



HANDBOOK

Instruction Manual | Biofeedback-Training | eSense-App

Version 4.2.8 | 13th of June, 2019

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

Contents

- Essential Functions of eSense Respiration..... 4
- Standard scope 6
- General Information about Breathing and Breathing Training 7
- Introduction to eSense Respiration..... 8
- Breath Measurement and Biofeedback Training 8
 - Operating Instructions for eSense Respiration12
- Training Procedure.....13
 - First Training Phase (observation and experimentation; determination of the actual state)14
 - Second Training Phase (targeted biofeedback training based on the measured values)...16
 - Third Training Phase (provocation, relaxation and stress management)18
 - Fourth Training Phase (transfer, and relaxation without feedback).....19
- Features of the Mindfield eSense App.....20
 - General View22
 - Breathing aid23
 - Survey (optional).....24
 - Pie Chart (after the measurement).....24
 - Explanation of the Individual Measured Values.....25
 - General settings (overview)28
 - Archive (Overview)31
 - Archive (single view)33
 - Mark function35
 - Procedures36
 - Procedures Settings36
 - Procedure Editor37
 - Add new module38

2

Overview of the modules	39
Meditations	42
Creation of an example-procedure.....	42
Supported Android devices.....	43
Supported iOS devices	44
New: Smart bulbs (optional).....	45
Extension of the Cable of the eSense.....	46
Troubleshooting Measuring Signal and Breathing Belt	46
EC Declaration of Conformity for Mindfield eSense Respiration	47
Privacy policy	48
Transmission of Anonymous Usage Data and Crash Reports.....	48
Contact.....	49
Your Notes	49

Essential Functions of eSense Respiration

eSense Respiration is a breathing belt sensor that uses a smartphone/tablet and an app to accurately measure your breathing. The sensor focuses on the feedback of your breathing. eSense Respiration provides breathing training with biofeedback and serves to improve your breathing pattern, your breathing duration, breathing depth and thus your health! Breathing plays an important role in general well-being, and breathing exercises are part of many relaxation techniques around the world.

The eSense Respiration with the eSense App offers you:

- A pressure sensor to record your breathing (breathing frequency, breathing depth, breathing pattern; application always in connection with eSense skin response, as a sensor cable)
- A stretch belt that is comfortable to wear, washable and durable
- Comfortable to wear over clothing
- Unlimited recording duration
- Unlimited number of sessions and users
- Extensive statistics for breath analysis
- Breathing aid for breathing training with freely adjustable intervals, auxiliary tones and more
- Export of measurement data as a csv file with compatibility to other software programs for further analysis
- Export of curves, diagrams and statistics as a PDF report

- To train and improve your breathing, the app offers a wealth of biofeedback feedback:
 - Bar feedback
 - Curve feedback
 - Video feedback (videos included and own videos freely selectable)
 - Music feedback (music included and own music freely selectable)
 - Tone feedback (change of pitch by the measured values)
 - Tactile feedback through vibration (only smartphones; tablets cannot vibrate)
 - Feedback through color changes of smart bulbs (Bluetooth bulb and Philips Hue products are controllable)
- Set any number of markers during a recording
- Different, prefabricated 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 app updates
- **Possible combination with the eSense Pulse for heart rate variability biofeedback with determination of the coherence between heartbeat and respiration!**

Standard scope

Scope of delivery of the eSense Respiration:

- Mindfield® eSense Respiration Sensor incl. replacement spring
- Expansion strap
- eSense App from Mindfield (Apple App Store, Google Play or Amazon App Store)
- Detailed instructions for effective biofeedback training

Attention!

- **To run eSense Respiration, you need an eSense Skin Response!**
- **eSense Respiration is an additional product to eSense Skin Response.**
- **eSense Skin Response is available in a package with eSense Respiration at a reduced price.**
- **Users who already own eSense Skin Response can purchase eSense Respiration as a supplement.**



1: eSense Skin Response with eSense Respiration and Smartphone

General Information about Breathing and Breathing Training

Our state of mind is reflected in our breathing. If we are pleased or tense, we usually breathe quickly, irregularly and flatly. Positive as well as negative stress is reflected in this way. If, on the other hand, we are relaxed and calm or sleepy, our breathing is usually slow, even and deep.

All in all: Conscious, slow, deep breathing, preferably into the stomach, leads to a clear relaxation! We take advantage of this aspect.

Breathing has a special role in biofeedback in that we can consciously control this parameter. In everyday life we rarely think of our breathing and breathe almost exclusively unconsciously. If our unconscious breathing patterns are disturbed by chronic stress, pain or other psychological or physical stresses, this often leads to discomfort and the maintenance of stress.

With breathing training, you can train and improve your breathing, achieve deep relaxation states and significantly increase your general well-being. Breathing therefore plays an important role in almost all relaxation techniques such as autogenic training, yoga, meditation and progressive muscle relaxation.

Direct biofeedback of breathing; i.e., real-time feedback of breathing pattern, depth and frequency helps our consciousness to achieve new, better breathing patterns faster and more precisely than without biofeedback. The focus on feedback prevents the otherwise so frequent drift in thoughts and loss of concentration on breathing. Many meditation techniques involve the observation of breathing, which is very difficult for many beginners. Breathing biofeedback makes this entry much easier.

After a learning phase of some training sessions, respiratory biofeedback leads to a new feeling of switching off and full focus on breathing, more and more without the feedback of biofeedback, as a better self-perception is developed. In chapter "Training sequence" the sequence of a respiratory biofeedback training program is described.

Follow this suggestion and develop your own routines and integrate breathing training into your everyday life, first with and later without biofeedback. The eSense Respiration is a powerful tool to help you breathe better.

Introduction to eSense Respiration

Biofeedback breathing training with eSense Respiration is about observing your breathing through changing bars, curves, music, sounds, vibrations, light from light bulbs, and more. This gives your consciousness a new perspective on breathing, self-perception is trained, and a feedback cycle is created.

But it is also about the change of the breathing, towards a slower, deep abdominal breathing, which has many positive effects and can be trained by a breathing target in our app.

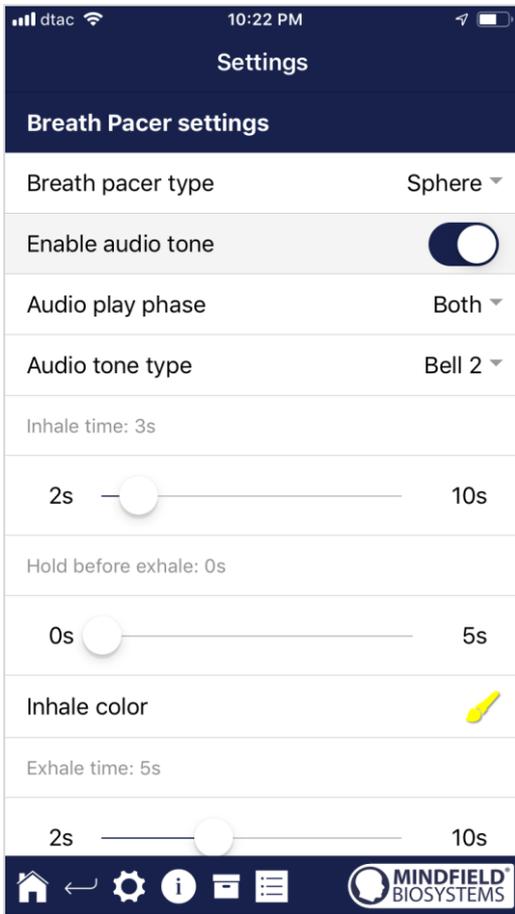
We combine the measurement and feedback of breathing in the eSense App with guided relaxation exercises, guided breathing exercises and meditation and offer you a total experience beyond biofeedback. In addition to extensive feedback variants, you can evaluate your measurements with many statistics, document your progress and export the recordings as CSV and PDF files. Your data belongs only to you! You have full access to the raw data.

Respiration is measured according to the principle of strain measurement. With every breath, your chest and abdomen space will rise and fall, and the belt you put on over your clothes will stretch slightly. You can put the eSense Respiration Stretch Belt either around the chest or around the abdomen. Abdominal breathing is measured and trained more frequently. eSense Respiration has a spring that translates the pressure of the belt into readings. The eSense Respiration Sensor is used for transmission to your smartphone and tablet via its microphone input. Our eSense app evaluates these signals and displays them in a comprehensive form.

