E Bike Tuning App

RedPed 2 for Haibike

April 2020

E Bike Tuning App

1. Contents

2. Information on road traffic regulations and disclaimer

The use of the module is only allowed in private, gated areas, for example for sports or marketing purposes. It manipulates the maximum speed settings of your pedelec or s-pedelec, set by the manufacturer, which is prohibited by the road/streets' laws. The module manipulates the speed sensor signal and therefore the total distance display of your e-bike. The use of the module falls under own risk. No liability is assumed for any present and future damage caused to property and/or persons by the installation/ removal and/or use. The guarantee of the e-bike is completely extinguished by the use or application of the module, because the installation or use represents a modification or manipulation of the e-bikes (pedelec or s-pedelec). If your e-bike has an operating license, it will extinguish. Always drive carefully, use protective clothing such as helmets or protectors and do not bring yourself and others in danger. Talk beforehand with your insurance company, so that all areas of your actions are protected. Please note further that other statutory provisions apply in other countries. This is especially true when you are driving with the e-bike in your holidays. Please inform yourself beforehand about possible restrictions and keep principles in mind.

3. Compatibility

Module	Motor	Display	Year
RedPed 2 for Haibike FW1.0	Yamaha PW-X, PW-SE, PW-TE, PW-X2, PW-ST	Display A, Display C, Display X	From 2019

4. ANDROID

The app is compatible with the following modules:
PumaPed 1, PumaPed 2, BlackPed, BlackPed+, GreenPed, BluePed, RedPed, RedPed 2
The app works with Android from version **7.0**.

4.1. START SCREEN

4.1.1. Module search

After launching the app scans for nearby modules. If a module is found, the name, UUID, motor, module and firmware version are displayed.

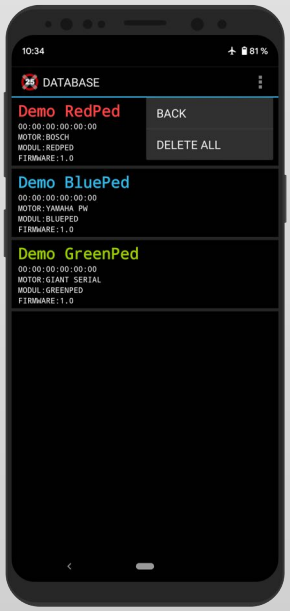
If the signal of a module is no longer received, it will be removed from the list.

The dBm value indicates the signal strength.

Each module has a unique UUID.

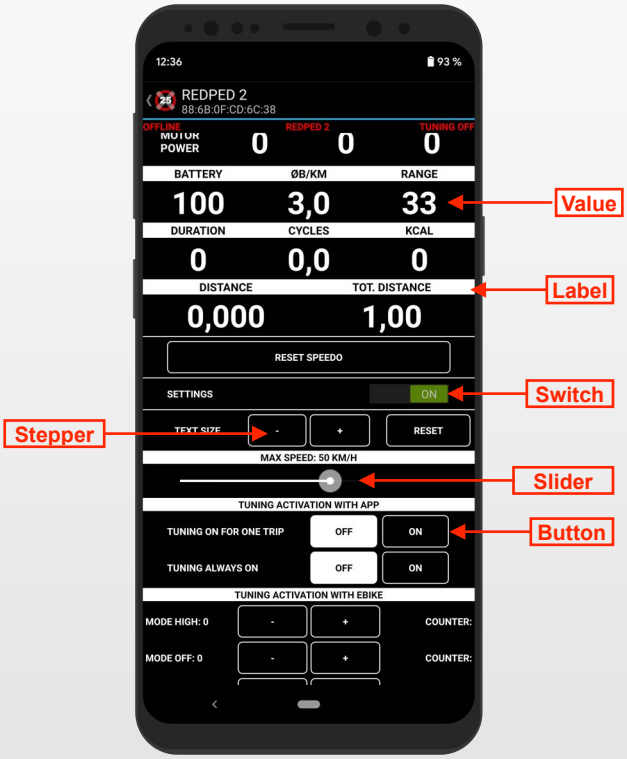
With a tap on a found module, the app connects to the module and opens the appropriate screen.

4.1.2. Database



The app creates an image for each module it connects to and stores it in a database. The image is refreshed each time before the app is closed. When the app is reinstalled, demo modules are created that display the module's screen when the app is connected. Individual modules can be deleted with a long tap, in the options menu all modules can be deleted.

