EMFIT®

QS
+ACTIVE

Installation &
operating instructions

for model IP-9360 (Wi-Fi)

V1.11
19.3.2019

Thank you for purchasing this EMFIT QS sleep tracker! You have made a great choice.

In this user guide you will find useful information about your device from taking it into use to analyzing your sleep patterns and longtime trends.

Content

1. Package contents

1. Electronic control unit with attached sensor
   - design might vary between QS models
2. Power supply
3. Plug adapter for European countries
4. Plug adapter for United Kingdom
5. Plug adapter for United States of America
6. Plug adapter for Australia
7. Quick guide
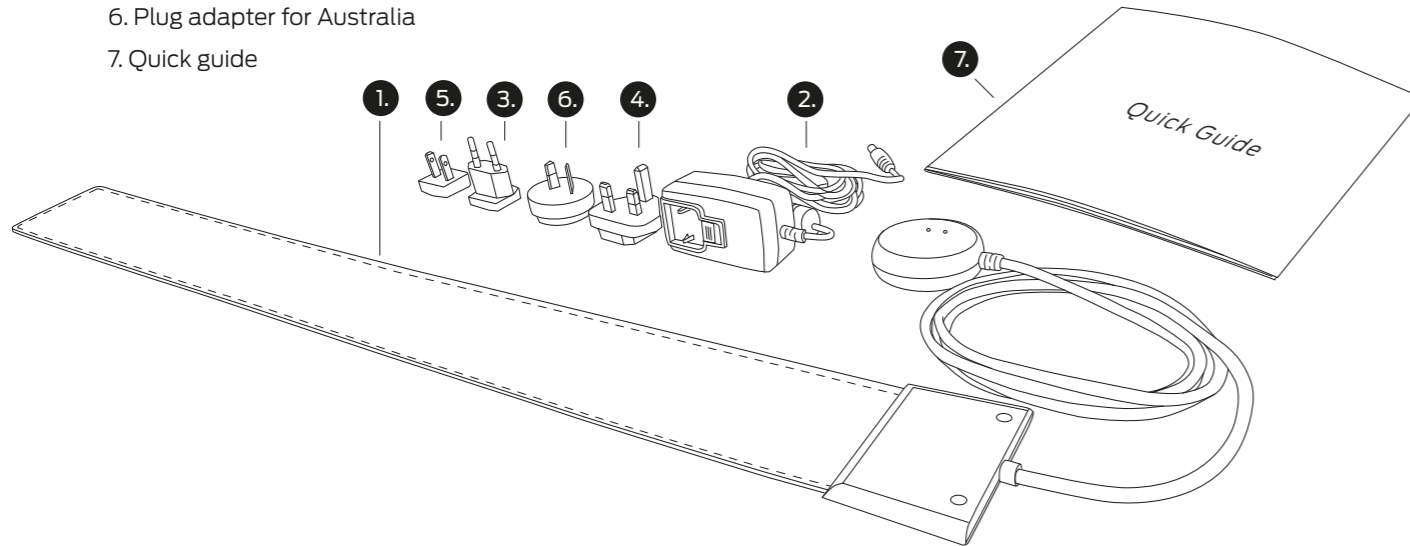
2. Safety instructions

⚠️ If the device gets wet or starts overheating stop using immediately and disconnect power supply from mains power.

⚠️ Equipment is not suitable for use in the presence of a flammable anaesthetic mixture with air or with oxygen or nitrous oxide.

⚠️ Only use the power supply (as specified in chapter Technical specifications) supplied with the product.

❗ This product is designed for indoor use only.

❗ This product IS NOT intended to be used for direct diagnosis or monitoring of disease or other conditions, or physiological processes.

❗ Do not use this device for any purpose other than that specified by the manufacturer.

❗ Do not try to repair the device yourself.

SYMBOLS USED IN THESE INSTRUCTIONS FOR USE
The following instructions are designed to ensure the personal safety of the user and protect this device or any device connected to it from damage. These instructions use symbols to draw the user's attention to the instructions at hand. The symbols act as safety and warning signs. The symbols and their explanations are as follows:

⚠️ *If the instructions are not adhered to, the situation may lead to a death or serious personal injury (in these instructions for use). ATTENTION – consult accompanying documents (i.e. these instructions for use)*

❗ *Means that the section contains important information for the user (in these instructions for use).*

3. Symbols used in these instructions for use

The following instructions are designed to ensure the personal safety of the user and protect this device or any device connected to it from damage. These instructions use symbols to draw the user's attention to the instructions at hand. The symbols act as safety and warning signs. The symbols and their explanations are as follows:

⚠️ If the instructions are not adhered to, the situation may lead to a death or serious personal injury (in these instructions for use). ATTENTION - consult accompanying documents (i.e. these instructions for use)

ℹ️ Means that the section contains important information for the user (in these instructions for use).

🗑️ Symbol of European Waste Electrical and Electronic Equipment Directive (WEEE Directive) 2002/96/EC on waste electrical and electronic equipment (in these instructions for use and on the electronic unit).

🏭 Indicates manufacturer's name and address (in the control unit and on the electronic unit).

◇●◇ Indicates polarity of d.c. power connector (In the external power supply).

∼ Indicates alternating current (in the external power supply).

⎓ Indicates direct current (in the external power supply).

▫ Indicates that product meets safety requirements specified in IEC 61140 for Class II equipment (In the external power supply).

⌂ Product is for indoor use only (in the external power supply).

Ⓓ Product is UL Demko certified (in the external power supply).

⑩ Product is China SJ/T 11363-2006 certified (in the external power supply).

cⓊus Product is UL certified (in the external power supply).

CE Indicates that the product conforms with the relevant requirements of the Medical Device Directive 93/42/EEC.

FC Product contains FCC ID: W7OMRF24WG0MAMB

VCI Product is VCCI certified (in the external power supply).

Product is UKRSepro certified (in the external power supply).

Product is GOST-R certified (in the external power supply).

Product is C-TICK certified (in the external power supply).

Product is China RoHS 30 certified (in the external power supply).

Product is BSMI certified (in the external power supply).

Product is SIQ certified (in the external power supply).

Product is IRAM certified (in the external power supply).

Product is CCC certified (in the external power supply).

Product is CPSQ certified (in the external power supply).

Product is PSE to J60950 certified (in the external power supply).

4. Environmental conditions

Storage and transportation
- **Temperature:** $^-30^oC$ – $^+50^oC$
- **Relative humidity:** ≤80%

Use
- **Temperature:** $^+10^oC$ – $^+40^oC$
- **Relative humidity:** ≤75%
- **Altitude:** <3000 m

5. Cleaning

ℹ️ **CAUTION** Do not spray, pour or spill liquid onto the power supply, device, cables, or sensor.

The Emfit device may be surface-cleaned using a soft cloth dampened with either a commercial, nonabrasive cleaner or a solution of 70% alcohol in water. Lightly wipe the surfaces of the device, power supply, cables and sensor.

6. Minimum requirements

· **2,4 GHz (802.11 b/g/n) home* Wi-Fi network with access to Internet. The 5 GHz Wi-Fi is not supported.**

· **Channels 1 - 11 in use (channels 12-14 are not supported)**

· **For Wi-Fi set up process, a computing device (for example laptop, desktop computer, smart phone) with internet browser.**

· **Electrical outlet (110 - 230V AC) for the included 5V power supply**

* In home Wi-Fi networks usually all outgoing ports are open. If you use professional (office, corporate) Wi-Fi you need to enable outgoing ports 35110 - 35121 open.

To operate, EMFIT QS needs Internet connection. It can be either:

A

**Home Wi-Fi
with Internet access**
Your Wi-Fi network
password

or

B

**Mobile device as
Wi-Fi hotspot**
Your hotspot Wi-Fi
network password
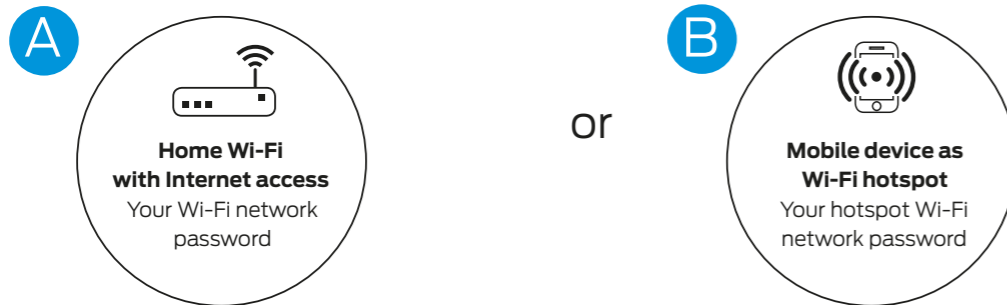
TO SET UP THE W-FI YOU NEED
(ONLY DURING SETUP)**:**

Computing device
(computer or tablet
or smartphone
with browser)
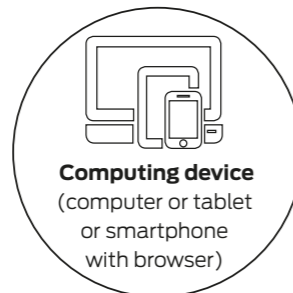
NOTE! If you choose method B,
please notice that you will need an additional computing device during setup:
· **Mobile device:** to create hotspot (Internet connection)
· **Computing device (laptop, mobile phone or tablet):** to set up your Emfit QS device to this hotspot

7. Overview

7.1. Intended use
The EMFIT QS hardware (Product) and web application (Service) together is a general wellness product intended to be used for tracking the impact of free-time activities on recovery, fatigue and sleep quality on a healthy subject. It is not a medical device and is not intended to be used for diagnosis or monitoring of disease or other conditions, or investigation of a physiological process.

The product consists of electronic unit with attached bed sensor and a separate power supply.

7.2. Liability of the manufacturer
Emfit Ltd is liable to ensure the safety, reliability and performance of the device, provided that:
· The device is installed, used and cleaned in accordance with these instructions
· Any changes to the product, maintenance and repairs are conducted by a person trained by Emfit Ltd or its representative.

7.3. About these instructions for use
Read all warnings and reminders in these instructions for use with care to avoid any hazardous situations and damage.

7.4. Why to use EMFIT QS
· Long term measurement, all your round, every night, whole night!
· Ease of use, nothing needs to be turned on, no need to wear anything, no irritation on skin, etc.
· User can see long term development, and also possible deterioration, and look reasons for this.
· System gives information about training load (evening HRV sinks), recovery rate (ratio between evening and morning HRV's), and recovery status (morning HRV). With this information, the user can optimize the training schedule based on actual body needs, and not on what calendar says.
· System can also prevent the user from training when it is not beneficial; for example Resting HR usually sinks if person is getting ill, before the person even knows that. Long term decrease in RMSSD may be indication of over-training syndrome.

