

## ProBee - how to use GPS tracker

A GPS tracker is a device that measures temperature, responds to motion, and sends its GPS coordinates. Can be used to detect hive movement - whether in shaking, falling, or moving on longer distances. It uses the Internet of Things (Sigfox) to report movement. In idle mode, it transmits temperature information once per hour. In case of a movement, it switches into alarm mode, besides the temperature it starts to detect and transmit its GPS coordinates. The transmission interval in the alarm mode is shortened to 10 minutes and lasts one hour after calming (then the GPS coordinates are no longer transmitted and the interval returns to 1 hour).

All tracker information is sent to the ProBee web server where the user can see it on their portal.

At the beginning, the tracker must be assigned to a specific hive. This can be done in the Sensors section (in the Tools / Sensors menu) by clicking on the pencil icon  in the first column and selecting from the hive list in the second column.

ProBee can announce movement of the tracker using so called Info channels. First, you need to create the channel in the Tools / Info channels section by clicking on , filling in the email address, or phone number and marking where the messages should be sent (whether to the email address, the phone number, or both). Then, in the Sensors section (Tools/Sensors), click on the pencil icon  in the first column, which allows to select the appropriate channel for the sensor in the Channel for alert column. Multiple sensors can be set to the same channel or each sensor can be set to different channel. When the tracker moves, ProBee immediately takes a snapshot from all possible cameras on the apiary.

When the tracker is in idle state, it is shown on the map as a yellow mark . When it activates the alarm state, the mark on the map changes into red . If the GPS position of the tracker is changed, the movement to a new position is shown as a line on the map. The map is available to the user after logging in at the home page, then after clicking on the icon  in the list of hives in the GPS column (in the Hives menu), or the same icon  in the list of sensors (in the Tools/Sensors menu). The map is available to the user at three various places. 1) at the home page (after logging in); 2) in the Hives/GPS column (after clicking the icon !!!); 3) in the Tools/Sensors/Outputs/Tracker (after clicking the icon !!!) The measured temperature is also available in the list of hives in the Temperature column. By clicking the button with the temperature value we can display the temperature trend in the form of graph.

Complete history in the form of a table is available in the list of sensors after clicking the icon .

After arriving at the apiary, place the tracker on the hive for at least 10 minutes to make sure it receives the correct GPS coordinates.

For the best signal quality, place the tracker vertically on the long side (so that the ProBee logo is in its normal position when looking at it, not upside down).

The tracker is waterproof, so it is not a problem when it sinks in the comb with honey or the bees build some combs around it.

The tracker is powered by 4 AAA batteries. They should live for about 1 year with a small number of movements that activate GPS and use more power. The ProBee system itself monitors the level of

the batteries and sends the user an alert when the change of batteries is required. The change is simply done after unscrewing the back cover of the tracker. The cover is also waterproof, so just be careful to return it properly. We recommend using lithium batteries that have the longest durability and are resistant to low temperature.

**Notice:**

Do not place the tracker in a hive near a metal surface that would shield the signal (e.g. into the top super under the metal roof). It is necessary to test the position in the hive - it depends on the local quality of the Sigfox signal (it is distributed by selected T-Mobile transmitters) in the area and on the construction of the hive. Even though it is very improbable, there exist places without Sigfox signal. In such cases, the tracker cannot be used.

The trace of a possible motion route is approximate, since the tracker only transmits once in 10 minutes in alarm mode. There may be cases when the hive is, for example, transported in a car. The metal body can act as a shield, then no signal can be transmitted. However, after unloading the hive from the car the tracker will send the current position within 10 min.