



MANUAL

User Manual | Biofeedback-training | eSense-App | Finger Clip

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Contents

Contents	2
Delivery contents	3
Skin temperature in general.....	4
Skin temperature and biofeedback training	5
Process of a training.....	5
First stage (observe and experiment, determine your initial status)	6
Second stage (biofeedback training with the temperature feedback)	7
Third stage (transfer, relaxation without feedback).....	7
Fourth stage (deliberate provocation, relaxation and stress coping)	8
Functions of the free eSense Temperature App.....	9
General View.....	9
Set up of animation	11
Configuration of auditory feedback.....	13
Export and forward of measured values.....	14
Important note regarding iOS	14
Functions of the eSense Universal App.....	15
General view	15
Settings (Overview)	16
Tone Feedback	18
Tactile Feedback.....	19
New: Procedures.....	19
Overview of the modules.....	22
Export and forward of measured values.....	23

Supported devices; Android..... 25

Supported devices iOS 25

Options for fixation of sensor 27

 Holding 27

 Leukosilk (medical tape)..... 27

 Finger Clip 28

Extending the cord of the eSense..... 28

EC Declaration of Conformity for the Mindfield eSense..... 29

Contact 30

Your Notes..... 30

Delivery contents

Mindfield® eSense Temperature Sensor

1 Velcro electrodes

Free App from Mindfield (from the App Store or Google Play)

Detailed instruction for efficient biofeedback training



Skin temperature in general

The temperature at the surface of the skin changes according to blood circulation through body tissue. The small blood vessels (arterioles) crossing through the tissue are surrounded by fibers of smooth muscle, which are controlled by the sympathetic nervous system.

In a state of increased exertion, excitement and stress, these muscle fibers contract, causing a stenosis of vasculature. This leads to a reduction of skin temperature, since blood circulation through the tissue is reduced. In contrast, in a state of relaxation, the musculature is also bound to relax, causing the vasculature to expand. Hence, the skin temperature rises.

Mental stress often leads to a lower peripheral perfusion and a decrease of skin temperature at the hands, caused by increased activity of the sympathetic nervous system. From an evolutionary point of view, this stress reaction serves to prepare us for “fight or flight” in a physically threatening environment, because the maximum amount of blood is concentrated in the working muscles.

We usually know those situations from our own lives as well. Think for example of a speech that you gave in front of an audience or a job interview. If in those situations you were excited, can you remember the cold (and sweaty) hands?

This physiological stress reaction can be useless or harmful in many contexts in modern society (e. g. mental exertion, worries, psychosocial stress, anxiety disorder). A conscious control of physiological stress can help you to react in a more relaxed and efficient manner to many situations. Biofeedback is an established way to learn this kind of control!

Skin temperature and biofeedback training

Biofeedback with skin temperature is mainly applied in relaxation exercises. It's easy to handle, and easy to learn. Experience with this technique shows a high rate of success and improvement of subjective well-being. If you suffer from a serious disorder or medical condition, always consult a professional physician or therapist, and do not attempt a treatment on your own. Biofeedback training is not an officially recognized medical procedure. Hence the eSense Temperature is not a medical device and may only be used for stress reduction training.

A particularly easy and effective biofeedback method is hand warming training. It works with the eSense Temperature sensor attached to a finger, or simply held between thumb and index. You will learn through direct feedback to intentionally raise the temperature of your fingers, thus increasing perfusion in your hands.

The biological temperature sensors in our hands give us only a coarse impression of our skin temperature. The real-time feedback of the eSense Sensor will give you way more exact information on the perfusion and temperature of your hands, enabling you to learn conscious control of these parameters and your relaxed well-being.

The goal of the hand warming training is to get a feeling for the own skin temperature and hence to get a direct control over the blood circulation in the outer limbs. A biofeedback training consists of 4 training stages. For the first training, schedule about 60 to 90 minutes of free time in which you can conduct the training undisturbed and at a stretch. Hereafter you find an example sequence of a stress relief training.

Process of a training

1. A quiet, comfortably tempered room without phones and other sources of distraction, and convenient seating and clothing are the conditions we need for successful training. As skin temperature depends also on ambient temperature, you should try to perform each training session under similar ambient conditions.
2. Use the accompanying tape (or a fabric tape of your choice) to attach the temperature sensor to your index or middle finger. Plastic tape works as well, although it's less comfortable because it's airtight and can make your fingers perspire.



3. You should get accustomed to the ambient temperature for at least 5 minutes, letting the training start while your body is in a steady state. This phase of acclimatization can already raise your hand temperature by several degrees.

First stage (observe and experiment, determine your initial status)

1. In comparison with other biofeedback techniques, you will need fewer sessions for a reliable success. 6-10 sessions should be sufficient. In order to keep focused throughout the entire session you should limit session length to about 15 minutes. If you start feeling tired while training, you should shorten your sessions and practice more often instead.
2. You should record your baseline state for 2-3 minutes at the beginning of each session, letting the sensor temperature adapt to your finger. Sitting upright and comfortable, do not watch the temperature but simply let the device measure. Sensor temperature will become relatively stable, and the training itself can begin.
3. In your first session, take 10 minutes to relax consciously as best as you can without watching the temperature feedback. This part is about determining whether simple relaxation without feedback can raise your skin temperature.
4. Take a look at the measurements. Did conscious relaxation already raise the temperature? No matter if it happened or not, get accustomed to the feedback function of the application now. Watch the temperature feedback and see if you can exert conscious influence on it! This exercise marks the end of the first stage. Keep in mind that your daily condition can affect the measurement.

You can send the measured values to your email address using the respective function of the application.

Second stage (biofeedback training with the temperature feedback)

1. Before embarking upon the next session, try to be aware of your hand's temperature during everyday activities. Do your hands feel particularly warm or particularly cold in certain situations? These observations can be very helpful for the exercises to come.
2. The second stage consists of multiple sessions. These sessions should always follow the following scheme. Start every session with a 2-3 minute baseline measurement without watching the values in order to reach a steady state.
3. Now you can start to train conscious relaxation, using the feedback signal. Watch the temperature values while relaxing and try to find ways to bring them up. It can be helpful to imagine yourself lying in the sun, relaxing in a sauna, or putting your hands into warm water. You can also work with autosuggestion techniques, telling yourself sentences like "My left hand feels warm...it feels even warmer now...". Feel free to experiment.

As with every activity, regular practice is the key to success. You should be able to raise your skin temperature by several degrees, unless your baseline is already at 33-34 °C / 91-93 °F. The colder your hands are in the first place, the more potential you have to raise their temperature. In principle, you can achieve more than 36 °C / 97 °F in your hands, a temperature normally reserved to your body core.

