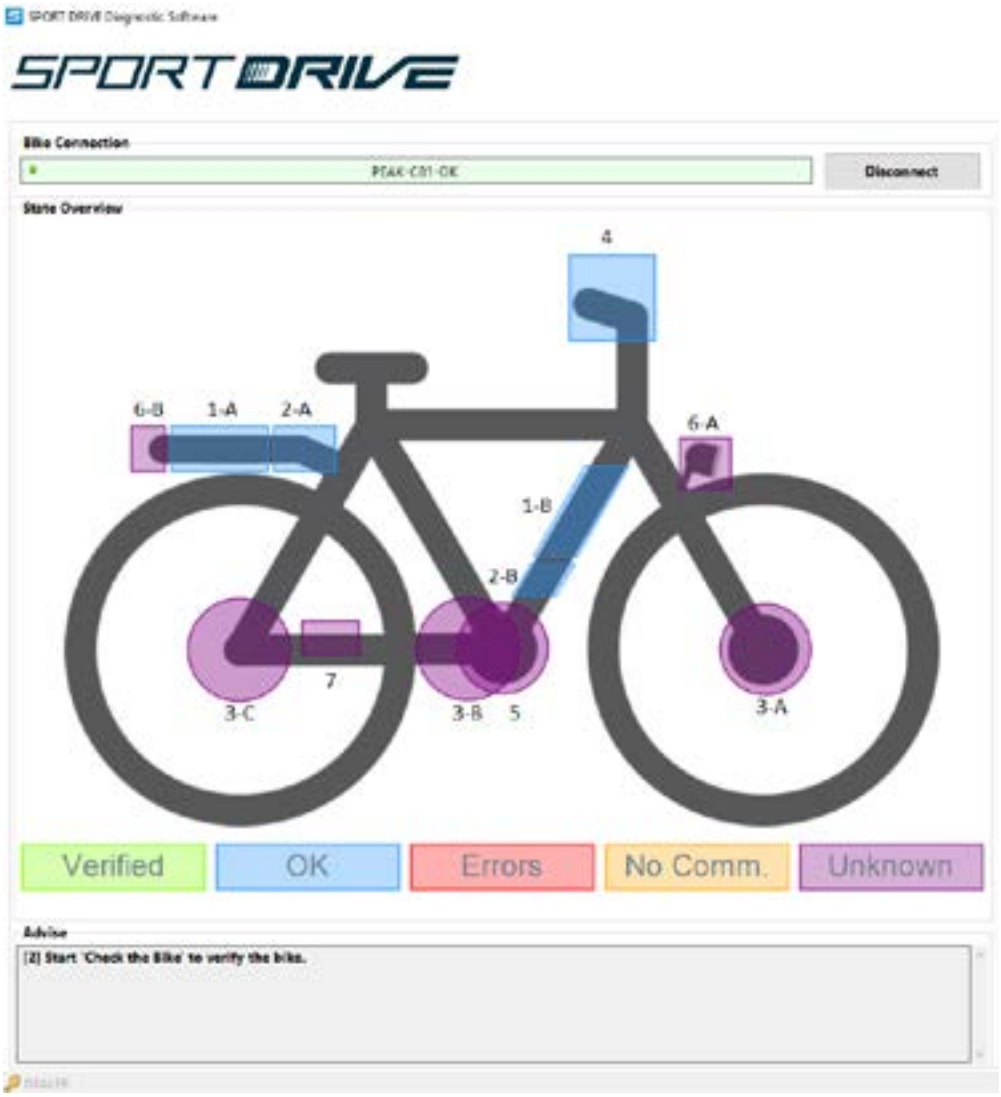


Figure 3.12 Diagnostics - Bike status overview

1	A	Carrier battery
	B	Semi-integrated down tube battery / Fully integrated battery
2	A	Carrier control unit docking station
	B	Down tube docking station of the control unit / Control unit in motor hanger
3	A	Front motor
	B	Mid motor
	C	Rear motor
4		Display
5		Bottom bracket set
6	A	Front light
	B	Rear light
7		Speed sensor

Bike Connection	Diagnostic connection status.
State Overview	Displays a summary of the status of each component in five levels: VERIFIED - verified by test sequence; OK (OK) - the component communicates with other components; ERRORS - error status of a component or function related to that component; NO COMM. (NO COMMUNICATION) - component does not communicate; UNKNOWN - The component has not yet been verified or does not contain an autonomous check.
Advise	A tip is provided for each diagnosed state. Individual tips are described in detail in Chapter 3.4.14.

3.4.2 System overview tab

This tab provides a basic overview of the bike (Fig. 3.13).

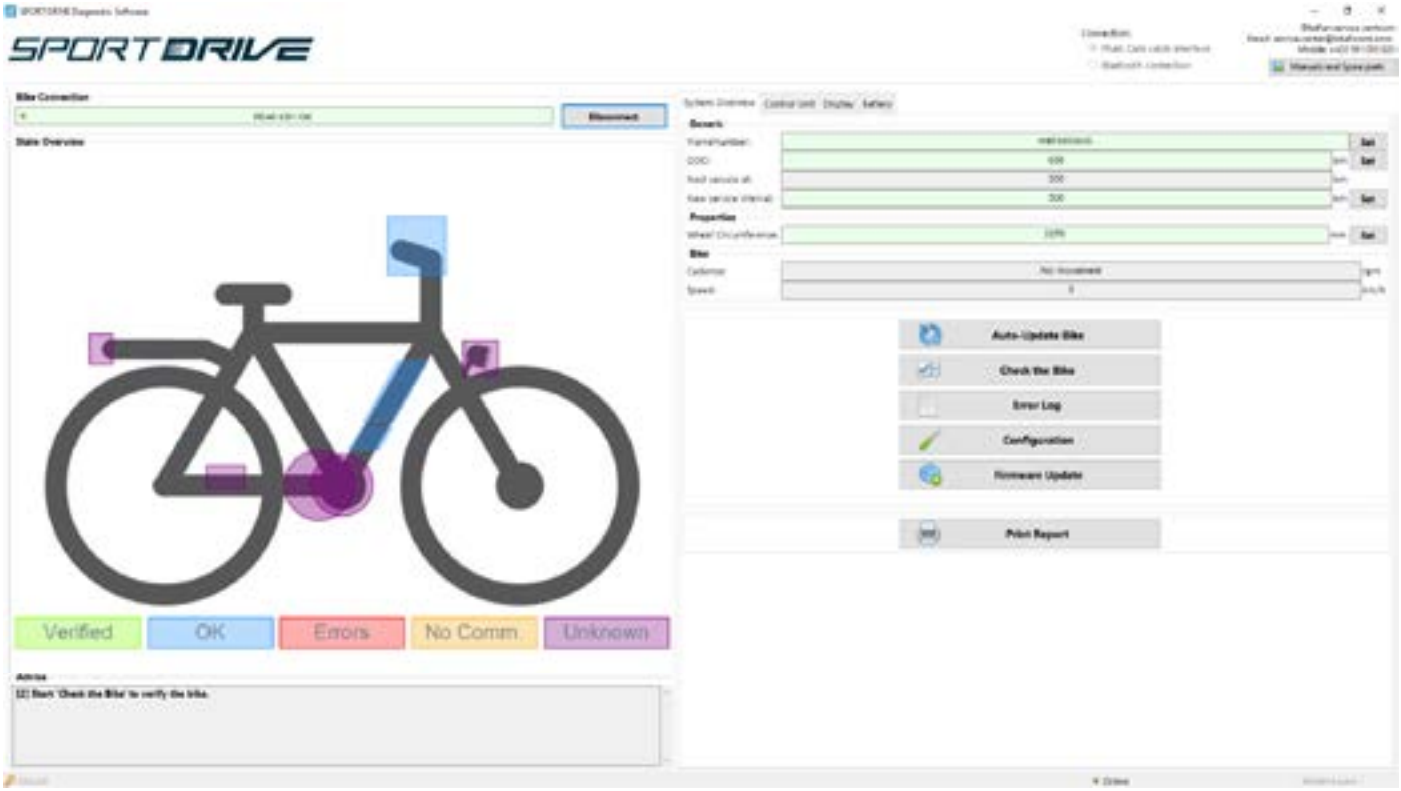


Figure 3.13 *Diagnostics - Electrical system overview tab*

SYSTEM OVERVIEW (ELECTRICAL SYSTEM OVERVIEW)	
Frame number	Unique number assigned to each frame. Entering the correct frame number is critical to ensure diagnostics works properly. This number is located on the bottom of the lower or upper tube of the frame.
ODO (Total traveled distance)	Total traveled distance of the bicycle. This value may be reset or changed in diagnostics (for example if the control unit is replaced). [km]
Next service at (Service interval)	Set distance to the upcoming service inspection. Once the ODO reaches this value, the maintenance indicator is activated (a wrench icon appears). [km]
New service interval	Set distance to the next service inspection. Dealers are free to adjust this distance as they see fit. [km]
Wheel Circumference	Wheel circumference is entered in mm and may be adjusted depending on wheel diameter: 29” 2200 - 2350 mm; 28” 2100 - 2250 mm; 27.5” 2050 -2200 mm; 26” 1950 - 2100 mm; 24” 1850 - 1950 mm.
Cadence	Shows the current pedal rotation speed [rpm].
Speed	Shows the current speed. [km/h]
Version (of the diagnostic program)	Current version of diagnostics in use (located in the lower right-hand corner).
Auto-update Bike	Used to automatically update the bike (see Chapter 3.4.9).
Check the Bike	Contains a sequence of bike verification tests (see Chapter 3.4.13).
Error log	Errors recorded during the use of the e-bike (see Chapter 3.4.7).
Configuration	Used for manual uploading of the XML configuration file and to complete “motor learning” - see Chapter 3.4.11 (offline only).
Firmware Update	Manual updating of new firmware for the control unit - see Chapter 3.4.10 (offline only)
Print report	Prints a report with important information about the bike. Perform the “Check the bike” step before printing the report.

3.4.3 Control Unit tab

This tab contains information about the control unit and enables its configuration (Fig. 3.14).

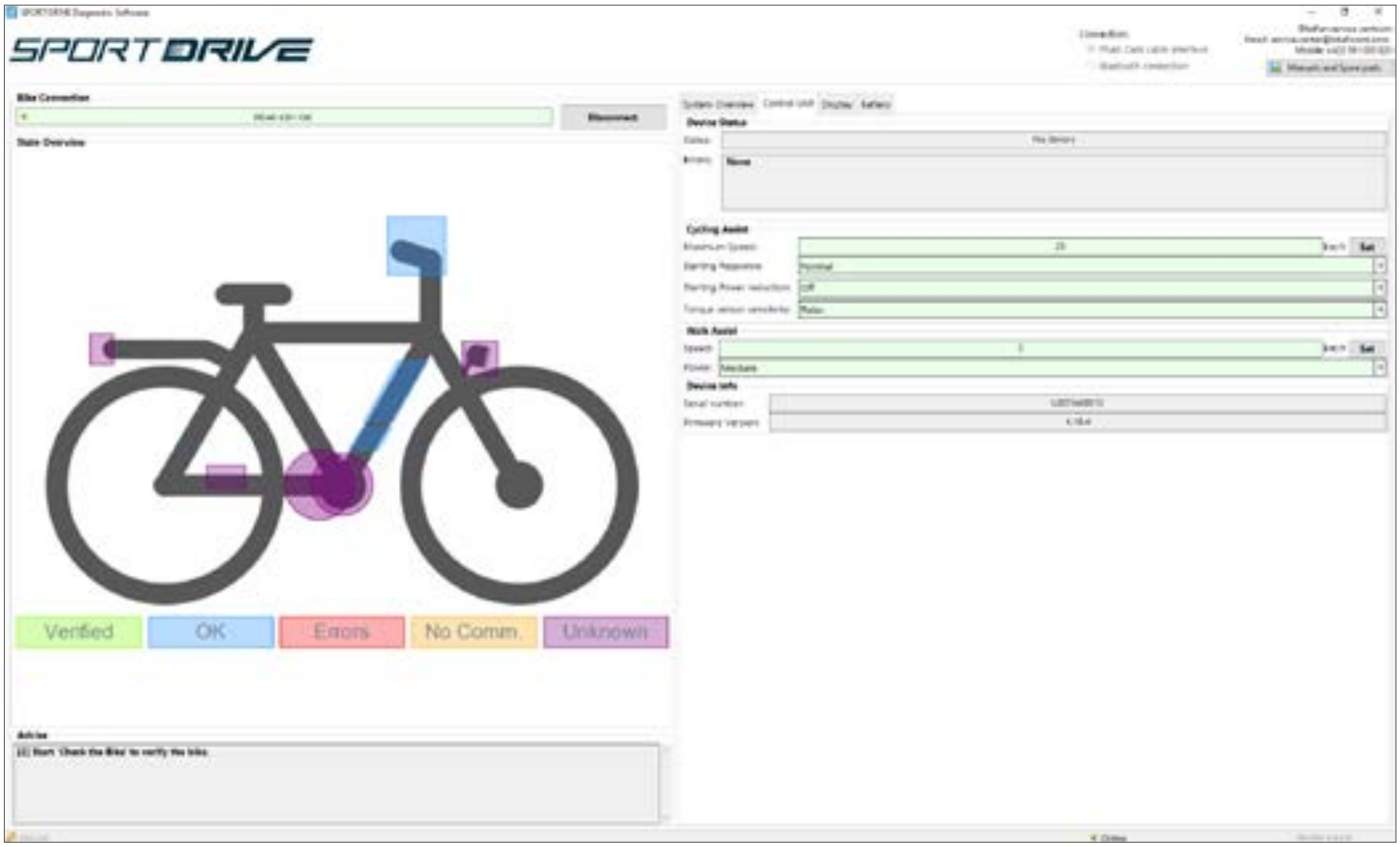


Figure 3.14 Diagnostics – Control unit tab

CONTROL UNIT	
Status	No Errors/ERROR
Errors	NONE / name of error (see Chapter 3.4.14 for a description of the individual errors).
Maximum speed	Set the maximum speed at which pedal support deactivates. The speed ranges from 10 to 25 km/h. This value is entered in km/h, even if miles are selected on the display (in the Display tab).
Starting Response	Sets the speed at which support responds after the pedals are turned (three options are available: SLOW, NORMAL, and QUICK.
Starting power reduction	This sets the starting power reduction at speeds up to 10 km/h (Off [no reduction], Medium [moderate reduction] and High [high reduction]). This permits the setting of a smoother (less aggressive) starting push on the bike.
Torque sensor sensitivity	Sets the sensitivity of the torque sensor (Relax [highest sensitivity], Tourist [moderate sensitivity], Sport [lowest sensitivity]). Relax has the highest sensitivity, which means the rider needs to exert the least amount of force on the pedal to achieve maximum output.

ATTENTION!

Torque sensor sensitivity has an impact on the range.

WALK ASSIST	
Speed	Sets the walk assist speed. The speed ranges from 3 to 6 km/h. This value is entered in km/h, even if miles are selected on the display (in the Display tab).
Power	Sets the walk assist power (LOW, MEDIUM, or HIGH).

DEVICE INFO	
Serial number	Unique control unit serial number
Firmware version	Control unit firmware

3.4.4 Display tab

Shows information about the display (Fig. 3.15).

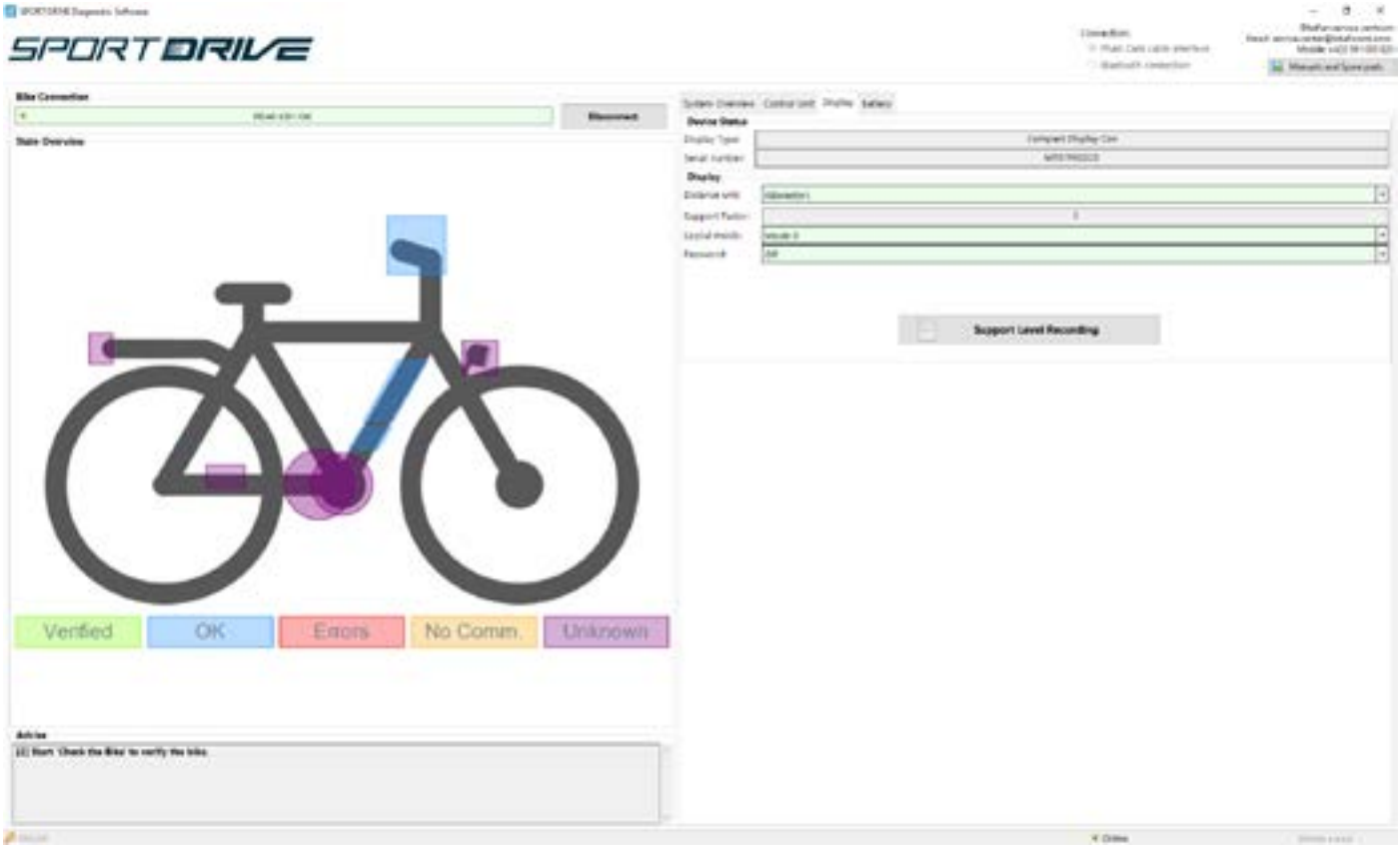


Figure 3.15 Diagnostics – Display tab

Display	
Display type	Shows the type of connected display: No Display/ Compact Display/ Grip Display/ Grip Pro Display/ Square Display/ Color Display
Serial number	Unique serial number of the display
Distance Unit	Sets the units to be shown on the display (kilometers or miles).
Support factor	Shows the current support level setting.
Layout mode	Available for Compact, Grip Pro, Square, and Color displays. Arranges various display layout options. Three options are available on Compact displays. Two options are available for Grip Pro, Square, and Color displays.
Password (access code)	This is set to password-protect activation of the electrical system. See Chapter 3.4.8.
Support Level Recording	Records a trip history with tracking of the support level and it's changes.

ATTENTION!

In the Cycling Assist/Maximum speed and Walk Assist/Speed settings (in the Control unit tab), all values must be entered in km/h even if the display is configured for miles.
25 km/h = 15 mph

3.4.5 Battery tab

Shows information about the battery (Fig. 3.16).

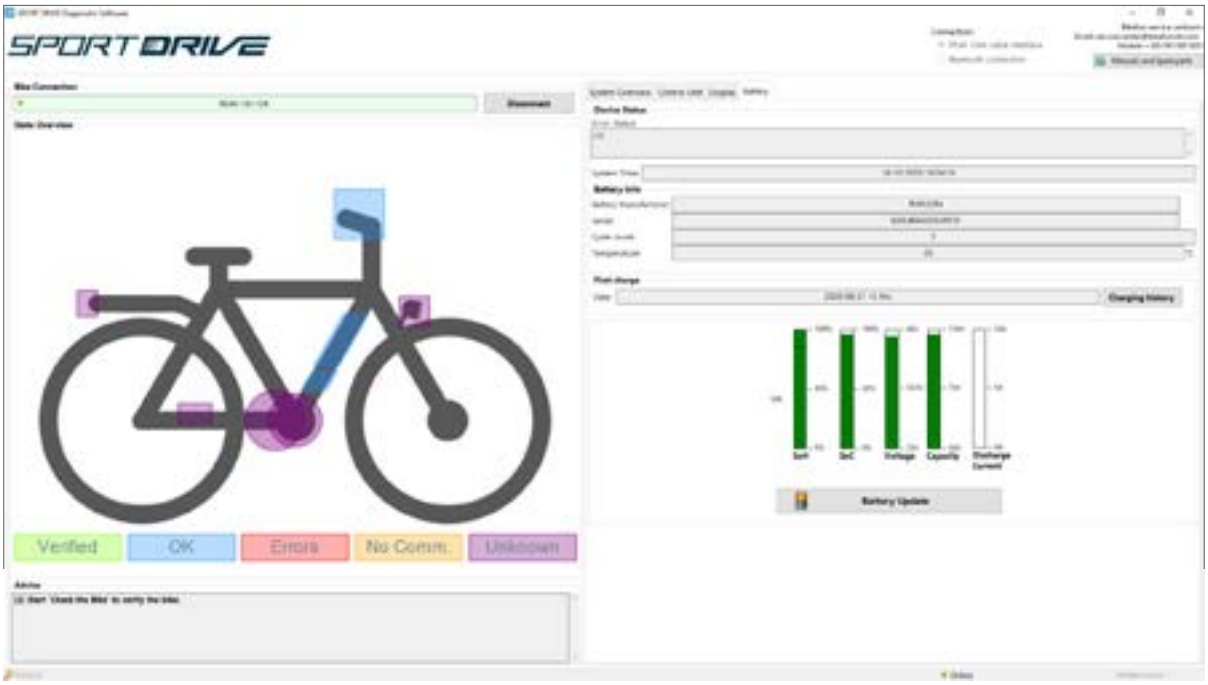


Figure 3.16 Diagnostics – Battery tab

BATTERY	
Error status	OK / Error name.
System time	Central European Time is shown [GMT+1:00]
Battery manufacturer	Battery manufacturer
Serial	Unique battery serial number. The following is used to decode battery manufacturing data: YYMMDD..... A-1; B-2; C-3; D-4; E-5; F-6; G-7; H-8; I-9; J-0, YY = year, MM = month, DD = day (e.g.AGABBE – 161225 = 25/2/2016)
Cycle count	The number of battery charging cycles; one cycle is 100% available battery capacity (two charges from 50% is equal to one cycle).
Temperature	Battery temperature in degrees Celsius
First charge	Date of first battery charge.
Charging history	Shows battery charging history (see Chapter 3.4.6).
SOH - State of Health	Shows the battery's current condition, which is calculated based on a calibration of the battery's current capacity and the battery's original capacity.
SOC - State of Charge (Charge level)	Shows the battery charge level as a percentage [%].
Voltage	Shows the battery charge level in volts [V].
Capacity	Shows the current battery capacity in ampere-hours [Ah].
Discharging Current	Shows the discharging current [A].
Charging Current	If the battery is charging, the charging current is shown instead of the previous "Discharging Current" [A].
Battery Update	The "Phylion battery updater" opens when "Battery Update" is clicked. Then follow the instructions in the updater. This is only available over the PEAK-CAN-Cable connection.

3.4.6 Charging history (Battery tab)

Shows battery charging records (Fig. 3.17). All charging sessions longer than 15 minutes are recorded.

