



HANDBOOK

Instruction Manual | Biofeedback-Training | eSense-App

Version 5.6.1 | 08.02.2022

Please read these operating instructions carefully before using the unit for the first time.



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Features of the eSense Pulse

The eSense Pulse is a pulse sensor that uses a smartphone/tablet and an app to accurately measure heart rate variability. We focus not only on measurement, but also on biofeedback training to improve your heart rate variability and health!

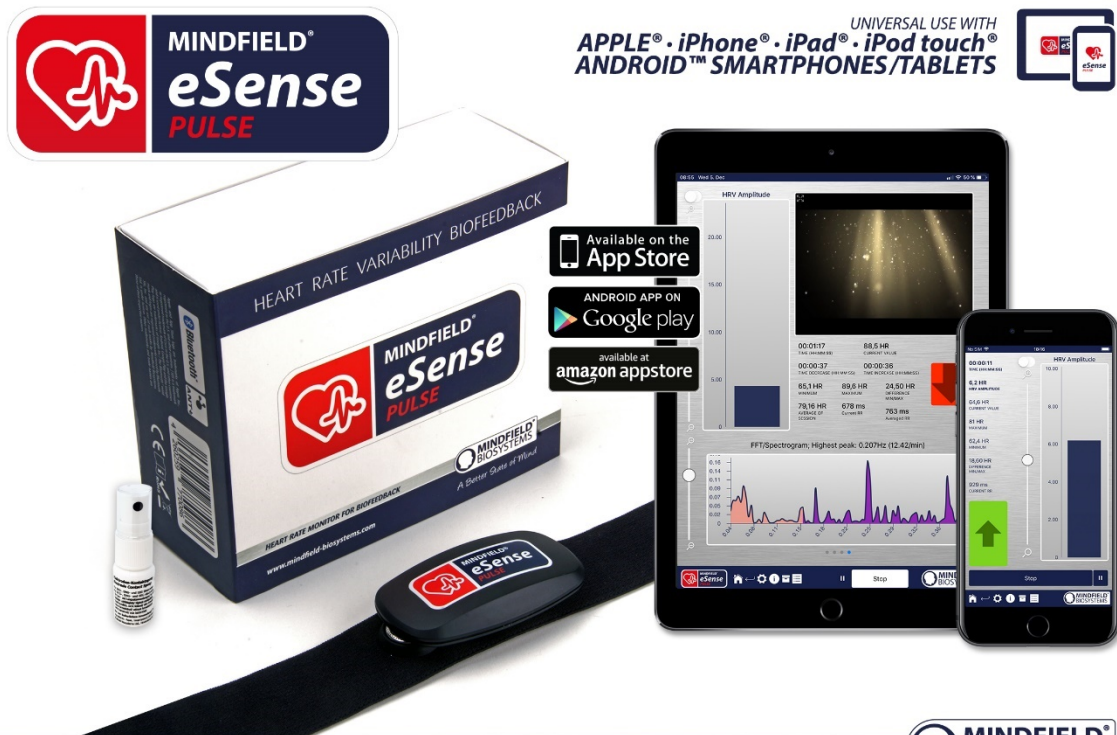
The eSense Pulse with the eSense App offers you:

- a precise 1-channel ECG with 500 Hz sampling (internal)
- transmission of RR distances in milliseconds at 5 Hz via Bluetooth Low-Energy
- a chest strap that is comfortable to wear, washable and durable
- optimal skin contact with the help of supplied electrode spray
- unlimited recording duration
- unlimited number of sessions and users
- extensive statistics on heart rate variability (time and frequency data)
- Real-time Fast Fourier analysis with spectrogram
- breathing aid for breathing training with freely adjustable intervals, auxiliary tones and more
- Export of measurement data as CSV file, compatible with other software programs for further analysis (e.g. Kubios)
- Export of curves, diagrams, and statistics as a PDF report.
- To train and improve HRV, the app offers a wealth of biofeedback feedback on HRV amplitude:
 - Bar feedback (HRV or breathing aid)
 - Curve feedback (HRV and breathing aid)
 - Video feedback (videos included and your own videos may be used)
 - Music feedback (music included and your own music may be used)
 - Tone feedback (change of pitch by the measured values)
 - Tactile feedback through vibration (only smartphones, tablets cannot vibrate)
 - Feedback from smart bulbs (Bluetooth bulb and Philips Hue products are controllable.)
- Set any number of markers during a recording
- Different, premade training procedures are included in the app
- Free training according to your wishes with any biofeedback variant or several at the same time
- Extensive in-app help and manuals
- Regular updates of the app
- Integration with a real breathing sensor to record respiration during the HRV measurement (eSense Respiration sensor, optional available)

Included in the package

Scope of delivery of the eSense Pulse:

- Mindfield® eSense Pulse Sensor incl. battery (lasts approx. 1 year) and spare battery
- Electrode contact spray
- eSense App from Mindfield (Apple App Store, Google Play or Amazon App Store)
- Detailed instructions for effective biofeedback training



News

In addition to the usual bug fixes and small improvements, we have once again improved the design and navigation with the new version 5.1.0 of the eSense app. This means that the app runs even faster and smoother now.

Another new feature is the extended view of the archive with which you can track and evaluate your measurements over a longer period even better.

We have also optimized the cloud view. This means that the cloud functions can be used even more effectively.

However, you still have the option of using the app as usual with all previous functions without creating an account.

General information on heartbeat and heart rate variability

Our hearts keep us alive and work tirelessly throughout our lives. It pumps the blood through our body, so that oxygen-rich blood penetrates all the parts of our body and oxygen-poor blood is enriched again in the lungs with fresh oxygen. But it also keeps everything moving, including the transport of nutrients, hormones, immune cells, etc.

It is easy to know that our heart is beating, you can feel your pulse or even hear it when you put one ear to the chest of another person. Since time immemorial, we have been studying and measuring the functions of the heart and measuring the heartbeat is essential.

Depending on the situation, our heart is able to regulate the heartbeat. When we sleep, it usually beats slowly and evenly, when we exercise, it beats fast and adjusts its frequency constantly. Depending on the creature, the resting pulse changes: only six heartbeats per minute for a blue whale and 1,000 heartbeats per minute for a shrew. We humans lie with approximately 60 heartbeats per minute in the lower range, infants have a faster resting pulse of approximately 130 beats per minute. With great effort, our heart can also beat at over 200 beats per minute.

Heart rate variability (HRV) refers to the ability to change the frequency of the heart rhythm. Even at rest, there are spontaneous changes in the time between heartbeats.

Our body has a multitude of regulatory mechanisms to change the heart rhythm. Two essential components are the sympathetic nervous system, which activates and accelerates the heartbeat, and the parasympathetic nervous system, which acts as a brake to slow down the heartbeat.

A healthy person constantly adapts the heart rhythm to current requirements. In addition to physical exertion, such as sport or physical work, psychological exertion such as stress also results in an increase in the heart rate. The heart rate sinks again when the strain is relieved and the body relaxes. In humans, heart rate variability ranges from 10 (low, a sign of stress)

to 30 (high, a sign of relaxation).

The more our body is able to regulate the heart rate (the greater the heart rate variability), the healthier we are. If the heart beats only rigidly, a person is about to die.

The measurement of heart rate variability is a large field in cardiology and is used for extensive diagnostics. With the eSense Pulse, we want to **focus on biofeedback training**, i.e. **improving heart rate variability**. To describe the current state and progress of the training, the eSense app also provides the essential statistics and analyses of HRV.

Introduction to eSense Pulse

There are various methods for measuring the heartbeat. With the eSense Pulse, we have decided on a chest strap that performs a 1-channel ECG measurement. There are two electrodes in the chest strap which require good, direct skin contact. The chest strap must always be worn under clothing.



In order to ensure a good contact between the electrodes and the skin, the enclosed electrode contact spray or an equivalent electrode gel should be used. Without it, the heartbeat sensors will not take sufficient measurements, which makes a precise HRV measurement difficult. For more information, refer to [Training procedure](#) on Performing a Measurement from page 12.

The eSense Pulse uses a 500 Hz sampling rate (500 times per second) to determine heart beats and wirelessly transmits the time between two heart beats to your smartphone/tablet and the eSense App in milliseconds via Bluetooth. Compared to the normal electrocardiogram (ECG), in which the waveform is very important, the measurement of heart rate variability focuses on the temporal resolution of the RR intervals.

With this data, the eSense App can then perform various calculations, such as determining the

heart rate (beats per minute or, colloquially, the pulse), the heart rate variability with various analysis parameters and biofeedback training. In chapter [Explanation of the individual measured values](#), all parameters of the eSense App and their meaning are explained clearly in detail from page 22.

It also important to note that heart rate variability benefits respiration. Of particular interest is the coupling of heartbeat and respiration in order to determine the degree of coherence or synchronization of heart rhythm and respiratory rate. This is also done in the eSense App.

The heart rate increases when inhaling and decreases again when exhaling. This phenomenon is called respiratory sinus arrhythmia (RSA) and is used to check the balance of the nervous system. Biofeedback training in the eSense App uses this phenomenon to improve heart rate variability with the help of a breathing target.

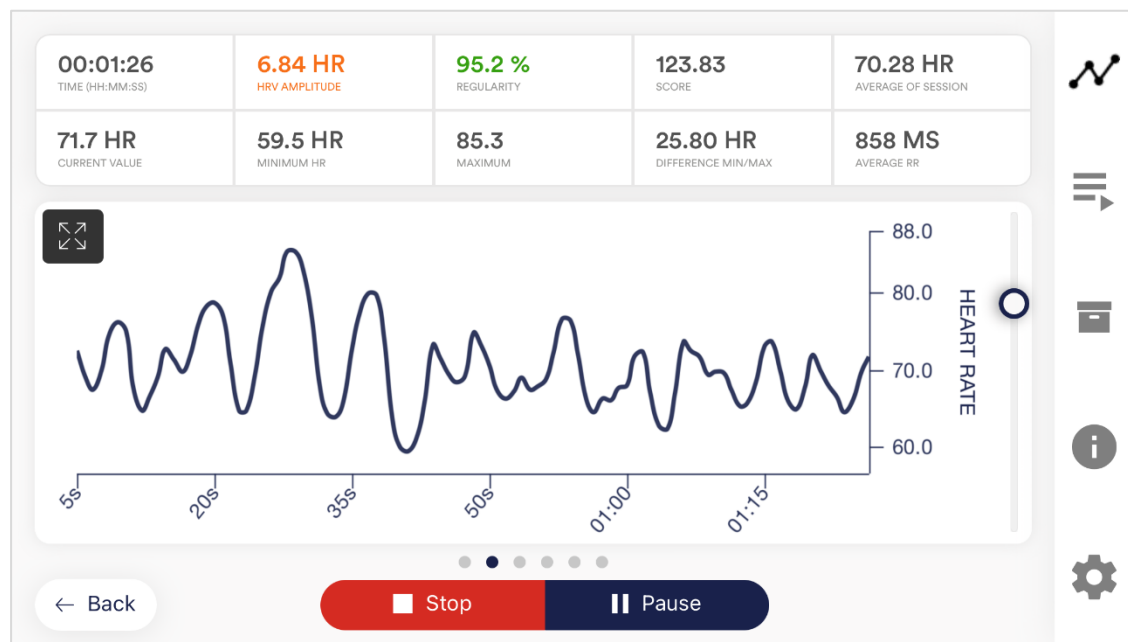
Regular biofeedback training with the eSense Pulse has a positive effect on heart rate variability and RSA, and both have a positive effect on a number of stress-related problems. Bring your nervous system back into balance!

Heart Rate Variability and Biofeedback Training

In order to reduce stress and its symptoms, biofeedback training can be performed seeking to **increase** heart rate variability.

Biofeedback training is quite applicable to heart rate variability. In stress medicine and psychophysiology, HRV biofeedback is used for depression, heart disease, asthma, anxiety disorders and insomnia. HRV biofeedback is also widely used in coaching and competitive sports. Improving HRV and the connection between breathing and the heart can help relieve tension, cope with stress and anxiety, and contribute to a more relaxed response in everyday life. If you suffer from an illness, do not treat yourself and always consult a medical professional. The eSense Pulse is not a medical device and may only be used to reduce stress.

The eSense Pulse is a very precise device. It can record heartbeats and display them, for example, as a measurement curve. Take a look at the following example of a measurement at rest and with even, slow breathing:

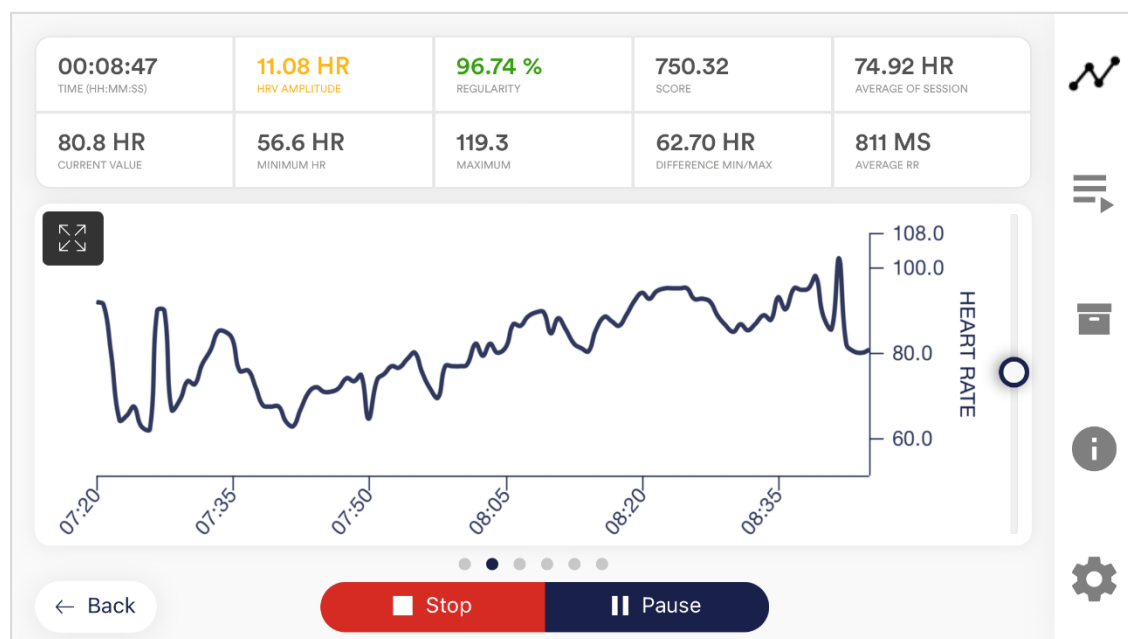


Example measurement curve from eSense Pulse at rest and pronounced heart rate variability.

As you can see in the example above, the curve is a distinct sine wave and the amplitudes are very uniform.

The aim of HRV biofeedback is to increase heart rate variability, specifically its amplitude. In other words, to maximize the difference between low heart rhythm and high heart rhythm in the interplay of inhalation and exhalation, rest and demands.

Under demands and with uneven breathing, HRV and its curve shape decreases significantly, as shown in the figure below:



Exemplary measurement curve eSense Pulse for tension or demands and low heart rate variability.

In the above example, the curve is uneven, and the deflections are different. Especially from 6:30 and 6:50 the line is almost horizontal with almost no amplitudes.

If respiration is included, the eSense App offers various ways to visualize it and to define respiration in a certain rhythm. The coupling of heartbeat and respiration is greatest in most people when breathing at about 4.5 to 6.5 breaths per minute.

In the eSense app, you can do a free training or complete predefined procedures. **The amplitude of HRV is measured and an increase is providing positive feedback, while a decrease provides negative feedback.** A change in breathing is also linked to feedback.