4.2. Optical speedometer settings



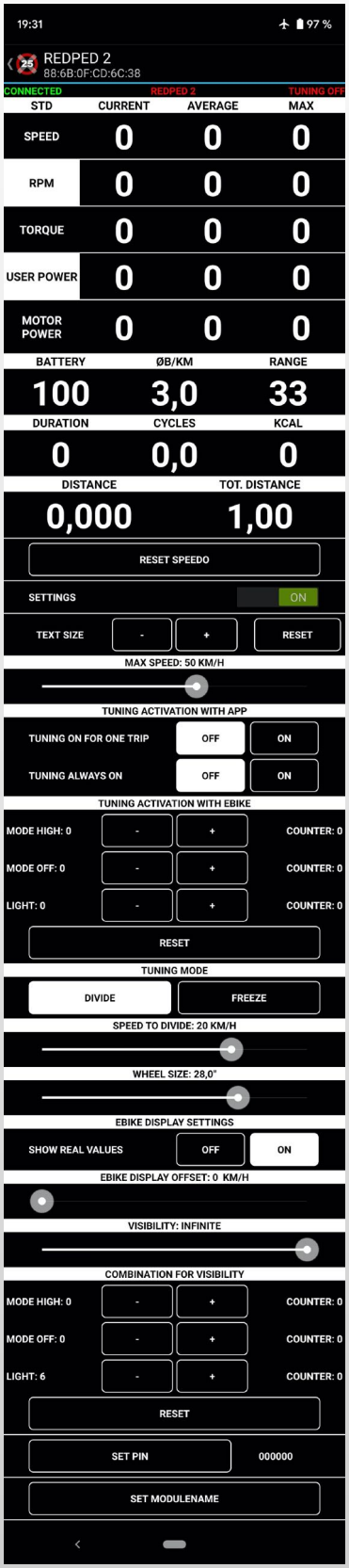
Change colors
A quick tap on the label changes the color of the underlying value. A tap on „CURRENT, „AVERAGE“ or „MAXIMUM“ will change the color of the column below. A tap on „SPEED“, „RPM", „TORQUE“, „USER POWER“ or „MOTOR POWER“ changes the color of the line.

Hide values
A long tap on the label makes the label disappear and the associated value. A long tap on „STD“, „CURRENT“, „AVERAGE“ or „MAXIMUM“ causes the label and the underlying column to disappear. A long tap on „SPEED“, „RPM“, „TORQUE“, „USER POWER“ or „MOTOR POWER“ makes the label and the line disappear

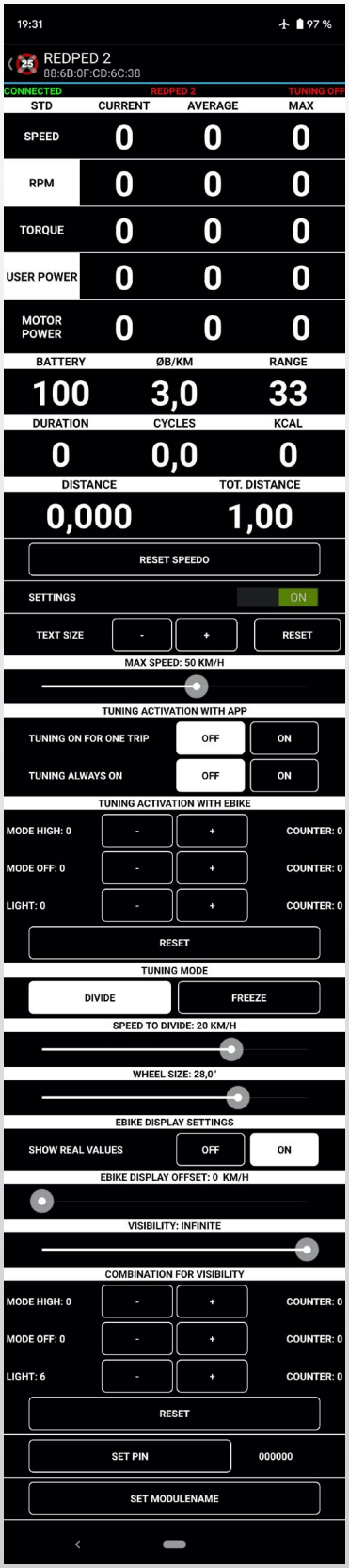
LABEL	TYPE	FUNCTION
SETTINGS	Switch	Shows or hides the area with the settings.
TEXT SIZE	Stepper	Gradually changes the font size of the speedometer.
RESET	Button	Resets all optical settings of the speedometer.

All settings are stored permanently and can also be made offline in the database.

