



# Manual



## badassBox 5

### **Bosch CX**

MY 22-24 (BDU 37)  
from MY 25 (BDU 38)

### **Bosch SX**

from MY 24 (BDU 31)

## Introduction

Thank you for choosing a quality product made by Badass eBikes. The badassBox 5 is the result of more than 10 years of expertise in e-bike tuning.

## Scope of Delivery

- 1x badassBox 5
- 1x adapter (BDU 37 or BDU 38)
- 1x AAA-Battery
- 1x spokes magnet
- 1x spacer
- 1x rubber foam
- 4x zip ties

## Product Description

In the original state, the magnet attached to the valve of the rear wheel sends pulses to the sensor integrated in the motor, thereby transmitting the vehicle speed to the motor system.

The badassBox uses this transmission path to intercept and alter the signal. This is done by removing the original magnet from the valve and replacing it with a spoke magnet. Now the pulse is no longer sent to the motor directly, but rather to the badassBox that sits attached to the chain stay. The badassBox is connected to an adapter which sits inside the motor housing and transmits the altered pulses to the original sensor in the motor. The received signals are manipulated in a way that make it seem to the motor system as if the current speed was lower than the actual speed. This is achieved either through reducing the number of pulses, resulting in a lower perceived speed for the motor, or through freezing the current speed after surpassing a certain value. As with all previous tuning kits developed by Badass eBikes, the badassBox 5 does not have a direct electrical connection to the motor system, thus resulting in an easily and completely reversible tuning.

The installation process is kept as simple as possible. All you have to do is install the spoke magnet, attach the badassBox to the chain stay with the zip ties and the pulser coil easily finds its way in the correct position inside the motor. The badassBox 5 can be combined with any adapter brought to you by Badass eBikes. This is beneficial for you, since a single box can be used for a plethora of different motor systems, for which only the right adapter has to be purchased.

Additionally, by popular demand, we added bluetooth capabilities to our badassBox 5, which enables you to connect to it via the *Boost Buddy* App, available for iOS and Android. Take full control of your tuning kit by choosing between different tuning modes (see page 12) and many more settings. On top of that, you are able to see your actual speed and distance traveled, not the altered stats your original sensor receives. The cycling speed is transmitted via bluetooth using the CSCS-protocol and can be used with compatible third-party apps as well.

## Compatibility

The badassBox 5 can be attached to all the different adapter types that Badass eBikes provides for the different motor systems. Currently we offer tuning adapters for the following variants from Bosch:

- Performance Line CX BDU374Y
- Performance Line CX BDU384Y
- Performance Line SX BDU314Y

We are planning on expanding our portfolio in the near future.

## Functional Description

Put simply, the badassBox 5 captures the magnetic signal of the rear wheel, alters it accordingly and forwards it through an adapter to the original motor sensor. Now the motor system believes that it is traveling at a lower speed than it actually is, resulting in further motor support.

The badassBox 5, like its predecessors, does not have a direct electrical connection to the motor drive system, thus resulting in an undesirable misrepresentation of all speed-relevant data collected by your e-bike and presented on the display. This affects the actual speed, the top speed, average speed as well as the traveled distance (trip). The latter is especially important with regards to selling your e-bike in the future.

In the *Boost Buddy* App, however, you are able to view the correct data.

## Physical and Personal Requirements

The badassBox must not be used by persons with physical, sensory or mental disabilities. Children, adolescents and persons with impaired reactions and behavior may not use this product.

Children have to be supervised to ensure that they do not play with the badassBox.

The use of accessories and add-on parts that are not explicitly authorized and recommended by the e-bike and motor drive manufacturer can lead to injuries and damage and may invalidate the warranty and guarantee.

## Legal Notice

Tuning measures on e-bikes limited to 25 km/h mean that they may no longer be operated within the scope of the Road Traffic Licensing Regulations. Legally permissible use is therefore only possible on private property or, if authorized, in competitions. The use of a tuned e-bike on public roads can lead to criminal liability for riding without drivers license or riding without insurance coverage.