8. Setup

1 Select a suitable adapter from the four alternatives.
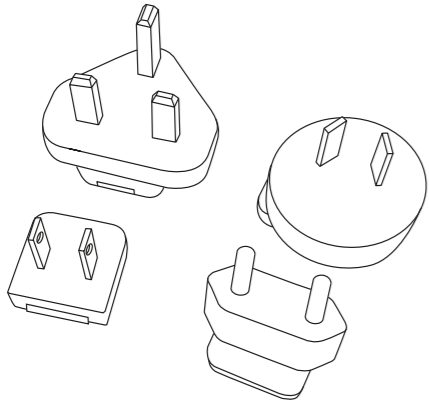
2 Connect the correct adapter to the power supply and ensure that it locks in its place.

CLICK!
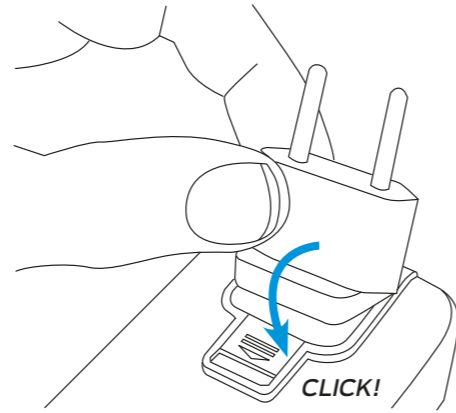
3 Connect the power supply to electrical outlet (110 - 230V AC) and connect the power cord to EMFIT QS.

Green and red lights start to flash alternately and device makes beep sounds.

Green

Red

EMFIT

Power cord

Sensor cord

Power cord
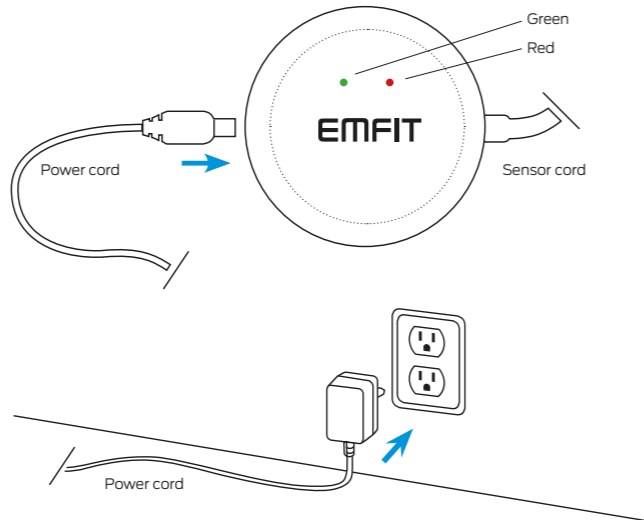
! **Note!** If only the red led flashes you need to restore the device into AP mode. Please see chapter 10 on page 24.

4 Place the bed sensor beneath the mattress or mattress topper across the bed under your chest area.

You can place the EMFIT QS beneath the mattress topper...

... or you can place it beneath the mattress.
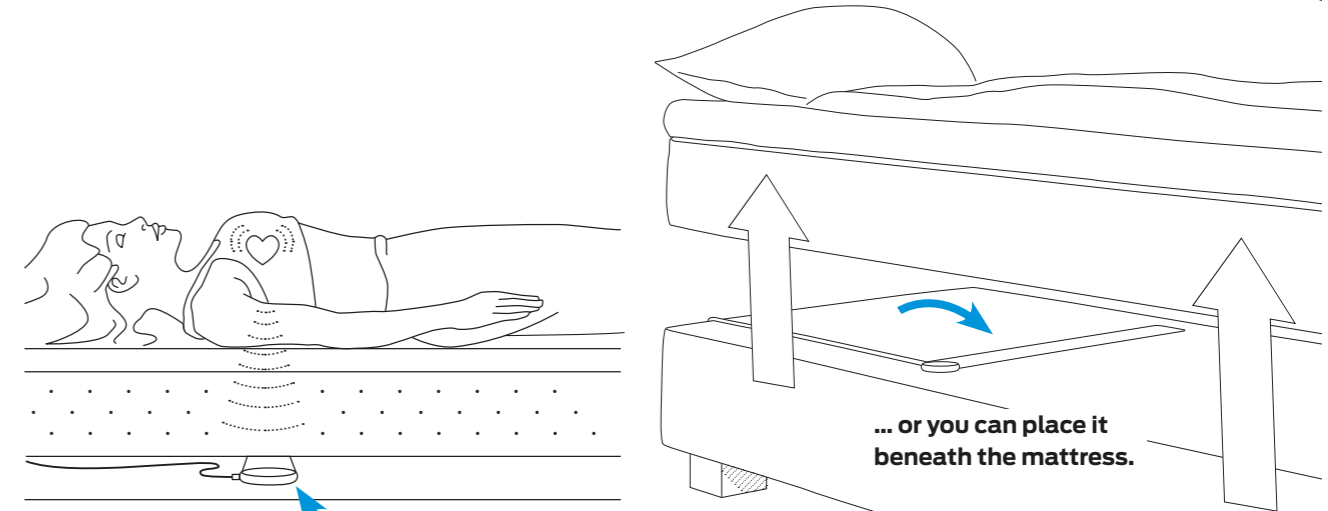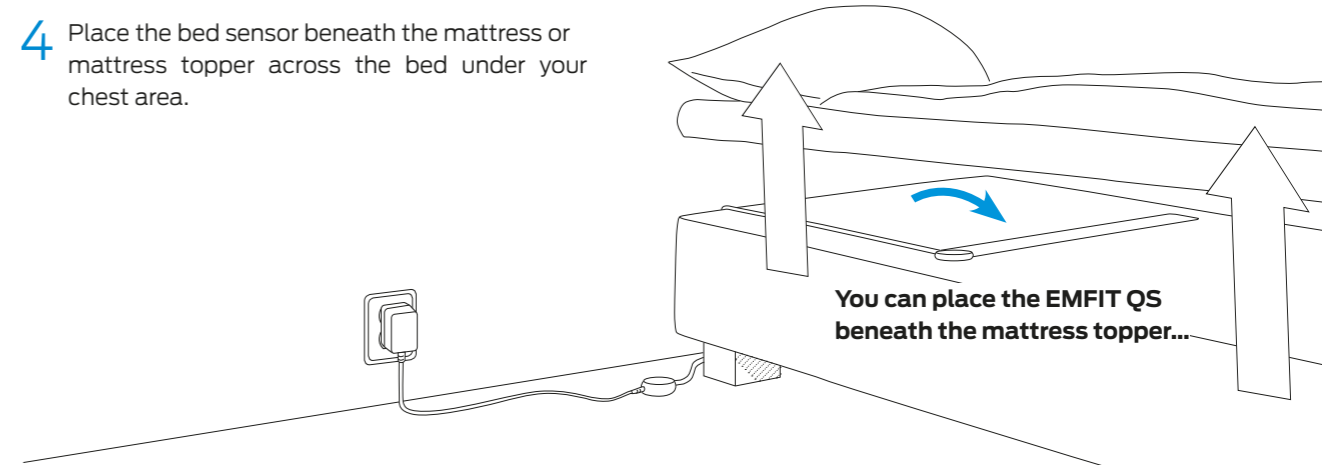
The device works most reliably when the sensor is located directly below your heart.

NOTE! The electronics unit must be placed on the floor and at minimum 20 cm distance from your body.
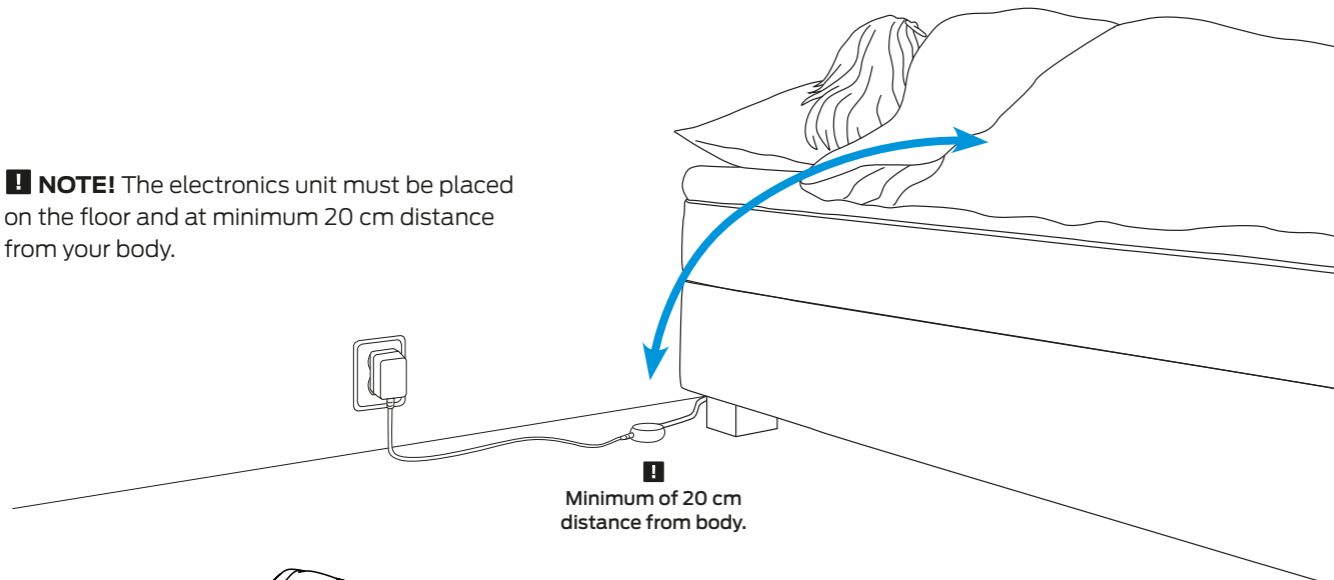
❗
Minimum of 20 cm distance from body.
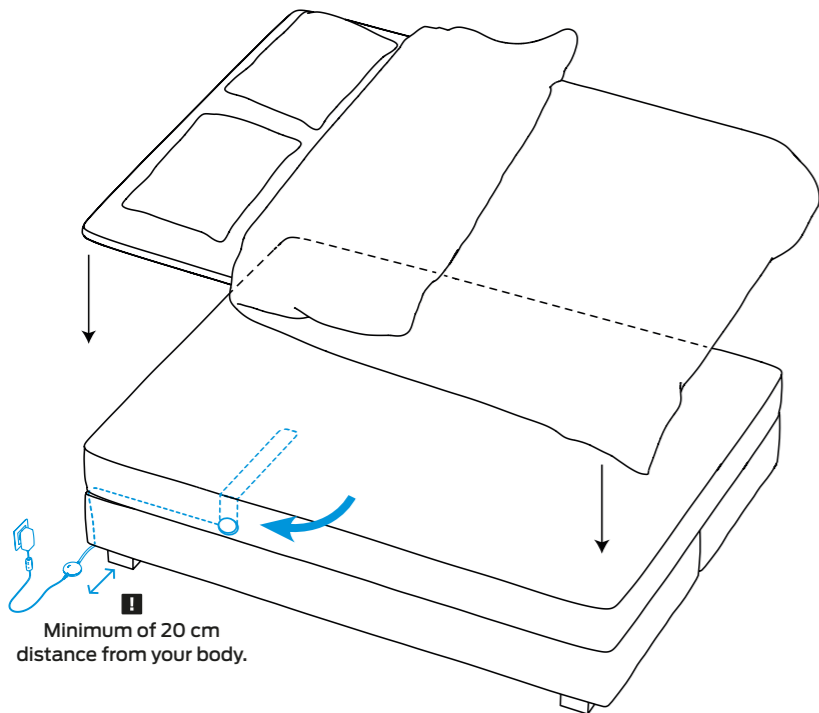
Placing the EMFIT QS in double bed

