

HRM Led – User Manual

DRAGILLA
ELECTRONICS FOR SPORTS

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1. History of changes in the document

The table below presents a list of changes made in this document.

Version no	Date	Changes
1.0	28.10.2023	First version in English is released
1.1	31.10.2023	New version of Android application, unified screenshots in the document
1.2	22.01.2024	Added ANT sensor searching
1.3	03.03.2024	Added extended led set, added rom update fail troubleshooting

2. HRM Led ROM change log

The table below presents a list of released ROMs (software packages) for HRM Led. Each ROM introduced some changes, which are described below. To upgrade the ROM of your HRM Led device, please use the “HRM Fan&Led” mobile application (see chapter “Mobile application”, “Remote software update”).

Version no	Date	Changes
3.1.7	28.10.2023	First official version of ROM working with HRM Fan&Led mobile application
3.2.7	13.01.2024	Added ANT sensor searching, minor bug fixes
3.3.4	03.03.2024	Extended leds added

3. History of changes in the mobile application

The table below presents a list of changes in the mobile application – „HRM Fan&Led”.

Version no	Date	Platform	Changes
2.0.25	28.10.2023	Android	First official version of the HRM Fan&Led app for Android
2.0.27	31.10.2023	Android	Unified look of Android and iOS applications
2.1.1	13.01.2024	Android	Added ANT sensor searching
2.3.6	03.03.2024	Android	Extended led configuration added
2.0.16	28.10.2023	iOS	First official version of the HRM Fan&Led app for iOS
2.0.17	02.11.2023	iOS	Unified look of Android and iOS applications
2.1.0	13.01.2024	iOS	Added ANT sensor searching
2.3.2	03.03.2024	iOS	Extended led configuration added

4. Short description of the product

HRM Led is a device in form a USB stick used to automatically control the color of a wirelessly connected RGB led strip. HRM Led can connect to external sensors, like heart rate monitor, bicycle speed sensor or bicycle power meter and use data from those sensors to control a led Bluetooth led driver, to change colors. Colors can change smoothly in defined ranges or based on specific zones. All necessary configurations can be done using a dedicated mobile application - “HRM Fan&Led”. The link to download the mobile application is available at <https://dragilla.com/support> .

5. Basic information

5.1. What’s in the box?

The contents of the box are:

- HRM Led device,
- RGB Led set.

Since RGB Led set is also available as a separate product in our shop, it has a dedicated user manual that describes its box contents and installation. Please refer to “RGB Led set user manual” available at <https://dragilla.com/support> .

5.2. Physical device and connection method

HRM Led is a small USB stick. There are no buttons and only one led that shines through the housing. The led indicates the status of the device (see the list of device states in the next chapter).

The photo below shows the appearance of the HRM Led device



To power on HRM Led just plug it into a USB charger or any USB type A port, for example in your computer. Power requirements are minimal. The device does not establish any data connection if it is plugged into a computer. It only uses power from the port.

5.3. Device states and LED signaling

HRM Led can be in one of three states when plugged into power. All states and the way they are signalled by the device are described in the table below:

STATE NAME	DESCRIPTION	LED SIGNALING
ON	The device is searching for available sensors after being powered on.	Continuous light of the led, green color
Sleeping	The device has entered the sleep state. It does not accept signals from external sensors. The user can connect to it from the mobile app to wake it up.	Continous light of the led, red color
ROM update	The device is updating its internal software. The process is governed by the mobile application.	Continuous light of the led, green color

6. How to use HRM Led

Using HRM Led is relatively simple. The device is ready to work right out of the box after being connected to the power supply. It is recommended to configure it using the mobile application to adjust the settings to the individual needs of the user. The configuration process has been described in a chapter dedicated to mobile app – “Mobile application”.

NOTE: HRM Led does not require a running mobile application to function. The communication between the HRM Led, the sensors (heart rate, speed, power) and the led Bluetooth driver is direct. The app is mainly for configuration and manual control. You can also use it to monitor the current state of the sensors and the led driver – it presents current data coming from the sensors in use (i.e., heart rate, bike speed or bike power) and the current RGB led strip color.

Assuming that the device is configured, its use is limited to the following steps:

- Connect HRM Led to the power – either to a USB charger or USB A port in a computer,
- Connect a compatible RGB led driver to the power outlet (as described in the “RGB Led set user manual”). Wait for HRM Led to connect to the driver (this can be monitored in the mobile app).
- After detecting your heart rate and/or other configured sensors the device will start controlling the color of leds.

- After the training, you can put the device to sleep - from the mobile application (sleep button). If you leave the device turned on, it will go to sleep after a programmed period of inactivity - 15 minutes by default. The sleep can be turned off from the mobile application – this way the device will always stay on searching for sensors in range.

NOTE: Make sure there are no obstructions between the device and the sensors and that they are relatively close to each other. Also, the led driver should be within range of the HRM Led device - preferably within 3m of the device, with no physical obstacles between the driver and the HRM Led device. Otherwise, the data transmission from sensors to the device (i.e., heart rate, bike speed and/or bike power) and from the device to the led driver, may be impaired, which might result in improper functioning of the whole set.

7. Supported devices

7.1. Heart rate monitors

The device supports heart rate sensors based on the following technologies:

1. ANT+, HR profile, for example straps from Garmin, Wahoo, Polar and similar, smartwatches with HR broadcast function, like Garmin 735xt, etc.
2. BLE (Bluetooth Low Energy), HR profile (for example HRM Dual from Garmin, Wahoo, Polar H7, H9, H10).

NOTE: When using a Bluetooth LE heart rate sensor, please keep in mind that due to the technology used, such a sensor can only connect to one data recipient. In such a situation, if the sensor first connects to a watch, a bicycle computer, or a computer on which a training app like Zwift is running - such a sensor will not be able to connect to the HRM Led device anymore. The opposite situation may also occur - the sensor will first connect to HRM Led and then it will no longer be available to other recipients (for example it will not be detected in Zwift). This limitation does not apply to ANT+ sensors - there is no limit for the number of data recipients in ANT+. Most popular heart rate sensors, for example from Wahoo or Garmin, transmit in both technologies (ANT+ and BLE). In such a situation, we recommend choosing the ANT+ technology in the HRM Fan&Led mobile application. The process of configuring the heart rate sensor and selecting its type is described in “Mobile application” chapter of this manual.

7.2. Bicycle Speed sensors

The device supports most ANT+ speed sensors (i.e., those that conform to the Bicycle Speed ANT+ profile). Examples include:

1. Garmin GSC10 – combined speed/cadence sensor
2. Garmin Speed & Cadence sensors V2 (only the speed sensor is required)
3. Bontrager Interchange Digital Combo Sensor, and many others.

NOTE: Some proprietary speed sensors don't conform to the ANT+ speed profile. An example is Wahoo speed sensor build into the later editions of Wahoo Kickr Core trainers. Such sensors won't work with HRM Led.

The process of configuring the bike speed sensor is described in the chapter titled "Mobile application".

7.3. Bicycle Power sensors / power meters

The device supports almost all ANT+ power sensors (i.e., those that conform to the Bicycle Power ANT+ profile). Examples include:

1. Favero Assioma (both single and dual sided)
2. Garmin Vectors (all versions)
3. Power meter build in Tacx trainers, and many more.

The process of configuring the power sensor is described in the chapter titled "Mobile application".

7.4. RGB led drivers and strips

HRM Led works with the dedicated RGB led driver, which is a part of the RGB Led set. It can also be purchased in a separate set (BLE driver, power supply and a compatible RGB led strip) in our online store at: <https://dragilla.com/shop>

NOTE: It is not recommended to use RGB led strips that are not part of the HRM led or RGB Led sets sold in Dragilla online store. The use of other RGB led strips is not covered by the warranty and may damage the components of the set.