Tuning measures on the e-bike can lead to a loss of warranty and guarantees made by manufacturer. This also applies to purchase models such as job bike, company leasing, etc. Please refer to your respective contract documents for the exact conditions regarding subsequent modifications to the bike.

In addition, tuning measures can lead to a loss of insurance coverage in the event of an accident. An e-bike modified by tuning measures is exposed to additional stress due to the higher speeds, which can lead to component failure on essential systems of the e-bike.

## Warning

The badassBox may not be operated in road traffic or within the scope of the German StVO. Use is only permitted on private property. Before using the badassBox, check whether and how its use is permitted in your area.

Fitting the badassBox may invalidate the bike's warranty. Use of the badassBox is at your own risk and peril. We, the manufacturer, accept no liability for damage to objects and/or persons caused by improper use of the badassBox and/or accessories.

## Safety Information

- Please read these operation instructions carefully before using the appliance for the first time. It contains important information for your safety as well as for the use and care of the appliance.
- Only use the device for its intended purpose. Improper use could lead to hazards.
- The badassBox 5 is only suitable for private use.
- This badassBox is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and/or knowledge, unless they have been given supervision or instructions concerning use of the device by a person responsible for their safety.
- Children should be supervised to ensure that they do not play with the badassBox.
- The use of accessories and components not explicitly recommended by the e-bike and/or motor manufacturer may cause injury or damage and will invalidate the warranty.
- Never immerse electrical parts of the badassBox in water or other liquids during cleaning or operation. Never hold it under running water.
- Do not attempt to repair the badassBox yourself. Instead return it to our customer service for maintenance and repair.
- To reduce the risk of fire and electric shock, do not expose the badassBox to fire (fireplace, barbecue, candles, cigarettes, etc.) or water (vases, tubs, ponds, etc.). Do not use the badassBox in extremely dry air, since such environments may lead to electrostatic discharges.
- Do not expose the badassBox to marine corrosive air, direct sunlight and dust.
- Protect the badassBox against extreme heat (above 35°C) and cold (below 5°C).
- Always store the badassBox dry, dark and at room temperature.

## Notes on Batteries and Packaging

- The badassBox may only operate with alkaline AAA batteries. Do not use lithium or rechargeable batteries.
- Caution! There is a risk of explosion if the battery is replaced incorrectly. Only replace batteries with the same or an equivalent battery type!
- Ensure that the battery is inserted correctly. Observe the polarity (+ and -) on the battery and on the rubber seal inset of the badassBox. Improperly inserted batteries can lead to leakage or, in extreme cases, cause a fire or explosion.
- Never expose the batteries to excessive heat (e.g. direct sunlight, fire) and never throw them into a fire. The batteries could explode.
- Battery contacts must never be short-circuited.
- Remove used batteries and dispose of them properly.
- Remove the battery when not using the device for a prolonged period of time. Otherwise the battery may leak and cause damage.
- Store the batteries at a place unreachable for small children. If batteries were swallowed, immediately seek for medical attention.
- Non-rechargeable batteries must not be recharged.
- In the case of a battery leakage, remove the battery from the device with a towel and dispose of it properly. Avoid skin and eye contact with the battery acid. In the case of eye contact with battery acid, flush your eye thoroughly with water and immediately seek for medical attention. In the case of skin contact with battery acid, wash the area with plenty of water and immediately seek for medical attention.
- Choking hazard! Keep all packaging material away from infants and children.
- Ensure that packaging materials are disposed of properly. Find out about local collection centers and waste separation.



## E-bike Firmware Upgrades

Despite all claims made by manufacturers and workshops, e-bike firmware updates and upgrades are always gateways to features that could take away or restrict your choice of tuning. We therefore recommend that you do not carry out any updates or upgrades to the motor firmware or have them carried out for you, e.g. by a service centre, in order to retain the option of tuning.

An e-bike that works most likely does not need an update. Even in the case of deleting an error in the e-bike memory it is not necessary to install a new firmware.