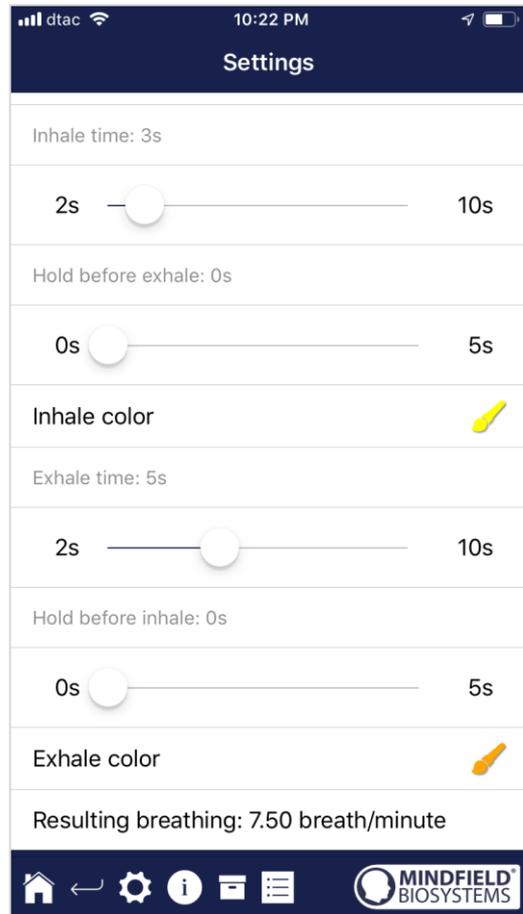
Breath Measurement and Biofeedback Training

To reduce stress and its vegetative symptoms, biofeedback training can be performed by monitoring and reporting your breathing. **Frequently, feedback alone is enough without specifications, and the user automatically breathes more calmly and evenly.**

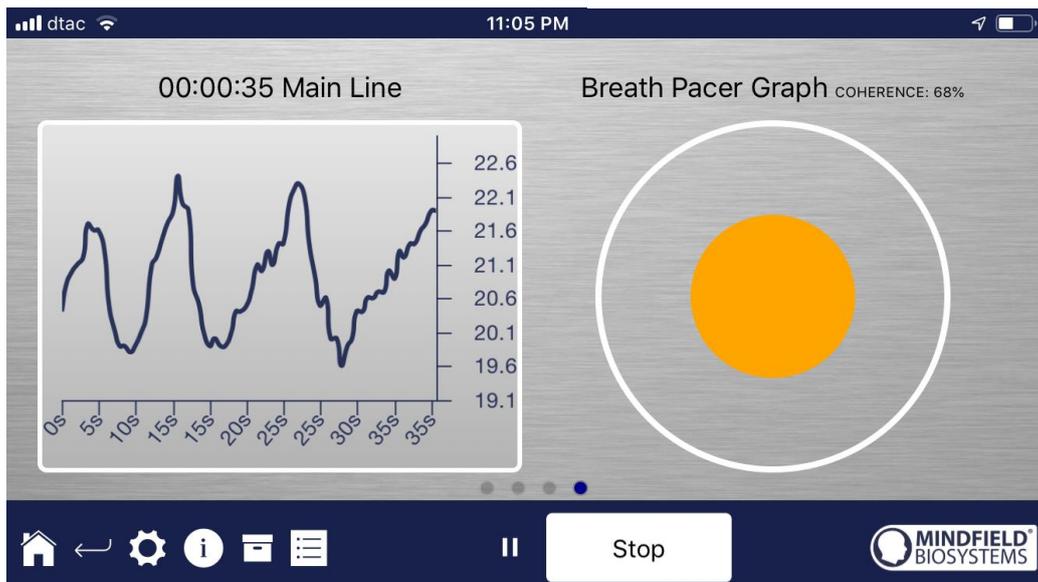
In addition to this measurement and feedback, it is also possible to **specify** how the user should breathe. The app includes a breathing aid for this purpose. A bar, line or sphere changes by rising or zooming to symbolize inhalation. A falling of the beam or lines, as well as a shrinking of the sphere shows an exhalation. The user follows this guideline by breathing. The breathing target is freely adjustable regarding inhalation - hold - exhale - hold.



2: Adjustment options for breathing aid (ball; line) and tones



3: Adjustment options for the breathing aid with freely selectable times for inhalation, holding, exhalation, holding and the resulting breaths per minute



4: Breathing aid as a ball (right) with a measured breathing curve (left) and coherence between breathing and curve

Breathing can be used quite universally for biofeedback training. In stress medicine and psychophysiology, respiratory biofeedback is used, for example, for depression, heart disease, asthma, anxiety disorders and insomnia. Breathing biofeedback is also common in coaching and competitive sports. Improving breathing patterns can help relieve tensions, cope with stress and anxiety, and help you react more calmly in everyday life. If you suffer from an illness, do not treat yourself; instead, consult a therapist. eSense Respiration is not a medical device and may only be used for stress reduction.

The eSense Respiration is a handy device. It can record respiration and display it as a measurement curve, for example. Look at the following example of a measurement at rest and with even, slow breathing:



5: Sample measurement curve eSense Respiration at rest, with deep, slow and even respiration (RA = Respiration Amplitude)

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

The curve looks very different under requirements and with uneven breathing, as the following figure shows:



6: Example of eSense Respiration curve for tension or requirements and erratic, irregular, fast and shallow breathing.

In this example above, the curve is uneven, and the deflections are different.

In the eSense app, you can do a free training or complete predefined procedures. **Your breathing is reported back, and an increase (inhalation; belt expanding) changes a feedback in a certain way, while a decrease (exhalation; belt contracting) changes a feedback in a slightly different way.**

As feedback there is; e.g., a video, which becomes brighter or sharper in the positive case (darker or blurred in the negative case), a music, whose volume changes, tones, which change in the sound, a vibration of the smartphone, and much more. Of interest is the function of controlling a smart light bulb (Philips Hue or Magic Blue), whereby breathing is reflected in the change in color and brightness of one or more lamps. You can use your breathing to illuminate an entire room in different ways.

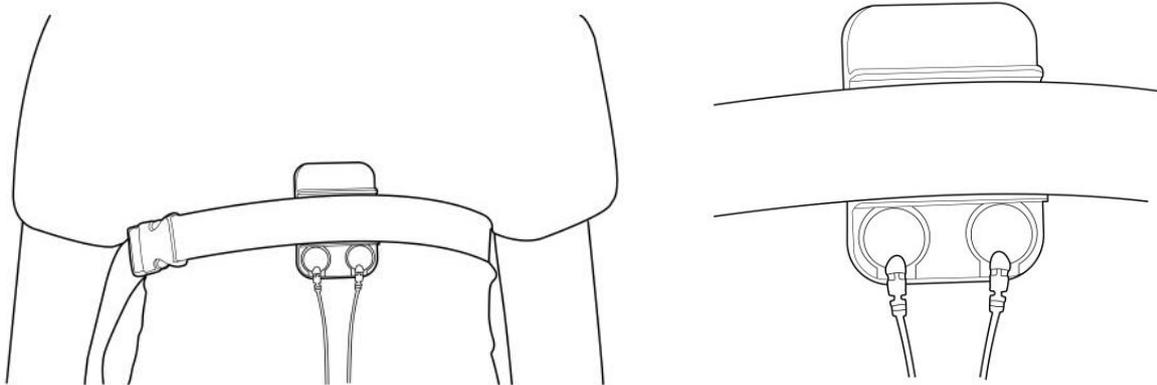
A biofeedback training session consists of four training phases. Plan about 60 to 90 minutes for the first session, during which you can do the training undisturbed and coherently. Detailed instructions can be found in the chapter "Training sequence".

Operating Instructions for eSense Respiration

Contents of the packaging:

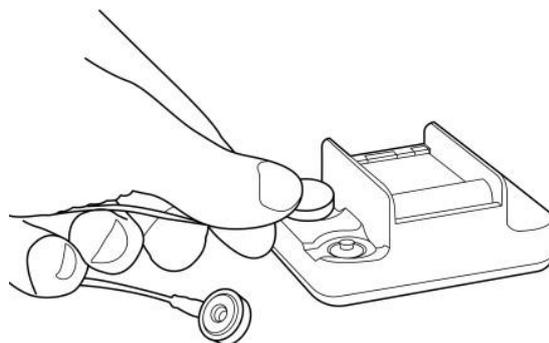
- eSense Respiration Sensor Unit (black box with inserted spring + one replacement spring to replace in case of defect of inserted spring)
- eSense Respiration Stretch Strap, variable length adjustable
- Printed guide

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



You can wear the belt either around the chest or around the abdomen. In most cases, the measurement and training of deep abdominal breathing are useful.