7.5. Mobile devices

Smartphones with the Android (5.1+ versions) and iOS (13+ versions) mobile platforms are supported. Smartphones must have Bluetooth LE (Low Energy) to communicate with the HRM Led device. If you have doubts as to whether your smartphone will work with HRM Led, please contact us.

8. Mobile Application

Mobile application designated to HRM Led devices is called “HRM Fan&Led”. The app is available for Android and iOS platforms.

The main functions of the application are:

- Configuration of a connected HRM Led device – configure connected sensors, ranges of operation, sleep timer, etc.
- Manual, remote control of the color and brightness of a compatible RGB led set, connected to HRM Led.

The application is available in two languages that automatically switch depending on the language set on the phone:

- English – the default language,
- Polish.

8.1. App installation

8.1.1. Android

The application can be downloaded from the Android Play Store. The name of the application is “HRM Fan&Led”. The link to the application can be found on the website: <https://dragilla.com/support> .

8.1.2. iPhone

The application can be downloaded from the Apple App Store. The name of the application is “HRM Fan&Led”. The link to the application can be found on the website: <https://dragilla.com/support> .

8.2. First run

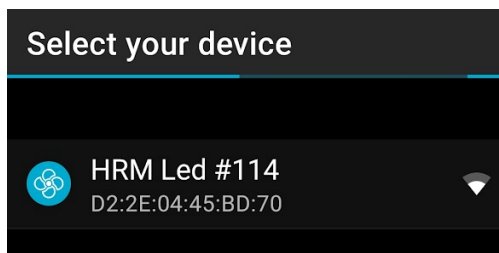
After installing the application, its icon will appear in the list of applications installed on the phone:



After clicking on the icon, the application will start. Right after booting, you'll be asked to turn Bluetooth on. Bluetooth is used for communication between the mobile device (smartphone) and HRM Led, and between HRM Led and the LED driver.

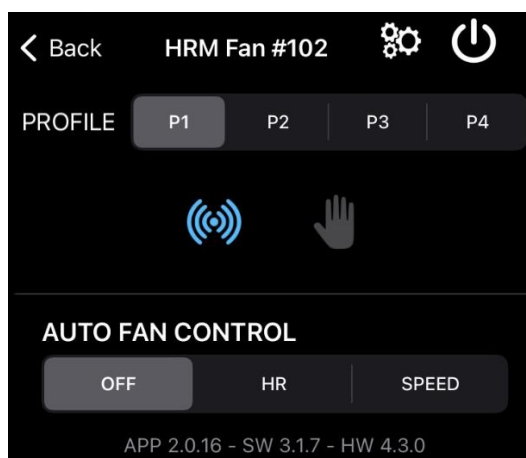
After turning the Bluetooth on, the app will start looking for your HRM Led device. Power on your device. Once connected to power, the green LED will light up on it.

The device will appear on the list in the application - select it.







List of devices

After selecting the device, the application will establish a connection with it and the main application screen will open. The initial screen will look as follows:





Initial screen

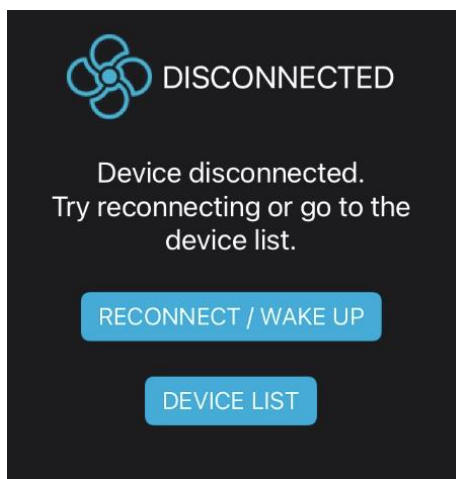
On this screen you will see:

- Button to return to the device scanning screen:  or .
- The device name (e.g., HRM Led #114).
- The sleep button , which puts the device to sleep.
- The settings button , which displays the settings screen.
- List of profiles. You can switch between profiles by clicking on them. The active profile is highlighted.
- A bar with section icons. Individual icons are displayed or hidden depending on the selected sensors, settings mode (advanced or standard). The description of each section is presented in the following chapters of this manual. To change the section, just click on the selected section icon.

Two icons will be visible on first run (active section's icon is highlighted in blue):

- Icon of the "Sensors" section , which is used to configure the sensors and what they control,
- "Manual" section icon  - used for manual RGB leds control. In this section, it is possible to set any color from the displayed rainbow pallet and brightness (1-10 range) that will be displayed on the connected RGB led strip (assuming the led driver is connected). Controlling RGB leds is possible only through a dedicated Bluetooth RGB led driver, which is a part of the HRM Led.
- Contents of the current section. "Sensors" section is displayed on the first run (above – "AUTO LED CONTROL").
- Footer with running application (APP), device software (SW) and device hardware (HW) versions.

NOTE: When the application loses connection to the HRM Led device (e.g., the user takes the phone beyond the Bluetooth range, puts the device to sleep or the device goes into sleep mode automatically), the reconnect/wake-up screen will appear. From this screen, you can try to connect again (the device will then wake up from the sleep state) or return to the list of devices.



Disconnected screen

8.3. Device configuration

The configuration is saved locally on the phone in the current profile. Each time you change the settings they are automatically saved and the configuration from the current profile is sent to the device.

In addition to profiles, the app has global settings, configured on the settings screen (see chapter “Settings screen”). These settings are stored independently from the profiles – i.e. changing profiles does not change these settings (with exception of the “Use BLE HR sensor” setting, which IS saved within profiles).

Profiles and settings on the phone are independently saved for each device that you connect to – if you have more than one Dragilla device (ex. HRM Fan and HRM Led) you can use one phone with both – the configurations for both devices will be stored separately and loaded upon connection each device (based on the name of the device).

HRM Led remembers the last settings sent to it between runs.

The first step in the configuration process is selecting the sensors that control the external RGB leds. This is done in the “Sensors” section, described in one of the following chapters.

After selecting and configuring sensors, you should go through all the available sections and set your desired parameters.

8.4. Navigating through the app and Sections







Navigating the application is about switching between sections available in it. Changing sections is achieved by clicking on icons of selected sections. Menu bar with section icons is

located below the bar with profiles (P1/P2/P3/P4). Active icon (icon of the section which contents are displayed) is highlighted in blue.





Not all icons are visible at a time. Only “Sensors” and “Manual” icons are always visible. Other icons are shown when the corresponding sections is available for configuration. For sensors this happens when a sensor is selected as controller for the leds in the “Sensors” section.

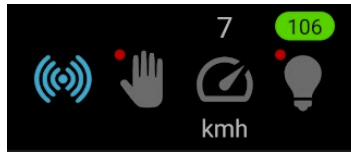
The led section (and its icon) is visible when AUTO LED CONTROL in the “Sensor” section is set to something other than OFF.

The following sections are available (although not always visible) in the application (from left to right). Each section is described in a dedicated chapter in this document.

Icon	Section name	Description
	Sensors section	In this section you can configure what sensor controls the external RGB leds.
	Manual section	A section that allows you to manually set the color and brightness of RGB leds.
	Heart rate section	Here you set the range or zones of heart rate in which the RGB leds will be controlled.
	Speed section	Here you set a range of speed in which the RGB leds will be controlled.
	Power section	On the power section screen you can configure the power range or zones for which the colors of RGB leds will change.
	RGB Led section	On the screen of the led section, you can configure either a single range of colors (for hr single range, or speed range) or six ranges (for either hr or power zones). Ranges are configured on a “rainbow slider”.

Additionally for sensors icons (hr, speed and power) and led icon, additional information is presented above and below the icon.