If you sleep with a partner in a double bed, place the sensor on to your side of the bed as far as possible from your partner. Make sure the sensor is still under your chest area.

You can bend the sensor over the corner of your mattress. It will help to prevent sensing your partner's heart rate, especially when you leave the bed earlier than he/she.

❗
Minimum of 20 cm distance from your body.

8.1. Connecting EMFIT QS to your Wi-Fi network
(without WPS button)

❗ **Note!** If you are using Windows 10 operating system, we recommend to use Google Chrome browser during Wi-Fi setup. According to our experience setup may be difficult with other browsers.

1 Place the bed sensor beneath the mattress or mattress topper across the bed under your chest area. With your computing device search for wireless

2 networks.

Connect your computing device to the network: **Emfit_xxxxxx** (where xxxxxx is the serial number ❗ of your device).

Ignore possible "No internet connection".

Windows

Networks

Connections
Network   Connected ⊡

Wi-Fi
Emfit_1234567
Some-Guest-2.4GHz
2WIRE123

Mac OSX

Wi-Fi: On
Turn Wi-Fi Off

✓**Emfit_1234567**
AppleWiFi
Testwork

Join Other Network…
Create Network…
Open Network Preferences…

3
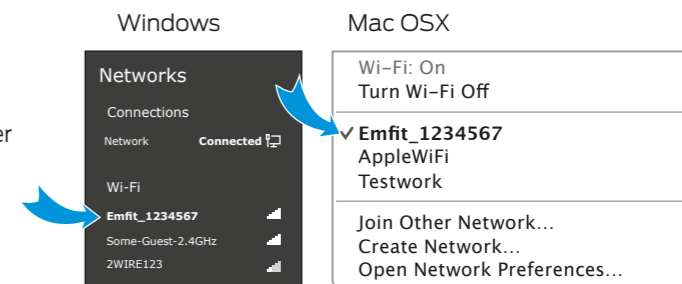
Emfit Ltd, Finland | Product: Emfit QS | Model: IP-9360
SN: XXXXXX
PIN: XXXXX
PW: **XXX-XXXX-XXX**
http://192.168.1.3
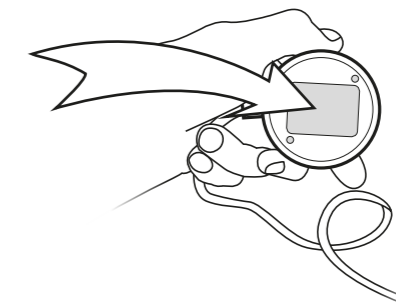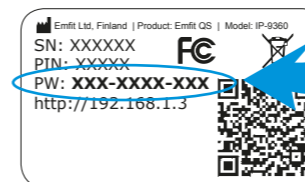
❗ **Note! The password must be filled in with the hyphens.**

4 Open your computing devices' browser (Mozilla, Safari, Chrome, Internet Explorer etc.).

Type in address/url bar:
http://192.168.1.3 and hit enter.
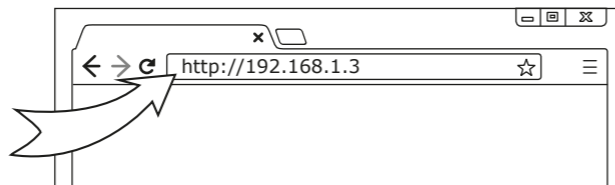
! **If you cannot access above IP-address, check that your computing device did not disable itself from EMFIT QS and is perhaps again connected to your own Wi-Fi. Problem especially arise with desktop computer and LAN/ethernet cable connected. To solve possible problem, simply remove LAN/ethernet cable temporarily.**

5 Select your own Wi-Fi network from the list and type its password.
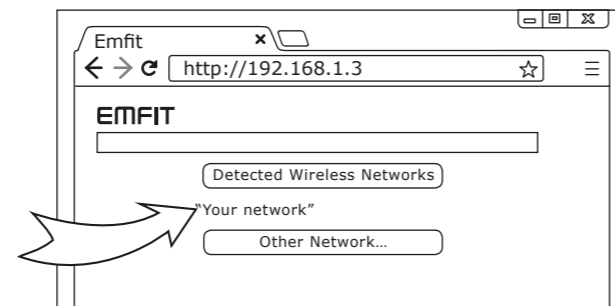
6 Press enter and EMFIT QS will now try to connect to your Wi-Fi network. Connecting can take up to few minutes. You hear short "beep" sounds and see the red led flashing.
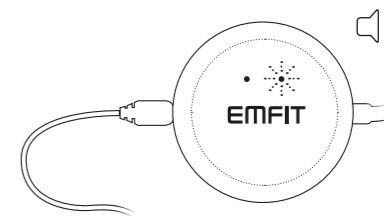
Red light starts flashing.

Successful connection type 1
Device will emit high tone sounds. In about 1-3 minutes red light will stop flashing and green light will start flashing.
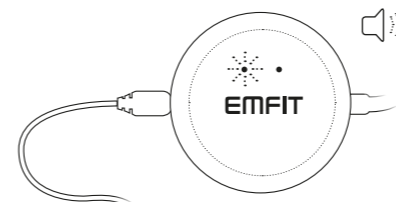
Green light will start flashing.

☺ **You are done! Your device is now connected and ready to track your sleep.**

Red light remains flashing
Device will emit high tone sounds (password you typed is correct). However red light will keeps flashing (in cycles of once, twice or three times) even after three minutes.
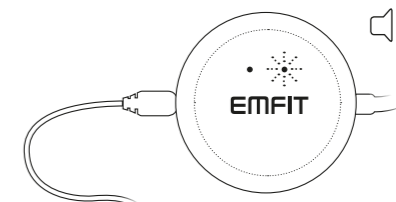
Only red light remain flashing.

☹ **Sorry, you are not done yet! Router/modem may be blocking the Internet connection. This occurs occasionally in a corporate Wi-Fi network which may have restrictions for IOT devices. You may need to contact your IT support or Emfit support so that we will help you.**

Unsuccessful connection

Device will emit low tone sounds. Red and green lights flash alternately again. This means device has returned to AP mode. This can happen a few times, so please be patient. This is common issue in Wi-Fi networks.

Please start again from step 1. Check that your computing device has automatically returned connection to your home Wi-Fi. You need to search again for available Wi-Fi networks and reconnect to EMFIT QS.

With your next attempt(s) you probably can skip step 3 as your laptop/tablet/smartphone remembers the EMFIT QS password.
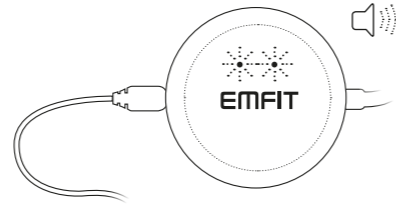
Red and green lights are flashing alternately. Device is again at AP mode.

! *Please don't get confused if your browser says "http://192.168.1.3 is not replying." It is because your computer probably switched automatically to your home Wi-Fi and there is no device in that address in Internet.*

! *Check however again that you write your own home Wi-Fi network password correctly. Also, if after few attempts still no success, check that*

your router is not 5 GHz version only or operating at channels 12-13. For troubleshooting, see page 21.

! *You may also get reply from some other than EMFIT QS device. For example if you have IP camera.*

> ## After successful Wi-Fi connection, it is time to register your device.
>
> ↓
>
> ## Go to chapter 9.

8.2. Connecting through Wi-Fi Protected Setup (WPS) button

1) Enable your home Wi-Fi router's WPS button. Depending on your router, you may need to push the button for 2-3 seconds or more. After you have pressed the WPS push button of your router, it will be in pairing mode usually for 1-2 minutes.

2) Press and hold your EMFIT QS device WPS button for 2-3 seconds until you hear a sound. Button is accessible via the tiny hole in the back. Use for example a paper clip. Lights of the device will flash. After you have pressed both your router and EMFIT QS device WPS buttons, pairing of the devices begins.

Press when using WPS method.
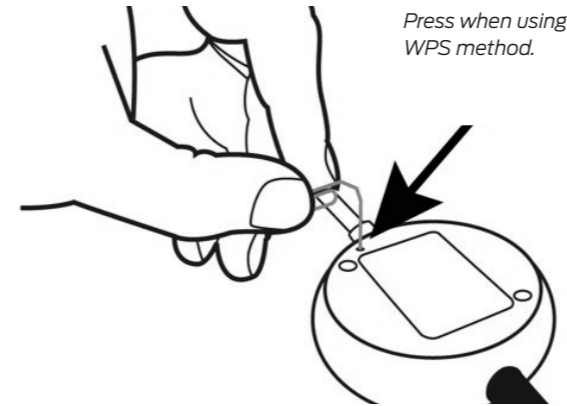
Examples of WPS button in router.

Pairing of the devices can take up to few minutes. Usually it is less though. During this time QS device will keep emitting short sounds and red light is blinking.