4.3. REDPED 2 FOR HAIBIKE



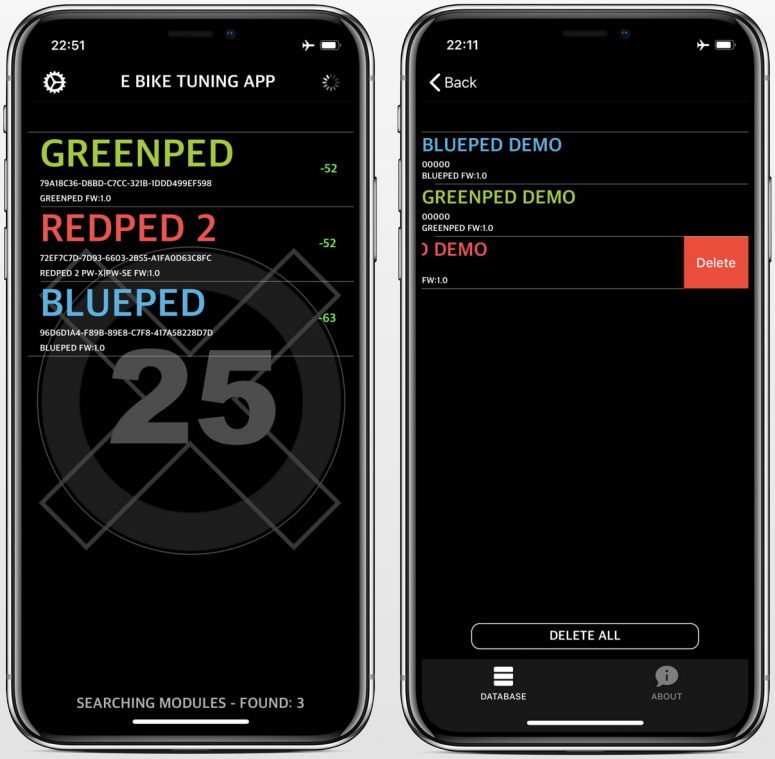
LABEL	TYPE	FUNCTION
BACK	Button	Disconnects and starts the search screen.
REDPED 2	Label	Name of the connected module.
88:3F:4A:E0:C2:EF	Label	Unique ID of the module.
CONNECTED	Label	Displays the current connection status to the module.
TUNING OFF	Label	Shows if the tuning is activated.
STD	Label	Support level of the e-bike.
SPEED	Label	Shows in the line the current, middle and maximum speed in km/h.
RPM	Label	Displays in the line the current, average and maximum speed of the crank. (Revolutions per minute)
TORQUE	Label	Shows in the line the current, average and maximum torque of the crank in Nm.
USER POWER	Label	Displays in the row the current, middle and maximum user power in Watts.
MOTOR POWER	Label	Displays in the line the current, average and maximum motor power in percent.
BATTERY	Label	Battery charge level of the e-bike in percent.
ØB/KM	Label	Battery discharge per KM in percent, averaged over the last 10 km. A long tap sets the value back to 3.0.
RANGE	Label	Calculated range of RedPed.
DURATION	Label	Travel time in minutes.
BATTERY CYCLES	Label	Number of battery cycles, with a long tap, the value can be changed.
KCAL	Label	Burned KCAL of the rider.
TRIP DISTANCE	Label	Currently driven route.
TOTAL DISTANCE	Label	Total distance of the module, can be changed with a long tap by entering a new value.
SPEEDO RESET	Button	A tap resets the entire speedometer, except battery cycles and total distance.
SETTINGS	Switch	Shows or hides the area with the settings.
TEXT SIZE	Stepper	Gradually changes the font size of the speedometer.
RESET	Button	Resets all optical settings of the speedometer.
MAX: 50 KM/H	Slider	Sets the theoretically maximum possible speed of the e-bike when the tuning is active.
TUNING ACTIVATION WITH APP		
TUNING ON FOR ONE RIDE	Button	Tuning activated until the e-bike is switched off.
TUNING ALWAYS ON	Button	Tuning activated, even when the e-bike is restarted.



TUNING ACTIVATION WITH EBIKE		
MODE HIGH	Stepper	Sets how often you need to toggle between the e-bike support levels "STD" and "HIGH" to enable tuning. Maximum number 10.
MODE OFF	Stepper	Sets how often you need to toggle between the e-bike support level "OFF" and "ECO +" to activate the tuning. Maximum number 10.
LIGHT	Stepper	Sets the number of times the light button must be pressed to activate the tuning. Maximum number 10.
COUNTER: 0	Label	Counts the rider's input.
RESET	Button	Resets all steppers to 0.
TUNING MODE		
DIVIDE	Button	Divides the speed internally for the engine control unit.
FREZE	Button	Freezes the speed internally for the engine control unit.
SPEED TO DIVIDE	Slider	The speed is internally divided at the set value or kept constant.
WHEEL SIZE	Slider	Sets the wheel diameter in inches. Setting applies to the module and not to the e-bike.
SHOW REAL VALUES	Button	Here you can set whether the e-bike display shows the values of the e-bike control unit or the manipulated values of the RedPed.
EBIKE DISPLAY OFFSET	Slider	Decreases the speed display by the e-bike display by the set value.
VISIBILITY	Slider	Sets how long a smartphone can connect to the module after turning on the e-bike.
COMBINATION FOR VISIBILITY		
MODE HIGH	Stepper	Sets how often does it have to switch back and forth between the e-bike support level "STD" and "HIGH" to make the module visible. Maximum number 10.
MODE OFF	Stepper	Sets how often does it have to switch back and forth between the e-bike support level "OFF" and "ECO +" to make the module visible. Maximum number 10.
LIGHT	Stepper	Sets the number of times the light button must be pressed to make the module visible. *For the motors from 2020, the Automatic-Button can also be used.* Maximum number 10.
COUNTER: 0	Label	Counts the rider's input.
RESET	Button	Set the stepper MODE HIGH to 0, MODE OFF to 0 and LIGHT to 6.
SET PIN	Button	Here the 6-digit PIN code can be entered.
SETZE MODULNAME	Button	Here you can enter the 9-digit module name.