The belt should sit quite loosely and should not restrict you in any way! A small amount of pressure on the spring of the sensor unit is enough. After applying the strap, slide the sensor unit under the strap, connect the cables from the eSense Skin Response to the sensor's push button connectors, and plug the other end of the eSense Skin Response into the microphone input of your smartphone or tablet. If your device no longer has a microphone input, an adapter may be required (e.g., for the newer Apple iPhones/iPads). This is available from the manufacturer and the eSense works fine with it.



Cleaning and Care

There are the following 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 with a temperature above 30°C.
- Ironing, bleaching and heating must be avoided at all costs.
- Do not drop or use force against the sensor.
- Avoid exposing the sensor to high temperatures or sunlight.
- If the eSense Respiration is stored near freezing point, allow it to warm to room temperature before next use.
- Do not attempt to open the sensor; the spring can be replaced without opening the housing.
- **To replace the spring, bend it slightly upwards with your fingers, then pull it out to the front and push the replacement spring back in.**

Training Procedure

1. Create favorable conditions: a quiet room (mobile phone, telephone, etc. switched off), pleasant room temperature of 20-22°C, comfortable seating and clothing. Strong physical activity before measurement should be avoided. To obtain comparable measurements, you should always train under the same conditions.
2. It is best to sit in a comfortable armchair for the first application. With some experience, the application is also recommended when lying on the bed or a comfortable surface. It is important that you maintain your position as far as possible, otherwise you will have to readjust the belt.
3. Put on the stretch belt around your chest or belly as described in the previous chapter and start the Mindfield eSense App. Select eSense Respiration from the various eSense selection screens.
4. The belt should fit loosely over the clothing and should not slip during the measurement. Probably, it is not possible to find the optimal setting right away. This is quite normal. Above all, the belt should not give the feeling of tightening when breathing. The spring in the sensor is very sensitive, so it is enough to put on the belt only loosely, so that minimal pressure occurs.

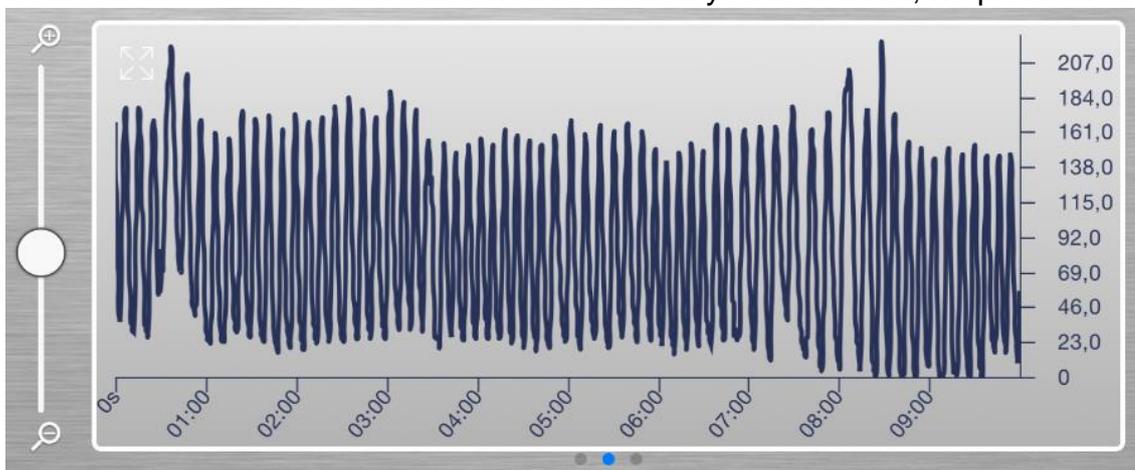
5. Rotate your smartphone or tablet to landscape so you can see the oscilloscope.
6. Now start a free measurement (simply press "Start" on the main screen) and look at your breathing curve. Now it is a matter of finding an optimal setting for the belt, where an expansion of your chest or abdomen leads directly to a force transfer to the sensor and to a deflection of the measuring curve upwards. In most cases, you will then move within a measuring range of 20 to 200.
7. Below 20 the belt is very loose, and you should not let the curve touch the zero point of the Y-axis. If you have exhaled completely, a minimum pressure should still be applied.
8. Over 150-200 the belt is too tight from our experience and the pressure is unnecessarily strong. Loosen the belt slightly at the buckle without opening or taking off the belt. Gain experience with an optimal attitude. The belt retains its setting even for the next application.
9. Under no circumstances should you have the feeling that you are too restricted and therefore restricted in your breathing.
10. The number of sessions required for reliable success is relatively small. Usually, 10 to 15 sessions is enough. 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 chosen.
11. To get an optimal comparability of sessions, 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 the 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 comparability of your training sessions later.

First Training Phase (observation and experimentation; determination of the actual state)

1. First, determine a ten-minute baseline (default state without influence) at rest. Before doing this, you should have found the optimum setting for the breathing belt, as described in the previous section. It always makes sense to compare measurements of the same length, so use the option in the settings to set the

session length to a fixed duration, so you do not have to stop at the right time. Now set the session length to ten minutes.

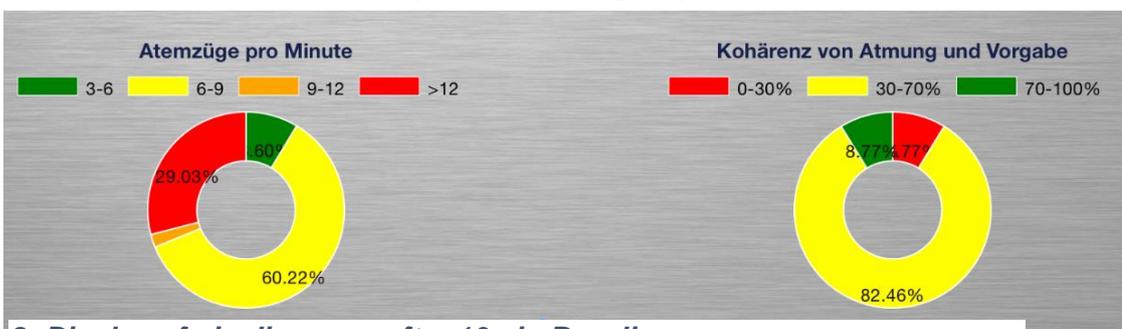
2. Try to relax as much as possible **and DO NOT observe the breathing curve** during these first ten minutes, as this would falsify the measurement.
3. Breathe calmly, deeply and evenly as you feel comfortable, but **without forcing your breathing!** Follow pleasant thoughts and memories.
4. Hold your smartphone or tablet in landscape mode. Look at your breathing curve **after the first ten 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—



7: Example of a measurement curve of a 10-minute baseline

this will follow. Good relaxation goes hand in hand with a slow and even breathing curve. Distractions and irregular breathing affect an irregular curve.

5. After completion of the ten-minute baseline, you will first be shown a survey. Answer the questions and take notes if necessary. You will then see two pie charts. One shows you the number of breaths per minute and the other the coherence between breathing and breathing target. Since you have not yet used



8: Display of pie diagrams after 10min Baseline

the breathing target, this pie chart is unimportant. However, look at the chart of breaths per minute and note the proportion of breaths that occurs most frequently. You're probably still breathing orange and red, which is perfectly normal. A training goal in respiratory biofeedback is to achieve a particularly slow breathing rhythm with increasing difficulty.

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. So, 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 in the archive.**
7. One more hint: If the measured values are disturbed for no apparent reason, the sensor was not positioned optimally. Check the breathing curve in another measurement and again find the optimum setting for the stretch belt. Repeat the baseline measurement.