Third stage (transfer, relaxation without feedback)

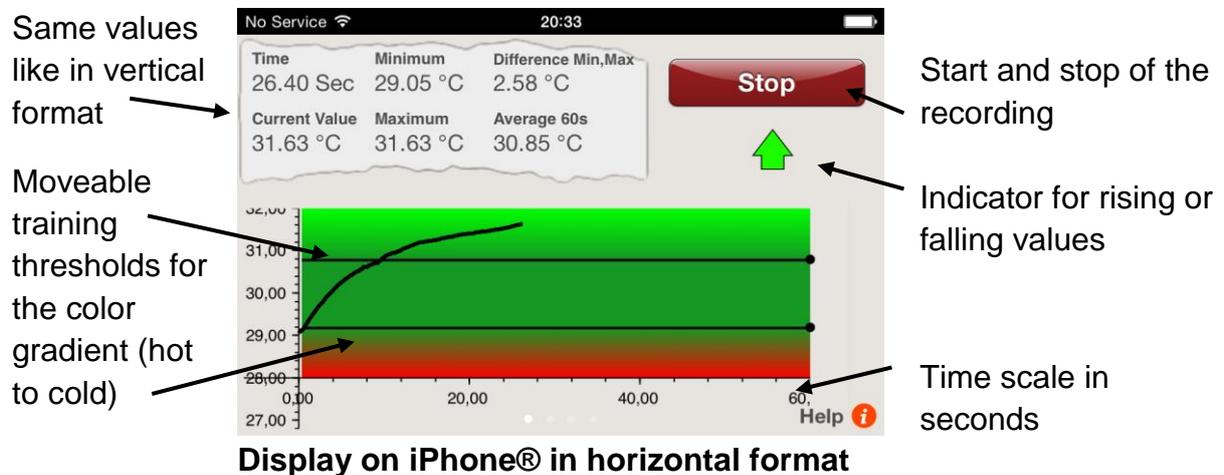
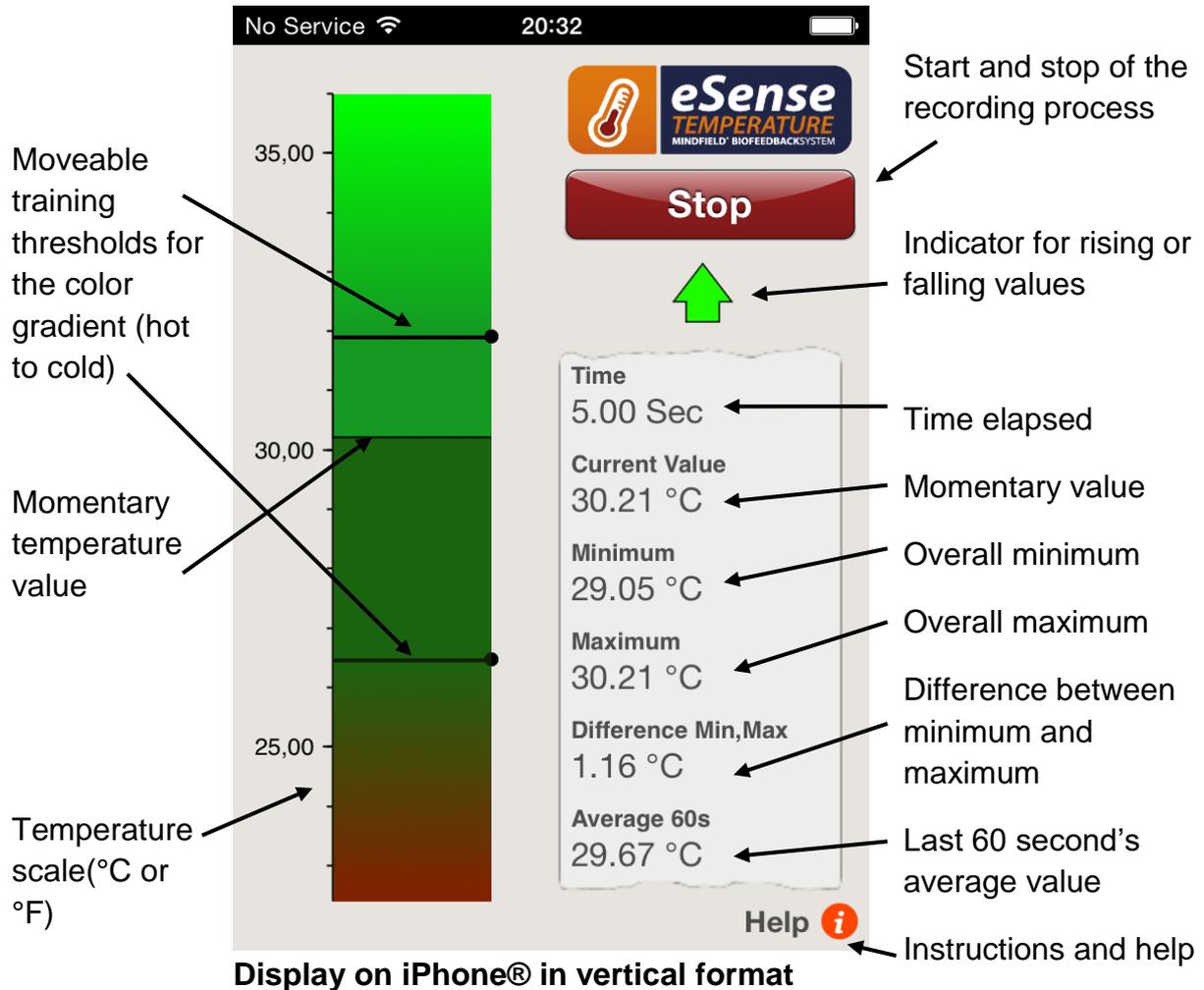
1. Now you can check if a state of deepened relaxation, and the corresponding rise in skin temperature, can already be achieved without feedback. After measuring the baseline as usual, you should alternate between watching and not watching the feedback, two minutes each way. The longer and more often you can keep the temperature up without the feedback, the better your self-control has already become.
2. Perform multiple sessions in third stage. When you can keep you skin temperature up for a prolonged time and mainly without feedback, you have successfully completed this stage.