For feedback, there is, for example, a video, that continues to run in the positive case (stops in the negative case), music, whose volume changes, tones, which change pitch, vibration of the Smartphone and much more. Of interest is the function for controlling a smart light bulb (Philips Hue or Magic Blue), whereby heart rate variability is reflected in the change in color and brightness of one or more lamps. You can use your stress level to illuminate an entire room.

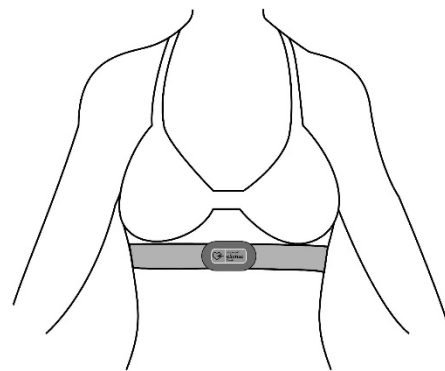
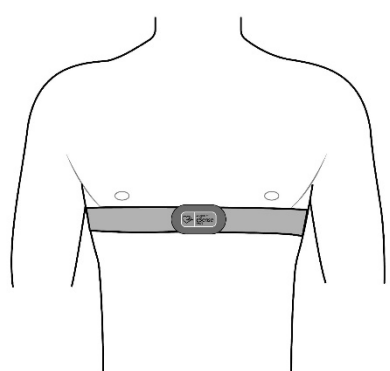
A biofeedback training session consists of four training phases. Plan about 60 to 90 minutes for the first session, during which you can do the training undisturbed and in one session. Detailed instructions can be found in the chapter, "Training sequence."

Operating instructions for the eSense Pulse

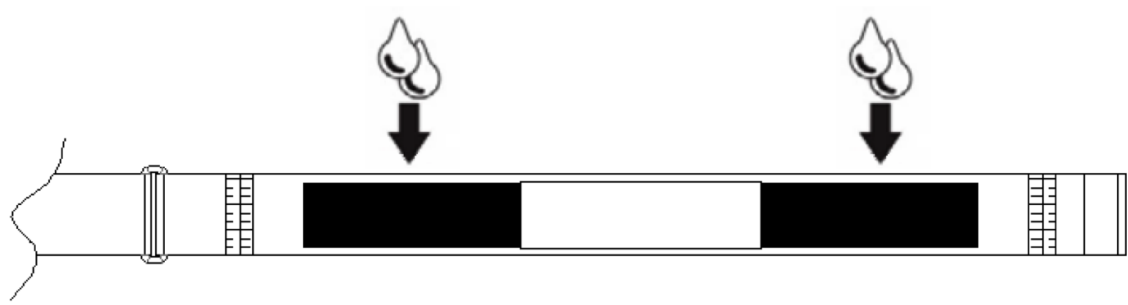
Contents of the packaging:

- eSense Pulse sensor unit (with colored eSense Pulse logo)
- eSense Pulse Chest Strap, variable length adjustable
- electrode spray
- manual

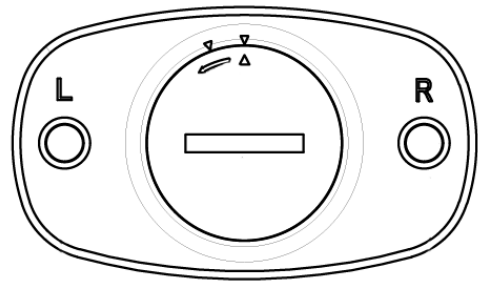
Remove the eSense from its packaging. Put on the chest strap as shown and adjust it to the correct length.



The strap should be tight, directly under the chest muscles, but not uncomfortably tight or squeezed. Once you have adjusted the belt, remove it again to apply a small spray of the enclosed electrode contact spray to each electrode. This surface separates the two electrodes from each other! No "bridging" may occur here.



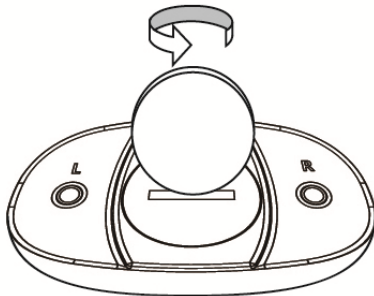
This process significantly improves the conductivity and the ECG signal becomes clean and precise. Put on the belt again and press the eSense Pulse Sensor on the two push buttons. **Make sure that the eSense logo on the front is not upside down for a person looking at you. You will also find an "L" for left and an "R" for right on the push buttons on the sensor.**



Now the eSense Pulse is ready to use and can be connected to the eSense App. In case of any connection problems, briefly remove the sensor and reconnect it to the belt. This will switch it on and off. **To prevent the battery in the sensor from being used up unnecessarily, always disconnect it from the belt when not in use.**

Battery Change & Battery Information

The battery has a service life of approx. one year if used regularly. You can read the current state of charge in the eSense App. A replacement battery type CR2032 is available in our online shop or in any electronics store. Dispose of a used battery professionally and not in the household waste. Batteries are very dangerous if swallowed. For this reason, keep batteries and small parts away from children. If a battery has been swallowed, consult a doctor immediately.



To change the battery, open the battery compartment by turning it counterclockwise with a coin. The battery is facing up with the positive pole. Insert the new battery and close the battery compartment again by pressing on the cover and turning it clockwise for a short time.

Cleaning and Care

Important instructions for cleaning and care:

- Do not wash the belt and sensor in the washing machine or put them in the dryer.
- Before cleaning the belt, remove the sensor as it is not washable.
- You can wash the strap by hand, but do not use water warmer than 30°C.
- Ironing, bleaching and heating are strictly forbidden.
- Do not drop or use force against the sensor.
- Avoid exposing the sensor to high temperatures or sunlight.
- If the eSense Pulse is stored near freezing, allow it to warm to room temperature before next use.
- Do not attempt to open the sensor except for the battery compartment.
- If you will not be using the eSense Pulse for a long time, remove the battery from the sensor.

Preparation and start of the app

Create the conditions needed for a successful training:

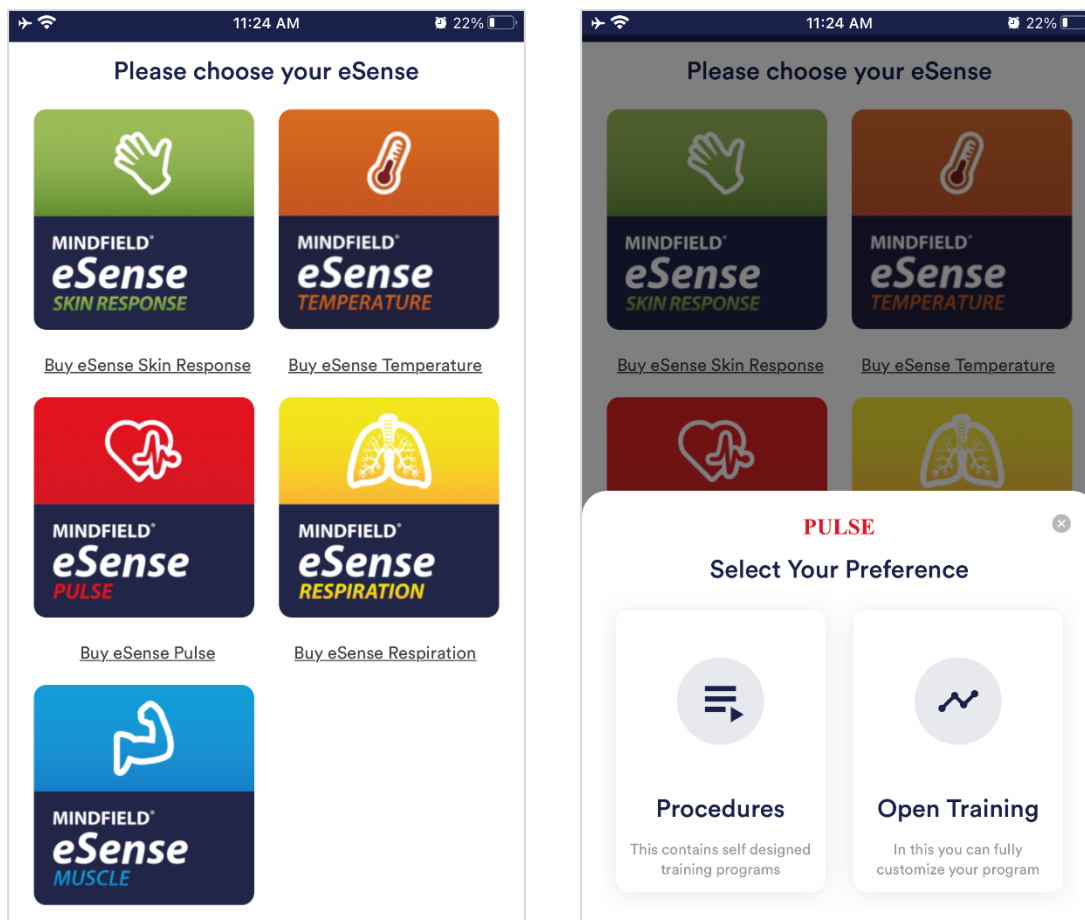
- find a quiet room (mobile phone etc. switched off)
- appropriate temperature of 20-22° C (68-72° F)
- convenient seating

- comfortable clothing

Strong physical activity before measurement should be avoided. In order to obtain comparable measurements, you should always **train under the same conditions**.

The **number of sessions** required for reliable success is relatively small compared to other biofeedback training sessions. Usually, six to ten sessions are sufficient. As far as the duration of a session is concerned, it depends on your ability to concentrate, but should not exceed 30 minutes. If you are experiencing severe fatigue, the training should be shorter and a higher number of sessions should be done.

The next step is to start the app. At the beginning you can choose between a free training and a procedure. We recommend that you start with a procedure. We present you both below.

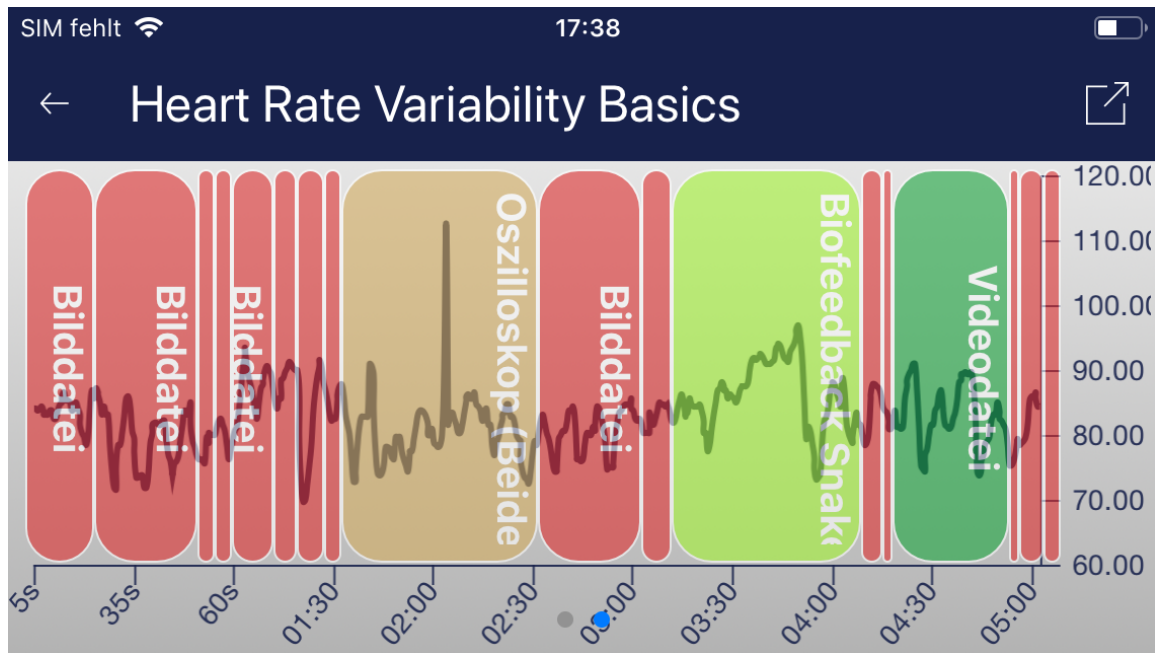


Choose between procedure or open training after starting the app

Procedures

A procedure consists of different modules. The procedures can be used, for example, to implement instructions for relaxation, a stress test, a defined biofeedback training session or tasks for research purposes.

The possibilities are manifold. During a procedure, your heart rate variability is naturally recorded. At the end of a procedure, a summary is displayed, showing your readings for each module and the overall view.



Overview after a procedure

We recommend that you **try the demo procedures** included in the app. These give you a guided overview of the different modules and functions.

The included procedures are also protected by a password in order that those can't be edited or deleted by accident. You can any time create a copy of those procedures without a password and change it as you wish.

We also explain in detail how you can create and edit your own procedures in the chapter procedures settings.

Open Training

As a second option you can also conduct an open training. This is compared to the procedures a bit more complex. We therefore explain a typical open training session which consists of 4 training phases.

Preparation and start

1. Follow the first steps of preparation from the previous chapter and choose an open training in the selection screen after starting the app
2. Now start a free measurement (simply press "Start" in the main screen) and take a first look at the measured values of your pulse rate. An adult's resting heart rate is usually between 60-80 heartbeats per minute. You will immediately see this value as the current measured value with the unit "HR" (heart rate).
3. In order to be able to compare sessions optimally, you can set the time for a measurement in the settings of the eSense App and limit it to a value, e.g. 10 minutes. The measurement then stops automatically after this time has elapsed. In the default setting of the eSense App, the measurement duration is unlimited. It is recommended to set a time after the first experiments and to adjust the settings to correspond to the desired, regular training duration. This way, you will get an optimal evaluation and be able to compare your training sessions later on.

First training phase (observation and experimentation, determination of the actual state)

1. First, determine a 10-minute baseline (default state without influence) at rest. It is very important to always compare measurements of the same length, so use the option in the settings to set the session length to a fixed duration. Now set the session length to 10 minutes.
2. Try to relax as much as possible **and DO NOT observe the measured values** during these first 10 minutes, this would compromise the measurement.
3. Use your breathing to relax, breathe calmly, deeply and evenly as you feel comfortable
4. Keep your smartphone or tablet in landscape mode. Look at your HRV curve **after the first 10 minutes**. Were there sections of an even curve? Were there strong fluctuations and irregularities? How do you rate your ability to relax during the measurement? You may already be able to determine a connection between the curve and the tension or relaxation you feel. If not, no problem – this will come. Good relaxation goes hand in hand with high heart rate variability and an even curve. Distractions and irregular breathing will result in a decrease in HRV and an irregular curve.



Example of a measurement curve of a 10-minute baseline

5. After completion of the 10-minute baseline, you will first be shown a survey. Answer the questions and make notes if necessary. You will then see a pie chart showing you the time when HRV has increased, decreased or remained the same. The more HRV has risen, the better. Next to the pie chart, you will see a table with measurements and statistics. These are used to assess your condition and compare training progress. In chapter [Explanation of the individual measured values](#), all parameters of the eSense App and their meaning are explained clearly in detail from page 22.
6. This is now your initial training status. Of course, the respective day also plays a role: It should make a difference whether you measure after a stressful working day (or even during work) or at the end of a relaxed weekend. **Use the corresponding function of the app to export this baseline as a CSV file. You can do this by calling up the measurement in the archive. With this, you can later (besides the archive) also access your baseline in other ways (e.g. in Excel). You can also export a PDF file of curves and statistics from the archive.**
7. One more tip: If the measured values are disturbed for no apparent reason, the skin contact was not optimal, or the sensor was electrostatically charged. To "discharge" the sensor, remove the battery once and reattach the sensor to the chest strap **without the battery** for a few seconds. Then reinsert the battery. Use sufficient electrode spray and repeat the measurement.

Second training phase (targeted biofeedback training based on the measured values)

1. The second training phase consists of several measurements, which should always be

carried out according to the scheme described below. You should practice targeted relaxation with the help of feedback.