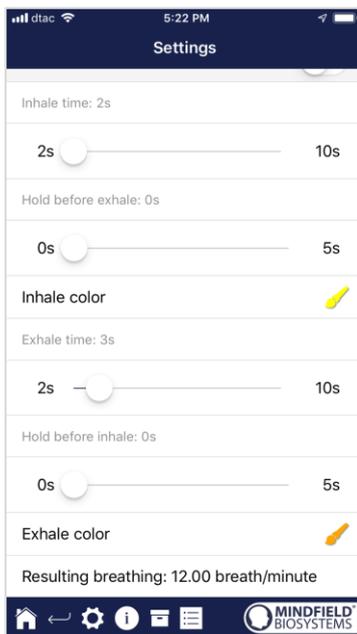
Second Training Phase (targeted biofeedback training based on the measured values)

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 breathing curve for a while. The goal now is to achieve an even, slow breathing curve. In the main screen of the app in portrait format, you can see the breathing in the form of a bar. With every breath the bar goes up and down. In landscape format, you can see your breathing curve in the oscilloscope. If necessary, adjust the zoom control so that breathing is clearly visible.



Breathing as a curve and in bar form

3. Now try to achieve a state of passive observation and allowing breathing through targeted relaxation and calm, even breathing. You can test different feedback variants of the app and test relaxation techniques. At first you can also consciously control your breathing (deep inhalation and exhalation). The device gives you precise information about the resulting respiration. At a later stage, our prefabricated breathing exercise is also discussed in the procedures of the app.
4. Practice even breathing, including breathing aid if desired. You can configure the breathing aid in the app settings. 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 ten 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 achieve ten quiet breaths per minute). It's soothing to exhale a little longer than to inhale.
5. Here is a possible 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)

You can also set a hold time between inhalation and exhalation breaths. However, we recommend setting this to 0 at the beginning (i.e., no holding time) and experimenting with the holding time only during advanced training.

6. Train using the various biofeedback features the app offers. In landscape format, you also have the breathing aid as a line. You have a freely selectable video, which changes with breathing. In the settings, you can choose from various options for video feedback. 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 app.
7. **Use the supplied procedures!** This allows you to get to know the different functions of the app even better and to perform a 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 even more specifically to train stress management. Breathing biofeedback is well suited for the use of targeted provocation methods, as it shows a timely and sensitive reaction to a stimulus,

and since this reaction is also proportional to the strength and significance of the stimulus.

2. Start the measurement and observe your breathing curve 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 specifically. Examples are negative thoughts, looking at emotionally occupied pictures or objects as well as unpleasant noises. As a rule, everyone knows things that put them in tension and excitement. 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 breathing curve, and you will probably notice a more irregular, flatter 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 until you feel you are less sensitive to stressors or recovering more quickly. The aim is to simulate everyday situations with stressors and to counter them with targeted resting breathing and to find the breathing that will help you to relax the quickest through feedback.

Fourth Training Phase (transfer, and relaxation without feedback)

1. Now it should be checked whether you have achieved a training success and whether an improved ability to relax is already achieved without feedback. To do this, carry out another ten-minute baseline measurement and try to relax as much as possible. **DO NOT observe the measured values.** Only consider afterwards how this measurement behaves in comparison to the baseline from the first training phase. In the archive, it is possible to compare sessions with each other. It is to be expected that various 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 so you do not have to stop at the right time.
2. As another transfer exercise, you can work with a stressor again and then try to relax while NOT observing the measured values. Check afterwards whether you have 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 completed a successful stress reduction training. If you now find yourself in a stress 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. The question also arises: Have you been able to breathe slower and deeper than at the beginning? Did you get a better feeling for breathing? Do you encounter stress more often with deep abdominal breathing? Has your breathing pattern improved? These are the objectives that are usually to be achieved.
4. Our eSense App offers free training as well as the use of procedures. These are ready-made training programs which you can individualize 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

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

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 (curve), a feedback via video, music (by means of tones), vibration and 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/de/app/mindfield-esense/id1141032160?mt=8>

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

Amazon: <https://www.amazon.de/dp/B073VPZ97R>

In the following the app is described in all details.

General View

Measurement duration

Current elongation of the belt

Breathing aid coherence

Evenness of respiration in %

Breaths per minute

Display whether the value is rising or falling

Back

Preferences

Instructions and help



Change between beam, breathing aid and breathing aid coherence

Breathing scale

Zoom for breath scale

Current elongation of the belt

Starting, stopping and pausing a recording

Procedures

Archive

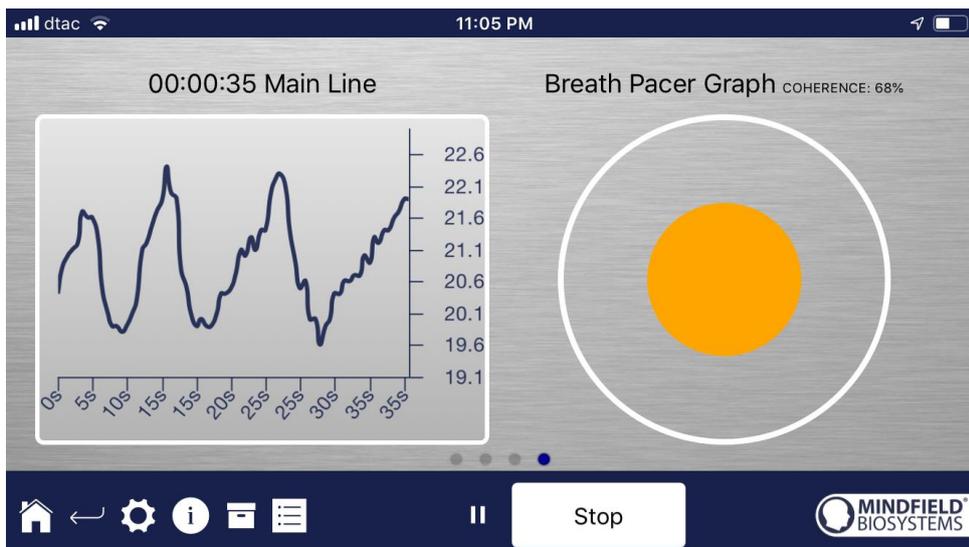
Currently calculated RA (Respiration Amplitude = how deep you breathe)



Set mark

Wipe 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.

Breathing aid

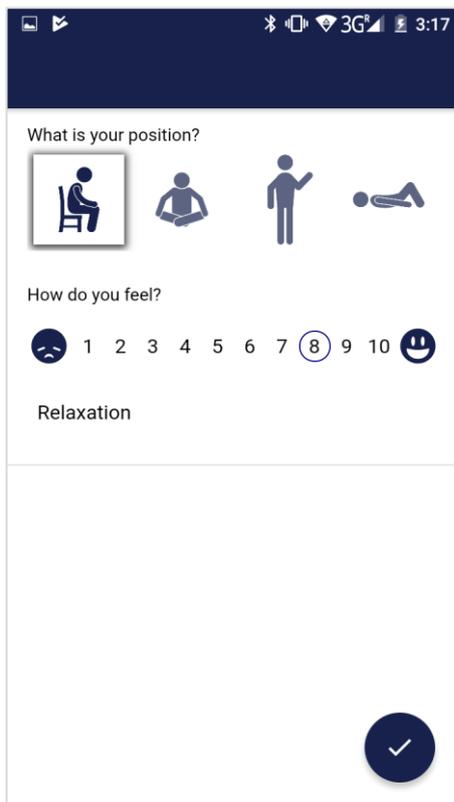


Breathe as the sphere expands. The ball will grow and shrink. The coherence (here 74%) shows you how much your breathing follows the target. The higher the

value, the better. 100% cannot be achieved. As soon as you are above 50%, your breathing will follow the preset. Try to reach as high a value as possible and experiment with different breathing times (inhalation time, exhalation time, holding time).

Survey (optional)

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



What is your position?

How do you feel?

Relaxation

Your position during measurement

Choose between sitting, "cross sitting," yoga sitting, standing or lying.

How are you feeling?

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 (here "relaxation"), optional

Here you can write a note about 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 two pie charts: the breaths per minute and the coherence of breathing and breathing target, each over the entire session in %.

At this point you can also wipe the screen to the left or right to switch between the pie charts and the graphs of the measurement.



Pie chart and values after a measurement

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:

$$Score = Score_0 + \frac{0.1 \times Amplitude}{5}$$

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 respiration values

There are three categories of readings that we cover with the eSense app: Breathing rate, depth and pattern.

Respiratory rate

The breathing rate is the number of breaths per minute. In other words, how often you breathe. **No specific value** is sought. However, most people tend to breathe too quickly, especially during stress, so they tend to aim for slower breathing (fewer

breaths per minute). The number of breaths per minute also **depends on the activity**.