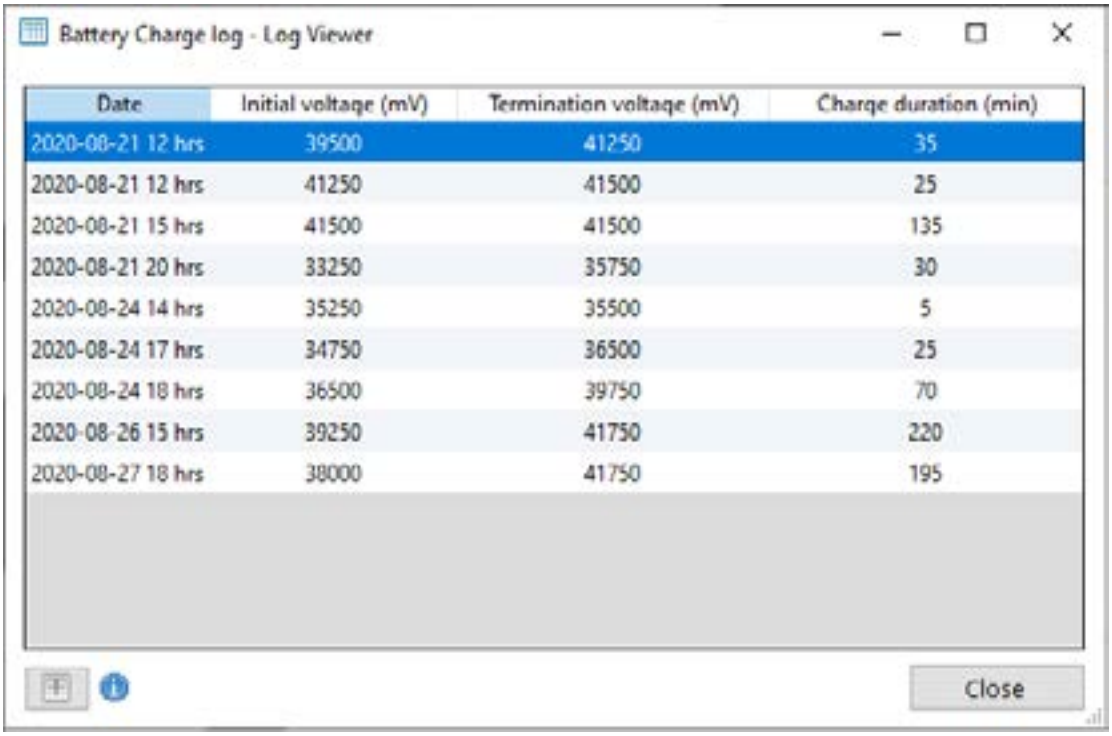


Figure 3.17 Diagnostics – Charging history

CHARGING HISTORY	
Date	Shows the charging starting time as yyyy-mm-dd hh.
InitialChargeVoltage	Shows the initial battery charge in volts [V].
TerminationVoltage	Shows the battery voltage at the end of charging [V].
ChargeDuration	Shows the charging duration in minutes [min].

3.4.7 Error log (System overview tab)

The control unit automatically records errors at all times when the electrical system is active. The time and current mileage (ODO) are recorded for the individual errors. More detailed information is provided in Chapter 3.4.14 based on the numeric codes assigned to individual errors.

These errors are stored in memory (max. 50 records, after which the oldest is overwritten). Errors may also be caused by inappropriate use of the bike.

This can also help to expose errors. For proper troubleshooting, check if the error was recorded recently or hundreds of kilometres previously at a time when the bike was otherwise functioning properly.

Tip:

- To simplify the process of identifying errors that appear prior to the next service visit, delete all errors once the bike servicing is completed (press “+” in the lower left-hand corner and then press “erase log on device” to clear the error records).

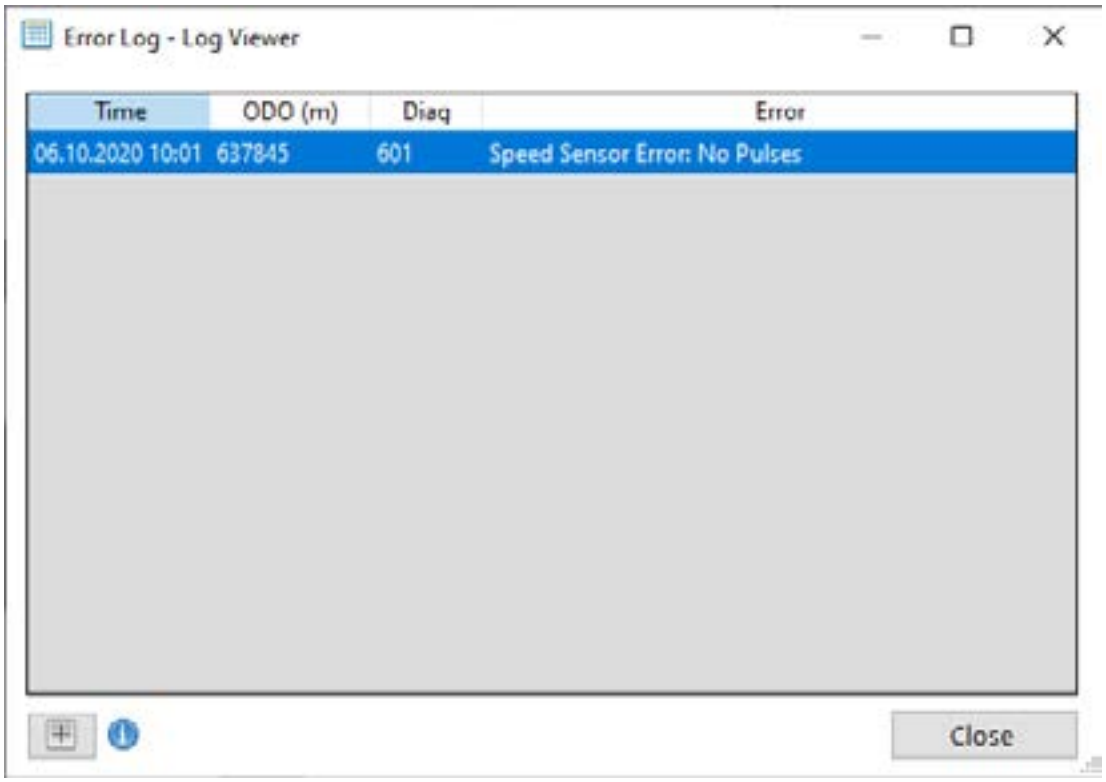


Figure 3.18 Diagnostics – Overview of errors

3.4.8 Password (Display tab)

The customer may activate the Password function to improve security. If a Password is active, it must be entered every time the electrical system is activated. If the password is entered incorrectly, the support will not be activated.

Select the “Password” ON option when activating the Password function. Enter a three-digit code in the “Set password” row (Fig. 3.19) selected by the customer. The display will prompt for the password when the electrical system is activated. Use the Increase Support Level (+) or Decrease Support Level (-) buttons to set the proper number and then confirm using the Walk assist / Lights Control button.

Use the INFO button to confirm the correct number on Grip Pro displays. The password is verified once all three numbers are entered. If the password is entered correctly, the system will turn on and support will be activated. If an incorrect password is entered, the user will be prompted to enter it again and support will remain disabled. There is no limit on the number of attempts.

If a user forgets their password, simply connect the bike to the diagnostics and determine or change the password in the Display tab.

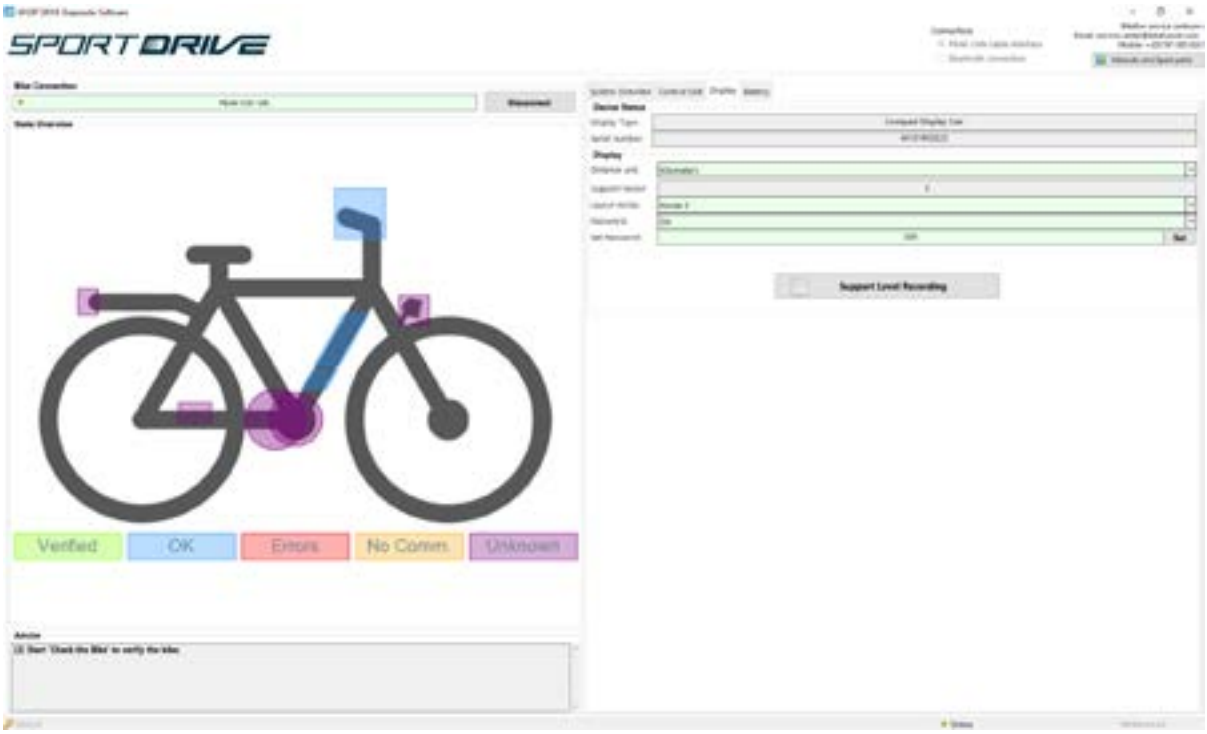


Figure 3.19 *Diagnostics – Password settings*

3.4.9 Auto-update Bike (System overview tab)

The latest firmware and correct XML configuration file are automatically updated and uploaded into the bike control unit. If a new update is available for the connected bike, you will be automatically prompted to complete an Auto-update (Fig. 3.20) in the advise field. The proper frame number must be loaded into the control unit for Auto-update to work properly (Fig. 3.13) and the computer must be online.

ATTENTION:

- Auto-update only works when the computer is online.
- The frame number saved in the control unit must match the frame number on the bike.
- If an XML configuration file is to be imported, the motor and the wheel must be free to rotate (the wheels will turn).
- If you are certain that the frame number you entered is correct and diagnostics are still unable to locate the bike, contact the helpdesk of the distributor in your country or directly BIKE FUN International service center.

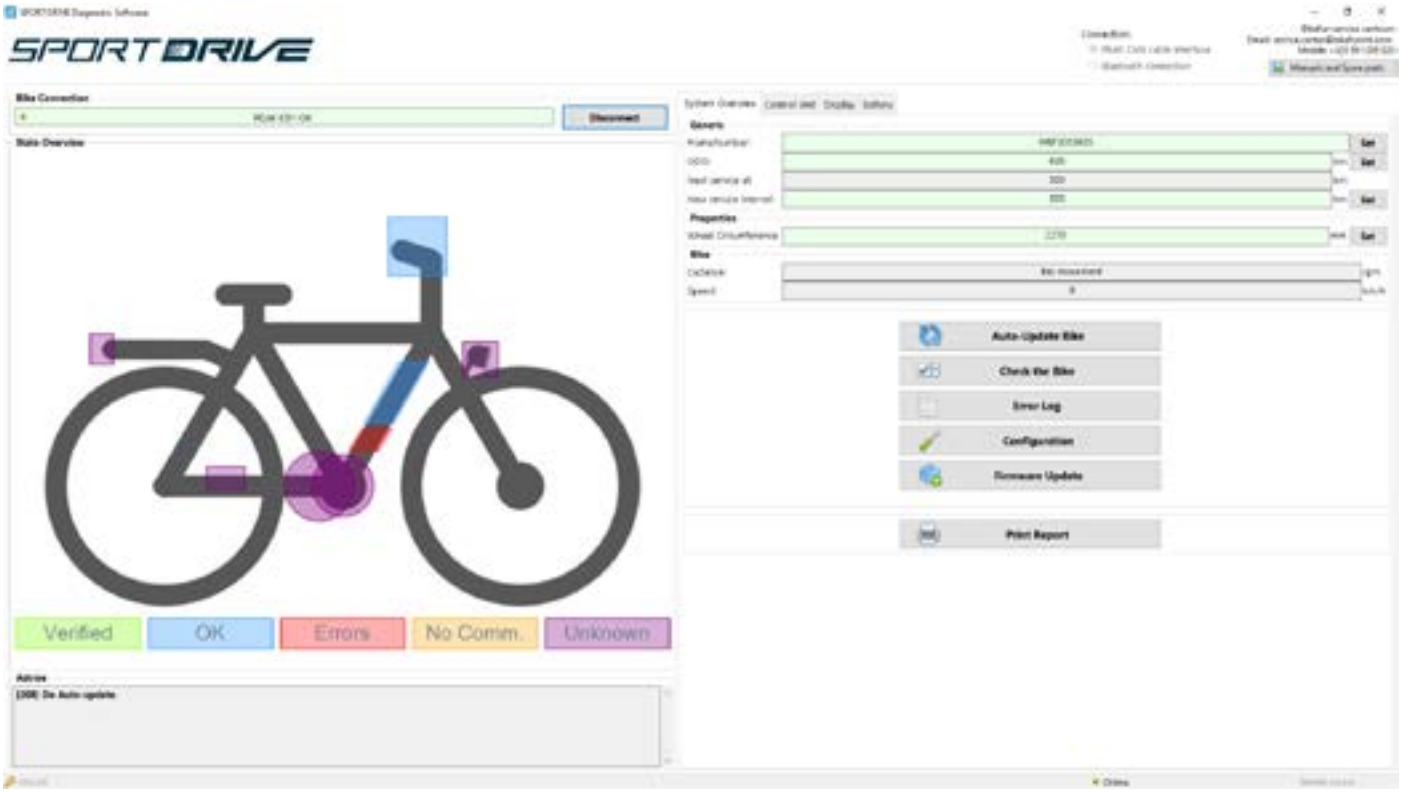


Figure 3.20 *Auto-update – Tips*

Procedure:

1. If the XML configuration file needs updating (Fig. 3.21), place the bike in the stand, the motor and the wheel must be free to rotate, and confirm (press YES) that the motor may be turned. This step is skipped if the XML configuration file is current.

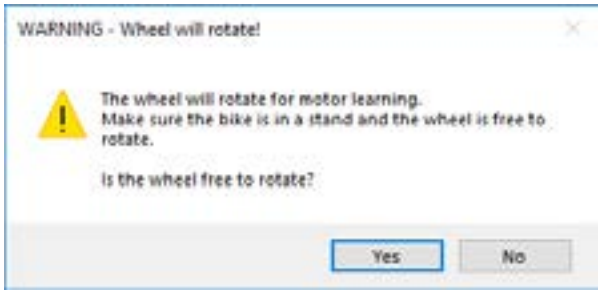


Figure 3.21 *Auto-update – Warning*

2. This is followed by a firmware update (Fig. 3.22). Once the update is complete, remove (for at least 5 seconds) and reinstall the battery in the bike (Fig. 3.23). This step is skipped with the control unit's firmware is current.

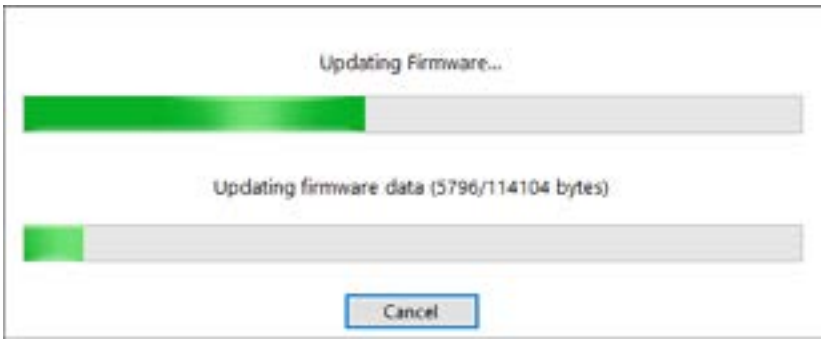


Figure 3.22 *Auto-update – Firmware update*

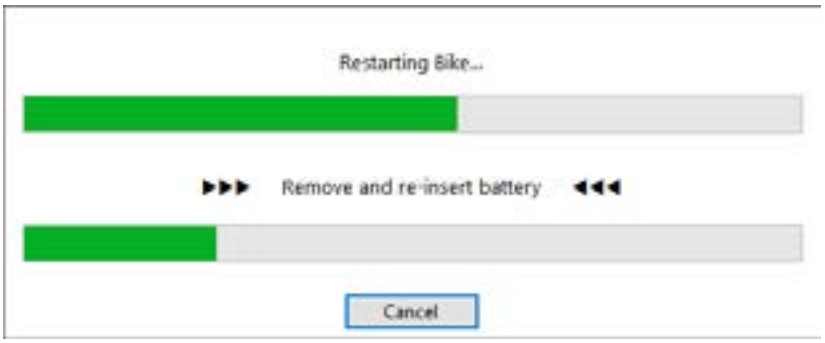


Figure 3.23 *Auto-update – Bicycle restart*

ATTENTION:

- Auto-update will continue about 15 seconds after the battery is connected to the bicycle. Do not press the On/Off button on the display.
- Auto-update will end if you do not remove the battery within 2 minutes (Fig. 3.24). Press Auto-update again to continue.

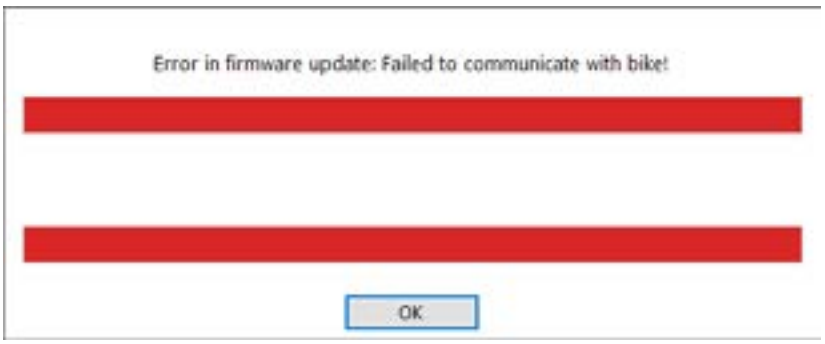


Figure 3.24 *Auto-update – terminate communication*

3. The XML configuration file is then imported (Fig. 3.25) and "motor learning" takes place (Fig. 3.26).

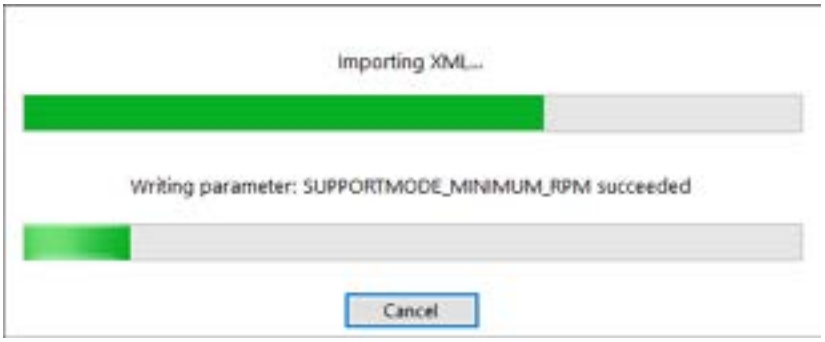


Figure 3.25 *Auto-update – importing the configuration file*

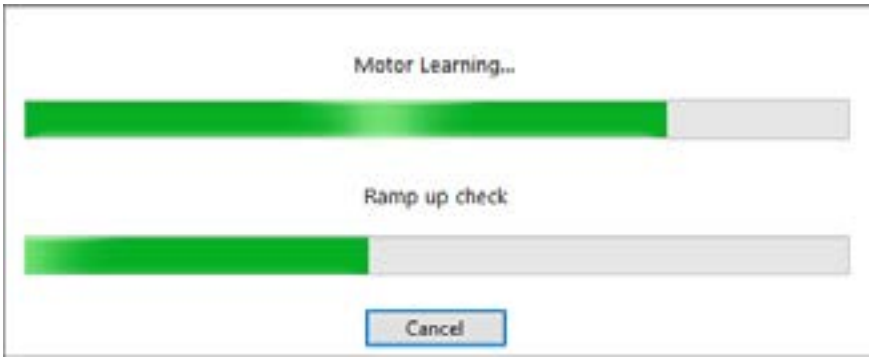


Figure 3.26 *Auto-update – motor learning*

4. Auto-update is complete once “motor learning” is complete. Click on “OK” (Fig. 3.27) and then remove (for at least 5 seconds) and reinstall the battery in the bike (Fig. 3.28).

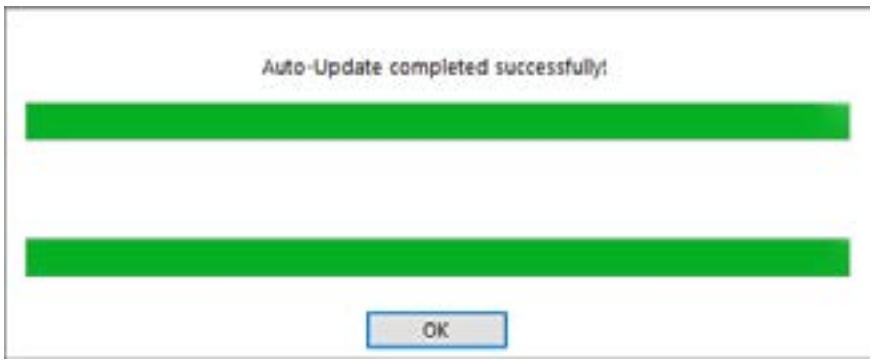


Figure 3.27 *Auto-update – Completing an automatic update*

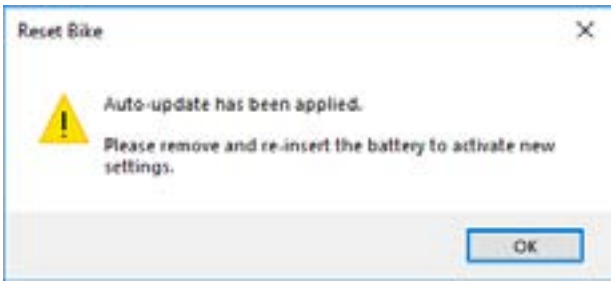


Figure 3.28 Auto-update – Bicycle restart

Tip:

- Perform an auto-update to restore the default factory settings to the control unit even if the diagnostics do not require it. If you decide you want to reimport the XML configuration file, click on “Yes” (Fig. 3.29) and complete steps 1, 3 and 4 in the update process.

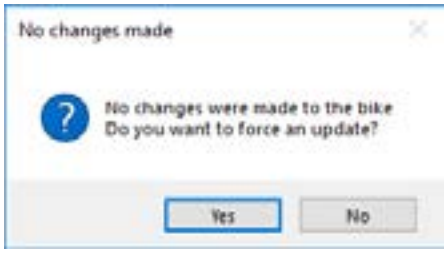


Figure 3.29 Auto-update – No changes

ATTENTION:

In case of factory default setting the following settings are reset: New service interval, Wheel circumference, Maximal speed, Starting response, Starting power reductions, Torque sensor sensitivity, Walk assist – speed, Walk assist – power.

3.4.10 Firmware update [manual] (System overview tab)

If the manufacturer releases a firmware update and your computer is offline, the firmware must be updated manually (you cannot use the Auto-update function). If your computer has been offline for more than a month, the downloaded firmware for the control unit may not be up-to-date. Connect your computer to the Internet or contact the helpdesk of the distributor in your country or directly BIKE FUN International service center.

Procedure:

1. In the System overview tab (Fig. 3.13) click on “Firmware update”.
2. Select the update file by clicking on “Browse” (Fig. 3.30).

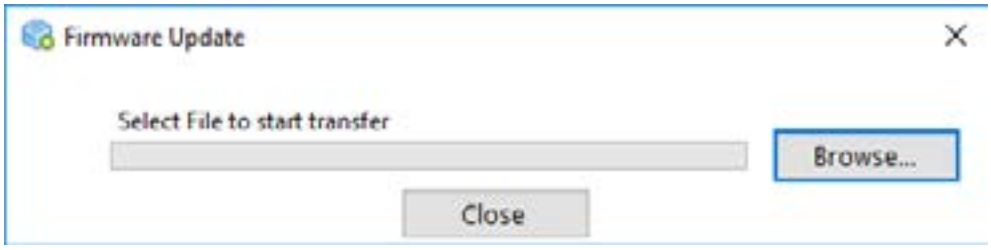


Figure 3.30 Firmware update - Selecting an update file

3. Two firmware files are available; if you need to update a third-generation bike, open the GEN3 folder (Fig. 3.31) and select the file named MCU_FW_V2.XX.XX.bin (Fig. 3.32) and press “Open” to start the update. If you need to update a fourth-generation bike, open the GEN4 folder (Fig. 3.31) and select the file named MCU_FW_V4.XX.XX.bin (Fig. 3.33) and press “Open” to start the update.
   Please contact the helpdesk of the distributor in your country or directly BIKE FUN International service center if you need assistance in selecting the correct firmware.