Fourth stage (deliberate provocation, relaxation and stress coping)

1. Finally, you should check if you have acquired improved stress resilience. Start a session with the baseline as usual, then keep your skin temperature on elevated levels (well above 30°C / 86°F) for a couple of minutes.
2. Try to bring yourself into a strenuous situation. You can recall previously memorized everyday situations in which you tend to have cold hands, or situations that have caused tension and anger. You can also move to a stressful environment, or ask another person to exert a stressful stimulus upon you. Keep the stress situation short and do not overload your ability to cope with it.
3. If you can sustain elevated levels of skin temperature during strenuous situations, ideally at levels above your personal maximum in the first stage, you have learned to remain relaxed and calm even in difficult and stressful situations. You have fully reached the goal of hand warming training!

Functions of the free eSense Temperature App

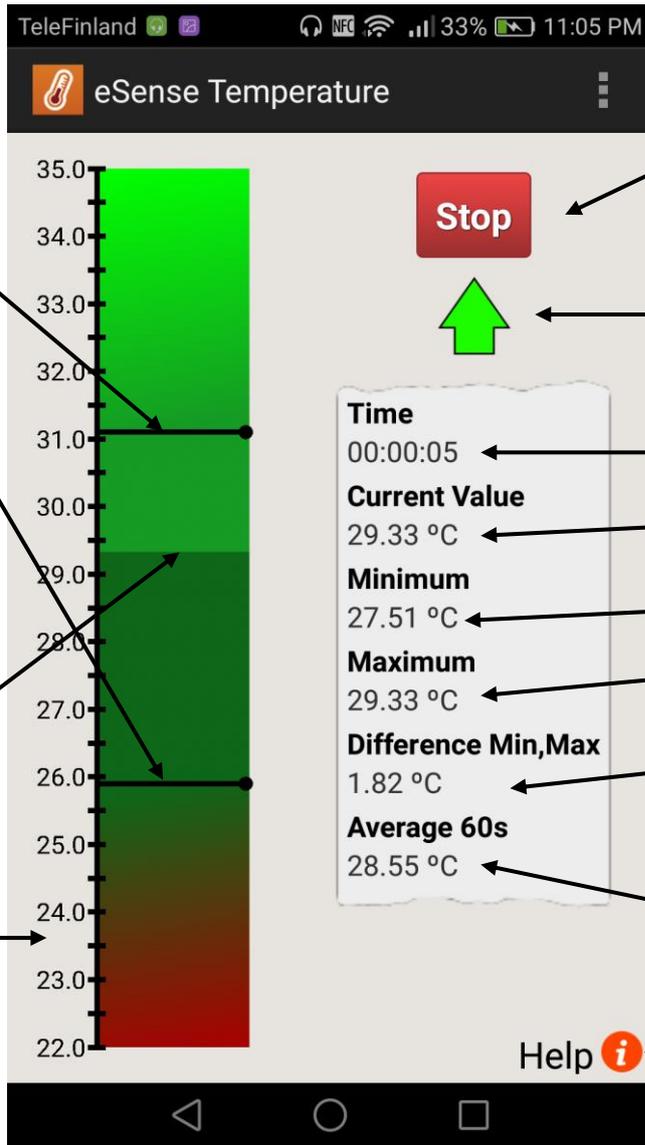
General View



Moveable training thresholds for the color gradient (hot to cold)

Momentary temperature value

Temperature scale (°C or °F)



Start and stop of the recording process

Indicator for rising or falling values

Time elapsed

Momentary value

Overall minimum

Overall maximum

Difference between minimum and maximum

Last 60 second's average value

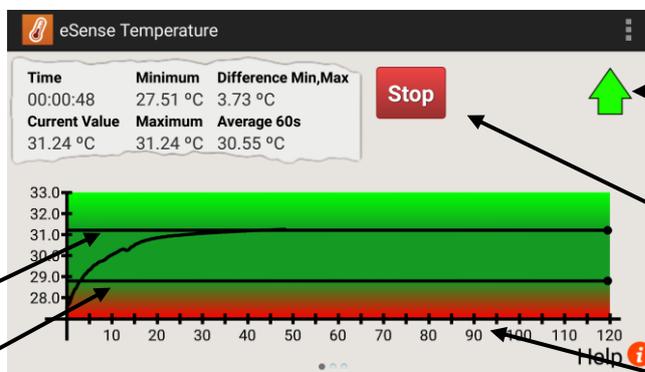
Help

Instructions and help

Display on Android™ in vertical format

Same values like in vertical format

Moveable training thresholds for the color gradient (hot to cold)



Indicator for rising or falling values

Start and stop of the recording

Time scale in seconds

Display on Android™ in horizontal format

Set up of animation



Display on iPhone®

Sweep your finger over the display to change between the horizontal format and the animation.

Double tap on the animation to maximize it.

Move two fingers together (“pinch”) to shrink the animation to original size!

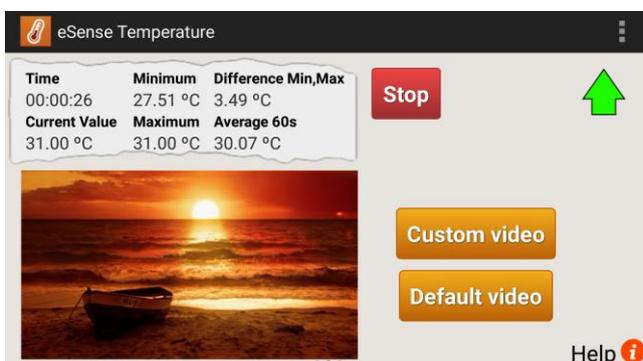
Rising temperatures keep the animation going, while falling temperatures stop it.



Display on iPhone®

You want to raise your skin temperature, so keep the animation going!

Tap on Custom Video to choose your own video, an on Default Video to return to the standard video!



Display on Android™

When using iOS, your custom video must be in the "Camera Roll."

Here's how you add a video to it:

1. Send the video to yourself in an e-mail.
2. Open the e-mail in the Mail app.
3. Download the video.
4. Click and hold the video and select "Save to Camera Roll."
5. Now you can select the video from within the eSense app.

A list of supported video formats for iOS can be found here:

<http://www.apple.com/de/iphone/specs.html>

When using Android, your video must be in the "Gallery."

Here's how you add a video:

1. Send the video to yourself in an e-mail.
2. Open the e-mail in the Mail app.
3. The video will be shown as an attachment. Click the dots on the right edge of the attachment and select "save."
4. The video is now in the Gallery and can be loaded by eSense.

As an alternative, you can use Dropbox:

1. Move the video into your Dropbox.
2. Select the video from the Dropbox and export it onto the SD card in the "Movies" folder (in the Gallery).