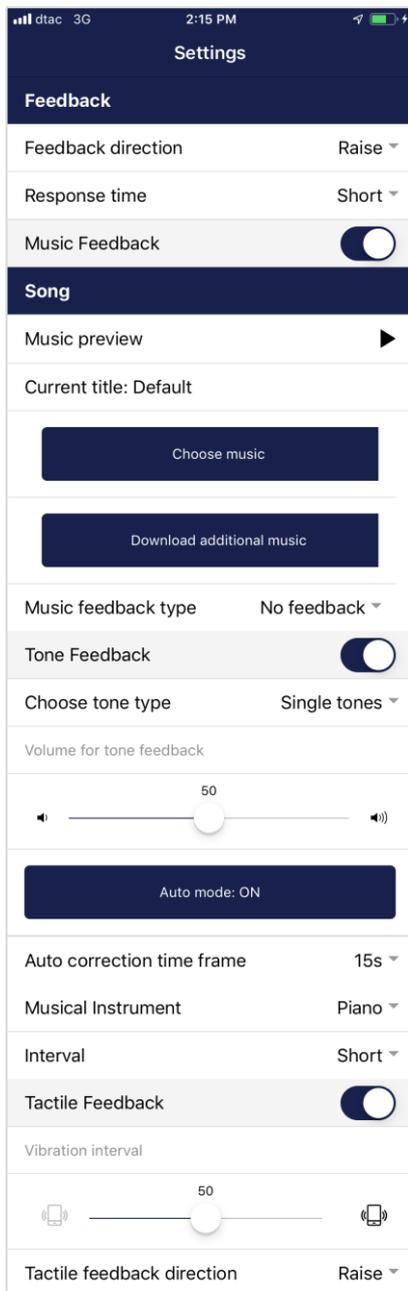
Breathing depth

In simple terms, the depth of breath means how deeply you breathe. The **Maximum RA (Respiration Amplitude)** is the maximum of the calculated amplitude. The higher this value is, the deeper you breathe. A **high value** is sought. **Independent of the activity**, deep breathing is generally desirable, independent of the activity. Some breathing techniques such as the Wim Hof method work with particularly fast and deep breathing (hyperventilation).

Breathing patterns

The breathing pattern is the form of breathing. This is represented by the graph. The aim is to achieve a **uniform graph**. You can see an example of an even graph on page 9 of this manual. A nice even curve is also desirable **regardless of the activity**.

General settings (overview)



Feedback direction

Select the direction in which you want the feedback to address. It can respond either to an increase or decrease in the measured values. The values increase when inhaled and decrease when exhaled. So, choose which breathing phase you prefer to occupy with positive feedback.

Reaction 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 of 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.

Download additional music

You can download more music as in-app-purchase and use it in the app.

Music feedback type

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

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 are 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 automatic 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 automatic 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.

Smart bulb feedback	<input checked="" type="checkbox"/>
Choose a bulb	Magic Blue ▾
Magic blue is currently not chosen	
Choose a bulb	Connection test
Auto mode: ON	
Auto correction time frame	15s ▾
Lower range color	
Upper range color	
Breath Pacer	<input checked="" type="checkbox"/>
Breath Pacer settings	
Breath pacer type	Sphere ▾
Enable audio tone	<input checked="" type="checkbox"/>
Audio play phase	Both ▾
Audio tone type	Bell 2 ▾
Inhale time: 2s	
2s	<input type="range"/> 10s
Hold before exhale: 0s	
0s	<input type="range"/> 5s
Inhale color	
Exhale time: 3s	
2s	<input type="range"/> 10s
Hold before inhale: 0s	
0s	<input type="range"/> 5s
Exhale color	
Resulting breathing: 12.00 breath/minute	
Video	
	

Interval

Set an interval for the tone feedback.

Tactile Feedback

Your device will vibrate to 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 or Phillips Hue.

Connection test

With this option, the Magic Blue 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 a 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 / exhale color

Select the color of the bar or sphere for inhalation and exhalation.

Video

Choice: In the dropdown menu, you can select from existing videos or you can select your own videos from your device.

Download additional videos

You can download and use more videos.

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 displayed in the archive here.

Video	Burning Wood ▾
Download additional videos	
Video feedback type	No feedback ▾
General	
Session name:	Respiration
Time length X-Axis	60s ▾
Decimal separator	Point ▾
Sample Rate (CSV Export)	3Hz ▾
Session time length	Unlimited ▾
Show Tutorial	
Survey after recording	<input checked="" type="checkbox"/>
Markers	<input checked="" type="checkbox"/>
Relaxation	<input type="checkbox"/>
+	
Chart settings	
Chart axis color	
Chart line color	
Oscilloscope background 1	
Oscilloscope background 2	
Smoothing of curve	
	1 ————— 5 ————— 10
Reset to default colors	
Arrow raise background color	
Arrow lower background color	
Show arrow	<input type="checkbox"/>
	

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.

Sample Rate (CSV Export)

This determines how many values per second are recorded in the CSV file. More values (a higher Hz value) produce more detailed data, but also increase the size of the CSV file.

Session time length

You can limit the time of normal measurements.

Show tutorial

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

Survey after recording

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

Markers (here "Relaxation")

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).

Chart Settings

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

Smoothing of curve

You can adjust the smoothing of the curve in the oscilloscope between 1 (hardly) and 10 (very strong).

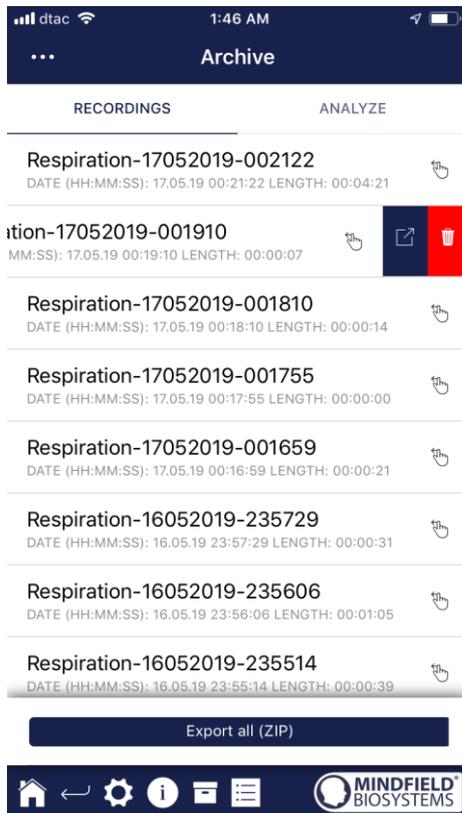
Arrow raise / lower background color

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

Show arrow

You can also disable the arrow in the main view.

Archive (Overview)



The app contains an archive in which all your recordings are stored. You can view them again in detail, compare them with each other and export them individually or all together (as a ZIP file).

Records

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

To select certain measurements and compare them in the analysis, tap on the 3 points at the top right and select "Select".

If you want to delete a measurement from this list, you can drag the measurement to the left (shown here on the third measurement from above). Then tap on the trash. To export the measurement as a CSV file, you can tap the blue button.

In the lower area, you see the button to export all measurements as a compressed ZIP file.



Analysis

Here all measurements are listed in the following factors:

Time, Average Session RA, Breath depth RA, Average breath per minute.

This allows you to see trends over time and different measurements.

If, for example, your breathing depth RA values increase through regular training, you can see this here at a glance.

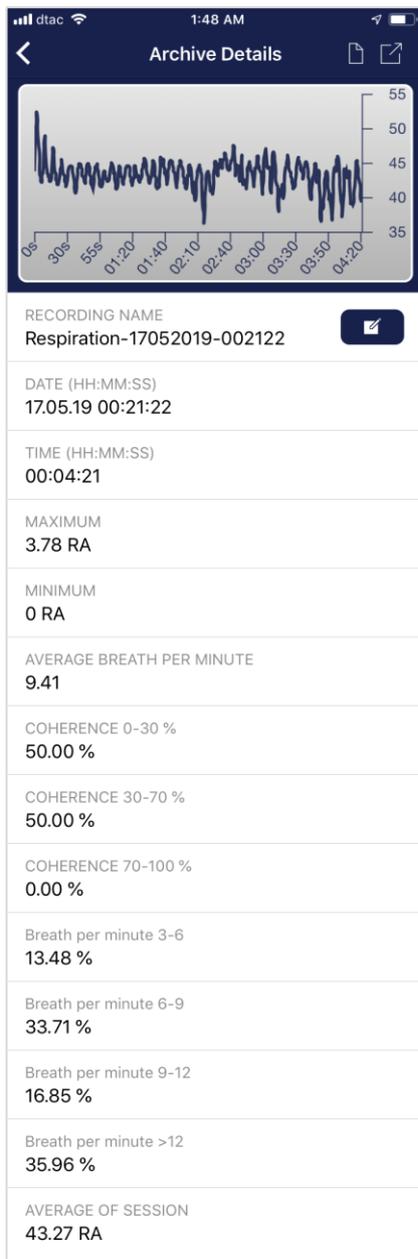


Database

You can import and export all measurements as a database (.sql file). The database is currently saved on your device and can be re-imported later after a new installation of the app. With a future update of the eSense App we will also add the function of an online backup to the database.