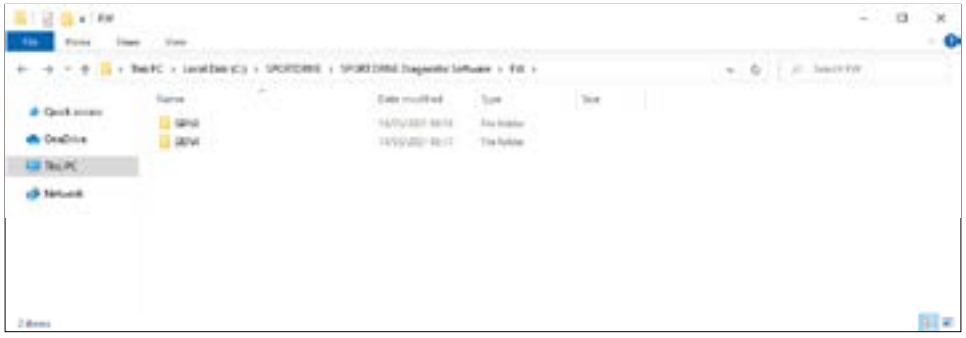


Figure 3.31 Firmware update - Selecting the folder

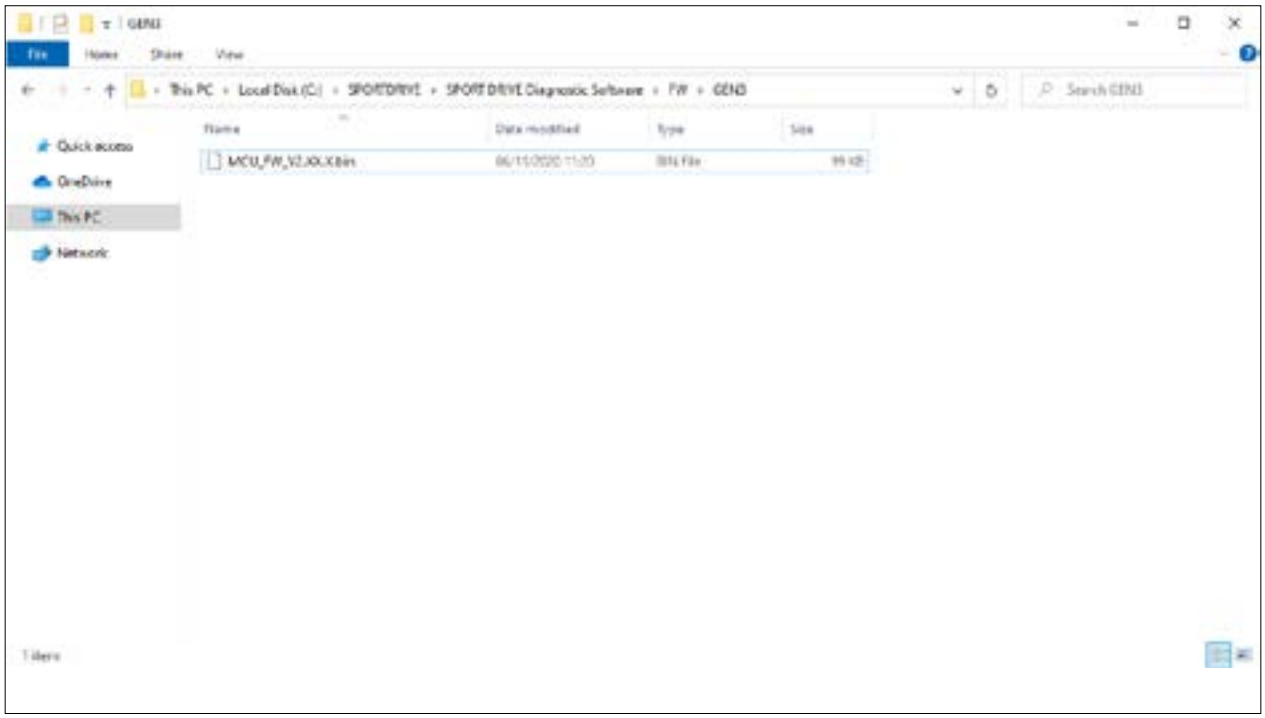


Figure 3.32 Firmware update - Selecting the file to update a third-generation bike

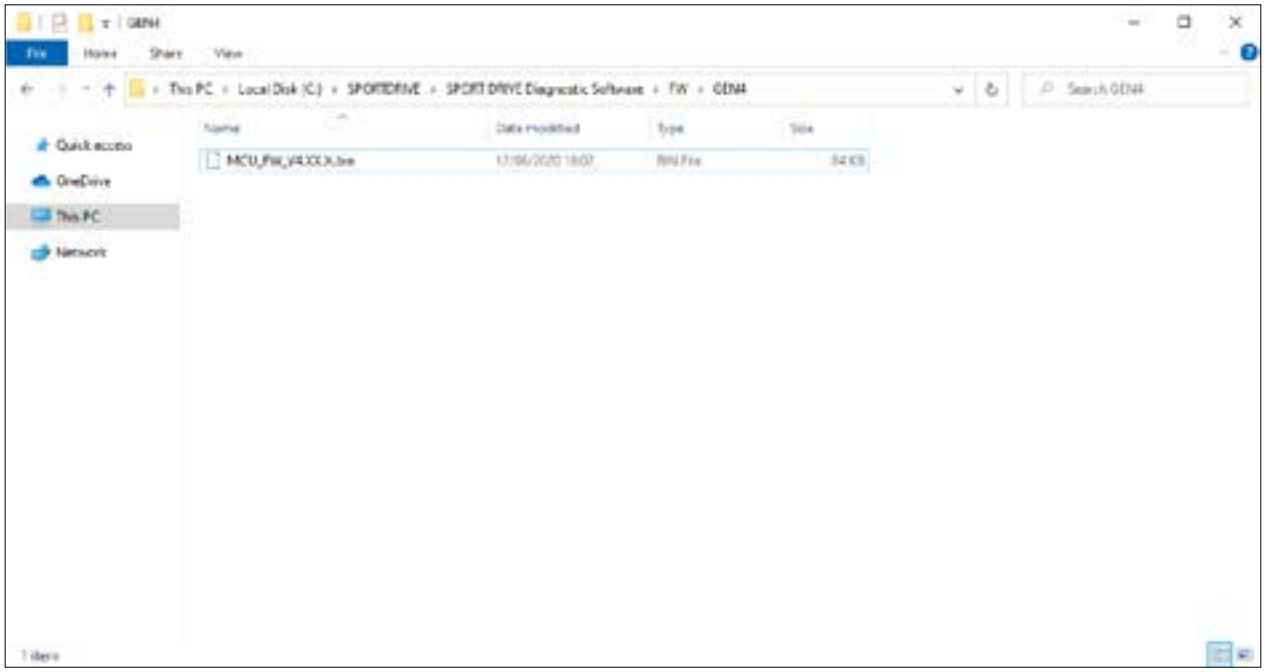


Figure 3.33 Firmware update - Selecting the file to update a fourth-generation bike

4. Updating takes approximately one to two minutes (Fig. 3.34).

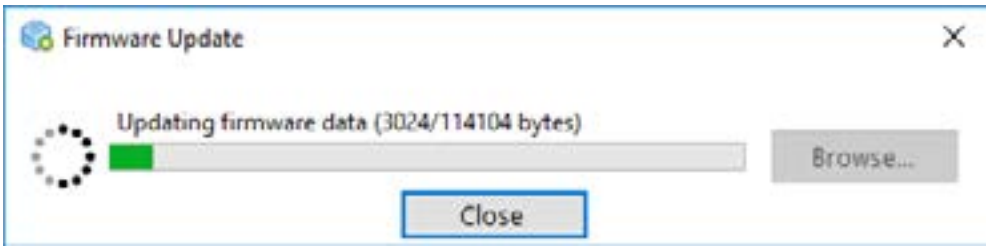


Figure 3.34 Firmware update – Updating process

5. Click on “OK” once the update is complete (Fig. 3.35) and then remove (for at least 5 seconds) and reinstall the battery in the bike.

Figure 3.35 Firmware update – Completion

6. Then click on “Connect” (Fig. 3.36).

Figure 3.36 Firmware update – Reconnection

3.4.11 Configuration - [Import XML and Motor learning] (System overview tab)

Configuration is used to manually import the XML configuration file and perform “motor learning”. Importing the XML configuration file and performing “motor learning” are required if the control unit or motor are replaced. If the computer is online, use the Auto-update function (Chapter 3.4.9) to import the XML configuration file and perform “motor learning” automatically.

Manual importing of the XML configuration file

This tab enables checking or manual importing of the XML configuration file (Fig. 3.37). This file contains the bike settings and must be imported for a new control unit, or if it is necessary to restore factory default settings. Only use this function if the computer is offline. Contact the helpdesk of the distributor in your country or directly BIKE FUN International service center if you are unsure of the correct XML configuration file.

1. Click on “Import XML Configuration” (Fig. 3.37).

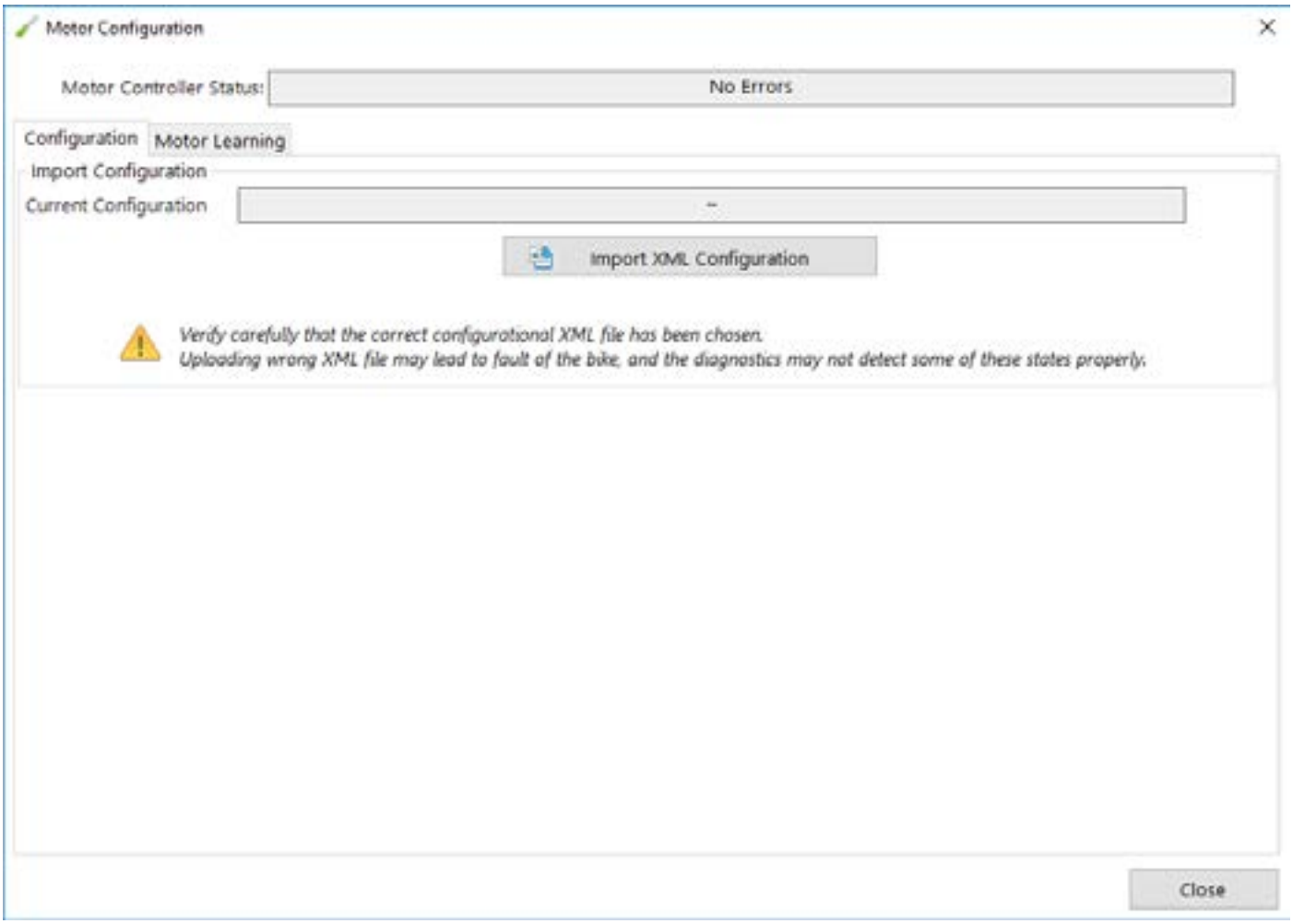


Figure 3.37 Configuration – XML file import

2. Select the suitable XML configuration file (Fig. 3.38).

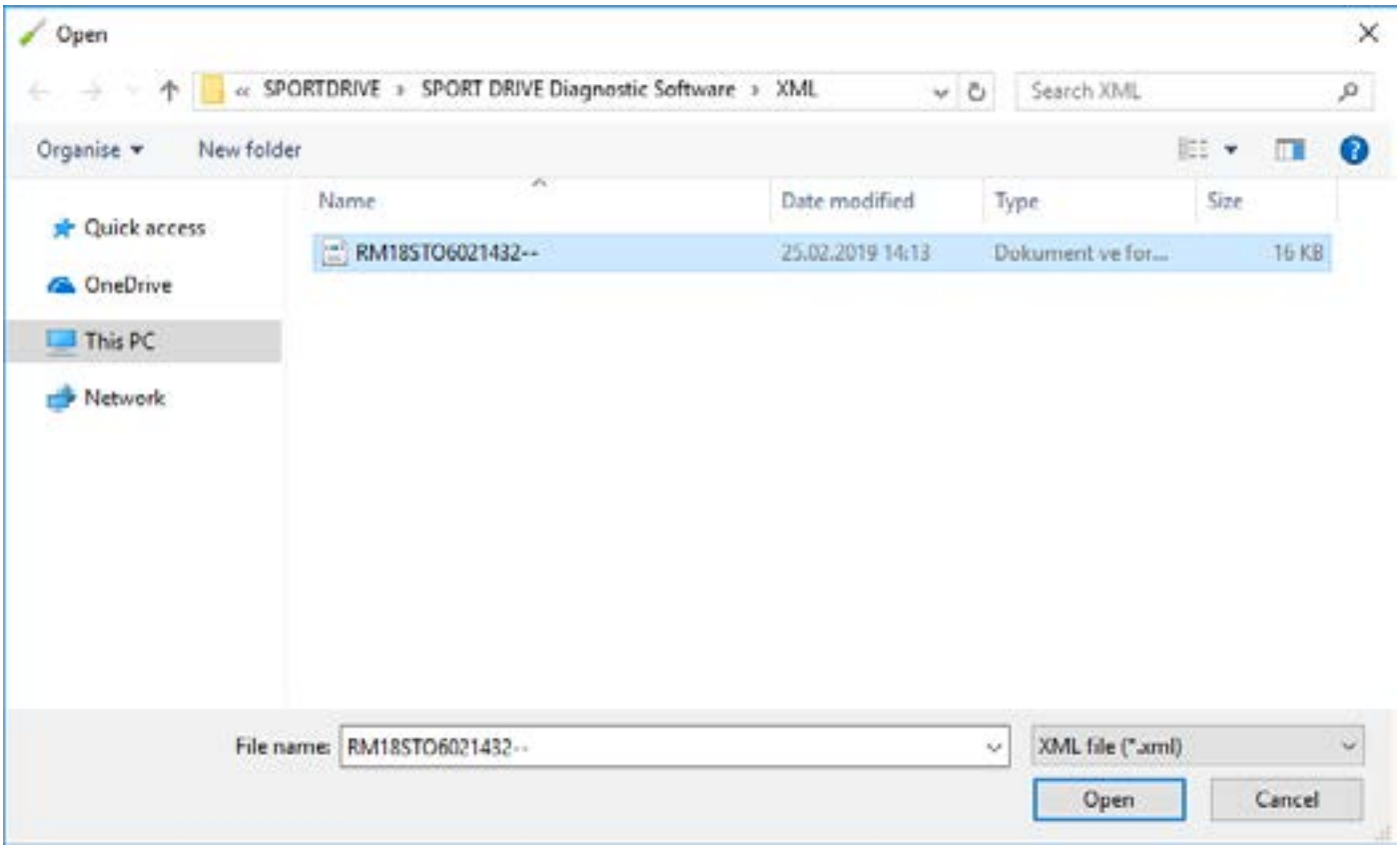


Figure 3.38 Configuration – Selecting the correct XML file

a) If the XML configuration file is successfully imported (Fig. 3.39), click on “OK”.

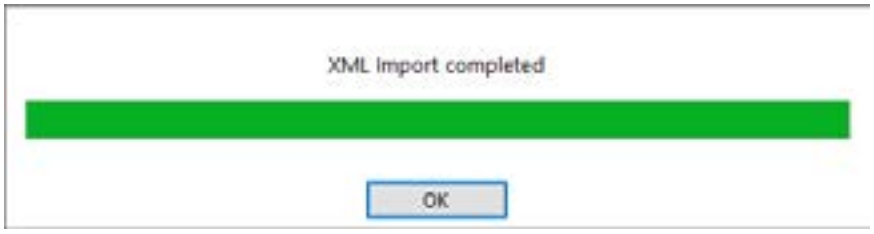


Figure 3.39 Configuration – Successful import

b) If it was not imported successfully (Fig. 3.40), click on “OK” and continue following point 1 and try to import the file again.

Figure 3.40 Configuration – Unsuccessful import

3. Once the XML configuration file is updated, click on “OK” (Fig. 3.41) and then remove (for at least 5 seconds) and reinstall the battery in the bike.

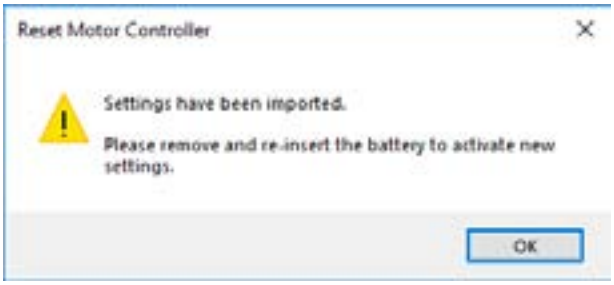


Figure 3.41 Configuration – Completion

ATTENTION:

Always run “motor learning” after importing an XML file.

Motor learning

This function optimises the motor control unit configuration. This permits motor controls to be configured for each specific motor. The entire configuration process lasts approximately a minute and a half. Do not forget to run motor learning after replacing the control unit or motor, or importing the XML configuration file.

ATTENTION:

Manual “motor learning” is not required if you performed an auto-update after replacing the control unit.

Procedure:

1. Place the bike in the stand and check to ensure the wheels are free to turn, and then click on “Start Automatic Motor Learning” (Fig. 3.42).

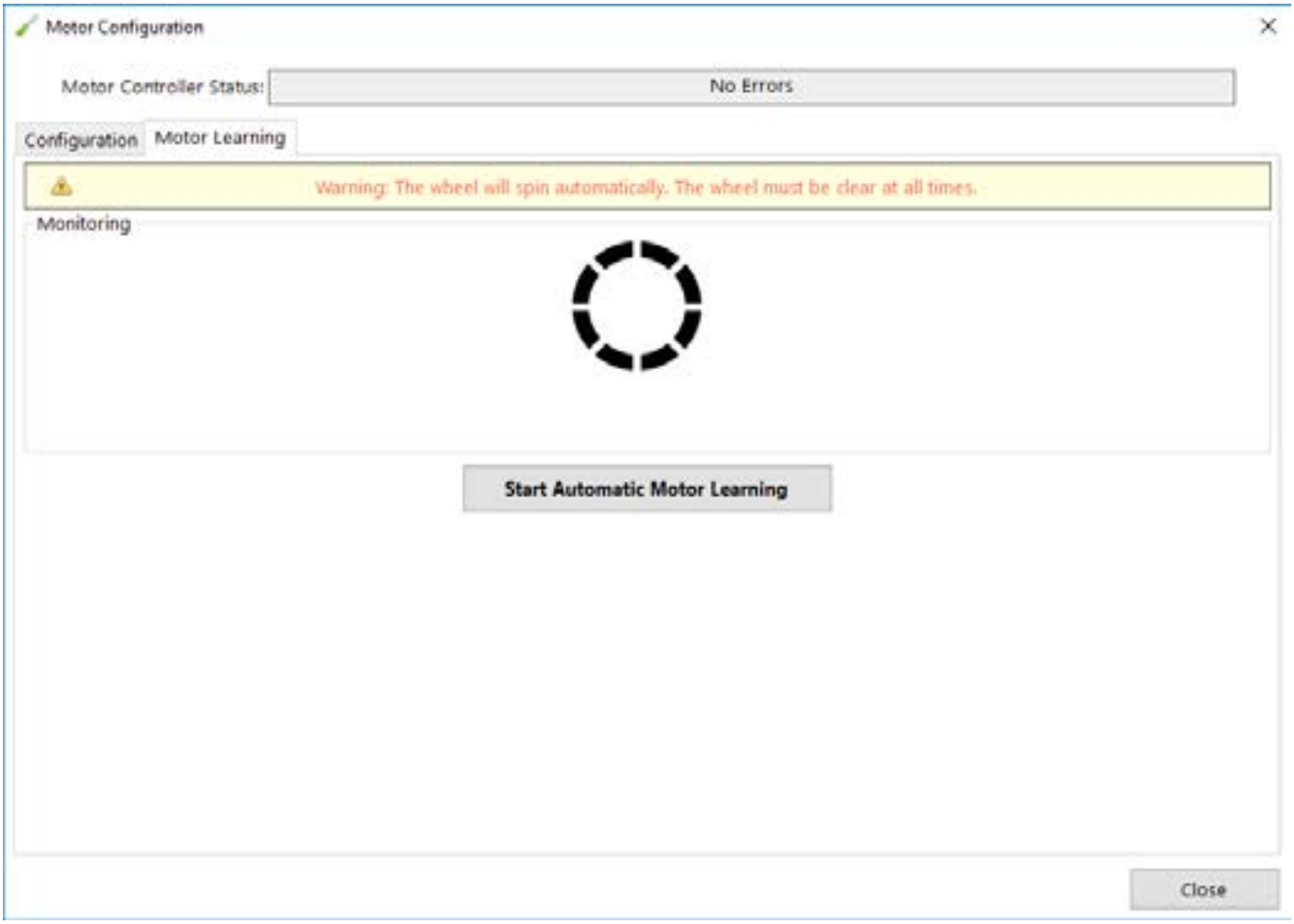


Figure 3.42 Motor learning – Starting

ATTENTION:

Leave the bike in the stand and the motor and the wheel must be free to rotate. (the wheels will turn).

2. Once the bike is prepared, click on “Yes” (Fig. 3.43).

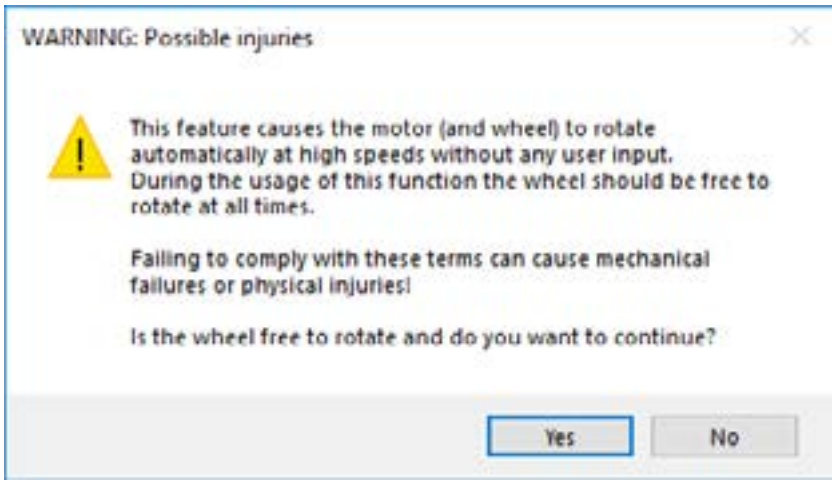


Figure 3.43 Motor learning – Confirmation the bike is prepared

a) The wheel will begin spinning from slow speeds to higher speeds. Motor learning is complete so long as no error occurs (Fig. 3.44).