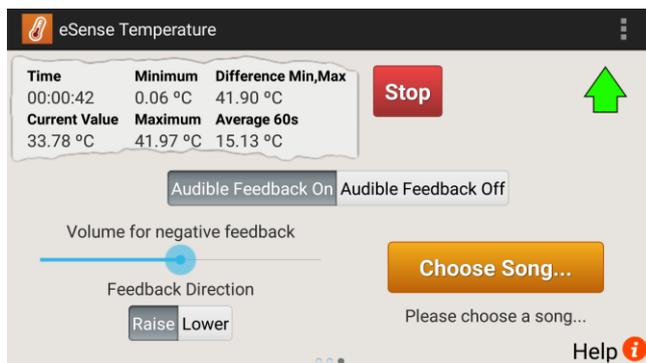
A list of supported video formats for Android can be found here:

<http://developer.android.com/guide/appendix/media-formats.html>

Configuration of auditory feedback



Display on iPhone®



Display on Android™



Display on iPhone®

Audible Feedback on/off

You can always hear sounds from other Apps in the background.

Volume for negative Feedback

When values move in the wrong direction, the sound becomes quieter:

0% = mute

100% = undiminished volume

Feedback Direction

Decide if rising (“raise”) or falling (“lower”) values should count as success for the feedback.

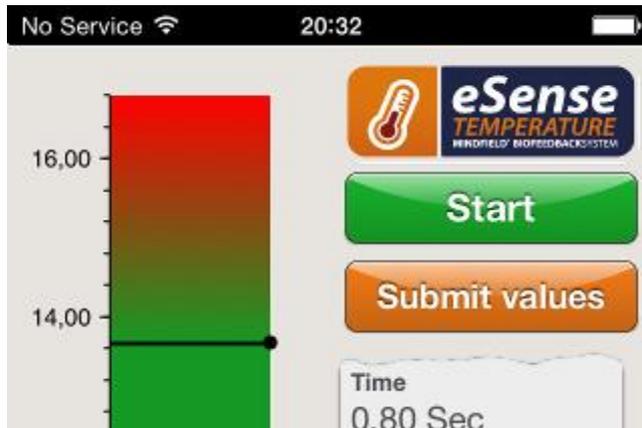
Choose Song

Please choose any Audio file.

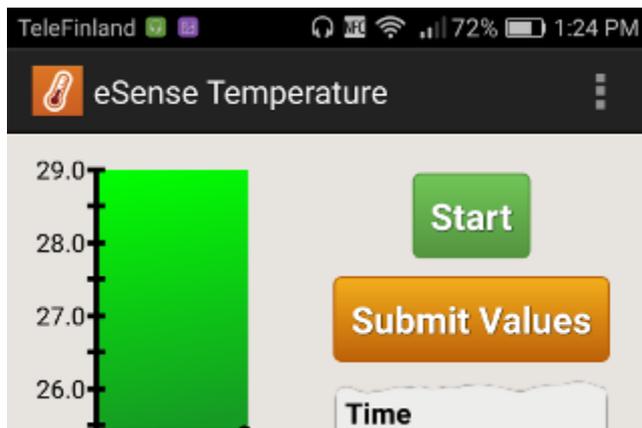
Feedback Response Time

Adjust how sensitive and quick the feedback will react to a changing direction (rising or falling) of the values.

Export and forward of measured values



Display on iPhone®



Display on Android™

After stopping a recording, you can transfer the measured values via e-mail (in iOS, you need an email account for this function).

5 values per second are saved to a CSV file where every line indicates one value, so 5 lines correspond to one second of measurement.

Click on “Submit values” to send a CSV (comma separated value) file to your personal or any other email.

The file can be processed in Microsoft Excel™ or Open Office.

Important note regarding iOS

The free eSense iOS app is not supported by iOS 11 anymore. Please use the new universal app instead under iOS 11.

Functions of the eSense Universal App

The eSense Universal App supplements both the free eSense Apps with additional functions. The settings are all combined in one menu. The Mindfield eSense Universal App is available in the Google Play Store (Android) for 1.99 Euro or in the Apple App Store (iOS) for free.

Beside the improved design and usability is the tone feedback and tactile feedback. Those give you more choices regarding the feedback. Therefore you can adjust your biofeedback-training individual to your wishes.

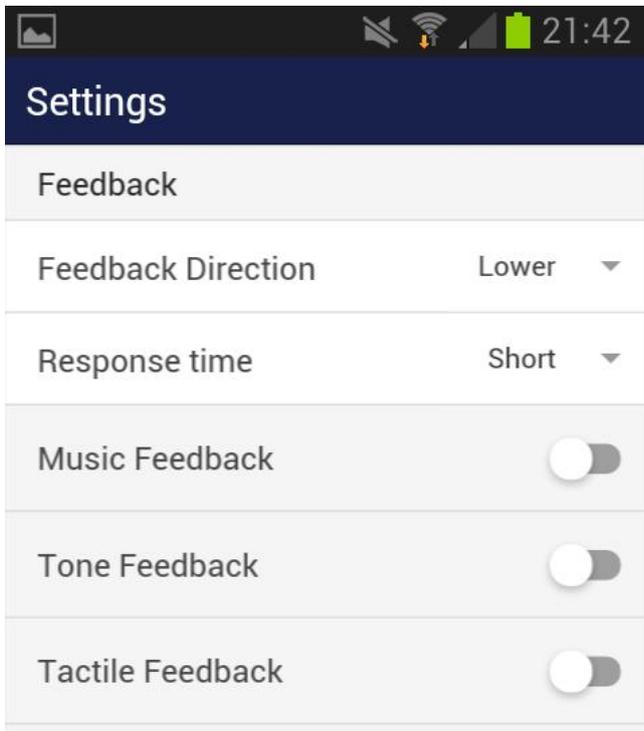
General view

The screenshot shows the app's main interface with the following labeled components:

- Time elapsed:** 00:05 (TIME (MINUTES))
- Momentary value:** 31.9°C (CURRENT VALUE)
- Overall maximum:** 31.9°C (MAXIMUM)
- Overall minimum:** 30.1°C (MINIMUM)
- Difference between minimum and maximum:** 1.80°C (DIFFERENCE MIN/MAX)
- Indicator for rising or falling values:** A green box with a green upward arrow.
- Scale for skin conductance (µS):** A vertical scale on the right with values from 27.00 to 33.00.
- Momentary value:** A white bar on the scale indicating the current value at 31.90.
- Zoom for conductance scale:** A vertical slider in the center used to adjust the scale.
- Start and stop of the recording process:** A large orange button labeled "STOP" at the bottom.
- Settings:** Represented by a gear icon in the bottom navigation bar.
- Instructions / Help:** Represented by an information icon in the bottom navigation bar.
- Procedures:** Represented by a downward arrow icon in the bottom navigation bar.
- Archive:** Represented by a clipboard icon in the bottom navigation bar.