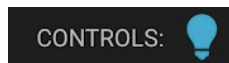
Icon	Section name	information above the icon	Information below the icon
	Heart rate section	Current heart rate, if sensor is connected, or “- -” otherwise	Heart rate units – beats per minute – “bpm”, only if the sensor is connected
	Speed section	Current speed, if sensor is connected, or “- -” otherwise	Current speed units as configured in settings (“kmh” or “mph”), only if the sensor is connected
	Power section	Current power, if sensor is connected, or “- -” otherwise	Units of power – watts – “W”, only if the sensor is connected
	RGB Led section	Current color number and actual color as background, if RGB leds are connected, or “- -” otherwise	-



Example section icons with additional information

NOTE: Red dots in the top-left corner of Manual and Led icons indicate that the manual mode is turned on. Read more about manual mode in “Manual” section chapter.

In each section corresponding to a sensor (heart rate, speed, or power) there is a special header at the top that displays information icons explaining what target device is controlled by this sensor. For example, the following header would inform you, that the speed sensor controls the RGB leds.



What is controlled by this sensor

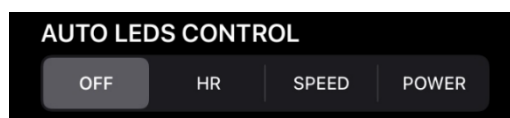
Similarly, for section corresponding to a target device (RGB leds) there is a special header at the top that displays information icon explaining by what sensor it is controlled. For example, below you can see the header in the led section informing you that RGB leds are controlled by speed.



By what sensor is this device controlled

8.4.1. Sensors section

The "Sensors" section is a place where you can configure which sensors control the RGB leds.



Selection of control sensor for RGB Leds

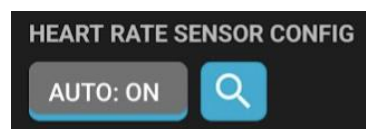
For each sensor you select above, there is additional configuration, described in the following chapters.

8.4.1.1. Heart Rate sensor configuration

Heart Rate sensor configuration includes:

1. The AUTO ON/OFF button,
2. Sensor ID field (visible only when AUTO is OFF),
3. Search button.

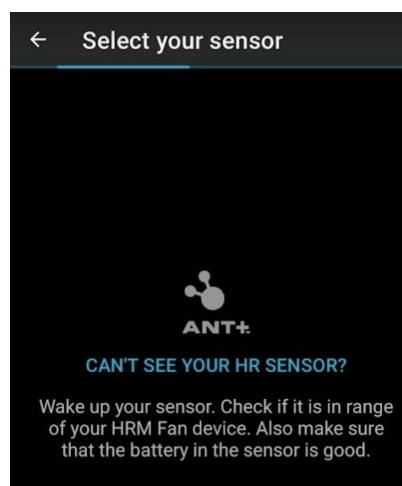
If you want your sensor to be detected automatically, you don't have to do anything. Your HRM Led device will search for and connect to the sensor with the strongest signal (which usually is the one closest to the device, but not always).



Heart rate sensor configuration – AUTO mode ON

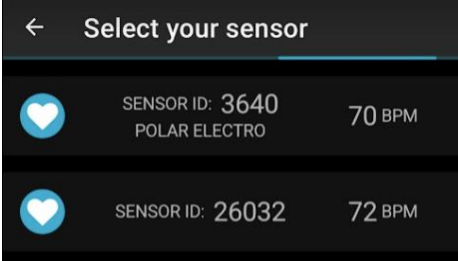
If you are the only person training in the area and you don't expect other sensors to appear, this is a good solution. However, if you want to avoid accidental connections from sensors of other people (maybe your neighbours or your spouse) then you should click on the AUTO button to turn the AUTO search OFF.

Turning off the AUTO search mode **in the basic mode** (when advanced settings are off) will have the same effect as clicking on the search button (loupe icon) – a search dialog will open.



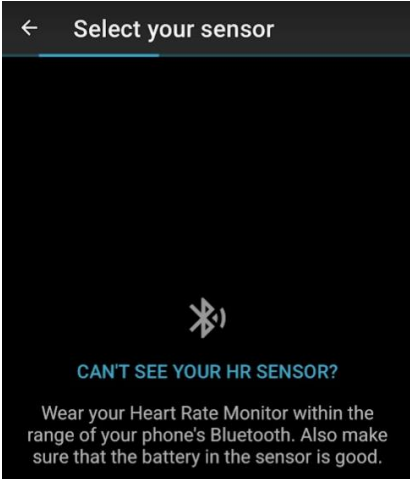
ANT+ search screen, no sensors found

By default, HRM Led searches for ANT+ heart rate sensors and displays a list of sensors that it can detect. You can select your sensor from the list to use with HRM Led. ANT+ sensors send the name of their manufacturer approximately once per minute. If you wait long enough, the name will be displayed on the list (see POLAR ELECTRO on the screenshot below).

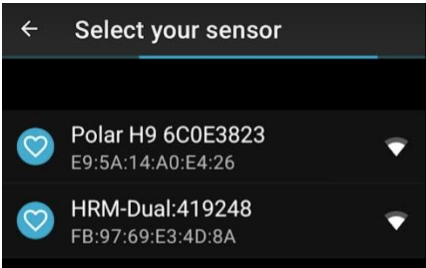


ANT+ search screen, two sensors found

NOTE: You can change the sensor type to Bluetooth. Read more in the “Use BLE HR sensor” chapter.

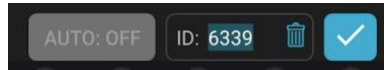


BLE search screen, no sensors found



BLE search screen, two sensors found

Turning off the AUTO search mode **in the advanced mode** will open the dialog for editing of the sensor ID. This way you can enter the sensor ID manually. If you want to search for the sensor, like in the basic mode, use the search button (loupe).



Sensor ID editing (AUTO search OFF, Advanced options ON)

To turn back the AUTO search mode ON, just click on the AUTO button. The last entered sensor ID will be saved (it will be there when turning the AUTO mode off), but it will not be used by HRM Led when searching for and connecting to your heart rate sensor.

8.4.1.2. *Speed sensor configuration*

For the speed sensor you can configure the following things:

1. The wheel circumference (using presets),
2. The wheel circumference (manual entry),
3. Search parameters.

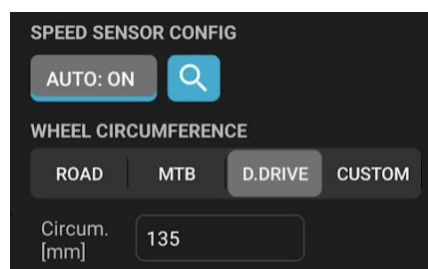
If the advanced configuration is set to OFF, then only three presets for the wheel circumference are available. The “Custom” option is hidden.

The “Road” preset defines the circumference of a regular road bike wheel. If your indoor trainer is “tire driven”, in which you don’t take off the rear wheel of your bike, then this preset is probably for you.

The “MTB” preset is for the same type of indoor trainer (tire drive) but for smaller, MTB wheels.

The third type (“D.Drive”) is for Direct Driver trainers, like Elite Turno, and alike.

Please test all presets and if you speed in not in line with the expected speed, consider entering the wheel circumference manually. This option is available when advanced settings are ON.

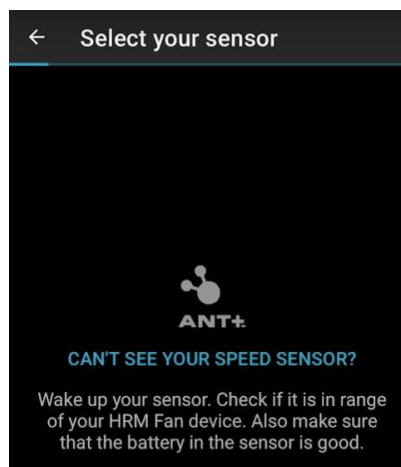


Speed sensor configuration

If you want your sensor to be detected automatically, you don't have to use the Search (loupe icon) or AUTO button. Your HRM Fan device will search for and connect to the sensor with the strongest signal (which usually is the one closest to the device, but not always).