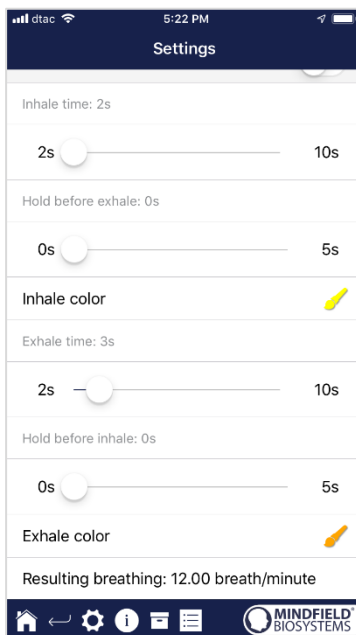
2. Start the measurement and observe your measured values for a while. The aim now is to increase the amplitude (i.e. the size) of the heart rate variability. In the main screen of the app in portrait format, you see the amplitude in the form of a bar. This is the most direct form of display. In landscape mode, you see the HRV amplitude as a numerical value.



Amplitude

Two images of the HRV bar in portrait format and the HRV curve in landscape format with the HRV amplitude marked.

3. First of all, try to increase the HRV amplitude by relaxing and breathing calmly and evenly. You can test different approaches and techniques of relaxation, such as conscious control of breathing (deep inhalation and exhalation), muscle relaxation, auto suggestion and much more. Here, your joy of experimenting is in demand! The device gives you precise information about the resulting effects. Also observe small changes in the measured values. Remember the maximum HRV amplitude you could achieve.
4. Practice an increase in heart rate variability, including the breathing aid. You can activate the breathing aid in the app settings, it is not active by default. Activate it and start breathing training at your usual breathing rate. This will, in most cases, be between 12 and 15 breaths per minute. This is faster than quiet breathing during deep relaxation. However, it is easier to start with your "normal" breathing first and then gradually slow down your breathing pace to below 10 breaths per minute. Set the inhalation and exhalation times in the breathing target as desired. (For 15 breaths, set 2 seconds for inhalation time and 2 seconds for exhalation time, or 3 seconds for inhalation and exhalation time if you want to try 10 quiet breaths per minute). It is helpful to breathe out a little longer than in.
5. Here is an example of a first exercise at 12 breaths per minute:



2 seconds for inhalation and 3 seconds for exhalation (5 seconds per breath / 12 breaths per minute)

6. Train using the different biofeedback features the app offers. In landscape mode, you also have the breathing aid as a line. You choose a video, which stops when the HRV amplitude falls and continues when it rises. You can also use music and sounds that you can activate in the settings. The individual feedback functions are all described in more detail in the corresponding chapter of the manual.
7. **Use the supplied procedures!** This allows you to get to know the different functions of the app even better and to perform standardized training. If you like, create your own individual procedure with your favorite feedback variants.

Third training phase (provocation, relaxation and stress management)

1. In the third training phase, stress stimuli are used in order to train stress management. HRV biofeedback is well suited for using targeted provocation methods, as it shows a timely and sensitive reaction to a stimulus, and also because this reaction is also proportional to the strength and significance of the stimulus.
2. Start the measurement and observe your measured values for a while. Then try to relax. The training begins with a resting phase of a few minutes.
3. Now a stressor (stress stimulus) should be used. Examples are: negative thoughts, looking at emotionally charged pictures or objects, as well as unpleasant noises. As a rule, everyone knows things that make them tense or excited. For example, if you do not like to speak in front of large crowds, try to make a speech spontaneously or imagine this situation. If such a stressor acts on you, observe the readings and you will

probably see a drop in HRV amplitude and a more irregular curve. Then, try to increase the amplitude again and make the curve even again.

4. During a training session, you can alternate phases of relaxation and stressors about three to four times. Always end a session with a rest phase and do not overtax yourself. Do several training sessions over a longer period of time until you feel you are less sensitive to stressors or recovering more quickly.

Fourth training phase (transfer, relaxation even without feedback)

1. Now you should check whether you have been successful in your training and whether you have already gained the ability to relax without feedback. To do this, carry out another 10-minute baseline measurement and try to relax as much as possible. **DO NOT observe the measured values.** Only consider how this measurement behaves in comparison to the baseline from the first training phase afterwards. In the archive, it is possible to compare sessions with each other. It is to be expected that many values have improved. Of course, your daily form also plays an important role here. Repeat the baseline measurement later if necessary. It is very important to always compare measurements of the same length, so use the option in the settings to set the session length to a fixed duration then it stops automatically.
2. As another transfer exercise, you can work with a stressor again and then try to relax, NOT observing the measured values. Check afterwards whether you succeeded in improving your measured values. If you succeed in this and the comparison with the first baseline also shows a clear improvement, you have successfully completed successful stress reduction training. If you now find yourself in a stressful situation in everyday life, think of your training sessions. Stay relaxed by using the skills learned here. The same applies here: Regular practice makes perfect!
3. Our eSense App offers free training as well as the use of procedures. These are ready-made training programs which you can customize according to your wishes. For an optimal comparability of training sessions, they should always be carried out under identical conditions (e.g. same time of day) and with identical length. The procedures are a great help. You can read more about this in the corresponding section of this manual.

Features of the Mindfield eSense App

eSense includes the Mindfield eSense App, which you can download for free from the Google Play Store (Android) or the Apple App Store (iOS).

It offers a wealth of functions for effective biofeedback training in a modern design. Essential functions are the display of the measured values as a bar graph and oscilloscope, feedback via video, music, sound, vibration and now with light with the help of smart light bulbs (Magic

Blue and Philips Hue). You receive a comprehensive evaluation after each measurement and can compare measurements with each other in the archive and export them as CSV files and PDF reports.

The app is available in the following languages: German, English, Spanish, French, Italian, Russian, Portuguese, Dutch, Turkish, Ukrainian, Japanese and Chinese. The respective language is automatically selected based on the language set in the smartphone or tablet.

Download-Links:



iOS: <https://itunes.apple.com/us/app/mindfield-esense/id1141032160?mt=8>

Android: <https://play.google.com/store/apps/details?id=com.mindfield.boisystem.esense>

General notes

- The data (that you can export as a csv-file from the eSense app) can also be evaluated with special HRV software such as the Kubios Standard or the Kubios Premium Software.
- If the text on your Android device is sometimes cut off the reason can be a larger font in the system settings (especially for Huawei). In the Android settings, there is usually a way to adjust the font size and display size. It's best to set this to "standard" or "default", otherwise it can cause problems with app.
- For data files which you can load as own media into the eSense App, the general limitations by Android and iOS apply. We have successfully tested the following:
 - o Images: PNG and JPG (GIF can be loaded but isn't animated)
 - o Audio: MP3, WMA and WAV (Android) and MP3, WAV and AAC (iOS)
 - o Videos: MOV, MP4 and 3GP (Android) and MOV, MP4 and M4V (iOS)
 - o If your audios or images are in other formats you simply can convert the files on your computer. Just use a free tool like Free Audio Converter (https://www.freemake.com/free_audio_converter/) or Free Video Converter (https://www.freemake.com/free_video_converter/)
- An additional tip: You can also directly download videos from YouTube and save them in the correct format (MP4) with tools like <https://notube.net/en>

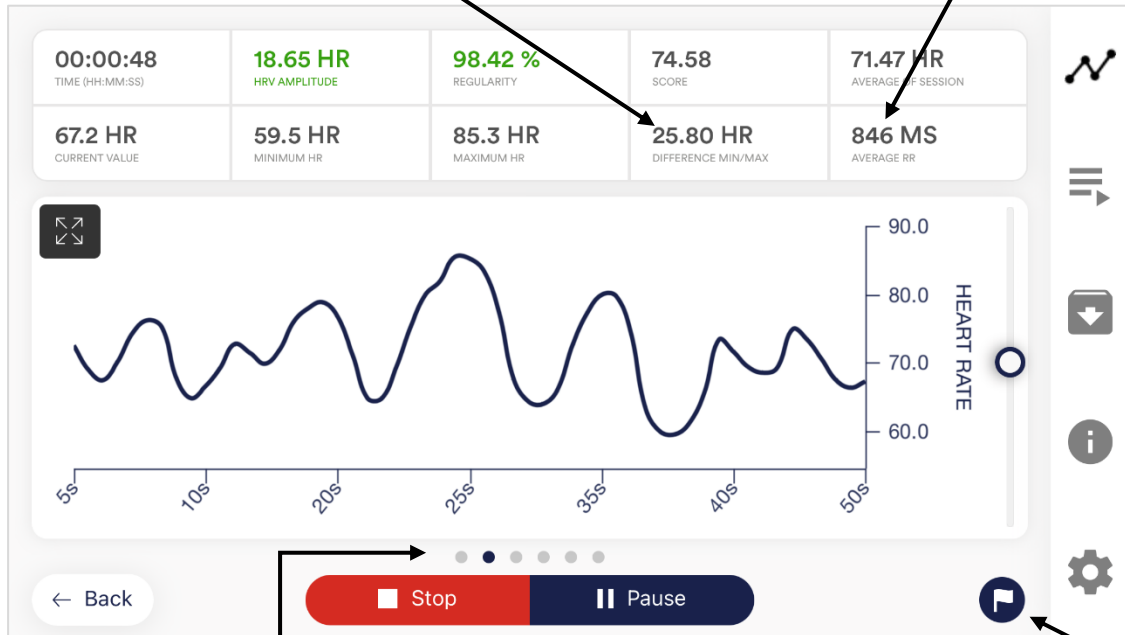
General view & Open Training

The screenshot shows the 'Open Training' screen with the following annotated elements:

- Measurement duration:** 00:02:42 (TIME (HH:MM:SS))
- Current HRV-Amplitude:** 16.02 HR (HRV AMPLITUDE)
- Regularity:** 92.64 (REGULARITY)
- Score:** 170.59 (SCORE)
- Current heartrate:** 61.1 (CURRENT VALUE)
- Minimum heartrate:** 85.3 HR (MAXIMUM)
- Maximum heartrate:** 58.6 HR (MINIMUM)
- Difference between minimum and maximum:** 26.70 HR (DIFFERENCE MIN/MAX)
- HRV scale:** A vertical scale from 0 to 25.00 with a green bar representing the current value at approximately 16.02.
- Current HRV amplitude:** Indicated by the height of the green bar on the HRV scale.
- Zoom for conductance scale:** A circular zoom control below the HRV scale.
- Start, pause, and stop of the recording:** A red 'Stop' button and a blue 'Pause' button.
- Bottom navigation bar:** Contains icons for Open Training, Procedures, Archive, Help, and Settings.

Average heartrate of session

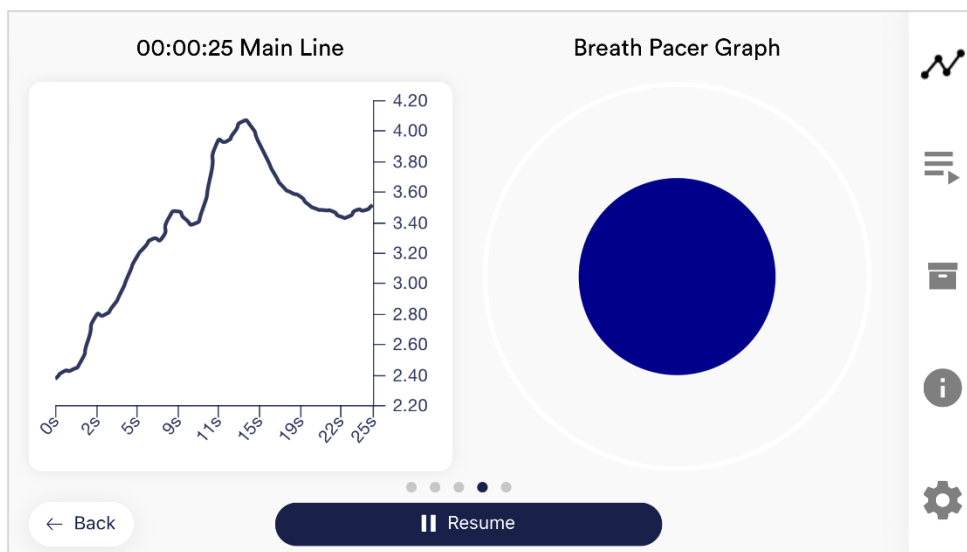
Average RR in ms



Set marker

Swipe the screen to the left or right to switch between this main view and the other views. After the measurement, you can also switch to the pie charts.

Breath Pacer



Breathe as the sphere expands. With growing ball breathe in, with shrinking ball breathe out.

The coherence (here 68%) shows you how much your heartbeat follows the breathing, the higher the value, the better. 100% cannot be reached. Once you are over 50%, there is a correlation between heart and breath. Try to get as high a value as possible and experiment with different breath time specifications.

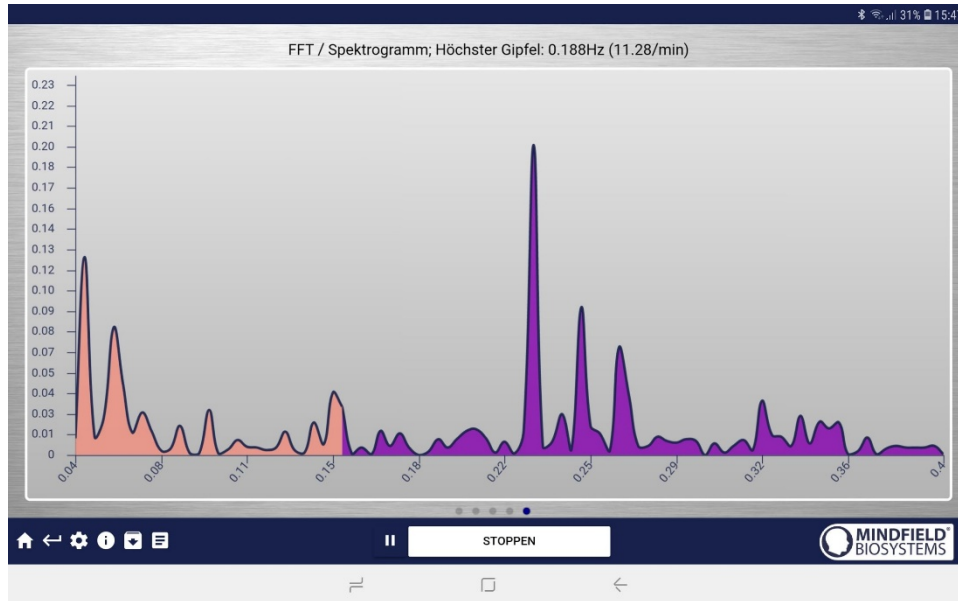
Biofeedback Snake



Biofeedback Snake for the Pulse

You can also display the Biofeedback snake as an additional option. At the top left are appearing symbols which vary in color depending on the current measured value. The symbols are either green (further positive direction), yellow (slight negative direction), orange (strong negative direction) or red (very strong negative direction). After 10 green symbols you will also be rewarded with a star and after 50 green symbols even with a shooting star. If the snake goes over the entire screen you will see the last 5 minutes.

Spectrogram



The spectrogram shows how often the respective RR intervals (also NN intervals, the distance between two heartbeats) occur. This provides information about the proportion of sympathetic and parasympathetic heartbeats.