Some motor manufacturers try to justify their numerous firmware upgrades with allegedly safety-relevant new features, in the same manner that smartphone or computer operation systems receive them.

We do not share this opinion about firmware updates, since an e-bike does not handle sensitive data like a mobile phone does (carrying out banking transactions or store private information). This view is also shared by motor manufacturers, whose drives work for years with the firmware that was installed when the new bike was first purchased.

## Disposal of old Electrical Equipment

The European Directive 2002/96/EC on waste electrical and electronic equipment (WEEE) states that used household appliances must not be disposed of together with unsorted municipal waste. These used appliances must be collected separately from regular household waste in order to increase the proportion of recovered appliances and recycle their materials with the aim of minimizing the impact on human health and the environment.

The crossed-out wheeled bin symbol is affixed to all appliances to remind consumers of the obligation to separate collection. Consumers must contact their local authorities or seller to find out how to dispose of their appliance. Before disposing of the device, remove the battery. Ensure proper disposal of packaging materials. Find out about local collection points and waste separation. For the sake of the environment.



## Installation of the Tuning Kit

The following is a step-by-step guide to installing the badassBox 5 and signal coil (top part of the adapter) to your e-bike.

### 1) Dismantling of the motor protection cover

First shift your bike into the largest sprocket and lay it on its right side, so as to minimize the force on the rear derailleur. Now remove the motor protection cover. In this example it is fastened with a single screw and hooked into a frame opening in the rear.



### 2) Installation of the signal coil

The signal coil is to be installed at the rear end of the motor. Look for the seal running through the center of the motor housing. Now insert the signal coil left of the seal into the motor housing (in direction of travel).







When the semi-circular part is in contact with the bulge in the motor housing, push on the signal coil until it clicks into place.



Without having to remove more than the motor protection cover, the signal coil was neatly installed and aligned in just a few easy steps.

Thanks to the independent and contactless design of the badassBox 5, there is no need to disassemble cranks, chainring or the original wiring of the drive system.



### 3) Reassembly of the motor protection cover

The motor protection cover can now be reinstalled with the same steps as above but in reverse order.

The cable to the signal coil is routed out of the left corner of the motor housing and along the inside or the bottom of the chain stay towards the rear.

Ensure that, for e-bikes with rear suspension, the cable is not under tension even when the suspension is at its maximum compression.

The cable must always be routed such that it will not come in contact with the tire!



### 4) Installation of the badassBox

The badassBox can now be attached to the chain stay using the enclosed zip ties. The eyelets should face towards the chain stay with the plug connector facing forward, as shown in the image

A spacer is included for particularly large lateral distances between the chain stay and the wheel. It can be attached to the cable tie mounts.