This feature is currently only available under Android and will also be available under iOS in the future.

Archive (single view)



Export data

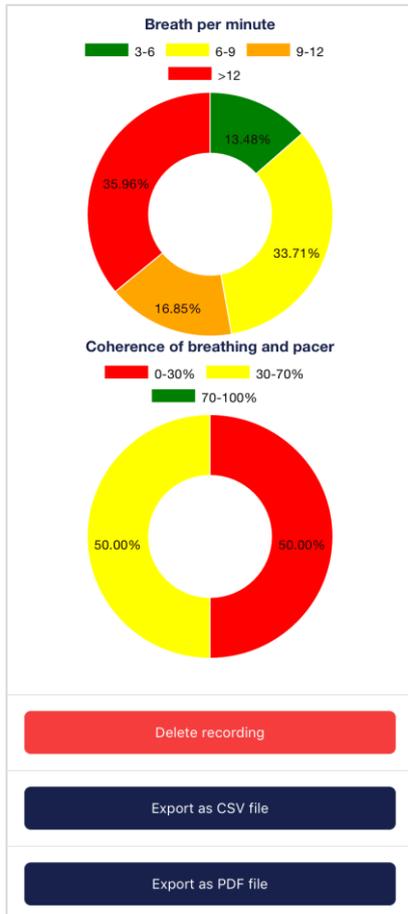
By clicking on the export icon at the top right or the "Export as CSV file" at the bottom, you can export the recordings in .csv format with all common apps (e.g., send via Messenger, WhatsApp, Email, etc.) or simply save them on your phone or in your cloud. The second symbol from the top right exports the measurement as a PDF file.

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).

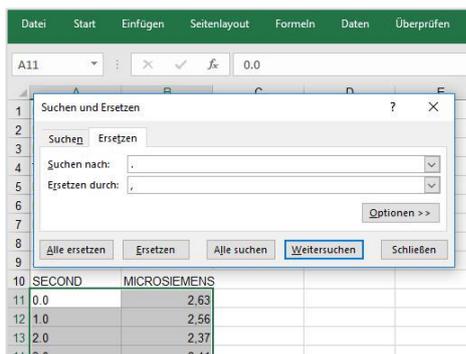
If you like to work with Google, Google Sheets™ (Google Tabellen™) can also be an alternative to Excel for you. You can also open and visualize your exported .csv files and access them easily from multiple devices via the cloud. Google Sheets™ has almost the same functions as Excel™ and a very similar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

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

<http://mindfield.de/esense-csv-anleitung>



Alternatively, you can export the measurement as a PDF file. Note: This will take a moment.



In Excel™ or Google Tables™

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

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

<http://mindfield.de/esense-csv-anleitung>

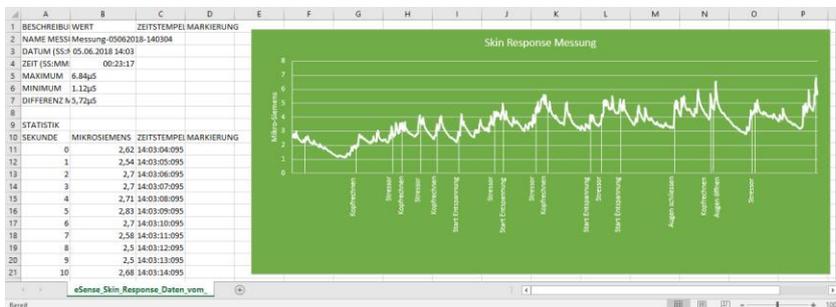


Exported measurement in Excel

Mark 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 (using the example Skin Response)

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 breathing is naturally recorded. At the end of a procedure, a summary is displayed, showing your readings for each module and the overall view.

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.

Procedures Settings



Edit or delete procedure

To be able 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

Procedure editor
+

Procedure name

Relaxation

Created at: 12.03.2018

Export settings

Decimal separator Point ▾

Sample Rate (CSV Export) 1Hz ▾

Start time (00:00:00)

Text
90

▾

Fixation cross
120

▾

Text
30

▾

End time (00:15:00)

Add module to procedure +

← ⚙️ ⓘ 📄 ☰


Procedures Name

Here you can give your procedure a suitable name (as an example in the picture, the name "Relaxation").

Decimal separator

You can choose between point or comma.

Sample Rate (CSV Export)

This determines how many values per second are recorded. More values (a higher Hz value) produce more detailed data, but also increase the size of the downloaded file.

Procedure editor with modules

You can move the individual modules with the arrows in their order.

To edit an individual module, move it to the left (shown here with the upper module).

The color of the modules you see in this overview depends on the settings in the module editor.

Add module

Start by pressing the + to add modules to your procedure!

Add new module

Add new module
✓

Procedure general settings

Procedure name Test

Created at: 25.03.2018

Module type Image file ▾

Module duration 120s.

⌚ ————— ⌚

Module color 🖌️

Image module settings



Feedback image Meditation - 1 ▾

←
⚙️
ℹ️
📁
☰

Module type

You can choose from a text, an image, a video, an audio file, a fixation cross, an arrow or a bar graph.

Module duration

Set how long the module should last. Simply move the slider to the left or right.

Module color

Specify the color of the module in the Procedure Editor.

Overview of the modules



Text module

This module displays text that you can edit as you like.



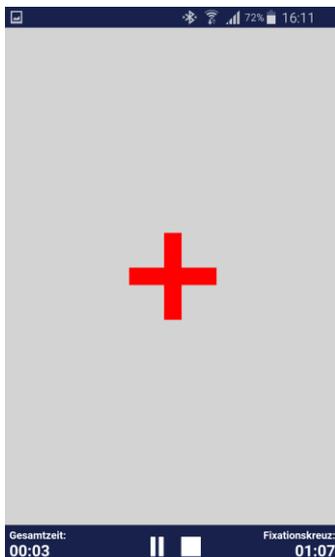
Image module

The image module shows you either a standard image from the app or an image you can choose from your gallery.



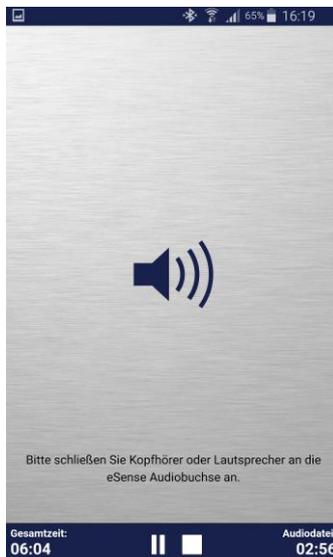
Video module

With the video module, you can also use either the standard video included with the app or your own video.



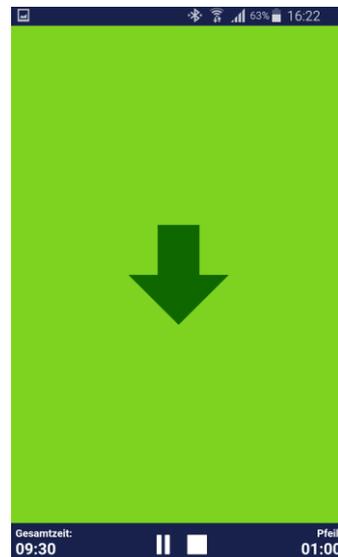
Fixation cross module

The fixation cross changes color according to your skin conductance. This



Audio module

The audio module plays a relaxing song. You can also use your own music.