Settings (Overview)



Feedback Direction

Decide if rising (“raise”) or falling (“lower”) values should count as success for the feedback.

Responsive time

Adjust how sensitive and quick the feedback will react to a changing direction (rising or falling) of the values.

Music Feedback

Volume for negative Feedback: When values move in the wrong direction, the sound becomes more quiet.

Tone Feedback

You can always hear sounds from other Apps in the background.

Tactile Feedback

Your device will vibrate as feedback.

Song

Default ▶

Choose song

Default song

Video



Select Burning Wood ▼

Select Burning Wood ▼

General

Decimal separator Comma ▼

Time length X-Axis 90s ▼

Sample Rate (CSV Export) 1Hz ▼

←
⚙️
ℹ️
↓


Choose Song

Choose any Audio file.

Video

Select: In the Dropdown Menu, you can choose also "Custom". You can choose your own videos from the hard drive of your device.

Decimal separator

You can choose between point or comma.

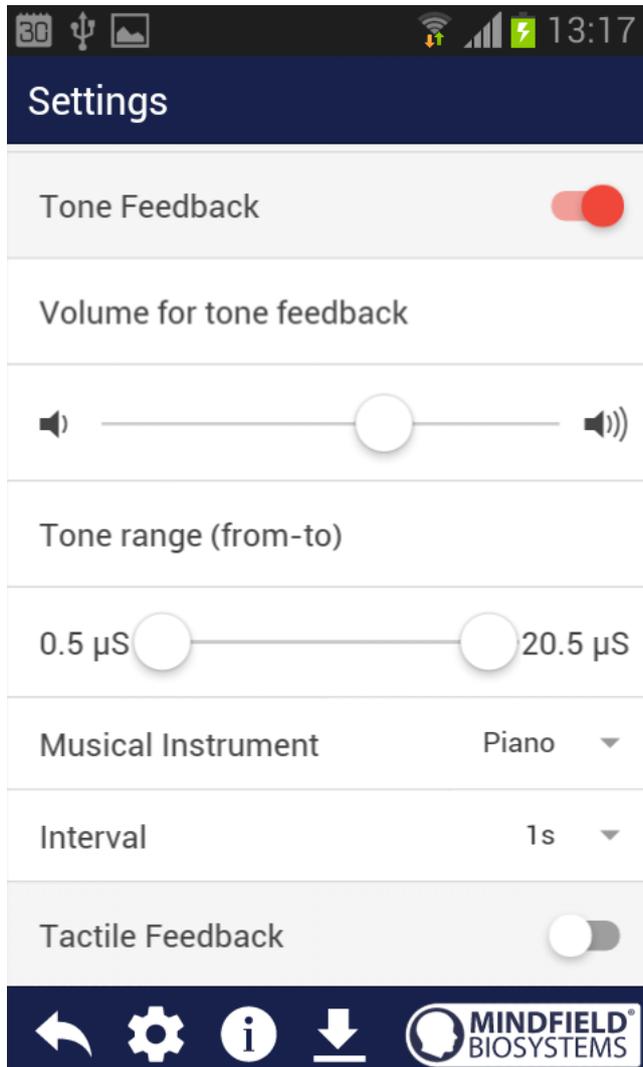
Time length X-Axis

You can set the time frame which is shown on the graph while measuring.

Sample Rate (CSV Export)

This determines how many values per Second are recorded. More values (a higher value of Hz) creates more detailed data, but also increases the size of the download-file.

Tone Feedback



Tone Feedback

A new function of the Mindfield Universal App.

Volume for tone feedback

Set the volume for the tone feedback.

Tone range (from-to)

You can set the range in which the tone feedback will be active. We suggest to choose a wide range in the beginning and reduce it later if necessary

Musical instrument

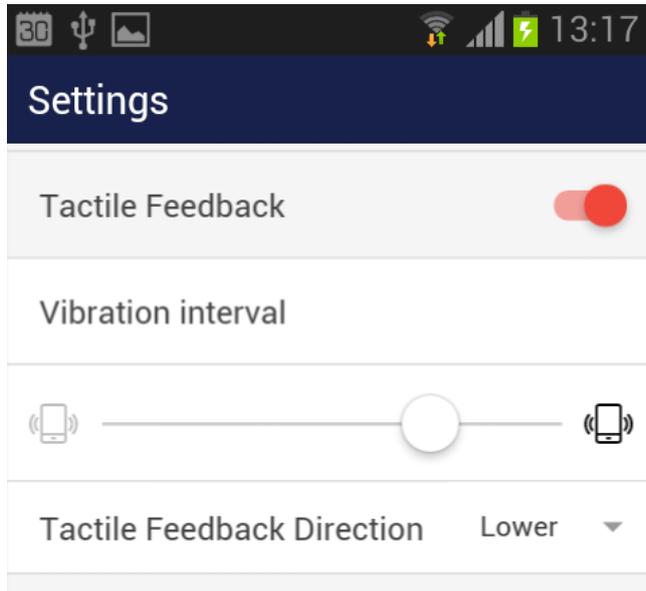
You can choose from several pre-installed instruments.

Just for Android: You can also choose your own tones. Choose "custom tone" (just visible in Android). You need to put suitable MP3-files into the folder "eSense tone files" which is located in the root of Android.

Interval

Set an interval for the tone feedback. You can choose different values between 1 and 20 seconds.

Tactile Feedback



Tactile Feedback

Another new function of the Mindfield Universal App. Your device can vibrate in order to give you direct feedback about your training.

Vibration interval

Set how long your device will vibrate as feedback.

Tactile Feedback Direction

Decide if rising (“raise”) or falling (“lower”) values should count as success for the feedback.

New: Procedures

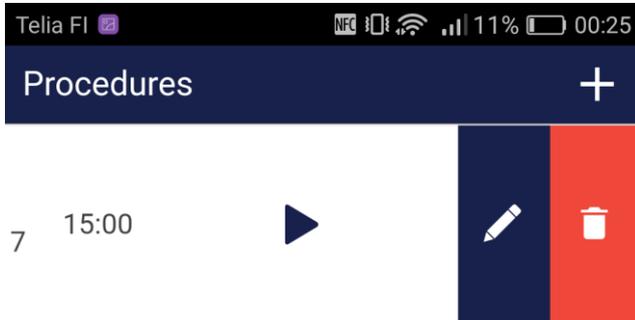
A Procedure consists of several assembled modules. With this new feature, you can build the perfect individual relaxation guide, a stress test, pre-defined biofeedback training or use it for research.