Successful pairing
If pairing of the devices is successful and Wi-Fi connection is enabled, EMFIT QS device will emit 3 short notes with rising tone and red light will go off wihin 2 minutes and green light starts to blink.

Unsuccessful pairing
If the pairing fails, you will hear three quick tones - low high low - and red light will keep blinking. EMFIT QS

device will automatically return to the state it was in at the beginning of this chapter i.e. AP (access point). Check again that your router goes into pairing mode and make sure its WPS push button is enabled. Try to pair the devices again. It is worth to try this at least three times.

If the pairing still fails you will need to connect manually. See the chapter 8.1. on page 13.

NOTE: Videos that will help you to understand how the WPS pairing is done are available in the User's Guide at **qs.emfit.com** after you have logged in.

> ## After successful Wi-Fi connection, it is time to register your device.
> ## Go to chapter 9.

8.2.1. MY NETWORK IS HIDDEN

First you will need to find out what type of encryption your home Wi-Fi network uses.

With Windows OS computer, move the mouse cursor over the network. WPA2 is a common encryption.

Take note on this security method's name as you will use it on next actionstep.

On Windows see network listing and hover mouse over your network:

On Mac, click the top right toolbar icon while holding ALT key pressed down. This lists networks with additional details:
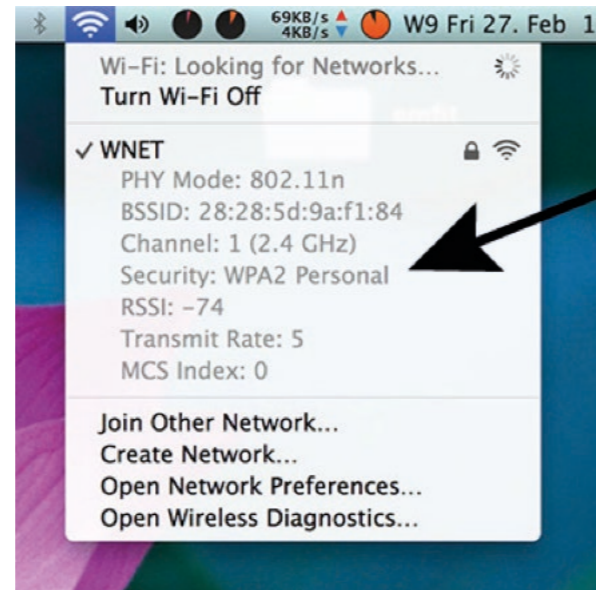
If you don't have the toolbar icon enabled alternatively you can view it here:
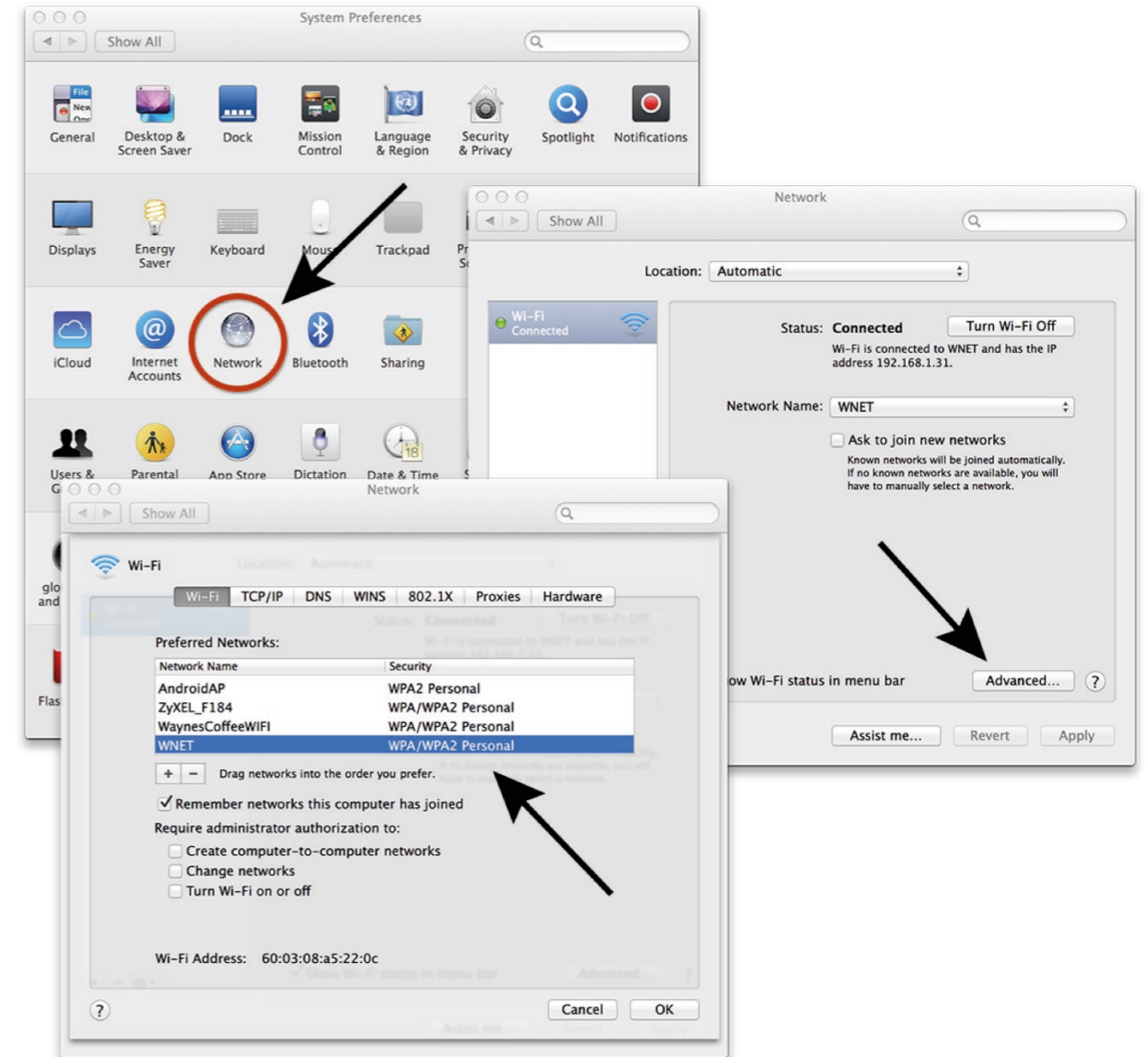
Next, on the web page in your browser, click "Other network" button and type your network's name and choose the correct encryption method. Press join.

When you click OK, the device will start connecting to your selected network. Connection in progress page will appear. Notification sounds emit indicating that connection attempt has begun. During the connection attempt the device will emit continuous sounds. After successful connection you will hear three short notes with rising tone. Red light goes off and green will keep blinking.

Type your Wi-Fi network password and click OK. The password you type is visible on purpose because you must ensure that you type it correctly. The field is case sensitive. If you don't have a password for your network (your network is open), leave the password field empty and click OK.

! **NOTE!** If connecting fails, you will hear three quick tones of low-high-low and red light will keep blinking. The EMFIT QS device will automatically return to access point (AP). Try again and make sure you have typed the Wi-Fi network's password correctly.
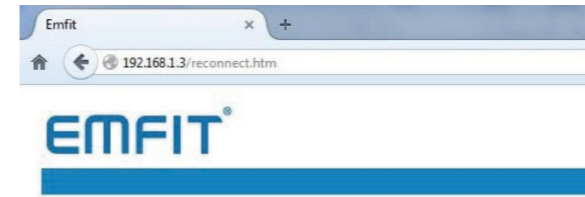
Red light will stop blinking. Your EMFIT QS device has now been configured.

! **NOTE!** When QS device is connected to the selected wireless network, you will not be able to access your device from this page anymore without resetting your device to Access Point (AP) again. But you have no need for it unless you wish to connect to a different wireless network or if you have changed your home network's password.

! **NOTE!** If red light is still blinking after 2 minutes, something went wrong and your device is not connected to our server. Try once more by restoring to factory settings. See chapter 9. on page 23 for instructions for instructions on Restoring EMFIT QS device to Access Point (AP) mode and factory settings

8.3. Checking device's data flow to server's database

The system begins to gather data after one minute of detected presence in the bed (green light will turn on as the system has noticed that you are lying on the bed).

To check this, lie on the bed until green light stops blinking and turns on. "Monitor" section of qs.emfit. com should now start showing graphs. Then leave the bed. After a short while "Monitor" section should say "Absent".

Please note that Sleep Period data will not be available until at least one hour of sleep. Sleep classification however needs a minimum of two hours of presence in bed.

! **NOTE!** Trends are not available until four nights of sleep.

9. Register the device

After successful Wi-Fi connection, it is time to register your device.
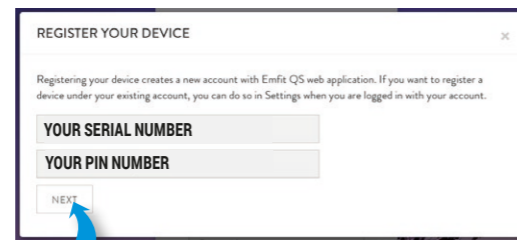
1 Go to **https://qs.emfit.com** and click "Register your device".
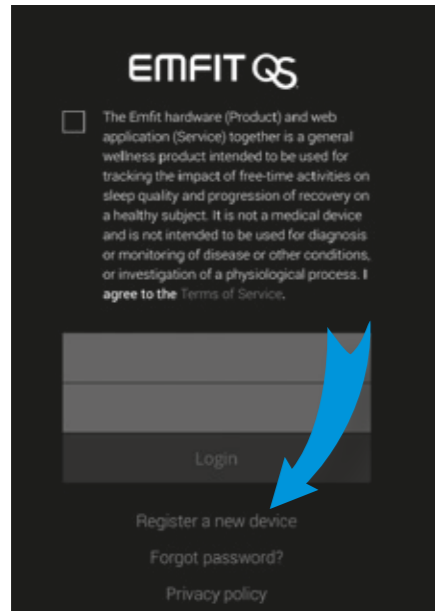
2 Locate your serial and PIN numbers on the back of the device.
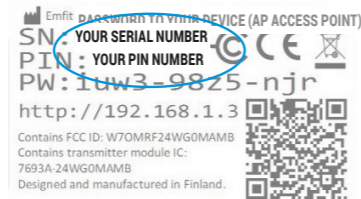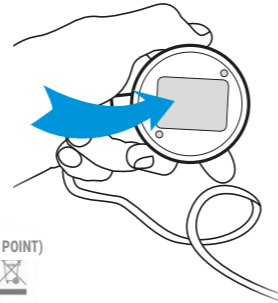
3 Insert serial number and PIN number of your device.