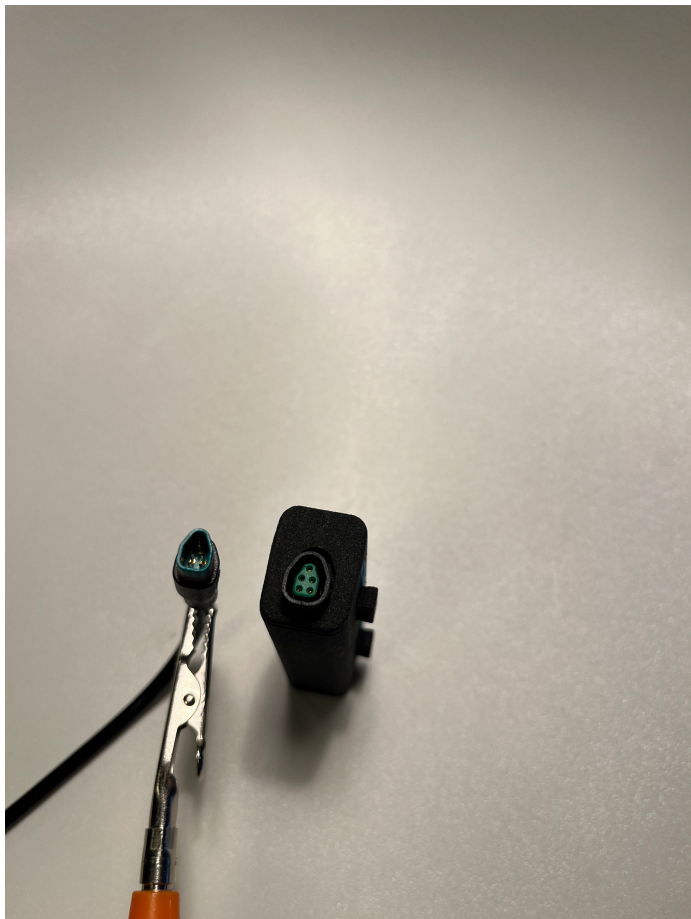




The exact positioning of the box is irrelevant, just make sure that there is sufficient clearance between the chain stay and the spokes. The clearance should be between 30-35mm.

Install the magnet on a spoke and make sure that the ideal distance between 5-10mm is met.

Remove the original sensor from the valve of the rear wheel.



##### 5) Plug in the adapter (with its signal coil)

Now that the badassBox 5 and the signal coil are both installed, you can plug in the adapter into the box. Thanks to the form-fit plug, it is impossible to incorrectly connect the badassBox.

The tuning kit is now ready to operate. For the full experience, install and connect the Boost Buddy App now!



## Free App *Boost Buddy*

The app *Boost Buddy* is available to download for Android as well as iOS through the respective app store. It was developed specifically for the badassBox 5 and offers a wide range of optional functionality only accessible through the app. Scan the adjacent QR codes to download and install the app on your mobile device. The badassBox 5 transmits your actual speed using the CSCS bluetooth protocol and can thereby be used with any third-party app that supports that protocol. We recommend the *Boost Buddy* app to access the full functionality of your tuning kit.

### App Settings

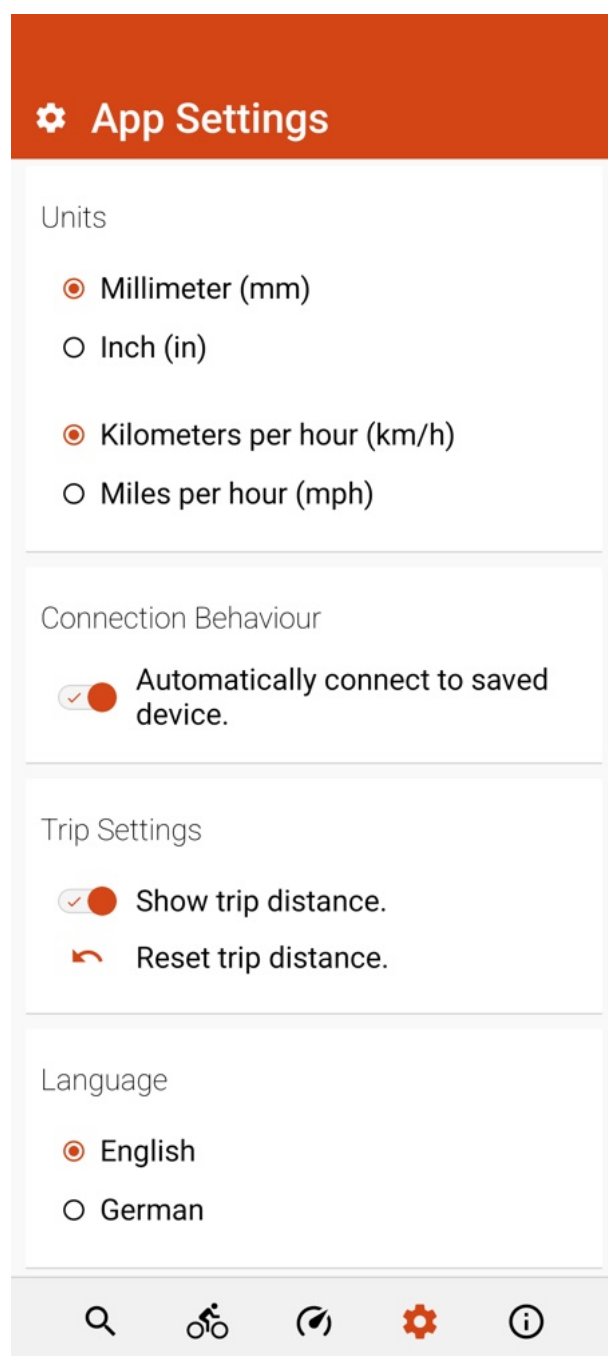
You can make personal adjustments to the behavior of the app.