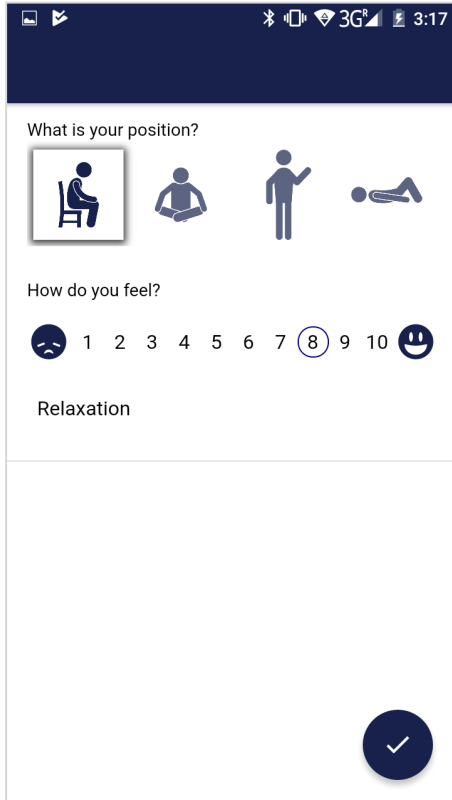
The spectrogram shows frequency bands from 0.04 to 0.4 Hz. The number of RR intervals of each frequency band is counted and plotted on the spectrogram. The skin-colored range shows the low RR intervals (0.04 Hz - 0.15 Hz, sympathetic range) and the purple range shows the high RR intervals (0.15 Hz - 0.4 Hz, parasympathetic range). The spectrogram is calculated using a Fast Fourier Transformation (FFT).

Simply put, with this graph, you can see how even the RR intervals are. Optimally, you have only one (or a few) distinct peak(s) in the skin-colored area and only one (or a few) distinct peak(s) in the purple area. This indicates that your RR interval repeats regularly in both the low (sympathetic) and high (parasympathetic) frequency ranges without large deviations.

Further information on the RR interval (NN interval) and the significance of the low and high frequency ranges can be found under "Explanation of the individual measured values" in this manual.

Survey (optional)

If you have activated this option in the general settings, a small survey will appear immediately after each measurement. This allows you to archive measurements that are reproducible in the long term or to document a change in your measurements. (If you for example start to use the eSense while lying down instead of sitting down).



Your position during measurement

Choose between sitting, the "tailor's seat" or yoga seat, standing or lying down.

How do you feel?

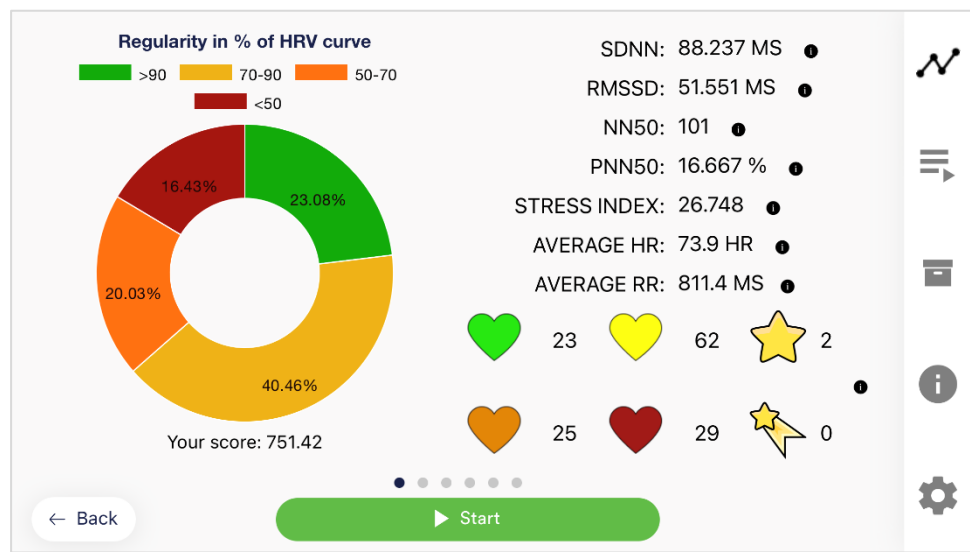
Here you can indicate your state of mind after the session. This gives you the opportunity to record your mood together with the measurement results over the long term.

Note function, optional Here you can add a note to the measurement in the free text field. We recommend that you write down any special circumstances so that you can still classify measurements with a lot of stress or relaxation later.

Pie chart (after the measurement)

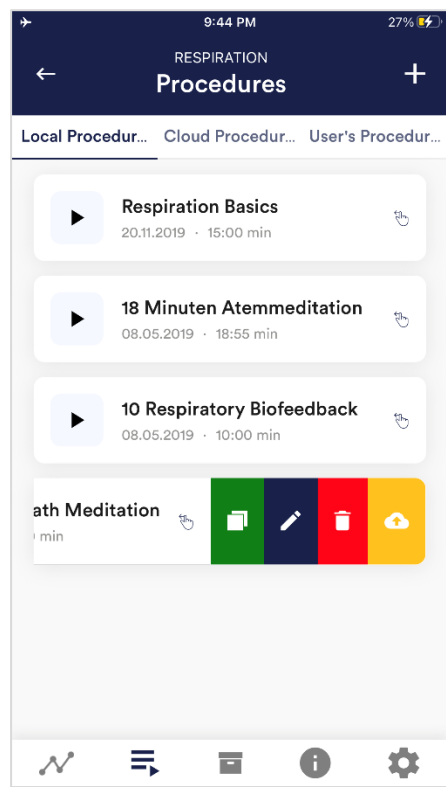
After the measurement (and optional questioning), in landscape format, a screen appears with a pie chart: The time in percent of the regularity of your HRV curve. In addition, additional values from the entire measurement are listed for you again.

At this point, you can also swipe the screen to the left or right to switch between the pie chart and the graph of the measurement.



Pie chart and values after a measurement

Procedures



Edit or delete procedure

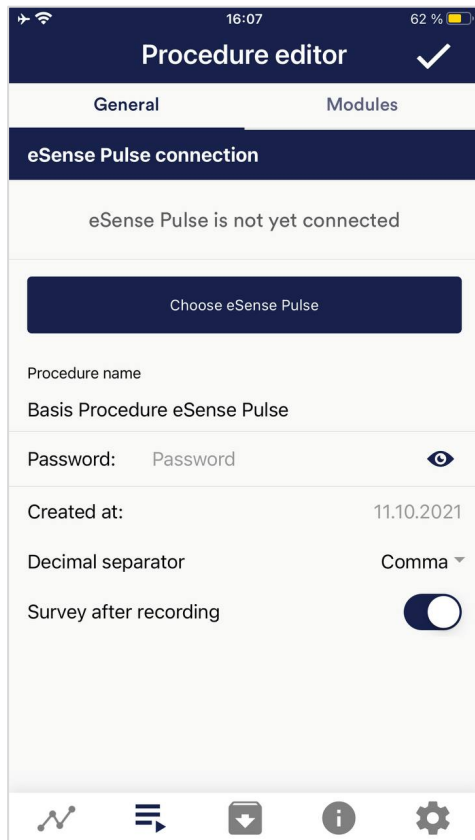
To edit a procedure, simply move it to the left in the overview.

You will then see the blue pencil icon for editing the module.

If you want to copy the procedure, tap the green copy icon.

With the red trash can symbol on the right, you can delete the procedure completely.

Procedure editor



The screenshot shows the 'Procedure editor' app interface. At the top, there's a status bar with the time 16:07 and 62% battery. Below that is a dark blue header with 'Procedure editor' and a checkmark icon. Two tabs, 'General' and 'Modules', are visible. A dark blue bar indicates 'eSense Pulse connection'. Below this, a message states 'eSense Pulse is not yet connected'. A button labeled 'Choose eSense Pulse' is present. The 'Procedure name' field contains 'Basis Procedure eSense Pulse'. The 'Password' field is currently empty. The 'Created at' field shows '11.10.2021'. The 'Decimal separator' is set to 'Comma'. The 'Survey after recording' toggle is turned on. At the bottom, there is a navigation bar with icons for a line graph, a list, a download arrow, an information 'i' icon, and a settings gear icon.

Procedure name

Here you can name your procedure with a suitable name (in this example, it is simply "test").

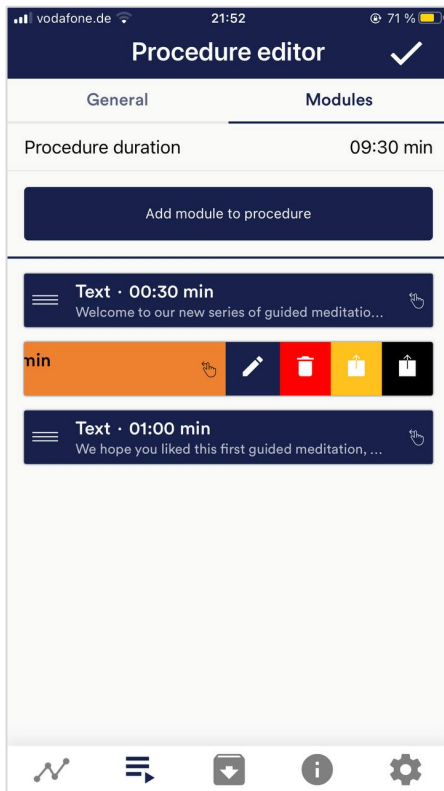
Decimal separator

You can choose between point or comma as separator of values in CSV export of procedures.

Survey after recording

Here you can activate/deactivate the survey (position, mood, notes) after each measurement.

Add new module



In the procedure editor, select the "Modules" tab.

Add module to procedure

Click on this button to add another module.

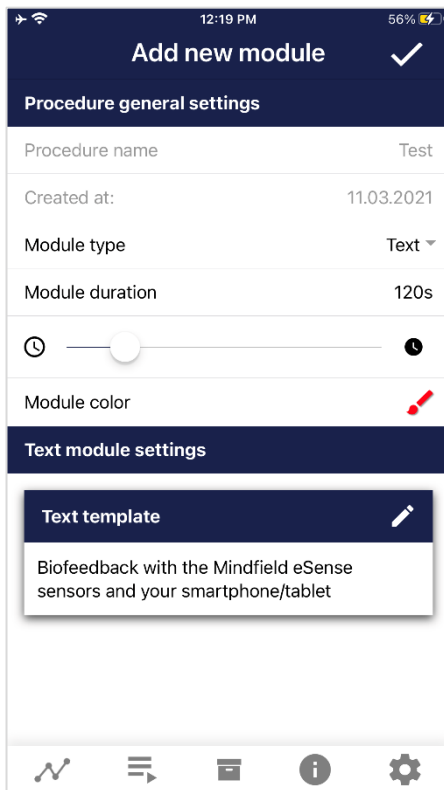
Edit module

Slide the module to the left and tap on the blue pencil symbol to edit.

To delete a module, tap the red trash can icon.

To duplicate a module within the procedure, click on the yellow sharing symbol.

To duplicate a module to another procedure, click on the black sharing icon and select the procedure from the following popup.



Module Type

You can choose between a text, a fixation cross, an image, a video, an audio file, an arrow, a bar graph, a smart bulb, a oscilloscope, a breath pacer or the biofeedback snake.

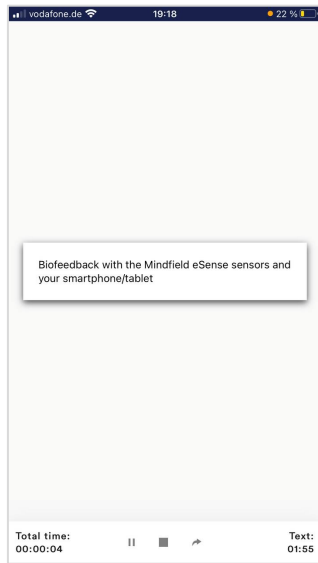
Module duration

Set how long the module shall last. Simply swipe the slider to the left or right.

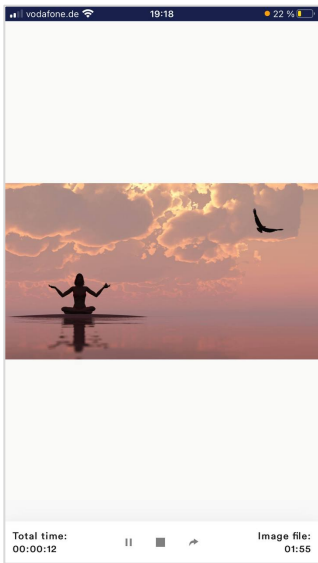
Module color

Determine the color of the module in the procedure editor.

Overview of the modules



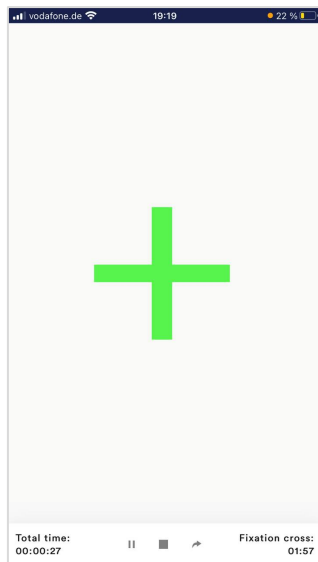
Text module
This module shows a text which you can edit.



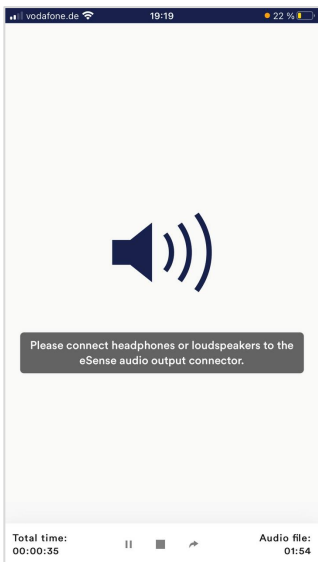
Picture module
The picture module shows either a standard picture from the app or a picture from your gallery.



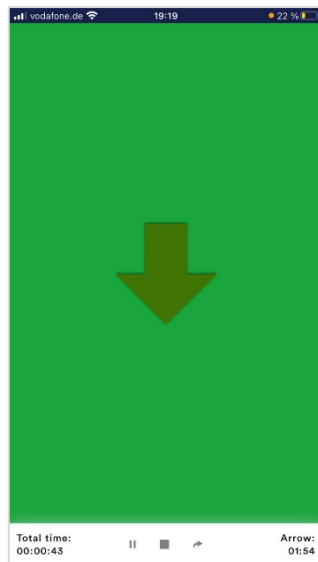
Video module
In the video module, you can choose either the standard video from the app or use your own video.



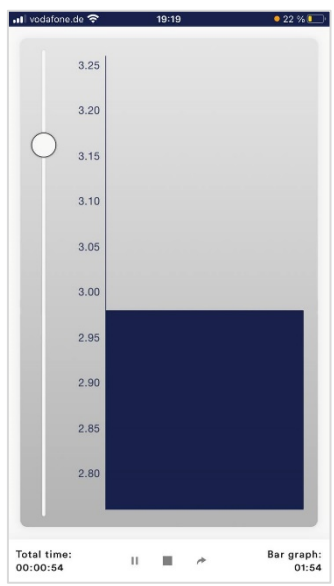
Fixation cross module
The cross changes its color depending on the conductance and provides direct biofeedback.



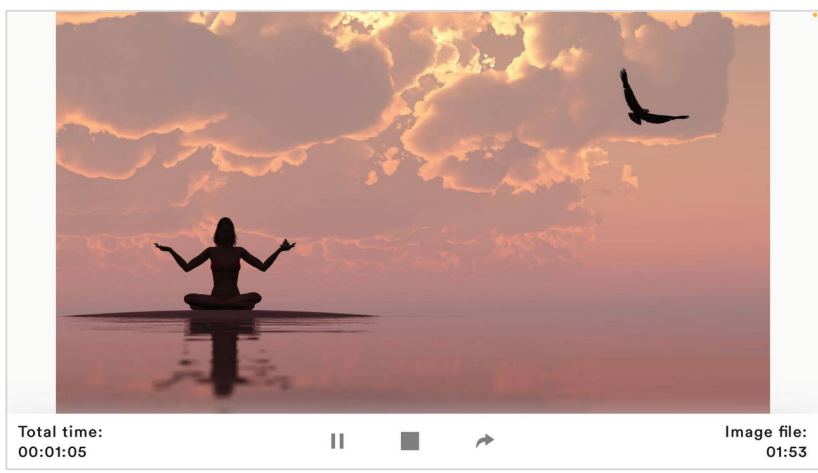
Audio module
The audio module is playing a relaxing song. You can choose your own music.