There are many possibilities. During a procedure, your skin response, respectively or temperature (depending on the eSense sensor you have) will be recorded and afterwards you see your results for each module and in total.



Summary measured values

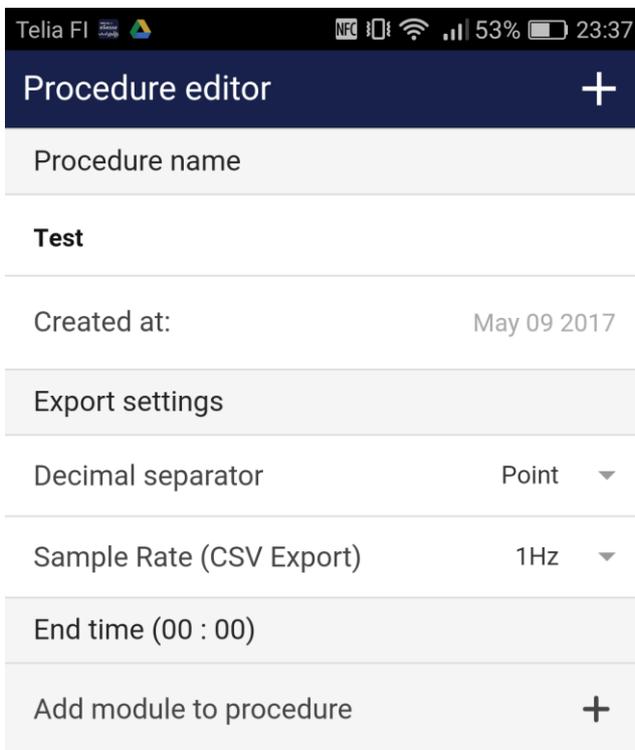
We suggest you to test the demo-procedures which are included in the app. Those will give you a guided overview over the different modules and functions of the procedures.



Edit or delete procedure

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

You then see the blue pen-symbol to edit the module.



Procedure editor

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.

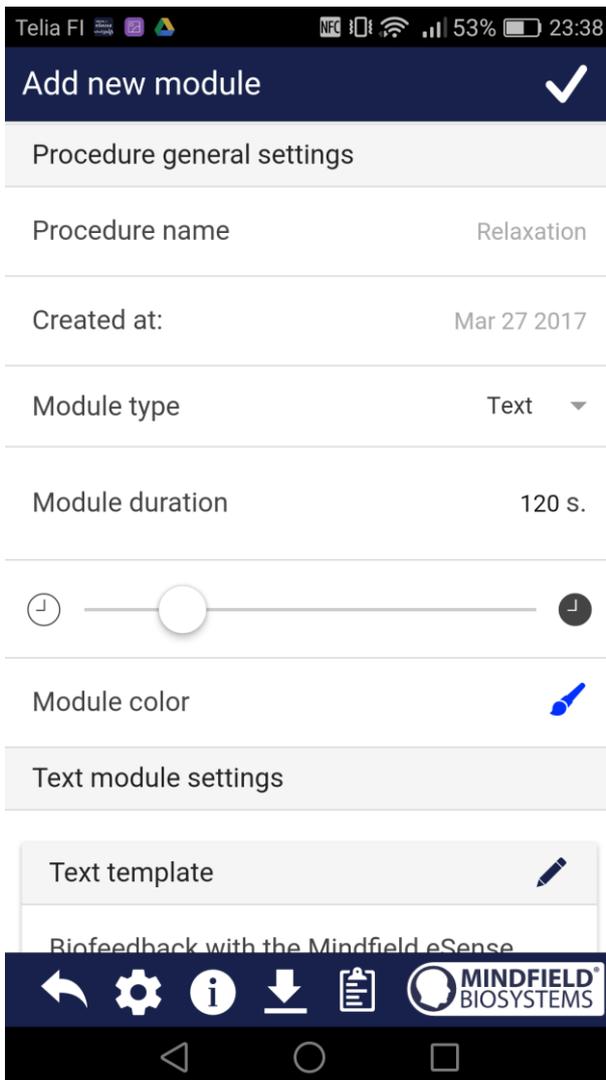
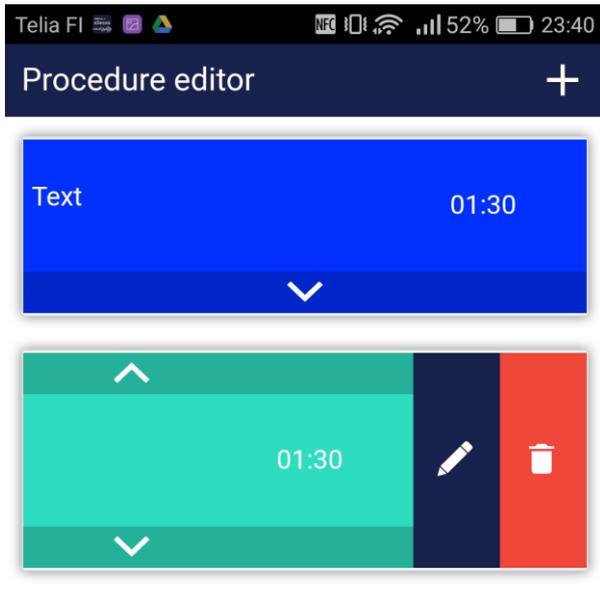
Sample Rate (CSV Export)

This determines how many values per Second are recorded. More values (a higher value of Hz) creates more detailed data, but also increases the size of the download-file.

Add Module to procedure

Start to add modules to your procedure by pushing the + -sign!





Procedure editor with modules

You can change the order of the single modules by the arrows.

To edit a single module, simply swipe it to the left as well. (as shown here with the lower module).

The color of the modules in this overview is determined by your settings in the module editor.

Module overview and settings

The single modules can of course be edited as well.

Module Type

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

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.



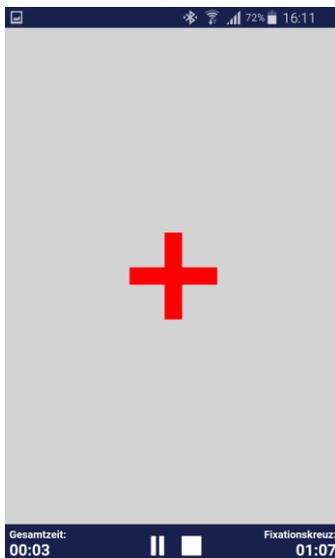
Picture module

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.