Choose your preferred unit for displaying the speed, trip distance, and wheel circumference.

If activated, your smartphone connects to a saved badassBox (called a device) as soon as it is recognized. Device becomes saved after being connected to the app once. All saved devices are shown on the *Device Scan* page.

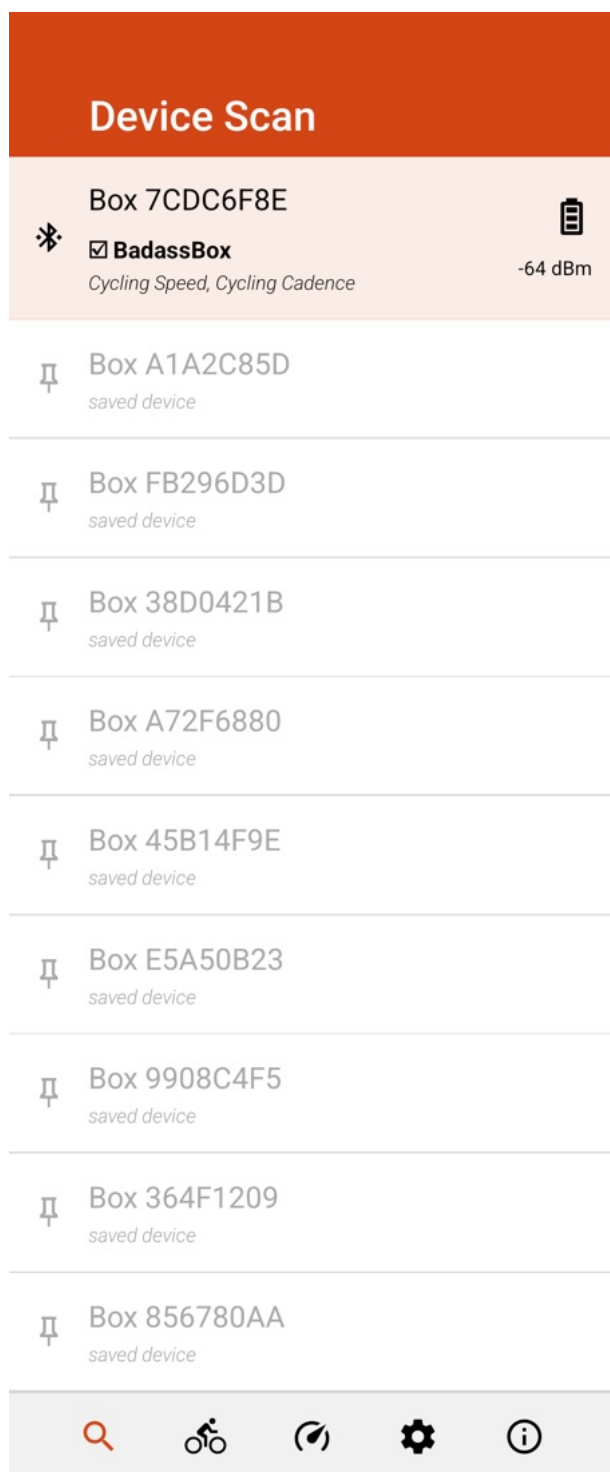
Toggles the display of the trip distance on the *Cycling Speed* page. Allows for resetting the current trip distance.

Choose your preferred app language between English and German.