5. iOS

5.1. Start screen



After launching, the app will search for modules nearby. If a module is found, the name, UUID, module and firmware version are displayed.

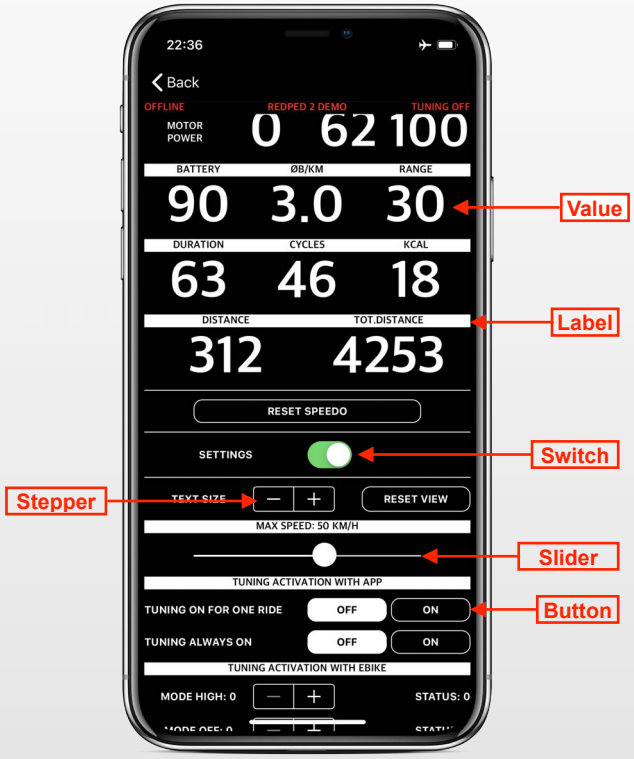
If the signal of a module is no longer received, it will be removed from the list after 3 seconds.

The dBm value indicates the signal strength.

Each module has a unique UUID. However, the UUID does not match the one displayed in the Android app.

Clicking on the gear symbol will bring you to the database screen, where the last received values of the modules with which the app was connected are saved.
When you first start the app demo modules are created, you can click to see the app in the connected state, if you have no module. You can delete modules by wiping from right to left.

5.2. Optical speedometer settings



Change colors
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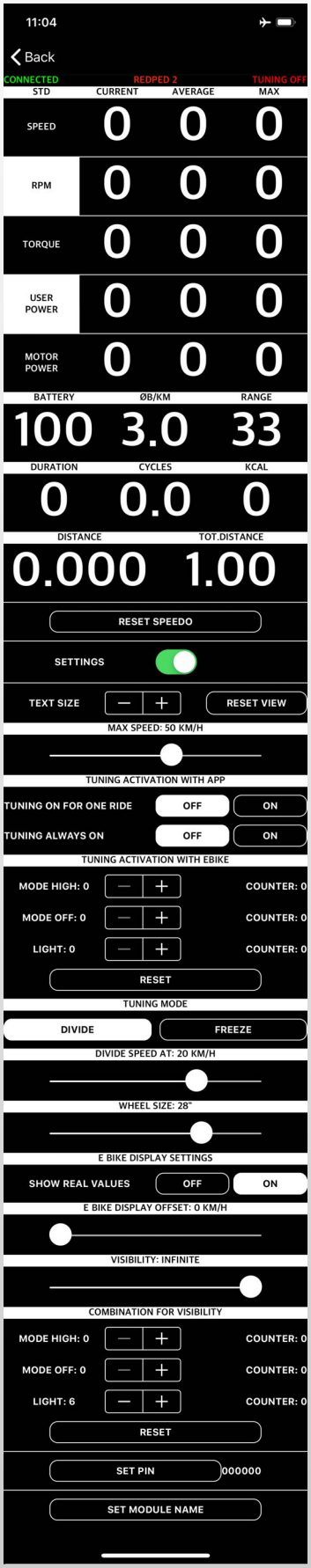
LABEL	TYPE	FUNCTION
SETTINGS	Switch	Shows or hides the area with the settings.
TEXT SIZE	Stepper	Gradually changes the font size of the speedometer.
RESET	Button	Resets all optical settings of the speedometer.