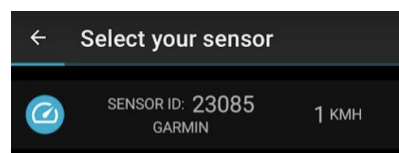
If you are the only person training in the area and you don't expect other sensors to appear, this is a good solution. However, if you want to avoid accidental connections from sensors of other people (maybe your neighbours or your spouse) then you should click on the AUTO button to turn the AUTO search OFF.

Turning off the AUTO search mode **in the basic mode** (when advanced settings are off) will have the same effect as clicking on the search button (loupe icon) – a search dialog will open.



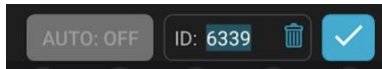
ANT+ search screen, no sensors found

HRM Led searches for ANT+ speed sensors and displays a list of sensors that it can detect. You can select your sensor from the list to use with HRM Led. ANT+ sensors send the name of their manufacturer approximately once per minute. If you wait long enough, the name will be displayed on the list (see GARMIN on the screenshot below).



ANT+ search screen, one sensor found

Turning off the AUTO search mode **in the advanced mode** will open the dialog for editing of the sensor ID. This way you can enter the sensor ID manually. If you want to search for the sensor, like in the basic mode, use the search button (loupe).



Sensor ID editing (AUTO search OFF, Advanced options ON)

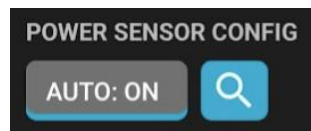
To turn back the AUTO search mode ON, just click on the AUTO button. The last entered sensor ID will be saved (it will be there when turning the AUTO mode off), but it will not be used by HRM Led when searching for and connecting to your speed sensor.

8.4.1.3. *Power sensor configuration*

Power sensor configuration includes:

1. The AUTO ON/OFF button,
2. Sensor ID field (visible only when AUTO is OFF),
3. Search button.

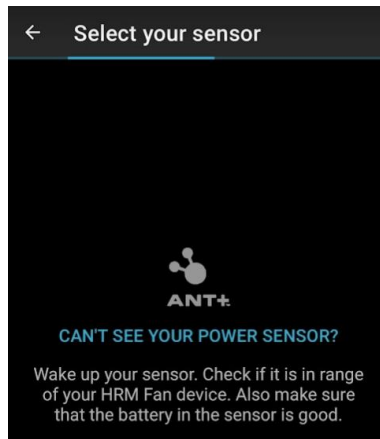
If you want your sensor to be detected automatically, you don't have to do anything. Your HRM Led device will search for and connect to the sensor with the strongest signal (which usually is the one closest to the device, but not always).



Power sensor configuration – AUTO mode ON

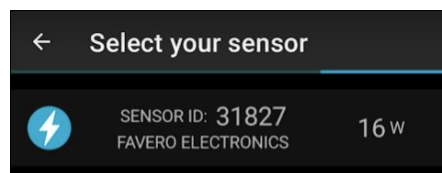
If you are the only person training in the area and you don't expect other sensors to appear, this is a good solution. However, if you want to avoid accidental connections from sensors of other people (maybe your neighbours or your spouse) then you should click on the AUTO button to turn the AUTO search OFF.

Turning off the AUTO search mode **in the basic mode** (when advanced settings are off) will have the same effect as clicking on the search button (loupe icon) – a search dialog will open.



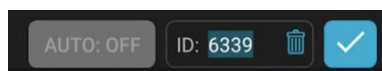
ANT+ search screen, no sensors found

HRM Led searches for ANT+ power sensors and displays a list of sensors that it can detect. You can select your sensor from the list to use with HRM Led. ANT+ sensors send the name of their manufacturer approximately once per minute. If you wait long enough, the name will be displayed on the list (see FAVERO ELECTRONICS on the screenshot below).



ANT+ search screen, one sensor found

Turning off the AUTO search mode **in the advanced mode** will open the dialog for editing of the sensor ID. This way you can enter the sensor ID manually. If you want to search for the sensor, like in the basic mode, use the search button (loupe).



Sensor ID editing (AUTO search OFF, Advanced options ON)

To turn back the AUTO search mode ON, just click on the AUTO button. The last entered sensor ID will be saved (it will be there when turning the AUTO mode off), but it will not be used by HRM Led when searching for and connecting to your power sensor.

8.4.1.4. External led configuration

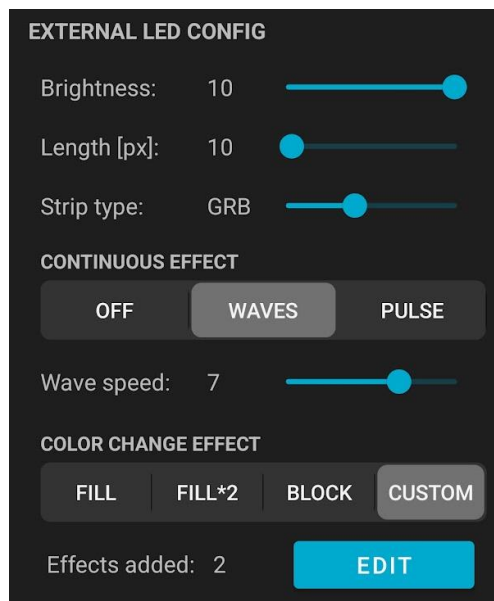
External led configuration contains the connected led driver settings. Depending on the led driver type (“External RGB LEDs” setting on the “Setting screen”) the available options are as follows.

For the standard (STD) led driver:

- Brightness setting.

For the extended (EXT) led driver

- Brightness setting,
- Length (in pixels) setting – available in advanced mode only,
- Strip type setting – available in advanced mode only,
- Continuous effect configuration,
- Color change effect configuration.



External leds configuration

Brightness setting

Brightness setting changes overall brightness of the colors presented on the led strip. The setting has 10 levels (from 1 to 10) that can be selected on a slider.

Length setting

NOTE: This setting is available only for the extended Led strip.

NOTE: This setting is only available in the advanced mode.

Extended led strip is divided into segments (pixels) which can be individually addressed and controlled. Changing this setting tells the led driver where the strip ends. This setting also limits the range of “color change effect” configuration.

NOTE: It is crucial to set this parameter correctly. If the length is set to a value that is too small – the strip will not change colors on its full length. On the other hand, if the length is set too long, the color change effects will take longer (the driver will try to control an inexistent portion of the led strip) and will not work smoothly.

NOTE: the minimal value for length is 8, the maximal value is 100.

The default value of this parameter is 50, as the extended led strips sold in our shop are 5 meters, with 10 pixels for each meter.

Strip type setting

NOTE: This setting is available only for the extended Led strip.

NOTE: This setting is only available in the advanced mode.

This setting tells the led driver how the colors in the strip are organized. Available options are: RGB, RBG, GRB, GBR, BRG and BGR. The default is GRB, because this is the strip type currently shipped with our extended led set).

If you use a led strip sold in our shop, you don't need to change this parameter.

Continuous effect configuration

NOTE: This setting is available only for the extended Led strip.

This setting tells the driver what effect should be applied to leds in a continuous fashion, i.e. all the time – independently from the color changes. There are three possible variants:

- OFF – don't do anything – just display the current color,
- WAVES – apply a wavy effect, where the brightness is slightly changed for a moving section of the led strip,
- PULSE – pulse the current color (change brightness) in rhythm of the heart rate. This setting is only available when either “AUTO FAN CONTROL” or “AUTO LEDS CONTROL”

is set to “HR”. If the heart rate sensor is not connected, the heart rate used to regulate the pulsing frequency is 60 beats per minute (the leds will pulse once a second).