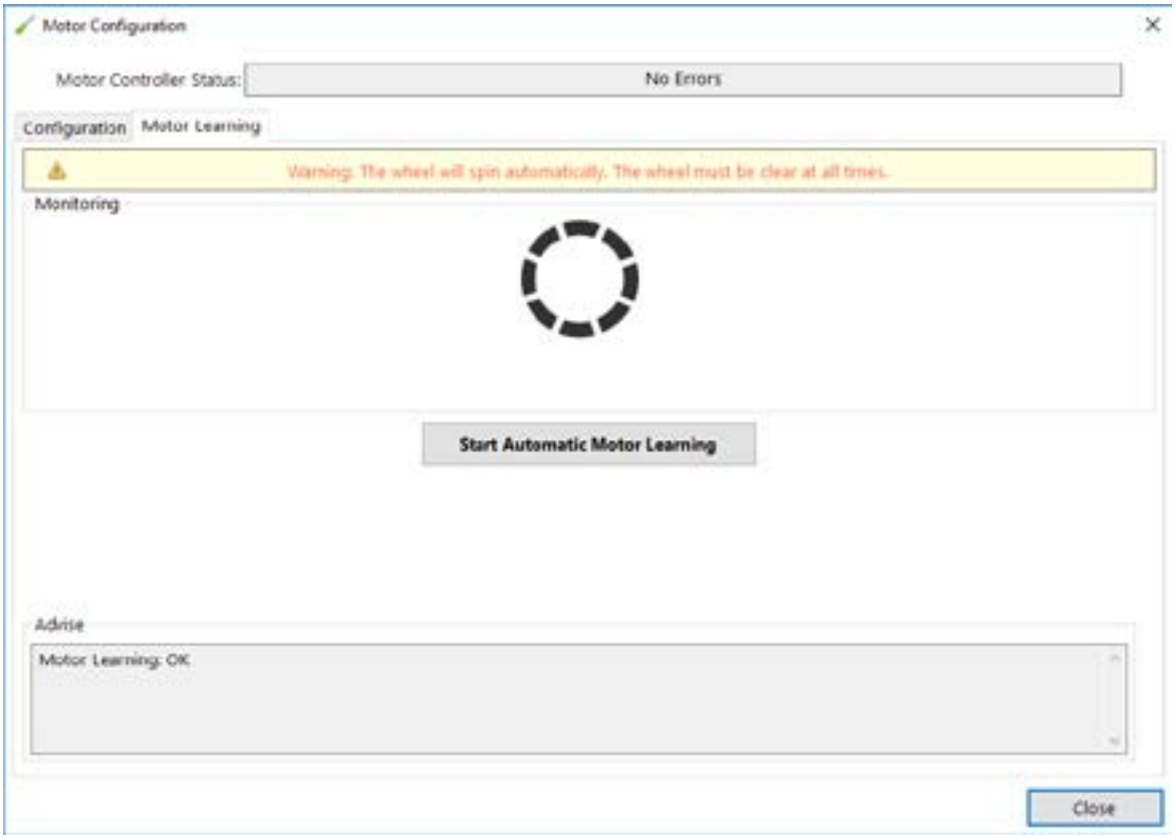


Figure 3.44 Motor learning – Successful completion

b) If an error occurs (Fig. 3.45), check to ensure the wheels are not blocked or braked and then repeat “motor learning”. If the error occurs again, follow instruction [411] provided in Chapter 3.4.14.

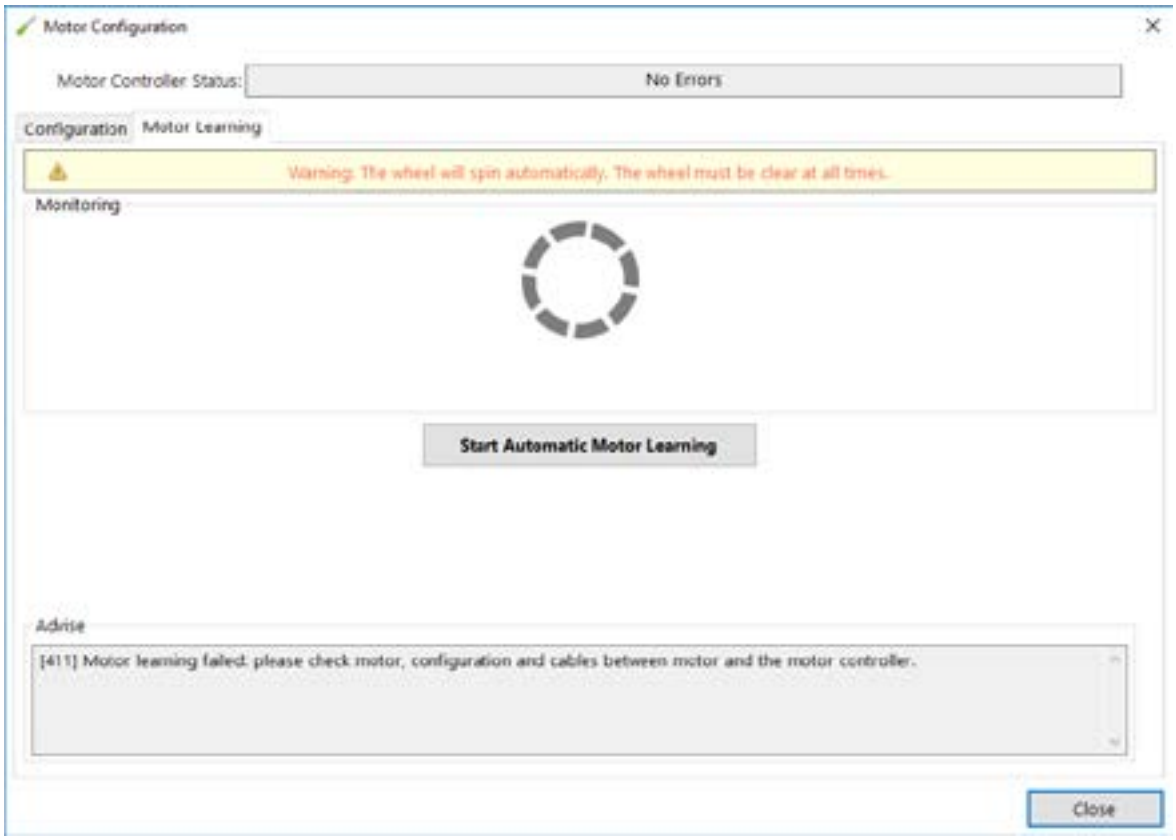


Figure 3.45 Motor learning – Error

3.4.12 Support level recording (Display tab)

This records the support levels used while riding (Fig. 3.46) and the mileage at which changes were made. The last 50 support level changes lasting at least 10 seconds are recorded.

Tip:

- For better transparency delete these records once bike servicing is completed (click on “+” in the lower left-hand corner and then click on “erase log on device” to clear these records).

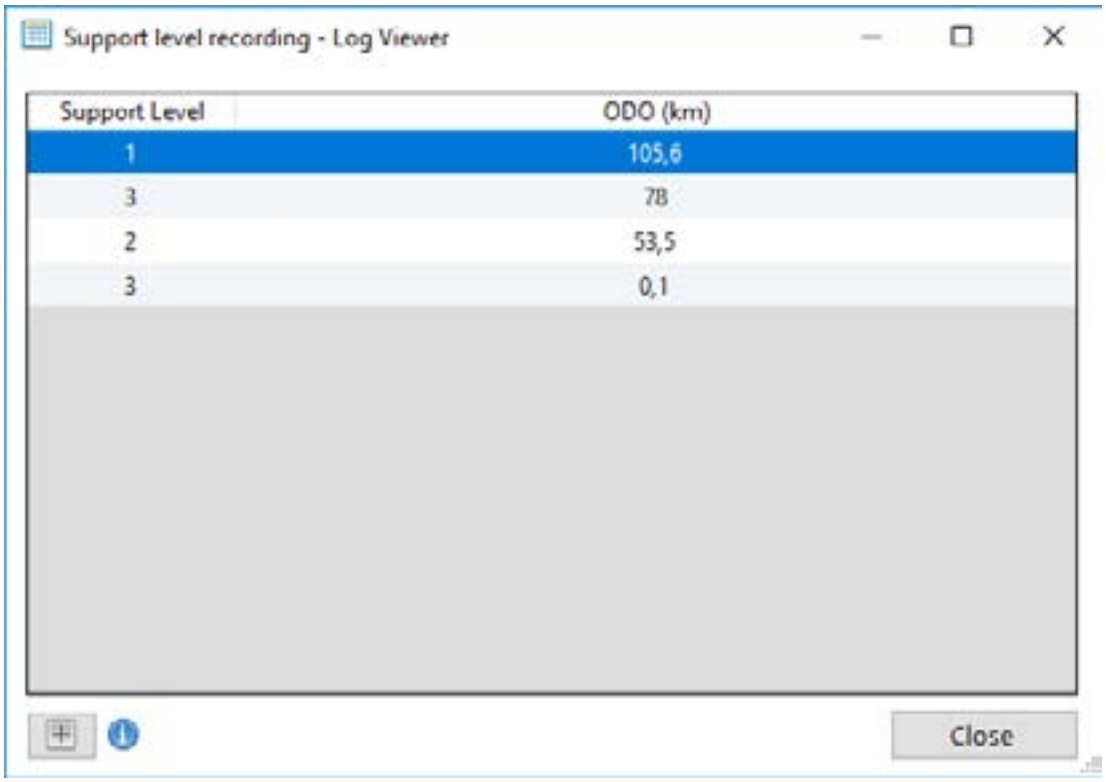


Figure 3.46 Support level recording

3.4.13 Check the bike (System overview tab)

Testing sequence which thoroughly verifies individual components. For this test, place the bike in the stand and ensure the wheels can move freely.

1. **Display button test** - the first part ensures that none of the buttons are jammed. Wait three seconds for automatic button verification (Fig. 3.47). Then confirm by clicking on the "Next" (Fig. 3.48).

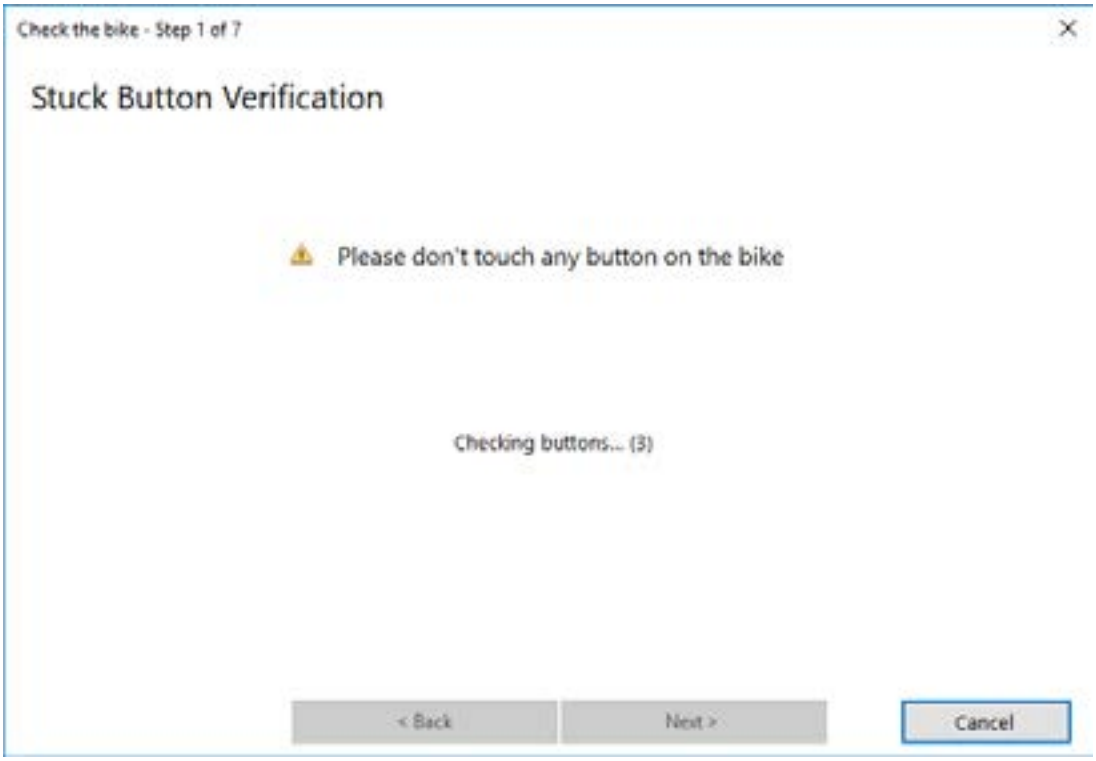


Figure 3.47 Display button test process

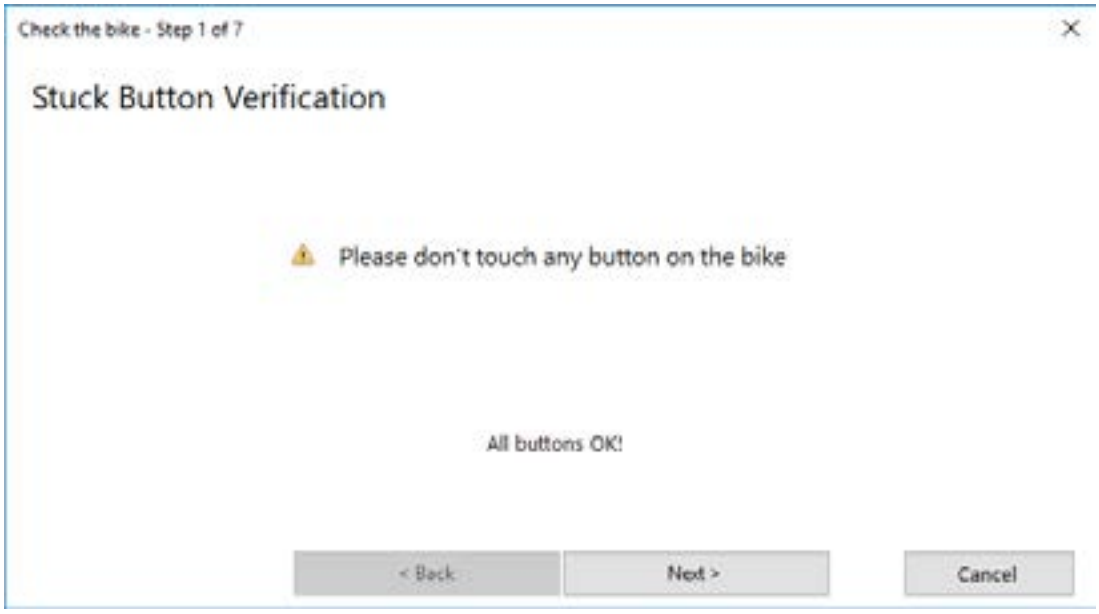


Figure 3.48 Completing the display button test

2. **Display button test** – press and hold each of the buttons one by one until the screen lights up green. If the screen stays red for any of the buttons, press "Failed".

Figure 3.49 shows the start of the test and Fig. 3.50 shows a successful test result.

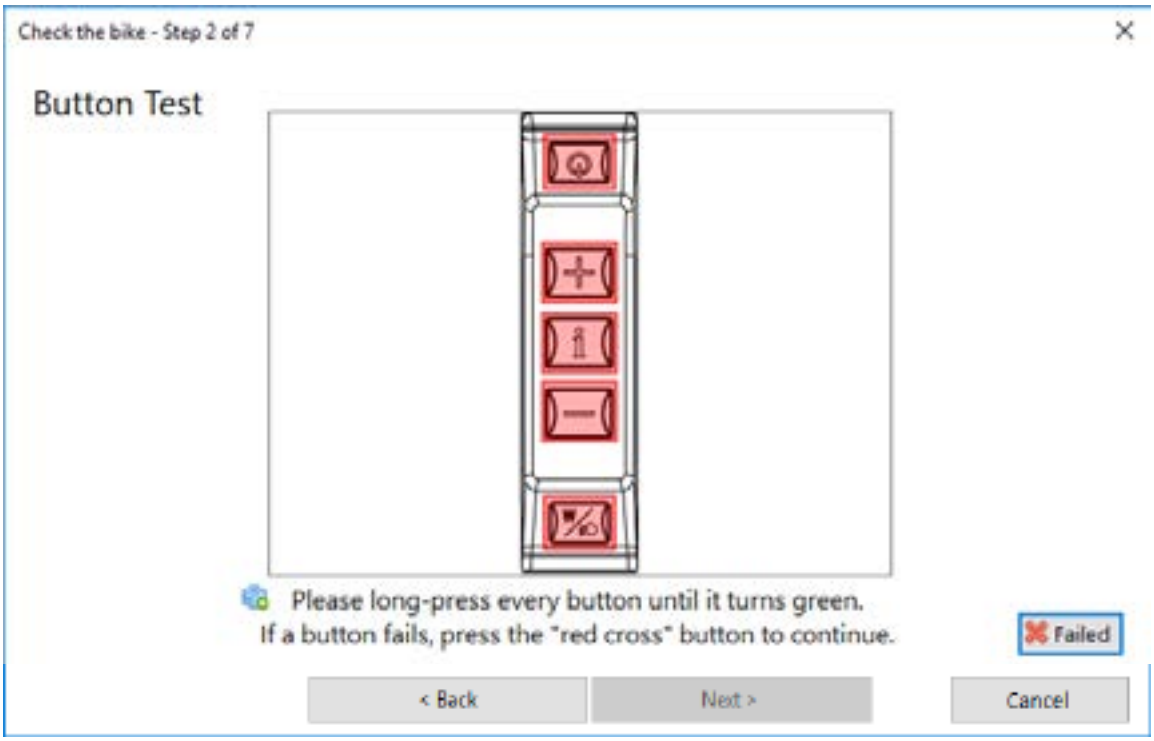


Figure 3.49 Starting the display button test

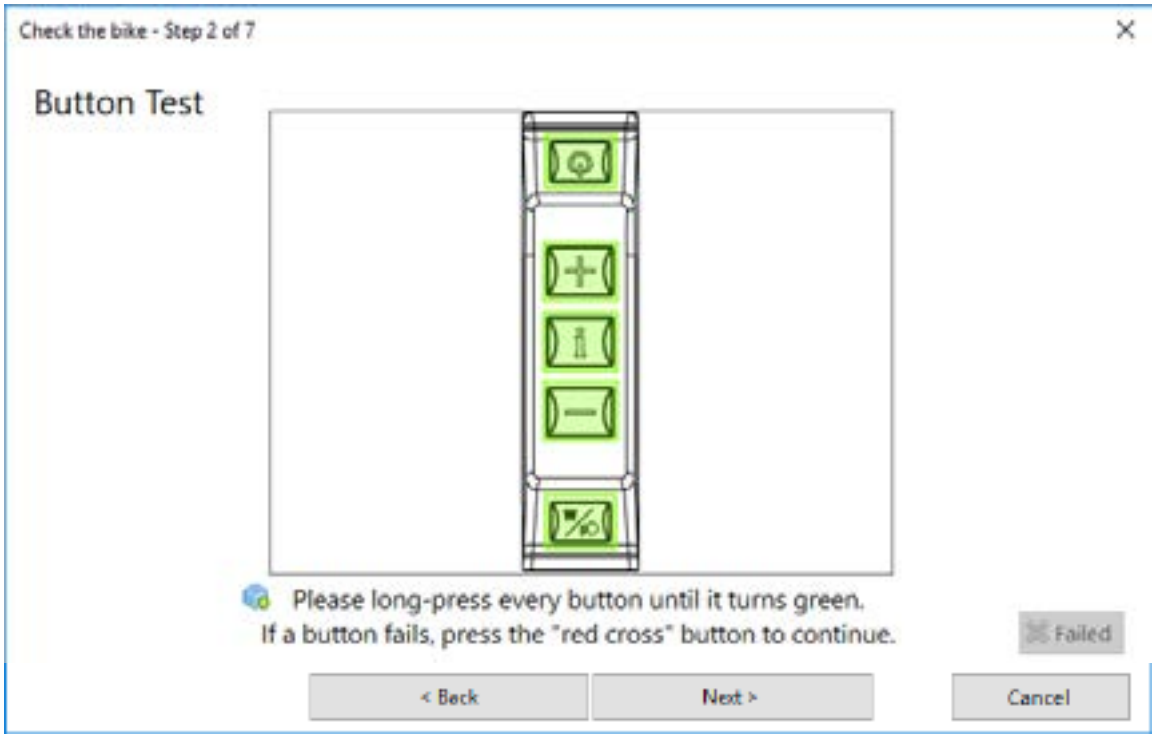


Figure 3.50 Successful completion of the display button test

ATTENTION:

This figure is for illustration purposes only. The figure may vary depending on the display on the e-bike.

3. **Verification of display segments**

a) Grip Pro/ Square/ Grip displays

This test checks the functionality of all segments. (Fig. 3.51). Verify if all segments flash. If everything is working properly,click on “OK”, and if not, click on the “Broken” button.

Figure 3.51 Verification of display segments

b) Compact display / Colour display

In this test(Fig. 3.52) the display grid will be switched on and off. Check to ensure all grid points switch on. If everything is working properly, click on “OK”, and if not, click on “Broken”.

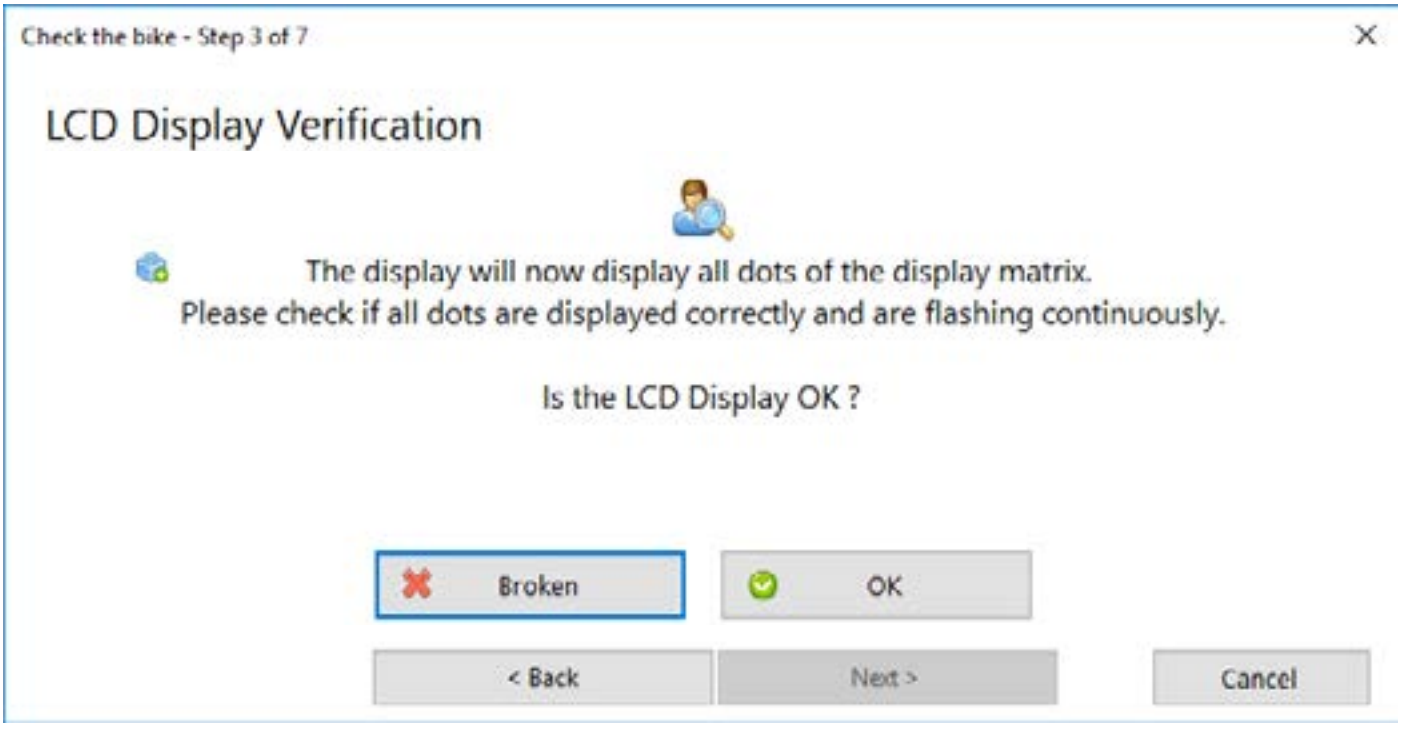


Figure 3.52 Verification of display segments

4. **Light test** – if the bike has lights powered by the e-bike battery, both lights will flash. Verify that they are operating correctly and confirm by clicking on “OK” (functional) or “Broken” (non-functional). If the bike does not have lights, click on “Not available” (Fig. 3.53).