It can be zoomed in into the speedometer.

5.3. REDPED 2 FOR HAIBIKE



LABEL	TYPE	FUNCTION
BACK	Button	Disconnects and starts the search screen.
REDPED 2	Label	Name of the connected module.
CONNECTED	Label	Displays the current connection status to the module.
TUNING OFF	Label	Shows if the tuning is activated.
STD	Label	Support level of the e-bike.
SPEED	Label	Displays in the line the current, middle and maximum speed in km/h.
RPM	Label	Displays in the line the current, average and maximum speed of the crank. (Revolutions per minute)
TORQUE	Label	Displays in the line the current, average and maximum torque of the crank in Nm.
USER POWER	Label	Displays in the row the current, middle and maximum rider power in Watts.
MOTOR POWER	Label	Displays in the line the current, average and maximum motor power in percent.
BATTERY	Label	Battery charge level of the e-bike in percent.
ØB/KM	Label	Battery discharge per KM in percent, averaged over the last 10 km. A long tap sets the value back to 3.0.
RANGE	Label	Calculated range of RedPed.
DURATION	Label	Travel time in minutes.
BATTERY CYCLES	Label	Number of battery cycles, with a long tap, the value can be changed.
KCAL	Label	Burned KCAL of the rider.
TRIP DISTANCE	Label	Currently driven route.
TOTAL DISTANCE	Label	Total mileage of the module, can be changed with a long tap by entering a new value.
SPEEDO RESET	Button	A tap resets the entire speedometer, except battery cycles and total distance.
SETTINGS	Switch	Shows or hides the area with the settings.
TEXT SIZE	Stepper	Gradually changes the font size of the speedometer.
RESET	Button	Resets all optical settings of the speedometer.
MAX: 50 KM/H	Slider	Sets the theoretically maximum possible speed of the e-bike when the tuning is active.
TUNING ACTIVATION WITH APP		
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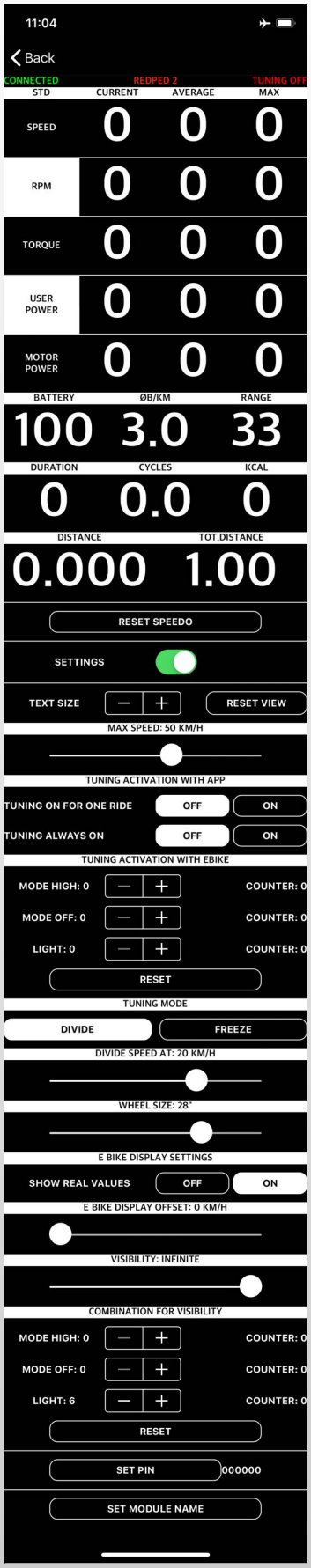
TUNING ALWAYS ON	Button	Tuning activated, even when the e-bike is restarted.