Arrow module
The arrow changes depending on relaxation and gives you direct biofeedback.



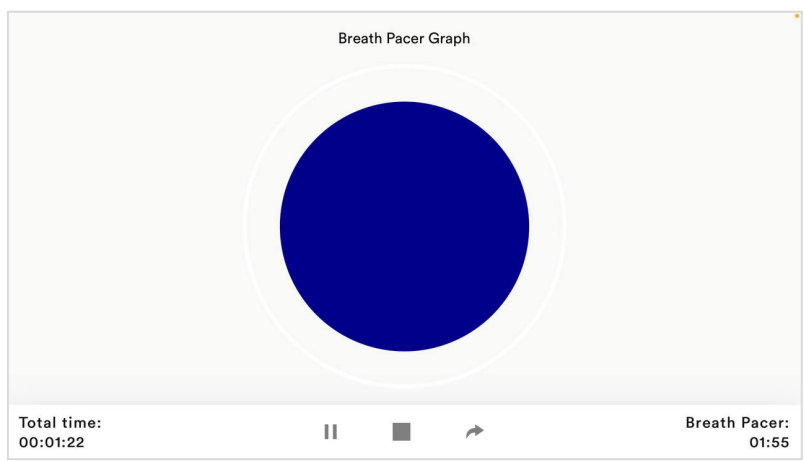
Bar graph module
The bar graph shows you your current value and gives you direct biofeedback.



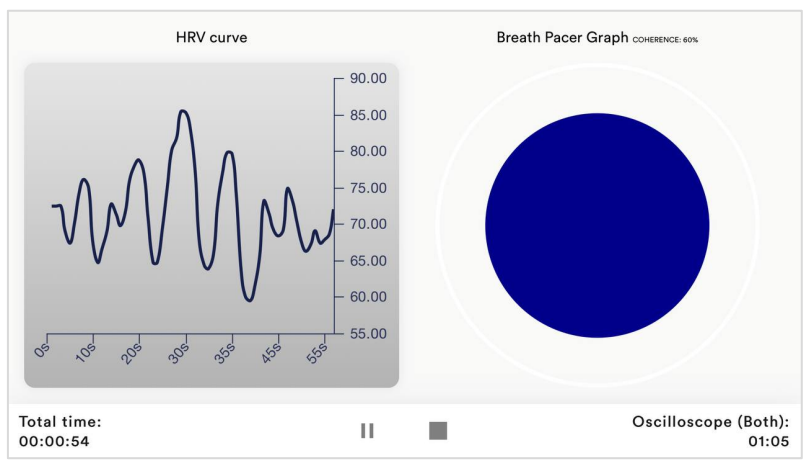
Picture module in landscape format
The procedures can be displayed also in landscape format.



Breath Pacer module in landscape format
The procedures can be displayed also in landscape format.



Oscilloscope Type Breath curve (Sphere)
The circle leads the breathing rhythm. When the blue circle contracts, breathe out. When he expands, inhale. You can also set holding phases between inhaling and exhaling.



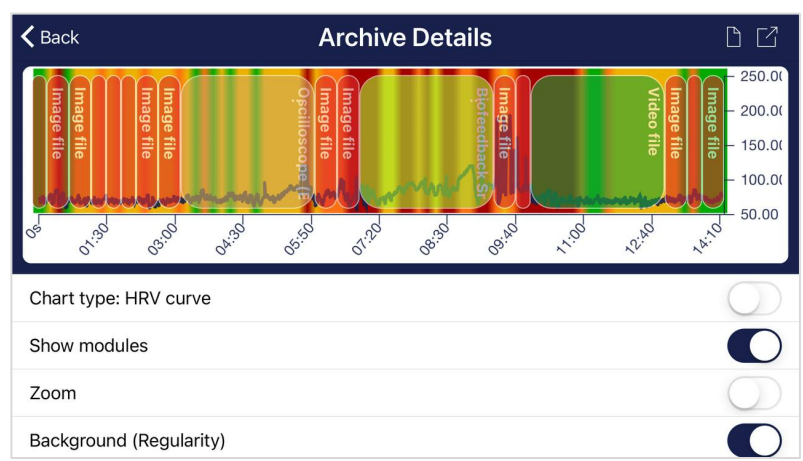
Oscilloscope Type Both

This is a combination of the graph to the left and the breathing aid to the right \. You can see the measured values while following the breathing aid.



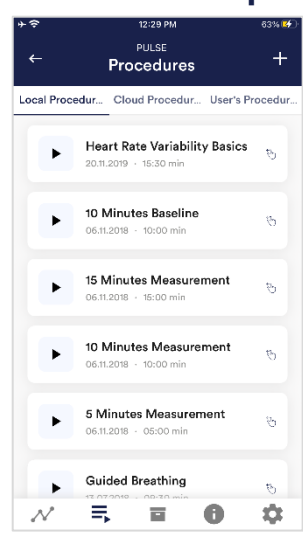
Biofeedback Snake

The Biofeedback Snake is also available as module.

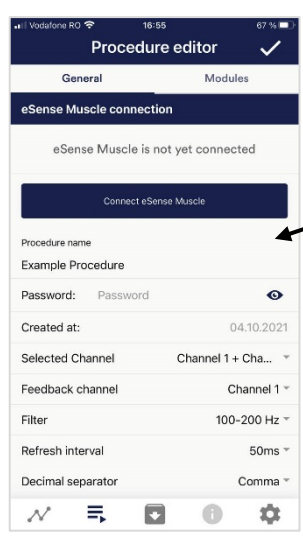


Procedure in the archive

Creation of a procedure

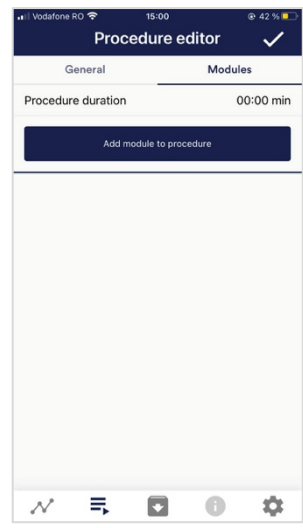


1) Tap on the plus icon to create a new procedure.

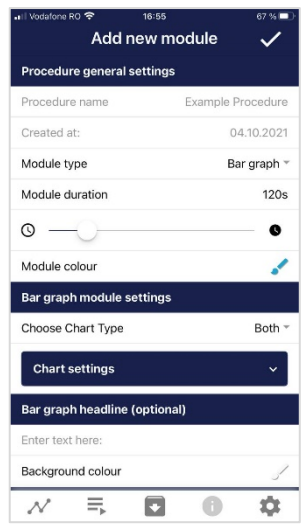


2) Give the procedure a name (here "Example Procedure").

You can simply accept all other default settings for this example.

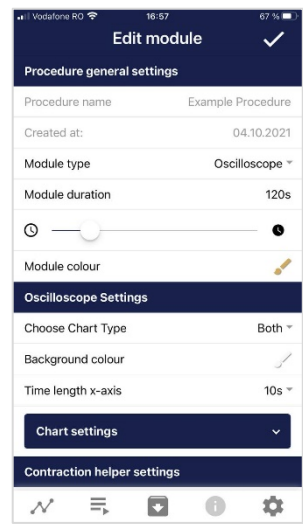


3) Select the upper tab "Module" and tap on the button "Add module".



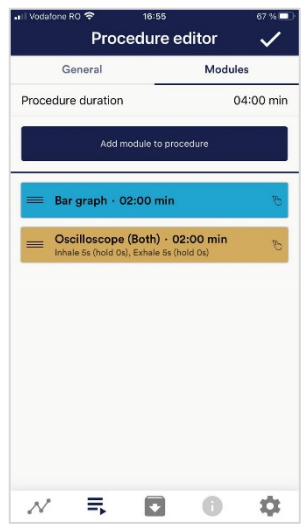
4) Select a bar graph module and tap the check mark.

Here, too, you can accept the default settings.

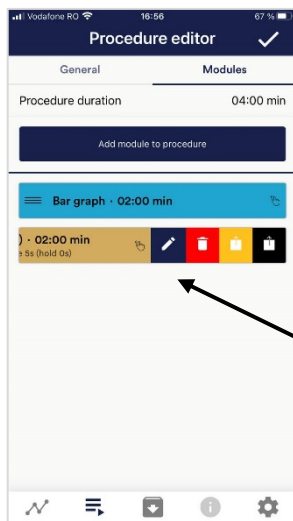


5) Then add an Oscilloscope and breath pacer module

Here, too, you can accept the default settings.

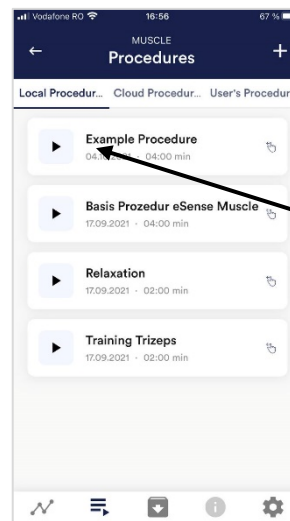


6) Your procedure should now look like this.



7) If you want to change something at a later date on one of the modules, you can swipe the corresponding module to the left and tap on the blue pencil symbol.

Otherwise you can now tap the tick at the top right.



8) Start the procedure by tapping the play button.

Have fun!

Meditations

You can also choose one of our guided meditations as a procedure. The breathing meditation is already included in the eSense app. We will also offer more meditations shortly as new free cloud procedures for users with account.

The meditations thus offer you an easy way to train your awareness and attention and, at the same time, receive biofeedback.

Own media (photos, video and audio)

You can use your own pictures in the picture module, your own videos in the video module or your own music or melodies in the audio module in the procedures.

Android usually enables this without any further problems. As long as you allow the eSense app to access your files on your device, you can upload them to the eSense app.

iOS is a bit more restrictive. As usual, you can use your pictures from your device in the iCloud for pictures and videos.

For audio files you need iTunes (or an alternative such as "CopyTrans Manager"). This is where your music or melody must be. You can find your music in iTunes (or CopyTrans Manager) under the tab "My Sound" and insert it into your procedures.

We have a detailed video at https://www.youtube.com/watch?v=A_CRbmBeBBc where we show all the steps.

On iOS, the **power saving mode** must also be deactivated, otherwise the videos in the procedures cannot be played.

Explanation of the individual measured values

Score (developed specifically by Mindfield)

For the Mindfield app, we have developed our own score system. This score, developed by us, should simply tell you how good your heart rate variability is with just one number.

Simply put, the better your heart rate variability, the higher this value.

In detail: The score is the sum of the regularity of the curve (in percent) and the amplitude (absolute value) divided by the rate of data from eSense Pulse (which transmits the last measured values via Bluetooth every 200 ms) plus the previous score.

Therefore:

$$Score = Score_0 + \frac{0.1x(RegularityPercent - 90) + 0.1xAmplitude}{5}$$

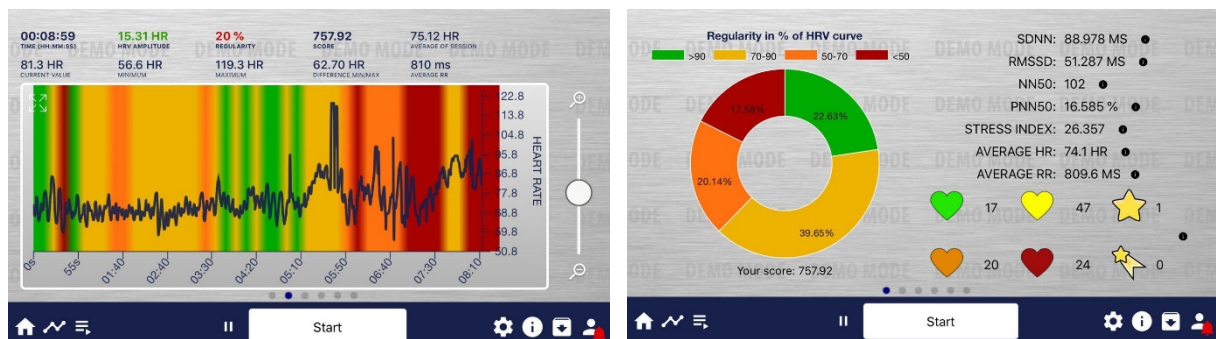
Whereby the time interval between Score and Score₀ is just 200ms. If RegularityPercent <90 then:

$$Score = Score_0 + \frac{0.1xAmplitude}{5}$$

Thus, especially measurements of the same duration can be compared well (for example, if you always set 15 minutes as the measurement duration in the settings), since a higher regularity of the curve and / or a higher amplitude but constant time results in a higher value.

Regularity (developed specifically by Mindfield)

We also included the regularity as another value. This is also recorded by a formula developed by us and displayed in color (from a measurement duration of 5 minutes or more) in the overview after the measurement:



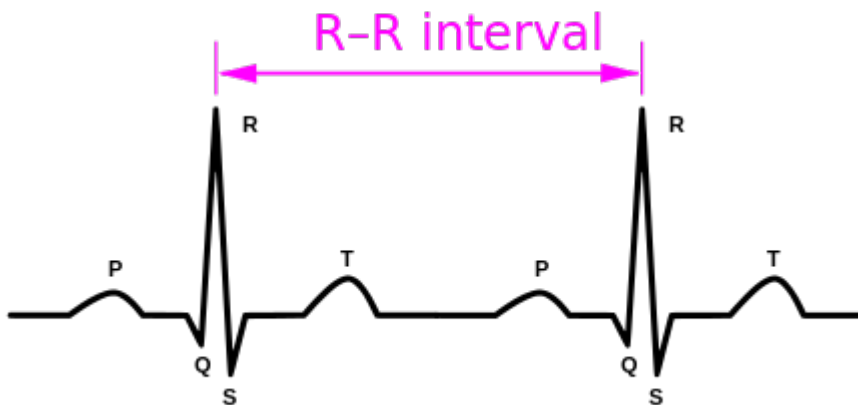
Attention: The colored coloring of the regularity does not correspond 100% with the color distribution in the pie chart as these are detected in different ways.

For the background coloring of the oscilloscope, a period of 20 seconds is taken and it is determined which regularity value is the most common color.

The pie chart, on the other hand, uses all the numeric regularity values of the entire session, with the percentages in red, yellow, orange, and green taken from them.

General HRV values

As an introduction to all measured values, we would like to briefly point out that the terms RR and NN mean the same thing but are used alternately in science and literature. The RR or NN interval is the distance between two heartbeats, in milliseconds.



Put simply, you train as much variability as possible between these intervals. The analysis of this distance data is possible in different parameters, which allow for different conclusions about the condition of your nervous system.

Time-based measured values

SDNN

("Standard Deviation of the NN Interval") is the standard deviation of the RR intervals. Put simply, how do the intervals deviate on average from the average of all intervals? Suppose you have a value of 68ms. This means that, on average, one heartbeat deviates from the next heartbeat by 68ms, which is 68ms earlier or later than the previous heartbeat. *The higher this value, the higher your overall heart rate variability, which means the better your body can adapt to changes. You can also see how well Sympathetic and Parasympathetic work together.*

RMSDD

("Root Mean Square of Successive Differences") is one of the most important parameters that provides information about the activity of the parasympathetic nervous system. It describes the short-term variability of the heartbeat, how strongly the heart rate changes from one heartbeat

to the next. This is how the RMSSD value is calculated: The temporal difference of successive RR intervals is multiplied by itself to obtain only positive values. These intermediate values are summed and divided by the number of RR interval differences to obtain the mean value. The square root is drawn from the mean of these squared differences. *The RMSDD is often referred to as the body's ability to recover or the nervous system's "brake." The larger this number is, the better.*

NN50

The number of pairs of RR intervals that are more than 50ms apart. *The larger this number is, the better. However, only compare sessions of the same length and under the same conditions (e.g. sitting position, before/after sports, mornings/evenings, etc.).*

pNN50

The percentage of pairs of RR intervals that are more than 50ms apart. *The larger this number is, the better. However, only compare sessions of the same length and under the same conditions (e.g. sitting position, before/after sports, mornings/evenings, etc.).*

Average RR

The average RR (also sometimes called RR interval or NN interval) is the average distance between two heartbeats. It is thus the reciprocal of the heart rate.