**Boost Buddy**  
Badass eBikes



### Device Scan

This page shows all saved and discovered bluetooth devices. It allows for connecting to your badassBox.

To be able to discover your badassBox, it has to be wakened-up first. This is done by a single magnet impulse to the box, e.g. by turning the rear wheel.

Now you can connect to your badassBox by clicking it once. After successful pairing the device is colored orange, and the bluetooth icon and the battery symbol appear as shown on the image.

One badassBox can only be paired with one smartphone at the same time. It is possible to see a badassBox on the device scan page, even when it is currently paired with another device. It is then not possible to connect to the box until the previous connection is canceled.

Greyed out devices are saved, which means they have been connected before, but are now inactive. If the badassBox you are trying to connect to is in this state, please make sure that

- your badassBox is within reach
- your badassBox is active (through a magnet impulse)
- the battery is good (change when in doubt)

Saved devices can also be deleted („forget“). To remove a saved device from the list, press and hold it until the option to *delete* appears. Pressing *delete* removes the saved device from the page but it can still be discovered again when it becomes active again.

## Device Settings

On this page you can make changes to settings that concern the currently connected badassBox directly. You can only access this page if there is an active connection. Any changes made here persist on the badassBox even after disconnecting. Important: Updating the firmware of the badassBox resets all settings made here to the factory settings. For more on firmware updates see page 15.

Every badassBox comes with an arbitrary name. Tap the field to change it to your liking. Just make sure to use a maximum of 16 of the permitted characters.

The tuning mode can be dynamically changed chosen during operation.

On: The tuning is always on.

On when connected: The tuning is only on while exactly your smartphone is connected to the box. Otherwise it behaves as if put into the mode *off*. No other smartphone is able to change the tuning mode of that particular badassBox (Except through updating the firmware which resets all settings made to the device).

Off: The tuning is deactivated. The app still shows your current speed and tracks your trip distance.


Test Mode: The box constantly imitates a speed of 17 km/h. Only intended for testing purposes!

This is the speed at which the badassBox starts freezing the current speed transmitted to the motor drive system. For most use-cases the standard setting of 22 km/h is ideal.

Enter the wheel circumference of your e-bike for the correct calculation of the displayed speed and trip distance. Tap to

The currently installed firmware of the connected badassBox 5. Any firmware installation resets the device settings to the factory settings.

Every change to the settings must be transmitted to the badassBox by clicking the save button that automatically appears at the bottom!

 **Device Settings**

Device Name

Box 7CDC6F8E

Only numbers, letters, spaces, -, \_ and a maximum of 16 characters.

Tuning Mode

☒ Always On

☐ On when connected

☐ Off

☐ Test Mode (constant speed)

Freeze Speed

22 km/h

18 26

22






Wheel Circumference

2350

millimeter

Device Version

BlueBox 5.17





### Cycling Speed

This page shows the true current cycling speed. You can change the unit of speed on the *App Settings* page. There you can also toggle the displaying of the trip distance and reset it.

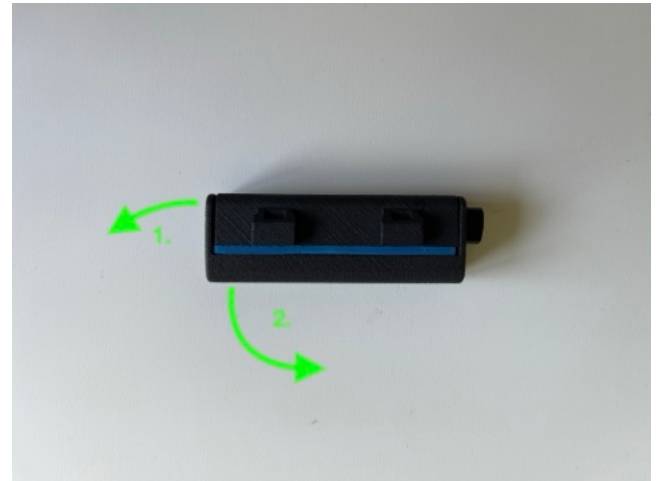
## Battery Replacement

To replace the battery, first unplug the adapter from the badassBox and dismount the box from the chain stay.