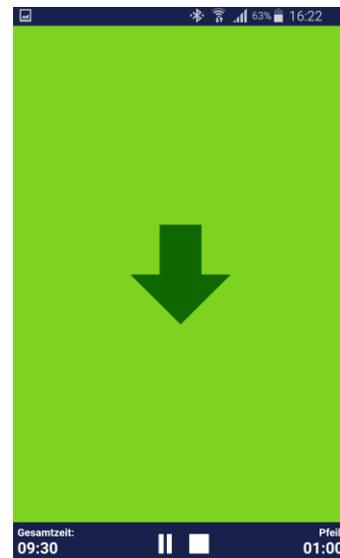
Fixation cross module

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



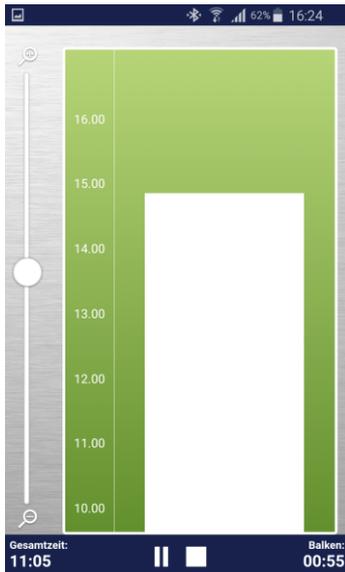
Audio module

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



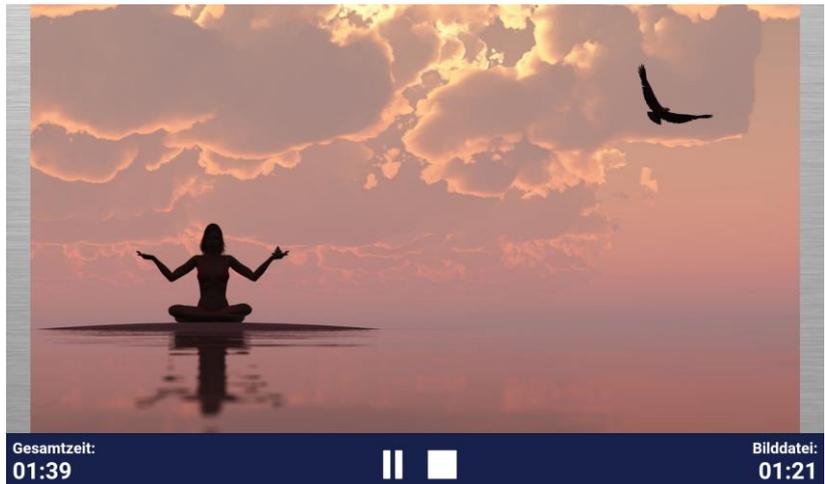
Arrow module

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



Bar graph module

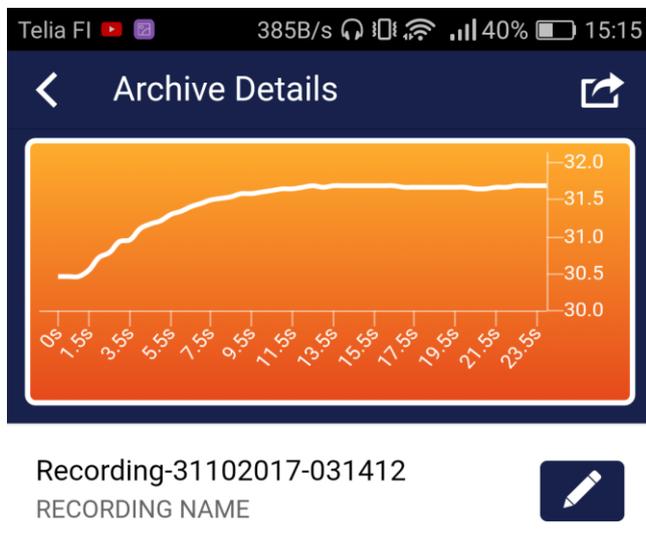
The bar graph shows you your current value and gives you direct biofeedback.



Picture module in landscape format

The procedures can be displayed also in landscape format.

Export and forward of measured values

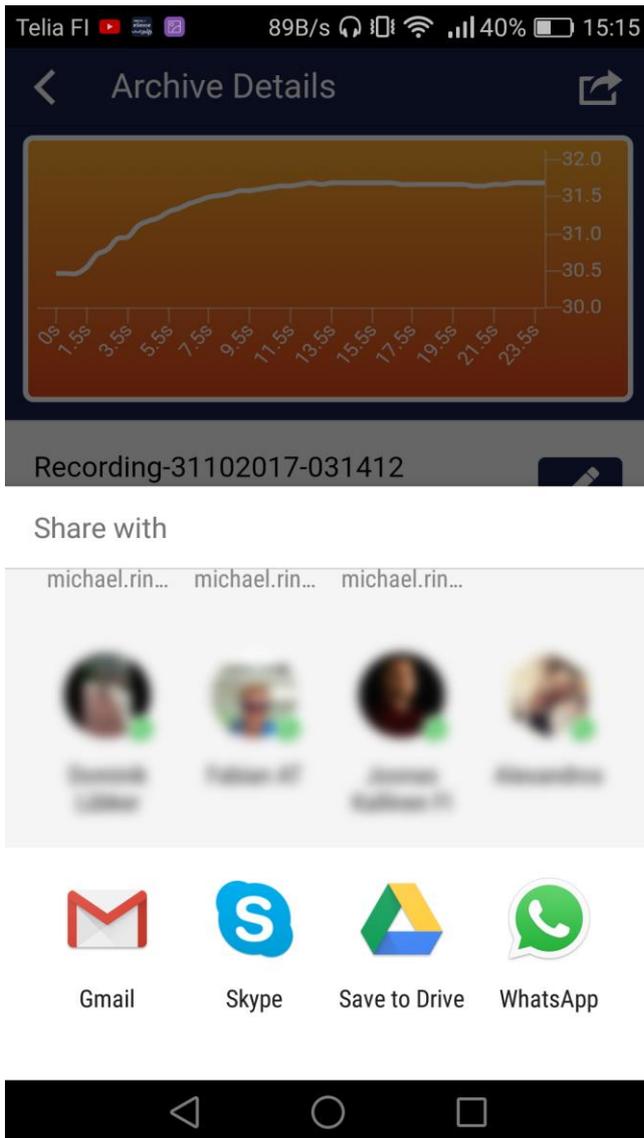


Overview archive

Archive Overview

The Mindfield Universal App contains also an archive, in which you can save your measurements and export them as well.