To get a feeling for this value, just think of the following three examples: If you have a resting pulse of 60 beats per minute, the average RR is exactly 1,000ms or one second (since one beat per second). If you are doing light to medium physical exertion at 120 beats per minute, then the RR is 500ms, or half a second (since two beats per second). If you're working very hard to get your pulse up to 180 beats per second, the RR is 333ms or a third of a second (because three beats per second). *For this value, there is no better or worse, the bigger or smaller. The only statement that can be made is that the higher the value at rest, the slower your resting pulse, which, for example, is a sign of fitness and a strong heart muscle in endurance athletes.*

Stress Index

The exact formula: $\text{Stress index (SI)} = \text{AMo} / 2\text{Mo} \times \text{MxDMn}$. Where AMo is the amplitude of the modal value and represents the percentage in comparison to all other RR intervals. Mo (in the formula 2Mo) is the modal value for the duration of a RR interval that has been measured the most often. MxDMn is the variability width, or in other words the difference between the maximum and minimum measured RR interval. Simply put, this formula calculates how adaptive the heart is or the value of the heart rate variability (HRV). A good relationship between the sympathetic and the parasympathetic reaches scores of 30 to 150 points. At 500 - 1000 points, limitations of adaptability are already assumed. Over 1000 points is an indication of a high level of exertion or stressful circumstances. Of course, it must also be noted that the SI depends on the respective situation. It makes a difference whether you are sitting quietly or exercising physically. *However, at least in general terms, the lower the stress index (SI), the better. The more rigid and less variable the RR intervals are, the higher the stress index scores.*

Frequency-based measured values (available as in-app-purchase)

In addition to the time parameters, we have also integrated frequency-based parameters into the analysis. A Fast Fourier Transformation is performed during each measurement from start to finish. You can observe the resulting spectrogram during the measurement in the last slide in landscape format.

VLF

("Very low frequency") is the HRV in the range from 0.0033 to 0.04 Hz. The VLF requires measurements with a length of at least 5 minutes. The VLF also differs from the LF and HF by a different characteristic. The changes in the VLF frequency band are visible longer. The VLF band is therefore the component for slow recovery.

LF

("low frequency") is the HRV in the range from 0.04 to 0.15 Hz. This allows vibrations in the range of about 10 seconds to be recorded. Here, the activity of the sympathetic nervous system is well reflected, with very slow breathing also in the upper range at 0.15 Hz of the parasympathetic nervous system. *The higher this value is, the more distinctly the sympathetic nervous system is active in the center of gravity.*

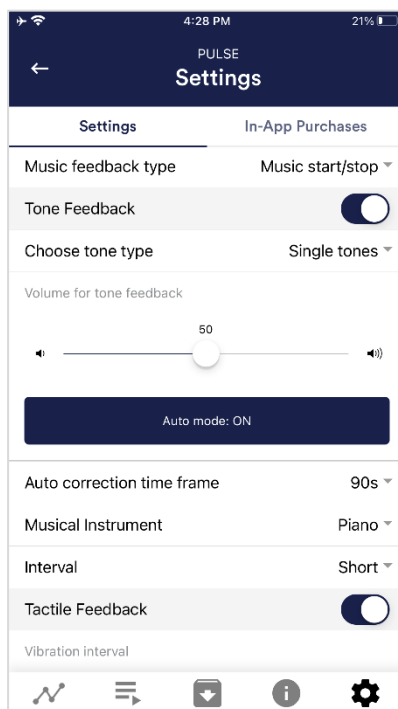
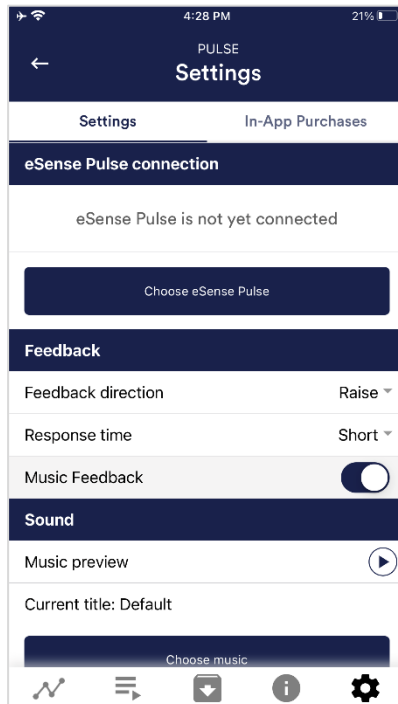
HF

("high frequency") is the HRV in the range from 0.15 to 0.40 Hz. This includes oscillations of about 2-7 seconds, in which the heart beat is often influenced by breathing (RSA = respiratory sinus arrhythmia). This also clearly shows the activity of the parasympathetic nervous system. *The greater this value, with even, quiet breathing, the more pronounced the activity of the parasympathetic nervous system.*

LF / HF ratio

LF / HF Ratio is the ratio between the HRV in the low frequency band (Low Frequency) to the HRV in the high frequency band (High Frequency). It thus expresses the sympathovagal balance. Since the LF band can be traced back to the sympathetic and the HF band to the parasympathetic, the LF / HF ratio indicates a possible dominance of the sympathetic or parasympathetic nervous system. *If the LF / HF ratio is high, this indicates a dominance of the sympathetic nervous system. Typically this occurs in "fight or flight behavior". A low LF / HF ratio indicates a dominance of the parasympathetic nervous system. This is a sign of relaxation and harmonious behavior.*

General settings (overview)



eSense Pulse Connection

Select the eSense Pulse you want to connect. You must perform this step before you can perform a measurement. With the connection test, you can test the connection and see the battery status.

Correction level

Set how sensitive the correction algorithm is.

Feedback direction

Select the direction in which you want the feedback to react to. It can respond either to an increase or decrease in the measured values.

Response time

The default setting is "Short," which allows feedback to respond quickly to changes in readings. For longer measurements, we recommend "Medium" or "Long," then the reaction time will be slightly delayed and the eSense will no longer react to every small change in the measured values.

Music Feedback

If the value moves in the unwanted direction (e.g. lower values), the music will become quieter or change its speed depending on the type of feedback you choose.

Music preview

Tap the Play button to listen to the selected song.

Choose Music

You can use the default or your own music.

Music feedback type

You can optionally choose between music start/stop, volume feedback or playback rate feedback. Note: For iOS are the options restricted.

Tone Feedback

In the background, you can hear sounds from other apps.

Choose tone type

You can choose between single or continuous tones.

Auto mode

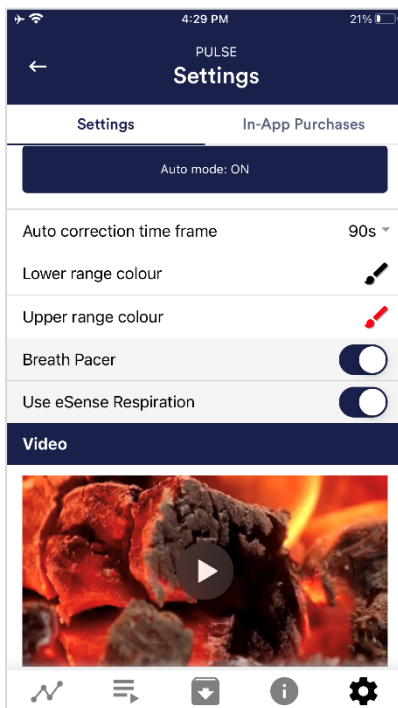
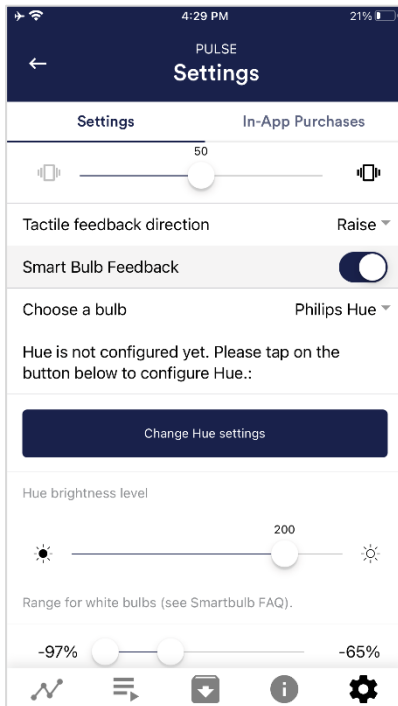
When this is activated, the range in which the sound changes is automatically adjusted. The minimum and maximum values of the set time window are automatically used for the lower and upper limits of the following interval.

Value range from-to (Not visible when auto mode is enabled)

You can set the area in which the feedback is active. We recommend selecting the range wide at the beginning and to set it smaller over time if necessary. Alternatively, you can use the automatic mode.

Auto correction time frame (Only visible when auto mode is enabled)

You can specify the time window in which the automatic mode adjusts itself each time.



Musical instrument

You can choose from various preset instruments.

Interval

Set an interval for the tone feedback.

Tactile Feedback

Your device will vibrate to provide feedback. Only smartphones support this feature, tablets do not have a vibration motor.

Tactile feedback direction

Decide whether decreasing ("Decrease") or increasing ("Increase") tactile feedback values should be considered a success.

Smart bulb feedback

The light bulb changes its color depending on the values.

Choose a bulb

Choose between Magic Blue, Magic Blue V2 or Phillips Hue.

Connection test

With this option, the bulb changes color if the connection is successful.

Breath Pacer

If activated, a breathing aid is displayed during the measurement.

Breath pacer type

You can choose between line and sphere.

Enable audio tone

Tones can also be added as auditory breathing aids.

Inhale time / exhale time

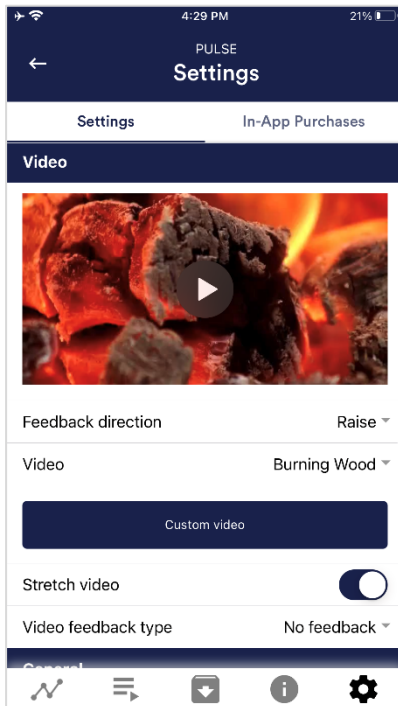
Select the seconds for each inhalation breath and exhalation breath to display the breathing aid.

Hold before inhale / exhale

Select the seconds between inhalation and exhalation breaths

Inhale color / exhale color

Select the color for each inhalation and exhalation stroke of the bar or ball.

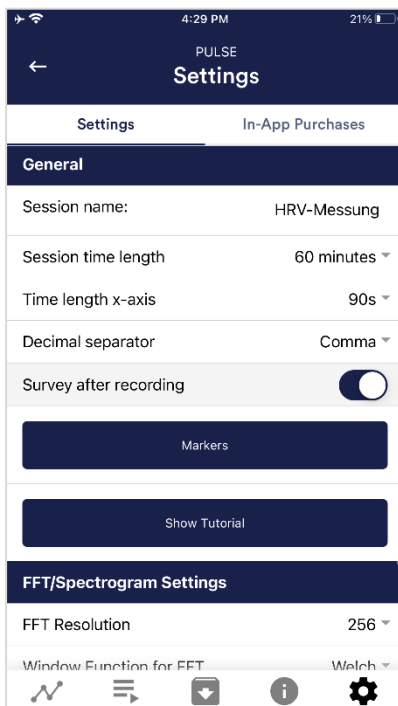


Video

Choice: In the dropdown menu, you can select from included videos and "Select your own video". You can select your own videos from your device.

Video Feedback Type

Effects can be applied to the video as feedback. You can choose between Start/Stop, Sharpness, Brightness and Saturation.



Session name

Enter the name of your session which will be displayed in the archive here.

Session time length

You can automatically time-limit normal measurements.

Time length X-Axis

You can set the time period displayed on the X-axis of the oscilloscope. We recommend 90 seconds.

Decimal separator

You can choose between comma or dot.

Survey after recording

Here you can activate/deactivate the survey (position, mood, notes) after each measurement.

Markers

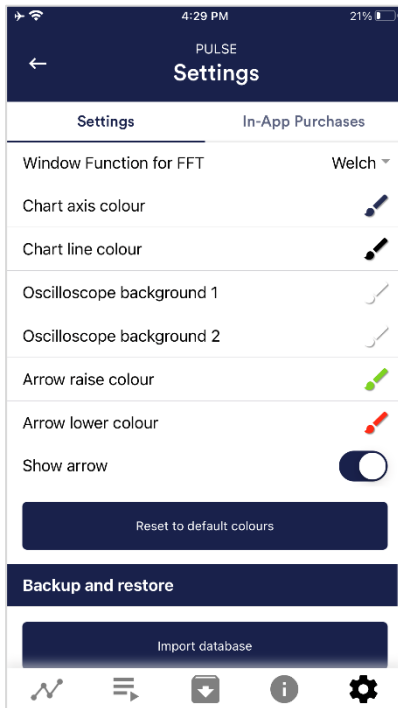
If enabled, you can define markers by tapping the + button. These are the markers you can set during a measurement. (See also 'Set Marker' in Landscape mode of the general view above).

Show tutorial

You can watch the tutorial again at any time from the first start of the app.

FFT resolution

Selectable are 128 samples, 256 and 512. By default, 256 is selected. The eSense Pulse has a 5 Hz sample rate, so 256 samples are about 52 seconds of data.



Window function for FFT

You can choose between Welch and Hanning, two common window functions, see Wikipedia for more details.

Chart settings

You can change the colors of the graph and the oscilloscope in the general view.

Chart axis color

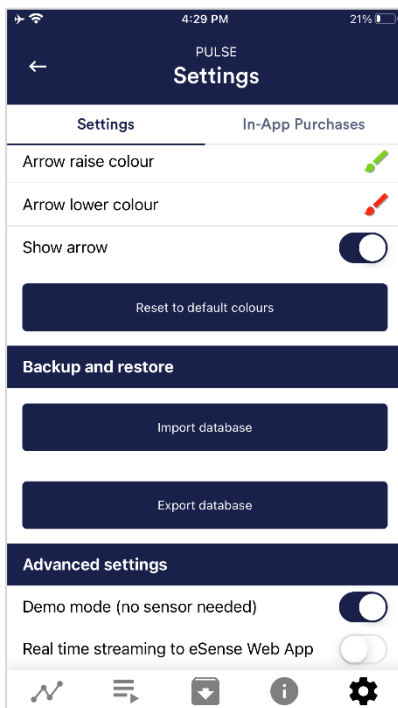
You can change the color of the chart axis in the main view.

Chart line color

You can change the color of the chart line in the main view.

Oscilloscope background 1&2

You can change the background color of the oscilloscope in the main view.



Arrow raise / lower color

You can change the color of the arrow in the main view.

Show arrow

You can also disable the arrow in the main view.