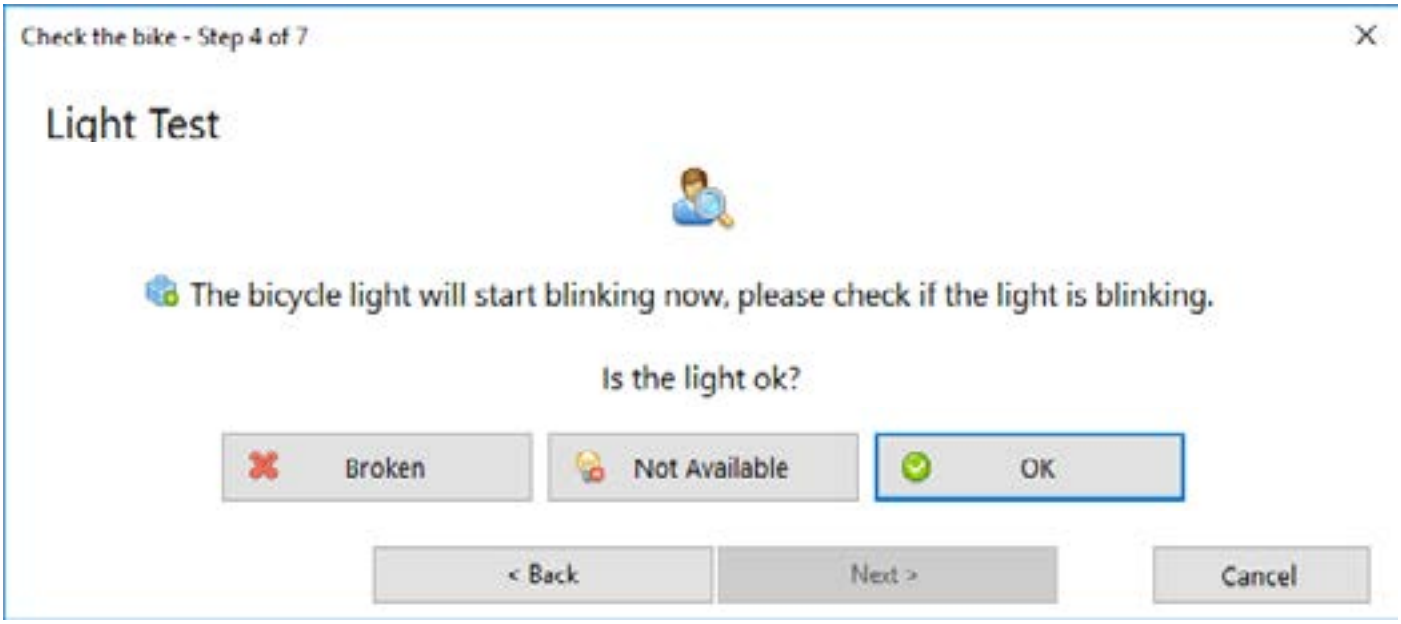


Figure 3.53 Light test

5. **Bottom bracket sensor test** – rotate the pedal one turn in the forward direction and verify the operation of the bottom bracket sensor (Fig. 3.54). Depending on what bottom bracket set is used a different number of pulses is required to successfully complete this test (revolution sensor 16 pulses, torque revolution sensor 32 pulses). Click “Reset” and repeat the test if you are unable to generate the required quantity of pulses during a single rotation. Click on “Failed” if the test cannot be passed after the 3rd attempt.

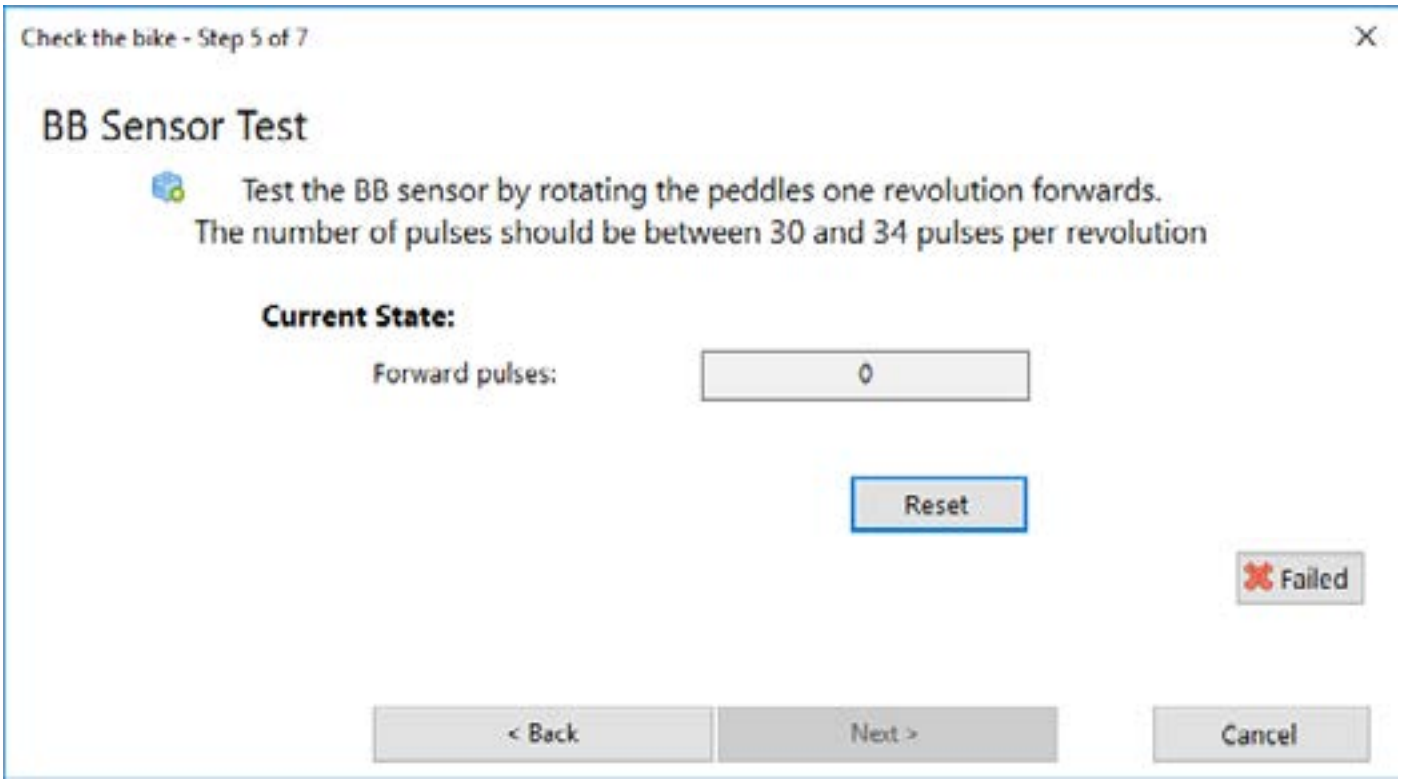


Figure 3.54 Bottom bracket set sensor test

6. **Motor test** – To start the motor test, click on the “Click to: Rotate the motor!” (Fig. 3.55). The motor should start immediately. Ensure the motor is running smoothly and not emitting unusual noises or sounds.

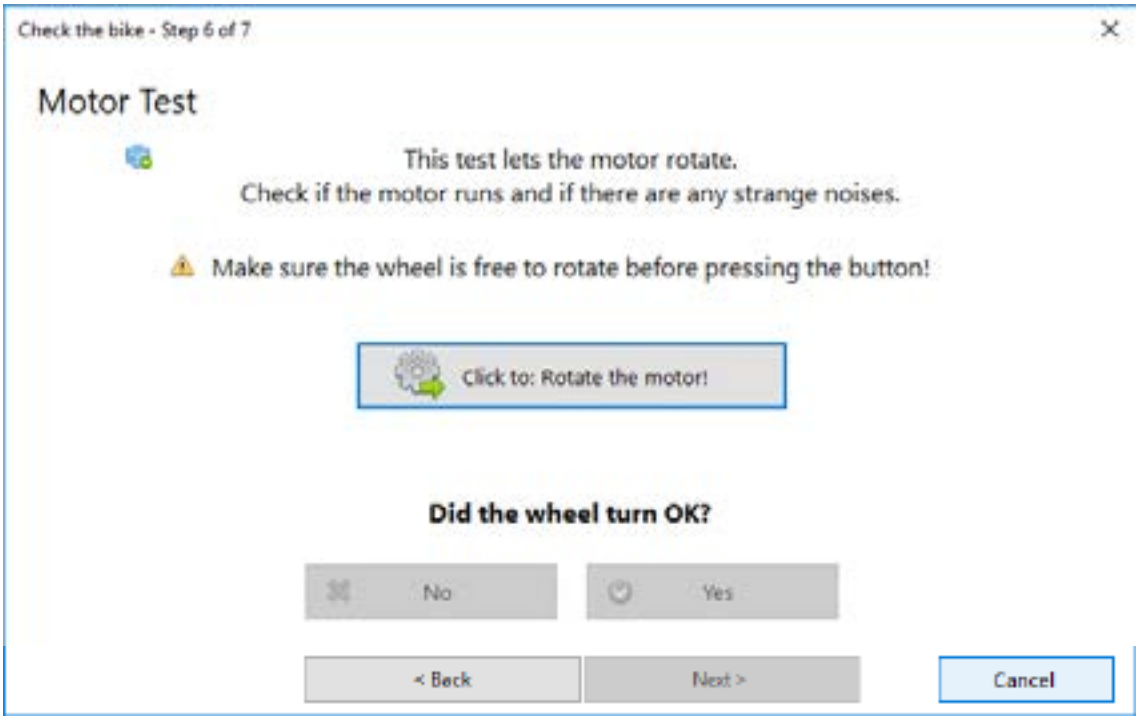


Figure 3.55 Motor test – starting

Click on “Stop Rotating!” to stop the test and ensure the motor ran properly (click on “Yes”) or not (click on “No”), (Fig. 3.56).
If you click on “No”, the battery test is skipped and a "Check the bike” test will be completed.

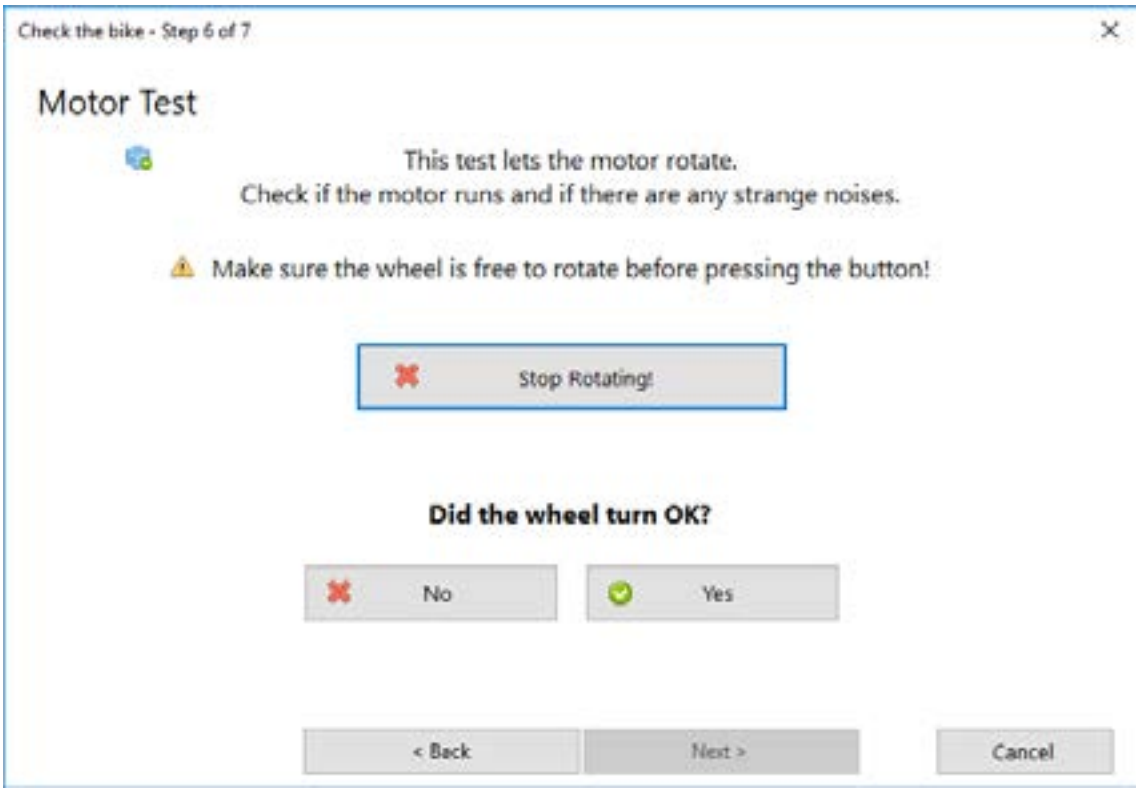


Figure 3.56 Motor test – testing

7. **Battery test** – The battery is subjected to a load test. After clicking on“Start” (Fig. 3.57) and a short delay, the motor starts.

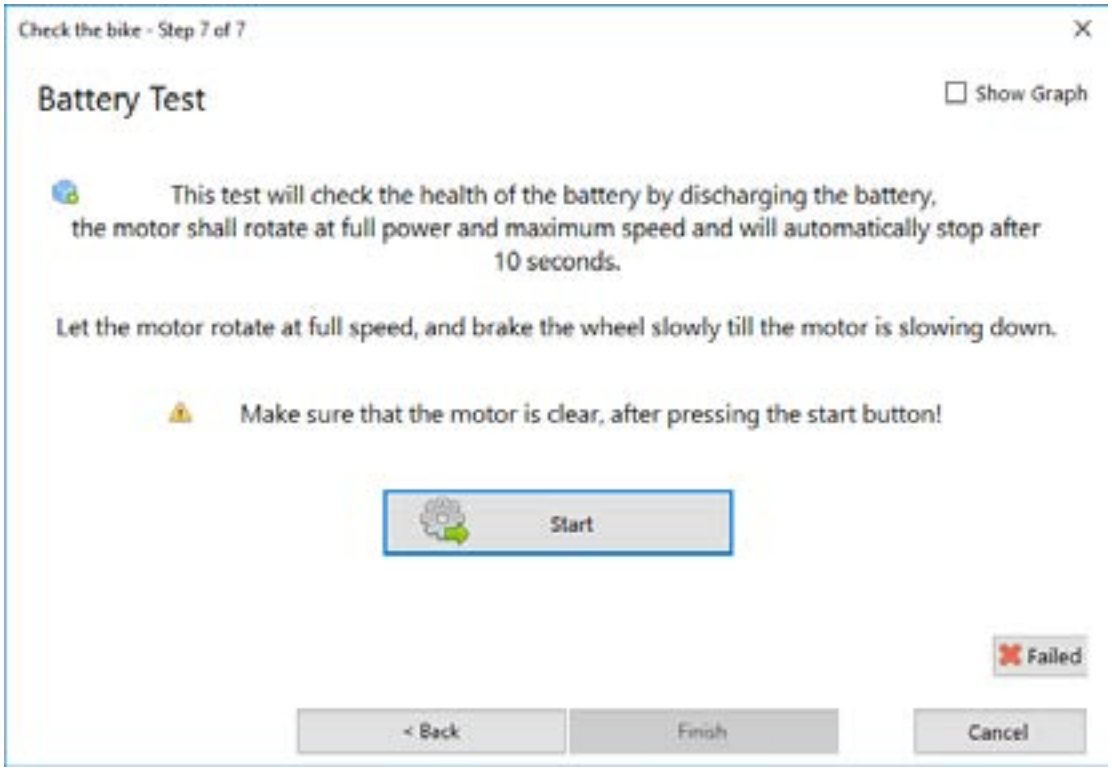


Figure 3.57 Battery test – loading

The brake is applied slowly to create a load and the motor slows almost to a stop.
The test result is evaluated automatically (Fig. 3.58). If the brake is not applied sufficiently, you will be prompted to repeat the test (Fig. 3.59). If the test result is unsuccessful (Fig. 3.60), click on “OK” and replace the battery for a new one and test again.
The bike test is complete once this test is finished (Fig. 3.61). Click on “OK” and return to the System overview menu.

Figure 3.58 Battery test – successful completion

Figure 3.59 Battery test – insufficient loading

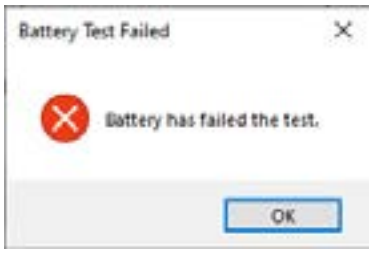


Figure 3.60 Battery test – unsuccessful test

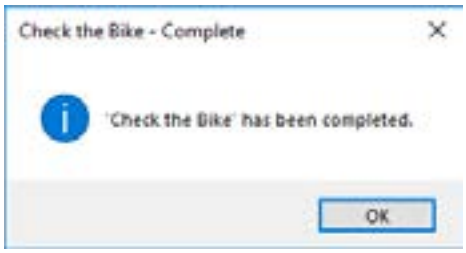


Figure 3.61 Bike test – completed

3.4.14 Tips for individual advices

[1] System initialization – Diagnostics initiates communication with the bike. Please wait a few seconds.

[2] Bike connected – Diagnostics successfully connect to the bike and verified communication with the battery, control unit, and display. Run a "CHECK THE BIKE" test to completely test the bike.

[3] Bike OK – The bike was successfully tested. Print the test report as needed.

[4] Communication with control unit failure – No connection was made to the control unit.

If the display is on:

a. Check if the battery socket is OK and properly connect it to the control unit.
b. Connect to another control unit and check to see if the original control unit is OK.
c. Insert another battery and check to see if the original battery is OK.

If the display is off:

a. Switch on the display.
b. If the display does not turn on, remove the battery for at least 5 seconds, press the battery charge indicator button on the battery and reinstall the battery.
c. Replace the display and the display extension cable.
d. Replace the control unit if the problem persists.

[5] Battery communication failure – Replace the battery.

[6] Diagnostics not connected / Battery problem

a. Check to ensure diagnostics are connected to the e-bike (see Chapter 3.2).
b. Check the diagnostic cable for damage (replace if necessary).
c. Connect the battery charger and check if the battery can be charged (when the battery is in sleep mode or short-circuit protection is activated).
d. If the battery could not be charged, or does not communicate after charging, replace the battery.
e. Check the connections at the control unit and if the cable in the docking station is damaged.

[8] Connection lost – communication lost between the diagnostics and the e-bike

a. Remove the battery for at least five seconds and then reinstall in the bike.
b. Press the "Disconnect" button and then "Connect".
c. Check the diagnostic cable for damage (replace if necessary).

[9] Diagnostics are OFFLINE – Connect the computer to the Internet to ensure diagnostics operate properly.
Automatic checking of the XML configuration file is unavailable and must be performed manually. Before resolving any error states, check first to see if the correct XML configuration file is importer (See Chapter 3.4.11 for more).

[10] Incorrect frame number – Enter the correct frame number (Fig. 3.13). If you are certain the frame number is correct, contact the helpdesk of the distributor in your country or directly BIKE FUN International service center.

[102] Battery problem (ΔU) – The battery has too much cell imbalance. Replace the battery.
[103] Battery undervoltage protection (UVP) – The battery is deep discharged. Charge the battery.
[104] Under-temperature protection (UTP) – Battery is too cold. Leave the battery above -10 ° C for discharging and 5 ° C for charging.
[105] Over-current protection (OCPD) – Battery output short-circuited. Check the connections at the control unit and connect the battery for a few seconds to a charger.
[106] Charging over-current protection (OCPCH) – Charger output short-circuited. Replace the defective charger.
[107] Battery overvoltage protection (OVP) – Battery is overcharged. Discharge the battery and check the function of the charger.
[108] Battery problem – Battery failed the load test. Replace the battery.
[201] Control unit overvoltage protection (OVP) – Supply voltage is too high. The e-bike is not connected to the correct battery.
[202] Undervoltage protection (UVP) – The battery is deep discharged. Charge the battery.
[203] Control unit overheated – Control unit is overheated.

a. Check the configuration of the docking station (see Chapter 4.3, 4.4 or 4.5) and the control unit. Focus on the correct assembly of the thermally conductive pad (it must not be rolled up).
b. Perform "motor learning" (for more see chapter 3.4.11).
c. If problems persist, replace the control unit.

[204] XML configuration file not imported – Import the correct XML configuration file (see Chapter 3.4.11 for more).
[205] Out-of-date control unit firmware – Update the control unit firmware to the latest version (see Chapter 3.4.10 for more).
[206] Incorrect type of control unit

a. Check if the correct XML configuration file is imported.
b. Check if the control unit is properly connected. See Chapter 4.2 for more.

[208] Perform an Auto-update – The control unit contains out-of-date firmware or the incorrect XML configuration file (or both). Auto-update will ensure the bike is automatically updated.

ATTENTION

Updating of the XML configuration file will be followed by the wheels turning. Leave the bike in the stand and the motor and the wheel must be free to rotate. This error occurs when a sensor is connected to the control unit when the system is on.

[301] Display cable problem

a. Check to ensure the display cable is properly connected in the bottom frame tube.
b. Check to ensure the display extension cable is properly connected in the docking station.
c. Swap the display to check for proper operation.
d. Swap the control unit to check for proper operation.

[302] Incorrect display version (non-original display) – Connect the correct display.

[303] Problem with display buttons – Replace the display.

[304] Problem with display segments – Replace the display.

[401] Problem with the motor

a. Check for proper connection of the motor:
   - Front motor: Check the connections between the motor cable and the motor extension cable in the bottom frame tube and the connections to the control unit and ensure that the motor extension cable is not damaged.
   - Rear motor: Check the connections between the motor cable and the motor extension cable in the rear frame assembly and the connections to the control unit and ensure that the motor extension cable is not damaged.
   - Mid motor: Check for proper connections between the motor and the control unit and check the cable for damage.
b. Swap the motor to check for proper operation.
c. Swap the control unit to check for proper operation.

[402] Incorrect firmware version – Update the control unit (see Chapter 3.4.10).

[403] Problem with motor connection

a. Check for proper connection of the motor:
   - Front motor: Check the connections between the motor cable and the motor extension cable in the bottom frame tube and the connections to the control unit and ensure that the motor extension cable is not damaged.
   - Rear motor: Check the connections between the motor cable and the motor extension cable in the rear frame assembly and the connections to the control unit and ensure that the motor extension cable is not damaged.
   - Mid motor: Check for proper connections between the motor and the control unit and check the cable for damage.
b. Swap the motor to check for proper operation.
c. Swap the control unit to check for proper operation.

[404] Motor control failure

a. Tune the control unit by activating the "motor learning" function (see Chapter 3.4.11).
b. Swap the control unit to check for proper operation.

[405] Problem with motor connection

a. Check to ensure the motor cable is properly connected in the bottom frame tube.
b. Check to ensure the motor extension cable is properly connected in the docking station.
c. Swap the motor to check for proper operation.
d. Swap the control unit to check for proper operation.

[407] Motor overheating

a. Run “motor learning".
b. Swap the motor to check for proper operation.
c. Swap the control unit to check for proper operation.

[410] - [411] Problem with the “motor learning” function

a. Check to make sure the motor and the wheel are free to rotate.
b. Check for proper connection of the motor:
   - Front motor: Check the connections between the motor cable and the motor extension cable in the bottom frame tube and the connections to the control unit and ensure that the motor extension cable is not damaged.
   - Rear motor: Check the connections between the motor cable and the motor extension cable in the rear frame assembly and the connections to the control unit and ensure that the motor extension cable is not damaged.
   - Mid motor: Check for proper connections between the motor and the control unit and check the cable for damage.
c. Swap the motor to check for proper operation.
d. Swap the control unit to check for proper operation.

[501] Problem with the bottom bracket set sensor

a. Verify proper connection of the sensor to the control unit in the docking station (see Chapter 4.2).
b. Swap the bottom bracket set sensor to check for proper operation.
c. Swap the control unit to check for proper operation.

ATTENTION:
This error occurs when a sensor is connected to the control unit when the system is on.

[502] Problem with the bottom bracket set sensor

a. Verify proper connection of the sensor to the control unit in the docking station (see Chapter 4.2).
b. Check the sensor cable for damage.
c. Check for proper sensor connections to the sensor extension cable in the hanger (motor bracket) and check for any damage - only applies to bikes with mid motor and carrier docking station (Fig. 4.12)

d. Swap the bottom bracket set sensor to check for proper operation.
e. Swap the control unit to check for proper operation.

[503] Incorrect or damaged torque sensor

a. Check to ensure the correct sensor is connected (5-wire torque sensor or 4-wire revolution sensor).
b. Check for proper sensor connections to the sensor extension cable in the hanger - only applies to bikes with mid motor and carrier docking station (Fig. 4.12)
c. Swap the bottom bracket set to check for proper operation.

[601] Problem with the speed sensor

a. Ensure the magnet is in the correct position in the rear wheel assembly (Fig. 4.43 or 4.44).
b. Verify proper connection of the sensor to the control unit in the docking station (see Chapter 4.2).
c. Check for proper sensor connections in the hanger – only applies to bikes with mid motor and carrier docking station (Fig. 4.12)
d. Swap the sensor to check for proper operation.
e. Swap the control unit to check for proper operation.

[602] Problem with the speed sensor - Ensure the magnet is in the correct position in the rear wheel assembly (Fig. 4.43 or 4.44).

[701] Problem with lights

None of the lights work::

a. Check the front and rear light connection in the bottom frame tube and at the light (check for voltage of 6V).
b. Swap the control unit to check for proper operation (check for voltage of 6 V).
c. Swap the display extension cable to check for proper operation.
d. Run a “Check the bike” test to check the display.

Front light:

a. Check the front light cable connections in the bottom frame tube and at the light (check for voltage of 6 V).
b. Check light operation.
c. Swap the display extension cable to check for proper operation.
d. Run a “Check the bike” test to check the display.