TUNING ACTIVATION WITH EBIKE		
MODE HIGH	Stepper	Sets how often you need to toggle between the e-bike support levels "STD" and "HIGH" to enable tuning. Maximum number 10.
MODE OFF	Stepper	Sets how often you need to toggle between the e-bike support level "OFF" and "ECO +" to activate the tuning. Maximum number 10.
LIGHT	Stepper	Sets the number of times the light button must be pressed to activate the tuning. Maximum number 10.
COUNTER: 0	Label	Counts the rider's input.
RESET	Button	Resets all steppers to 0.
TUNING MODE		
DIVIDE	Button	Divides the speed internally for the engine control unit.
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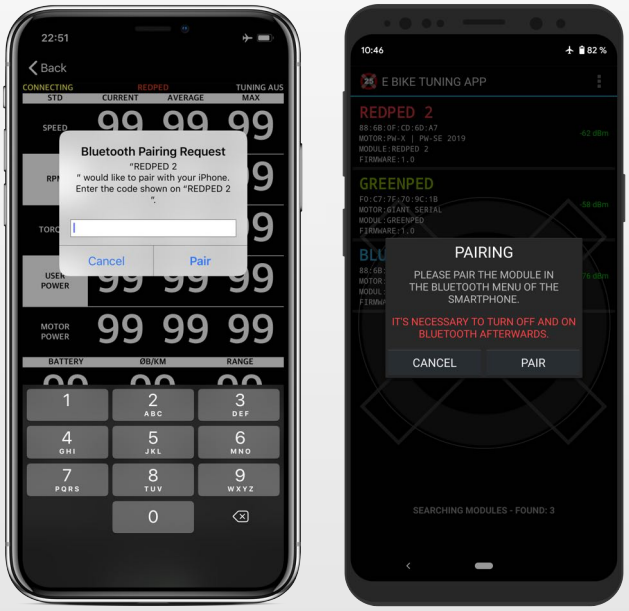
WHEEL SIZE	Slider	Sets the wheel diameter in inches. Setting applies to the module and not to the e-bike.
SHOW REAL VALUES	Button	Here you can set whether the e-bike display shows the values of the e-bike control unit or the manipulated values of the RedPed.
EBIKE DISPLAY OFFSET	Slider	Decreases the speed display by the e-bike display by the set value.
VISIBILITY	Slider	Sets how long a smartphone can connect to the module after turning on the e-bike.
COMBINATION FOR VISIBILITY		
MODE HIGH	Stepper	Sets how often does it have to switch back and forth between the e-bike support level "STD" and "HIGH" to make the module visible. Maximum number 10.
MODE OFF	Stepper	Sets how often does it have to switch back and forth between the e-bike support level "OFF" and "ECO +" to make the module visible. Maximum number 10.
LIGHT	Stepper	Sets the number of times the light button must be pressed to make the module visible. *For the motors from 2020, the Automatic-Button can also be used.* Maximum number 10.
COUNTER: 0	Label	Counts the rider's input.
RESET	Button	Set the stepper MODE HIGH to 0, MODE OFF to 0 and LIGHT to 6.
SET PIN	Button	Here the 6-digit PIN code can be entered.
SETZE MODULNAME	Button	Here you can enter the 9-digit module name.

6. Explanation and notes

6.1. Pairing



iPhone
When connecting for the first time, the PIN of the module must be entered. The PIN in the factory state is 000000. There is always a 6-digit PIN.

Android
Before connecting for the first time, the PIN code of the module must be entered. The PIN in the factory state is 000000. There is always a 6-digit PIN. Pairing must be done in the Bluetooth menu (Settings => Bluetooth®). After pairing, Bluetooth® must **be turned off and on**.

6.2. Visibility

To prevent access to the module by third parties, the module may become invisible after a set time. The visibility can be set from 0 to 240 seconds or to infinity. If you put them for example to 30 sec, the module is 30 sec after the start of the e-bike is no longer found in the app. You can connect to the module within 30 seconds, after disconnecting, the timer is reset to 30 seconds. If you set the visibility to 0 sec, the module can't be found with the app anymore. Possibilities to make the module visible:

- Factory settings: 6x light button
- Set combination
- Black reset plug on the module

Combination
If the module is invisible, it can be made visible by a combination of the manual control. In the factory state, the light button must be pressed 6 times. If the combination is to 0, then the module can only be made visible via the reset connector.

6.3. Reset module

The module can only be brought to the factory settings via the black connector. To do this, the two contacts must be connected with a conductive material, e.g. a key. The contacts must be connected 10 times within 10 seconds, 0.5 seconds must elapse between short-circuiting. Another reset can only be made after restarting the e-bike

6.4. Divide | freeze and maximum speed

The actual maximum speed with activated tuning depends on the engine and chainring. The value set via the app is used to set the divider.

The factory settings should only be changed if there are problems with the support or error messages appear.
The division is determined by two parameters divided by the divider and the speed at which it is divided. The divider is determined by the set maximum speed ($\text{Divider} = \frac{\text{Max speed}}{25}$).
Freezing means that the speed remains constant after exceeding the set value.