If you click on the export symbol on the top right, you can export the measurements as a .csv-file with all common apps (f.i. send over the Messenger, WhatsApp, email etc.) or simply save them on your device or in your cloud.

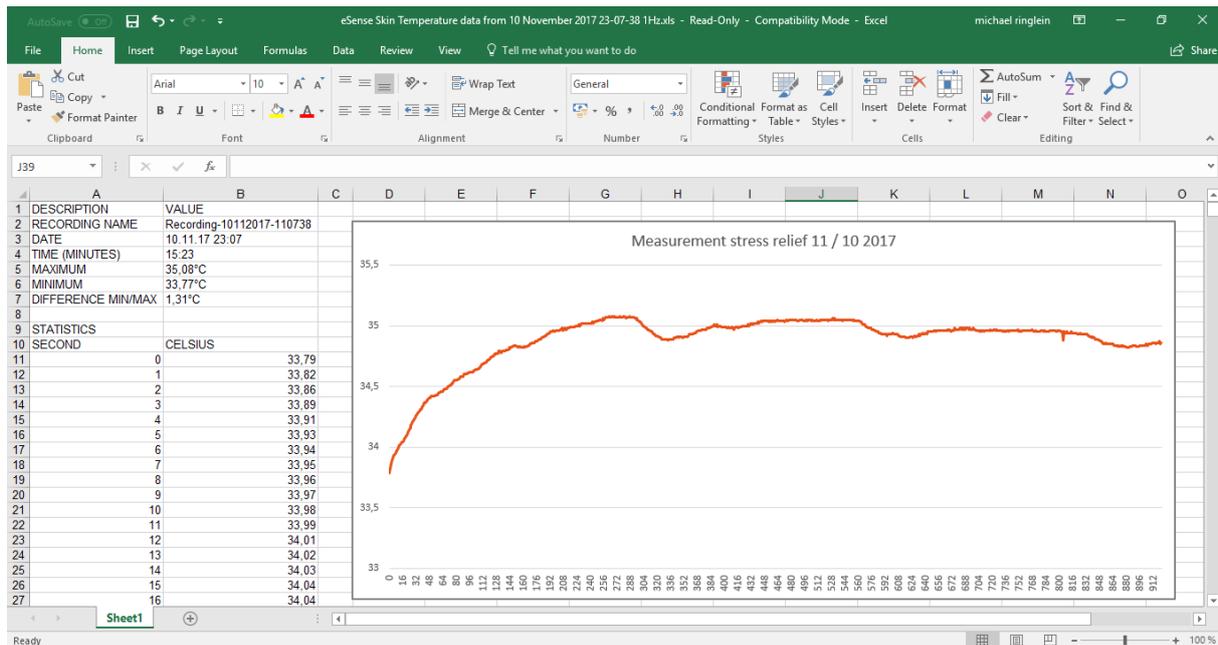


Export of the measured values

The data are exported as .csv-file (comma separated values). This format can be opened f.i. with Microsoft Excel or Open Office Calc (for free).

Notice: It might happen that if you open the .csv-file with Microsoft Excel, your values are automatically formatted (f.i. as date). If this is the case, we suggest to open the .csv-file with Open Office (choose the Semicolon as separated by), save it as .xls-file and open this .xls-file again with Excel.

If you want to change the separator for the hundreds or thousands (f.i. from 1.000,00 to 1,000.00 or vice versa), then you can do this at File –> Options –> Advanced –> Editing options and clear the “Use system separators” check box.



Exported Data in Excel

Supported devices; Android

In general, Android smart phones and tablets from Android 4.0 can be used with the eSense without complications.

Your Android device requires a 3.5mm jack (headphone jack) for external microphones which is built-in into most devices by default.

We suggest the [Amazon Fire 7](#) as an affordable tablet to use with the eSense.

Supported devices iOS

The following iOS devices can be used with the eSense:

Apple® iPhone® from 4S

Apple® iPad® from 2nd Generation

Apple® iPod touch® from 5th Generation

Apple® iPhone 7 and iPhone 7 Plus (in combination with the included Lightning to 3.5 mm Headphone Jack Adapter)

Additional note iOS 7 (or higher): The eSense works through the microphone port. From iOS 7 or higher you have to allow explicitly that the eSense app may use the

microphone port, otherwise it will not work. You are asked for this during installation, please answer with “Yes” or “Allow”. After installation you can make this setting manually: Allow the eSense app to use the microphone port in the system settings of your iOS device: Settings -> Privacy -> Microphone.

Options for fixation of sensor

You can simply hold the sensor, fixate it with a Leukosilk (medical tape) or use our Finger clip.

Holding



Holding between index finger and thumb

No additional equipment necessary

Leukosilk (medical tape)



Mounting on a finger or the palm

Fixation with Leukosilk

More comfortable

Finger Clip



No sticking

No heat accumulation

Best fixation of temperature sensor

Our recommendation

You can order the Finger Clip here:

<https://mindfield-shop.com/innovative-finger-clip-for-temperature-sensor.html>

Extending the cord of the eSense

If you wish to use a longer cord between the eSense and your smart phone or tablet, you can extend the original cord of the eSense with a common, 4-pin, 3.5mm jack headset extension cord. We have tested 3 cords that have worked well:

2m cord: <http://amzn.to/2kJwgBM>

0,5m cord: <http://amzn.to/2kKEONs>

110cm cord: <http://amzn.to/2jJg1LZ>

All three suggested cords cost between £ 6-8 and are available f.i. from Amazon. Alternatively you should be able to use other 4-pin cords as well.

EC Declaration of Conformity for the Mindfield eSense

in accordance with the following directive(s):

The Electromagnetic Compatibility Directive (EMC) (2004/108/EG)
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 Bio-systems Ltd.
Hindenburggring 4
D-48599 Gronau
Germany

WEEE-Reg.-Nr. DE 24465971

hereby declares that the following product:

“Mindfield® eSense”

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 (2011-01)

DIN EN 55022 Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement (2008-05)

DIN EN 55024 Information technology equipment - Immunity characteristics - Limits and methods of measurement (2011-09)

Place: Berlin

Date: 12th of April, 2016



Niko Hübner-Kosney, Managing Director



The Mindfield eSense have to be recycled as electrical waste according to the legal requirements.

WEEE-Reg.-Nr. DE 24465971