Reset to standard colors

You can restore the default colors for the graph at any time.

Backup & Restore

You can export and import your procedures and measurements. More about this in our FAQ

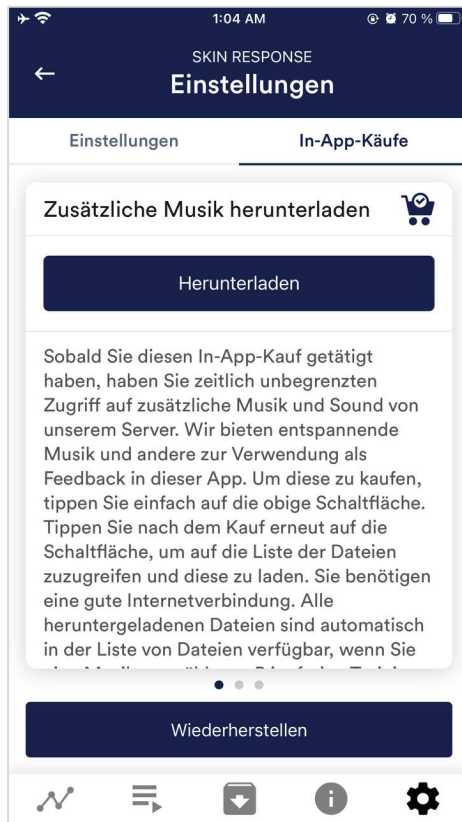
Demo Mode

A saved measurement is played back automatically. A real sensor is not needed.

Real time streaming to eSense Web App

This allows you to stream the data live to the eSense Web App. More information in the Account and Cloud section.

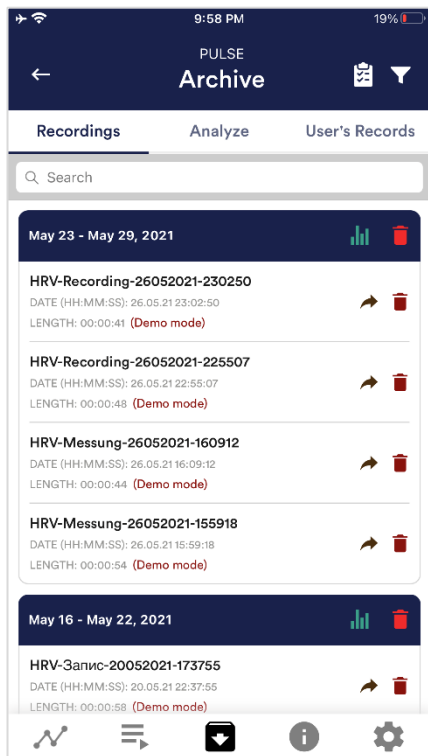
In App Purchases



In-App Purchases

Additional to the option to use your own music or videos in the eSense App you can also purchase additional music or videos. We regularly extend the offer.

Archive (overview)



The app also contains an archive, in which you can save your measurements and export them as well. You can watch those in detail again, compare them to each other and export them individual or all together (as ZIP file).

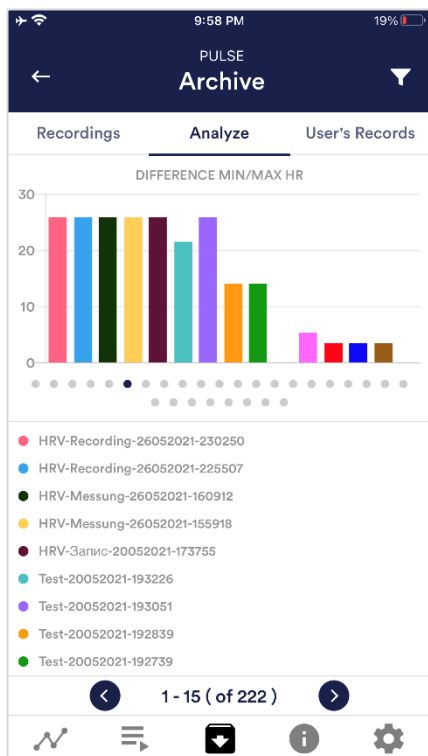
Recordings

Here you can see your measurements listed. You can view a single measurement by tapping on it.

If you click on the clipboard symbol at the top right, you can mark one, several or all measurements. You can then export, analyze or delete the exported measurement (s).

On the filter symbol you can choose whether you want to sort the measurements by name, date, length in ascending or descending order.

If you want to delete a single measurement from this list, you can also tap on the trash can symbol to the right of the measurement.



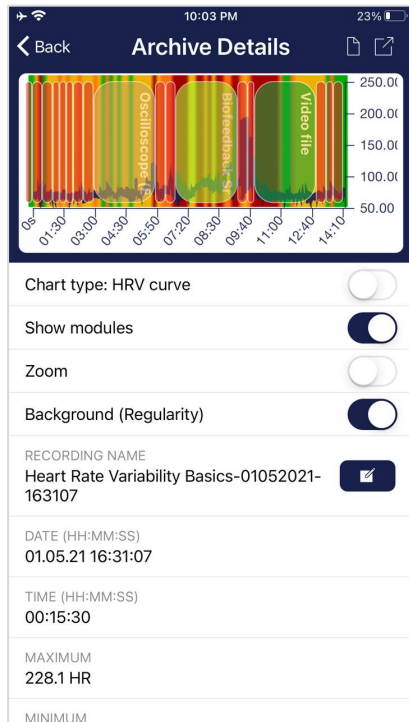
Analyze

Here all measurements are listed according to the following factors:

Time, score, average of session HR, minimum HR, maximum HR, difference min/max HR, SDNN ms, RMSSD ms, NN50, pNN50 %, stress index, average RR ms, Average HR.

With this, you can recognize trends over time and over several measurements (if, for example, your % of SCR of Session decreases by regular training, you can see this here immediately).

Archive (single view)



Export data

By tapping on the export icon at the top right or the "Export as CSV file" at the bottom, you can export the recordings in .csv format with all common apps (e.g. send via Messenger, WhatsApp, email, etc.) or simply save them on your phone or to your cloud.

The data is exported as a .csv file (comma separated values). You can open this file format with Microsoft Excel™ or Open Office Calc (free alternative to Excel), and many other apps.

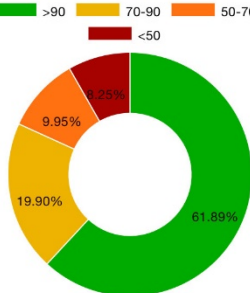
If you like to work with Google, Google Sheets™ (Google Tabellen™) can also be an alternative to Excel for you. You can also open and visualize your exported .csv files and access them easily from multiple devices via the cloud. Google Sheets™ has almost the same functions as Excel™ and a very similar handling.

Note: We have also compiled **detailed instructions for CSV export and processing of your data in a separate manual.** You can find it at the following link:

www.mindfield.de/esense-csv-anleitung

AVERAGE HR 64,2 HR
AVERAGE RR 934,8 ms
CORRECTED HR VALUES 0
CORRECTED HR VALUES IN % 0,0 %
AVERAGE LF 1698,1514 ms ²
AVERAGE HF 2250,3909 ms ²
LF/HF RATIO 0,7546

Regularity in % of HRV curve



Your score: 251.62
SDNN: 61,842 MS
RMSSD: 97,055 MS
NN50: 57
PNN50: 61,290 %
STRESS INDEX: 92,802
AVERAGE HR: 64,2 HR
AVERAGE RR: 934,8 MS
AVERAGE LF: 1698,1514 MS²
AVERAGE HF: 2250,3909 MS²
LF/HF RATIO: 0,7546

Delete recording

Export as CSV file

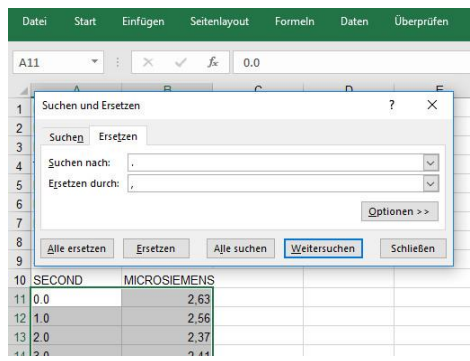
Export as PDF file

Regularity in % of the HRV curve

You can see here also the Regularity of your measurement. This pie chart is the same as the one you see after the measurement. You can get more information about the regularity in the chapter 'Explanation of the individual measured values' in this manual.

Export as PDF File

You can export the measurement also as PDF alternatively. Note: This takes a moment

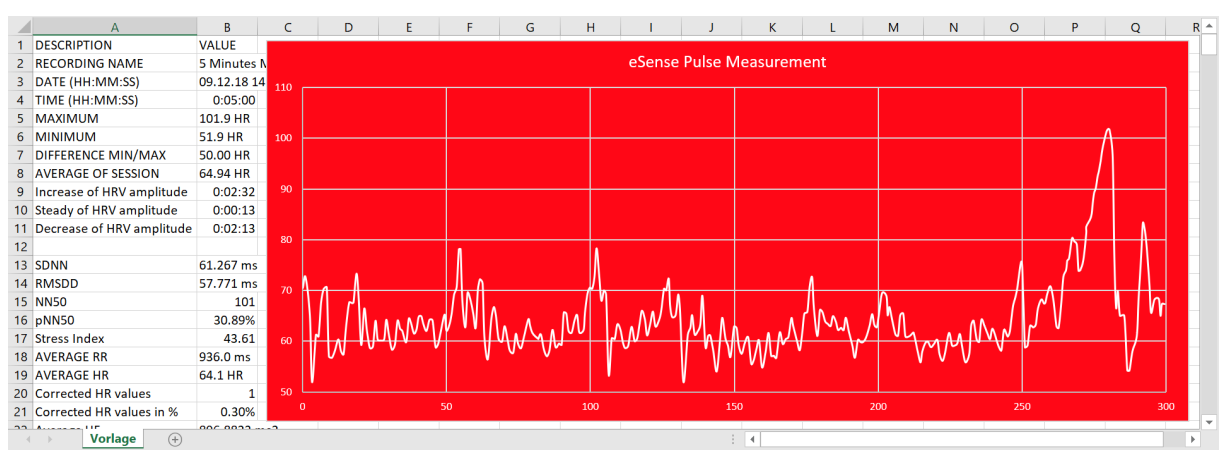


In Excel™ or Google Sheets™

Note: If you open the CSV file with Excel™ (or Google Sheets™) and the numbers don't make sense, it's mostly due to different language settings in the eSense app and Excel™ or Google Sheets™.

We have summarized this point and also provide a **detailed manual for CSV export and processing of your data**. You can find it under the following link:

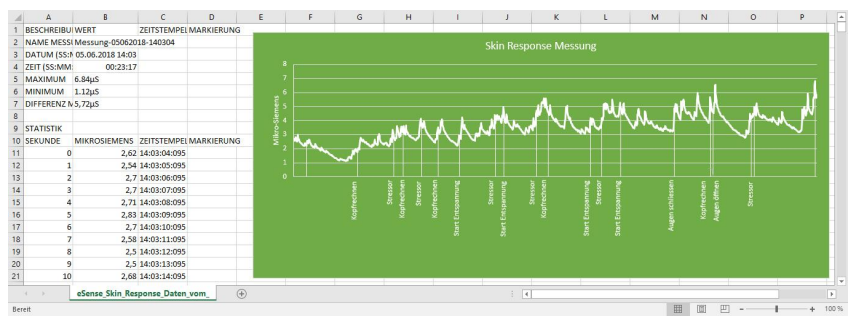
www.mindfield.de/esense-csv-anleitung



Exported measurement in Excel

Marker function

You can also set markers during the measurement. For example, if one of your biofeedback exercises involves quiet breathing, you can set a marker at that location during the measurement. Later, in the exported data, you will see where you breathed calmly. This is especially useful for longer measurements with several actions. The markers can also be displayed particularly well in Excel:



Exported measurement in Excel with markers (example of Skin Response)

Account and Cloud

You can register your own, free account for the eSense app and book plans. You can also benefit from free, regularly added procedures without booking a plan. Thus, we recommend using the app with an account. With the plans you can mainly use the cloud and its functions and get also access to the eSense web app.

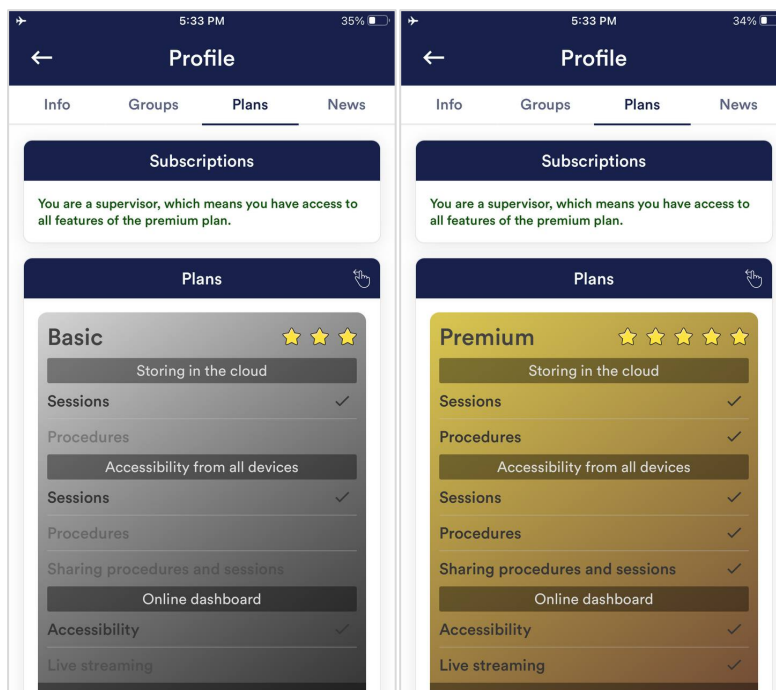
With the Basic plan, you can save your measurements locally and online in the cloud and thus access your measurements from all devices and from anywhere. You also get access to the eSense web app.

The Premium Plan includes all functions of the Basis Plan. In addition to your measurements, you can also save your custom procedures online in the cloud and thus access your procedures from all devices. (Attention: Technical limitations from Apple unfortunately do not allow the upload (and thus the synchronization) of audio files. The synchronization of picture and video files is possible, however).

You can also share your measurements with other users as Premium plan user. You also have the option to live stream your data to the eSense Web App in real time.

These plans can be used, among other things, to design a trainer's client's workflow. An overview of the account and the cloud in our separate PDF: <https://mindfield.de/dwnld.php?download=191>.

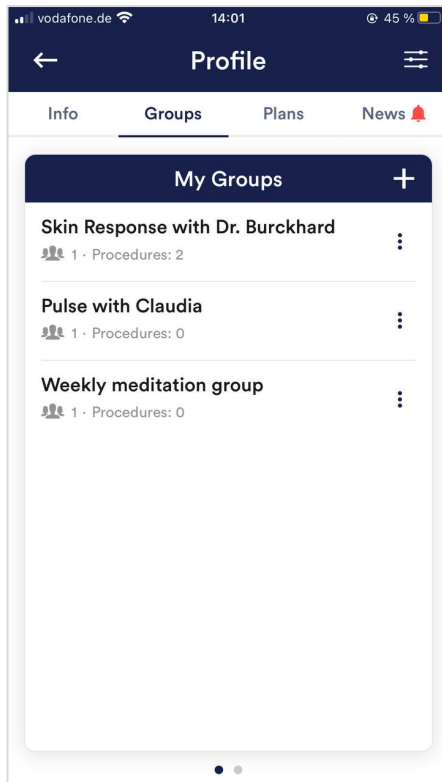
You can book the plans in our app in the profile tab:



Plans in Profile Tab

Groups

The accounts enable you to create your own groups or to join other groups. This allows you to share your recordings with your friends. Or you can work with a trainer as a client since you can share your recordings with the trainer.