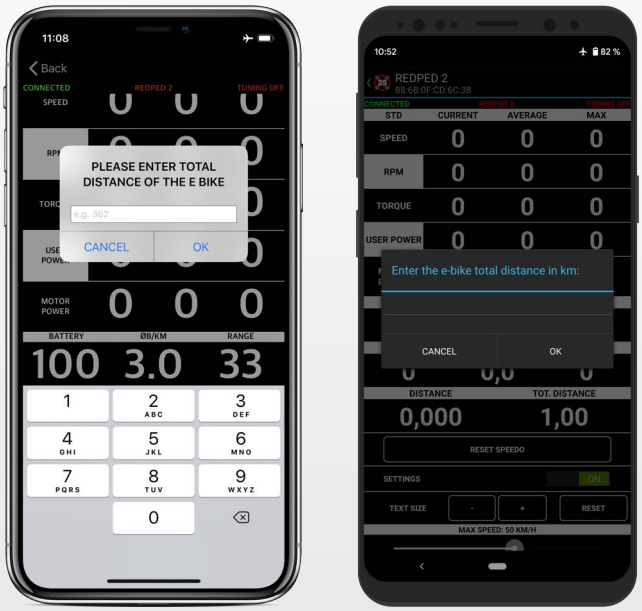
6.5. Pin

Before the data of a module can be read out, a PIN must be entered. The PIN is always 6 digits and can be changed in the app. If the entered new PIN is too short, zeros are prefixed, e.g. "123" is entered, the PIN is automatically changed to "000123". The PIN can be reset to "000000" via the reset connector.

6.6. Tuning activation

Tuning activation via the app will be deactivated, if the tuning activation with the e-bike is activated.
All set conditions must be met during the tuning activation with the e-bike (AND link). A maximum of 5 seconds may elapse between two actions, otherwise the counters will be reset.

6.7. Total distance and information on the removal of the module



The total distance of the module is set at the factory to 1 km. This can be changed by a long tap.

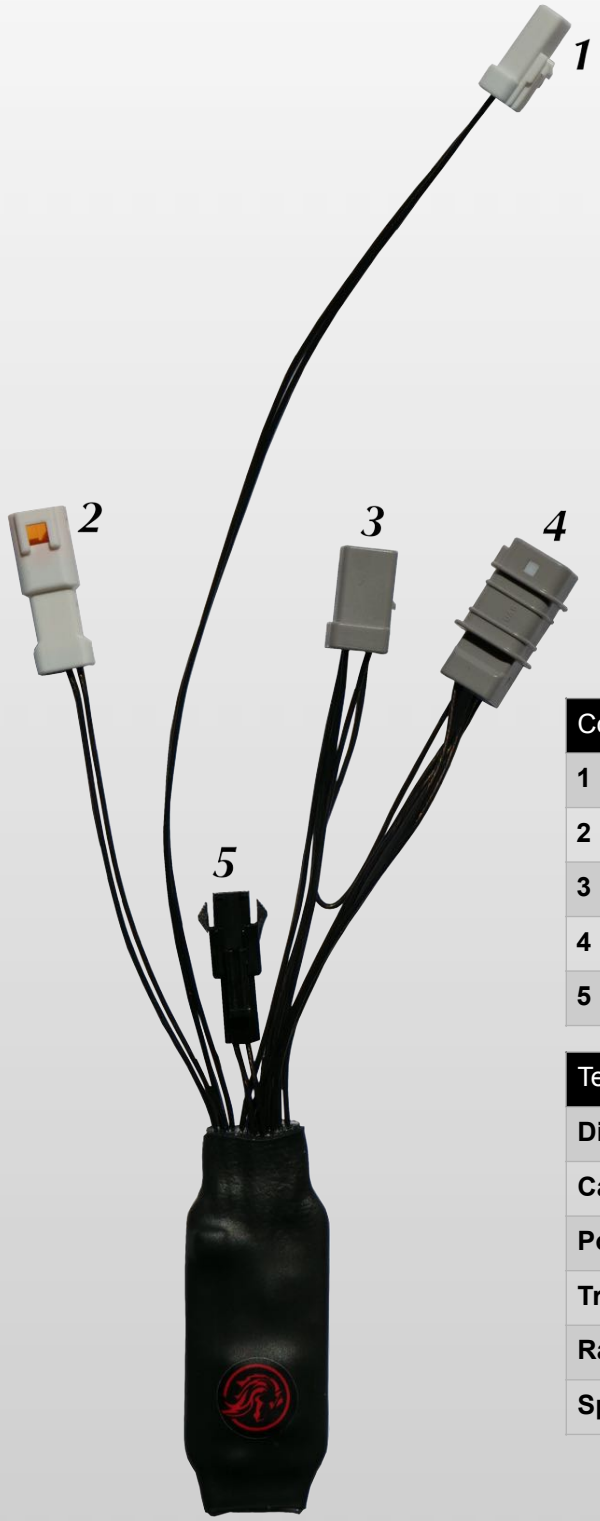
After removing the tuning chip, the e-bike displays another lower total distance. The reason for this is that the tuning module sends the speed split to the engine control unit, so you can drive faster. However, it corrects the divided values that the engine control unit sends to the display. When it is removed, the values are no longer corrected.

6.8. E-bike display offset

The value can be set between 0 and -15 km/h. The speed in the e-bike display is reduced by the set value. If you set the slider e.g. at -5 km/h, only 25 km/h are displayed in the e-bike display at a real 30 km/h. All other values are however calculated correctly.