Click "next".

4 Fill/choose the details.

REGISTER YOUR DEVICE

Please fill your account details:

NAME YOUR DEVICE. FOR EXAMPLE "MY EMFIT QS"

YOUR EMAIL ADRESS. IMPORTANT! YOU MUST PROVIDE EMAIL FOR ACCESS AND VERIFICATION, AND IF YOU FORGET YOUR PASSWORD

RETYPE YOUR EMAIL ADRESS

CREATE A PASSWORD TO YOUR ACCOUNT

RETYPE YOUR PASSWORD

Optional field 1

Optional field 2

Language	CHOOSE YOUR LANGUAGE
Time Format	CHOOSE YOUR TIME FORMAT
Date Format	CHOOSE YOUR DATE FORMAT
Time Zone	CHOOSE YOUR CONTINENT
	CHOOSE YOUR TIME ZONE

REGISTER   Click "register".

5 This will open.

REGISTER YOUR DEVICE

Thank you!

One more step... You should receive an account verification email soon. Please check your inbox and click the link to verify your email.

CLOSE   Click "close".

6 Go and check your email for our verification email. Open it and click the link in it.

(If you do not receive the confirmation message within a few minutes of signing up, please check your Spam folder just in case the confirmation email got delivered there instead of your inbox.)

Hi,

An account has been registered with Emfit QS application with this email. If you didn't initiate this action, you don't need to take any further action.

Verify your account by clicking this link

7 You will be directed to the Emfit QS web application.

User Guide
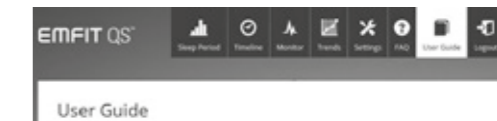
10. Restoring Emfit QS device to Access Point (AP) mode

Follow these steps if you need to connect EMFIT QS device to a different wireless network that has Internet access, or if you experience any problems with setting up your device. This action restores the device back to factory default settings (NOTE: Sleep data or registration details will not be deleted), and returns the device back in Access Point (AP) mode:

A) Remove the power supply cord from the device.

B) With using a paperclip or a needle, press and hold down the WPS / multifunction button on the back of the device:

C) Connect the power supply cord while keeping the button pressed down. Remain keeping the button pressed down.
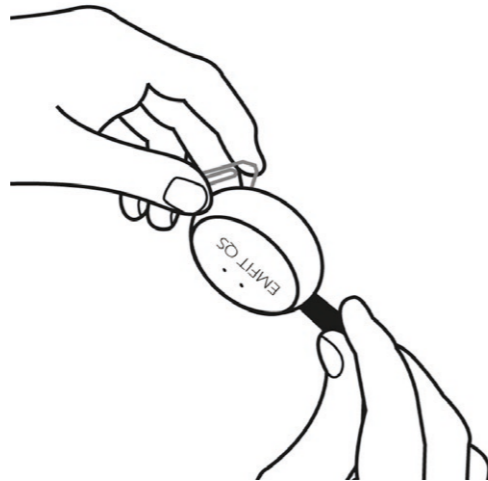
D) As the red light starts flashing, keep the button pressed down about 10 seconds until the red light stops flashing and turns on.

E) Release the button. Green and red light will start blinking alternately. Factory settings have been restored.

NOTE: Videos that will help you to understand how the restoring is done are available in the User's Guide at **qs.emfit.com** after you have logged in.

11. Meanings of lights and sounds

How EMFIT QS device LED lights and sound notifications behave in different situations. Sound signals are used during setup only to help the user interpret the status of the device.

During Setup

When everything goes well:

Case	Red LED light (light on the right)	Green LED light (light on the left)	Sound description
The device is powered and it is an AP (access point)	Flashing alternately with green LED (about once per second)	Flashing alternately with red LED (about once per second)	Beep - beep (two short beeps)
You connect to the device while it is an AP	No change. Green LED flashing alternately (about once per second)	No change. Flashing alternately with red LED (about once per second)	Beep (one short beep)
You went to the device's internal html-page at IP address: 192.168.1.3., choosed your own home Wi-Fi network and clicked to establish connection to it.	Flashes three times fast, then about 3 seconds pause, again 3 fast flashes, and pause, and so on...	No flashing light	Several low short beeps while establishing connection
Successfully connected to your home Wi-Fi network and Emfit server	Stops flashing	Starts flashing every 3 seconds (slowly). Lit when you are in bed for longer than one minute.	Two times short beep and one long beep (something like beep-beep-beeeeep)
Connects to your home Wi-Fi network but router is not connected to the Internet	After connection to Wi-Fi network remains flashing once every three seconds. QS is no longer in AP mode.	Stops flashing when connecting to Wi-Fi, but does not start flashing after connection: no connection to the Internet.	Two short beeps and one long beep ("beep-beep-beeeeep").

Fault cases:

Wrong password for your home Wi-Fi network or unknown connectivity issue between your router and EMFIT QS	Three fast flashes, 3 seconds pause, again 3 fast flashes and pause. When the device notices the connection cannot be established it returns back to the AP mode and red and green start flashing alternately.	Stops flashing during connection attempt. When QS notices that connection cannot be established it returns to AP mode and red and green start flashing alternately.	Several long beeps when establishing connection. Low pitched beep and beep-beep indicate return to AP mode.

During use

Network problems:

Your home Wi-Fi network has no Internet connection (for example temporary loss of Internet connection)	Flashes in cycles of three	Does not flash (person out of bed) or stays on (person in bed)
Emfit server does not respond (temporarily)	Flashes once (person out of bed) Does not flash (person in bed)	Does not flash (person out of bed)
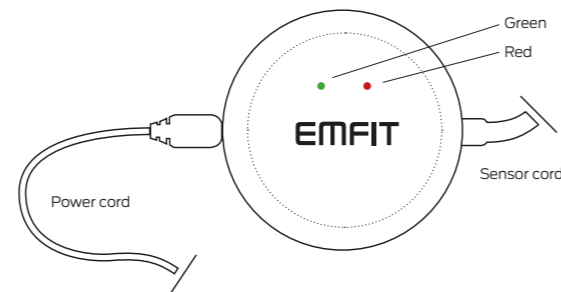
Data buffering, network connection is lost:

EMFIT QS has an internal memory (about 15 hours) where sleep data is stored if network or server connection is lost. Blinking LED lights are used to inform user when device is buffering sleep data to memory and when sleep data is released from memory to Emfit server.

Data buffering release, network connection up again:

Case	Red LED light (light on the right)	Green LED light (light on the left)
Person is sleeping or lying in bed. Wi-Fi network or connection to Emfit server reverts.	Flashes in parallel with green led in every 2 seconds	Flashes in parallel with red led in every 2 seconds

Green

Red

EMFIT

Power cord

Sensor cord

12. Using the device

After you have registered your device, installed it to your bed and hooked it up to your wireless network the device is ready to track your sleep.

You can acccess your sleep data at **qs.emfit.com.**

Please note that a minimum of two hours of sleep is required before sleep results can be viewed.

12.1. Overview of web interface

When you log in at **qs.emfit.com** for the first time the interface will take you to Devices tab. There may not necessarily be anything visible yet as the QS needs to track presence (at least one minute in bed until green light turns on) before device becomes visible.

First sleep results will be available after minimum of two hours of sleep.

Sleep periods tab gives you overview of your last night's sleep. You can click the small arrow next to each graph for detailed view.

Trends tab collects your sleep data for 30 day period. Here you can take a closer look how your sleep may have changed during the month. By navigating the upper buttons you are again able to see detailed view for each graph.

Monitor tab tells you current status of the device. While in bed it shows your breathing rate etc. in real time. It also shows how long you have been absent and if there is something wrong with network connection.

Timeline tab shows presence and absence periods for last 7 days.

On the Settings tab you are able to edit your account details and add new devices. You can also link your device with third party apps and enable Raw signal view.

User's guide tab includes the latest user guide.

You can log out from the web application by pressing the log out tab

Support button on the left bottom corner is used to contact us for any question or comment.

13. Understanding the data

13.1. Main display (dashboard) items

1. SLEEP SCORE
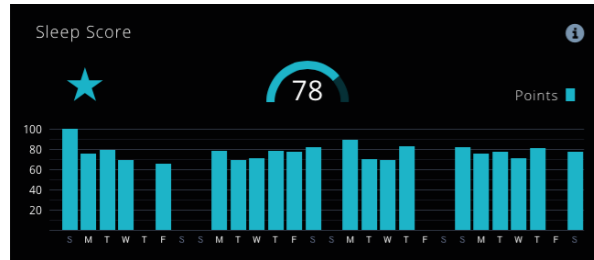
This is single number indicating how well slept night was. Number consists of total sleep time, amount of REM and DEEP sleep, and number of wakenings. Sleep Score breakup: Sleep Score= (total_duration_of_sleep + (duration_of_REM_sleep) *0.5 + (duration_of_DEEP_sleep) *1.5) - ((duration awake/3600) *0.5 + number_of_wakenings/15)) * 8.5

Simply said, this means that the more you sleep, the more you have REM sleep, and the more you have DEEP sleep, and the better your Sleep Score is. On the other hand, the more you are awake and the more often you wake up during the night, the worse your Sleep Score is.

By this formulation Sleep Score can reach values over 100, but in this case the value is truncated to a maximum of 100, which is indication of very good sleep.Usually values around 80 and higher can be regarded as good.

2. SLEEP TIME
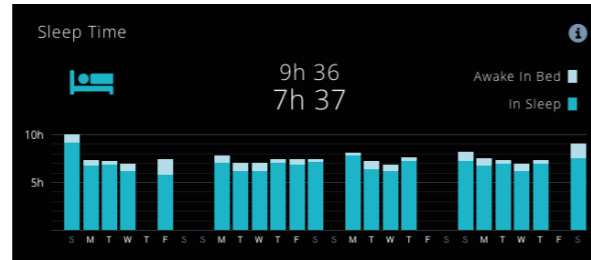
Here you see both time spent in bed and amount of sleep.

For adults, 7-8 hours of sleep is considered optimal, of course there are individual differences — some can manage with less sleep and some require more.

In one study it was found that people who sleep less than 6 hours perform worse in cognitive tests than those who sleep 7-8 hours, but people who sleep more than 9 hours also perform worse.

The need for sleep also changes according to a person's age. Infants may require up to 14 hours of sleep, whereas elderly people may be fine even with 5 hours of sleep.