Rear light:

a. Check the rear light cable connections in the bottom frame tube and at the light (check for voltage of 6 V).
b. Check light operation.
c. Swap the light extension cable to check for proper operation.
d. Run a “Check the bike” test to check the display.

4 ASSEMBLY

ATTENTION!

Take out the battery before working on the bike.

4.1 Motors

4.1.1 Front motor

1. Place the wheel in the fork (Fig. 4.1). Carefully position the cable when inserting into the fork to avoid damage – **the cable outlet must point downwards!**
2. Attach the front wheel into the fork. Use a cable guide washer.
3. Secure the motor cable to the fork with cable ties.
4. Plug the motor cable connector into the connector of the motor extension cable (Fig. 4.1 and 4.2).
   Ensure the arrows are properly aligned opposite to each other!
5. Insert the motor cable connector into the bottom frame tube.
6. Reinstall the rubber cover into the frame opening.

ATTENTION!

Run “motor learning” after replacing the motor.

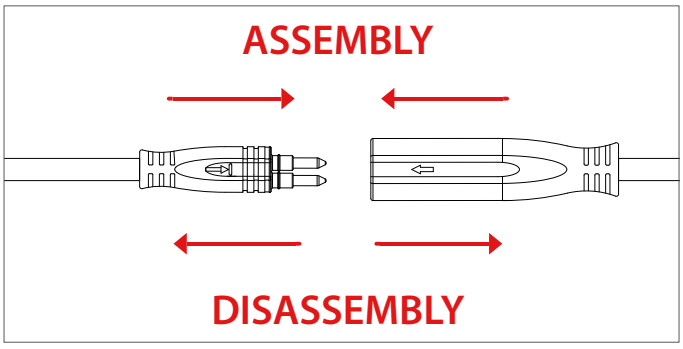


Figure 4.2 *Motor cable connection and disconnection*

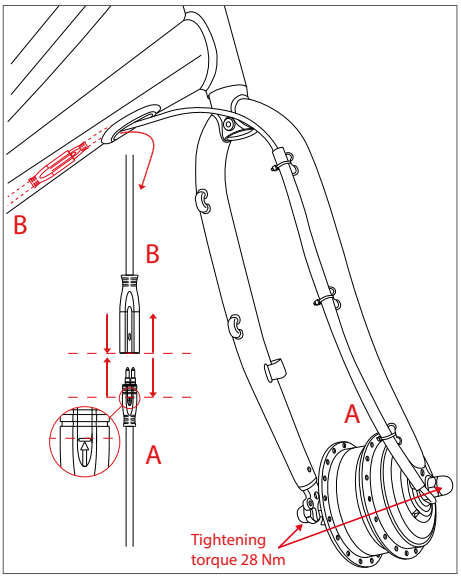


Figure 4.1 *Motor cable connection and disconnection – front motor*

4.1.2 Rear motor

1. Place the wheel with the new motor into the rear dropout of the bike (Fig. 4.3). Carefully position the cable when inserting into the forks to avoid damage – **the cable outlet must point downwards!**
2. Mount the rear wheel to the rear dropout. Use a lock washer with a catch.
3. Secure the motor cable to the chain stay with cable ties.
4. Plug the motor cable connector into the connector of the motor extension cable (Fig 4.3 and 4.4).

   Ensure the arrows are properly aligned!
5. Mount the cable using a cable tie.

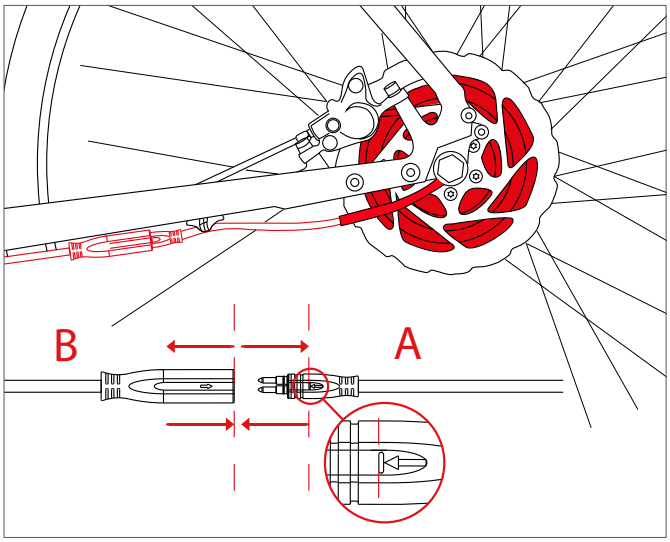


Figure 4.3 *Connecting and disconnecting the motor cable – rear motor*

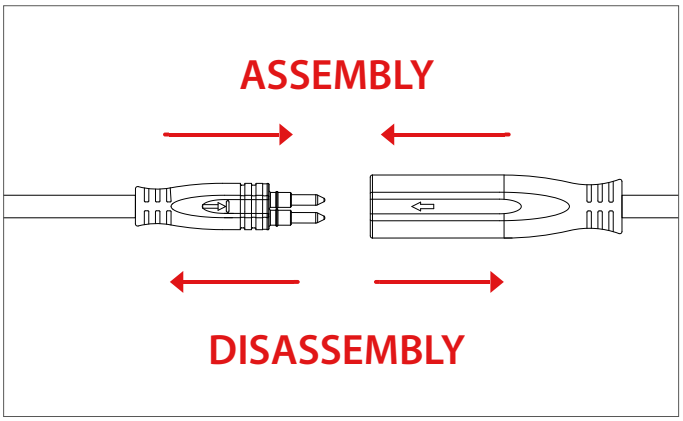


Figure 4.4 *Motor cable connection and disconnection*

ATTENTION!

Run “motor learning” after replacing the motor.

4.1.3 Mid motor

a) Docking station on the down tube

1. Route the cables to the docking station.
2. Insert the motor [A] into the hanger (Fig. 4.5).

ATTENTION!

Carefully insert the motor into the hanger to avoid damaging the cables.

3. Mount the motor using three M8 x 25 fasteners [B] and one M8 x 18 fastener [C] (Fig. 4.5 and 4.8). Tighten the fasteners to 18 - 20 Nm.
4. Use three M4 x 8 fasteners [K] to mount the chain guard bracket [J] to the motor (Fig. 4.11). Skip this step if the bike does not have a chain guard.
5. Install the chain ring [D] and the spider nut [E] and tighten them (to 35 Nm) with the wrench or castle nut (Fig. 4.5, 4.6 and 4.10).
6. Install the chain guard [R] and mount it to the chain guard bracket using two M5 x 6 fasteners [Q] (Fig. 4.13). Skip this step if the bike does not have a chain guard.

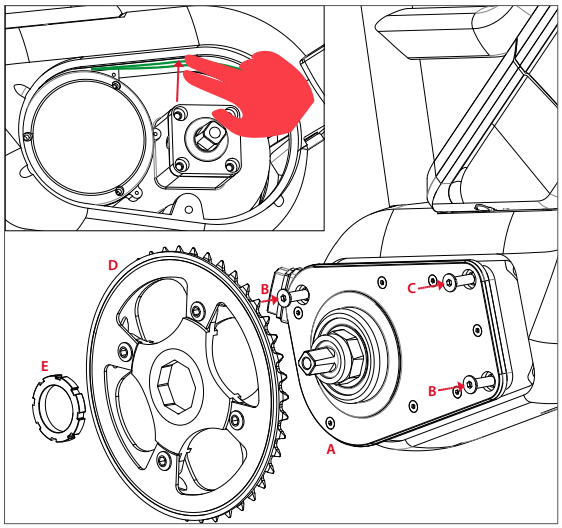


Figure 4.5 Mid motor assembly 1

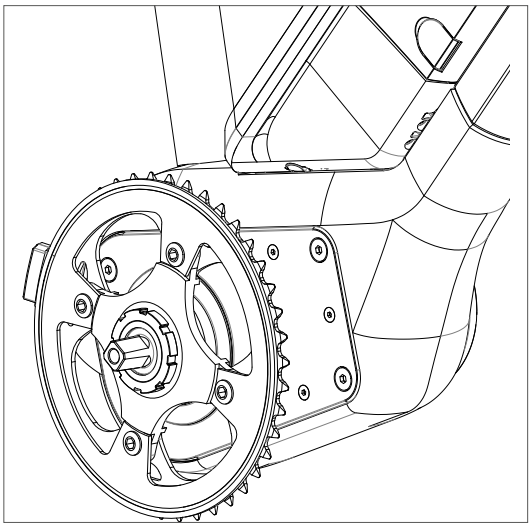


Figure 4.6 Mid motor assembly 2

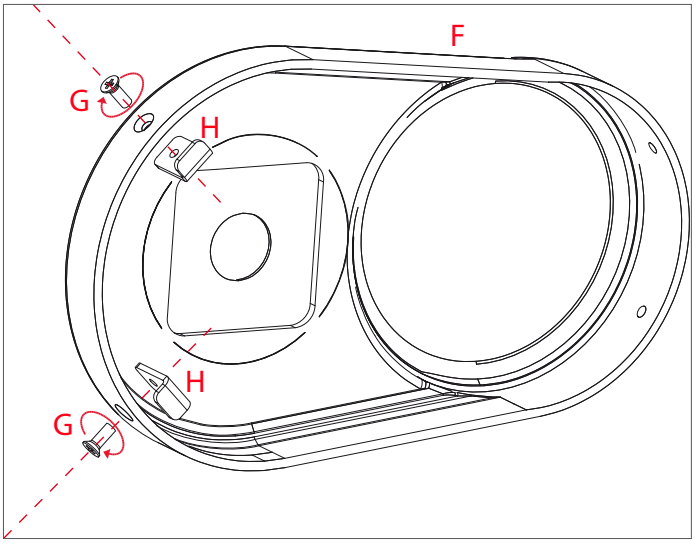


Figure 4.7 Mid motor assembly 3

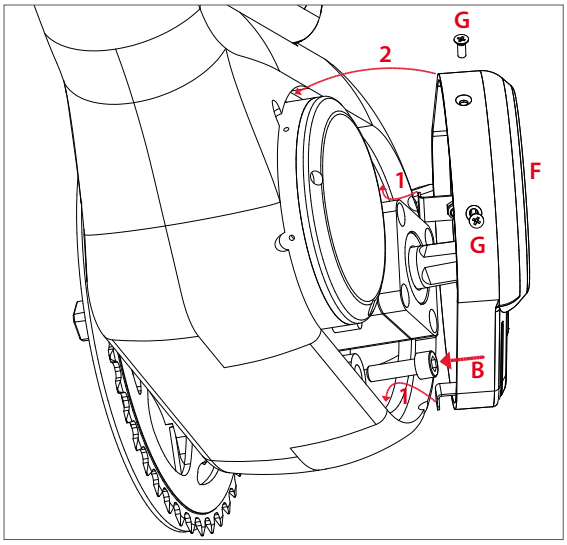


Figure 4.8 Mid motor assembly 4

7. Use two M3 x 6 fasteners [G] to slightly attach the L-shaped brackets [H] to the motor cover (Fig. 4.7).
8. Install the motor cover (Fig. 4.8):
    a) Hook the L-shaped brackets to the motor bracket [1].
    b) Position the motor cover over the motor [2].
9. Use two M3 x 6 fasteners [G] to attach the motor cover to the motor cover (Fig. 4.9). Tighten the fasteners to 0,7Nm

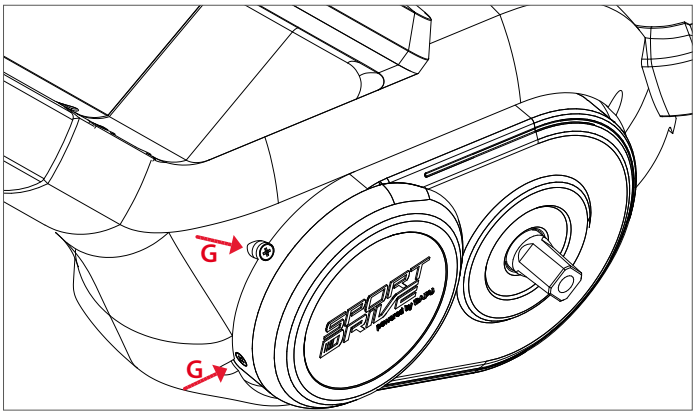


Figure 4.9 *Mid motor assembly 5*

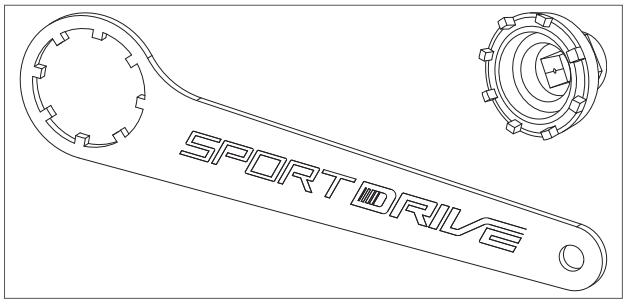


Figure 4.10 *Wrench and castle nut for spider nut*

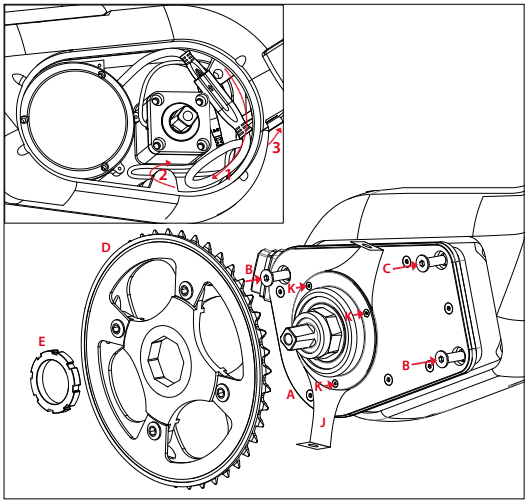


Figure 4.11 *Mid motor assembly 6*

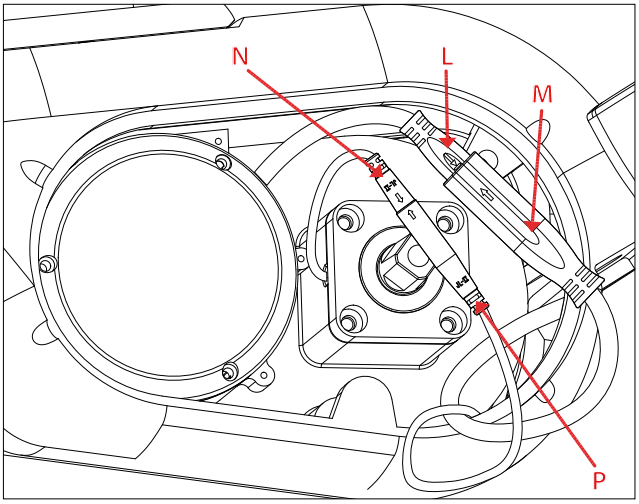


Figure 4.12 *Mid motor assembly 7*

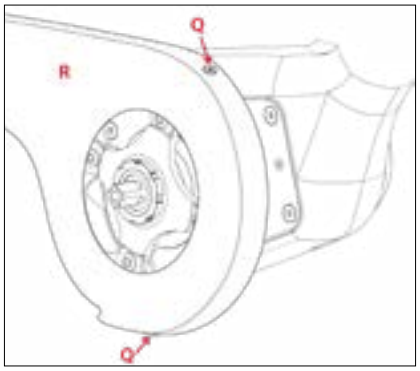


Figure 4.13 *Mid motor assembly 8*

b) Carrier docking station

1. Route the cables to the docking station and insert into the tunnel (see Chapter 4.11)
2. Route the cables to the hanger and insert the motor [A] into the hanger (Fig. 4.11)

> **ATTENTION!**
>
> Carefully insert the motor into the hanger to avoid damaging the cables.

3. Mount the motor using three M8 x 25 fasteners [B] and one M8 x 18 fastener [C] (Fig. 4.11 and 4.8). Tighten the fasteners to 18 - 20 Nm
4. Connect the bottom bracket set sensor [N] to the sensor extension cable [P] (Fig. 4.12).
5. Connect the motor cable [L] to the motor extension cable [M] (Fig. 4.12) and position the cables as shown in Figure 4.11
6. Use three M4 x 8 fasteners [K] to mount the chain guard bracket [J] to the motor. Skip this step if the bike does not have a chain guard.
7. Install the chain ring [D] and the spider nut [E] and tighten them (to 35Nm) with the wrench or castle nut (Fig. 4.5, 4.6 and 4.10).
8. Install the chain guard [R] and mount it to the chain guard bracket using two M5 x 6 fasteners [Q] (Fig. 4.13). Skip this step if the bike does not have a chain guard.
9. Use two M3 x 6 fasteners [G] to attach the L-shaped bracket [H] to the motor cover (Fig. 4.7).
10. Install the motor cover (Fig. 4.8):
    a) Hook the L-shaped brackets to the motor bracket [1].
    b) Position the motor cover over the motor [2].
11. Use two M3 x 6 fasteners [G] to attach the motor cover to the motor cover (Fig. 4.9). Tighten the fasteners to 0,7 Nm

c) Integrated docking station

1. Position the control unit and connect all cables to the control unit (see Chapter 4.5).
2. Insert the motor [A] into the hanger (Fig. 4.5).

> **ATTENTION!**
>
> Carefully insert the motor into the hanger to avoid damaging the cable.

3. Mount the motor using three M8 x 25 fasteners [B] and one M8 x 18 fastener [C] (Fig. 4.5 and 4.8). Tighten the fasteners to 18 - 20 Nm
4. Use three M4 x 8 fasteners [K] to mount the chain guard bracket [J] to the motor (Fig. 4.11). Skip this step if the bike does not have a chain guard.
5. Install the chain ring [D] and the spider nut [E] and tighten them (to 35Nm) with the wrench or castle nut (Fig. 4.5, 4.6 and 4.10).
6. Install the chain guard [R] and mount it to the chain guard bracket using two M5 x 6 fasteners [Q] (Fig. 4.13). Skip this step if the bike does not have a chain guard.
7. Use two M3 x 6 fasteners [G] to attach the “L” brackets to the motor cover [H] (Fig. 4.7).
8. Install the motor cover (Fig. 4.8):
    a) Hook the “L” brackets to the motor bracket [1].
    b) Move the motor cover over the motor [2].

9) Use two M3 x 6 fasteners [G] to attach the motor cover to the motor cover (Fig. 4.9). Tighten the fasteners to 1Nm

4.2 Control unit

There is only one type of control unit for bikes with revolution sensor and torque/revolution sensor. Connections are shown in Figures 4.14 and 4.15.

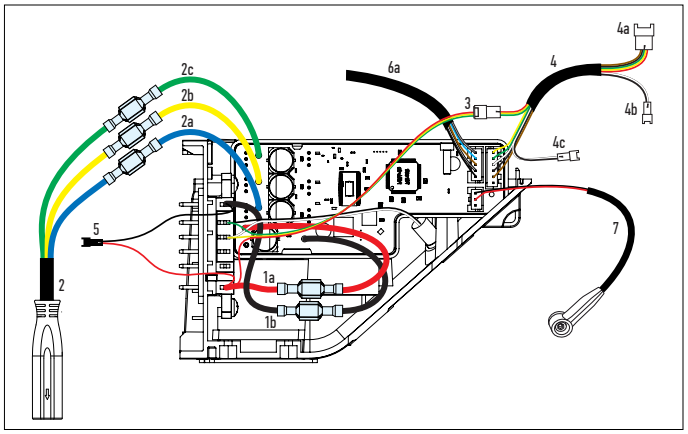


Figure 4.14a Control unit cabling for the torque revolution sensor

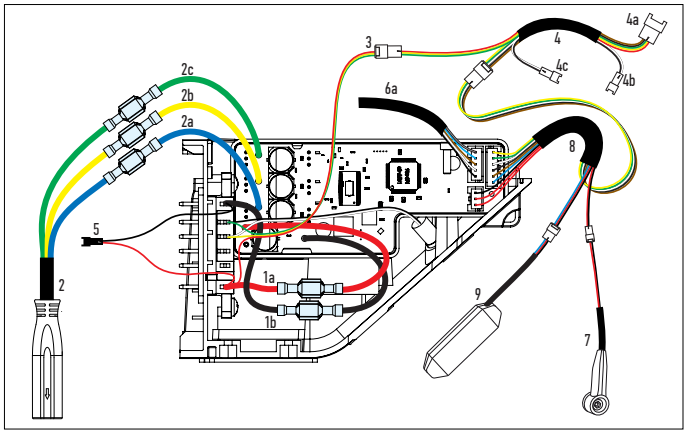


Figure 4.14b Control unit cabling for the torque revolution sensor with gear sensor

1a	Power cable +
1b	Power cable -
2	**Motor extension cable**
2a	Blue motor phase cable
2b	Yellow motor phase cable
2c	Green motor phase cable
3	**Communication cable (1. green, 2. yellow, 3. red)**
4	**Display extension cable (1. yellow, 2. green, 3. white, 4, black, 5. orange)**
4a	Display connector
4b	Front light connector
4c	Rear light connector
5	**Power cable for GPS tracker**
6a	**Bottom bracket sensor (torque/revolution sensor) (1. black, 2. white, 3. brown, 4. blue, 5. grey)**
6b	**Bottom bracket sensor (revolution sensor) (1. black, 2. white, 3. brown, 4. blue)**
7	**Speed sensor (2. red, 3. black)**
8	**Gear sensor splitter**
9	**Gear sensor (1. black, 2. red, 3. blue)**

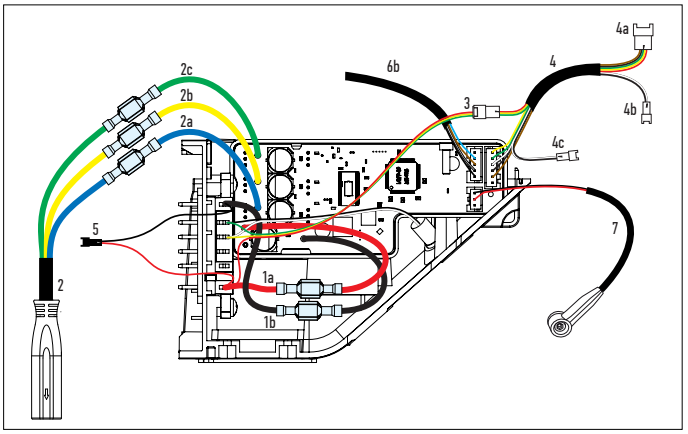
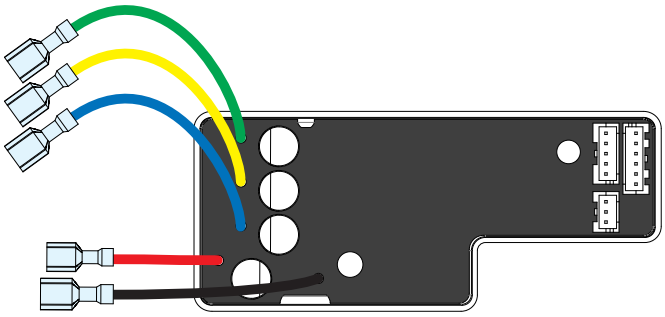


Figure 4.15 Control unit cabling for the revolution sensor



4.3 Docking station on the down tube

4.3.1 Pre-assembly of the docking station

1. Use the four M4 x 6 fasteners [E] to mount the heat sink to the docking station [F] (Fig. 4.16)
2. Install both seals [H,G] on a clean surface (Fig. 4.17).

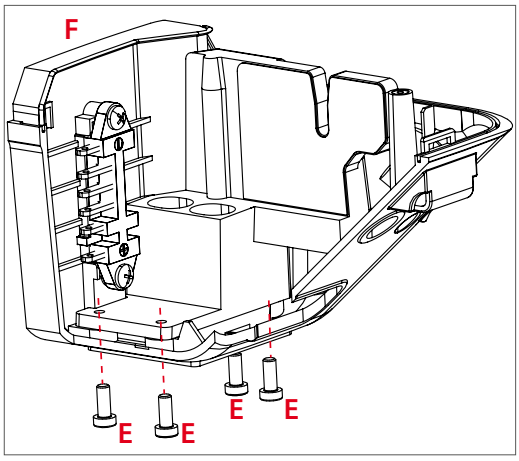


Figure 4.16 *Docking station - Docking station heat sink assembly*

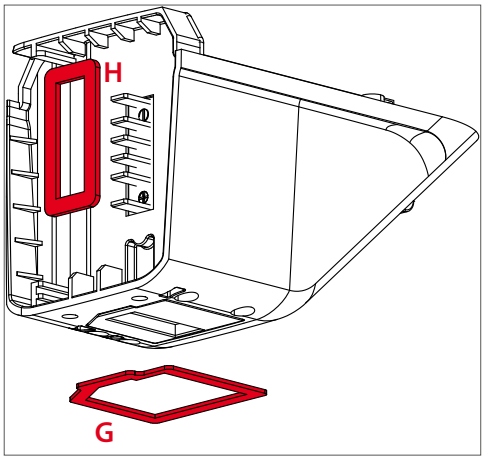


Figure 4.17 *Docking station - Attaching the seal*

4.3.2 Docking station assembly

1. Install the thermally conductive pad on the bottom of the heat sink [A] (Fig. 4.18).
2. Use the two M5 x 16 fasteners [B] to mount the docking station to the frame (Fig. 4.19).