NOTE: When using the manual mode to control the leds and the PULSE effect is turned on, the heart rate used for controlling the PULSE effect is not updated (pulsing frequency does not change) – the last known heart rate is used.

NOTE: both WAVES and PULSE effects operate within the set brightness. The leds will not get brighter than configured.

If “WAVES” is selected an additional setting becomes available – waves speed. Using a slider, you can change how fast the waves propagate along the strip.

NOTE: waves speed setting is only available in the advanced mode.

Color change effect configuration

NOTE: This setting is available only for the extended Led strip.

NOTE: The effects configured in this section are better visible if the colors change in a discrete way – for example using zones. When the color change is smooth – for example when the range of colors is used – the effect can easily be missed.

NOTE: When colors change frequently, i.e. faster than effects can end, the new effect starts immediately with the color change and effects are combined.

This parameter tells the led driver what effect it should use when the color changes.

There are three presets available for the user to choose:

- FILL – this effect looks like water filling the strip with new color (from the beginning of the strip to its end),
- FILL*2 – this is the same effect but used twice on the strip. The first effect goes from the beginning to the middle of the strip, the second goes from the end to the middle. If the length of the strip is not even – the middle is rounded down (ex. when strip length is 11, the middle would be 5).
- BLOCK – this effect divides the strip into sections, each consisting of three 2-pixel blocks, lets call them A, B, C. So the strip of length 12 would look like this (each letter is a pixel): AABCCAABBCC. The effect at first changes all A’s to new color, then B’s, then C’s, in regular time intervals.

If you need more control over the color change effect, you can use the CUSTOM setting.

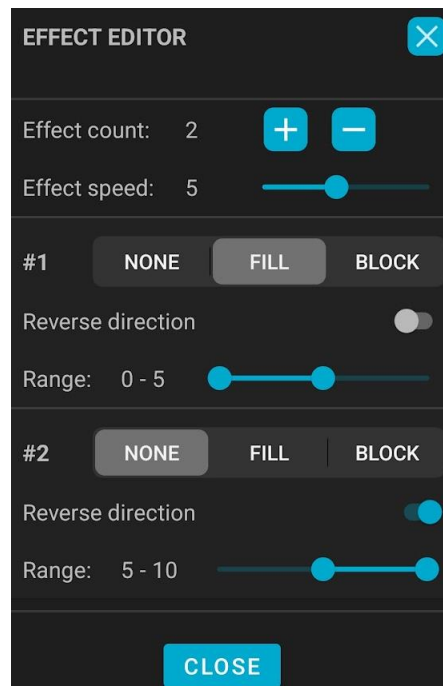
NOTE: the custom setting and the EDIT button are only available in the advanced mode.

If you select CUSTOM from the selector or use the EDIT button below, a new screen will open - effect editor. The effect editor allows you to configure complex effects on a single strip. For example, you can lay your strip on the wall in a shape of ECG (heart rate pulse) and then isolate

this part of the strip to change color using the fill effect whereas the rest of strip could change color immediately. Or maybe in addition to the ECG you can add additional two fill effects with opposite direction that will meet in front of you. The possibilities are limited only by your imagination.

On the effect editor screen you will be able to:

- Add and remove color change effects (up to 5) onto you led strip,
- Configure the speed of color change effects (from 1 to 10),
- Configure each added effect individually (set its type, direction, and range – where on the strip it is located).



Color change effect – editor screen

NOTE: the editor is constructed in such a way that you can add effects only at the end of the strip (on the right side of the slider). By default, each effect added populates the whole strip, so to add another effect, you first need to make room for it, i.e. decrease the range of the previous effect.

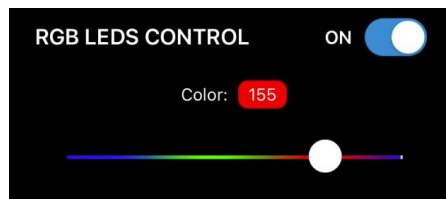
NOTE: When strip length is decreased and some effects are configured outside of the new length, they will be deleted.

NOTE: if you want a section of your strip to change color with no effect, immediately after the color change is initiated, assign the “OFF” effect to this section. On the other hand, if you want the color to change after all other effects on the strip have ended, leave this section of the strip without any effects assigned.

8.4.2. Manual section

Manual section allows for manual control of the color of external RGB leds. This setting is available when external RGB leds are connected to HRM Led.

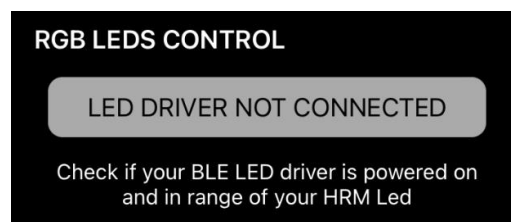
When RGB leds manual control has been turned on (using the switch in the top right corner), external leds will show the color and brightness set on the slider regardless of the data coming from the sensors. This is indicated by a red dot visible in the top-left corner of the Manual section icon. If “AUTO LED CONTROL” is not set to OFF, the red dot will also appear in the top-left corner of the RGB Led section icon (if the led control is set to OFF, this icon is not visible).



Manual section

Manual control of the colors of the external RGB leds is done by selecting a color on the slider with a range of colors (rainbow) and setting the switch on the right to "ON", which will turn on the test mode. After turning on the test mode, each adjustment of the value on the slider will automatically send a new value to the HRM Led device, which will change the color of external RGB leds accordingly.

If the HRM Led device has failed to connect to the RGB led driver, it is not possible to test the colors. The manual section will display an adequate message instead.



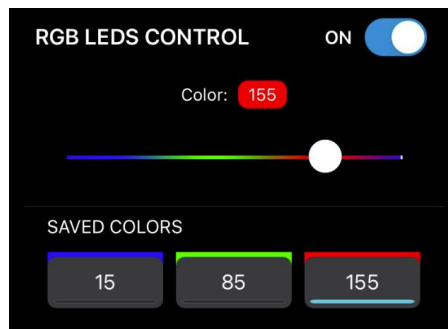
Leds not connected

In addition to the color itself, the number of the selected color appears above the slider. This number allows you to remember the exact color that has been tested in manual mode to be used in the color configuration (“RGB Leds” section).

The rightmost color on the slider is white (200). The leftmost is black (000) which represents the RGB leds being off. This allows you to set the color ranges in such a way that, for example,

during the Warm-up stage, the leds are white, and they turn off during the Cool down stage. A detailed description of the division of workout into phases is provided in the "Heart Rate" section in the "Dividing the workout into phases". For a description of the color configuration, see the "RGB Leds" section.

Additionally, if the Advanced settings are ON, the programmable presets are visible in the Manual section:



Manual section in advanced mode

The currently active preset is highlighted in light-blue from the bottom.

Programming a preset is done by setting the selected value on the color slider and holding the selected button with your finger for one second. After this time, the phone will vibrate, and the value will be programmed into the selected preset.

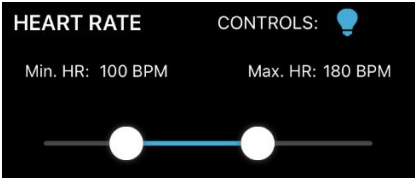
8.4.3. Heart Rate section

The "Heart Rate" section is used to set the heart rate thresholds, which determine the heart rate ranges within which the device will control the external RGB leds.