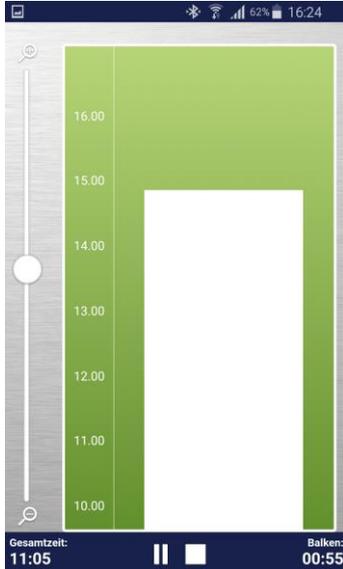


Arrow module

The arrow changes color and direction according to

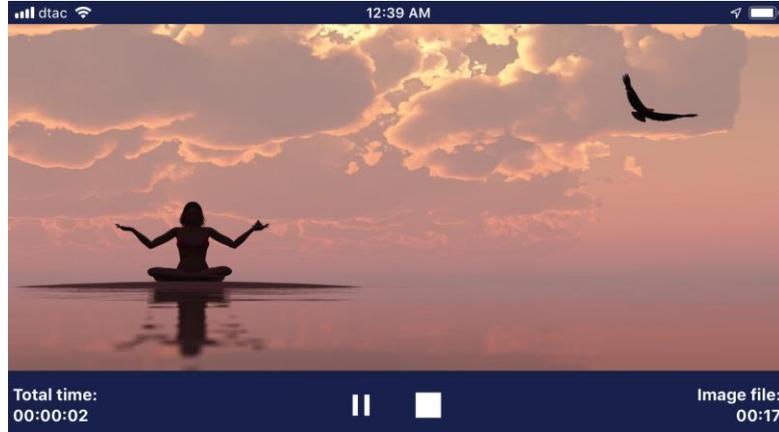
gives you direct biofeedback.

your relaxation, giving you direct biofeedback.



Bar graph module

The bar graph shows you the current value and gives you direct biofeedback.



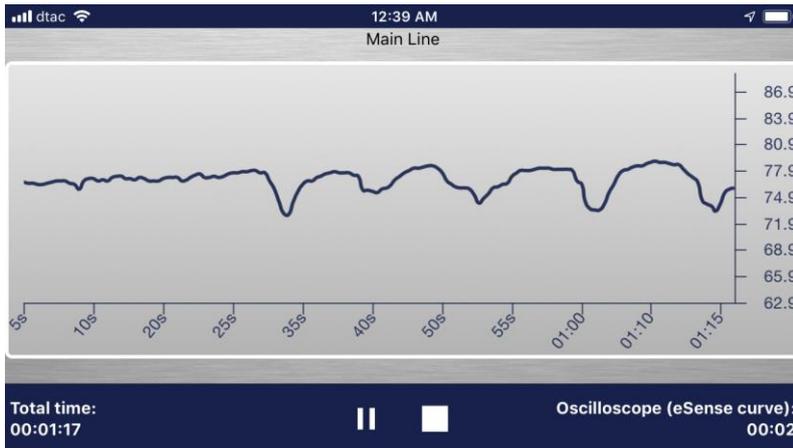
Picture module in landscape format

The procedures can, of course, also be displayed in landscape format.

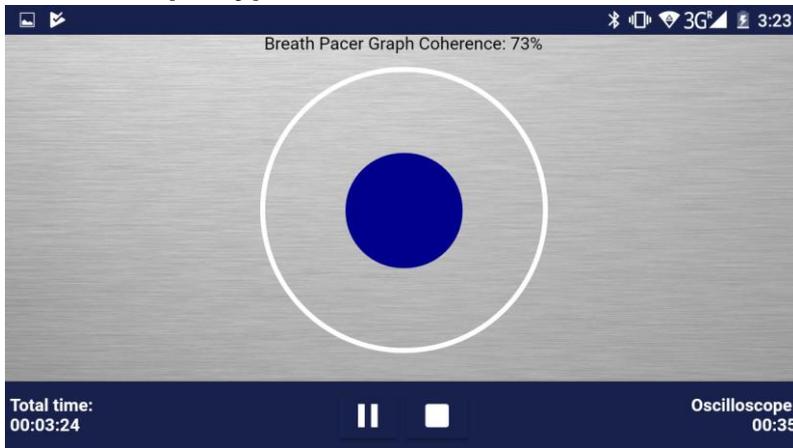


Breathing aid line (in landscape format)

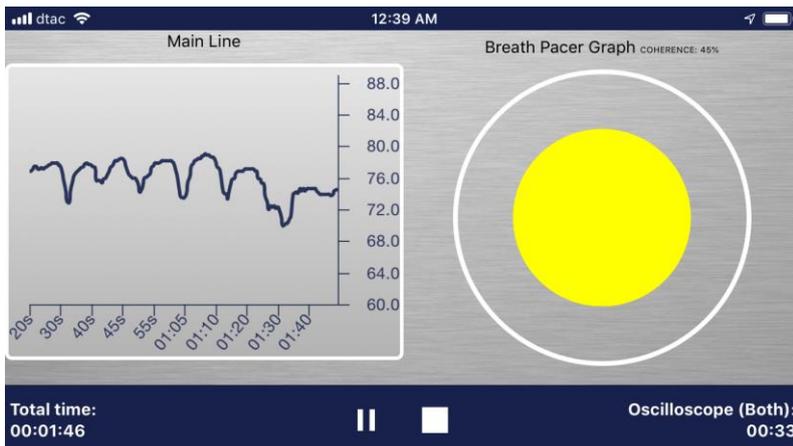
The breathing aid is displayed in landscape format by default.



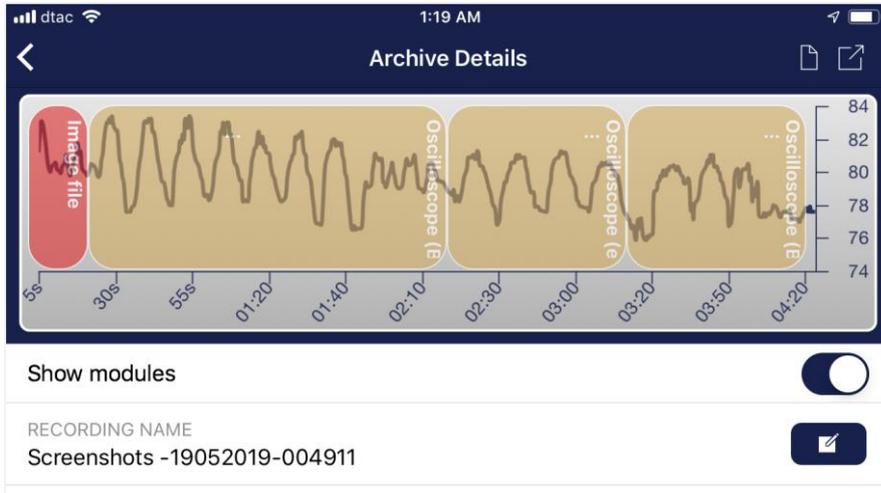
Oscilloscope Type HRV Curve



Oscilloscope Type Breathing curve (ball)



Oscilloscope Type Both



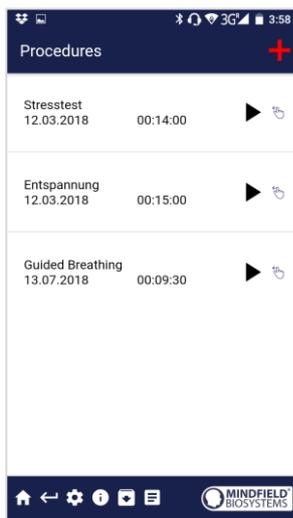
Procedure in the archive

Meditations

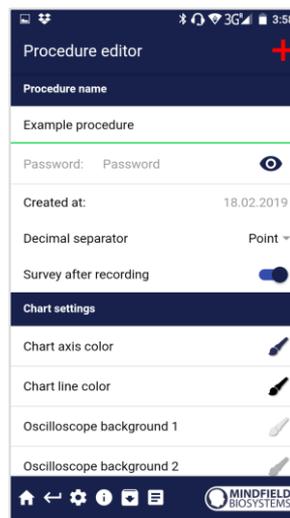
You can also choose one of our guided meditations as a procedure. The breathing meditation is already included in the eSense app. We will also offer four more meditations shortly as in-app purchases.