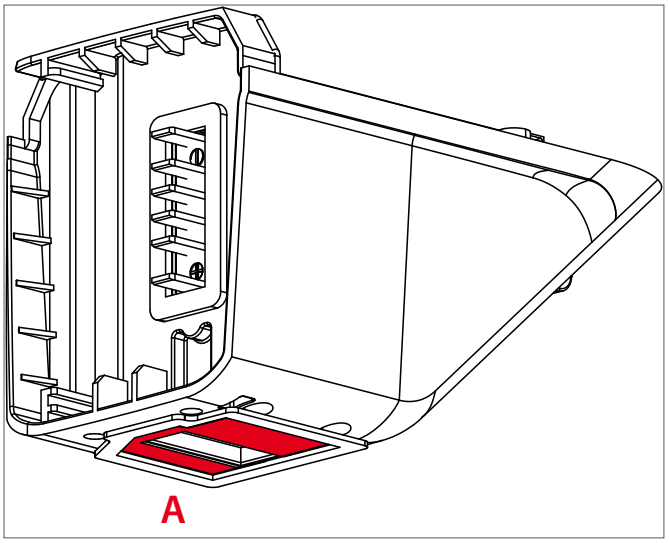


Figure 4.18 *Docking station - Thermally conductive pad*

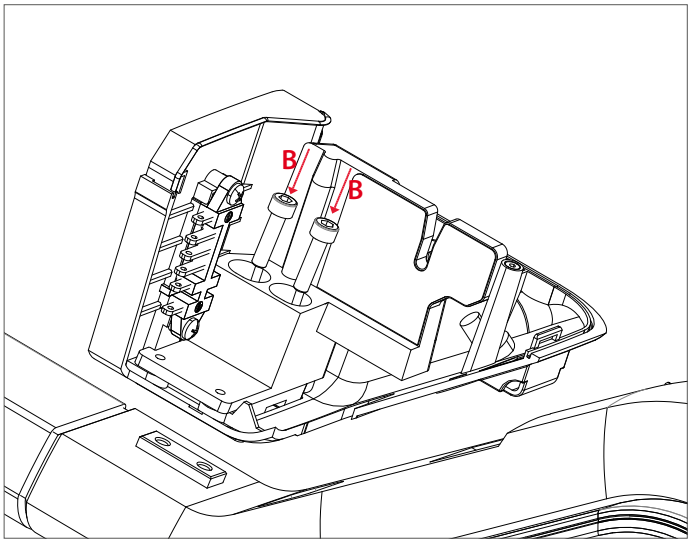


Figure 4.19 *Docking station - Mounting*

4.3.3 Lock assembly

1. Insert the battery / battery model (Fig. 4.20).
2. Mount the lower part [A] using the fixing washer [B] and two M5 x 16 fasteners [C] (Fig. 4.21). Remove the battery.
3. Insert the lock [D] into the correct position (Fig. 4.22).
4. Insert the middle part [E] (Fig. 4.23).
5. Mount the front part [F] and secure using the four 3 x 16 self-tapping fasteners [G] (Fig. 4.24).
6. Check if the battery is securely assembled (Fig. 4.25).

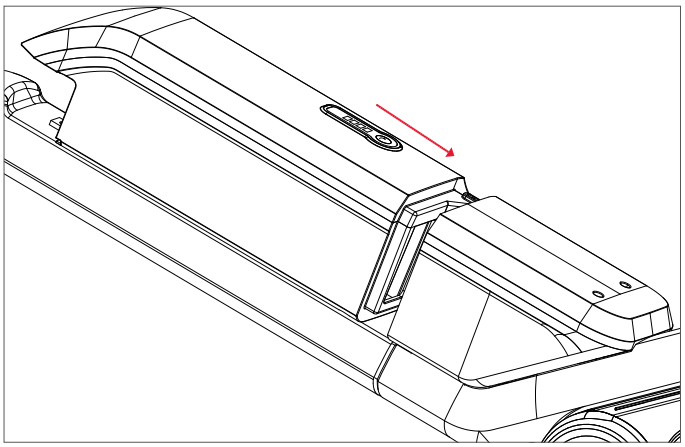


Figure 4.20 Lock assembly – battery insertion

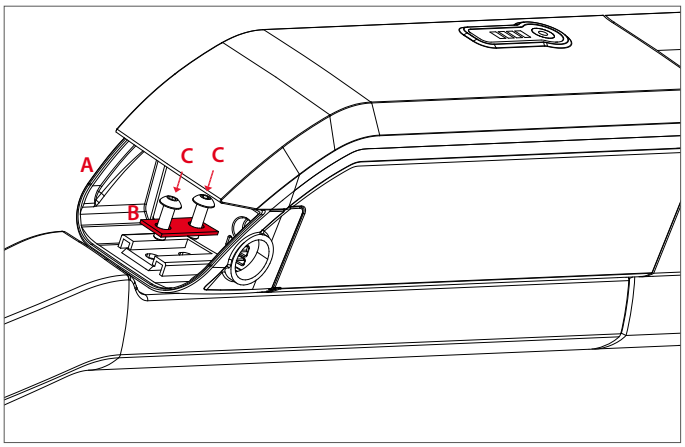


Figure 4.21 Mounting the fixing pad

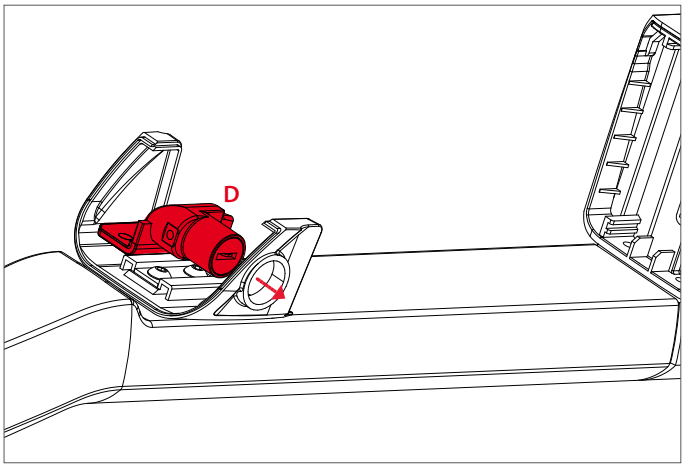


Figure 4.22 Inserting a lock

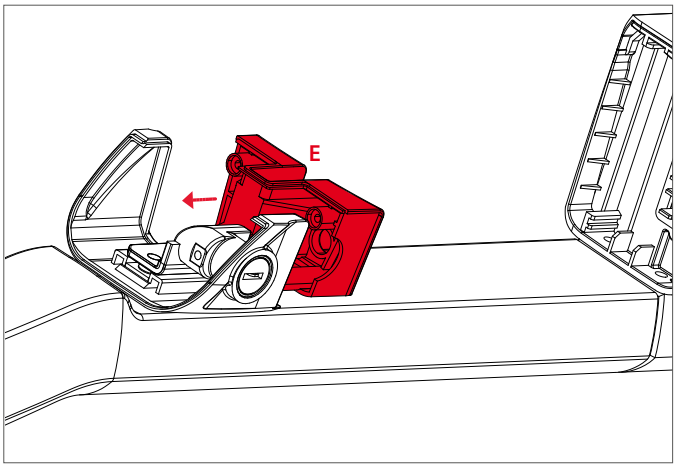


Figure 4.23 Inserting the middle part

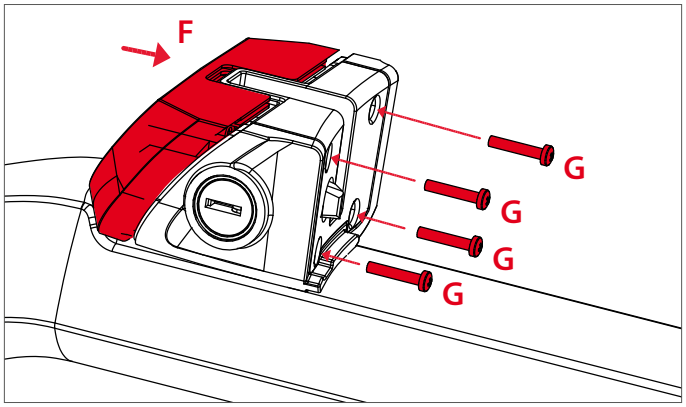


Figure 4.24 Mounting the front part

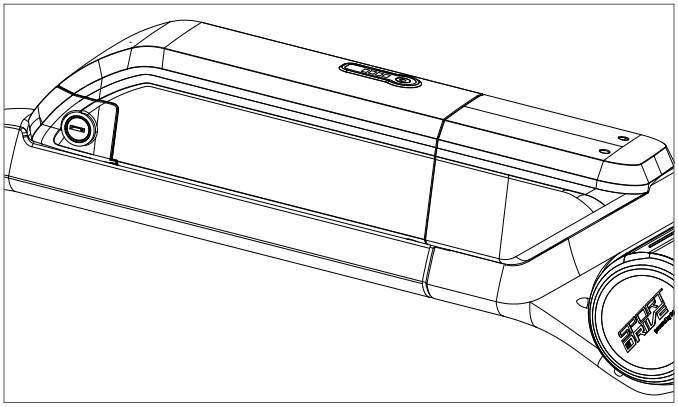


Figure 4.25 Lock assembly - complete

4.3.4 Control unit assembly

ATTENTION!
The control unit can only be connected or disconnected if the battery is not installed in the bike!

1. Connect all cables according to the schematic (Fig. 4.14 or 4.15).
2. Place the thermally conductive pad [B] on the clean surface of the heat sink (Fig. 4.26).
3. Insert the control unit [A] into the docking station (Fig. 4.26) and mount to the heat sink using an M4 x 12 [2] hexagonal fastener (Fig. 4.27).
4. Close the docking station by inserting the top cover [D] and using two M3 x 8 fasteners [E] (Fig. 4.28).
5. Run an auto-update after replacing a control unit (see Chapter 3.4.9).

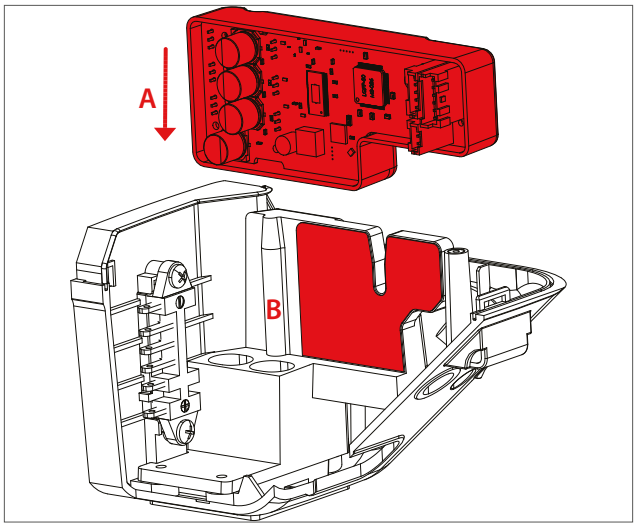


Figure 4.26 *Inserting the control unit*

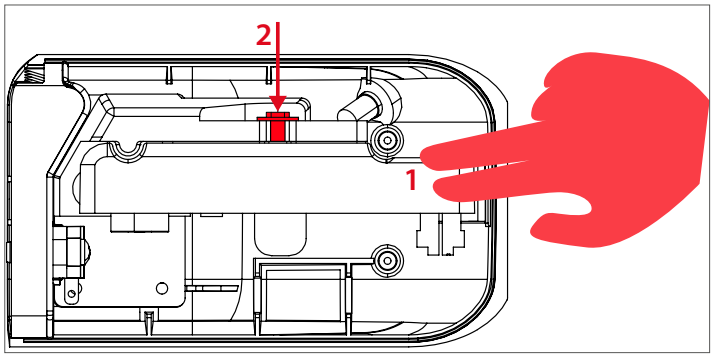


Figure 4.27 *Control unit mounting*

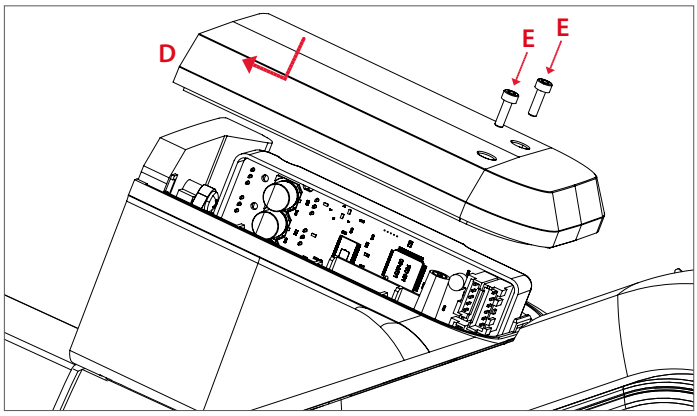


Figure 4.28 *Assembly of docking station top cover*

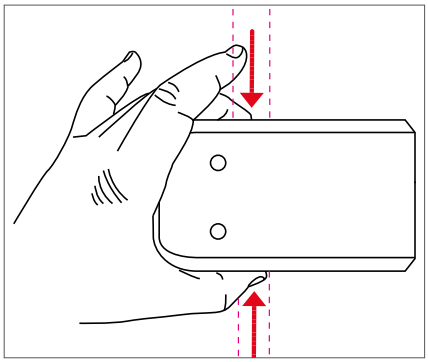


Figure 4.29 *Removal of docking station top cover*

Tip:

- Press the docking station to remove the cover (Fig. 4.29)

4.4 Carrier docking station

4.4.1 Carrier docking station assembly

1. Use two 3 x 14 self-tapping fasteners [A] to mount the battery socket [B] to the docking station [C] (Fig. 4.30).
2. Use four 3.5 x 16 self-tapping fasteners [D] to mount the docking station [C] to the carrier (Fig. 4.30).
3. Use two 4 x 20 self-tapping fasteners [F] to mount the lock [E] to the docking station [C] (Fig. 4.30).

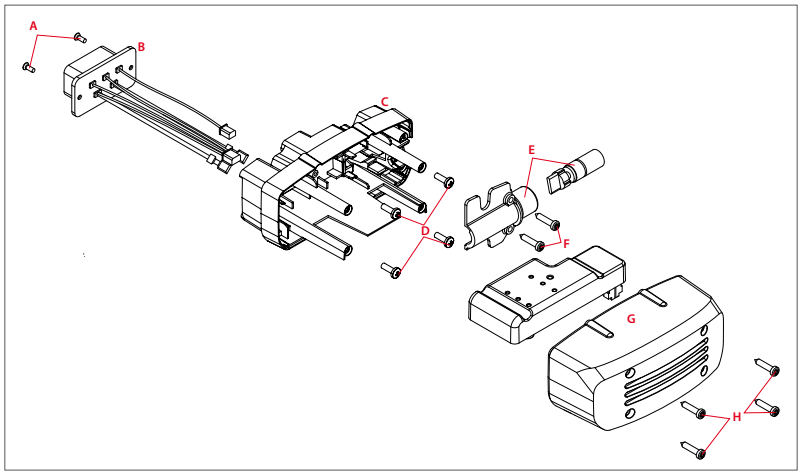


Figure 4.30 *Assembly of carrier docking station*

4.4.2 Control unit assembly

1. Connect all cables according to the schematic (Fig. 4.14 or 4.15).
2. Mount the control unit using the bracket and M4 x 10 fastener [1] to the top posts of the docking station (Fig. 4.31).
3. Store the wires in the docking station.
4. Use two 4 x 20 self-tapping fasteners [H] to mount the docking station cover [G] to the docking station [C] (Fig. 4.30).

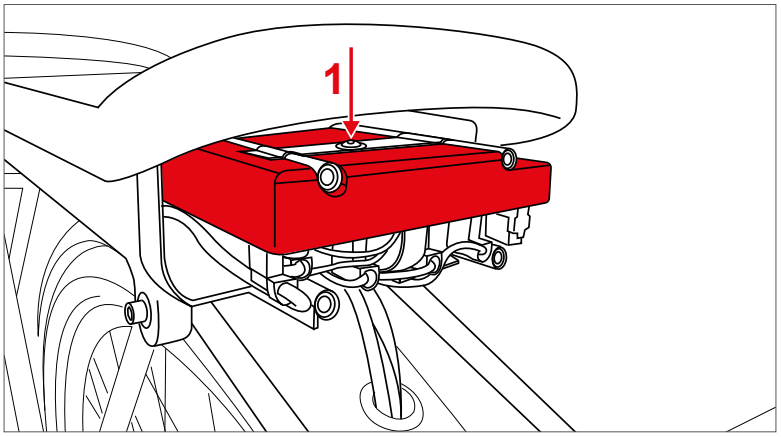


Figure 4.31 *Control unit assembly*

ATTENTION!
The control unit can only be connected or disconnected if the battery is not installed in the bike!

4.5 Integrated docking station

4.5.1 Battery socket assembly

1. Install two M3x8 fasteners [A] on the bottom side of the battery socket (Fig. 4.32)
2. Route the wires to the hanger (Fig. 4.32).
3. Mount the battery socket to the frame using two 2.9 x 25 mm self-tapping fasteners [B] (Fig. 4.32). Tighten the fasteners to 0,7Nm

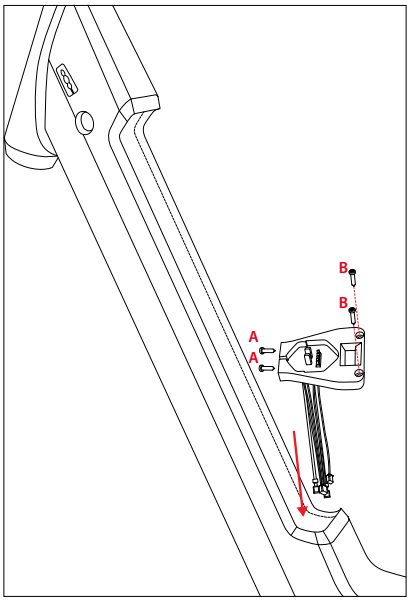


Figure 4.32 Battery socket assembly

4.5.2 Lock assembly

1. Install two M3x8 fasteners [A] on the bottom side of the plastic part of the lock (Fig. 4.34)
2. Place the rubber plug [1] into the opening for the key (Fig. 4.33).
3. Connect the plastic part of the lock to the lock using two M5 x 14 mm fasteners (Fig. 4.33).
4. Attach the lock to the frame using two 2.9 x 25 mm self-tapping fasteners [B] (Fig. 4.34). Tighten the fasteners to 0,7Nm.

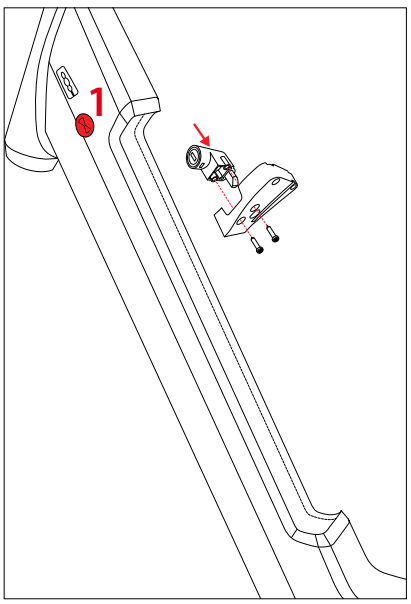


Figure 4.33 Lock iassembly1

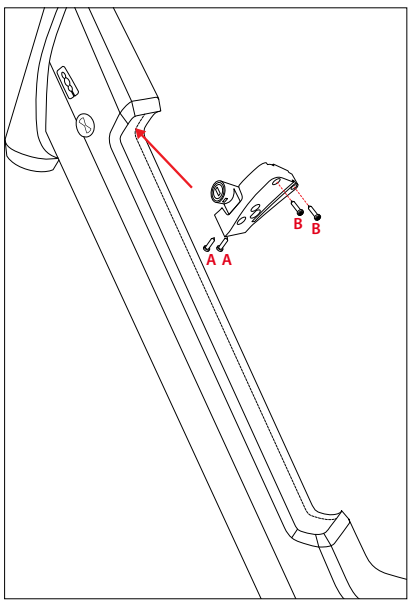


Figure 4.34 Lock iassembly 2

4.5.3 Charging connector assembly

1. Route the charging connector cables through the opening in the frame (Fig. 4.35).
2. Mount the charging connector to the frame using two M3 x 9.5 mm fasteners (Fig. 4.35). Tighten the fasteners to 0,7Nm.
3. Connect the charging connector to the battery socket.

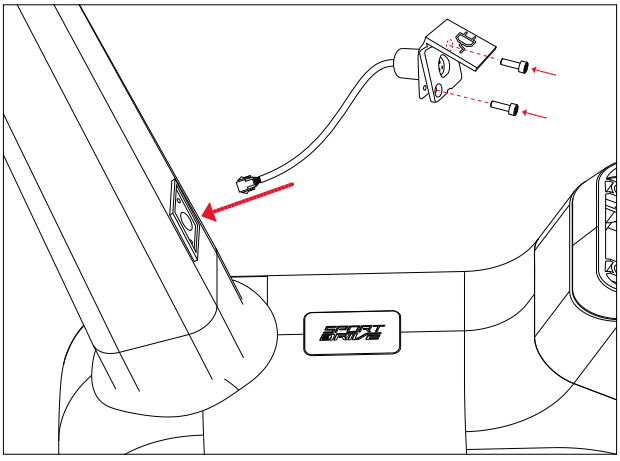


Figure 4.35 *Charging connector assembly*

4.5.4 Control unit assembly

1. Place the thermally conductive pad on the clean surface of the control unit (Fig. 4.36).
2. Insert the control unit in the hanger and mount the control unit to the hanger using an M4 x 10 fastener (Fig. 4.36). Tighten the fasteners to 2Nm.
3. Cover the head of the fastener with a sticker (Fig. 4.36).
4. Connect all cables according to the schematic (Fig. 4.14 or 4.15).

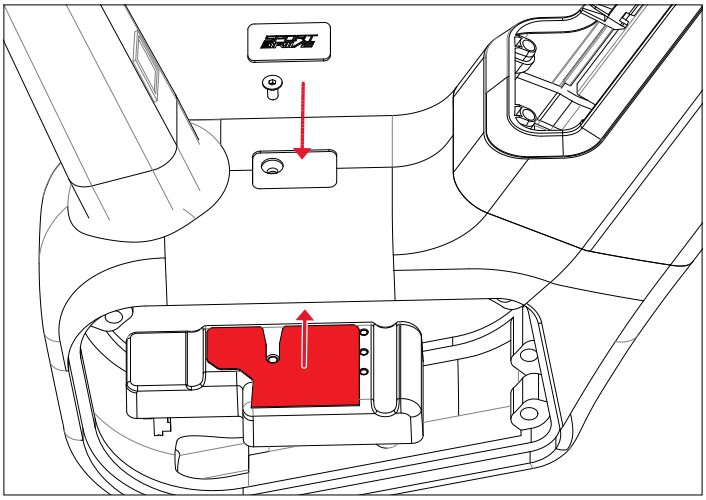


Figure 4.36 *Control unitassembly*

ATTENTION!
The control unit can only be connected or disconnected if the battery is not installed in the bike!

4.6 Display

1. Mount the display to the handlebars (Fig. 4.37 to 4.41). Tighten the fasteners to 0,5 Nm
2. Use a clip to secure the display cable to the brake cable.
3. Connect the display connector to the display extension cable (Fig. 4.42).
4. Route the cable into the bottom frame tube.
5. Reinstal the rubber cover into the frame opening.