8.4.3.1. *Standard configuration*

When controlling the leds, when the lower heart rate threshold is reached, the device will set the leds the color configured as the lower threshold in the "RGB Leds" section. As the heart rate increases, the device will steadily change the color along the rainbow, until the upper heart rate threshold is reached - the led will then reach the maximum color defined as the upper limit in the "RGB Leds" section. A further increase in heart rate will not change the color of the leds. When the heart rate starts to drop, the HRM Led will change the color accordingly until the heart rate reaches the lower limit of the defined range - then the leds will turn off.

If the advanced settings are disabled, the Heart Rate section consists of a single slider which is used to define the range of heart rate used for controlling the leds.

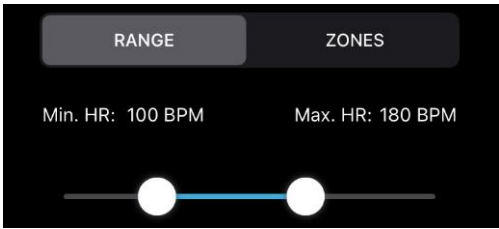


Heart rate range slider

8.4.3.2. *Advanced configuration*

The advanced heart rate configuration for the external led driver has two modes:

- 1. Range (default),
- 2. Zones (6 zones, each defined by two heart rate values)



Heart rate range configuration for the led driver

Range configuration works in the same way as described in “Standard configuration” section of the “Heart rate section” chapter.

Heart rate zones divide the full heart rate range (defined by the “Max HR” parameters entered in a text field above the zones) into six partitions (zones 1 to 6). If zones are selected, then the following screen is displayed.

Heart rate zones configuration for the led driver

Above the individual zone definition fields, there is selector menu, that has two options: Default and Custom. The default setting calculates the zones automatically, based on the max heart rate entered in the dedicated “HR Max” field.

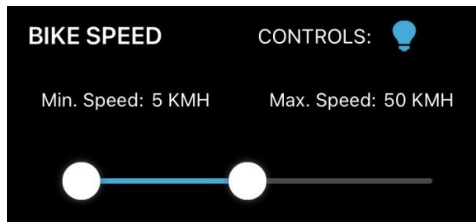
The default zones are calculated according to the following table:

Zone	Lower limit	Upper limit
1	0	$0.5 * \text{HR Max} - 1$
2	$0.5 * \text{HR Max}$	$0.6 * \text{HR Max} - 1$
3	$0.6 * \text{HR Max}$	$0.7 * \text{HR Max} - 1$
4	$0.7 * \text{HR Max}$	$0.8 * \text{HR Max} - 1$
5	$0.8 * \text{HR Max}$	$0.9 * \text{HR Max} - 1$
6	$0.9 * \text{HR Max}$	HR Max

If you want to change the default zones to your desired values, you can edit the higher limit of zones 1 through 5 – the other values are updated automatically. Once you change any of the fields the selector menu changes to “Custom” automatically.

8.4.4. Speed section

Speed can also be used to control the external leds. The mechanism used to control the leds is the same as in the case of heart rate, when advanced options are disabled – there is only a single slider that is used to define the range of operation (see “Heart rate section”, “Standard configuration”).



Speed configuration – kmh

Depending on the speed unit setting defined on the settings screen (see “Settings screen”) the speed range set on the slider are either expressed in kilometres per hours (kmh) or miles per hour (mph).

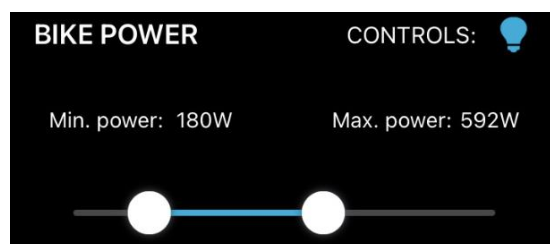
8.4.5. Power section

Power section looks differently depending on the “show advanced options” setting. The following chapters describe both settings.

8.4.5.1. *Standard configuration*

In the standard configuration (advanced options are disabled) the power settings are limited only to a single range, defining the boundaries of operation for the external leds.

The mechanism used to control the leds is the same as in the case of heart rate, when advanced options are disabled (see “Heart rate section”, “Standard configuration”).



Power settings

8.4.5.2. *Advanced configuration*

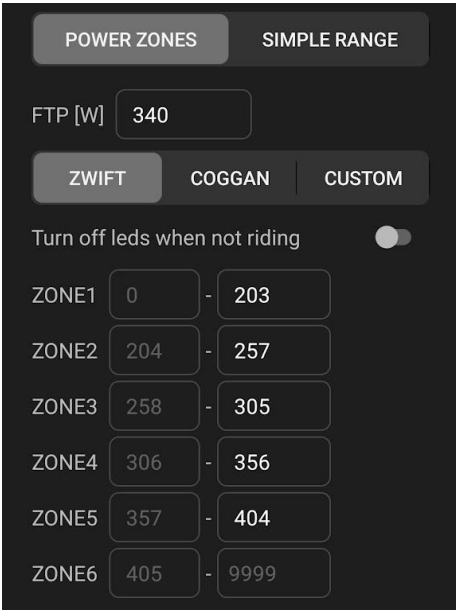
When the advanced options are ON, you are presented with additional selector, allowing you to choose between a simple range and zones configurations.

Simple range allows for the same configuration as can be done when advanced settings are OFF – single range slider.



Simple range – advanced options enabled

Power zones divide the full power range (from 0 to 9999) into six partitions (zones 1 to 6). If zones are selected, then the following screen is displayed.



Power zones

The “Turn off leds when not riding” switch allows to turn off the leds completely when the power is 0W. With this setting set to OFF the leds would normally stay ON, because power zones start at 0. When this setting is ON, it reflects the behavior of a simple range, because when using the simple range, the leds turn off below the lower threshold.

Above the “Turn off leds when not riding” switch, there is selector menu, that has three options: Zwift, Coggan and Custom. The Zwift and Coggan settings calculate the zones automatically, based on the FTP value entered in dedicated “FTP” field.

The zones are calculated using the following table:

Zone	ZWIFT		COGGAN	
	Lower limit	Upper limit	Lower limit	Upper limit
1	0	0.60 * FTP – 1	0	0.56 * FTP – 1
2	0.60 * FTP	0.76 * FTP – 1	0.56 * FTP	0.76 * FTP – 1
3	0.76 * FTP	0.90 * FTP – 1	0.76 * FTP	0.91 * FTP – 1
4	0.90 * FTP	1.05 * FTP – 1	0.91 * FTP	1.06 * FTP – 1
5	1.05 * FTP	1.19 * FTP – 1	1.06 * FTP	1.21 * FTP – 1
6	1.19 * FTP	9999	1.21 * FTP	9999

The Zwift setting aims to reflect the zones that are calculated in Zwift – an online cycling platform. This way you can match the colors that are displayed in Zwift for each power zone on the external leds. There is a dedicated setting for colors in the “RGB Leds” section to match the colors displayed in Zwift.

The Coggan setting is based on the zones determined by Dr. Andrew Coggan PhD, a well-established training expert. If you want to change the automatically calculated zones to your desired values, you can edit the higher limit of zones 1 through 5 – the other values are updated automatically. Once you change any of the fields the selector menu changes to “Custom” automatically.

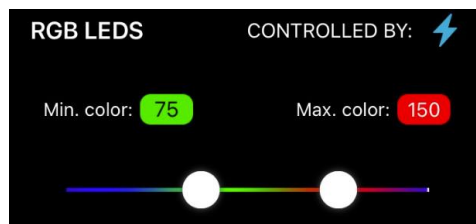
8.4.6. RGB Leds section

In the “RGB Leds” section, you can configure the color ranges that will be used by your HRM Led device.

The content of this section depends on the “Show advanced settings” option (on or off). Details of both versions are presented in the following chapters.

8.4.6.1. Standard configuration

When advanced settings are OFF, the colors are selected on a single slider with a rainbow of colors underneath.