7. Hardware - Module

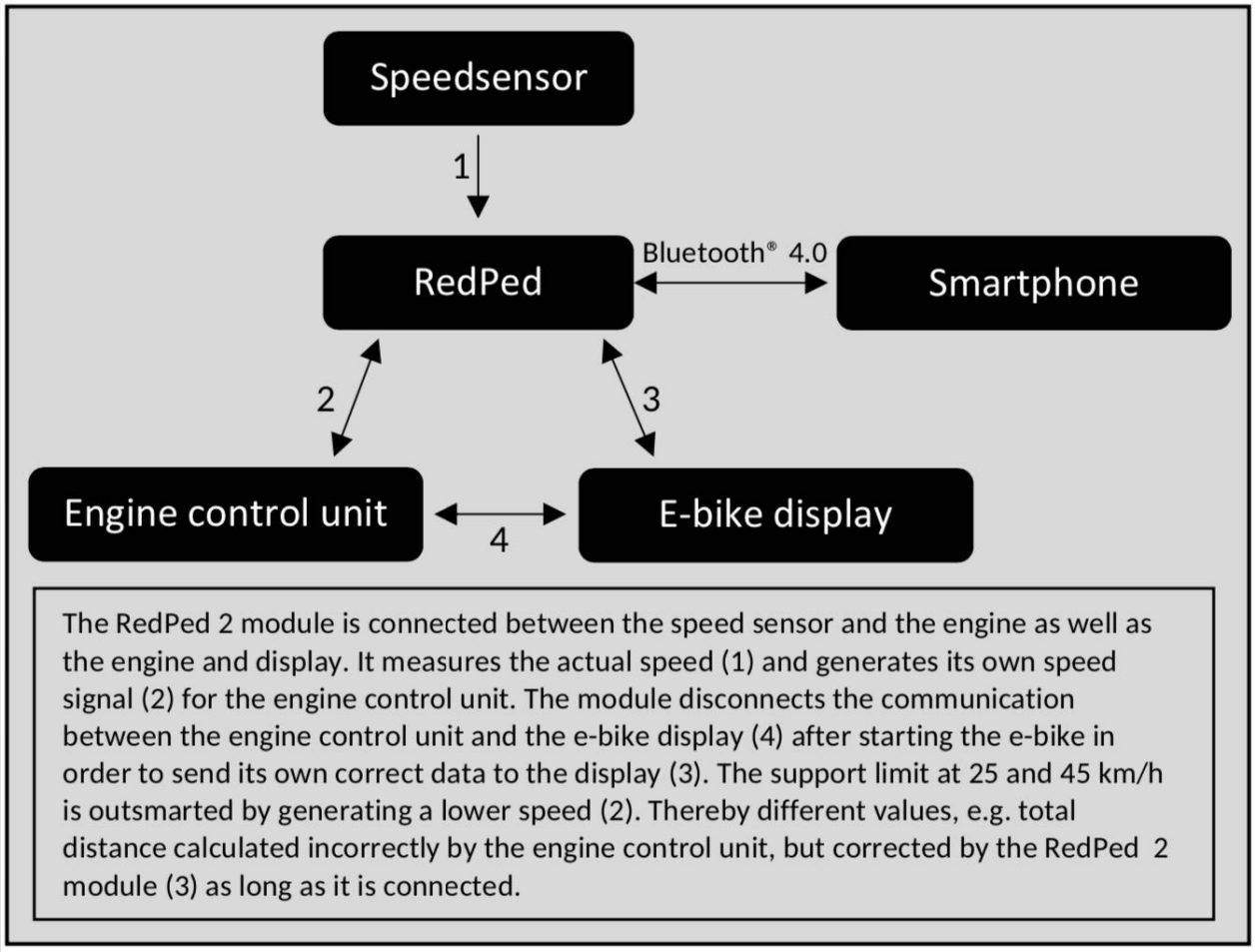
7.4. RedPed 2 for Haibike



Connector connected to ...	
1	the speed sensor, 3-pin
2	the speed sensor socket of the motor, 3-pin
3	the display socket of the engine, 5-pin
4	the e-bike display, 5-pin
5	not connected, reset plug, 2-pin

Technical specifications	
Dimensions	5,3 x 2,1 x 0,8cm
Cable length	3cm, 8cm, 18cm
Power	150mW
Transmission range	10m
Radio communications	Bluetooth® 4.0
Splash-proof	Yes

7.5. FUNCTIONALITY



The RedPed 2 module is connected between the speed sensor and the engine as well as the engine and display. It measures the actual speed (1) and generates its own speed signal (2) for the engine control unit. The module disconnects the communication between the engine control unit and the e-bike display (4) after starting the e-bike in order to send its own correct data to the display (3). The support limit at 25 and 45 km/h is outsmarted by generating a lower speed (2). Thereby different values, e.g. total distance calculated incorrectly by the engine control unit, but corrected by the RedPed 2 module (3) as long as it is connected.

8. COMPANY INFORMATION

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RoHS compliant