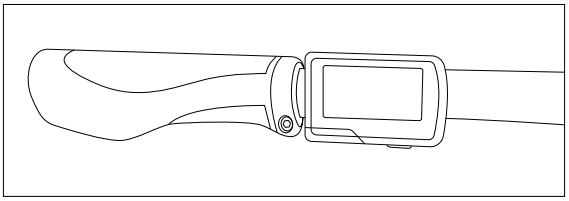


Figure 4.37 Grip Pro display assembly

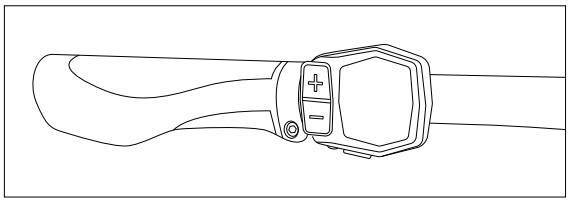


Figure 4.38 Grip display assembly

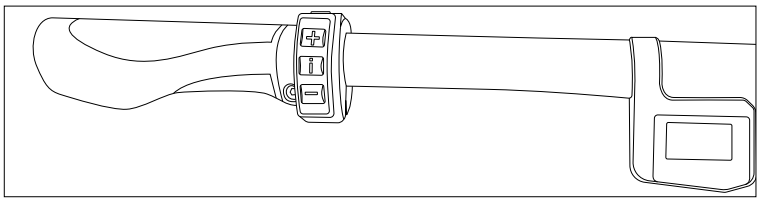


Figure 4.39 Compact display assembly

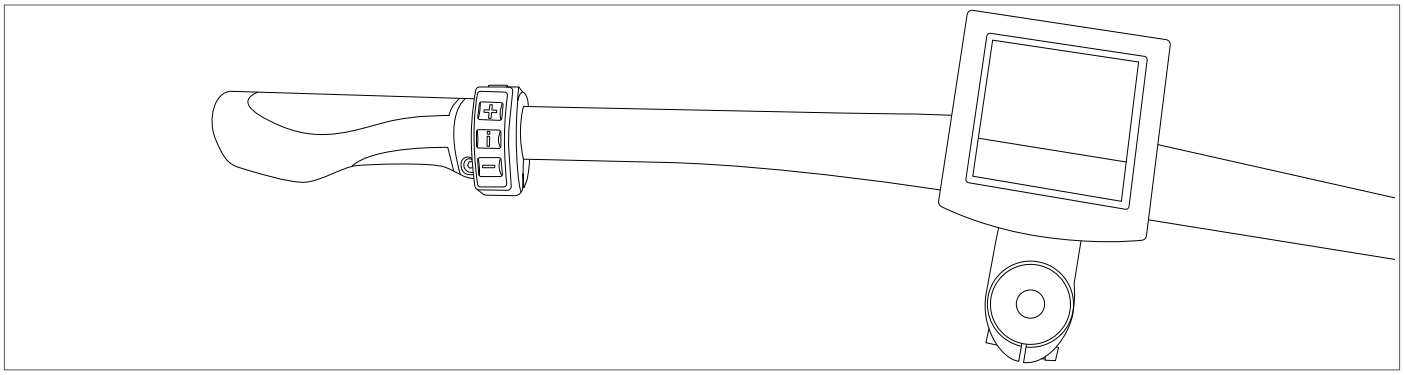


Figure 4.40 Square display assembly

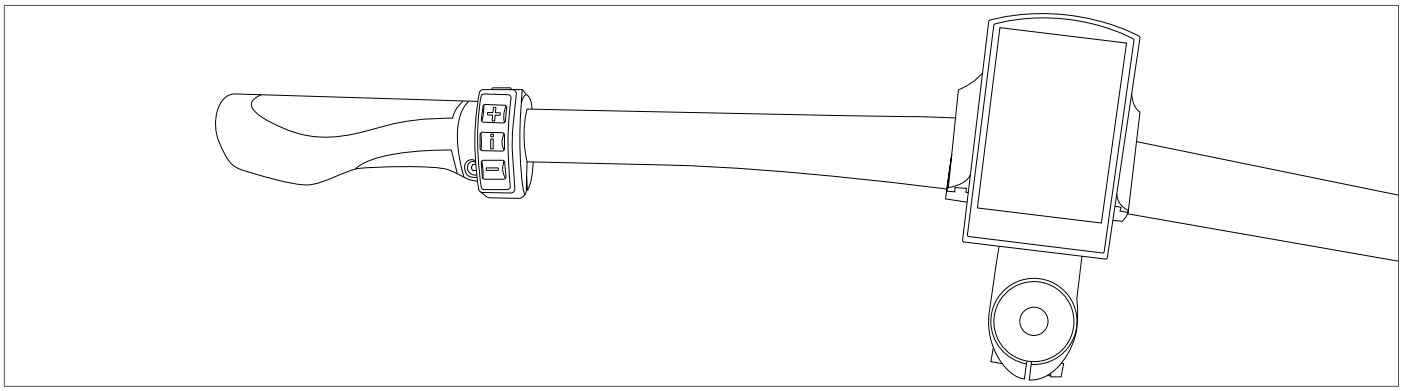


Figure 4.41 Color display assembly

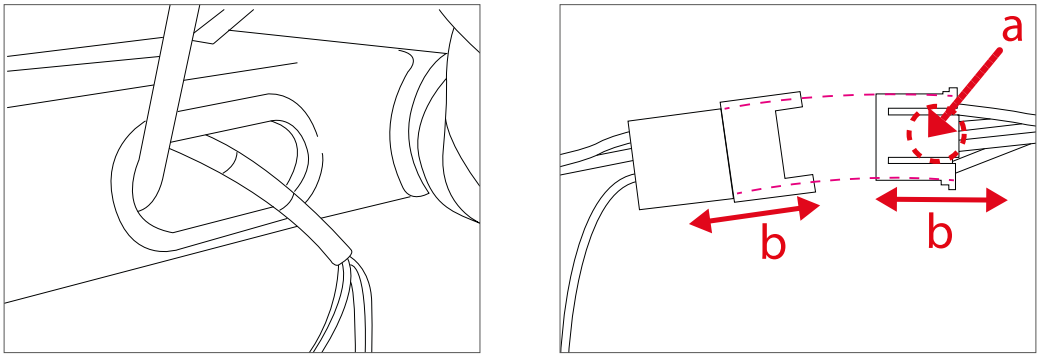


Figure 4.42 Display cable connection / disconnection

4.7 Speed sensor

a) Type A

1. Use cable ties to fix the new speed sensor to the rubber pads on the left chain state.
2. Mount the magnet 1 to 15 mm from the sensor and across from one of its ends (Fig. 4.43).
3. Attach the cable to the rear left chain state.
4. a) Carrier battery: Route the cable through the rubber tunnel in the fender (see Chapter 4.11).
   Route the cable through the top opening in the fender.
   b) Semi-integrated down tube battery: Route the cable to the docking station.
5. Connect the speed sensor to the control unit (Fig. 4.14 or 4.15).

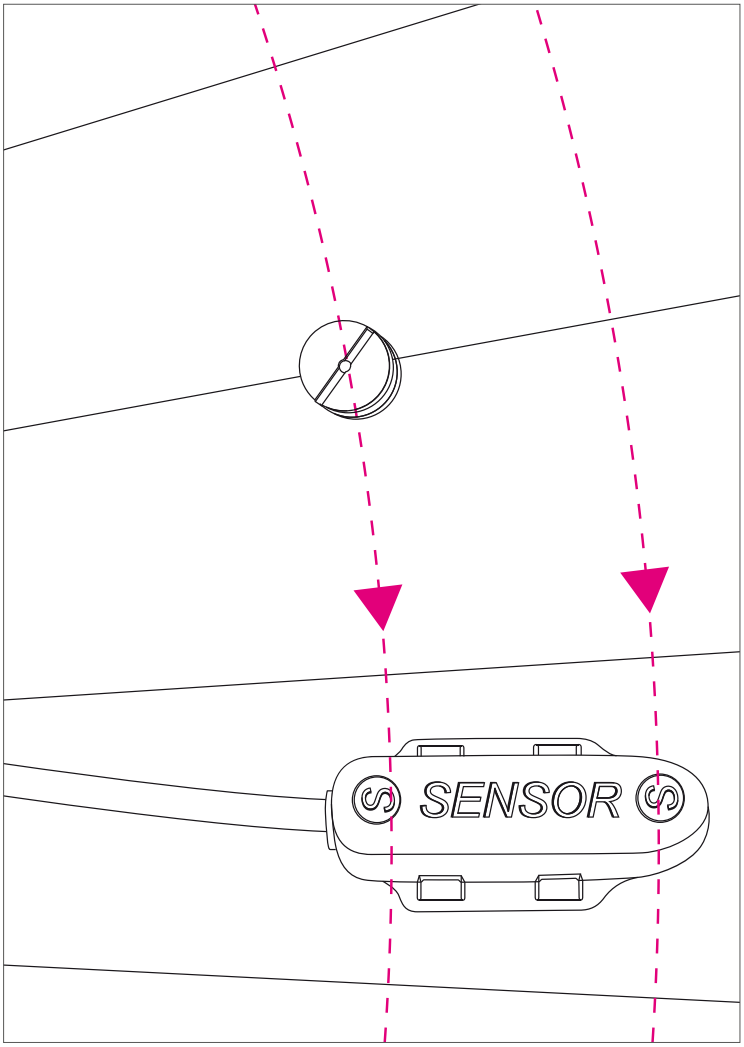


Figure 4.43 *Magnet position relative to the sensor*

TIP:

Before removing the speed sensor cable from the docking station, use its cables to route the auxiliary cables to reassemble the speed sensor.

b) Type B

1. Use an M5 x 15 fasteners to mount the speed sensor to the bike frame.
2. Mount the magnet 1 to 15 mm across from the speed sensor (Fig. 4.44)
3. Attach the cable to the rear state.
4. a) Carrier battery: Route the cable through the rubber tunnel in the fender (see Chapter 4.11).

   Route the cable through the top opening in the fender.

   b) Semi-integrated down tube battery: Route the cable to the docking station.

   c) Fully integrated battery: Route the cable to the hanger.
5. Connect the speed sensor to the control unit (Fig. 4.14 or 4.15).

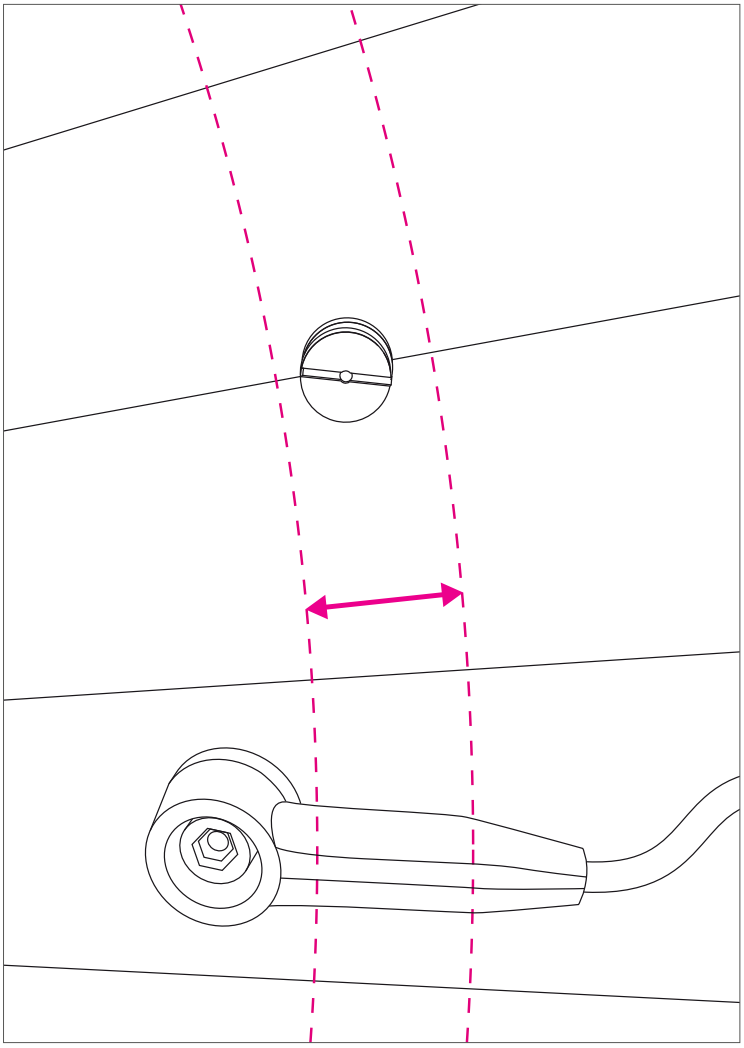


Figure 4.44 *Magnet position relative to the sensor*

4.8 Bottom bracket with sensor

1. Install the left bottom bracket cup (Fig. 4.45).
2. Route the bottom bracket cable through the opening the rear part of the bottom bracket shell (Fig. 4.46).
3. Install the new bottom bracket set in the sleeve and lock in secure by tightening the right cup (Fig. 4.47).
4. A) Carrier battery – Route the cable through the tunnel in the fender (see Chapter 4.11). Route the cable through the top opening in the fender.
   B) Semi-integrated down tube battery – Route the cable to the docking station.
5. Connect the bottom bracket cable to the control unit (Fig. 4.14 or 4.15).

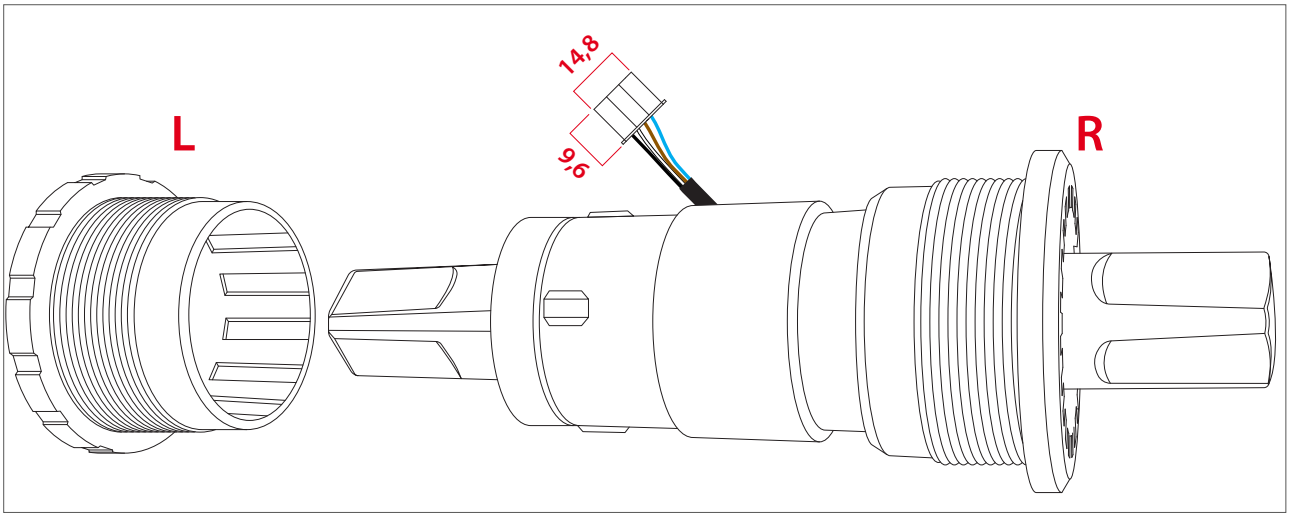


Figure 4.45 Bottom bracket set

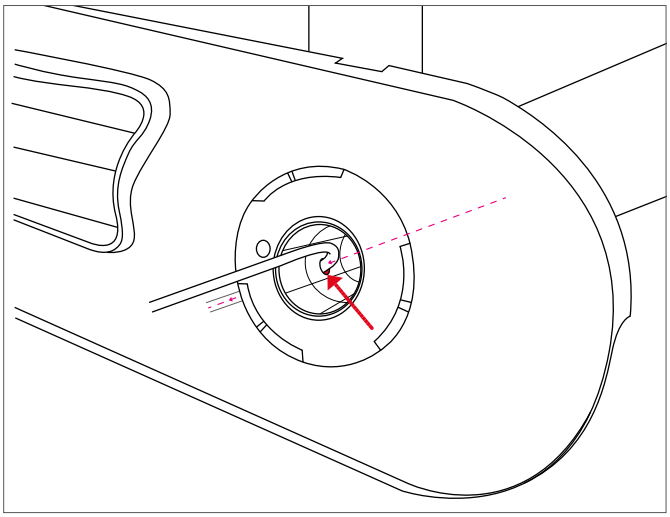


Figure 4.46 Routing the bottom bracket set cable through the sleeve

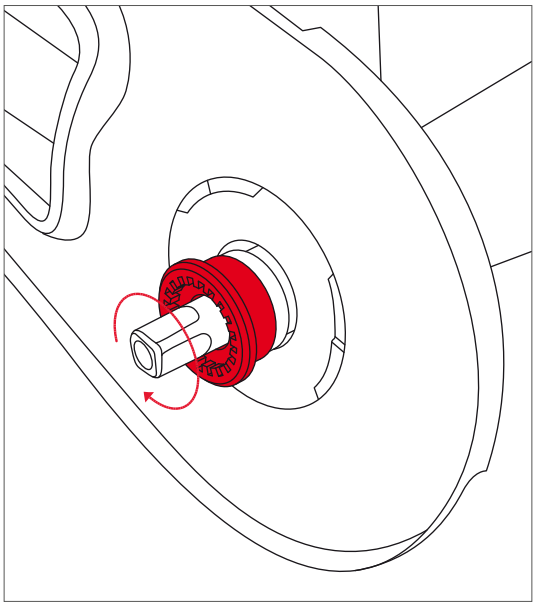


Figure 4.47 Bottom bracket set assembly

TIP:
Before removing the bottom bracket set cable from the docking station, use its cables to route the auxiliary cables for reassembly purposes.

4.9 Rear light on the carrier battery

1. Connect the light cable connector to the light (Fig. 4.48).
2. Check to ensure the light cable is routed away from the nut to avoid damage (Fig. 4.49).
3. Position the light in place.
4. Use an M3 x 20 Phillips fastener to mount the light. Tighten the fasteners to 0,7 Nm.

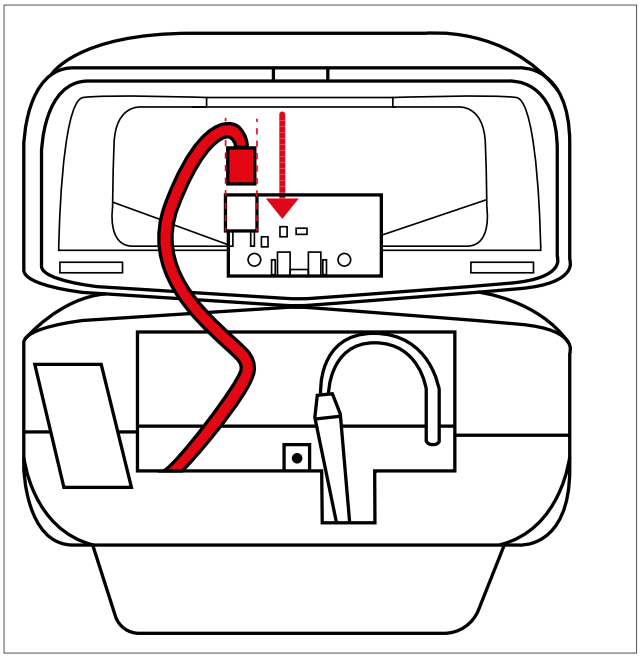


Figure 4.48 Connecting the charging cable

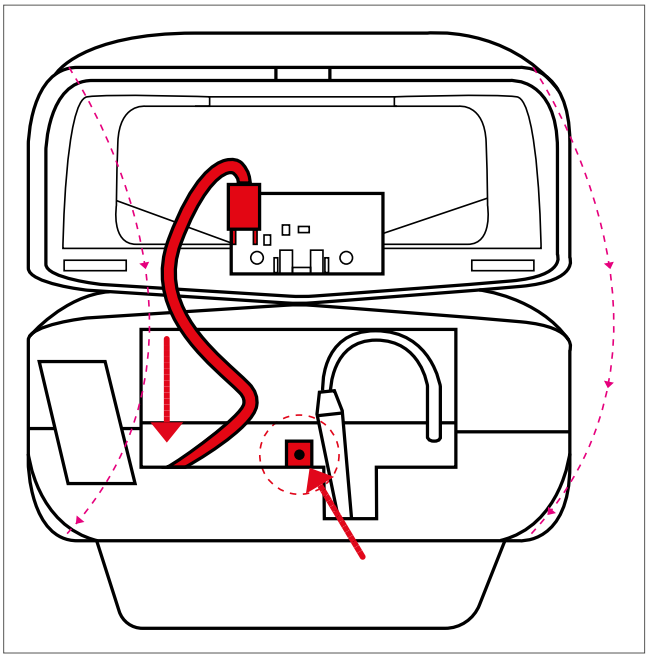


Figure 4.49 Light assembly

4.10 Gear sensor

Assembly:

1. Pass gear cable [2] through Gear sensor [1] (Fig. 4.50)
2. Insert both sides of the bowden cable [3] into the gear sensor [1] (Fig. 4.50)
3. Connect the Gear sensor [1] according to the schematic (Fig. 4.14)

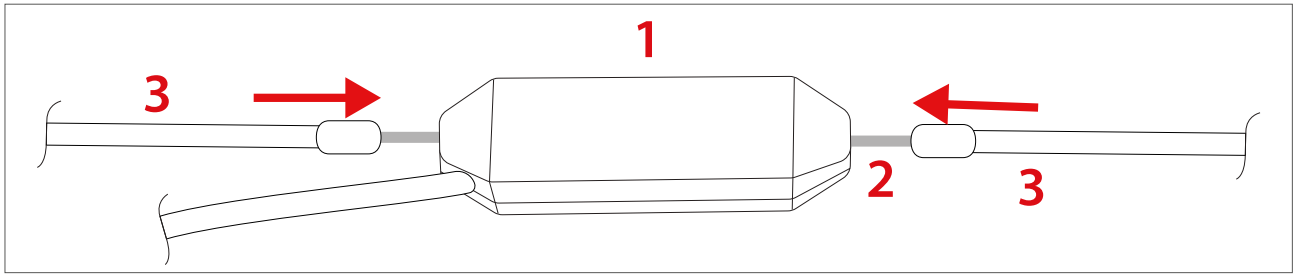


Figure 4.50 Gear sensor assembly

4.11 Bike with carrier battery - rubber tunnel in fender

Assembly:

1. Insert the cables into the tunnel per Figure 4.51:
    a) display extension cable
    b) speed sensor cable
    c) bottom bracket cable / sensor extension cable
    d) motor extension cable
2. Route the cables through the opening the fender.
3. Mount the T-shaped bracket [B] at the end of the tunnel (Fig. 4.52).

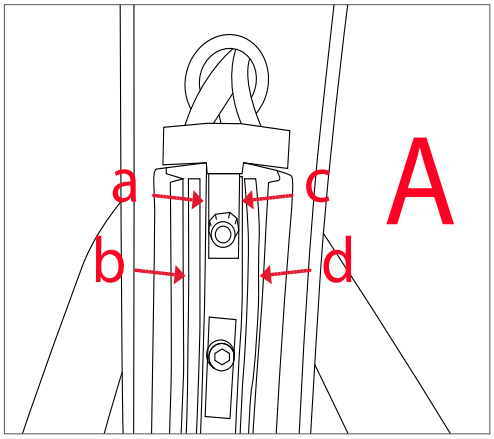


Figure 4.51 *Cable location in tunnel*

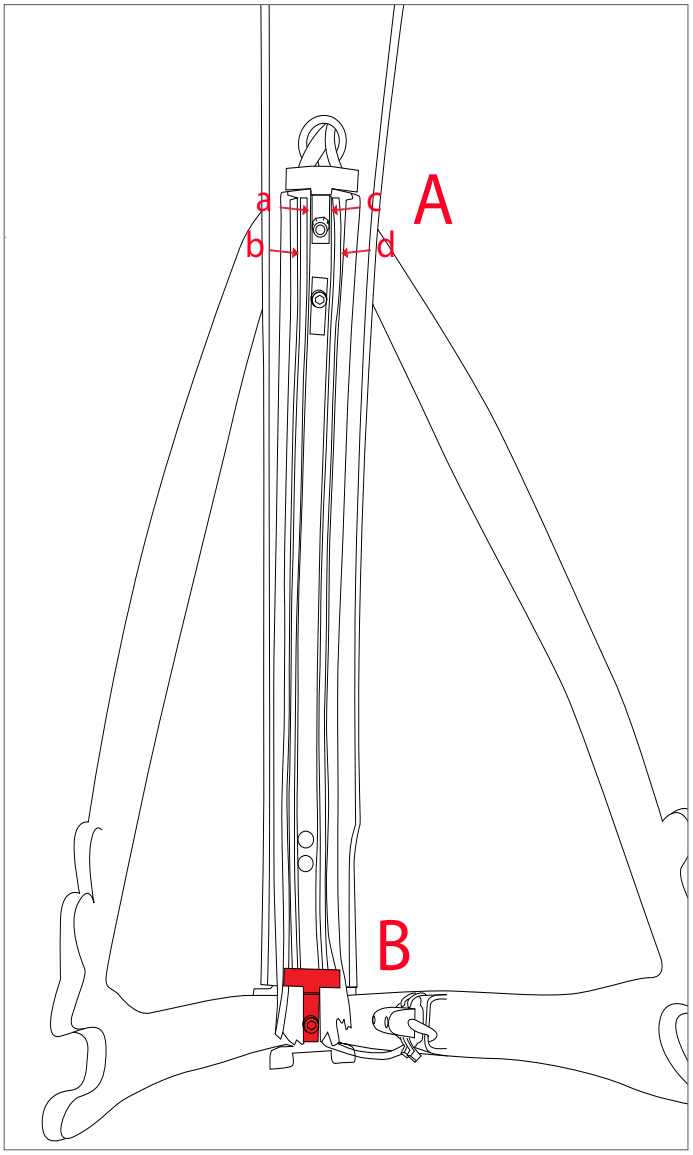


Figure 4.52 *Location of "T" brackets*

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