Color range slider – standard configuration

The color on the left selected on the slider will be sent to the connected RGB LED driver when the controlling sensor (heart rate, speed or power) reaches the lower limit.

The second color is the "maximum" color - corresponding to the upper limit of the controlling sensor. If the sensor data rises above the upper threshold, the color will no longer change.

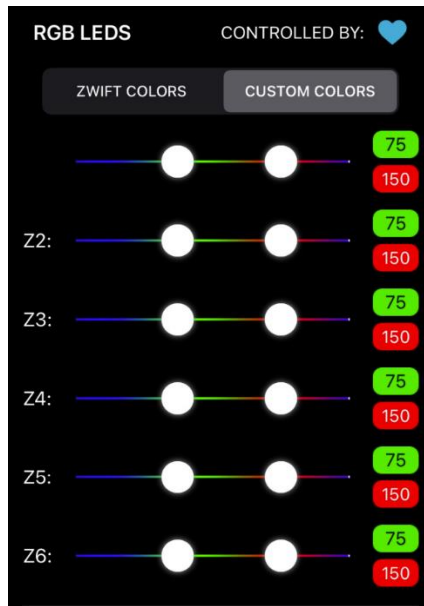
The colors will smoothly change over the configured range, from the left color to the right, through all the colors of the rainbow in between.

8.4.6.2. *Advanced configuration*

If the advanced settings are enabled, the screen can display three variants, depending on the controlling sensor and its configuration. All options are listed in the table below.

What controls the leds	Controlling sensor configuration	What is displayed
Heart rate	Simple range	Single color range slider (see above)
	Zones	Six color sliders, one for each zone (see below)
Speed	Simple range	Single color range slider (see above)
Power	Simple range	Single color range slider (see above)
	Zones	Six color sliders, one for each zone (see below)

In the variant with six sliders, additionally you will have a possibility to use the preset configuration called "Zwift colors". Selecting this option will set the sliders to the colors that Zwift uses for individual power zones (colors are displayed in-game on the power chart on the bottom of the screen). This setting combined with the "Zwift" zones setting in the "Bike power" section, allows you to visualize on the external RGB leds the same colors as Zwift is currently showing.



RGB Leds configuration – Zones

8.5. Settings screen

The Settings screen is a view that is displayed when you click on the gears icon in the top right of the main screen in the app, next to the sleep button.

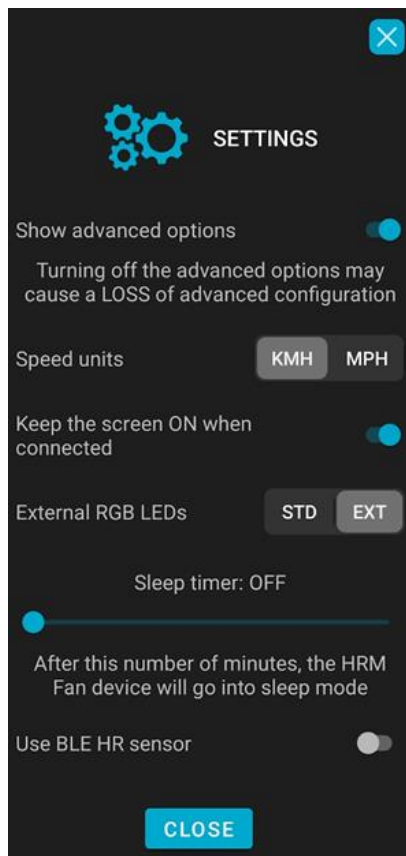
Settings are a global app configuration that is saved regardless of the currently selected profile (except for “Use BLE HR sensor” configuration).



Top bar with gears icon

The settings screen includes the following settings:

1. Show advanced options.
2. Speed units (kmh / mph),
3. Keep screen on when connected,
4. External RGB Leds,
5. Sleep timer configuration (only visible when advanced options are on),
6. Use BLE HR sensor.



Settings screen –Advanced ON

To close the settings screen, click on the “x” button in the top right corner. For iOS you can also swipe down. For Android, there is an additional “Close” button on the bottom.

8.5.1. Show advanced options

This setting allows you to enable advanced options and settings across the application. This gives you more flexibility in configuring your sensors and RGB leds.

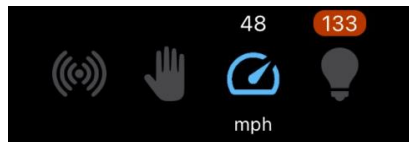
When you turn this setting ON, certain parts of the app will become visible. The details of each section and what configuration parameters are visible with advanced settings on or off, are described in individual chapters dedicated to each section.

NOTE: Since disabling the advanced options hides some parts of the application and simplifies the view and the configuration, some advanced configuration might be lost when turning the advanced options OFF.

NOTE: Turning the advanced settings on will show the sleep timer configuration. Disabling advanced options will hide this section. See “Sleep timer configuration” for more information.

8.5.2. Speed units

This simple setting allows you to change the speed units displayed across the application. This applies to the “Speed” section, where you can set the speed range at which speed will control the external RGB leds and to the top menu bar, with section icons – the units are shown below the speed icon. Speed is automatically recalculated when changing the units.



Speed units in menu bar – mph

8.5.3. Keep screen on when connected

This option, when on, will keep the screen of your phone on, when the application is connected to a HRM Led device. This can be useful if you want to monitor the parameters and data coming from the sensors while doing your training.

8.5.4. External RGB Leds

Two possible options are available for this setting:

- Standard RGB Leds (STD) – connect to the normal led strip with regular led driver. Only brightness and color can be adjusted for this kind of led strip,
- Extended RGB Leds (EXT) – connect to the extended, addressable led strip with adequate driver. For this led strip/driver you can set various effects. More information on this topic can be found in the chapter “External led configuration”.

After selecting a led driver type, HRM Led will start searching for a compatible RGB led driver to connect to. Make sure that the driver is connected to the power supply and is within range of the HRM Led device.

8.5.5. Sleep timer configuration

Configuration of the time that must elapse before the device goes into sleep mode is possible thanks to the slider, on which the time is set in minutes (from 0 to 60). If you set the slider to 0 minutes (OFF), the device will never go to sleep automatically. It will be possible to put it to sleep using the sleep button. Disabling the automatic sleep mode allows you to automate the

use of the device. If, for example, you are sure that there will not be an accidental sensor in the vicinity of the device, which could unnecessarily turn on the RGB leds, then leaving the device in the awake mode allows for immediate detection of the sensors when you start training - it will not be necessary to wake up the device.

NOTE: In the standard mode (advanced settings disabled), the configuration of the sleep timer is hidden, while the sleep mechanism itself works in the same way as in the advanced mode. Thus, it is possible to switch to advanced mode for a while, change the sleep timer setting and return to the standard mode keeping the sleep configuration.

8.5.6. Use BLE HR sensor

By default, HRM Led uses an ANT+ heart rate sensor. This type of sensor is better in a sense that it allows multiple devices to use it simultaneously, which is not possible with Bluetooth (except for some heart rate sensors with multichannel Bluetooth). If your heart rate sensor has ANT+ support, you don't have to change this setting. If on the other hand you only have Bluetooth (BLE) heart rate sensor which you want to use with HRM Led, please turn this setting to ON. This changes the type of sensor that is being detected / searched for in the Sensors section.

NOTE: This setting is only visible in the advanced mode.

NOTE: This setting is saved within the current profile (unlike other settings, which are saved globally, regardless of the selected profile).


8.6. The Sleep mechanism

The sleep mechanism is a function of the HRM Led device that allows you to:

- Easily turn off the leds after training without disconnecting the cables or reaching to the leds to physically turn them off.
- Leave the device connected to the power supply between workouts. In sleep mode, the leds will not turn on, even if there is an active heart rate monitor or other sensor in range of the HRM Led device,
- Conveniently turn on the device (wake it up) just before training (i.e., from a mobile application).