With athletes, the research has shown that in several different sports, including swimming, tennis, football and basketball, increasing sleeping time to 10 hours per night resulted in improved speed, reaction time, sprint time and accuracy.

3. SLEEP STAGES
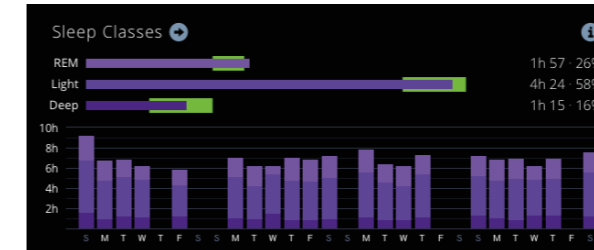
Here you see breakdown of sleep in to three stages: Light, REM and Deep sleep.

Green brackets indicate optimal range for each of the stages, and total durations and percentages are also given in numerical format.

All three stages have different physiological characteristics, and their meaning to your body is different.

• LIGHT sleep is transitionary state from awake state to DEEP sleep. Eyes are not moving, and muscle tone is decreased.

• In DEEP sleep physical movement and muscle tone is almost non-existent. Breathing rate is slow and steady, heart rate is slow and blood pressure low. DEEP sleep is essential for physical recovery and most physiological systems in you are in a heightened anabolic state, showing increased production of proteins, the essential building blocks needed for cell growth and repair and rejuvenation of the immune, nervous, skeletal and muscular systems.

• REM sleep is dreaming phase, characterized by rapid eye movements, paralyzed muscles, and variable blood pressure and heart rate. REM sleep is needed for mental recovery; during this sleep stage synaptic connections can be re-organized, which enables learning, storage of memories, and forgetting unnecessary things.

For complete recovery of your body and mind you need to have sufficient amount sleep in general, but also enough both REM and DEEP sleep.

REM sleep should constitute 20-25 % of your total sleep, and DEEP sleep 10-20 %. This leaves some 50-60 % for LIGHT sleep.

4. HRV RMSSD
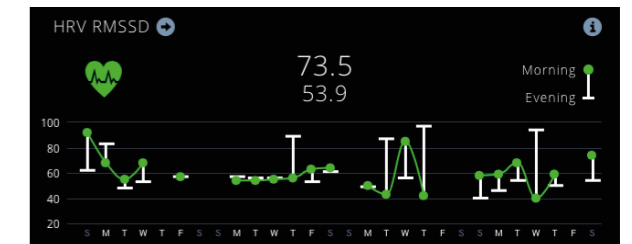
RMSSD, "Root Mean Square of Successive Differences", is one of the most widely used time domain heart rate variability values. It tells about the activity of our central nervous system, higher number indicates better recovery, lower stress, etc.

We show both evening and morning values. Low evening value tells that the day has been heavy, either due to mental stress, or due to physical exercise. With evening value athletes can see whether their training has been effective.

Morning value should usually be higher than evening value, indicating that there has been efficient recovery and resting during the night. Mathematically, RMSSD

is the square root of the mean of the squares of the successive differences between adjacent heart's beat-to-beat intervals.

In the scientific literature RMSSD is widely accepted as a measure of parasympathetic nervous system (PNS) activity. According to Wikipedia, PNS is responsible for stimulation of "rest-and-digest" or "feed and breed" activities that occur when the body is at rest, and complementary to that of the sympathetic nervous system (SNS), which is responsible for stimulating activities associated with the fight-or-flight response.

For efficient recovery from training and stress, it is essential that parasympathetic nervous system is active, and our body gets sufficient rest and replenishment. With HRV RMSSD value one can monitor what his/her general baseline value is and see how heavy exercise, stress, etc. factors influence it, and see when the value gets back to baseline, indicating for example capability to take another bout of heavy exercise. RMSSD can be measured in different length time windows and in different positions, e.g. supine, sitting or standing.

Morning RMSSD value presented here is average of all 3 minute window RMSSD values measured during last 90 minutes prior to waking up. This should give you indication of how ready and well rested your body is for the new day. Evening value is similarly measured within first 90 minutes in bed.

For more detailed analysis of full night HRV data you can delve in to the details by using arrow button next to i-button.

RMSSD value is highly individual and depends on age, gender, fitness level, stress level, lifestyle choices, etc. For this reason, one should monitor values for a few weeks, and only after that make conclusions on what

kind of implications different values have for him/her.

Generally, higher values indicate better health, fitness, etc. In short term RMSSD indicates readiness for the day, and in long term, for example along with training, RMSSD values tend to climb up.

Long term decrease in RMSSD may be indication of approaching over training condition.

5. TOTAL RECOVERY
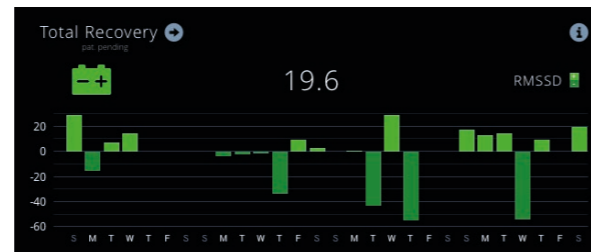
Total Recovery is simply difference between morning and evening RMSSD values. Usually it should be positive, indicating that there has been efficient recovery and resting during the night.

Of course, this should be analyzed with regard to activities of previous day: if previous day was very light (no stress, no heavy exercise) and evening RMSSD is relatively high, it is not reasonable to expect high Recovery number, because there is no load to recover from.

Values of Recovery are highly individual, and you should inspect them against your own baseline values, and also in comparison to Evening RMSSD values.

6. INTEGRATED RECOVERY
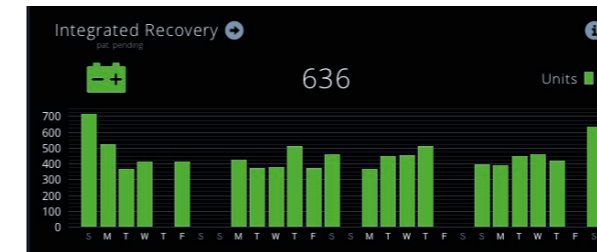
Integrated Recovery is the area remaining under the RMSSD graph, and in some sense it indicates how much recovery you gain during the whole night. For example, some people may start to recover very nicely (RMSSD graph shooting upwards) during early hours of the night, after they go to bed and fall asleep, but towards the morning hours they may start become anxious (for example because of work stress), and their RMSSD starts to decline. As a result, morning RMSSD may be quite low when compared to evening RMSSD, thus indicating poor recovery, even though during the night there has been some good recovery. This is where integrated recovery steps in, as it indicates also this good recovery earlier in the night.

Integrated Recovery and Total Recovery should be checked together; even if Total Recovery is low, but Integrated Recovery is medium or high with regard to ones own history, then there has been some recovery. On the other hand, if they both are low, then recovery is propably not sufficient, and one should avoid stressing him/herself too much, for example, avoid very heavy physical exercise.

7. ANS BALANCE

Autonomic Nervous System Balance tells whether the user is too excited (high LF value) or too phlegmatic (high HF value).

LF and HF refer to Low Frequency and High Frequency, respectively, and they both are common frequency domain measures of heart rate variability.

LF is the area measured in a frequency band of 0.04-0.15 Hz, and it is considered as a state indicator of both sympathetic/parasympathetic nervous systems.

HF is the area measured in a frequency band of 0.15-0.4 Hz, and it is considered as a state indicator of parasympathetic nervous systems.

In our system we use normalized units LFn and HFn, and the normalized units have been expressed as a percentage of the sum of LF+HF, i.e. LFn=LF/(LF+HF).

Diagram displays both LFn and HFn, and ideally, the indicator should stay near the 50-50 shaded line between values of 25 and 75.

Deviation beyond 25-75 or 75-25 line may be indication of insufficient recovery, high or chronic stress, general fatigue or some other malfunction in your body.

8. HEART RATE
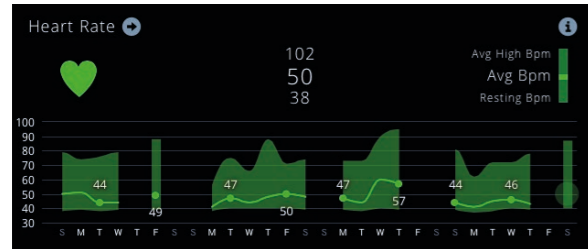
Avg BPM is simply average heart rate for the whole night.

To find the Resting BPM, your average heart rate is computed for every three-minute time window during the whole night, and the smallest value is chosen out of all these. In other words, it is the smallest 3-minute average heart rate you had during sleep.

Resting BPM can be used as a mild indication of stress or overtraining. After you have established your baseline Resting BPM during a couple of weeks, you can check out for notable deviations from this norm.

General rule of thumb is that if your Resting BPM bumps up more than 7 beats per minute, you should consider skipping the exercise or exercise little bit lighter, and find some means to relieve your stress. The same rule applies also if there is a notable decrement in Resting BPM value.

Rapid changes in Resting BPM should not be confused with long-term changes. For example, physical exercise tends to decrease resting heart rate over time, and this only tells that you are getting more fit!

9. BREATHING RATE
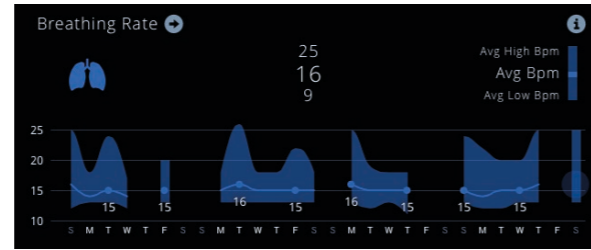
Avg BPM is simply average respiration rate for the whole night. The typical respiratory rate for a healthy adult at rest is 12–20 breaths per minute. Respiration rates may increase with medical conditions, such as fever or illness, and rise in Avg BPM may indicate this condition.

10. MOVEMENTS
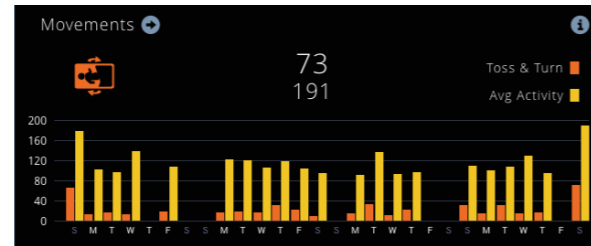
Avg Activity measures larger movements than those caused by heart beating and respiration, such as twitching leg or arm or changing position only slightly.

Bigger movements of your body are indicated by number Toss & Turn.