Create a group

Tap on the plus symbol to create a group.

Edit a group

Tap on the 3 dots next to the group name. You can then (if authorized) view and remove the members of the group or add new members. You can also change the title of the group or delete the group.

eSense Web App

In addition to the app, we have also developed an eSense web app that mirrors and supplements the app. You can use this with the account and plans mentioned above.

You can analyze your recorded data (with the basic plan) or even transfer your data to a PC in real time (live streaming with the premium plan).

The main advantage of this is that you can see the graph even better with a large screen and enlarge individual areas and have more advanced analyze features.



eSense Web App with a live measurement with the eSense Pulse

With the eSense Web App, you can also view measurements from several and different eSense simultaneously and in real time, which allows a professional trainer client to design the workflow.

You can find the web app at www.esense.live. There you can login with the same account (username and password) as for the eSense app. You can find more information about the eSense Web App and its possibilities in our separate PDF for streaming data (<https://mindfield.de/dwnld.php/?download=187>) and our YouTube videos (https://www.youtube.com/channel/UCNFYv0kkoKQvGL-SGGbh_cw/).

Supported devices Android

- All Android Smartphones and Tablets from Android 7.0 (Nougat)
- If you plan on purchasing a device for using the eSense, we suggest a Nokia 2.4 (<https://amzn.to/3olUjyn>), a Nokia G20 (<https://amzn.to/35JPDvS>), a Motorola Moto E7i Power (<https://amzn.to/3GyOh3X>) or a Xiaomi Redmi 9a (<https://amzn.to/32WHvao>) as an inexpensive entry-level device.

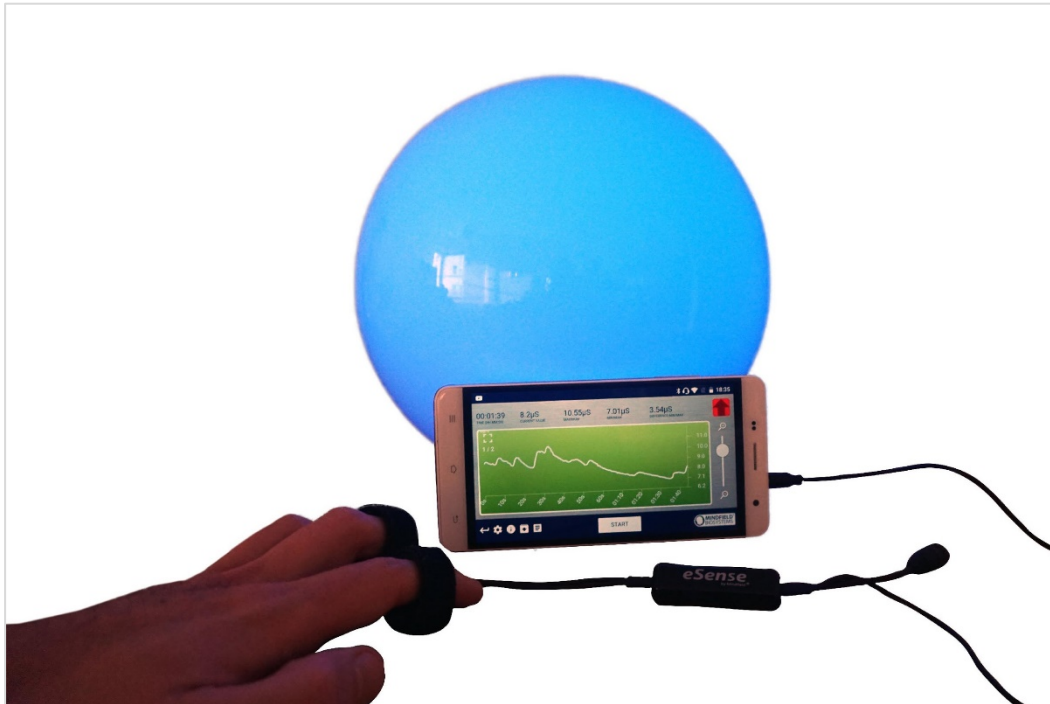
Supported devices iOS

- **All iOS devices from version 12.5 or higher, which are (in part):**
- Apple® iPhone® 5S, iPhone® 6 / 6S, iPhone® SE / SE 2, iPhone® 7/7 +, iPhone® 8/8 +, iPhone® X, iPhone® XR, iPhone® XS, iPhone® 11/11 Pro, iPhone® 12/12 Pro
- Apple® iPad® from 5th generation (iPad Air) or newer, including all iPad Mini from 2nd generation
- Apple® iPad® Pro from 1st generation or newer
- Apple® iPod Touch® from 6th generation or newer

Additional note Siri: Please note that Siri can NOT be activated while you do a measurement with the eSense app (this applies to all eSense sensors). Otherwise a running measurement can be disturbed and your values be wrong therefore. You have to deactivate Siri YOURSELF (our app can't do this due to the settings of Apple).

In order to deactivate Siri go Settings -> (General ->) Siri and deactivate Siri (the exact steps can vary depending on the version of iOS).

Smart bulbs (optional)



Smart bulb in use with the eSense Pulse

The eSense app supports biofeedback via smart bulbs. Smart bulbs can change their colors and brightness and can be controlled via Bluetooth. This allows you, in combination with the eSense app, to use the light from smart bulbs as an indicator of your stress or relaxation level.

The app supports Magic Blue and Phillips Hue smart bulbs. From the eSense app, you can connect the Magic Blue and use it in your biofeedback exercises. Philips Hue products can even control multiple lamps together. Connect to the Hue Bridge from the eSense app and select the lamps you want.

We have our own document with questions and answers for the smart bulbs here:

<https://www.mindfield.de/dwnld.php/?download=152>

Magic Blue V2

You can buy the Magic Bulb at our shop at www.mindfield-shop.com/en/product/magic-blue-v2/.

Phillips Hue

You should find Philips Hue products in any well-stocked electronics store. You can also order online. You can also find a list of online and offline retailers on the Hue website:

<https://www2.meethue.com/de-de>

For use with the eSense, we recommend one of the Philips starter kits, which also contains a

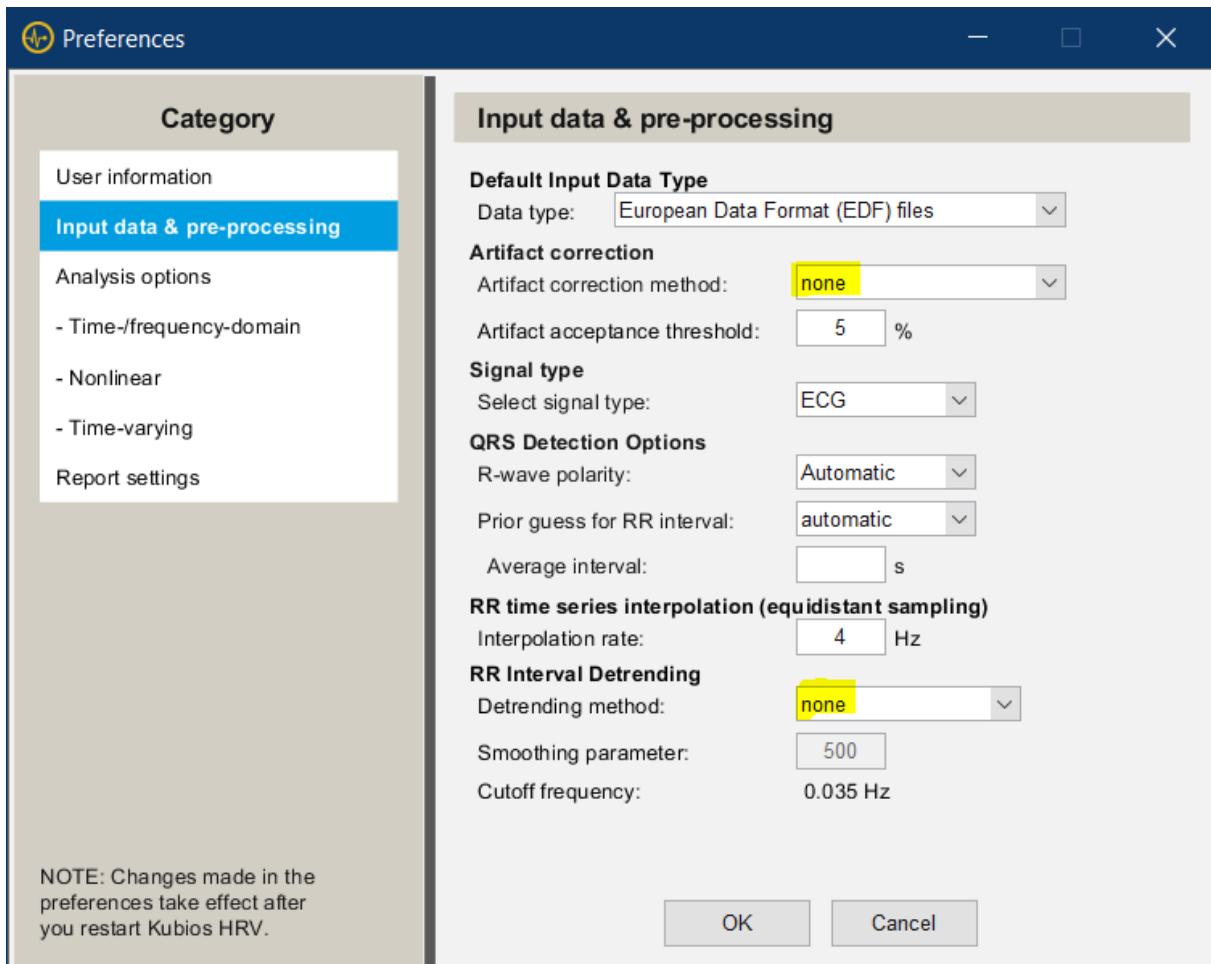
colored lamp ("White and Color Ambiance"): <https://amzn.to/2s6nloP>

Kubios HRV Software

The Kubios HRV Premium Software offers you detailed HRV-analysis with its over 40 analysis parameters and can be perfectly combined with the eSense Pulse.

Analysis of your measurements with Kubios

Some parameters (e.g. SDNN, RMSSD, pNN50) are measured different in the eSense app than in the Kubios software. You can adjust the settings in Kubios so that the data are identical. To do this, you must set the "Artifact correction method" and the "Detrending method" to "none" (marked in yellow below):



Technical data for the Mindfield eSense Pulse

Bluetooth	
Bluetooth Version:	4.0 Low Energy
Frequency range:	2402-2480 MHz
Data rate:	1 Mbps
Number of channels:	40
Channel spacing:	2 MHz
Antenna type:	Integrated antenna
Antenna gain:	0.5dBi
ANT+	
Frequency range:	2457 MHz
Operating voltage:	3 Volt DC
Antenna type:	Integrated antenna
Antenna gain:	0.5dBi

eSense Pulse:

- Sample frequency (internal): 500 Hz, RR intervals with 5 Hz to eSense App
- Measuring range: 30-240 BPM +/- 2 BPM
- Internal error correction
- Operating range: 5-40 °C, <= 95% relative humidity
- Belt made of polyamide and conductive silicone + TPU for the electrical contacts

Troubleshooting connection problems

1. Make sure that not only Bluetooth but also GPS or location is activated on your device. We will NOT determine your location. It is a mandatory requirement of Google / Android that GPS must also be active when using Bluetooth. We cannot change anything, but have to accept this. No GPS data is used by our eSense App.
2. If you have problems connecting to the eSense Pulse, please check that the eSense Pulse is NOT paired in the Bluetooth settings of Android / iOS. This is not allowed. Otherwise, it cannot be paired in the eSense app anymore. Remove the pairing there if necessary. The connection between eSense Pulse and your Smartphone/Tablet is only established within the eSense App. As mentioned under 1., Bluetooth and GPS must be activated and the eSense App must have received the requested authorization to use these two functions. The query for use comes up the first time the app is started and must be affirmed.
3. If the eSense Pulse cannot be found in the settings of the eSense App, please check the battery. Reset the eSense Pulse once by removing the battery, put on the eSense Pulse WITHOUT battery at the chest strap and remove it again. This triggers the reset. Then, insert the battery again or connect a new battery and the chest strap again. Then try reconnecting the eSense Pulse in the settings of the eSense App.
4. Please make sure to use electrode contact spray. Without bad electrode contact, a connection may not occur.

EC Declaration of Conformity for the Mindfield eSense

in accordance with the following directive(s):

Radio Equipment Directive (2014/53/EU)

RoHS - Restriction of (the use of certain) hazardous substances (2011/65/EU)

WEEE Waste Electrical and Electronic Equipment (2002/96/EG & 2008/34/EG)

The manufacturer

Mindfield Biosystems Ltd.
Hindenburgring 4
D-48599 Gronau
Germany

WEEE-Reg.-Nr. DE 24465971

hereby declares that the following product:

“Mindfield® eSense Pulse”

complies with all applicable essential requirements of the directives.

It is in conformity with the applicable requirements of the following documents:

DIN EN 60950-1 Information technology equipment – Safety – Part 1: General requirements (2013)

DIN EN 62479 Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz) (IEC 62479:2010, modified)

ETSI EN 300 328 V2.1.1 (2016-11)

ETSI EN 300 440 V2.1.1 (2017-03)

Place: Gronau

Date: 19th of December 2018

N. Rockensüß

www.mindfield.de
A Better State of Mind

Niko Rockensüß, Managing Director



According to legal requirements, the Mindfield eSense has to be recycled as electrical waste.

WEEE-Reg.-Nr. DE 24465971

Privacy policy

The eSense App does not collect any personal data, such as name, gender, date of birth, etc..

Each recording of measurement data is done under a general prefix such as "measurement", supplemented by with the eSense sensor used, the current date and time of the measurement. The recorded measurement data cannot therefore be assigned to any person.

The prefix of a recording, e.g. "measurement", can be changed by the user in the settings and used for the assignment to a person. Users can decide whether to change this prefix to their name, for example. Then each measurement and also each CSV file exported from it contains the name of the user in the file name.

Access rights within the eSense App

1. Access to media library: Access to photos, music, and videos is only required if you want to use your own photos, music, and/or videos in the eSense App. The eSense app should be used as feedback. It is also possible to use only the by the app supplied media.
2. Access to the location: The access to the location (activation of GPS) is only required for the Bluetooth connection to the Magic Blue bulb (optionally available) or the eSense Pulse. This is mandatory under Android and lies outside the possibilities of the publisher of the eSense App. No standard data is collected, the standard function is not used.
3. Access to Bluetooth: If the eSense app is used with the Magic Blue smart bulb to provide biofeedback by modifying the color and brightness of the light bulb, it needs to be connected via Bluetooth within the app. To do this, the Bluetooth function is used. For the eSense Pulse Sensor, Bluetooth is also required as it transmits the data via Bluetooth.

Transmission of anonymous usage data and crash reports

In order to improve the technical stability of the eSense App and the detection of code errors, we use the Sentry service. Sentry serves these purposes alone and does not evaluate any data for advertising purposes. The transmission takes place anonymously and only with an existing internet connection.

Processed data

Usage data, metadata (device ID, device data, IP address).

Special protective measures: IP masking, immediate deletion.

External Functional Software Disclosure: Functional Software Inc., Sentry, 132 Hawthorne Street, San Francisco, California 94107, USA.

Privacy Policy: <https://sentry.io/privacy/>.

Processing in third countries: USA

Warranty for processing in third countries: Privacy Shield, <https://www.privacyshield.gov/participant?id=a2zt0000000TNDzAAO&status=Active>.

Deletion of the data: Information on the device or time of error is collected anonymously and is not used for personal purposes and then deleted.

Medical information

The Mindfield eSense sensors are not medical devices and may therefore only be used to reduce stress.

If you suffer from an illness, do not carry out any treatment on your own and always consult a therapist.