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

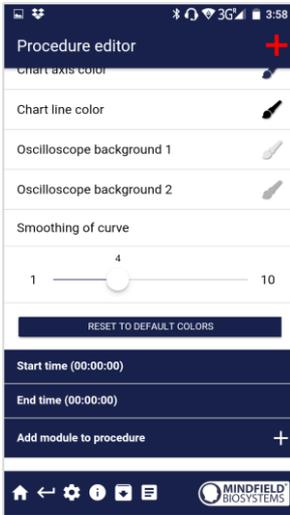
Creation of an example-procedure



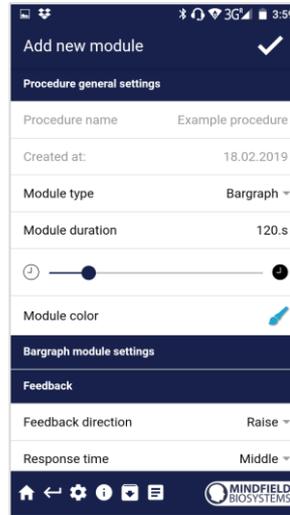
1) Tap on the plus icon in order to create a new procedure



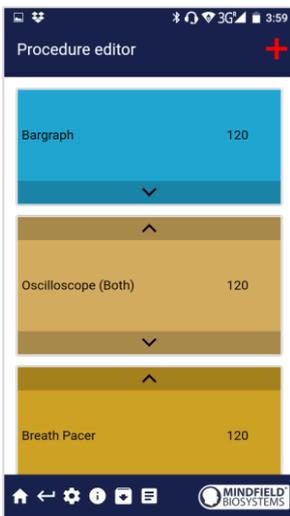
2) Give the procedure a name (here "Example procedure")



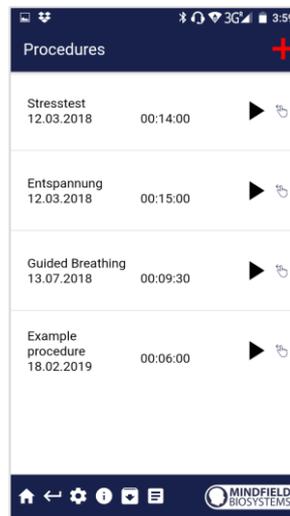
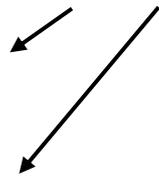
3) Scroll down and choose add module to procedure



4) When you are done with the settings of the module, tap on the check mark



5) Add an oscilloscope and breath pacer module



6) Start the procedure by tapping the play button



Supported Android devices

In general, Android smartphones and tablets can be used with Android 4.4 or later without any problems with the eSense.

A 3.5mm connector (standard headphones) is required for external headsets or microphones, as standard on most devices.

We recommend the [Amazon Fire 7](#) (from model 2017 on with model no: SR043KL) as a starter device for using the eSense.

Supported iOS devices

You can use the following iOS devices with the eSense:

- Apple® iPhone® 4S or higher
- Apple® iPad® from 3. Generation
- Apple® iPad® Pro (in combination with a [USB-C to 3.5mm headphone jack adapter](#))
- Apple® iPod touch® from 5. Generation
- Apple® iPhone® 7, iPhone® 7 Plus, iPhone® 8, iPhone® 8 Plus, iPhone® X, iPhone® XR and iPhone® XS (in combination with a [Lightning to 3.5mm headphone jack adapter](#))

Additional note iOS 7 and higher: The eSense works via the microphone input. Starting with iOS 7, you must explicitly allow the eSense App to use the microphone input, otherwise the eSense will not work. During installation you will be asked to allow the app to use the microphone; you must answer with "Yes" or "Allow". After installation, you can make this setting manually. Allow access to the microphone input in the system settings of your iOS device under Settings -> Privacy -> Microphone.

Additional information Siri: Please note that Siri must NOT be activated if you want to perform a measurement with the eSense (this applies to all eSense sensors). Otherwise, a running measurement can be disturbed, and your measured values falsified. You need to disable Siri SELBER (our app cannot do this automatically due to Apple's settings).

To disable Siri, go to Settings -> (General ->) Siri and disable Siri (the exact steps may vary depending on the iOS version).

New: Smart bulbs (optional)



Smart bulb in use with eSense Respiration

The eSense app supports biofeedback via smart bulbs. Smart light bulbs (LED) 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/esense-pulse-faq-de>

Magic Blue

You can buy the Magic Blue in our shop at <https://mindfield-shop.com/de/magic-blue-led-esense.html>

Philips 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>

Extension of the Cable of the eSense

If you'd like a longer cable between the eSense and your smartphone or tablet, you can extend the original eSense cable with a standard 4-pin 3.5mm jack headset extension cable. We've tested three cables for you:

2m cable: <http://amzn.to/2kil5bj>

0,5m cable: <http://amzn.to/2kEB8xo>

110cm cable: <http://amzn.to/2k7TBm8>

Troubleshooting Measuring Signal and Breathing Belt

1. If there are any problems using the eSense Respiration, please check the belt and spring. The harness should be positioned around your chest or abdomen in a tensioned position but should not be uncomfortably tight or squeezed. The spring is under the belt. You can also put your finger on the spring to see whether it responds and leads to a deflection of the curve during a running measurement.
2. Check the connection between the eSense Skin Response and eSense Respiration housings to make sure the snap fasteners are properly attached and that the other end is plugged into the microphone input.
3. Should the spring break or otherwise deteriorate in quality, a replacement spring is included. To change the spring, slightly bend it upwards with your finger, then pull it out to the front. The new spring is simply pushed back into the housing.

EC Declaration of Conformity for Mindfield eSense Respiration

according to the following guidelines:

Electromagnetic compatibility (EMC) (2004/108/EC)

RoHS substance bans (2011/65/EU)

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

The manufacturer / Distributor / Authorized representative

Mindfield Biosystems Ltd.
Hindenburgring 4
D-48599 Gronau
Germany

WEEE-Reg.-Nr. DE 24465971

hereby declares that the following product:

"Mindfield® eSense Respiration" in combination with the Mindfield® eSense Skin Response"

complies with the provisions of the Directives identified above, including their amendments in force at the time of the declaration.

The following harmonized standards have been applied:

DIN EN 60950-1 Information technology equipment - Safety - Part 1: General Requirements (2011-01)

DIN EN 55022 Information technology equipment - Radio disturbance characteristics (2008-05)

DIN EN 55024 Information technology equipment - Immunity characteristics (2011-09)

Place: Gronau, May 8, 2019

N. Rockensüß

www.mindfield.de
A Better State of Mind

The Mindfield eSense must be disposed of as electronic scrap in accordance with legal regulations.

WEEE-Reg.-Nr. DE 24465971

Niko Rockensüß, Managing Director

Privacy policy

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

Each recording of measurement data takes place under a general prefix such as "respiration", supplemented 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. This is up to the user whether they change this prefix to their name, for example. Then every measurement and every 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 as feedback. Only the media supplied with the app can be used.
2. Access the location: The access to the location (activation of GPS) is only required if a Bluetooth connection to the Magic Blue bulb (optionally available) or the eSense Respiration is to be established. This is mandatory under Android and is beyond the control of the publisher of the eSense app. No standard data is collected as the standard function is not used.
3. Access to Bluetooth: If the eSense App is used with the smart Magic Blue light bulb to display biofeedback by changing the color and brightness of the light bulb, the light bulb must be connected via Bluetooth within the app. The Bluetooth function is used for this purpose.

Transmission of Anonymous Usage Data and Crash Reports

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 data for advertising purposes. The transmission takes place anonymously and only with existing Internet connection.

Processed data

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

Special protective measures: IP masking, immediate deletion.

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

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

Processing in third countries: USA.

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

Deletion of data: Information about the device or the 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 for stress reduction. If you suffer from an illness, do not treat yourself and always consult a therapist.

Warranty by the manufacturer

The statutory warranty obligations apply to all our products. If you have a defect or any other problem with our products, please contact us directly. Our contact details can be found in the "Contact" section of this manual.

Contact

Manufacturer

Mindfield[®] Biosystems Ltd. · Hindenburgring 4 · D-48599 Gronau

Phone: + 49 (0)2565 406 27 27 · Fax: + 49 (0)2565 406 27 28 · E-Mail:
info@mindfield.de

If you have any questions, problems or if you have a warranty claim, please contact us by e-mail or visit our website for further information at: www.mindfield.de

Please do not send unsolicited or unfree parcels to us, as we will not accept them.

Your Notes