Higher value both in Avg Activity and Toss & Turn might indicate restless night, and these should be inspected against your own baseline values. Long term increase in these numbers may be indication of approaching over training condition.

13.2. More detailed information accessible through arrow button

Breathing Rate ➜

• **Sleep Classes**. Shows sleep architecture and bed exits. From this figure the user can see how different sleep classes are distributed throughout the night. Usually deep sleep phases should occur in 90-120 minute cycles, 4-6 times during the night. Alcohol or drug use, heavy training, or stress may change the pattern.

• **Heart Rate / Respiration Rate.** This figure helps to see when and how deep person's heart and respiration rate gets. Healthy individual should see clear pattern where heart rate goes down as sleep deepens, and goes up in light sleep and REM sleep.

• **Activity / Turns.** Gives indication how restless sleep has been. If there is lots of activity and turns, sleep quality is probably poor too.

• **Nervous System Balance.** This should remain generally near 50 %. If it peaks often over 25/75 % line, or it leans continuously to other side, one should consider relaxing (in case of high LF) or stimulating (in case of high HF) himself a little bit.

• **RMSSD / Heart Rate.** This tab gives most information to the athlete. After heavy exercise the evening RMSSD should be clearly down from the baseline (this can be used as indication of exercise load), and towards the morning there should be rising and fluctuating trend. This tells about the recovery rate during the night. If curve trends downwards, one may be getting ill, having digestive problems, sleeping bad, or stressing about work, relationship, or something else. Ideally RMSSD curve should be either horizontal (if there is no stress / exercise to recover from), or it should form rising trend towards morning (indicating healthy recovery).

NOTE! All screens have history of seven last days graphically displayed, which makes it easy to see where one goes each day in relation to other days.

RMSSD GRAPH (ESPECIALLY USEFUL FOR ATHLETES)
At dashboard, seven days mini graphs should give instantly indication how this particular day is in relation to earlier days, and whole night RMSSD graph gives useful information about daily loads and recovery during the night time. Here is short information about how to interpret whole night RMSSD graph:
In this graph we display total recovery in terms of RMSSD value, and also speed of recovery as RMSSD units / hour.

This should give several kinds of information:
1) If Evening RMSSD value is low (enough), it is indication that exercise has been (sufficiently) heavy.

2) If Morning RMSSD value is high (enough), it is indication that recovery throughout the night has progressed as expected, and you are ready for another heavy exercise.

3) If graph has upward trend, and Recovery Ratio is clearly > 1 there has been recovery during night.

4) If graph is mostly horizontal and Recovery Ratio is around 1, there probably has been no load nor recovery.

5) If graph has downward trend and Recovery Ratio is clearly < 1, it might be indication of uncontrollable stress, or about some physical condition (some sickness creeping in, digestive problems, overreaching, etc.)

This information might help you to adjust your training load. Also resting HR value is useful, if it suddenly bumps up, there might be something wrong in your body.

RMSSD graph should consist of equally spaced dots (one at every 3 mins, 20 dots / hour). If there are missing dots, it is indication of bad signal. In this case you should check the location of sensor, so that it is directly under your chest while you sleep.

14. Troubleshooting

• **EMFIT QS can't find my wireless network during setup**
EMFIT QS searches for open network when powered up in AP mode (after factory reset or taken first time out from the sales Box). Make sure that wireless network is available and it is not hidden. For connecting to hidden networks please see chapter 8.2.4.

• **EMFIT QS fails to connect to my wireless network (fail sound after connecting attempt)**
EMFIT QS supports only Wi-Fi 802.11 b/g/n (2,4 Ghz only). Wi-Fi channels 11-13 are not supported. Make sure your router is not set to these channels and that speed is 2,4 Ghz. Refer to your router's user manual for help.

Make sure you have typed the Wi-Fi password correctly.

If you can't get it connected after another attempt please contact customer support.

• **Do not use special characters like ´#! or others in the name of your wireless network.**

• **Red light keeps blinking even though I have connected QS to my wireless network successfully (success sound after connecting attempt)**
Red light should stop flashing completely within 2 minutes after successfully hooking EMFIT QS up to your Wi-Fi. This means that EMFIT QS is communicating with Emfit cloud server.

There is nothing that the user can do to speed up this process. Occasionally red light may flash when the device is being used. There may be a temporary error that prevents the device from communicating with the cloud service.

You can leave it be even though the red light is flashing. If red light does not stop flashing within 24 hours please contact customer service.

• **Red light is constantly on**
There may be something wrong with your sensor. Please contact customer support.

• **My sleep period is too long**
Too long sleep periods are usually caused by the device not registering that you have left the bed. If you need to remove power supply after wake up please wait until green turns from continuous on state to blinking. This happens usually within 10 seconds after getting up and means that the device has registered bed exit. Too long sleep periods can also be edited manually at the user interface.

• **My sleep period is not registered or data is missing**
Usually sleep periods will be available within one hour after getting up from bed. Connection cutoffs (either with your wireless network or at Emfit server) may however prolong this time. If you continue having this issue please contact customer support.

• **My sleep data is inaccurate**
Device may every now and then make false assumptions about your sleep. For example device may interpret that you were asleep while in reality you were awake but completely still. We are constantly working to improve our sleep algorithms to make sleep detection as precise as possible.

Your EMFIT QS will always be automatically updated to the newest possible firmware with newest improvements.

• **Green light stays on even if I have left the bed or green light keeps blinking when I'm on bed**
If you have just recently taken the device into use please wait for a couple of days. During the first days sensitivity adjustments are being made and most likely problem settles on its own over time. If you continue having this problem after a few days of use please contact customer support.

· I don't know which Wi-Fi frequency and channel my router uses

You can find it out:

On Windows open Command Prompt:
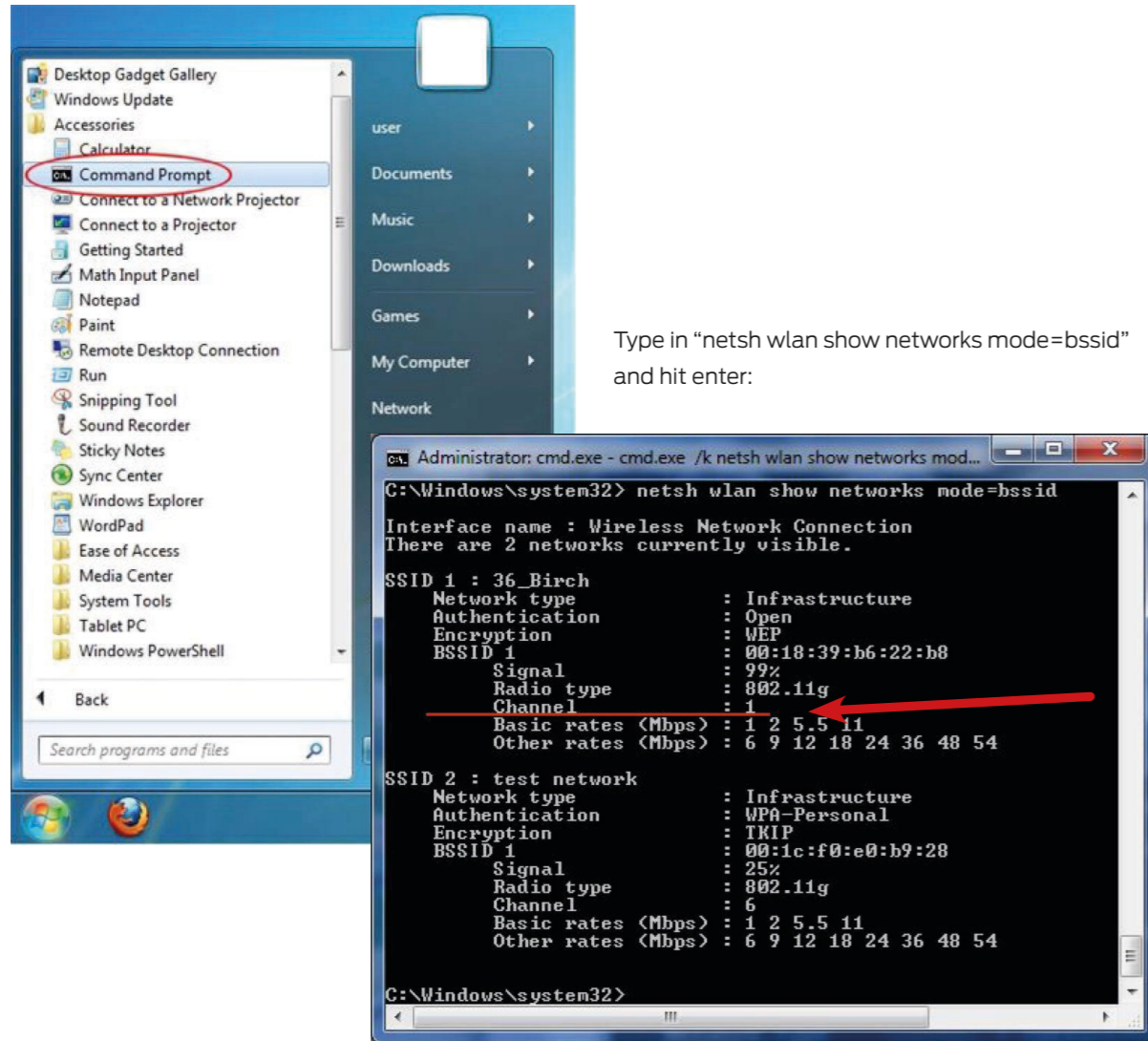
Type in "netsh wlan show networks mode=bssid"

and hit enter:

On Mac, click the top right toolbar icon while holding ALT key pressed down. This lists networks with additional details:
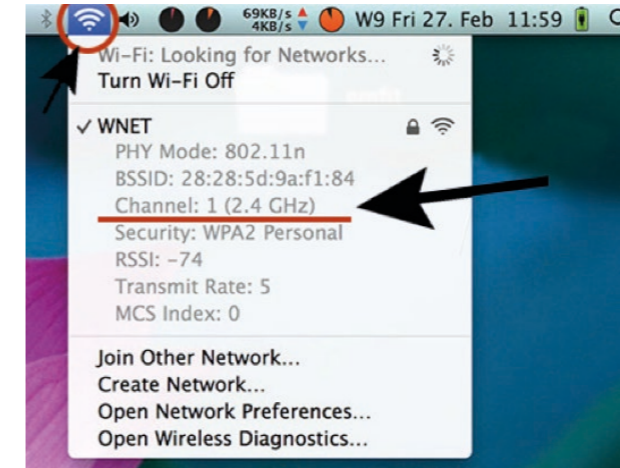
If you don't have the toolbar icon enabled you can enabled it here:
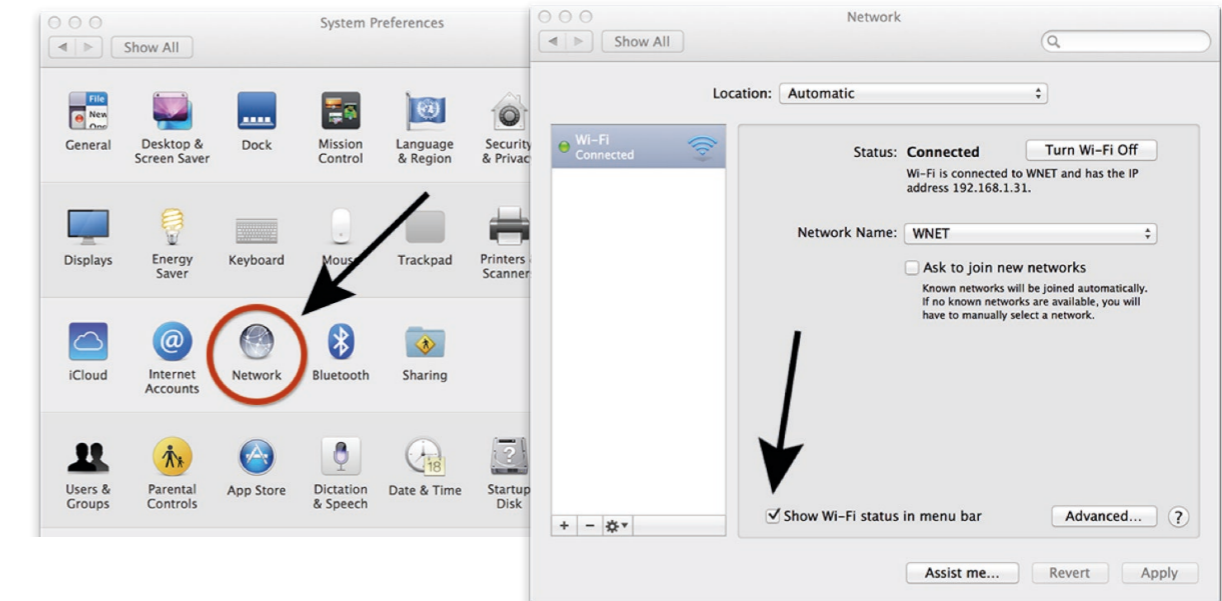
15. Technical specifications

Model:	IP-9360 (sensor attached is model L-0656)
Wi-Fi	IEEE 802.11 b/g Wi-Fi Transceiver Module. Compatible with IEEE 802.11b/g/n networks. Channels 1-11.
Memory:	128 Mbit (16Mbyte), with sampling rate 100Hz 15,5 hours
Operating voltage:	5V DC external power supply
Power supply:	Manufacturer: Globtek Inc. Model No. GTM41076-0605 100-240V~, 50-60 Hz, 0.16A-0.1A1
Input and output connectors:	Power supply input
Switches and controls:	Reset switch for returning to AP
Signal lights:	2 LEDs: green and red
Mounting:	Floor
Measurements (electronic unit):	ø 63mm x 20mm
Measurements (sensor):	542mm x 70mm x 1,4mm (without cable connection part)
Cable length:	1.8 meters
Total weight with cable:	230 grams
Surface material and color (sensor):	Artificial leather, white
Surface material (casing):	ABS plastic
IP rating:	IP20

16. Warranty information

In the unlikely event that your product needs guarantee service, please contact your dealer, distributor or manufacturer. To avoid any unnecessary inconvenience on your part, we recommend you read these instructions for use carefully before seeking guarantee service.

YOUR GUARANTEE

By this Guarantee, Emfit guarantees the product to be free from defects in materials and workmanship at the date of original purchase for a period of two (2) years from that date.

If within the guarantee period the product is determined to be defective (at the date of original purchase) due to improper materials or workmanship, Emfit will, without charge for labour or parts, repair or (at Emfit's discretion) replace the product or its defective parts subject to the terms and limitations below. Emfit may replace defective products or parts with new or refurbished products or parts. All products and parts replaced become the property of Emfit.

TERMS

Guarantee services will be provided only if the original invoice or sales receipt (indicating the date of purchase, model name and dealer's name) is presented with the defective product within the guarantee period. Emfit may refuse free-of-charge guarantee service if these documents are not presented or if they are incomplete or illegible. This Guarantee will not apply if the model name or serial number on the product has been altered, deleted, removed or made illegible.

This Guarantee does not cover transport costs and risks associated with transport of your product to and from Emfit.

This Guarantee does not cover:

a) periodic maintenance and repair or parts replacement due to wear and tear. Notice! Emfit bed sensor wears and tears significantly faster when installed on soft base like spring mattress.

b) consumables (components that are expected to require periodic replacement during the lifetime of a product such as non-rechargeable batteries)

c) damage or defects caused by use, operation or treatment of the product inconsistent with normal use

d) damage or changes to the product as a result of:
i. misuse, including:
treatment resulting in physical, cosmetic or surface damage or changes to the product
failure to install or use the product for its normal purpose or in accordance with Emfit's instructions on installation or use
failure to maintain the product in accordance with Emfit's instructions on proper maintenance installation or use of the product in a manner inconsistent with the technical or safety laws or standards in the country where it is installed or used
ii. the condition of or defects in systems with which the product is used or incorporated except other Emfit's products designed to be used with the product
iii. use of the product with accessories, peripheral equipment and other products of a type, condition and standard other than prescribed by Emfit
iv. repair or attempted repair by persons who are not Emfit employees
v. adjustments or adaptations without Emfit's prior written consent, including:
upgrading the product beyond specifications or features described in the instructions for use, or modifications to the product to conform it to national or local technical or safety standards in countries other than those for which the product was specifically designed and manufactured
vi. neglect
vii. accidents, fire, liquids, chemicals, other substances, flooding, vibrations, excessive heat, improper ventilation, power surges, excess or incorrect supply or input voltage, radiation, electrostatic discharges including lighting, other external forces and impacts.
This guarantee covers only hardware components of the product.

EXCLUSIONS AND LIMITATIONS

Except as stated above, Emfit makes no warranties (express, implied, statutory or otherwise) regarding product or accompanying or constituent software quality, performance, accuracy, reliability, fitness for a particular purpose, or otherwise. If this exclusion is not permitted or fully permitted by applicable law, Emfit excludes or limits its warranties only to the maximum extent permitted by applicable law. Any warranty that cannot be fully excluded will be limited (as far as permitted by applicable law) to the duration of this Guarantee.

Emfit's only obligation under this Guarantee is to repair or replace products subject to these Guarantee terms and conditions. Emfit is not liable for any loss or damage relating to products, service, this Guarantee or otherwise, including - economic or intangible losses - the price paid for the product - loss of profits, revenue, data, enjoyment or use of the product or any associated products - indirect, incidental or consequential loss or damage. This applies whether that loss or damage relates to: impaired or non-operation of the product or associated products through defects or unavailability while with Emfit, which caused downtime, loss of user time or business interruption inaccuracy of output from the product or associated products.

This applies to loss and damages under any legal theory, including negligence and other torts, breach of contract, express or implied warranty, and strict liability (even where Emfit has been advised of the possibility of such damages). Where applicable law prohibits or limits these liability exclusions, Emfit excludes or limits its liability only to the maximum extent permitted by applicable law. For example, some countries prohibit the exclusion or limitation of damages resulting from negligence, gross negligence, wilful misconduct, deceit and similar acts. Emfit's liability under this guarantee will in no case exceed the price paid for the product, but if applicable law permits only higher liability limitations, the higher limitations apply.

YOUR LEGAL RIGHTS RESERVED

Consumers have legal (statutory) rights under applicable national laws relating to the sale of consumer products. This guarantee does not affect statutory rights you may have nor those rights that cannot be excluded or limited, nor rights against the person from whom you purchased the product. You may assert any rights you have at your sole discretion.

17. Regulatory Statements

ELECTROMAGNETIC COMPATIBILITY (EMC) AND RADIO SPECTRUM MATTERS (ERM)

EUROPEAN UNION:
Declaration of Conformity
We, the manufacturer Emfit Ltd., hereby declare that Emfit QS model IP-9360 complies with the essential requirements of EMC directive 2004/108/EC , R&TTE directive 1999/5/EC and CE mark directive 93/68/EEC and carries the CE marking accordingly. Manufacturer's undersigned declaration of conformity (EU) is available by request from the manufacturer.

USA:
FCC notice to users
Contains FCC ID: W7OMRF24WG0MAMB
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio com-munications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and receiver.
• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult the dealer

To satisfy FCC RF Exposure requirements for mobile and base station transmission devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at closer than this distance is not recommended. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

CANADA:
Contains transmitter module IC:
7693A-24WG0MAMB
This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.
Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1)

l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

DISPOSAL OF THE DEVICE AFTER USE

In EU:
In conformity with the Waste Electrical and Electronic Equipment Directive (WEEE Directive 2002/96/EC), the device must be collected separately and returned to an authorized collection facility. The owner must take the device to the waste collection point specified by local authorities. For more information on how to dispose of the device, please contact the relevant authorities.

USA & Canada:
Please do not dispose Emfit electrical devices or accessories with your household waste. These items should be disposed of in accordance with the national collection and recycling schemes operated by your local or regional authority. Alternatively, you may return unwanted Emfit devices and electrical accessories to any Emfit approved distributor or dealer in your region.

RESTRICTIONS OF THIS RADIO EQUIPMENT

Norway:
Use of this radio equipment is not allowed in the geographical area within a radius of 20 km from the centre of Ny-Ålesund, Svalbard, Norway.

Revision history

Release date		Modifications
17.10.2016	v1.0	First release
31.10.2016	v1.1	Minor text changes & additions
22.11.2016	v1.2	Minor text changes & additions
7.12.2016	v1.3	Minor text changes & additions
23.2.2017	v1.4	Minor text changes & additions
6.6.2017	v1.5	Minor text changes & additions
5.7.2017	v1.6	Minor text changes & additions
4.10.2017	v1.7	Minor text changes & additions
25.10.2017	v1.8	Minor text changes & additions
22.1.2018	v1.9	Minor text changes & additions
9.2.2018	v1.10	Minor text changes & additions
19.3.2019	v1.11	Minor text changes & additions

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