Now remove the battery cover. To do so, pry off the latch on the side opposite the plug and move the cover over the plug connection afterwards.

Remove the old battery and replace it with the new one. Please mind the polarity imprinted on the blue sealing inset. The minus pole is facing towards the plug as can be seen on the image.

Finally reattach the cover to the box. Please note that the openings on either end are of different sizes. Make sure to insert the plug into the larger opening first.



## Firmware updates for the badassBox 5

The bluetooth module inside the badassBox allows for easy over-the-air (OTA) updating of the devices firmware. Scan the QR codes below to download and install the app *nRF Device Firmware Update* by *Nordic Semiconductor ASA* on your smartphone. The app leads you through the updating process step-by-step. The following guide supports you with the update process. Beware: Installing a firmware on your badassBox resets all device settings! So make sure the enter all the necessary information again after updating.

1. Check your currently installed firmware. Connect to your badassBox via the Boost Buddy app and scroll down on the device settings page. Close the app again after you are done.
2. Download the latest firmware version to your smartphone. Visit our website [badassebikes.com](https://badassebikes.com) to download the .zip folder containing the firmware. It is available on the respective product page.
3. Now open the *nRF Device Firmware Update* app. Under *File > Select* choose the firmware folder. It should be named *BadassBoxBlue\_x.xx.zip*. Now select the box you wish to update through *Device > Select*. Now start the Update by pressing *Progress > Start*. A green check mark is displayed next to *Completed* after a successful install.
4. Finally check the firmware version again. Open the Boost Buddy and scroll down on the Device Settings page. Now the new firmware version should be displayed. Make sure the reenter the correct wheel circumference and all the other device settings. Congratulations you are up-to-date!



nRF Device Firmware Update  
Nordic Semiconductor ASA



## Troubleshooting

In the case of the tuning kit apparently not working or if an error code is displayed, please follow this guide to troubleshoot the problem:

1. Check the installation of the badassBox 5 (see pages 6-9). Also check the magnet position. It should pass the box in the center with a clearance of 5-10mm. Rotate the magnet on the spoke by 90° if necessary.
2. Open the Boost Buddy app. Is the badassBox advertised for pairing?
  1. **No:** Make sure the box is active. Check the battery and optimize the magnet position on the spoke.
  2. **Yes:** Is a speed displayed in the app?
    1. **No:** Check the magnet position once more. It has to pass the box at the right position for every wheel revolution.
    2. **Yes:** The signal coil is most likely the problem. Pull it out of the motor housing and check its cables. Are there any visible flaws (cable breakage, crimped wires with visible strands, corrosion in the plug, etc.)? If **yes:** replace the whole adapter. If **no:** check the positioning of the coil inside the motor housing. Make sure that no other cables are running over the motor housing that could move the coil to an undesirable position. Check whether the coil clip is securely fastened in the designated position on the motor.
3. Finally calibrate the drive system. This happens automatically after the motor is turned on within the first few crank revolutions. Select a middle gear, switch on the drive, and lift the bike so that you can turn the cranks to perform the process while stationary. The motor system will calibrate its internal sensor to the signal sent from the badassBox through the signal coil to the motor.

## CE Declaration of Conformity

Manufacturer:  
Badass eBikes GmbH  
Mühlstraße 88  
D-63768 Hösbach

We hereby declare that the product „badassBox 5“ fulfills the essential requirements and regulations of the following directives

- Directive 2014/30/EU on electromagnetic compatibility (EMC)
- Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

Conformity has been assessed according to the following harmonized standards

- EN 55032: Electromagnetic compatibility of multimedia equipment
- EN 301 489-1/-17: Requirements for radio equipment and services
- EN 62479: Assessment of human exposure to electromagnetic fields

Date: 14.01.2025

Place: Hösbach

Signature:



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Dipl.-Ing. (FH) Peter Elsesser