The device in sleep mode indicates its state with a constantly lit red led on the housing. In sleep mode, the device does not search for sensors, so it will not connect to them and will not turn on the external leds. However, it is visible for scanning in the mobile application.

The device can be put to sleep in two ways:

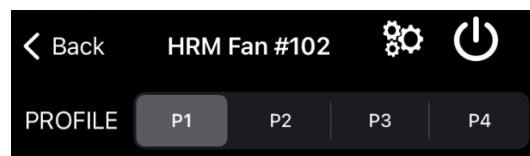
1. By clicking on the Sleep button in the mobile application 
2. The device will go into sleep mode by itself after a certain period of inactivity (when no sensor is connected, and the device is not in manual mode). The default timeout (set when the application is started for the first time) is 15 minutes.

You can wake up the device by connecting to it using the mobile application.

Configuration of the time that must elapse before the device goes into sleep mode is available in the settings screen and is described in the chapter: "Settings screen".

8.7. Profiles & Global application settings

There are four profiles available in the mobile application (P1, P2, P3, P4). Profiles are sets of settings that you can switch between using the profile buttons. Clicking on one of the buttons will load the configuration from the selected profile and send it to the connected HRM Led device. The data in the profile is saved automatically when the configuration is changed. Configurations in all profiles are saved locally on the phone, so they can be used on several HRM Led devices and between runs. Information about the currently set profile is also saved locally, so that after turning the mobile application off and on again, it will be set to the last used profile.



Profile switching buttons (P1-P4)

Profiles can be used for several purposes:

- When more than one person is using one HRM Led device, it is possible to save several sets of settings, e.g., one for each person. Then there is no need to reconfigure the device each time the device is handed over to another person,
- When you want to use more than one configuration for different types of training (e.g., a different configuration for running on a treadmill and a different configuration for training on a trainer).
- When you want to keep more than one configuration for different training intensities or your own fatigue levels.

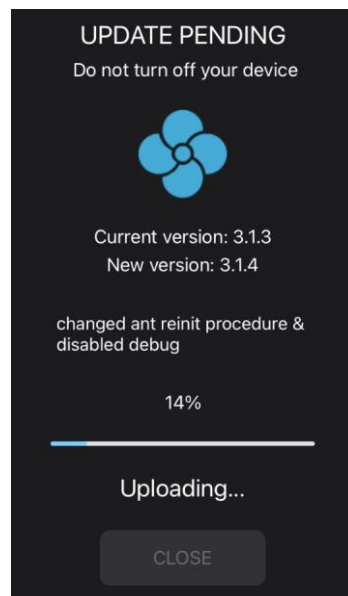
The entire configuration of the HRM Led device and other application settings are saved as part of the profile, except for the settings available on the Settings screen:

1. Show advanced options.
2. Speed units (kmh / mph),
3. Keep screen on when connected,
4. Sleep timer configuration.

Those settings are saved globally for the application and kept locally on the phone.

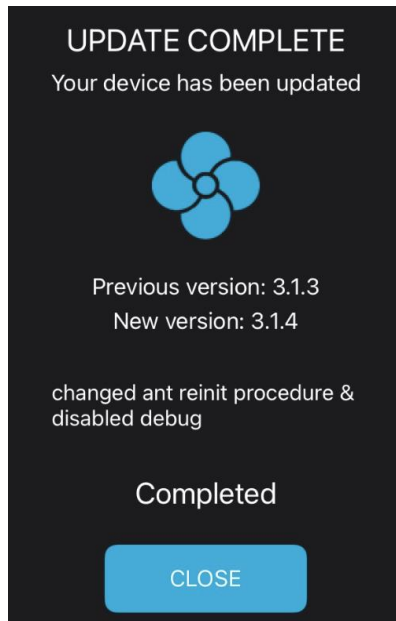
8.8. Remote Software Update

The mobile application allows for the software on the HRM Led device to be updated. After connecting to the device, the mobile application checks for available updates. If new software is found the update procedure is initiated. A simple list of changes in the new software is displayed and you can track the progress of the update on the screen.



Update in progress

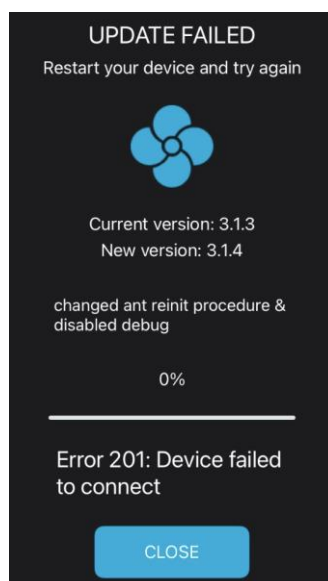
The update should not take longer than 1 minute. After the update is finished, the device is ready for use. Just click on the “CLOSE” button and the device will reconnect.



Update complete

NOTE: Updates contain bugfixes and improvements over existing features. Sometimes new features are also introduced. We are doing our best to preserve user configuration between software updates, however if the update is big and changes the way the device communicates or stores data, the profiles and other user configuration might be lost.

NOTE: If an update fails. Please close the application, restart the HRM Led device (disconnect from the power source, wait five seconds and reconnect) and try again. Try to keep your phone well within 1-2 meters from the device during the whole update process. Keep the application running in foreground.



Update failed

9. Safety Notes

This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory, or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved.

Children shall not play with the appliance.

Cleaning and user maintenance shall not be done by children without supervision.

10. Trouble shooting

The table below lists known problems and suggests solutions. If you have any other problem with our device or the suggested solution does not solve your problem, please contact us for support. We are happy to help.

Problem	Solution
<p>The RGB led operation is interrupted during training. The leds stop changing colors and restart after a few seconds even though my heart rate / speed / power was within the configured range.</p>	<p>This is usually due to one of two things:</p> <ol style="list-style-type: none"> 1. Low battery in your sensor, or 2. Obstacles between the sensor, led driver and HRM Led. <p>Make sure the sensor and led driver remain within range of HRM Led (maximum 3 meters) throughout training and that there are no physical obstructions that could block the transmission.</p> <p>Otherwise, replace the battery in your sensor.</p>
<p>After the heart rate monitor connects to HRM Led, I can no longer see my heart rate on my watch / cycle computer / in Zwift.</p>	<p>When using a Bluetooth LE heart rate sensor, remember that due to the technology used, such a sensor can only connect to one data recipient. We recommend using ANT+ technology to connect the heart rate sensor to HRM Led. More info can be found in the "Supported devices" chapter and in chapter about the mobile application.</p>
<p>The RGB leds won't connect to my device even though they are powered on and in range of my HRM Led device.</p>	<p>Please make sure that the led driver is not connected to another device / application. If you have controlled the leds for example using the duoCo Strip mobile app, please make sure you have disconnected this app prior to using the leds with HRM Led. Due to the technology used in the led driver (Bluetooth) it is possible for the driver only to connect to one device or application at a time.</p>
<p>When I connect to my device an update window pops up, but it freezes for more than 30 seconds and then the update fails.</p>	<p>When this happens try restarting the app and when update freezes again, try turning the device off for 5 seconds (in the middle of the update) and back on again. This should kick start the update process. If this fails, please see the next problem/solution.</p>
<p>The ROM update process fails.</p>	<p>First of all try to do the update freshly after the device was powered on. If this still doesn't work, try to restart Bluetooth in you phone and repeat. If this fails, restart your phone and repeat. The last resort is to try another phone with fresh HRM Fan&Led application install (or you can reinstall the app on your phone, but then you will lose your configuration).</p>

11. Contact information

The manufacturer and seller of the device is:

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